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A Psychiatric Screening Aid for Pre-combat Troops. *Mankey, O. B., and Zisson, M. M.*. 377

The Genetic Theory of Schizophrenia.

1. The methods available for genetic investigations in man are the pedigree or family history method, the contingency method of statistical prediction, and the twin study method.

2. A study of the relative effects of hereditary and environmental factors in the development and outcome of schizophrenia was undertaken by means of the "Twin Family Method." The study was organized with the co-operation of all mental hospitals under the supervision of the New York State Department of Mental Hygiene. The total number of schizophrenic twin index cases, whose co-twins were available for examination at the age of fifteen years, was 794.

3. In addition to 1,382 twins, the 691 twin index families used for statistical analysis include 2,741 full siblings, 134 half-siblings, 74 step-siblings, 1,191 parents, and 254 marriage partners of twin patients. The random sampling of these twin index pairs is indicated by the distribution of 174 monozygotic and 517 dizygotic pairs, yielding a ratio of about 1 : 3.

4. The morbidity rates obtained with the "Abridged Weinberg Method " are in line with the genetic theory of schizophrenia. They amount to 1·8 per cent. for the step-siblings, 2·1 per cent. for the marriage partners, 7·0 per cent. for the half-siblings, 9·2 per cent. for the parents, 14·3 per cent. for the full siblings, 14·7 per cent. for the dizygotic co-twins, and 85·8 per cent. for the monozygotic co-twins. This morbidity distribution indicates that the chance of developing schizophrenia in comparable environments increases in proportion to the degree of blood relationship to a schizophrenic index case.

5. The differences in morbidity among the various sibship groups of the index families cannot be explained by a simple correlation between closeness of blood relationship and increasing similarity in environment. The morbidity rates for opposite-sexed and same-sexed two-egg twin partners vary only from 10·3 to 17·6 per cent., and those for non-separated and separated one-egg twin partners from 77·6 to 91·5 per cent. The difference in morbidity between dizygotic and monozygotic co-twins approximates the ratio of 1 : 6. An analysis of common environmental factors before and after birth excludes the possibility of explaining this difference on non-genetic grounds.

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6. The difference between dizygotic and monozygotic co-twins increases to a ratio of 1 : 55, if the similarities in the course and outcome of schizophrenia are taken as additional criteria of comparison. This finding indicates that constitutional inability to resist the progression of a schizophrenic psychosis is determined by a genetic mechanism which seems to be non-specific and multifactorial.

7. The predisposition to schizophrenia, that is, the ability to respond to certain stimuli with a schizophrenic type of reaction, depends on the presence of a specific genetic factor which is probably recessive and autosomal.

8. The genetic theory of schizophrenia does not invalidate any psychological theories of a descriptive or analytical nature. It is equally compatible with the psychiatric concept that schizophrenia can be prevented as well as cured.

(Author's abstr.)

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The Genetics of Epilepsy.

Study of the incidence of epilepsy among 12,119 of the near relatives of 2,130 epileptics and among 55 twin pairs affected by seizures, together with analysis of the brain wave records of 470 relatives and of the 55 twins, leads to the conclusion that epilepsy *per se* is not inherited but a tendency or predisposition usually is inherited. The terms, genetic and acquired epilepsy, should replace the meaningless conventional terms essential and symptomatic. Probably in most patients both genetic and acquired factors are present. The incidence of epilepsy is higher among the near relatives of epileptics if pathology of the brain did not antedate the onset of seizures, if the patient's epilepsy began early in life, if he was mentally abnormal at birth, if he has *petit mal* and if the patient is female.

The electroencephalogram is an hereditary trait and brain wave tracings, properly made and interpreted, may be of positive value in visualizing a transmitted quality which (with the possible help of acquired pathology or pathophysiology) may eventuate in epilepsy. The practical value of this evidence is limited, because cortical electrical activity is a fluid trait, dysrhythmia cannot always be demonstrated in patients, and tracings of relatives may display only minor deviations from normal. Therefore, negative electroencephalographic evidence may not be significant. (Author's abstr.)

Dilantin Treatment for Behavior Problem Children with Abnormal Electroencephalograms.

A group of behavior problem children with abnormal electroencephalographic findings were treated with dilantin.

None of the children presented clinical evidence of epilepsy or were known relatives of epileptics. The physical and neurological examination of all the children was negative. None of the patients were adequately controlled by their environment previous to treatment. All were treated on an outpatient basis and showed definite clinical improvement under dilantin treatment.

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The results are considered encouraging and warrant further follow-up and study.

The implications and significance of recognition and treatment of these cases in terms of prevention or amelioration of adult neuropsychiatric difficulties are discussed. (Authors' abstr.)

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Some Common Features of Concrete and Abstract Thinking. *Helson, H., and Helson, H. B.* 468

Intellectual Functions with Restricted Intakes of B-complex Vitamins.

The chemical, physiological and psychological consequences of varying the intake of the vitamin B-complex on 8 physically normal men (*C. A.*, 20–32) were determined. Following a standardization period of 41 days, they received a diet in which thiamine, riboflavin and niacin were partially restricted for 161 days. Immediately following this, Ss were acutely deprived of these vitamins for 23 days and then received a supplementation of thiamine alone for 10 days. Two general intelligence tests (the ACE and the Ohio State University), the Porteus Maze, Cattell's Cursive Miniature Situations, and various more specific tests (spatial relations, verbal fluency, perceptual speed, number facility, etc.) were used. The tests were given in such a way as to trace the changes in intellectual performance throughout the period of deprivation. The results showed that acute deprivation of the vitamin B-complex resulted in a limited deterioration of performance on the tests demanding speed. Rate of learning was not affected though the level of performance was lowered. Recovery was produced by thiamine supplementation during 10 days. Psychoneurotic scores, especially the depression scale (Minnesota Multiphasic), rose during the period. The significance of these data in relation to other studies is considered. D. E. JOHANNSEN (Chem. Abstr.).

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Chicago Neurological Society.

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Cerebral Dysrhythmia and Psychopathic Personalities: A Study of Ninety-six Consecutive Cases in a Military Hospital.

Electroencephalographic tracings were obtained from 96 of a series of 104 patients with a disorder diagnosed as constitutional psychopathic state in a military setting. Within the special situation from which the patients were obtained, the sample was unselected. The personalities were evaluated first by psychiatric criteria, so that the finding of electroencephalographic abnormality did not influence diagnostic judgment. The records were classified in accordance with the Gibbs' criteria with the single exception that records showing certain slow dysrhythmias of paroxysmal character were classified with records of paroxysmal activity rather than with those containing slow sequences. The percentage of abnormal records did not greatly exceed the reported incidence of abnormality in normal control groups studied by different investigators, although we did obtain a definitely higher percentage of records with F-2 and S-2 frequencies than has been obtained for normal controls. The authors find no relationship between the severity of different manifestations of psychopathy and the incidence of abnormality in records. (Authors' abstr.)

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Recent Advances in Treatment of Epilepsy with Particular Emphasis on Use of Tridione. *Merritt, H. H.* 130

Results of Treatment of Multiple Sclerosis with Dicoumarin.

The evidence that sclerotic plaques arise as a result of venular thrombosis is reviewed.

The results of the treatment of 43 patients with multiple sclerosis with dicoumarin (3,3′-methylene-bis-(4-hydroxycoumarin)) for periods varying from six months to four years is reported.

Doses of dicoumarin sufficient to raise the prothrombin time to thirty seconds continuously were administered, with constant laboratory control.

Twenty-five patients suffering from a remittent form of the disease were adequately treated without interruption for a total period of approximately sixty-one patient years. In this group no fresh symptoms or obvious acute outbreaks occurred. Most of the 16 patients with chronic progressive disease continued in their downward course.

The treatment of two patients was interrupted for one reason or another. The patients were free from new symptoms while taking treatment, but both had acute relapses when it was discontinued. In two patients large doses of dicoumarin failed to produce the expected increase in prothrombin time, and relapses occurred.

(Authors' abstr.)

The Electroencephalogram and Personality Organization in the Obsessive-compulsive Reactions.

The number of patients in this series was relatively small, but since each was thoroughly studied for an adequate period it is felt that certain tentative conclusions may be drawn:

(1) Pathologic findings were present in the electroencephalograms of 13 out of 24 patients who presented obsessive-compulsive symptoms. There did not appear to be a connection between any special type of compulsive psychopathic disorder and the abnormal electroencephalographic findings. There was, however, a high degree of correlation between disturbances of the underlying personality organization and electroencephalographic abnormalities. All the patients with clearcut disturbances of personality organization, i.e. with psychopathic personalities, had abnormal electroencephalograms. Ten of the 11 patients who were considered to be well organized persons had normal electroencephalograms.

(2) Abnormal electroencephalograms, which were found in all the patients with disturbances of personality organization, were characterized by the presence of excessive quantities of slow waves (3 to 7 per second). The consistent finding of slow activity in this series suggests that we are dealing with the same type of neurophysiologic disturbance observed by Simons and Diethelm, who, in their study of psychopathic personalities, reported:

"The majority of abnormal records were those containing sufficient 5 to 7 a second activity of low average amplitude in the frontal and parietal leads to be considered beyond the limits of normal."

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(3) If the conclusions drawn from these observations are valid, certain therapeutic implications follow. Any patient who shows electroencephalographic abnormalities of the type presented by these poorly organized psychopathic patients must be suspected at least of having a deficiency in the synthesizing functions of his personality; this point should be investigated further, utilizing both clinical observation and anamnestic data from outside sources whenever possible. In the treatment of a psychopathic patient with obsessive-compulsive symptoms, it has been our experience that more or less passive analytic technics will result in the disappearance of the obsessive-compulsive phenomena, but there remain the manifestations of psychopathic personality, which must be approached with a more active, synthesizing type of treatment. The electroencephalogram is a useful tool in giving an early lead to the presence of disturbances of personality organization, for these disturbances are not always obvious during early contacts with the patient.

(4) The present study gives evidence that certain types of psychopathic personality, described by Simons and Diethelm, are associated with electroencephalographic abnormalities, whether these disturbances of personality organization appear as the leading clinical features or occur in cases in which obsessive-compulsive symptoms dominate the clinical picture. (Authors' abstr.)

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Effects of Pitressin Hydration on the Electroencephalogram; Paroxysmal Slow Activity in Non-epileptic Patients with Previous Drug Addiction.

The electroencephalograms of fourteen non-epileptic men with previous drug addiction were studied before and after pitressin hydration. No clinical seizures were induced by this procedure.

The alpha frequency showed a tendency to slowing after hydration, but in only three instances was the degree of change greater than that which could be expected from day to day variation. There was no significant change in the percentage of alpha activity.

In half the records there was shift to the slow side of the frequency spectrum.

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In half the records paroxysmal slow activity of moderately high amplitude appeared after hydration.

There was some correlation between the appearance of paroxysmal slow activity and the shift of the frequency spectrum to the slow side, but no correlation with the degree of hydration or the amount of pitressin administered.

The possible significance of these observations in their relation to idiopathic epilepsy is discussed. (Author's abstr.)

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Prefrontal Leucotomy.

The author emphasizes the rate of 14 per cent. of recoveries and 6 per cent, of great improvements as the result of leucotomy, notwithstanding the poor condition of the material. Simple leucotomy quietens and produces other minor changes in behavior without any alteration in the structure of the psychosis are not considered. An easy, inexpensive and nearly dangerless method of treatment, leucotomy is doubtless able to improve the conditions of the chronic patients. This was one of the reasons that induced the author to carry out the psychosurgical method of treatment. (Author's abstr.)

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Fibre Connections of the Subthalamic Region and the Centro-median Nucleus of the Thalamus.

Lesions have been made in the subthalamic region of the brain in five Macaque monkeys. The subthalamic nucleus is shown to project:

(1) On to the external and internal division of *Globus pallidus.*
(2) On to ipsilateral and contralateral red nucleus.
(3) On to ipsilateral and contralateral thalamus.
(4) On to a nucleus dorso-medial to substantia nigra.

The substantia nigra projects:

(1) On to the *Globus pallidus.*
(2) On to the centro-median nucleus.
(3) On to the anterior colliculus.

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A pathway from the centro-median nucleus and the dorso-medial nucleus of the thalamus to the central grey passing through the subthalamic region has been demonstrated. (Authors' abstr.)

Nutritional Neuropathies in the Civilian Internment Camp, Hong Kong, January, 1942–August, 1945.

Four diseases affecting the nervous system, and apparently due to dietary deficiency, are described as they occurred in the Civilian Internment Camp, Hong Kong, 1942 to 1945.

(1) Subacute wet beriberi—844 cases, conformed to previous descriptions and, in respect of incidence, prevention and treatment, was apparently due to a pure vitamin B_1 deficiency. The threshold vitamin B_1-carbohydrate ratio was found to be about 0·4 mgm. per 1,000 carbohydrate calories.

