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AM. J. PHYSIOL.

VOL. CXLIV. 1945.

VOL. CXLV. 1945.

AM. J. PSYCHIAT.

VOL. CIII. SEPTEMBER, 1946.

Two New Drugs in Epilepsy Therapy.

Two new drugs increase the range and the effectiveness of the control of epileptic seizures.

Trimethyloxazolidine dione (tridione) used alone has proved wonderfully effective in controlling seizures of the *petit mal* triad—*petit mal* (pykno-epilepsy), myoclonic jerks and akinetic seizures. In contrast, *grand mal* convulsions were not helped or were made worse. Psychomotor seizures were occasionally aided by tridione combined with an anticonvulsant drug.

Methyl phenyl ethyl hydantoin (mesantoin), used in 35 patients, did not help *petit mal*, but in approximately one-third of patients subject to frequent major seizures it has replaced diphenyl hydantoin (dilantin) with profit; the benefit resulted either from a reduction in the frequency of convulsions, or from an absence of the unpleasant side-effects of either muscular inco-ordination or gum hypertrophy. Generalized rash or somnolence were side-effects which limited the usefulness of the drug in many patients. (Author's abstr.)

Further Observation on the Use of Tridione in the Control of Psychomotor Attacks.

Tridione, a new addition to the treatment of the cerebral dysrhythmias, is helpful in the control of psychomotor seizures. While effective in certain instances if used alone, it is most helpful if used in combination with sodium diphenylhydantoinate and/or phenobarbital.

Toxic symptoms are infrequent in patients who respond to the drug, and do not constitute an important contraindication to its use.

Further research on the oxazolidine-2,-4-dione derivatives and related drugs may afford further advances in the therapy of epilepsy. (Author's abstr.)

Orbital Cortex Syndrome following Leucotomy.

1. The orbital cortex was partly isolated in 22 schizophrenics, and good response was observed where there were symptoms of introversion, blockage, emotional dulling and depersonalization present.

2. The isolation of the orbital lobe produced a triad of symptoms described as extroversion, increased motor activity and euphoria.

3. It was emphasized that the new symptoms produced balance well with the pre-existing psychotic symptoms. (Author's abstr.)

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*Studies of the Cortical Projection of the Labyrinth. *Gerebtzoff, M. A.* . 59

Studies of the Cortical Projection of the Labyrinth. I. *Some Effects of Labyrinthine Stimulation upon the Electrical Activity of the Cerebral Cortex.*

Electroencephalographic measurements made on a cat placed in an activity cage, the speed of which could be regulated, revealed that either positive or negative acceleration of the speed of the cage resulted in electrical activity of increased amplitude and frequency. The maximal effect was localized in the vestibular projection area in the posterior suprasylvian convolution. (Psychol. Abstr.)

VOL. LI. 1941.

*The Functional State of the Cerebral Cortex in the Course of Animal Hypnosis. *Gerebtzoff, M. A.* 365

The Functional State of the Cerebral Cortex in the Course of Animal Hypnosis.

Cats and rabbits in a hypnotic state showed a marked rise in the threshold of excitability of the cortical motor area controlling mastication. It was also observed that the electrical activity of the brain was similar to that in sleep in that the amplitude of the brain waves increased while the frequency decreased. These results are interpreted as illustrating the effect of a subcortical inhibition.

(Psychol. Abstr.)

ARCH. MAL. PROFESS.

VOL. VI. 1944–45.

ARCH. NEUR. PSYCHIAT.

VOL. LVI. SEPTEMBER, 1946.

Chicago Neurological Society.

Philadelphia Psychiatric Society.

New York Neurological Society and the New York Academy of Medicine.

Pre-traumatic Personality and Psychiatric Sequelae of Head Injury. II. Correlation of Multiple, Specific Factors in the Pre-traumatic Personality and Psychiatric Reactions to Head Injury, Based on Analysis of One Hundred and One Cases.

One hundred and one civilians with acute head injuries were subjected to intensive study of multiple factors in the pre-traumatic and the post-traumatic personality status. A clinical quantitated estimate was made of the degree of each of these specific personality factors. With such a method a multidimensional perspective of each patient was obtained, by which it was possible to quantitate changes, if any, in personality following head injury.

In addition, all patients were given categorical classifications of the pre-traumatic personality (normal, psychoneurotic, psychovariant and psychopathic).

Correlations were made with the nature and estimated severity of the acute

cerebral trauma and with various potentially complicating factors, such as associated bodily injuries and various possible sources of psychologic stress (litigation, occupation and financial and marital difficulties).

It was found that in a number of patients neurotic symptoms appeared for the first time after head injury. In most patients psychologic changes following head injury became most manifest shortly after discharge from the hospital and were at a maximum three to six weeks after discharge. The duration of post-traumatic symptoms varied, but in general they were substantially receding at the end of three months. However, approximately 50 per cent. of the patients showed some persistence of symptoms at six months, and approximately 15 per cent. had symptoms which persisted a year or longer. The duration of incapacity for work paralleled the persistence of psychologic symptoms; but most patients returned to work before they were entirely free of symptoms.

Patients with pre-traumatic psychoneurotic personalities showed a greater proportion of post-traumatic psychiatric symptoms than did patients in other groups. However, the patients with pre-traumatic normal personalities were closer to the psychoneurotic patients than were members of other groups.

There was no close correlation between the severity of the acute injury of the brain and the severity of the sequelae.

There was high correlation between the existence of persistent complicating psychosocial factors, such as continuing compensation, pending litigation, occupational stresses and persistent associated bodily injuries, and the severity and persistence of psychiatric sequelae.

No correlations were found which would permit the ascription of psychiatric sequelae to one particular cause or group of causes. The psychiatric sequelae in an individual case were usually the resultant of various factors. The etiologic factors in the psychiatric sequelae in a particular case depended on specific factors in that case. (Author's abstr.)

OCTOBER.

Illinois Psychiatric Society.

New York Neurological Society and the New York Academy of Medicine.

Chicago Neurological Society.

Primary Behavior Disorders and Psychopathic Personality. I. Correlations of the Electroencephalogram with Family History and Antecedent Illness or Injury.

1. Two hundred patients, 100 each with primary behavior disorders and with psychopathic personality, showed considerably higher percentages of electrocortical abnormality, 56 and 58 per cent., respectively, than the percentages reported for presumably neurologically normal children and adults.

2. Fourteen per cent. of the patients with primary behavior disorders, in contrast to 2 per cent. of the patients with psychopathic personality, had paroxysmal electroencephalographic activity.

3. The incidences in the family history of epilepsy, maladjusted personality, chronic alcoholism and psychosis were similar in the two diagnostic groups.

4. The incidences in the personal history of convulsions, severe illness and questionable birth injury were greater for the group of patients with primary behavior disorders than for the group with psychopathic personality. The incidences of head injury were similar for the two groups.

5. When the two groups of patients were combined, significantly greater proportions of abnormal electroencephalograms were found when there was a family history of either epilepsy or of maladjusted personality.

6. The proportion of patients showing electroencephalographic abnormality appeared to be greater when the mothers were judged maladjusted or alcoholic than when the fathers were so judged.

7. When the two groups of patients were combined, significantly greater proportions of abnormal electroencephalograms were found when there was a personal history of convulsions, head injury with unconsciousness or severe illness.

8. For the category of severe illness, the younger the patient at the time of the illness and/or the more severe the illness, the greater the probability of abnormal electrocortical activity. (Authors' abstr.)

NOVEMBER.

PHILADELPHIA NEUROLOGICAL SOCIETY.

PHILADELPHIA PSYCHIATRIC SOCIETY.

Effect of Glutamic Acid on Mental Functioning in Children and in Adolescents.

On verbal, motor and personality tests given, definite improvement following glutamic acid therapy could be observed in each of our nine subjects during a six months' interval. A number of experiments have pointed to the fact that l (+)-glutamic acid has a particular relation to cerebral metabolism. Weil-Malherbe reported that l (+)-glutamic acid is the only amino acid known to be metabolized by slices of brain tissue. Recent investigations of Nachmansohn and his associates suggest that the release of acetylcholine is intrinsically connected with the electrical changes during nerve activity. They found that the energy of the action potential

is derived from energy-rich phosphate compounds and concluded that these compounds yield the energy for the formation of acetylcholine. As a result of these observations they isolated an enzyme from the brain which synthesizes acetylcholine. This enzyme, choline acetylase, becomes inactive on dialysis. Addition of l (+)-glutamic acid reactivates the enzyme.

While the precise mechanism of the action of glutamic acid on the rate of acetylcholine has still to be elucidated, the intrinsic connection of acetylcholine with nerve activity and the demonstration of an increased rate of formation of acetylcholine in the presence of glutamic acid *in vitro* make it possible to assume that the physiologic basis of the observed effects of glutamic acid is in some way related to the formation of acetylcholine. At present this seems to be the best interpretation. (Authors' abstr.)

Electrical Resistance of the Skin : Effect of Size of Electrodes, Exercise and Cutaneous Hydration.

The following observations were made : 1. Apparent skin resistance decreases (*a*) as the size of the electrode is increased, and (*b*) as the superficial layer or layers of skin become hydrated as a result of continuous contact of electrode paste with the skin. 2. Apparent skin resistance increases during rest following exercise or activity. 3. The size of the electrode is determined by the area of skin wet with the electrode paste or sweat (effective electrode), and not by the absolute size of any part of the electrode itself. 4. Any aqueous film, such as sweat, outside the area of the electrode, but continuous with the electrode paste, acts to increase the size of the effective electrode. 5. The values for apparent resistance of two areas of skin, such as the palmar and the volar surface of the forearms, which may differ greatly when the subject is at rest, approach the same magnitude when the patient exercises vigorously.