(2) Chronic dry beriberi—small number of typical cases responded slowly to treatment with vitamin B_1, but more rapidly to whole vitamin B complex.

(3) " Burning feet " syndrome—756 cases, in 35 per cent. of which dry beriberi was superimposed, were found to show no response to vitamin B_1 or nicotinic acid, but to be slowly cured by food rich in vitamin B complex, the individual factor responsible being probably pantothenic acid.

(4) Amblyopia—370 cases, in which central or paracentral scotoma was the outstanding feature, was generally associated with B complex deficiencies and showed some response to foods rich in these factors, though on the present evidence the causative deficiency might equally be of an essential amino-acid.

(Author's abstr.)

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The Problem of Disseminated Sclerosis.

The conclusions reached in this paper may be briefly summarized as follows: The cause of disseminated sclerosis remains unknown, but it would seem to lie either in the direction of a biochemical or enzyme abnormality, of which proof is so far lacking, or on the other hand a toxi-infective process. Our increasing knowledge of the various forms of encephalitis and encephomyelitis in man and the lower animals, and the part played by viruses in certain of them when viewed against the histological background of disseminated sclerosis suggests that this disease is also infective in origin. The results of the clinical approach bring to light no facts which are contrary to this view and some which seem to favour it. The view is put forward that the course of the disease is determined by an immune reaction to an infection, and that the extent of this reaction varies considerably from case to case. The familial incidence of the disease is significant and suggests that an inherited constitutional factor may render an individual more susceptible to it. Pregnancy, trauma and mental stress may, in individual cases, precipitate the disease or may be closely associated with a relapse. These facts are not inconsistent with the theory of an infection, but at the same time a further study of such cases is desirable in order to understand the manner in which symptoms are produced. With the exception of cases in which there are " influenzal " symptoms, the onset of the disease is not generally accompanied or preceded by constitutional symptoms. Thus the possibility arises that invasion of the nervous system and the appearance of the first sign of the disease may not always coincide in time, but that the former may take place months or years previously as in rabies and syphilis. If this premise be admitted, then the question arises at what point in the patient's

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life history did the nervous system become infected or sensitized? In the investigation of a series of 142 cases no single common factor could be found which provided an answer to this question, although the scope of the enquiry may not have been sufficiently wide. Attention was next turned to the portal of entry of the hypothetical agent or toxin, and by analogy with other infections of the nervous system, it was inferred that the skin and the alimentary tract were the likeliest starting points of the invader. Furthermore, from the author's knowledge of the histology of disseminated sclerosis it was necessary to postulate a haematogenous spread from the focus with or without additional local spread by cranial or peripheral nerve pathways.

In a number of cases in this series the clinical onset of the disease was preceded at varying intervals by an infective focus of the skin or subcutaneous tissue. In certain of these cases local pain and swelling persisted, suggesting the presence of a chronic inflammatory process. The fact that the first sign of disseminated sclerosis sometimes occurred at a segmental level roughly corresponding to the infected limb suggests that this sequence of events was no mere coincidence. It is fully realized that the evidence in favour of the skin as an occasional portal of entry in disseminated sclerosis is purely circumstantial, but it seems to warrant further consideration in view of the part played by the skin in other infections of the nervous system. On theoretical grounds the possibility of other foci of infection playing a similar role must be borne in mind. The remaining portal of entry to be considered is the alimentary tract. I have already referred to a small group of cases in which influenzal symptoms immediately preceded the onset of the disease, thus suggesting the throat as a point of entry. The fact that a history of intestinal disorder prior to the onset of the disease is rarely obtained in these patients should not exclude the intestinal tract from consideration in any further research. Finally, the author wishes to make it clear that in the majority of patients included in this investigation no clue could be obtained as to how the disease originated.

(Author's abstr.)

Traumatic Amnesia.

It is naturally important to discuss the significance of the phenomena described above in so far as they may throw light on cerebral mechanisms. In the first place it is clear that traumatic loss of consciousness prevents remembering, and that this inability to remember events persists in most cases until full consciousness has returned. In other words, the recovery of continuous remembering coincides with a late, if not a last, stage in recovering consciousness.

It may also be affirmed that a single blow of varying severity can disturb remembering, as it does consciousness, for very varying periods of time, and that the duration of this period depends usually on the severity of the initial neuronal commotion.

The almost constant occurrence of R.A. indicates that the injury, though it cannot have time to prevent what is last seen or heard from reaching the sensorium, does completely prevent its retention for future recall. The latter process presumably requires a few seconds of time for completion.

The occasional occurrence of a vision of events within the R.A. indicates that in these cases some form of registration has occurred with great vividness which, though it can never be properly retained for later recall, can reproduce itself from a relatively low level in the form of a momentary " vision." This appears to be a striking illustration of different levels of activity in the Hughlings Jackson sense. The injury in such a case appears to have blocked the process of retention halfway.

The variations in the R.A. during recovery of full consciousness seem to be specially significant. Distant memories return first and loss of memories for the previous few years may, for a time, be so complete that the patient believes himself to be several years younger. After severe injuries there may be a permanent R.A. of several days' duration, which may include events of great importance to the patient.

General brain trauma, therefore, has an effect on *recent* memory, which is much greater than its effect on remote memory, and this fact must be closely linked with the physiology of remembering. It is clear that the events forgotten are often of importance to the individual, yet for a time, and sometimes permanently, they are completely erased, while distant memories of little importance are returning freely.

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The recovery of this type of memory loss is by shrinkage towards the present time. The long amnestic period recovers not so much according to the relative importance of events occurred. There is thus a vulnerability of memories which depends directly on their nearness to the injury.

The authors are thus forced to the conclusion that as memories become older they become more strongly established irrespective of their importance to the individual, while recent memories are relatively liable to traumatic extinction, however important they may be.

Further, it is clear that a long R.A. is almost always associated with a long P.T.A. The authors have good evidence that a long P.T.A. usually means a very severe injury, hence a long R.A. is observed when severe general neuronal commotion has occurred. It can thus be concluded that a long R.A., whether temporary or permanent, occurs after severe neuronal commotion and that severe neuronal commotion has a much more damaging effect on erasing recent than remote memories.

In the cases with long R.A. which recover spontaneously, it is evident that the effect of this neuronal commotion is reversible, but in some cases the effect is permanent.

In either case the observation demands a physiological explanation. It seems likely that memory of events is not a static process. If it were, then distant memories would surely fade gradually and would be the more vulnerable to the effects of injury. On the contrary, when the brain is injured, these distant memories are the least vulnerable. It seems that the mere existence of the brain as a functioning organ must strengthen the roots of distant memories. The normal activity of the brain must steadily strengthen distant memories, so that with the passage of time these become less vulnerable to the effects of head injury.

The patient with senile dementia may show a very similar loss of recent memory. She may forget the visit of her favourite grandchild within twenty minutes, yet she remembers an unimportant escapade of fifty years before in every detail. The distant memory shows no sign of fading and this suggests that it has received continual reinforcement and has survived not because it was important, but because the brain throughout the decades has strengthened it automatically till it has become highly resistant to cerebral degeneration.

It is tempting to speculate on the possible physiological processes concerned in remembering which could behave in this way. The brain works through chains and circuits of neurones which can set a pattern for automatic responses of infinite variety. Presumably the synapses of such a chain pattern are " opened " to allow the least possible delay and to avoid diversions in other directions. The neuronal system concerned with a certain memory, if it is to behave with the passing of years in the way it does, must then be automatically strengthened or more strongly canalized by the normal activity of the brain, and perhaps indeed this facilitation of the circuit is carried out by the spontaneous rhythm of the neurones concerned.

The recall under barbiturate hypnosis, or occasionally in the state of traumatic confusion, of events which cannot be remembered in the normal state of consciousness is of considerable interest. It seems as if under certain conditions clinically manifest as clouded consciousness, and physiologically determined by impairment of function at Jackson's highest level, pathological recall may occur as a release phenomenon. The twilight states of dreaming and toxic or infective delirium are analogous, and in these also there may be recall of experience not available in the state of clear consciousness. (Authors' abstr.)

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A Comparative Study of the Level of Aspiration of Normal and of Neurotic Persons.

1. Level of aspiration tests were given to 20 normal men and 33 normal women and to 100 male and 32 female neurotic service patients.

Estimates of future performance (goal discrepancy scores), estimates of past performance (judgment discrepancy scores), responsiveness in the setting of goals to changes in the level of performance (index of flexibility), and the percentage of typical reactions to success and failure were calculated.

2. All four groups overestimated future performance and underestimated past performance.

3. The behaviour of the women differed from that of the men in three respects. They had (*a*) a significantly lower average goal discrepancy score, (*b*) a significantly lower average judgment discrepancy score, and (*c*) a significantly higher index of flexibility.

This sex difference applied to the normal and the neurotic groups.

4. Significant differences were found in the responses of normal and neurotic subjects. The neurotic women had a higher positive goal discrepancy score than the normal women. Normal subjects tended to underestimate their past performance more than neurotic subjects. The spread of scores of the neurotic groups was significantly larger than that of the normal groups. The distribution of the scores of the neurotics was bimodal.

5. A different patterning of the responses was obtained for neurotics in contrast to normals. The correlation between goal and judgment discrepancy was positive for the normal and negative for the neurotic groups. The correlation between judgment discrepancy scores and index of typical reactions was negative for the normal and positive for the neurotic groups.

6. A new code symbol substitution test was used to measure the level of aspiration responses of 29 male and 29 female hysterical patients and of 34 male and 35 female dysthymic patients. The hysterics were found to have a more " realistic " objective goal-setting behaviour than either the normal or the dysthymic subjects. The goal judgment discrepancy scores of the hysterics were small and their indices of flexibility high. The dysthymics showed wide deviations in their estimates of past and future performance from actual performance. Their indices of flexibility were low.

7. Increased motivation was obtained by offering incentives. A comparative study of the behaviour of 20 male hysterical and 22 male dysthymic patients under these conditions was carried out. The increase in ego-involvement led to an accentuation of the response pattern that had been found to be characteristic of these two reaction types. (Author's abstr.)

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The Recalling of Thoughts.

The foregoing study is a contribution to the discussion of the old problem: Can we think without images? The problem is approached by considering the process of recalling thoughts. The word "thought" means here a mental content.

1. Introspection shows that there is no direct recall of a thought separated from its verbal expression or any other sensuous support. Contradictory observations seem to confuse the recalling of the thought itself with the direction of the mind towards a previous thought with the help of indicative images.

2. We often forget the original wording when we recall thoughts and replace it by new expressions of similar meaning. In order to explain this fact it is by no means necessary to assume that memory-traces of thought contents can be separated from any traces of words. A much better explanation is provided by the assumption that the traces of thoughts remain in close connection with those of words, and form a unity with them which may be changed with regard to the words or to the thoughts or to both.

3. An interesting problem concerning the dependence of thought upon its verbal expression arises when we ask whether the retention of thoughts is influenced by the way in which they are expressed. A method is indicated which enables us to compare the retention of thoughts which are expressed in the mother tongue of the observer with the retention of those which are expressed in a foreign language. This method was applied to three observers (one of them bilingual) and the results were analysed as a first approach to this problem. Further investigations with bilingual individuals might give us an answer to that problem and provide a new argument for or against the existence of imageless thoughts. (Author's abstr.)

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*Differential Modification of Post-rotational Nystagmus of Pigeons with Cerebral Lesions. *Yacorzynski, G. K.* . . . . . No. 2

Differential Modification of Post-rotational Nystagmus of Pigeons with Cerebral Lesions.

Two main experimental groups with cerebral lesions were tested for habituation (decreasing duration) of post-rotational nystagmus, one group with and the other without habituation training prior to the operation. Various control groups were also used. Cerebral lesions decreased significantly the usual habituation effects. In animals not previously habituated, the correlation between the size of the cerebral lesion and the degree of habituation was $-\cdot 65 \pm \cdot 129$. Pigeons habituated before the operation showed a greater duration of nystagmus than did normal controls, but animals with the skull trephined and no cerebral operation showed the same modification of nystagmus as the birds with lesions. The results are interpreted as favoring a central theory of habituation, but not a learning theory. Data are summarized which favor the concept that habituation of nystagmus is an homeostatic phenomenon. " The mechanism involved in throwing the homeostatic state out of equilibrium, thus producing nystagmus, involves a pattern of ratios between the neural discharge of the stimulated labyrinthine receptors. Continued stimulation of the non-acoustic labyrinth causes a new level of integration to be reached between the impulses of the eighth nerve and the nervous system." N. L. MUNN (Psychol. Abstr.).

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The Nuclei of the Human Thalamus: A Comparative Approach.