In any experiment in which the effect of a stimulus on apparent skin resistance is being measured one should be sure that the resistance is not changing as a result of (*a*) variation in the area of skin wet with the electrode paste or with sweat, (*b*) rest following exercise, or (*c*) hydration of the skin by the electrode paste. (Authors' abstr.)

Intravenous Injection of Sodium Amytal as a Test for Latent Anxiety.

1. Anxiety or tension states may give rise to symptoms referable to many systems of the body, even in patients not considered psychoneurotic.

2. Symptoms due to organic disease may be exacerbated because of tension.

3. Sodium amytal in average doses of 1½ grains (0·097 gm.) given intravenously will frequently relieve a symptom which is entirely due to tension within one to five minutes.

4. The same amount of sodium amytal will relieve that portion of the symptom due to tension in instances in which tensional pain is superimposed on pain or organic cause.

5. Sodium amytal in small doses can be used as a diagnostic test to separate symptoms of organic disease from tension symptoms.

6. The test should be used only to supplement thorough physical and psychiatric investigation. (Authors' abstr.)

ARCH. OPTH.

VOL. XXXV. 1946.

ARCH. OTOLARYN.

VOL. XLIII. 1946.

ARCH. PHYS. MED.

VOL. XXVII. 1946.

ARCH. PSICOL. NEUROL. PSICHIAT.

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ARCH. PSYCHOL., GENER.

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ARCH. SCI. CEREBR. PSICH.

VOLS. I–II. 1944–45.

ARCH. SURG.

VOL. LII. 1946.

BRAIN.

VOL. LXIX. JUNE, 1946.

Anosognosia and Disorders of Body Scheme.

Anosognosia, it is suggested, may be produced by brain damage of two kinds—focal and diffuse. That anosognosia of blindness can result from peripheral lesions blotting out the visual fields, has been shown by Redlich and Dorsey (1945); there is always co-existing clouding of consciousness. The second patient here described is another example of anosognosia of total blindness which was peripherally determined. Anosognosia of hemiplegia unassociated with agnosia of the body-half, it is thought may likewise result from non-specific lesions outside the thalamo-parietal segment but that there needs must be a defect of judgment such as may exist in a confusional state. The third patient is thought to illustrate such a mechanism.

It is also suggested that psychological factors underlying the delusion that disease does not exist, include defects in perception and in memory retention. The affective element in perception is thought to be another factor in the production of anosognosia. In Case 2 a strong desire not to suffer the disability which afflicted her was thought to be an additional factor in warping judgment and producing denial of blindness.

Anosognosia of blindness and of hemiplegia are believed to be predisposed by disorders of space perception. A distinction is drawn between awareness of personal space and awareness of extra-personal space. Though there may exist agnosia of both these aspects of space in the same subject, they may occur separately so that it is probable that they are subserved by separate neural links. Interruption of association paths from the occipital and parietal cortex to other parts of the brain probably account for the impaired space perception.

Agnosia of half extra-personal space may lead to neglect not only of half-space but to neglect of inability to see the contents of half-space (anosognosia of hemianopia). Bilateral lesions producing bilateral neglect of extra-personal space are thought to predispose towards anosognosia of total blindness, a condition which exists as a fixed delusion only when mental confusion is added.

Agnosia of half personal space leads not only to neglect of its contents (the body-half) but to paralysis involving the body-half (anosognosia of hemiplegia), a condition which exists as a fixed delusion only when mental confusion is added.

Agnosia of personal and extra-personal space, it is thought may be due to specific kinds of memory loss.

The first patient is an example both of agnosia of extra-personal space, producing anosognosia of hemianopia and of agnosia of personal space, producing agnosia of the body-half and anosognosia of hemiplegia. The delusion was fixed because mental confusion impaired judgment.

In this patient there was also an unusual response to pain stimulation which was interpreted as being a pseudo-affective reflex analogous to " sham-rage " seen in thalamic animals. (Author's abstr.)

Coughing and Unconsciousness : The So-called Laryngeal Epilepsy.

It seems probable that the syndrome in which loss of consciousness associated with coughing are the predominant symptoms has no single basis of causation. True vertigo is rarely, if ever, present, and the name " laryngeal vertigo " should not be used.

Some cases are epileptic in origin, but there is evidence that a majority may result from the circulatory changes induced by the cough. A diagnosis of epilepsy should only be made when other evidence points to the patient being an epileptic. Unless there are clear indications, as shown for instance by the tendency to recurrence and the occurrence of attacks unassociated with coughing, or when the EEG points to epilepsy, the basis of attacks should be regarded as cardiovascular in origin. (Author's abstr.)

BRIT. J. EDUC. PSYCHOL.

VOL. XVI. NOVEMBER, 1946.

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VOL. XXIX. 1945.

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BULL. CANAD. PSYCHOL. ASS.

VOL. VI. 1946.

BULL. JOHNS HOPKINS HOSP.

VOL. LXXVII. 1945.

VOL. LXXVIII. 1946.

BULL. LOS ANGELES NEUR. SOC.
VOL. XI. 1946.

Acute Porphyria. Report of a Fatal Case with Severe Neurologic Manifestations Encountered in the South-West Pacific.

This case proved of particular interest to the authors, for at the time they first examined the patient, they had in their neurologic ward several patients who had symptoms of neuronitis, neuromyelitis and various types of peripheral neuritis. Patients with such symptoms had been coming into the hospital with surprising frequency. The symptoms of many of these patients seemed to be due to a virus infection or to scrub typhus fever, malaria, trauma, vitamin deficiency and so forth. However, in this case, the authors were confronted with the classical picture of recurrent episodes of abdominal pains and constipation (obstipation) followed by pain in the extremities and weakness. Appendectomy had been performed as is so frequently reported by those who have had recurrent attacks of acute porphyria. The color changes in the urine and the subsequent chemical analysis of the urine disclosing increased amounts of coproporphyrin and large concentration of uroporphyrin and porphobilinogen substantiated the authors' first impression of acute porphyria.

The neurologic picture presented by the authors' patient is of particular interest in that he did not display the typical Landry's syndrome; his paralysis first involved the proximal muscles of the extremities and spread peripherally with more involvement of the upper than the lower extremities. Likewise there was early and intensive involvement of the extensor muscle groups. This was in keeping with the condition of many of the patients suffering from a probable virus form of neuronitis who were under the authors' care at that time. Although the patient's paralysis was relatively symmetrical the paralysis of acute porphyria is not always so, for in most of the 143 cases reviewed by Waldenstrom, in 60 of which neurologic signs were present, the paralysis was irregularly distributed, and frequently involved only small muscle groups, although in many almost the entire striated musculature was involved. Generalized convulsions (*status epilepticus*) and paralysis of deglutition (bulbar) experienced by the authors' patient are common findings, as have been emphasized by Mason and his associates, Hoagland, Nesbitt, Baker and Watson.

The therapy of acute porphyria is at best only symptomatic. As has already been noted, it would seem that serious attention might well be directed toward protecting the liver against the agent responsible for the necrobiosis, whatever it may be, since there is unmistakable evidence of diffuse liver damage. For the present, the intravenous administration of glucose and thiamin appears to be the authors' best means of protecting the liver. Although this type of therapy seems to have delayed only slightly the fatal issue in the authors' case, it must be remembered that acute porphyria is actually a chronic disease with acute exacerbations, and in certain instances the intensive use of glucose and thiamine, may carry the patient through the acute phase.

Parenteral administration of calcium has been suggested since calcium forms an insoluble salt with porphyrins. Its intravenous administration has been reported to diminish the excretion of porphyrins in the urine as well as to relieve abdominal pain. The authors' patient failed to respond clinically to the intravenous administration of calcium gluconate. Likewise it did not alter the port-wine color of the urine. (Authors' abstr.)

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VOL. X. NOVEMBER, 1946.

BULL. MILIT. CLIN. PSYCHOL.

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C. R. SOC. BIOL., PARIS.

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*Effect of the Central Nervous System on the Variation of Excitability of Motor Nerves in the Course of Peripheral Thermal Activity. *Chauchard, A., B., and P.* 1021

Effect on the Nerves of Central Inhibitory Phenomena.

When a head band protecting their eyes from light was used, an increase in the chronaxie of peripheral motor and sensory nerves was noted in the case of guinea-pigs and frogs. It was further noted that pressure of the head sufficient to produce a state of torpor left the chronaxie measurements unchanged. (Psychol. Abstr.)

Effect of the Central Nervous System on the Variations of Excitability of Motor Nerves in the Course of Peripheral Thermal Activity.

A slight warming of a dog's paw or a human subject's hand results in an increase in the chronaxie of peripheral nerves. For the dogs, chronaxie measured in the motor cortex is affected similarly. Either chloroform anaesthesia or expanding the surface stimulated, however, reverses the effect. (Psychol. Abstr.)

DELAWARE ST. MED. J.

VOL. XVIII. 1946.

Problems of Rehabilitation in Patients with Cerebral Palsy. *Fay, T.*. . 57

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VOL. XVII. 1945.

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DIS. NERV. SYST.

VOL. VII. OCTOBER, 1946.

*Sub-shock Insulin Therapy in Anxiety States and Anxiety Depressions. *Hohman, L. B., and Kline, C. L.* 293
Prediction of the Immediate Outcome of Shock Therapy in Dementia Praecox. *Danziger, L., and Kindwall, J. A.* 299
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Sub-shock Insulin Therapy in Anxiety States and Anxiety Depressions.

1. Thirty-seven patients with anxiety states, depression, and psychosomatic disturbances have been treated with daily 30–60 unit doses of insulin.

2. The rationale and technique of administration of this therapy have been discussed, together with a synopsis of the successful termination or alleviation of their symptoms.

3. Several case-histories have been selected from the group to illustrate the type of patients treated and the responses obtained by treatment.

4. This series of cases indicates that this therapy is a valuable, effective, safe method of treatment in a variety of anxiety states, particularly those arising in the military service and in men with combat experiences. (Authors' abstr.)

NOVEMBER.

DISCH. Z. NERVENHEILK.

VOL. CLVI. 1944.

EDUC. PSYCHOL. MEASMT.

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VOL. VI. 1946.

EXP. MED. AND SURG.

VOL. III. 1945.

FLORIDA M. A. J.

VOL. XXXII. 1946.

GENET. PSYCHOL. MONOGR.

VOL. XXXIV. AUGUST, 1946.

The Relation of Emotional Adjustment to Intellectual Function.

Since 1937 personality studies of normal children have been in progress at the Payne Whitney Nursery School. The records include anamnestic data, physical examination reports, psychometric test findings, daily behavior records, and individual play sessions. This method of investigation permits the analysis of any one phase of behavior in relation to any other phase. In the present study, an attempt has been made to establish whether any relation could be found between intellectual function, as measured by means of psychometric tests, and emotional adjustment, as evaluated through the total data. The trends of emotional adjustment were formulated independently of the findings of the psychometric tests.

Of the children admitted during the period from 1937 to 1942, 39 children had at least two psychometric tests in the course of two or three years' attendance at the school. On retest, 22 showed changes in I.Q. which were considered significant (10 points or more in either direction), and 17 showed no significant changes (less than 10 I.Q. points, or no change in either direction).

Of the 22 children with significant changes, 12 showed an increase in I.Q. rating of from 10 to 31 points, and 10 a significant decrease of from 10 to 19 points. In all of the 22 children which made up the two subgroups, there was a close parallel between emotional adjustment and psychometric test findings.

The 17 children without significant changes in I.Q. presented a more complex problem of analysis. They included two categories of children: stable, well-adjusted children whose home life seemed to present no cause for emotional disturbances; and children whose home conditions, while unsatisfactory, did not show variations or tendency toward marked improvement or further dislocation. The margin of error for predictability of I.Q. changes on the basis of biographical data was higher in this group than in the group with significant changes. In six children, variations in I.Q. were predicted in another direction than that afterwards noted or were quantitatively inaccurate though in the direction predicted.

The present study emphasizes that intellectual function, as measured through psychometric tests, shows fluctuations, and that the child's total emotional adjustment influences his test score. It also points to the need of a projective technique, in addition to the usual methods of psychometric testing, as a means of detecting factors inhibiting the intellectual function.

The clinical data have been presented and analyzed, but no hypothesis has been formulated regarding the inhibition of the intellectual function through emotional causes. (Authors' abstr.)

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What Price Lobotomy?

1. The subjects of this study are ten schizophrenic patients who have undergone bilateral prefrontal lobotomy. Five of them are discharged, and five still hospitalized. They are compared with a group of seven patients of similar diagnosis and vocabulary ability who have not suffered the operation.

2. The lobotomized individuals maintain many of their prepsychotic character traits, but they are lacking in a normal degree of deliberateness.

3. They show no unique characteristics in the projective (Rorschach) and intelligence (Binet) tests, do about as well as the control group of schizophrenics in abstract thinking (Shipley-Hartford), better in learning (Hunt-Minnesota), but less well in alternating attention and making a plan (Porteus Mazes).

4. They do significantly less well than the controls on two tests demanding deliberation (Rhymes and Numbers), standardized on a group of 105 junior college students.

5. They do significantly less well than the controls of tests demanding deliberative behavior (Downey's Speed of Decision, Volitional Perseveration, and Motor Inhibition).

6. It is concluded that bilateral prefrontal lobotomy, though of proved therapeutic value (and affording remarkable opportunities for research) is productive of a definite mental deficit; it reduces the capacity for prolonged attention.

(Author's abstr.)

J. ANAT.

VOL. LXXX. OCTOBER, 1946.

J. APP. PSYCHOL.

VOL. XXX. 1946.

The Effect of Prolonged Mild Anoxia on Speech Intelligibility.

(1) Using the method and materials employed in an earlier study in collaboration with C. P. Seitz, twelve subjects were tested for their ability to perceive standard speech sounds at four periods during an eight-hour exposure to mild anoxia encountered at an altitude of approximately 10,000 ft., simulated in a nitrogen dilution chamber. (2) The decrement in speech intelligibility at altitude was very slight and unreliable at the ¾-hour period; it was nearly reliable at the 2¼-hour and 4¾-hour periods; but there was a marked lessening of the altitude effect at the last period, 6¾ hours after entering the chamber.

Psychological factors, such as wandering of attention and boredom are suggested as explanations of the apparent losses in efficiency, although some physiological consequences of altitude changes are indicated by enlarged angioscotoma during prolonged exposure to increased altitude. H. HILL (Psychol. Abstr.).

Validity of the Hunt-Minnesota Test for Organic Brain Damage.

(1) When the Hunt-Minnesota Test for organic damage was applied to 64 presumably normal employees of the Norwich State Hospital, 55 per cent. had T scores indicating organic pathology. (2) The discrepancy between our results and Hunt's original validation results could not be explained by the fact that our data included cases with very high vocabularies and cases given only the short form of the test. (3) Since the test produces so many "false positives," its validity for diagnosing organic brain damage must be seriously questioned.

H. HILL (Psychol. Abstr.).

J. AVIATION MED.

J. BELGE NEUR. PSYCHIAT.

J. BONE JOINT. SURG.

J. CLIN. ENDOCRIN.

J. CLIN. INVEST.

J. CLIN. PSYCHOL.

J. CLIN. PSYCHOPATH.

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J. COMP. NEUR.

VOL. LXXXV. OCTOBER, 1946.

J. COMP. PSYCHOL.

VOL. XXXIX. OCTOBER, 1946.

J. CONSULT. PSYCHOL.

VOL. X. 1946.

J. EDUC. PSYCHOL.

VOL. XXXVII. 1946.

J. EXP. PSYCHOL.

VOL. XXXVI. OCTOBER, 1946.

J. GEN. PSYCHOL.

An Experimental Study of the Reactions of Neurotics to Experiences of Success and Failure.

A modified form of the pursuit rotor, involving an integrating mechanism, was used in obtaining performance scores, aspiration scores, and judgments of past performances. One hundred male neurotic army patients were tested, 50 of whom showed predominantly hysterical symptoms, while the other 50 showed predominantly affective symptoms. The two groups were equated for age and intelligence. The main hypothesis tested in this experiment was based on Jung's analysis of extraverted (hysterical) and introverted (affective) personality traits, and more particularly on his view that introverts are more affected by subjective factors, while extraverts are more affected by objective factors.

The results showed no significant differences between the groups for performance or improvement on the test. It was found, however, that both as regards their level of aspiration and their judgment of past performances the affective group showed significantly greater deviations from their actual scores than did the hysterical group. Quite generally the reactions to success and failure of the hysterical group were more objective, taking more account of external reality (test scores), while the reactions of the affective group were more subjective, taking more account of subjective states of mind.

Correlations were found between level of aspiration and judgment of past performance which indicated that " tendency to subjectivity " could be shown to be an important factor common to both these superficially quite unrelated scores. Further correlations were found between intelligence test scores, improvement,

level of aspiration, judgment of past performance, and a number of desirable and undesirable social qualities. It was also found that hysterics showed a greater intrapersonal variability, while the affectives as a group showed a greater interpersonal variability. (Authors' abstr.)

Expectancy versus *Performance in Hypnosis.*

This article is devoted primarily to the description of experiments on 10 selected and highly developed hypnotic subjects in whom strength of grip and expectancy were controlled by hypnosis. Complete or partial paralysis was produced in all the subjects, while their hypnotically controlled belief was that they were weaker than usual. Then their strength of grip was increased while their hypnotically induced belief was that they were weaker than usual.

These results contradict the suggestion theory of hypnosis, as illustrated by an experiment described by Crane, in which the two factors of expectancy and hypnotic performance are commonly said to be related causally—hypnotic phenomena being regarded as caused by expectancy.

Implication of the results of these experiments are pointed out, not only in regard to the distinction between the art of suggestion and the art of hypnosis, but also in regard to the relation of expectancy to disability in clinical cases of functional illness. (Author's abstr.)

OCTOBER.

Electrometric Studies of Sleep.

A technique has been described, embodying simultaneous DC and AC recording, for the measurement of changes taking place in the steady-state DC field of the human organism between the waking and the sleeping states.

The results indicate:

1. That the DC field of the human organism exhibits during sleep a decrease in the mean values of the potential differences recorded from different points related to the organism's nervous system.

2. That sleep produces a gradual reduction of the characteristic waking differences in E.M.F. which distinguish one individual from another at a given time and from himself at other times.

3. That the DC field of the human organism exhibits during sleep less intersubject variability for a given electrode placement than during waking.

4. That the DC field of the human organism exhibits during sleep less variability among different electrode placements than during waking. (Author's abstr.)

Level of Muscular Tension as an Aspect of Personality.

A general factor of muscular tension level in the individual has frequently been postulated. In previous studies the writer has found evidence for this assumption in the fact that subjects who were most tense during the performance of one task tended to be most tense during the performance of another task, and the tension *rank* (as opposed to the absolute tension *level*) of the individual during the performance of a given task tended to remain constant over a period of several months. In the present study the aim was to find further evidence of a factor of general level of muscular tension through determining whether such a factor could be extracted from measures of tension secured: (*a*) On different occasions, (*b*) during the performance of different tasks, and (*c*) by different techniques of measurement (some involving grip pressure and some point pressure).

Twelve measures of muscular tension and four measures of fluctuation in tension, obtained while the subjects were performing a wide variety of tasks, were subjected

to factorial analysis. These measures were secured on three separate occasions, the first separated from the second by three months, and the second separated from the third by one week. Three different techniques for measuring tension were employed: (*a*) Recording grip pressure from the unused hand, (*b*) recording grip pressure from the used hand, and (*c*) recording point pressure by counting the number of sheets of carbon paper through which pencil marks had penetrated.