(1) The cell groups of the rat and monkey thalamus were studied to serve as a background for a comparative approach to the human thalamus. The cell groups of the human thalamus were studied, and a wax model of these nuclei made.

(2) A comparative study of previous investigators' work is discussed.

(3) The nuclei of the rat, monkey and human thalamus are compared in chart form as to terminology and subdivisions.

(4) The nucleus medialis, nucleus ventralis lateralis, and pulvinar are believed to increase in size, due to their connection with the increasing frontal area, cerebellum, and inferior parietal and occipital associational areas respectively.

(5) The divisions of the medial thalamus remain fairly constant in phylogeny in contrast to the very rapidly developing lateral thalamus due to the great elaboration of the associational areas of the cerebrum. The divisions of the lateral thalamus of man are difficult to homologize with lower forms since the changes from one form to the next are complex. (Authors' abstr.)

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Retrograde Degeneration of the Thalamus Following Prefrontal Lobotomy.

On the basis of 1 successful and 3 unsuccessful cases of prefrontal lobotomy among the 12 studied at necropsy the conclusion is reached that because of the point-to-point correspondence of cortex and thalamus it is possible to designate areas in the thalamic nuclei that correspond with cortical cytoarchitectonic areas. The central part of the medial nucleus projects to the frontal pole, the lateral portion to the convexity, the medial portion to the base. The anterior nucleus projects to the medial surface of the hemisphere. The lateral group of nuclei projects to the motor and premotor areas and to the frontal adversive field. (Authors' abstr.)

Extracortical Connections of the Primate Frontal Cerebral Cortex. (1) *Thalamocortical Connections.*

The thalamofugal connections to the frontal cortex of the monkey have been restudied and a series of maps of the primate thalamus (in terms of the Brodmann nomenclature) have been prepared. Comparison of these maps with the projections of the human thalamus, as reported by Freeman and Watts ('47), indicates that the basic principles of projection are the same for both primates. The relation of the cortical plan of the human to that of the monkey is similar to that between a fully and a partially opened oriental hand fan. The basic arrangements and relative positions of the elements present in the simian, persist in the human, but there is a separation and interposition of additional material between these basic elements, both in the cortex and thalamus. The separation of elements and addition of new material in the thalamus is much less apparent than in the cortex.

There are three discrepancies between the communication of Freeman and Watts ('47) and the present. The first is that cortex designated as area 8 by Brodmann in the monkey is found by the author to project upon the dorsolateral part of the medial nuclear group, while that designated as 8 by Brodmann in the human is found by Freeman and Watts to project upon the dorsomedial part of the lateral nuclear group. Such a circumstance is far from disturbing. It has so far proved difficult to establish absolute homologies between the cortices of different species. Brodmann himself never envisioned an absolute transfer of this sort. The author regards the discrepancy as a reflection of the probability that what Freeman and Watts are calling 8 in the human is a trifle farther posterior in the cortex than what he calls 8 in the monkey. Such a difference in interpretation would naturally throw the representation of the regions in question to one side or the other of the internal medullary lamina of the thalamus. Even within a

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single species, the cortical representation of area 8 is variably represented by different authors.

Another discrepancy between the maps for the monkey and man is the representation of area 12, which in the monkey is rostral but in man caudoventral. Presumably this indicates that the human medial nucleus has been rotated forward along a horizontal axis for a distance of about 90°.

Freeman and Watts' paper contains an incidental note on the degeneration of the centromedian nucleus after striatal injury and sparing of this nucleus after pallidal damage. The author's opinion thus far has been that the centromedian nucleus is devoid of cortical connections and projects upon the pallidum rather than striatum. Review of the original cases (J33, Mettler, '43 and '45a; J100, Mettler, '45 and J148, Mettler, '45b) leaves no doubt as to the accuracy of the first observation, but an absolutely unimpaired pallidum in the complete absence of the striatum is hard to come by and it is more difficult to be certain about the second point.

In a case (J209) at hand, the head of the right caudate, front of the corresponding putamen and the intervening capsule had been destroyed. On the left the lesion removed all of the striatum and the external part of the pallidum. The left but not right centromedian nucleus was very gliotic but, since the specimen was a Marchi, it was very difficult to tell what the condition of its neurocytes may have been. Although gliosis is not an accurate index of retrograde degeneration, this case would suggest that the centromedian nucleus had a dual representation—to both parts of the corpus striatum.

Additional light on the matter may be obtained from the following case (Rhesus J171) in which the left centromedian nucleus was fulgurated (9/15/'44) by means of an electrode carried in the stereotaxic instrument. The animal showed no definite, consistent, physiologic abnormality and was killed 18 days later. It showed a lesion which began at the level of the posterior commissure, just between the medial geniculate and medial longitudinal fasciculus, and extended forward, in the dorsoventral third of the intramedullary lamina, to a level just rostral to the optic chiasm. The centro-median nucleus was practically all destroyed and there was little damage beyond its limits. There were two well-marked groups of degeneration emanating from the lesion. By far the most abundant of these moved directly laterally, through the internal capsule and came to lie in its lateral portion, just medial to that part of the putamen which projects dorsal to the pallidum. This group of degenerated fibers continued backward in this position.

At the level of the caudal part of the optic chiasm a considerable number of degenerated fibers moved into the medullary lamina between the pallidum and putamen. They broke up into smaller elements in this position. A considerable number of these smaller elements became lost in the putamen. None could be traced to the pallidum.

Many large degenerated fibers retained their original position in the internal capsule and, in sections through the level of the preoptic recess, moved farther medially and were joined by degenerated fibers emanating from the site of the needle track through the front part of the dorsal thalamus. These larger fibers, which continued into the corona radiata, must have emanated from that part of the arcuate nucleus which adjoins the centromedian for no fibers from the centromedian nucleus are distributed to the cortex.

It is worth observing that the centromedian fibers to the putamen do not accompany any of the efferent systems from the lentiform nucleus at any place except where these interdigitate with the fibers of the internal capsule.

The second group of degenerated fibers which emanate from the centromedian nucleus consists of a small number of elements which run into the pes pedunculi and run caudally for a short distance. They cannot be traced very far.

The diagrams of the thalamo-cortical systems have, therefore, been modified with regard to the thalamo-frontal projections. Attention should be called to the fact that the centromedian projection is a relatively small one which does not lie in the position of well-defined bundles of heavy fibers. The large fiber mass which passes from the thalamus to the medial segment of the pallidum (Mettler, '45a) must consequently emanate from another nuclear mass of the intralaminary group or in close association with this. This subject may be left for consideration at a later date. (Author's abstr.)

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On the Etiology of Dementia Praecox.

The literature of the past ten years concerned with the problem of etiology of schizophrenia or dementia praecox has been presented. One is impressed with the wide variety of etiological factors reported. While some of the etiological factors presented are almost completely hypothetical and theoretical, others seem to be well founded and of the latter there are many of different etiology. It is difficult for the authors to assume that so many of the investigators based their impression on insufficient evidence. Rather, they are driven to the following conclusions:

(1) Schizophrenia or dementia praecox is not a disease entity, but a syndrome or a reaction-type associated with a large variety of etiological factors. The best common denominator which the authors can find for the syndrome is to call it a deficit reaction. By calling the schizophrenic syndrome or reaction type a deficit reaction, they mean that it is typical of a human organism incapable of adequate social functioning.

(2) The etiological factors of the deficit reaction, known as schizophrenic reaction type or schizophrenic syndrome, may range from a hypothetically completely psychogenic nature to a hypothetically completely organic nature. One can conceive of all the cases actually occurring as being on some points of a continuum from a hypothetical locale of complete psychogenicity to a hypothetical locale of complete organicity of the syndrome. As relatively completely psychogenic one the authors would consider a case in which the early childhood setting is consistent with dynamic conceptualization of a traumatic character formation, particularly in the psychoanalytic sense; where character manifestations can be dynamically understood as forms of maladjustment; where the onset of the disease is more or less manifestly associated with psychological trauma and where many manifestations can be understood, interpreted, predicted, and controlled on the basis of psychological operations. Hypothetically speaking, by completely organic etiology one understands a case in which there is an absence of a psychological background, where the onset is abrupt, sudden and unrelated to mental factors and where there are associated clinical, laboratory data or postmortem data indicative of organic pathology related to the schizophrenic syndrome.

One might wish to consider as a case of predominantly organic causation of an essentially schizophrenic type those cases of mental disease where, with our modern means of diagnosis, we can establish a luetic etiology of the mental picture that otherwise would be definitely diagnosed as dementia praecox. The authors would conceptualize such a case as the schizophrenic type being due to destruction or dysfunction of brain tissue by *Treponema pallida* and corresponding to an organic deficit. However, in such cases they feel—as many investigators do—that the psychotic manifestation of this luetic deficit is definitely determined by the previous

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(psychologically caused) personality type. One might compare it to problems of gross brain injury—for instance, the frontal lobe lesions—in which most investigators feel now that the characteristics caused by the brain lesions are mostly accentuations of the previously existing personality type.

And, incidentally, one feels that in this direction those studies concerned with a biochemical aspect of the disease process deserve at present the greatest optimism, particularly those concerned with biochemical processes of an enzymatic nature concerned with the metabolism of the brain tissue.

(3) The authors believe a definite predisposition may be of importance in the etiology of the schizophrenic reaction type and that these predispositions may be of a constitutional nature, somatically speaking or socio-psychologically speaking. However, each case of schizophrenic reaction must be understood as an interaction between somatic or socio-psychological predisposition, and of a precipitating factor on that continuum between complete psychogenicity and complete organicity. The authors believe, for instance, that there may possibly be such a thing as diencephalic asthenia as revealed in electroencephalographic studies; they agree with Grinker that such diencephalic weakness may not at all be the essential determining factor in bringing about the schizophrenic reaction type, but that for instance a traumatic psychological background may be necessary to lead to the insidious onset of the disease symptoms. They also feel that a precipitating somatic and/or psychological factor may be necessary to bring about a deficit reaction superimposed upon a neurological predisposition. The authors believe that each case of schizophrenic reaction type must be considered as a psychosomatic problem of individual unique variations.

(4) Therefore, it is suggested that every case of schizophrenic reaction type be considered on the following four dimensional schemes, namely:

(*a*) Somatic predisposition.

(*b*) Socio-psychological predisposition.

(The two together might be conceptualized as threshold for schizophrenic reaction type liability.)

(*c*) Psychological precipitating causes.

(*d*) Somatic precipitating causes.

For statistical purposes the authors believe that each of these factors should be expressed on a three-point scale or a five-point scale or a seven-point scale, whichever may turn out to be the most practicable. It is suggested that such a scheme be used even in clinical diagnosis and that in the long run, if and when it proves advantageous, it be made part of the nosological classification system and the subtypes officially adopted.

Furthermore, it is suggested that research concerned with the etiology of schizophrenia be organized with such a scheme in mind. It is believed that work on the etiology of schizophrenia failed because of lack of awareness of the multiplicity of causes, and that research concerned with the constitutional background, more specifically the body type associated with the schizophrenic reaction type, may profit from selecting only cases in which apparently the predisposition was the most important factor, that is predisposition of a non-socio-psychological character, and where the precipitating causes were relatively at a minimum. It is felt that under those circumstances much more uniform results will be arrived at than has been possible so far. (Authors' abstr.)

FEBRUARY.

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The Pattern of Enzyme Distribution in the Brain and Mental Function.

(1) A pattern of distribution of carbonic anhydrase in the central nervous system is described and attention is called to its consistency of occurrence. In

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the human brain changes in its pattern of distribution appear to accompany abnormality in mental function.

(2) A theory is propounded which would account for mental disfunction on the basis of an imbalance in the potentialities for metabolic activity caused by a disturbance in the quantitative incidence of essential enzymes.

(3) It is advocated that the quantitative distribution of enzymes involved in neuron metabolism be comparatively studied in brains which have shown normal and abnormal functioning, in the hope of elucidating the problem of mental abnormality. (Author's abstr.)

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Effects of Vitamin and Hormone Treatment on Senile Patients.

Small groups of male senile patients were treated: (i) With small doses of vitamins B and C; (ii) with increased doses; (iii) with androgenous hormones. The patients, together with similar numbers of untreated controls, were tested individually with a large battery of mental and psychomotor tests before treatment and during each phase of treatment.

No evidence was obtained of any general improvement in intellectual efficiency or psychomotor capacities as a result of the treatment. There were slight indications of an improvement on general intelligence (g) tests among the more severe cases with vitamin treatment; and among the light and moderate cases the same treatment produced an increase in fluency and a decrease in perseverative tendencies (f and p factors).

Though these improvements amounted to about 10 per cent., they were of doubtful statistical significance and require confirmation with larger and more homogeneous groups of patients. Neither the psychomotor tests nor tests of intellectual deterioration were affected in any consistent manner. The increased vitamin treatment did not yield any more positive results, and the hormone treatment was apparently quite ineffective.

The lack of any clear-cut effects of treatment may have been due partly to the fact that the patients were already on a diet adequate in vitamins, and partly to the unreliability of psychological tests when repeated too frequently over too long a period. (Authors' abstr.)

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**The Nervous System as Physical Machine: With Special Reference to the Origin of Adaptive Behaviour.*

An outstanding property of the higher nervous system is that, in contact with a new and previously unexperienced environment, it develops and produces behaviour which is adapted to that environment. It is usually assumed that the behaviour depends on the development of an inner, neuronic organization. But considering that the neurons might as easily develop one of the almost infinite wrong organizations, the fact that the right one is developed calls for explanation. Why should a network of neurons produce adaptive instead of chaotic behaviour? Psychology cannot rest content until it has found a physical answer to this problem.

The author has approached this problem from the point of view that the brain is a physical machine, and that " adaptive " behaviour is that which maintains it in physical equilibrium with its environment. This basic theme has been studied with all possible generality and precision. This has necessitated the construction of a special mathematical technique, and this has led to a number of new theorems on equilibrium and organization in generalized dynamic systems.

The problem of a self-equilibrating physical system can now be attacked with both rigor and generality. The paper then shows how these new methods povide an essentially simple and clearcut solution to the problem. (Author's abstr.)

APRIL.

Professor Mare-Wogan's *Theorie de Sinnesdaten* (II). *Broad, C. D.* . . 97
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Emotional Disturbances in Epileptic Children.

Fourteen years after the organization of the Epilepsy Clinic at the Johns Hopkins Hospital, a follow-up study was made of 472 of the children. Among the many objectives of the study was a desire to know how many of them had been able to maintain a satisfactory place in society, and in what measure personality maladjustments accounted for the failures. The study was conducted by a trained social worker, and extended over a period of nearly two years. Evety attempt was made to record facts rather than impressions and to draw conclusions in as objective a way as possible. The details of the study have been presented elsewhere, but the central conclusions will be of interest here.

The major handicap of a large group of epileptic children, two to fourteen years after first being seen in the Clinic, was found not to be the seizures themselves or mental retardation, but the personality disorders. In some, the seizure had disappeared after a period of years, but left an individual who was unable to associate with others in a satisfactory way, or to carry on constructive remunerative work. In others, while seizures had continued to recur at intervals, these would not have interfered with employment or home-making had the individual been more stable, and less helpless and resentful when confronted with difficulties. It was also rather startling to find how satisfactory some patients were getting along in spite of recurrent seizures and perhaps some degree of mental retardation, provided their dispositions and attitudes had not been warped by the disease and the problems they had met. In spite of the fact that earlier in this report only 9 per cent. of epileptic children were classified as having serious personality disorders, as years

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go by the handicap of this aspect of the disease evidently assumes ever greater proportions. It appears that if the much larger group of epileptic children who show lesser grades of maladjustments are not given the benefit of expert care, the psychological problems tend to mount and eventually become the most serious handicap to normal living.

The outlook for the child with epilepsy is in many ways more favorable than has been thought in the past. Not only is medication more effective, but there is a growing appreciation of the many factors which contribute to the disease in any one individual, and with it a more sound basis for therapy. The realization that personality problems may contribute both to the causation and continuation of the disease has opened the way for preventive measures along these lines. There are at present lacks in facilities, time and interested personnel to carry on such work. However, in view of the obvious importance of such efforts to the individual and to the public as well, it is to be hoped that more emphasis will be placed in these directions in the future. (Author's abstr.)

Rorschach Psychodiagnosis in a Group of Epileptic Children.

In the light of the Rorschach psychodiagnosis, epileptics show a characteristic picture which can be summarized as follows :

(*a*) Deficient intellectual control over the affective emotional and instinctive spheres.

(*b*) Anxiety.

(*c*) Aggressiveness.

(*d*) Predominantly extravert reaction type.

(*e*) Tendency towards opposition.

(*f*) Poor mental efficiency.

(*g*) Slight bradypsychia.

None of the above traits can be considered pathognomonic. The syndrome of *grand mal* can be distinguished from that of *petit mal.* In the former the syndrome of anxiety is very strong ; while in the latter, especially in its psychmotor form, the author finds aggressiveness, lack of prudence and of intellectual control over the affective sphere. The mental deterioration is greater in *grand mal* than in *petit mal* and its various forms.

In so far as foretelling behavior is concerned, the author admits that the protocol of the patients with behavior disorders cannot be distinguished from that of persons with deficient learning capacity.

The clinical forms which are revealed through the use of the electroencephalograph can be divided by the application of the Rorschach test into two groups : *grand mal* and *petit mal* with psychomotor disorders.

The Rorschach test shows that in epileptics the light-dark responses are as typical as C and CF.

The division of the epileptics into two groups, A and B, and the one which the author's results show between *petit mal* and the psychomotor form, corresponds to the opinion of Guirdham that there is no fixed type of epileptic reaction.

The author believes that the results permit him to speak of psychic epilepsy without clinical manifestations. This is the form called psychomotor, which corresponds to a definite type of cortical dysrhythmia and to a specific psychic picture as revealed by the Rorschach tests. (Author's abstr.)

Drug Therapy for Epileptic Children.

Successful drug therapy of epilepsy means individual treatment of the individual patient and his particular type of seizure. One or more of eight different types may be present. Convulsive seizures are best treated with dilantin, phenobarbital, mesantoin or mebaral ; psychomotor seizures with dilantin (possibly combined with tridione) ; and the *petit mal* triad with tridione. Attention to dosages and to side-effects is a requisite of success. (Author's abstr.)

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1. Psychiatry, Physiology, Biochemistry, etc.

Notes on the Results of Army Intelligence Testing in World War I. [*Science*, **104**, 231–232 (1946).]

It has been argued that although data from the Army Alpha test should not be relied upon too strongly in making statements regarding the relative intellectual status of Negroes and whites because this test depends so much upon educational factors, greater reliance can be placed upon the Army Beta scores, inasmuch as these are presumably not influenced by educational and socio-economic status to so great a degree as the Alpha scores. Rank order correlations between median Beta scores for the various states and median Alpha scores, annual educational expenditures and *per capita* income range between ·50 and ·81. The order of magnitude of the coefficients for whites and Negroes, with respect to these measures are comparable. Such data probably most reasonably warrant the conclusion that Beta scores, like Alpha scores, reflect cultural factors concomitant with the socio-economic levels of the states. F. A. Mote (Psychol. Abstr.).

Aphasic Language Disorders. [*U.S. War Dep. tech. Bull., TB Med.* **155**, 3 (1945).]

The purpose of this bulletin was to establish uniform methods of study and management of aphasic language disorders in military hospitals. The neurological section was responsible for the early study and treatment of cases of disorder. A clinical psychologist was assigned the function of psychological evaluation of the brain-injured patient, and collaborated with the neurologist in the retraining of aphasic disorders. In addition to the usual clinical, neurological survey, mental testing of aphasic patients was done routinely as part of the neurological study. The following mental tests were recommended: (1) Army General Classification Test (retest) or basic battery; (2) Wechsler-Bellevue Intelligence Scale; (3) Goldstein-Scheerer Cube Test of Abstract and Concrete Behavior; (4) additional tests from the U.S. War Department Pamphlet No. 12–9, *Handbook for Clinical Psychologists*; and (5) writing complex sentences from dictation, repetition

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of phrases, oral reading, simple arithmetic, clock reading and setting, color naming, naming of common objects, and use, manipulation, and identification of common objects (searching also for apraxia and astereognosis). Suggestions for retraining are included. C. P. FROEHLICH (Psychol. Abstr.).

An Experimental and Comparative Study of Electroshock and of Cortical Epilepsy. [*Rev. Neurol.*, **77**, 57–70 (1945).]

Experimentation is reported to the effect that cortical epilepsy and experimental electroshock constitute one and the same process as far as their manifestations are concerned. While cortical epilepsy affects the cerebral cortex, experimental electroshock affects the pyramidal system. The authors believe the findings warrant a new conception of epilepsy to the effect that epilepsy, whether cortical or electroshock, is a general mode of reaction of nerve cells and not an exclusive property of the cortical cortex as has been believed.

F. C. SUMNER (Psychol. Abstr.).

Mental Breaking Points. [*New Engl. J. Med.*, **234**, 42–45 (1946).]

Two thousand naval service returnees were interviewed and given (1) the Cornell Selectee Index, (2) a psychosomatic inventory consisting of 64 questions, designed to elicit evidence of emotional instability. Of the entire group, 500 were survivors of sunken ships, 1,000 had combat duty, and 500 were overseas but did not encounter combat. Of the 2,000 only 5 per cent. showed evidence of severe nervous symptoms, and only ½ per cent. (10 men) needed hospitalization for mental or emotional disorder. The author points out that 95 per cent. of the returnees were normal, and that the neuroticness of veterans has been overstressed both by the medical profession and by laymen. It is considered unfortunate that the normal 95 per cent. are often treated, upon return home, as if they were members of the 5 per cent group. G. W. KNOX (Psychol. Abstr.).

Further Studies on the Biochemistry of Reflex Activity. III. Creatine of the Central Nervous System and Reflex Activity. Mitolo, Michele (*Univ. Bari, Italy*). [*Boll. soc. ital. biol. sper.*, **18**, 277–8 (1943); *cf. C. A.*, **40**, 6603[3]; **41**, 193c.]

Freshly isolated toad spinal cord contained, in mgm. per 100 gm. fresh tissue, free creatine, 50·7, combined creatine, 38·7, "residual creatine," 39·6, and total creatine, 129. After 4 hours in repose the corresponding values were 52·7, 32·2, 41·2 and 126 mgm. per cent. After 4 hours of reflex activity provoked as previously described the values were 75·8, 31·7, 44·4 and 152 mgm. per cent. The free and combined creatine were extractable by CCl_3CO_2H solution. The so-called residual creatine was not extracted by CCl_3CO_2H solution and was not creatine, but an unknown substance which gives the Jaffé color reaction like creatine.

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

Swelling of Brain Slices and the Permeability of Brain Cells to Glucose. Elliot, K. A. C. (*McGill Univ., Montreal, Can.*). [*Proc. Soc. Exptl. Biol. Med.*, **63**, 234–6 (1946).]

Brain slices swell considerably in solutions of the common salts and sugars, even though the concentration of the solutions is 2–4 times isotonic with serum. Brain tissue behaves as if freely permeable to glucose, fructose, and sucrose in the absence of electrolyte, but impermeable to sugars in the presence of a small amount of a salt. Small additions of substances known to affect permeability *in vivo* or nervous activity (adrenal cortical extract, acetylcholine, eserine, metrazole, Na pentobarbital) did not significantly affect the swelling in isotonic NaCl solution or in a mixture of 1 volume isotonic NaCl and 9 volumes isotonic glucose.

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

Effect of Excitation on Nerve Permeability. Euler, H. v., Euler, U. S. v., and Hevesy, G. (*Karolinska Inst., Stockholm*). [*Acta Physiol. Scand.*, **12**, 261–7 (1946).]

When the sciatic nerve of the cat is stimulated by condenser shocks 50 times per second, giving maximum motor reactions, the nerve permeability is increased over that of the resting state (as demonstrated by means of radioactive isotopes of K, Na, P and Br) in the ratio of $1{\cdot}55 \pm 0{\cdot}10$.

S. MORGULIS (Chem. Abstr.).

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Inhibition of the Anaerobic Glycolysis of Rat Brain by Adrenochrome. Randall, Lowell O. (Wellcome Research Labs., Tuckahoe, N.Y.). [*J. Biol. Chem.*, **165**, 733–4 (1946).]

The glycolytic rate of rat-brain homogenates was measured by the manometric method of Utter, Wood, and Reiner (*C. A.*, **40**, 1217[7]). Anaerobic glycolysis of rat-brain homogenates was inhibited by small concentrations of adrenochrome. Adenosinetriphisphate (ATP) increased the rate of glycolysis and partially overcame this inhibition. 0·001 mgm. of adrenochrome inhibited the glycolytic rate by more than 50 per cent., while, in the presence of 1 mgm. of ATP, 0·02 mgm. of adrenochrome was required for a 50 per cent. inhibition. The fact that ATP partially counteracted the inhibition produced by small concentrations of adrenochrome indicates that the latter inhibits the phosphate-transfer mechanism of the glycolytic cycle. Since oxidizing agents, such as iodine, quinone and dichlorophenolindophenol produce an inhibition of glycolysis which is counteracted by glutathione, the possibility is suggested that adrenochrome also produces inhibition by a reversible oxidation of the sulfhydryl groups of the enzymes of glycolysis.

HILDA H. WHEELER (Chem. Abstr.).