Five factors were obtained, four of which appear to be meaningful. Of the meaningful factors, Factor I is widely general, Factor IV has considerable generality, and Factors II and III appear to be specific.

Factor I, the most general of the factors extracted, is interpreted as representing a general tension factor of the sort postulated by the writer in the first quantitative investigations in which individual differences in tension were regarded as a significant aspect of personality. This factor incorporates a variety of tasks, all three techniques of tension measurement, and all three experimental sessions. Its generality is attested by the fact that, in addition to its six weights above ·40, it includes more weights between ·30 and ·40 than does any other of the factors extracted. Factor I, then, is interpreted as a factor which represents the general tension level of the subjects, or the tendency of the subjects to function more or less consistently at a relatively high or a relatively low level of tension during a wide variety of tasks performed on three separate occasions over a period of several months. It is a factor attesting the fact that tension is not specific to the task being performed, nor to the time of measurement (within the limits of the experiment), and is, to only a limited extent, dependent upon whether point pressure or grip pressure is being measured, or whether the measurement is made from the used or the unused hand.

One other factor, Factor IV, has some degree of generality, since it may be described as a factor of point pressure during a variety of tasks performed at two different experimental sessions separated by an interval of one week. The fact that the weights on this factor are arranged in what would appear to be the order of difficulty of the tasks involved, suggest that Factor IV is an aspect of tension and not merely a factor representing some incidental feature of the technique of measurement.

Factors II and III are specific factors. Factor II appears to represent point pressure during maze tracing. Factor III is probably specific to color-naming, or to the first experimental session, or to grip pressure from the unused hand, or to some combination of these aspects of the experimental situation. The design of the experiment does not permit finer delineation of this factor.

From the present study it may be concluded that there are both specific and general factors in the measurement of tension. Tension scores vary somewhat with the technique of measurement, with the nature of the task being performed, and with the time at which the measurement is made. But there is a general factor of tension which is more or less independent of the task, of the mode of tension measurement, and of the time at which the measurement is made. The isolation of this factor lends support to the notion that tension level is a more or less persistent characteristic of the individual, and is, in this sense, an aspect of personality.

The general factor of muscular tension found here is, the author believes, but one of a number of indicators of the energy mobilization of the individual. Palmar skin conductance, for example, has been found to vary directly with variations in tension of the muscles. Muscular tension would also correlate, no doubt, with insensible weight loss or other measures of metabolic activity. In fact, we should expect a correlation between muscular tension and any one of the physiological changes found by Cannon to be a part of the energy mobilizing processes which occur during the excited emotions—and which, we should suppose, would occur under any other circumstances which involve the mobilization of energy.

Energy mobilization tendencies constitute one of the most significant aspects of the individual's personality. They represent the intensity with which he responds to the various environmental situations with which he is confronted. They indicate, then, whether he is likely to be relatively unresponsive to situations, highly responsive, or moderately responsive. And this tendency to respond to situations with high, with low, or with some intermediate degree of energy mobilization is the basis for a wide variety of behavioral mainfestations which differentiate one individual from another. (Author's abstr.)

The Effect of Prolonged Mild Anoxia on Sleepiness, Irritability, Boredom and other Subjective Conditions.

Sixteen male college students, with a median age of 18 years 4 months, were asked to rate themselves with respect to 10 different subjective conditions at five different periods during a continuous 8-hour session in a nitrogen dilution chamber in which an altitude of approximately 10,000 ft. was simulated. The same procedure was followed during an 8-hour control run. The conditions rated were sleepiness, fatigue, boredom, attention, irritability, headache, elation-depression, motivation, co-ordination, and general feeling of well-being. Although the results for the altitude and control runs varied from one condition to another, there was, on the average, a pronounced trend on the altitude run in the direction of poorer adjustment from the first period, 1½ hours after admission to the chamber, through the fourth period, which occurred after an exposure of 6½ hours. The differences between the mean ratings for the control and altitude runs were in every case reliable at the points of maximum divergence, which occurred most frequently at the fourth rating period. There was, in general, a marked end-spurt between the fourth and fifth period when the subjects were aware that their ordeal was nearly over. There was also a marked drop in adjustment on most of the control runs following the lunch period. If such a tendency was present in the altitude runs this was submerged by the general downward trend of the curves. The results jibe with the frequent reports by crews of heavy bombers of feelings of boredom, sleepiness, and wandering of attention on protracted bombing sessions while flying without oxygen masks at comparatively low altitudes on the way to and from target areas. They would seem to indicate the need for more adequate precautions against anoxia even at relatively low cruising altitudes if alertness, freedom from distraction, and a higher order of motivation are required.

(Author's abstr.).

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J. GERONT.

VOL. I. 1946.

J. LAB. CLIN. MED.

VOL. XXX. 1945.

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Analysis of One Hundred Cases of Epilepsy.

(1) The catamnesis of 100 epileptics has revealed that among the dispositional factors head injuries play a major role, whereas the role of heredity is negligible.

(2) There are infrequent cases of epilepsy which do not exhibit a disturbance in the brain waves during the attack-free intervals. The change in the brain waves, if present, persists even after cessation of the attacks. Any medicinal treatment of epilepsy should be combined with hygienic measures, and with a particular diet omitting and reducing the salt intake.

(3) Three types of drugs are capable of controlling epilepsy: The barbiturates, sodium dilantin and methylphenylethyl-hydantoinate (mesantoin). Whereas the effect of the barbiturates frequently starts only after some years, even as late as after ten years, that of the hydantoinates sets in immediately or after a few months. Apart from an occasional rash, no unfavorable sequelae of the hydantoinates were observed.

(4) Apparently there is an individual reactivity to the remedies in question, and there are even cases intractable to all of them. One may, as necessity arises, replace the barbiturates with dilantin, and the latter with the hydantoinate preparation which exercises a particularly favorable influence on *petit mal* attacks.

(5) When the attacks have been controlled, the treatment has to be continued, since interruption might precipitate recurrence of the attacks.

(Authors' abstr.)

The Relationship of the Vegetative Nervous System to Anginal Anxiety.

What is the biological meaning of anxiety?

Anginal anxiety is to be considered as an irritation to certain "vegetative" structures within the diencephalon. From the clinical viewpoint it is comparable to physiologic sleep, which also is dependent upon excitation of certain portions

within the diencephalon, along the axis of the brain and adjacent to the ventricles. During the sleep there are numerous signs of parasympathetic hyperactivity. In anxiety the sympathetic tone is prevailing, although not to the exclusion of the antagonist system. During sleep restorative processes due to parasympathetic impulses are promoted. During anxiety the opposite effect is to be assumed, resulting in extreme weakness and prostration.

The irritation, confined primarily to the vegetative diencephalic centers and to the sympathetic fibers, may spread to the vagus. After the use of adrenalin, i.e., after sympathetic stimulation, ventricular flutter and sudden death, due to abrupt standstill of the heart, have been reported, the increased sympathetic tone causing vagal inhibition by reflex. This is the other biologic aspect of anginal anxiety.

The considerations in this article confirm the stand taken elsewhere regarding the relationship of the vegetative nervous system to angina pectoris abdominalis (L. Hess). In both conditions, in angina pectoris abdominalis and in anginal anxiety, the vegetative system is involved. It seems likely that even the primary site may be located outside the heart, within the centers of the vegetative nerves. In angina abdominalis, the vagus plays an important role; in anxiety, we are confronted with the predominance of sympathotonic features.

(Author's abstr.)

Results of Repetition of Electroencephalography in Adult Epileptics.

For 140 adult epileptic patients (100 idiopathic, 40 symptomatic) electroencephalography was repeated after an interval of five to seven years, under essentially the same anticonvulsant treatment.

Among idiopathic epileptic patients the subsequent electroencephalogram was the same in 85 per cent., worse in 10 per cent. and better in 5 per cent.

Among symptomatic epileptic patients the subsequent electroencephalogram was the same in 95 per cent., worse in 2·5 per cent. and better in 2·5 per cent.

Since only where the subsequent electroencephalogram was improved might the incidence of abnormality be lowered, it was evident that in the idiopathic group there was only a 5 per cent. chance that this might occur had electroencephalography been done at another time, whereas for the symptomatic group this was a 2·5 per cent. chance.

It was concluded that a single electroencephalogram taken at any one time has a 95 to 97·5 per cent. likelihood of representing the true electroencephalographic non-convulsive state of an epileptic adult, under unchanging therapy, and is, therefore, extremely reliable. (Author's abstr.)

DECEMBER.

Study of Electroencephalographic Findings in 209 Cases Admitted as Head Injuries to an Army Neurological-Neuro-Surgical Center.

(1) Electroencephalographic abnormalities are apparently a valid indicator of brain injury.

(2) The percentage of electroencephalographic abnormality increases with severity of injury. It is most marked when the dura has been penetrated, less in cases of open head injury without dural penetration and least in closed head injuries.

(3) The percentage of electroencephalographic abnormality decreases as time elapses from injury.

(4) Amplitude asymmetry is a guide to site of injury and an index of electroencephalographic improvement.

(5) Focal records were not found in cases with mild injury, but were more frequent with severe injury and penetrating wounds, and in our series occurred relatively soon after injury (under six months). Focal records without accompanying convulsions were found almost entirely in cases that had been injured less than six months before the initial electroencephalogram. Focal records with convulsions occurred in cases where the initial record was taken longer than six months after injury. This suggests the possibility that cases with focal records may eventually develop post-traumatic epilepsy, though initially asymptomatic.

(6) There is a suggestion that electroencephalographic improvement may occur after insertion of tantalum plates over skull defects. This may be due either to the healing influence of time or to a specific effect on the plate itself.

(Authors' abstr.)

A Preliminary Study on the Use of Methedrine in Psychiatric Diagnosis.