Calcium Ions in Neuromuscular Transmission. Coppee, G. (Inst. Leon Fredericq, Liege). [*Arch. intern. physiol.*, **54**, 323–36 (1946).]

Ca ions in physiological concentration assure maximum security for transmission of excitation, for regulation of the voltage of the response of motor bases and of the critical voltage, and for prevention of repetitive response.

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

Asphyxial Depolarization in the Spinal Cord. Harreveld, A. van. (Calif. Inst. Technol., Pasadena). [*Am. J. Physiol.*, **147**, 669–82 (1946).]

The existence of depolarization potentials during asphyxiation of the cord was studied, and an attempt was made to correlate the changes in the polarized structures thus recorded with the changes in the reflex activity during the development of and the recovery from asphyxia. E. D. WALTER (Chem. Abstr.).

Circulatory Modifications in the Brain in the Course of Experimental Pyruvate Poisoning. Dobrovolskaia-Zavadskaia, Nadine. [*Compt. rend.*, **223**, 519–21 (1946); *cf. C. A.*, **40**, 3526[8].]

Animals were treated with Na pyruvate (I) alone, NaCl (II) alone, or a combination of (I) and (II). The brains of the dead animals were examined microscopically. The hyperemia produced by (I) was slightly less than that produced by (II). Diffuse edema was not observed, but there was a dilatation of the perivascular pericellular spaces. Large veins contained blood, but small vessels were completely collapsed by the pressure of the fluid. This was most marked when animals were treated with (I) and (II). The administration of vitamin B_1 with (I) or vitamin PP with pyruvic acid did not save the life of the animals, but the brain showed less alteration. RACHEL BROWN (Chem. Abstr.).

Chronaximetric Study of Experimental Chronic Alcoholic Intoxication; Attempted Protection by Sugars and Thiamine. Chauchard, Paul, Mazoue, Henriette, and Lecoq, Raoul (Sorbonne, Paris). [*Compt. rend. soc. biol.*, **140**, 47–8 (1946).]

Daily administration of EtOH (5–10 gm./kgm.) to rats caused a decrease in nerve chronaxia and an increase in muscle chronaxia, similar to the changes seen in polyneuritis and acidosis. Feeding glucose or lactose had a slight corrective effect; thiamine or riboflavin or both together had no beneficial effect on chronaxia.

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

Radiopotassium Autography of Rat Brain. Colfer, Harry F., and Essex, Hiram E. (Mayo Foundation, Rochester, Minn.). [*Proc. Soc. Exptl. Biol. Med.*, **63**, 243–4 (1946).]

K^{42}, as chloride, was injected intraperitoneally in rats in a dose of 0·75 millicuries per 100 gm. body-weight. After 12–18 hours the brain was removed and

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cut in slices 6–12μ thick. The slices were placed on dental x-ray film for 12–24 hours, then the films were developed. It was found that the distribution of K^{42} in the brain was fairly homogeneous, except for slightly greater concentration in the cerebral and cerebellar cortex, the basal ganglia, and the roof of the fourth ventricle. L. E. GILSON (Chem. Abstr.).

Prolongation of Consciousness in Anoxia of High Altitude by Glucose. Riesen, Austin H., Tahmisian, T. N., and Mackenzie, Cosmo G. (Yale Univ.). [*Proc. Soc. Exptl. Biol. Med.*, **63**, 250–4 (1946).]

Preflight administration of 80 gm. of glucose in water to individuals on a normal diet produced a significant increase in the resistance to unconsciousness from anoxia at 27,000–30,000 ft. The protection afforded flying personnel by the glucose solution was greater 30–50 minutes after ingestion than at 60–80 minutes after ingestion. At 27,000 ft. the average duration of consciousness was increased approximately 40 per cent., or more than 1 minute. Vitamin C, alone or with the glucose, had no demonstrable effect on the duration of consciousness.
L. E. GILSON (Chem. Abstr.).

The Relation Between Sulfhydryl Groups and Pyruvate Oxidation in Brain Tissue. Peters, R. A., and Wakelin, R. W. (Oxford Univ.). [*Biochem. J.*, **40**, 513–16 (1946).]

The pyruvate oxidase system and the pyruvate dehydrogenase component are much more sensitive than succinic-dehydrogenase to Na maleate. Likewise, pyruvate dehydrogenase can be inactivated by cystine and reactivated by cystine ester. These effects are thought to be due to the presence of an essential — SH group in the enzymes. S. MORGULIS (Chem. Abstr.).

Biochemistry of Reflex Activity. I. Phosphorylation of Glucides of Nervous Tissue and Reflex Activity. Mitolo, Michele (R. Univ. Bari). [*Arch. fisiol.*, **42**, 1–24 (1942).]

The distribution of P in cerebrospinal tissue of frogs after 4 hours of apparent repose and after 4 hours of reflex activity respectively was: Inorganic P 32·5 and 35·6 mgm. per cent.; phosphocreatine P 0·00 and 0·00 mgm. per cent.; pyrophosphate P 19·3 and 11·3 mgm. per cent.; difficultly hydrolyzed P 84·8 and 61·6 mgm. per cent.; and acid-soluble P 136·6 and 108·5 mgm. per cent.
H. L. WILLIAMS (Chem. Abstr.).

Intracranial Neoplasms Produced in Dogs by Methylcholanthrene. Mulligan, R. M., Neubuerger, K. T., Lucas, J. T., jun., and Lewis, W. B. (Univ. of Colorado School of Med., Denver). [*Exptl. Med. Surg.*, **4**, 7–19 (1946); *cf. C. A.*, **39**, 744[6].]

Implantation of 100 mgm. methylcholanthrene in gelatin capsules beneath the dura over the right frontoparietal area of the cerebrum led to the production of intracranial neoplasms (extracerebral fibrosarcoma, glioma, and sarcomatous meningioma) in 378–436 days in 3 of 7 young male mongrel bulldogs.
MARION HORN PESKIN (Chem. Abstr.).

Curare and the Rigidity of Decerebration. Minz, B., and Veil, Catherine (La Sorbonne, Paris). [*Compt. rend. soc. biol.*, **140**, 466–7 (1946).]

The body rigidity produced in rabbits by section of the nerve axis between the anterior and posterior corpora quadrigemina disappears immediately after injection of 0·75 mgm./kgm. of orthocurare. Normal respiratory movements continue. Electric stimulation of the sciatic nerve produces muscle contraction, and intra-arterial injection of acetylcholine into a leg artery causes contraction of the muscles served. Since the peripheral sensory and motor apparatus thus remains intact, it appears that the action of the curare is central. An hour or more after the curare injection a state of complete rigidity again gradually develops.
L. E. GILSON (Chem. Abstr.).

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Studies of Indophenal Oxidase on the Central Nervous System. II. Indophenal Oxidase of the Various Portions of the Nerves of Animal and Man. Mitolo, Michele (Univ. Bari, Italy). [*Boll. soc. ital. biol. sper.*, **22**, 221–4 (1946); *cf. C. A.*, **40**, 6531[5].]

Different portions of the nerves of 14 species of animal and man were tested and the results charted. There was a great variation in the indophenal oxidase power in the various species. In general the power was less as the animals descended in the zoological scale. The indophenal oxidase activity was always greater in the grey matter of the nerves than in the white.

HELEN LEE GRUEHL (Chem. Abstr.).

The Blood Glucose : Spinal Fluid Glucose Ratio. I. Its Variations in Experimental Hypoglucemia. Tolone, Salvatore (Univ. Naples). [*Boll. soc. ital. biol. sper.*, **19**, 305–6 (1944).]

In normal dogs the blood glucose : spinal fluid glucose ratio averages 1·54, as compared with 1·77 for human subjects. In dogs the hypoglucemia provoked by injection of appropriate doses of insulin, thiamine or nicotinic acid is followed by a decrease in spinal-fluid glucose, but the changes are very slight compared to those in the blood.

II. *Its Variations in Experimental Hyperglucemia.* [*Ibid.*, 306–8.]

Hyperglucemia provoked by injection of glucose, metrazole, adrenaline, or synthetic adrenocortical hormone (cortenil Bayer) was accompanied by relatively slight increases in spinal fluid glucose. The injection of adrenaline into the spinal canal produced the same effects as intravenous injection.

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

Production of Electricity by Nerve. Barnes, T. Cunliffe, and Beutner, R. (Hahnemann Med. Coll. and Hosp., Philadelphia, Pa.). [*Science*, **104**, 569–70 (1946).]

Previously it has been reported (*C. A.*, **35**, 7431[1]; **37**, 1435[5]; **39**, 2298[8]; **40**, 1548[6], 1580[1], 4785[3]) that the chemical mediator of the nerve impulse, acetylcholine (I), sets up a negative phase boundary potential in the lipide layer of the nerve fiber. The lipide-soluble (I) dissolves in the oil layer to a much greater extent than in the saline, thus establishing a true phase-boundary potential, which can be demonstrated on an oil layer several cm. thick, thereby eliminating any permeability changes in an imaginary sieve membrane. When cholesterol is added to the oil layer, the phase-boundary potential is increased. A filtered cat-brain extract with guaiacol gives 45 mv. negative potential with 0·05 per cent. added (I) in contrast to 30 mv. from 0·05 per cent. (I) in guaiacol without brain extract. The addition of human serum, which contains serum cholinesterase and small amounts of cell cholinesterase, to the saline phase brings the oil cell model still closer to living nerve. Four c.c. of human serum added to 200 c.c. of 0·9 per cent. NaCl with $NaHCO_3$ to make pH 8·2, at 37° for 8 hours, destroys the electrogenic activity of 0·05 per cent. (I) as tested in the oil cell. This demonstrates that it is the (I) and not the esterase which produces the electric nerve impulse. The rise and fall of the spike potential in peripheral nerve can be duplicated in the oil cell by placing the (I) first on one side and then on the opposite side of the oil layer. With resin in the oil a film less than 0·1 mm. thick can be formed by pressure on the saline on one side. Under these conditions a potential of 30 mv. produced by 0·05 per cent. (I) falls to 0·0 in 4 hours, due to penetration of the alkaloid to the opposite side. (I) is the only substance so far found capable of producing the action current in nerve. Triglyceride oils establish potentials with sympathomimetic, but not with parasympathomimetic drugs. The study of the phase-boundary potential can be applied directly to nerve. Frog sciatic nerve is immersed in isotonic glucose for 1–2 hours to eliminate short circuits by salts. The ends are tied, and the nerve forms a loop between 2 watch-glasses of isotonic glucose connected to a potentiometer. Addition of 1 : 160,000 (I) to the solution bathing the part of the nerve in one dish sets up a phase-boundary potential of 10 negative mv., the magnitude of which decreases with time. These experiments support the theory that the electric nerve impulse is a phase-boundary potential produced by (I) in contact with nerve lipides.

BRUNO VASSEL (Chem. Abstr.).

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Influence of Glucose Loading on the Glucose of Spinal Fluid in Tuberculous Meningitis. Cicala, V., and Robertaccio, A. (Hosp. Domenico Cotugno, Naples). [*Boll. soc. ital. biol. sper.*, **19**, 193–5 (1944).]

The glucose content of spinal fluid is below normal in tuberculous meningitis, and shows little or no increase after oral administration of glucose.

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

Endogenous Purine Metabolism and the Vegetative Nervous System of the Endocrine (Glands). (1) Influence of the Thyroid (Gland) on the Endogenous Purine Metabolism. Rubino, A. (Univ. of Sassari). [*Policlinico (Rome) Med. Pt.*, **48**, 349–68 (1941).]

Four subjects at rest and on purine-free diets were injected with the thyroid hormone preparation elityran (Bayer), 3–4 ampoules per day for 4 consecutive days (strength of dose not given). Diuresis tended to increase after the hormone administration. Uricacidemia, uricaciduria, and total purine substances decreased. The purine bases at first followed the shape of the uricaciduria curve, then instead of a pronounced minimum, showed a sharp maximum. This rise in intermediary products of purine metabolism indicates stimulation of nucleo-protein katabolism under influence of the thyroid and increased rate of oxidative processes. The decrease of uric acid in the blood accompanied by its diminished excretion suggests the strong possibility that it is further decomposed in the human body. These experiments give support to the view that the thyroid gland stimulates uricolysis in the liver.

C. S. SHAPIRO (Chem. Abstr.).

Preparation and Chemistry of Anterior Pituitary Hormones. White, Abraham (Yale Univ.). [*Physiol. Rev.*, **26**, 574–608 (1946).]

The six hormones obtained in the last decade from the anterior pituitary are proteins and appear to be individual hormones. The lactogenic, adrenotropic, growth and luteinizing hormones are the ones most highly purified; the thyrotropic has been highly purified, but its protein purity has not yet been rigidly established, while the gonadotropic or follicle-stimulating hormone must be purified further. The biological activity of these hormones seems to be intimately related to the protein nature of the substance, and the slightest alteration in its protein structure results in partial or compete loss of activity. The adrenotropic hormone seems to be an exception in that it retains biological activity even after a significant number of its peptide linkages have been split. So far it has not been possible to obtain evidence of the existence of some specialized active groups in these protein hormones, although glucide has been recognized as a component of the thyrotropic, gonadotropic, and luteinizing hormones. Enzymes which split glucide inactivate the gonadotropic hormone, and the glucide group may be important in its biological activity, but this conclusion must be regarded as tentative. There are some species differences among the pituitary hormones manifested in their physical and chemical properties, these being most striking for the luteinizing hormone.

S. MORGULIS (Chem. Abstr.).

Mechanism of the Development of Obesity in Animals with Hypothalamic Lesions. Brobeck, John R. (Yale Univ.). [*Physiol. Revs.*, **26**, 541–59 (1946).]

Biochemically the interruption of axons due to hypothalamic lesions profoundly alters the energy balance; this leads to a retention of large surpluses of energy in the form of neutral fat. All other metabolic changes are simply secondary manifestations of the specific deficiency in the regulation of energy intake and output. There is nothing remarkable about the chemical composition of the accumulated fat. The animals utilize it if the food supply is inadequate; besides, the respiratory quotients of fasting obese rats are within the normal limits. There is evidence, however, in animals with hypothalamic hyperphagia that the transformation of carbohydrate to fat is tremendously accelerated. Conclusion: The hypothalamus normally participates in the maintenance of the overall energy equilibrium, and the control of food intake, work output and body temperature may be correlated and integrated within this portion of the diencephalon.

S. MORGULIS (Chem. Abstr.).

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Influence of Corticosterone on Neuromuscular Excitability and Fatigability. Borgatti, G. (Univ. Bologna, Italy). [*Boll. soc. ital. biol. sper.*, **17**, 671–3 (1942); *cf. C. A.*, **40**, 5150^5.]

In frogs and guinea-pigs desoxycorticosterone acetate (in oil) was injected into muscle with connections to the central nervous system severed but circulation intact. The nerve excitability was markedly increased (chronaxia decreased) and the muscle excitability was slightly increased. As shown by the ergograph, the work capacity of the muscle was increased.

Influence of Male Sex Hormone on Neuromuscular Chronaxia and Ergograph in the Guinea-pig. [*Ibid.*, 673–4.]

In experiments similar to the preceding, testosterone produced effects similar to, but less marked than those of desoxycorticosterone acetate.

Modification of Neuromuscular Excitability and Fatigability by Cholesterol. [*Ibid.*, **18**, 3–4 (1943).]

Cholesterol injected into muscles produced effects similar to those of testosterone and desoxycorticosterone. L. E. GILSON (Chem. Abstr.).

The Selectivity of the Inhibition of the Gonadotropic Function of the Hypophysis Caused by Estrogenic Substances. Gaarenstroom, J. H., and de Jongh, S. E. (Rijks-Univ., Leyden). [*Verslag. Gewone. Vergader. Afdeel Naturk. Nederland. Akad. Wetenschap.*, **52**, 446–52 (1943).]

There are at least two substances in the gonadotropic secretion of the hypophysis: one which stimulates development of the interstitial tissue of the testis, and another which initiates growth of the seminiferous tubules. Evidence for the presence of two distinct substances was obtained from transplantation experiments. The authors implanted hypophysis tissue both from rats which had been treated with estradiol benzoate and from untreated rats into the abdominal cavities of hypophysectomized rats. Hypophyses from treated rats produced less effect on the interstitial tissue of the testis of the receptor rats than did hypophyses from untreated rats, but had about the same effect on the seminiferous tubules. Another type of experiment also gave evidence of the plurality of hormones in the hypophysis. Administration of $\frac{1}{4}$ unit of pregnyl (placental gonadotropic hormone) daily for 12 days decreased both the germinal and the interstitial tissue in hypophysectomized rats, but increased both in normal rats; it did not affect the weight of the seminal vesicle. Administration of estradiol benzoate by itself decreased the weight of both interstitial tissue and germinal tissue of the testis of normal rats. Administration of both estradiol benzoate and pregnyl increased germinal tissue and decreased interstitial tissue. N. M. PAYNE (Chem. Abstr.).

The Influence of Vitamin B_1 on the Nervous System. Haex, A. J. Ch., and Gaillard, P. J. (State Univ. Leyden). [*Acta Brevia Neerland. Physiol. Pharmacol. Microbiol.*, **11**, 113–16 (1941) (*in English*).]

Nervous tissue from the optical lobe of chick embryos $7\frac{1}{2}$ to $8\frac{1}{2}$ days old was grown in a medium consisting of 1 volume chicken plasma, 1 volume press juice of chicken embryos 9 days old, diluted 1 : 2 with a physiological salt mixture (Titro salt), and 1 volume of a vitamin B_1 solution which was varied to give 1, 2·5, 5, 10, 12·5, 16·7, 25, 50 and 100 I.U. per explant. After culturing for two 24-hour periods the explants were fixed, cut into 10μ slices and stained with cresyl violet. The control sections remained nearly unaltered. In those where the vitamin had been added to the medium a distinct development of normal fibroblasts occurred. This influence of the vitamin B_1 varied with the concentration, and was absent in those cultures which were grown with the largest amount of the vitamin. An optimal concentration of 10 I.U. per explant was established.

GERTRUDE E. PERLMANN (Chem. Abstr.).

The Influence of Thiamine on the Susceptibility of Chicks to Avian Encephalomyelitis. Cooperman, J. M., Lichstein, H. C., Clark, P. F., and Elvehjem, C. A. (Univ. of Wisconsin, Madison). [*J. Bact.*, **52**, 467–70 (1946).]

One-day-old white leghorn chicks were divided into 3 groups, receiving a low, suboptimum, and optimum intake of thiamine, and inoculated with a virus sus-

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pension of avian encephalomyelitis. The chicks receiving the highest level of thiamine were protected to the greatest degree. Another group of day-old chicks were given an optimum level of thiamine for 2 weeks, then divided into the 3 groups for 2 weeks and inoculated. In this case the chicks receiving the least thiamine were protected to the greatest degree.

JOHN T. MYERS (Chem. Abstr.).

Avitaminotic Ailments of the Nervous System in Besieged Leningrad. Razdol'skii, I. Ya. [*Klin. Med.* (*U.S.S.R.*), **23**, *Nos.* 7–8, 14–19 (1945).]

Pellagra was the most common disease resulting from poor vitamin supply during the siege of Leningrad, although other forms of polyneuritis were widespread. Nicotinic acid was very effective as a therapeutic agent, although intralumbar injections of vitamin B_1 served excellently to combat the psychological symptoms of vitamin deficiency. G. M. KOSALAPOFF (Chem. Abstr.).

Effect of Vitamins on Sensitivity of Striated Muscle to Acetylcholine and Potassium. Torda, Clara, and Wolff, Harold G. (*Cornell Univ. Med. Coll., New York, N.Y.*). [*Exptl. Med. Surg.*, **4**, 50–3 (1946); *cf. C. A.*, **40**, 6173[8].]

In the course of an investigation of the behavior of striated muscle in patients with myasthenia gravis, a search for substances modifying the sensitivity of striated muscle to indirect and direct stimulation was undertaken. The acetylcholine sensitivity of frog muscle was decreased in the presence of vitamins A and B_1 (higher concentrations), increased in the presence of riboflavin and menadione (higher concentrations), and not affected by p-aminobenzoic acid, nicotinamide, nicotinic acid, pyridoxine, Ca pantothenate, or vitamins C, D or E. The K sensitivity decreased in the presence of vitamin A and Ca pantothenate (higher concentrations) and increased in the presence of most of the other substances used, especially menadione. MARION HORN PESKIN (Chem. Abstr.).

The Influence of Thiamine on the Action of Acetylcholine on Muscle. Sadhu, D. P. (*Presidency Coll., Calcutta, India*). [*Am. J. Physiol.*, **147**, 233–6 (1946).]

Thiamine in sufficiently high concentration annuls to various degrees the effect of acetylcholine, but not when the Ca-ion level is too low. Thiamine in high concentration annuls the effect of acetylcholine on the heart even in the presence of eserine. It prevents the inhibitory action of vagus stimulation on heartbeats.

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

The Direct Action of Prostigmine on Skeletal Muscle; Its Relationship to the Choline Esters. Riker, Walter F., jun., and Wescoe, W. Clarke (*Cornell Univ. Med. Coll., New York, N.Y.*). [*J. Pharmacol.*, **88**, 58–66 (1946).]

The destruction of muscle cholinesterase was effected by injecting an anticholinesterase, diisopropyl fluorophosphate (DFP), into the artery supplying the muscle. The characteristic contractile responses of cat leg muscle to the intra-arterial injection of acetylcholine or prostigmine (I) were essentially unaltered in the absence of cholinesterase. The effect of DFP on the activity of skeletal muscle differs from that of (I) in that it produces only scattered irregular fasciculations after a latent period of 2–5 minutes. The action of (I) appears to be primarily directly on the muscles and differs from that of an antiesterase. Because of the similarity in structure of (I) and the natural and synthetic choline esters it is reasonable to predicate a common basis of action for all.

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

Action of Cocarboxylase in the Synthesis of Acetylcholine. Minz, B. (*Sorbonne, Paris*). [*Compt. rend. soc. biol.*, **140**, 412–14 (1946).]

The dorsal muscle of the leech, in the presence of air, cocarboxylase, choline and eserine, rapidly forms a substance which causes the muscle to contract. Presumably choline is converted into acetylcholine and cocarboxylase in some manner aids the reaction. L. E. GILSON (Chem. Abstr.).

Oscillations of the Tone of the Respiratory Muscles Provoked by Acetylcholine in Decerebrated Animals. Pupilli, G., and Bottoni, A. Sacchi (*Univ. Bologna, Italy*). [*Boll. soc. ital. biol. sper.*, **18**, 258–60 (1943).]

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

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Sulfhydryl Groups in the Action of Acetylcholine and Inhibition of the Vagus Nerve. Koshtoyants, Kh. S., and Turpa'ev, T. M. (*Acad. Sci. U.S.S.R., Moscow*). [*Nature*, **158**, 837–8 (1946).]

The cardio-inhibitory effect due to vagus nerve stimulation and acetylcholine is abolished after application of 10^{-3} and 10^{-4} $HgCl_2$ to the frog heart. $HgCl_2$ binds SH groups. The effect is restored after the heart is washed with 2×10^{-3} cysteine. The inhibition of acetylcholine action by atropine is not reversed by cysteine. LEONARD J. COLE (Chem. Abstr.).

Action of Acetylcholine on Maximum Tolerance to Oxygen Deficiency. Scoz, G., and Michele, G. De (*Univ. Naples*). [*Boll. soc. ital. biol. sper.*, **19**, 3–4 (1944).]

In patients with pulmonary tuberculosis the subcutaneous injection of 100 mgm. of acetylcholine increased the tolerance to low concentrations of O but did not increase the total O consumption. Adrenaline had little or no such effect and glycerophosphates had no effect.

Action of Acetylcholine on the Erythrocyte Count of the Peripheral Blood. [*Ibid.*, 4–5.]

In the above experiments the acetylcholine produced a transient rise in the red cell count in the hour following the injection.

Action of Acetylcholine on Maximum Tolerance to Oxygen Deficiency and on the Erythrocyte Count. Michele, G. De, and Scoz, G. [*Ibid.*, 6–7.]

The two effects show no significant correlation.

Action of Histamine on Maximum Tolerance to Oxygen Deficiency. Michele, G. De. [*Ibid.*, 8–9.]

In pulmonary tuberculosis patients the intramuscular injection of 0·5 mgm. of histamine-HCl slightly decreased tolerance to air mixtures with lowered O content. L. E. GILSON (Chem. Abstr.).

The Influence of Sodium Salicylate on the Action of Acetylcholine. Valenzuela, Manuel de Armijo (*Fac. Medicina Cadiz*). [*Farmacoterap. actual* (*Madrid*), **3**, 684–9 (1946).]

Na salicylate in concentrations of 1 : 100,000 to 1 : 10,000 has no influence on the eserinized dorsal muscle of the leech, but it reduces the response to acetylcholine. This effect changes to augmentation at concentrations of more than 2 : 10,000, when the salicylate becomes active directly. The action on the non-eserinized muscle is similar, although at higher concentrations. Continued administration of Na salicylate to humans causes a decrease in acetylcholine activity of the spinal fluid. A. E. MEYER (Chem. Abstr.).

Synthesis of Acetylcholine in Brain. Balbi, R. (*Univ. Naples*). [*Boll. Soc. ital. biol. sper.*, **18**, 285–7 (1943).]