Fifteen to 20 mgm. of methedrine, given intravenously, produced definite effects in five patients with various psychiatric disorders. The vascular responses, namely, increase in arterial tension and ventricular slowing, occurred typically in each instance. No toxic manifestations were observed, although the patients complained of insomnia on the night following the injection.

The drug made all patients become more talkative; some disclosed previously unobtainable material. In several cases emotional outbursts occurred. In one instance paranoid delusions, previously expressed but more recently concealed, were released.

Conclusion.—From this preliminary study it is suggested that methedrine may have a place in the armentarium of psychiatric diagnostic methods.

(Authors' abstr.)

J. NEUROPATH. EX. NEUROL.

VOL. V. OCTOBER, 1946.

Morphologic Changes in the Brain of Monkeys following Convulsions Electrically Induced.

Electrical currents similar in type, intensity, duration of current flow and frequency with that used in human electric shock therapy, may cause morphologic changes in the central nervous system of monkeys.

The nerve cell alterations are mostly of the reversible type. The changes are mostly related to circulatory disturbances and increased permeability of the blood vessel walls. The latter is shown by distension of the perivascular spaces and perivascular edema and by some diapedesis of form blood elements. Compound granular corpuscles filled with presumably hematic pigment and free pigment in the blood vessels seem to confirm such an occurrence.

When more intense current and of longer duration is applied, occasional minute petechial hemorrhages result. This seems to support the contention that the severity of the lesions are proportional to the intensity of the electrical current, the duration of the current flow and, to a lesser extent, to the number of electric shocks.

The histopathologic changes are more pronounced in the areas of tissue traversed by the main path of the current.

In comparing the slight morphologic changes in experimental animals with

those encountered in control animals, it is necessary not only to evaluate them qualitatively but also quantitatively.

Reversible chemical or structural changes, and possibly some permanent slight structural damage may be at the base of the temporary alterations in the mental processes occurring in patients in the course of electric shock therapy.

(Authors' abstr.)

Experimental Arteriosclerosis in the Nervous System.

Experimental cholesterol arteriosclerosis in rabbits, caused by a diet of milk, yolk powder and yolk cake, supplemented by pure cholesterol in some cases, showed an involvement of the nervous system. Foam cells were found in the vascular tissue of the choroid plexus in all cases, and in the capillaries of the suprachiasmatic region in five out of 17 animals. In four cases the ependymal lining of the third ventricle was distorted or dissociated. The leptomeninx, too, showed occasionally foam cell aggregation, the source of which could not definitely be determined.

In peripheral nerves, foam cells were found between the nerve fibers. The problem of their origin is discussed. In two other cases axons had become swollen, fragmented and strongly basophilic. No explanation is given for this alteration.

It is believed that an endotheliopathy is the primary lesion in experimental cholesterol arteriosclerosis.

The pathological changes in experimental cholesterol arteriosclerosis of the central nervous system seem related to the hemato-encephalic and hemato-cerebrospinal fluid barrier. (Author's abstr.)

Acetylcholine-Induced Depression of Cerebral Cortical Activity.

Application of acetylcholine to the cortex causes a depression of electrical activity of the cortex. This depression is a cortical phenomenon independent of systemic effects of acetylcholine. Decrease of electrical activity is associated with decreased cortical responsiveness. The depression spreads over the cortex, probably in linear fashion. While the depression induced by acetylcholine occurs prior to acetylcholine discharges, the diminution of activity does not always presage increased activity. (Authors' abstr.)

J. NEUROPHYSIOL.

VOL. IX. SEPTEMBER, 1946.

Presence and Action of Acetylcholine in Experimental Brain Trauma.

1. As a result of experimental trauma to the head, ACh is consistently present in the C.S.F. in estimable quantities, 2·7 to 9·0 gamma per cent. within a few hours of injury. The abnormal amounts of ACh may be detected for as long as 48 hours following trauma, after which the time concentration falls below the sensitivity of the test object. The abnormal presence of ACh is presumed to be due to an excess production or release of the substance, an insufficient destruction, and consequent persistence within the intercellular spaces. It has been suggested that such persistent ACh be termed " free ACh."

2. The EEG of a number of cats and dogs have been studied for varying periods of time following trauma. Confirmation for both the previously described intense neuronal discharge and the transient flattening of all recorded electrical activity

has been obtained. Following these effects, there occurs a prolonged period of abnormality in one or both hemispheres. The abnormalities are essentially paroxysmal, high amplitude sharp waves with frequencies varying from 6–7 per second to 16–20 per second.

3. Changes in behaviour include tonic-clonic seizures, apnoea, and loss of ocular and corneal reflexes followed by partial or complete loss of hopping and placing reactions, sense of equilibrium, orientation, and a stuporous condition for varying periods of time of from hours to days.

4. The EEG patterns and the stuporous condition may be abolished by appropriate doses of atropine sulphate.

5. ACh perfused over an exposed area of cortex produces high amplitude sharp waves in small physiological concentrations, 1 gamma per cent. or less, and a flattening of recorded cortical potentials in high physiological concentrations, 2 gamma per cent. or more (depending upon the depth of general anaesthesia).

6. The intracisternal injection of ACh in amounts ranging from 0·02 to 10·0 gamma produces similar behavioral and EEG changes as previously noted, i.e., transient flattening with high concentrations and paroxysmal, high amplitude sharp waves of varying frequencies with low concentrations.

7. The EEG and behavioral effects of intracisternal ACh may also be abolished with appropriate doses of atropine sulphate.

8. It is suggested that " free ACh " may be one of the physiological factors underlying the acute paralytic and excitatory phenomena of cerebral concussion and more severe craniocerebral injuries. (Author's abstr.)

The Relation of Electric Potential Changes to Contracture in Skeletal Muscle.

Experiments were performed on nerve-muscle fibre preparations of the M. adductor longus and on whole isolated sartorius muscle of frogs (*Hyla aurea*). Contractures were set up by constant current pulses and by application of drugs.

1. Negative potential changes are always recorded at the site of origin of contractures in isolated muscle fibres.

2. Contractures, like propagated muscle responses, are initiated, after a sufficient depolarization of the muscle membrane. Contractures may arise: (i) Following on muscle impulses, which may gradually fail to propagate fully from the region of their origin. In these preparations a transition can be detected from normal to " abortive " impulses and to a maintained negative potential change which may give rise to contractures without appreciably exceeding the potential level at which the preceding propagated responses had been set up; (ii) not preceded by propagated responses following on the depolarizing action of drugs or currents in fatigue narcotized or injured muscles.

3. Contractures set up by chemical application are actively maintained by the depolarizing action of drugs. This action is analogous to the " cathodic shortening " effect which lasts for the duration of the current flow. " Chemical " or " electrical " contractures can be graded, depending on drug concentration or current strength.

4. Relaxation of chemically produced contractures can be effected at the anode of constant currents.

5. Novocaine does not raise the threshold at which contractures are set up by constant currents or by potassium application. The apparent threshold for brief shocks, however, is greatly increased. The electric time constant and the resting potential of the muscle membrane is not significantly affected.

6. The connection between the muscle membrane and the contractile elements is discussed. It is suggested that the action currents which accompany depolarization or the propagated muscle impulse are not the essential link in the transmission of " excitation " from the membrane to the contractile elements.

(Author's abstr.)

Righting and other Postural Activity in Low-decerebrate and in Spinal Cats after d-Amphetamine.

Righting and other postural activity was observed in low-decerebrate cats, and in spinal cats, after the intraperitoneal injection of d-amphetamine sulphate, usually in a dose of 10 mg./kg. In the decerebrate cat the righting activity consisted of elevation of the head and shoulders from the surface upon which the cat

was lying and of movements of the fore- and hind-legs, rump, and tail which resulted in incomplete righting of the body. The tail rotated in a manner suitable to promote righting. In spinal cats similar righting movements were observed in the hind-legs, rump and tail.

Asymmetry of body contacts is essential for righting activity in the decerebrate cat under the influence of d-amphetamine. In spinal cats after d-amphetamine, righting activity does not appear unless there is asymmetry of body contacts plus additional tactile stimulation of the lateral aspect of the hind knee, which is next on the table.

The authors' data indicate that, in addition to the previously known centers in the mid-brain, there are centers for righting caudad to the mid-brain, i.e., in the pons, medulla, and even the spinal cord. (Authors' abstr.)

Stimulation with Minimum Power.

An exponentially rising current will stimulate nerve with least power. Such waves are not easily generated. A square wave of correct intensity only requires 22 per cent. more power, and is easily generated. The exponentially falling current obtained from thyratron stimulators requires 85 per cent. more power than the best current form. The use of square waves for stimulators and electric shock therapy is indicated. (Author's abstr.)

Responses of Single Human Motor Units to Electrical Stimulation.

1. The responses of single human motor units to stimulation with instantaneously or slowly rising currents are demonstrated.

2. Accommodation curves with the electrical response of a single motor unit as index were determined and are compared to those given by a muscle twitch.

3. The duration of the motor unit responses to constant currents of various strength—the so-called adaptation time—was determined. Significant differences were found to exist for the proximal and distal parts of the same fibre, the former showing a longer adaptation time. (Authors' abstr.)

Natural and Artificial Activation of Motor Units: A Comparison.

The activation of motor units evoked by voluntary innervation and by electrical stimulation of the motor nerve has been studied in certain human muscles.

1. Stimulation with slowly rising currents has made a separate study of motor units of different thresholds and spike sizes possible. A typical experiment, involving the response of three different units to linearly rising currents of different gradients and strengths and to constant currents of different strengths, is described.

2. The recruitment of motor units to nerve stimulation with very slowly rising currents has been shown to be similar in certain respects to that found during sustained voluntary contractions.

(*a*) Both types of contraction start with a unit of small amplitude, followed by units of progressively larger spike size. The electrical stimulation experiments, as well as some with selective blocking of the motor nerve during voluntary innervation, indicate that the initial small spikes from the muscle correspond to activity in low threshold nerve fibres. The factors determining muscle spike size are briefly discussed.

(*b*) In most experiments the units appearing in a particular order during a voluntary contraction are identical with those recruited in the same order by electrical stimulation.

(*c*) The initial discharge frequencies of identical units at thresholds in both contractions are about the same. The increase of frequency during increased contraction exhibited by a given unit when the next in the sequence appears is also the same in both cases.

The results are discussed in the light of the theories of central excitation, and special attention is directed to the parallelism between the thresholds of different motoneurons during peripheral stimulation and central excitation.

(Authors' abstr.)

Competitive Reinnervation of Rat Muscles by their Own and Foreign Nerves.

The problem of whether the original motor fibers of a muscle have any advantage over any other motor fibers in reinnervating that muscle was investigated by letting

the tibial and peroneal nerves compete for reinnervation of the denervated plantar extensors. In 14 white rats the proximal tibial and peroneal stumps were joined to the distal tibial stump only. The junction was effected by means of a Y-shaped sleeve consisting of the reversed posterior end of the aorta, with the two iliac arteries serving as inlets for the two proximal nerves and funnelling the regenerating fibers into the common aortal trunk, which contained the distal tibial stump. Fibers from both sources thus travelled side by side and arrived in the muscles together.

After regeneration was completed, isometric tensions of the plantar extensors in response to supramaximal stimulation of the two nerve sources were determined. The results proved that the fibers from both sources had reinnervated the muscles at random, and the original supply had no systematic advantage over the fibers of foreign origin. In half of the cases the original nerve innervated a greater share of the muscle fibers, and in the other half the foreign nerve took the greater share. The statistical average of all cases shows both sources to be of equal weight. The concept that there is any selectivity, absolute or relative, in the establishment of regenerative connections between motoneurons and muscle fibers is therefore contradicted by the facts.

The experiments have also brought further confirmation of the fact that a single muscle fiber in general does not accept innervations from more than one motoneuron.

(Authors' abstr.)

NOVEMBER.

Facilitation and Inhibition of Spinal Motoneurons.

Facilitation and inhibition, by the direct actions of primary afferent fibers, of two-neuron-arc reflexes has been examined by experiment.

An afferent volley, in group 1 fibers arising in one head of a muscle, facilitates the action of its synergists and inhibits the action of its antagonists. Details of the distribution of these actions are presented elsewhere.

The temporal characteristics of facilitation and inhibition have been defined. Facilitation is maximal on the occasion of synchronous convergence of "conditioning" and "test" volleys, and decays exponentially along a curve falling to 1/e in approximately 4·0 msec. duration, thereafter decaying in the same manner as facilitation.

Reasons are given for supposing that the facilitation described here is the expression of a process additional to the detonator action of earlier descriptions. Accordingly it may be called "residual facilitation."

The assumption of two excitatory events, detonator action and residual facilitation, makes no demand for elementary processes unknown in peripheral nerve. Their existence is predicted by the nerve-block model of synaptic transmission, only the significance of the latter, as far as the central nervous system is concerned, having remained in doubt in the absence of demonstration. The functional importance of residual facilitation has now been established.

According to present evidence it is permissible to assume a correlation between residual facilitation and the "synaptic potential" of Eccles.

Residual facilitation and inhibition are regarded as functional opposites, they being similar in all known characteristics excepting direction.

Of many possible factors, three—detonator action, residual facilitation and inhibition—have received sufficient documentation to necessitate inclusion in theoretical consideration of the known properties of synaptic transmission.

Reason is given for supposing that the brief facilitation periods evident in appropriately designed experiments do, as had been supposed, measure the effective duration of the detonator action. (Author's abstr.)

Integrative Pattern of Excitation and Inhibition in Two-neuron Reflec Arcs.

An afferent volley arising in the nerve of a given muscle of muscle fraction has, by direct impingement upon motor nuclei, the following actions :

1. If above threshold it discharges motoneurons that supply that muscle or muscle fraction ; otherwise, excitation is subliminal.

2. It facilitates the action of motoneurons that supply the muscle remainder, or synergists, at the same joint.

3. It inhibits the action of motoneurons that supply antagonists at the same joint.

The afferent volley in question, by direct action, neither excites nor inhibits motoneurons of muscles, flexor or extensor, that act at neighbouring joints.

In every instance the actions described are in strict accord with the requirements of reciprocal innervation.

The origin and distribution of excitation and inhibition so evoked indicate the role they play in myotatic reflex performance.

The mutually dependent muscles of a joint, together with the direct reflex paths that bind them, may be considered as constituting a myotatic unit.

The myotatic units in the first instance are independent one from another. Two-joint muscles form peripheral bridges between adjacent myotatic units.

Without the necessity for other than direct reflex connections, the myotatic unit exhibits, complete within itself, the elementary mechanism of reciprocal innervation. (Author's abstr.)

Reflex Control of the Ciliary Muscle.

In cats under nembutal anesthesia, faradic stimulation of a peripheral nerve or of the skin of the snout elicited a dioptric change in the direction of hypermetropia both before and after sympathetic denervation of the eye. Complete atropinization of the eye with resulting depression of cholinergic fibers did not abolish this response. It was abolished, however, when the oculomotor nerve was severed intracranially and when the adrenergic fibers were depressed by means of intravenous administration of ergotoxine phosphate.

Intracranial stimulation of the oculomotor nerve caused a dioptric change in the direction of myopia following depression of the adrenergic nerve fibers with ergotoxine phosphate, while identical stimulation of the oculomotor nerve following complete atropinization of the eye, with depression of cholinergic nerve fibers, resulted in a dioptric change in the direction of hypermetropia.

These results seem to indicate that reflex inhibition of the ciliary muscle is an actively integrated and controlled reaction mediated through the parasympathetic innervation of the eye, which involves the efferent conduction of impulses from the ciliary ganglion to the ciliary muscle through adrenergic components of the short ciliary nerves.

In human subjects mild faradic stimulation of the skin of the forearm or of the finger tips elicited a dioptric change of small magnitude in the direction of hypermetropia in untreated eyes as well as during cycloplegia produced by instillation of homotropine into the conjunctival sac, with resultant depression of cholinergic fibers.

The reflex control of the ciliary muscle appears to be mediated exclusively through its parasympathetic innervation. (Authors' abstr.)

Cortico-cortical Connections in the Monkey with Special Reference to Area 6.

1. Afferent cortical connections to area 6a have been described for the first time from areas 46 and 5 + 7 of the lateral hemispheral surface, areas 41 and 42 of the temporal lobe, and areas 7, 23b and 24 of the medial surface of the macaque brain by the method of physiological neuronography.

2. Additional observations on homolateral inter-areal connections have been made, including afferents to many of the suppressor regions. (Authors' abstr.)

Centrifugal Functional Deterioration of Asphyxiated Motor Nerve within the Neural Axis.

By means of placing stimulating electrodes along the intramedullary portion of the facial nerve and observing electrical thresholds before and after clamping the trachea, it has been shown that asphyxial deterioration of the nerve begins in

the nucleus and extends progressively distalward with time. These results complement the previous finding of a proximo-distal deterioration gradient along the medial popliteal nerve and contributing ventral roots, and with it establish the existence of a gradient along the entire length of living motor nerve.

(Authors' abstr.)

J. NUTRITION.

VOL. XXXI. 1946.

J. PARAPSYCHOL.

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Hypnotic Suggestion in PK Tests.

In tests of psychokinesis (PK), 5 male subjects were tested individually in procedure which involved the mechanical release of 96 dice at a time. Each subject made 20 throws of the 96 dice in the prehypnotic control session. Then " each subject was hypnotized and told that he would try very hard to make the specified target face turn up when he released the dice and that he would be able to influence them by his concentrated effort." The subjects were then retested, with the result that their scores were far below those of the control session. " With two subjects, however, it was found that an incidental break in the hypnotic spell brought about a reversion to high scoring." Thereafter, when other subjects scored low in the post-hypnotic session, they were rehypnotized and told that they would do further tests in a spirit of fun and relaxation. These subjects then produced scores higher than those of their control session. There were significant differences between the scores of the first post-hypnotic section and the other sections of the data.

B. M. HUMPHREY (Psychol. Abstr.).

J. PEDIAT.

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VOL. XXII. OCTOBER, 1946.

Electroencephalographic Studies of Mental Fatigue.

1. Twenty-six medical students and one professor were examined before the beginning of a typical day of classes and at the end of it. Electroencephalograms were taken, together with physiological variables, such as blood sugar, susceptibility to hypocapnia, white blood picture, etc.

2. Of the 23 persons having alpha waves, seven showed loss of alpha and four increase of alpha time. Statistical analysis shows that loss of alpha, claimed as an electroencephalographic evidence of mental fatigue, was not significant.

3. The susceptibility of the EEG to deep breathing was twice as great at 8 a.m. as it was at 5 p.m., when corrections were made for blood-sugar level, vital capacity, and evidence of peripheral vasoconstriction. (Authors' abstr.)

Effects of Electro-convulsive Shocks on "Reasoning" Ability in Albino Rats.

Evidence based on data from six adult rats indicates that electro-convulsive shocks alter and impair the performance of rats in the Maier "reasoning" test. The amount of disturbance appears to be inversely related to the length of the period of recovery after individual shocks. Suggestions have been given for further investigations which may shed considerable light on the influence of convulsive shocks on cognitive functions in infra-human subjects.

(Authors'-abstr.)

J. ROY. NAVAL MED. S.

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Alterations of Conditioned Reflexes in Old Age.