The synthesis of acetylcholine by rat brain homogenate in Ringer solution containing eserine was demonstrated. The synthesis, at pH 7·4, was accelerated by glucose and Na pyruvate, lactate, acetoacetate, and acetate, the effectiveness decreasing in the order named. L. E. GILSON (Chem. Abstr.).

Acetylcholine in the Blood of Patients with Gastric or Duodenal Ulcers. Al'pern, D. E. [*Klin. Med.*, **23**, *Nos.* 7–8, 52–4 (1945).]

See *C. A.*, **40**, 7361[9]. G. M. KOSOLAPOFF (Chem. Abstr.).

Presence of Acetylcholine in the Blood of Patients with Ulcers. Bykhovskii, Z. E., and Korenevskaya, O. G. [*Klin. Med.*, **23**, *Nos.* 7–8, 54–7 (1945).]

The authors found acetylcholine in the blood of 60·4 per cent. patients suffering from gastric or duodenal ulcers, with the level corresponding usually to the gravity of the case. Most frequent occurrence was observed in cases involving the parasympathetic nervous system. G. M. KOSALOPOFF (Chem. Abstr.).

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Apparent Curare Effect of Substances that Decrease Acetylcholine Synthesis. Torda, Clara, and Wolff, Harold G. (Cornell Univ. Med. Coll., New York, N.Y.) [*Am. J. Physiol.*, **147**, 384–90 (1946); *cf. C. A.*, **40**, 2211[9].]

Uric acid, pyrrole, alloxan, methylguanidine, vitamin K, NH_3, hydroquinone, α-naphthol, β-naphthol and glyceraldehyde decreased the response of striated muscle to indirect stimulation. Serum collected from the working arm of human subjects also decreased the response of striated muscle to indirect stimulation and decreased the synthesis of acetylcholine without decreasing the response of excised muscle to acetylcholine. It is suggested that an apparent curare effect may be exerted by substances acting, not on some structure or process within the muscle, but on the nerve tissue. E. D. WALTERS (Chem. Abstr.).

Nervous System Changes Produced in Dogs by Choline and Carbamylcholine. Davis, John E., and Fletcher, D. E. (Univ. of Arkansas, Little Rock). [*J. Pharmacol.*, **88**, 246–53 (1946).]

Hyperchromic anemia was produced in dogs by daily administration, for several weeks, of choline chloride or carbamylcholine or both. Definite changes in the nervous system were also produced. In the acute phase the lesions were characterized by multiple hemorrhages in the grey substance of the brain and spinal cord, and by a diffuse gliosis and acute neurone changes. After recovery from drug treatment, the lesions were chracterized by perivascular gliosis, glial nodules, diffuse scar formation and neurone depletion. The similarity and differences between these changes and those found in pernicious anemia, and the possible etiological factors responsible for the changes, are discussed.

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

Studies on Choline Acetylase. III. Preparation of the Coenzyme and Its Effect on the Enzyme. Nachmansohn, David, and Berman, M. (Columbia Univ.). [*J. Biol. Chem.*, **165**, 551–63 (1946); *cf. C. A.*, **40**, 4403[3].]

The coenzyme necessary (I) for the activity in nerve tissue of choline acetylase (II) was prepared from brain, liver, heart and skeletal muscle by grinding the tissue in a Waring blender with 1–2 times its weight of water, heating to 100°, and filtering. Proteins were removed from the filtrate by precipitation with AcOH and filtration. The filtrate was neutralized and showed coenzyme activity. (I) can be partially purified by precipitation with $Ba(OH)_2$ and redissolving with Na_2SO_4. Boiling (I) in 0·1 N HCl caused more rapid loss in activity than did boiling in water, while boiling for ½ hour in 0·1 N NaOH caused the disappearance of all the activity. While K and cysteine cause partial reactivation of dialyzed (II), (I) causes complete reactivation. Addition of (I) to undialyzed (II) increased the rate of acetylcholine formation. (II) was shown to be present in sensory nerves. Evidence was also found for the presence of (II) in invertebrates, since the addition of (I) to extracts of lobster abdominal chain caused a large increase in the rate of acetylcholine formation. Diisopropyl fluorophosphate, which inhibits cholinesterase, did not affect (II). Approximately doubled activity was exhibited by (II) if, in addition to (I), Mg or Mn was present. The effect of Mg was the same on dialyzed as undialyzed (II). Mg could not replace K. High-speed centrifugation at 48,000 r.p.m. increased the purity of (II), the activity being found in the bottom layer, which showed only one component. Methylnaphthoquinone and 2-methyl-1,4-naphthoquinone-8-sulfonic acid inhibited (II).

A. JEROME GANZ (Chem. Abstr.).

The Effect of Chloroform and Ether on the Activity of Cholinesterase. Miquel, Ovidio (Cornell Univ. Med. Coll., New York, N.Y.). [*J. Pharmacol.*, **88**, 190–3 (1946).]

Ether and $CHCl_3$ in concentrations corresponding to those attained during deep general anesthesia do not inhibit the activity *in vitro* of the nonspecific cholinesterase of cat serum and the specific cholinesterase of eel electric organ. Higher concentrations partially inhibit the activity. The inhibiting action of ether in high concentrations is partially reversible. These observations support the hypothesis that the parasympathetic effects observed during general anesthesia from ether and $CHCl_3$ are not due to inhibition of cholinesterase activity.

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

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Cholinesterase and Pseudocholinesterase. Vincent, D., [*Presse med.*, **54**, 571–3 (1946).]

True cholinesterase of the nervous system is effective at a maximum concentration of acetylcholine of 1 mgm. in 100 c.c. The non-specific pseudocholinesterase of the serum and pancreas is most effective at a concentration of 100 mgm. per 100 c.c. Acetyl-β-methylcholine is hydrolyzed by true cholinesterase. Benzoylcholine is split by the pseudocholinesterase.

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

Action of Calcium, Barium and Magnesium on Blood Cholinesterase. Scoz, G., and Michele, G. De (Univ. Naples). [*Boll. soc. ital. biol. sper.*, **19**, 24 (1944).]

In Na barbital buffer solution of pH 8 low concentrations of Ca++, Ba++ and Mg++ increased and high concentrations inhibited the cholinesterase activity of whole blood. Removal of Ca++ from blood (by oxalate) inhibits the cholinesterase activity. L. E. GILSON (Chem. Abstr.).

Anaphylaxis and Cholinesterase Activity. Laborit, H., and Morand, P. [*Press med.*, **54**, 533–4 (1946).]

It is claimed that anaphylactic shock is caused by acetylcholine, and seems to be determined by a deficiency in cholinesterase. A. E. MEYER (Chem. Abstr.).

The Significance of Serum Cholinesterase. Cristol, P., Passouant, P., Benezech, C., and Dutarte, G. [*Presse méd.*, **54**, 557–8 (1946).]

The level of serum cholinesterase is low in uncompensated cirrhosis of the liver, jaundice, active pulmonary tuberculosis, nephritis with edema, and insulin-treated diabetes. It is normal or increased in jaundice caused by biliary obstruction, in inactive tuberculosis, untreated diabetes, and in hypertension.

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

Cholinesterase Determinations. Aron, Émile, and Herschberg, A. D. [*Presse med.*, **54**, 107–8 (1946).]

The determination of cholinesterase does not seem to be of value as a means of differential diagnosis. The cholinesterase is high wherever the acetylcholine activity is increased. Therefore it is high in asthma, spastic constipation, and similar conditions of high parasympathetic tonus. The determination has mainly a prognostic value. A. E. MEYER (Chem. Abstr.).

A New Biological Test : The Determination of Cholinesterase Activity and Its Clinical Importance. Laborit, H., and Morand, P. [*Presse méd.*, **54**, 106–7 (1946).]

The determination is of interest in angina and coronary disease, Raynaud's disease, megacolon, gastric ulcer, insulin-resistant diabetes, bronchial dilatations, and vascular affections of the retina. In asthma hypoactivity of cholinesterase is observed. A. E. MEYER (Chem. Abstr.).

Protection of Cholinesterase Against Irreversible Inactivation by Diisopropyl Fluorophosphate in vitro. Koelle, Geo. B. (Edgewood Arsenal, Md.) [*J. Pharmacol.*, **88**, 232–7 (1946).]

Eserine, by combining reversibly with rat brain cholinesterase, protects the enzyme against irreversible inactivation by diisopropyl fluorophosphate (DFP) *in vitro*. The degree of protection varies directly with the concentration of eserine. This may explain how eserine protects cats against DFP poisoning. Of 19 other anticholinesterase drugs similarly tested, prostigmine and carbamylcholine afforded marked protection ; pilocarpine, nicotine, atropine, choline, procaine and morphine afforded relatively slight protection ; and methylene blue, strychnine, atebrin, quinine, NaF, thiamine, cysteine, Na p-amino-benzoate, acetyl-β-methylcholine, acetylcholine and curare (intocostrin) gave no protection. The protective property does not appear to depend on the potency of anticholinesterase activity alone, but also on the ability of the compound to compete with DFP for a specific active group of the cholinesterase molecule. L. E. GILSON (Chem. Abstr.).

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Action of Atropine on Blood Cholinesterase. Scoz, G., and Michele, G. De (*Univ. Naples*). [*Boll. soc. ital. biol. sper.*, **19**, 5–6 (1944).]

Very small quantities of atropine increased the cholinesterase activity of blood *in vitro*. In normal human subjects the subcutaneous injection of 1 mgm. of atropine sulfate increased the cholinesterase activity of the blood 30–50 per cent. for several hours. L. E. GILSON (Chem. Abstr.).

Ultraspectrophotometric Studies on Cerebrospinal Fluids. Spiegel-Adolf, Mona, and Wycis, H. T. (*Temple Univ. Med. School, Philadelphia*). [*J. Phys. Chem.*, **50**, 447–52 (1946).]

Either a Hilger quartz spectrograph and sector-photometer or a D U Beckman photoelectric quartz spectrophotometer were employed to measure the extinction coefficients of cerebrospinal fluids in the wave-length range 220 mμ to 300 mμ. The results showed a marked selective absorption, with a peak at 265 mμ in cerebrospinal fluids of patients who had sustained a cerebral concussion or been subjected to convulsive disorders. The selective absorption of these fluids has been tentatively explained by the presence of nucleic acids or their derivatives, liberated by cell injury. A comparison of the selective absorption of cerebrospinal fluids with that of pure sodium thymonucleate indicates the presence of an average of 0·1 mgm. of nucleic acid per molecule in the pathological cases.
W. F. MEGGERS (Chem. Abstr.).

Influence of Thiamine on the Nicotinic Acid Content of Cerebrospinal Fluid. Malaguzzi-Valeri, Claudio, and Neri, Ferrante (*Univ. Bari, Italy*). [*Boll. soc. ital. biol. sper.*, **17**, 644–5 (1942).]

In 4 normal subjects the spinal fluid contained 15–19 γ/c.c of nicotinic acid. Parenteral administration of 100 mgm. of nicotinic acid daily for several days approximately doubled the values; 100 mgm. of nicotinic acid plus 12·5 mgm. of thiamine daily for the same period caused a decrease in spinal-fluid nicotinic acid to an average of 10γ/c.c. L. E. GILSON (Chem. Abstr.).

The Copper Content of the Cerebrospinal Fluid. Axtrup-Lund, S. (*Univ. Lund*). [*Ann. Paediat.*, **166**, 259–64 (1946).]

The Cu content of cerebrospinal fluid (measured by the method of Heilmeyer, *Fischer's Verlag*, Jena, 1941) in various diseases averaged 15γ per cent. with a range of 1 to 26γ per cent. In cases of meningeal affection the Cu content is low.
BARBARA R. MURRAY (Chem. Abstr.).

2. Pharmacology and Treatment.

Conditioned Reflex Treatment for Alcohol Addicts. [*Clin. Med.*, **53**, 220–2 (1946).]

Modern Trends in the Treatment of Alcohol Addicts. [*J. soc. Casework*, **27**, 222–9 (1946).] R. D. WEITZ (Psychol. Abstr.).

Fixation of Arsenic in the Central Nervous System During Hyperpyrexia. Untersteiner-Occhialini, L. (*Univ. Genova, Italy*). [*Boll. soc. ital. biol. sper.*, **18**, 197–8 (1943).]

Active hyperthermia was induced in rabbits by injection of a mixture of several species of killed bacteria, or passive hyperthermia was produced by placing the rabbits in a hot chamber; then a solution of arsenite or neoarsphenamine was injected. In no case was there any significant fixation of arsenic by the brain or medulla. L. E. GILSON (Chem. Abstr.).

Penicillin in the Treatment of Neurosyphilis. I. Asymptomatic Neurosyphilis. Moore, Joseph E., and Mohr, Charles F. (*Johns Hopkins Univ., Baltimore*). [*Am. J. Syphilis, Gonorrhoea, Venereal Diseases*, **30**, 405–19 (1946).]