Observations on a 15-year-old dog who had been subjected to 12 years of experimentation show that, in this animal, trace conditioned responses could not be produced at all. Delayed conditioning could be accomplished only with difficulty. A previously learned discrimination between two auditory stimuli was lost. During the last half year of the dog's life, the conditioned salivary response decreased by two thirds, while the magnitude of the unconditioned salivary response increased markedly. Theoretically, these results are taken to mean that, in senility, the cortical processes of inhibition and excitation are lost in the order named, although subcortical function remains unimpaired. G. A. KIMBLE (Psychol. Abstr.).

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PSYCHOL. BULL.

VOL. XLIII. NOVEMBER, 1946.

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VOL. LIII. SEPTEMBER, 1946.

On the Nature of Fear.

(1) Anthropoid fears of inert, mutilated or dismembered bodies are spontaneous —that is to say, although experience of a certain kind is a pre-requisite and learning is definitely involved, the avoidance of such objects is not built up by association with a more primitive cause of fear.

(2) These and a number of other fears are evidently not determined by a sensory event alone, and the behavior is not intelligible except on the assumption that its control is a joint product of sensory and " autonomous " central processes. Consequently no amount of analysis of the stimulating conditions alone can be expected to elucidate the nature of fear, or to lead to any useful generalization concerning its causes.

(3) An adequate hypothesis of the nature of fear cannot be framed in psychological terms alone, but must utilize physiological concepts of cerebral action. No common psychological ground can be discovered for all the various causes of fear. What is there in common, for example, between the characteristically high level of the auditory and low level of visual stimulation which induces fear in children, or between fear of strangers, which decreases, and fear induced by pain, which tends to increase, with repetition ?

The hypothesis developed here has made a considerable synthesis of formerly unrelated facts, although it remains vague on some crucial points. It proposes, in brief, that fear originates in the disruption of temporally and spatially organized cerebral activities ; that fear is distinct from other emotions by the nature of the processes tending to restore cerebral equilibrium (that is, *via* flight) ; and classifies the sources of fear as involving (1) conflict, (2) sensory deficit or (3) constitutional change. By distinguishing between processes which break down and those which restore physiological organization in the cerebrum, the variability of fear behavior is accounted for.

The conceptions of neurophysiological action on which this is based were developed originally as an approach to other problems, and will be presented in detail elsewhere. When this is done, and the neurophysiological implications are made explicit, it may appear that a basis has been laid at last for an adequate theory of emotion and motivation—something which is lacking in psychology at present. (Author's abstr.)

NOVEMBER.

PSYCHOSOM. MED.

VOL. VIII. SEPTEMBER–OCTOBER, 1946.

Studies on the Nature of Certain Symptoms Associated with Cardiovascular Disorders.

Day-to-day studies were made over a period of almost a year of the symptoms and cardiovascular and respiratory functions of healthy human subjects, and short term observations were made on selected patients.

Emphasis was placed upon reactions to persistent low-grade stresses and strains which are a part of " every day " living and which constitute the core of the bedside problem rather than upon the well-known responses to major life crises. These studies have revealed the following :

1. Dyspnea associated with inefficient pulmonary ventilation may occur in

response to stress-producing life situations in association with anxiety, anger, guilt, rage, frustration, and tension.

2. Palpitation associated with increased stroke volume may occur under similar circumstances.

3. Heart pain in the presence of anatomical narrowing of the coronary arteries may result from increased work of the heart attendant upon prolonged elevation of the blood pressure and cardiac output in association with rage, resentment, anxiety, fear, and tension.

4. Heart pain in the presence of anatomical narrowing of the arteries may result from a fall in the cardiac output and coronary blood flow in association with desperation and defeat.

5. Giddiness and faintness may result from cerebral anoxia attendant upon diminished venous return to the heart. Also, giddiness and faintness may result from hyperventilation, which is followed by cerebral vasoconstriction, impaired dissociation of oxyhemoglobin and cerebral anoxia. Both type of cerebral anoxia occur in response to stress-producing life situations in association with feelings of exhaustion, anxiety, fear, and during the early part of convalescence.

6. Fatigue, as experienced by patients is a complex state dependent upon emotional attitude, the absence of a dominant motivation and the presence of a stress-producing life situation with accompanying inefficiency of cardiovascular and respiratory function.

7. Individuals differ as regards the intensity and duration of the cardiovascular and respiratory responses to life situations. The fact that a single subject tends to react under different circumstances in many different ways suggests that the individual is manifesting a variety of ways of dealing with his environment as regards his cardiovascular and respiratory functions.

8. These results indicate that, in a setting of adverse life circumstances and associated emotional reactions, performance in terms of respiration and work of the heart is costly. This high cost may manifest itself in cardiovascular symptoms which are not dependent alone upon gross structural heart disorder. This uneconomical performance may also manifest itself in impaired total efficiency of the individual. (Authors' abstr.)

An Electrocardiographic Study of Psychoneurotic Patients.

The mechanism of non-specific electrocardiographic abnormalities observed in normal, psychotic and neurotic individuals is still not entirely understood. It is generally accepted, however, that the deviations from the normal are associated with an imbalance in the autonomic nervous system. The appearance of these abnormalities is apparently independent of the degree of nervous imbalance, since in only a relatively small percentage of cases with psychoneurotic cardiac dysfunction do these occur. Mainzer and Krause showed that an emotion such as fear before an operation produced changes in the electrocardiogram strongly suggestive of transitory coronary insufficiency. When consciousness was depressed by anaesthesia the electrocardiographic record reverted to a normal pattern. This observation was interpreted by them as indicating the marked influence the autonomic nervous system has on the coronary circulation. They suggested that vagal influence was dominant in decreasing the coronary flow. Since, however, there is no unanimous agreement among workers as to the precise action of the sympathetic and parasympathetic supply on the coronary circulation, it would appear hazardous to insist that the essential action of psychic impulses to the heart is directed precisely upon the coronary flow. Furthermore, in all published reports on this problem, as well as in the present investigation, no combination of abnormalities suggestive of a myocardial infarction pattern was observed: It would appear, rather, that the psychic impulses to the heart may act upon any of its elements, producing in this way non-specific deviations from the normal pattern. Further evidence to support the view of the effect of autonomic imbalance on the cardiac mechanism was presented by Wendkos, using vagolytic and sympatholytic drugs on normal individuals having an inverted T wave in lead CF_3 of the electrocardiogram. Earlier observations of the effect of emotion on the electrocardiogram contribute little towards a better appreciation of the use of this instrument in differentiating benign from organic heart disease. Since anxiety is the central symptom of nearly all neuroses and psychoses, and all fears either apparent or

obscure form the essential component of the psychoneurotic states, it would appear that the electrocardiographic abnormalities noted in such cases may be attributed to inherent fear reactions.

In an electrocardiographic study of 1,000 young aviators, Graybiel *et al.* found that P waves with an amplitude of 2 mm. or greater occurred in 2·1 per cent., and 0·5 per cent. of their records in leads II and III respectively, and none in lead I. In the present report P waves of the same amplitude occurred in 3·9 per cent. of the records in lead II, and 0·7 per cent. of the cases in leads II and III. In ten instances, tall P waves were associated with small upright or diphasic QRS complexes in lead I, tall QRS complexes in leads II and III, with a slight S-T depression in lead III, giving the impression of a right heart strain pattern. It is well known that persons with asthenic body builds, low diaphragms and small hearts show a right axis shift pattern in the electrocardiogram. In the present study only 60 per cent. of the patients with neurocirculatory asthenia had this type of body habitus, and only one-third of this group had right axis shift. This has been the experience of other workers in this field.

Graybiel *et al.* showed that deep S_2 waves greater than 4 mm. occurred in 2·4 per cent. of their records, while Hall *et al.* on a similar study of 2,000 young aviators, found S_2 greater than 3 mm. in 20·7 per cent. of their records. In the present investigation, the presence of deep S_2 waves was observed in only 1·5 per cent. of the records. This suggests that the occurrence of a deep S_2 wave alone, unassociated with other well-defined abnormalities in the electrocardiogram, should be regarded as an individual variation and not indicative of myocardial damage.

Flat or small T waves in leads I and II occurred in 5·3 per cent. of the present series of records. Graybiel *et al.* reported inversion of T_2 in 0·2 per cent. of their records in a large group of healthy individuals, and Hall *et al.* in a similar study observed this abnormality in 0·3 per cent. of their cases. Graybiel and White reported seven cases of neurocirculatory asthenia, known to be free of organic heart disease, showing inverted or flat T waves in leads I and II. According to these workers there was no evidence in these cases to indicate inadequacy of the coronary circulation to explain the abnormality in the T wave. White *et al.* observed T_2 inversions occurring occasionally in persons with asthenic habitus and vertical hearts. They suggested that this electrocardiographic abnormality may be produced either by variation in position of the heart, depression of the diaphragm or by overventilation resulting in alkalosis. Barker *et al.* reported that alkalosis decreased and acidosis increased the amplitude of the T waves in the limb leads, and believed that abnormal T waves produced by voluntary hyperventilation may be due to alkalosis. When they induced alkalosis by feeding large quantities of sodium bicarbonate (25 to 50 gm.) to normal patients, they were able to produce in 5 out of 7 cases similar T wave changes. However, they were unable to show a strict parallelism between the pH of the blood and the electrocardiographic changes. Thompson explained the T inversions found in tracings of patients with anxiety neurosis and the hyperventilation syndrome as being due to alkalosis. He believed that smoking may produce similar changes by deep inspiration, contrary to the view of Graybiel *et al.* that flattening or inversion of the T waves in the limb leads are due to the toxic action of nicotine. Scherf and Weisberg presented convincing evidence showing that the alterations in the T waves may be attributed to the diaphragm during respiration. Logue *et al.*, from a study of 74 cases of neurocirculatory asthenia, reported 30 per cent. of their records showing low T waves. In a recent report, Loftus *et al.* studied a series of 41 cases with anxiety neurosis, with only 2 cases (5 per cent.) showing low amplitude of the T wave in leads I and II, which is in close agreement with the findings of the present investigation. Their other 39 cases apparently showed no electrocardiographic deviations from normal, in spite of the marked personality disorders, which is significant. Other workers have observed transient T wave inversion in lead II following a paroxysmal ventricular tachycardia in patients without psychoneurotic personality patterns.