Intramuscular injection of penicillin has a favorable influence on spinal fluid abnormalities and affects, in order, cell count, protein content, colloidal gold curve, and Wassermann reaction. The rapidity and extent of its action depends in the

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degree of the spinal fluid abnormality and the duration of the syphilitic infection. The penicillin was administered over a period of 7–10 days. Five of 48 patients with early, and 19 of 41 patients with late, asymptomatic neurosyphilis had abnormally high protein, greater than 38 mgm. per cent., in the cerebrospinal fluid. The protein content fell after treatment and attained a normal value by the sixth month. A. DIETZ (Chem. Abstr.).

Electrical Manifestations of the Cerebellum and Cerebral Cortex Following DDT Administration in Cats and Monkeys. Crescitelli, Frederick, and Gilman, Alfred (Edgewood Arsenal, Md.). [*Am. J. Physiol.*, **147**, 127–37 (1946).]

The alterations in the spontaneous electric potentials recorded from either the exposed or non-exposed cerebral cortex and cerebellum, following the intravenous administration of DDT emulsions into cats and monkeys which had been treated with small doses of Na pentobarbital to suppress the convulsive action of DDT, are presented. E. D. WALTER (Chem. Abstr.).

Action of Magnesium on the Excitability of Nerves and Muscles. Bartorelli, Cesare (R. Univ. Bologna). [*Arch. fisiol.*, **42**, 316–51 (1942); *cf. C. A.*, **40**, 5833[5].]

Muscle preparations, the gastrocnemius muscle of *R. temporaria* and *R. esculenta*, showed shortening of the chronaxia and increase of the rheobase, while nerve preparations showed lengthening of the chronaxia and a similar increase in rheobase. H. L. WILLIAMS (Chem. Abstr.).

Convulsant Action of Pyridoxine. Saviano, Mario (R. Univ. Napoli). [*Arch. fisiol.*, **42**, 375–83 (1942).] H. L. WILLIAMS (Chem. Abstr.).

Change in Neuromuscular Excitability Caused by Quaternary Ammonium Salts. Bartorelli, Cesare (R. Univ. Bologna). [*Arch. fisiol.*, **42**, 189–221 (1942).]

Gastrocnemius nerve-muscle preparations from *R. temporaria* and *R. esculenta* were made more sensitive by the iodides of tetramethylammonium, tetrapropylammonium and tetrabutylammonium, while tetraethylammonium iodide caused an initial diminution in sensitivity followed by an increase. H. L. WILLIAMS (Chem. Abstr.).

Effects of Several Local Anesthetics on the Resting Potential of Isolated Frog Nerve. Bennett, A. L., and Chinburg, K. G. (Univ. of Nebraska Med. Coll., Omaha). [*J. Pharmacol.*, **88**, 72–81, (1946).]

By a study of resting and demarcation potentials in isolated frog sciatic nerves it was shown that cocaine, procaine, intracaine, borocaine, monocaine, pontocaine, metycaine, nupercaine, naphthacaine, γ-phenyl-γ-hydroxy-β-(diethylamino)propyl benzoate, β-diethylaminoethyl-trans-α-ethylcinnamate, β-(N-methyl-N-phen-ethyl amino) ethyl carbanilate, and γ-di-ethylaminopropylphenylurethan block conduction without depolarizing the nerves. This supports the view that anesthetics in general block nerves because they stabilize those conditions, relative to the cell membrane, which normally are sufficiently labile to permit the phasic shift in potential during impulse conduction. L. E. GILSON (Chem. Abstr.).

The Synergism Between the Barbiturates and Ethanol. Ramsey, Helen, and Haag, H. B. (Med. Coll. of Virginia, Richmond). [*J. Pharmacol.*, **88**, 313–22 (1946).]

The administration of EtOH markedly increases the anesthetic and toxic actions of Na seconal (Na allyl-sec-amylbarbiturate), Na phenobarbital, and Na barbital given orally to mice and Na pentothal given to dogs. The disposition of EtOH in the body appeared not to be influenced by the presence of Na barbital; conversely, the blood level of picrotoxin was less efficient as an analeptic in rabbits given Na pentobarbital plus EtOH than in those given Na pentobarbital only. L. E. GILSON (Chem. Abstr.).

Comparative Study of Several Barbiturates with Observations on Irreversible Neurological Disturbances. Krop, Stephen, and Gold, Harry (Cornell Univ. Med. Coll., New York, N.Y.). [*J. Pharmacol.*, **88**, 260–7 (1946).]

Cats show very large individual variations, but the approximate oral LD 50 is, for seconal (allyl-sec-amylbarbituric acid), 50 mgm./kgm.; pentobarbital, 100;

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sigmodal (sec-amyl-β-bromoallylbarbituric acid and antipyrine), 110; and pernoston (sec-butyl-β-bromoallylbarbituric acid), 135 mgm./kgm. The course of action after oral administration of the above dosage in cats is, onset of ataxia in about 5 minutes, maximum narcosis in about 30 minutes, duration of full effect for about 18 hours and, if not fatal, disappearance of ataxia after 2–3 days. With phenobarbital (LD 50 = 175 mgm./kgm.) the onset of ataxia is somewhat slower and the ataxia lasts 2–3 times as long. Large doses of sigmodal cause irreversible damage of the central nervous system, resulting in motor, postural and reflex abnormalities in about 8 per cent. of cats, but not in dogs. Large doses of pernoston also sometimes damage the central nervous system of cats. Such action does not occur with compounds not containing the bromoallyl group.

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

Narcosis and Precipitation of Cellular Lipides. *Dode, Maurice, Gavaudan, Pierre, and Poussel, Helene.* [*Compt. rend.*, **223**, 521–3 (1946).]

A theory of narcosis based on precipitation under the action of narcotic is compatible with the principles of thermodynamics. It is necessary to determine the nature of the precipitation, whether it is truly a precipitation of the lipides of the lipoprotein complexes. RACHEL BROWN (Chem. Abstr.).

Action of Wine on Vestibular Chronaxia. *Mouriquand, G., and Coisnard, J.* [*Compt. rend. soc. biol.*, **140**, 294–5 (1946); *cf. C. A.*, **40**, 6656[1].]

In human subjects the ingestion of 60–100 c.c. of red wine (9 per cent. EtOH) caused a small increase in vestibular chronaxia; 200–500 c.c. caused a small decrease.

Action of Ingested Insulin on Vestibular Chronaxia. [*Ibid.*, 296–7.]

In men, children, and pigeons, the oral or parenteral administration of insulin caused an important decrease in vestibular chronaxia.

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

Metrazole Epilepsy and the Physiological Basis of Convulsant Coma Therapy. *Chauchard, Paul, Mazoué, Henriette, and Lecoq, Raoul (Hôpital de St-Germain-en-Laye).* [*Ann. pharm. franç.*, **3**, 143–9 (1945).]

A discussion of results previously obtained by Chauchard *et al.* and others (*cf. C. A.*, **39**, 1642[3]), from which various conclusions are drawn. It is thought that the electroencephalographic manifestations induced by metrazole are not due to a cerebral excitation, but to the repercussion of the excitation of the lower nerve centers on the brain. The resultant bursts of motor nerve impulses are thought to overcome the normal barrier between the cortex and the periphery. For the same reasons as insulin and electric shock, metrazole induces coma by depressing the brain and exciting the lower centers. From a therapeutic standpoint it would be inaccurate to consider this either as a pure convulsive or a pure coma-producing agent. Simple hypnotics or anesthetics do not possess the same properties. Chronaxic measurements show that convulsive coma therapies cause complex changes in the nervous system, which apparently are responsible for their greater effectiveness. The brain is not only subjected to a depressing influence; according to the observation of I. Bertrand *et al.* (*Compt. rend. soc. biol.*, **138**, 143 (1944)) it is affected by the repercussions of the mechanism of the excitation of the lower centers. A. PAPINEAU-COUTURE (Chem. Abstr.).

Tetrazole Derivatives. III. Some Pharmacologic Properties of Aminotetrazoles. *Gross, E. G., and Featherstone, R. M. (State Univ. of Iowa, Iowa City).* [*J. Pharmacol.*, **88**, 353–8 (1946); *cf. C. A.*, **40**, 6656[4].]

The stimulating and analeptic actions of the HCl salts were studied in rats, and the lethal doses were also determined. Most of them produced convulsions and depressed respiration. The lack of analeptic action is ascribed to the presence of the amino group. The optimum structural factors for central nervous stimulation appear to be the presence of a relatively large alkyl or phenalkyl group in the 1 position and a small group on the 5-amino group. The unsubstituted amino compound of the series, TT-31, showed no central nervous action, either stimulatory or depressant. L. E. GILSON (Chem. Abstr.).

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Tridione: A New Anticonvulsant Drug. **Richards, R. K., and Everett, G. M.** (*Abbott Labs., Chicago*). [*J. Lab. Clin. Med.*, **31**, 1330–6 (1946); *cf. C. A.*, **41**, 212*g*.]

A discussion of the pharmacology and therapeutic applications of tridione (3,5,5-trimethyloxazolidine-2,4-dione). Clinical investigations indicate its usefulness in the treatment of *petit mal* epilepsy, although its site of action has not yet been determined. J. P. CRISPELL (Chem. Abstr.).

The Excretion of Amphetamine. **Harris, S. C., Searle, L. M., and Ivy, A. C.** (*Northwestern Univ. Med. School, Chicago*). [*J. Pharmacol.*, **89**, 92–6 (1947).]

When 30 mgm. of dl-amphetamine (benzedrine) or 15 mgm. of d-amphetamine (dexedrine) was given daily to 10 human subjects for 56 days, the daily urinary excretion of the drug remained essentially constant. The average recovery in the urine was 45·6 per cent. for benzedrine and 47·3 per cent. for dexedrine. These results imply that the rate of destruction (presumably in the liver) remained constant, and that the development of tolerance cannot be attributed to a progressive increase in drug destruction. There was no evidence of a diuretic effect of amphetamine; the excretion of the drug was independent of urinary volume. Amphetamine did not affect the blood level of ascorbic acid.

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

Procaine Therapy. **Velazquez, B. Lorenzo.** [*Farmacoterap. actual* (*Madrid*), **3**, 655–69 (1946).]

The total pharmacology of procaine is discussed, and kymographic tracings are presented to demonstrate, in comparison with p-aminobenzoic acid and diethylaminoethanol, the inhibiting effect on the guinea-pig intestine, the antagonism to the spastic action of acetylcholine, the stimulation of the uterus, especially the enhancing effect on pituitrin, and also the increase of the pressor action of the latter in the spinal cat. The anticholinesterase action is demonstrated in experiments with the leech muscle. Various methods of local anesthesia and nerve blocking are discussed. A. E. MEYER (Chem. Abstr.).

Paralysis by Curare. **Zelikowski-Guttel, A.** (*Sorbonne, Paris*). [*Compt. rend. soc. biol.*, **140**, 451–2 (1946).]

The effects of several kinds of curare were studied in frogs. There was very little difference in the actions of orthocurare and paracurare. The paralysis produced appeared to be due to action on the central nervous system rather than to peripheral interference with transmission from nerve to muscle.

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

Effects of Ether and Curare on Neuromuscular Transmission. **Schallek, Wm.** (*Washington Univ. Med. School, St. Louis, Mo.*). [*Proc. Soc. Exptl. Biol. Med.*, **63**, 78–81 (1946).]

The response of the gastrocnemius to maximum stimulation through its nerve was studied in rats. During deep etherization there is a depression of 12 per cent. in the muscle-action potential. At the same time the respiration is depressed; anoxia alone due to this may account for 5 per cent. depression. Hence a muscular depression of only 7 per cent. can be attributed to the action of ether, not necessarily involving neuromuscular block. A synergism exists between ether and curare (intocostrin), since the effect of these agents given together is one-third greater than the sum of their separate effects. L. E. GILSON (Chem. Abstr.).

Effect of Pentothal Anesthesia on Canine Cerebral Cortex. **Homburger, E., Himwich, W. A., Etsen, B., York, G., Maresca, R., and Himwich, H. E.** (*Union Univ., Albany, N.Y.*). [*Am. J. Physiol.*, **147**, 343–5 (1946).]

The effect of light pentothal narcosis was compared with that of deep anesthesia, and the av. O intake in the brain of 7 dogs was found to fall from 5·9 c.c. O per dog per 100 gm. of tissue per min. to 2·6 c.c. O. per 100 gm. of tissue per min., a decrease of 56 per cent. The cerebral metabolic rate is higher than that obtained from the brain of man and monkey with the same methods. The difference is laid to the fact that in the dogs the venous blood came chiefly from the cerebral hemispheres, which possess a faster metabolism than the lower parts of the brain.

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

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