T wave inversions in the precordial leads were not observed in the present investigation. Wendkos reported T inversions in CF_2 in 4 cases of neurocirculatory asthenia and ascribed this change to a preponderance of either the vagal or sympathetic tone—not to the position of the heart, since the stability of the inversions was unaffected by postural changes. Logue *et al.* recorded 3 per cent. of their cases having the T wave inverted in lead CF_3. Inverted T waves in lead CF_2,

having the characteristic feature of a long descending and short ascending limb, have been commonly observed in normal infants' and children's electrocardiograms. Occasionally similar T inversions in this lead have been noticed in young, healthy adults and their occurrence has been ascribed to the residual qualities of the juvenile heart; for that reason, it is not a characteristic feature of autonomic imbalance in psychoneurosis.

S-T segment depressions occurred in 8 per cent. of the present series of records. This abnormality has been frequently observed following shock treatment and in electrocardiograms of emotionally unstable individuals. However, the degree of deviation of the S-T segment from the reference level, or how commonly this abnormality occurs, had not been recorded. While 36 per cent. of the present records reveal S-T depressions in the limb leads, actually only 8 per cent. of these showed depressions of at least 0·5 mm. in leads I and II, and 0·75 mm. in lead III, taking the P-Q segment as the reference level. Graybiel *et al.* found 0·9 per cent. of their records of 1,000 normal aviators showing a mean S-T junction depression of 0·64 mm. in lead I, 1·2 per cent. of the records with a mean depression of 0·46 mm. in lead II, and 7·7 per cent. with a mean depression of 0·33 mm. in lead III. Since S-T depressions occur in a variety of electrocardiographic patterns indicative of disease involving various cardiac elements, the significance of this abnormality in benign cardiac dysfunctions is difficult to evaluate. It is significant, however, to note that this abnormality occurs at least six times more commonly in patients with personality disorders than it does in normal individuals under the age of 40 years. (Authors' abstr.)

NOVEMBER–DECEMBER.

Organ Function and Form Perception.

The Rorschach records of two groups, each consisting of 60 patients, were compared. One group, designated as V group, was picked for the common feature of arterial hypertension. The other group, designated as L group, was composed of 30 cases of chronic arthritis and 30 cases of Parkinsonism.

The two groups showed specific preferences for certain types of responses which made it possible to distinguish between an L type and a V type of response. The critical responses could be subsumed under 4 general categories. In all 120 patients the number of responses of their own type exceeded the number of responses of the other type in at least two categories. The four categories and the differences between the two groups are as follows:

1. Vertical axis.
   (*a*) Location: Patients of the L group had a much greater tendency to center one-half or more than one-half of their responses in the axis than the V group.
   (*b*) Form: Patients of the V group saw the axial part as an opening about five times more often than the L group.
   (*c*) Content: Warm-blooded organisms and dynamic emphasis centred in the axis were observed more often in the L group than in the V group. The V group saw more anatomical structures, ritualistic objects, and water and fire than the L group.
2. Kinesthetic responses: Goal-directed activities were indicated more often by the L patients, while actions determined by convention or by efforts to maintain a certain position were indicated more often by the V patients.
3. Integration and disintegration: The tendency toward integration of the ink-blots into a comprehensive interpretation was more pronounced in the L group, while the tendency toward disintegration was more pronounced in the V group.
4. Animals: Eagles and pigs were most frequently seen by the L group, while cows, sheep and beasts of prey were most frequently seen in the V group.

The psychological interpretation of the findings suggested that arthritic and Parkinsonian patients are dominated by an urge for individualistic, independent

action. Obstacles are liable to provoke aggressiveness in excess of the chances for success. Patients suffering from arterial hypertension have a tendency toward dependent relationships in form of identification with their social environment. Action is determined by material needs and by social standards. Obstacles easily provoke conflicts between dependent and aggressive impulses, resulting in restriction of the range of action and of perception.

Specific correlations between organ dominance, disease liability and form of perception were discussed. They gave added insight into the physiological basis of the Rorschach method and of physiognomical understanding.

The discovery of two gestalt tendencies associated with individualistic and with collectivistic personality types suggested the possibility of making current personality and aptitude tests more reliable, and the possibility of further extending the use of the Rorschach method. (Author's abstr.)

The Sleep of Patients with Manic-Depressive Psychosis, Depressive Type: An Electroencephalographic Study.

(1) The entire night's sleep of 6 patients with manic-depressive type, was studied electroencephalographically and compared with data similarly obtained from normal subjects. The categories for the electroencephalograms were waking or daytime and sleep, the latter being subdivided into low voltage, spindles, spindles plus random, and random.

(2) There was considerable variability among the patients in the percentage of time that each electroencephalographic type appeared during the entire night's recording. This variability became less when the waking records were excluded and only the electroencephalographic patterns that occurred in sleep were considered.

(3) In a comparison of the mean percentage of time each electroencephalographic sleep pattern appeared in the sleep records of patients and normal controls, it was found that the patients had almost twice as much low voltage activity as the normal controls (37·5 to 19 per cent. respectively) and approximately one-half as much spindles plus random activity as the normal controls (23 to 40 per cent. respectively).

(4) In a comparison of the minute by minute fluctuations from one electroencephalographic pattern or level to another for the entire night's recording of patients and normal controls, it was found that the fluctuations were more frequent for the patients.

(5) The per cent. of the minutes during the night's sleep which contained two or more of the electroencephalographic sleep levels was nearly twice as great for the patients as for the normal controls (52·7 to 28·5 per cent. respectively).

(Authors' abstr.)

Psychodynamic and Electroencephalographic Factors in Duodenal Ulcer.

Twenty-five cases of duodenal ulcer were studied from a psychodynamic and electroencephalographic point of view. The cases represented an unselected sample of the naval ulcer population. The electroencephalographic data showed a high incidence of dominant alpha activity in this ulcer group. Using the Davis classification for the measurement of normal electroencephalograms, it was found that 76 per cent. of the cases were in the dominant alpha group, 4 per cent. in the subdominant alpha group, and 20 per cent. were in the rare alpha group. Thus there were almost four times the expected number in the dominant alpha group.

The psychological data revealed a rather consistent ulcer personality constellation. Duodenal ulcer individuals were characterized by marked feelings of insecurity associated with strong passive dependent trends. There was usually a marked reaction against these trends with the development of a facade of independence and aggressiveness. The ulcer syndrome seemed to result from the interaction of this personality constellation and the frustrating service environment.

The basic correlation between a dominant alpha rhythm and psychic trends to passivity and dependency appears valid. However, one must not assume any causality between these two aspects of the total organism. The alpha rhythm is best considered as a concomitant electrocortical activity of the tendency of the individual to assume a passive, tensionless, unstimulated state.

(Author's abstr.)

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The Effects of Certain Parasympathomimetic Substances on the Emotions of Normal and Psychotic Individuals.

Desoxycorticosterone acetate and prostigmin methylsulfate were used with some 60 psychotic and neurotic patients and with normal controls. The acetate, an extract of the adrenal cortex, had a somewhat less marked effect than the prostigmin, a synthetic drug. A variety of physiological changes were carefully recorded. The emotional effect was in general relaxing. Under prolonged treatment, several manic patients and schizophrenics became eligible for discharge. A single administration of either substance produced measurable chemical and vascular effects over a period of about four hours.

H. D. SPOERL (Psychol. Abstr.).

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Alterations of Conditioned Reflexes in Old Age.

Observations on a 15-year-old dog who had been subjected to 12 years of experimentation show that, in this animal, trace conditioned responses could not be produced at all. Delayed conditioning could be accomplished only with difficulty. A previously learned discrimination between two auditory stimuli was lost. During the last half year of the dog's life, the conditioned salivary response decreased by two thirds, while the magnitude of the unconditioned salivary response increased markedly. Theoretically, these results are taken to mean that, in senility, the cortical processes of inhibition and excitation are lost in the order named, although subcortical function remains unimpaired. G. A. KIMBLE (Psychol. Abstr.).

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1. Biochemistry, Physiology, Anatomy, &c.

Studies in Cholinesterase. V. Selective Inhibition of Pseudocholinesterase in vivo. *Hawkins, Rosemary D., and Gunter, Josephine M.* (*Univ. Toronto, Can.*). [*Biochem, J.*, **40**, 192–7 (1946).]

The prostigmine analog (dimethyl-carbamate of (2-hydroxy-5-phenylbenzyl) trimethylammonium bromide) inhibits almost completely and selectively the non-specific or pseudocholinesterase. Injections of this compound produce almost complete inhibition of the pseudocholinesterase in the blood and tissues of dogs, but do not produce symptoms suggesting an accumulation of acetylcholine, which appear only when the true or specific cholinesterase is significantly suppressed at the same time. It is, therefore, concluded that the pseudocholinesterase plays no significant part in the *in vivo* splitting of acetylcholine.

S. Morgulis (Chem. Abstr.).

Iron Concentrations in Cholinesterase Preparations. *Barnard, Robert D.* (*Fox Hills, Staten Island, N.Y.*). [*Science*, **104**, 331 (1946).]

A sample of electric eel material, 1 mgm. of which hydrolyzed 1,200 mgm. of acetylcholine per hour, had an Fe content of 47·3 mgm. per cent.; a serum esterase preparation, which split 20 mgm. of acetylcholine per hour, had 19·8 per cent. of Fe; while a human erythrocyte cholinesterase preparation, with an esterase activity of 7·8 mgm. per mgm./hour, had an Fe content of 9·0 mgm. per cent. This suggests that the Fe either is concentrated along with the esterase fractions or comprises an actual component of the latter. E. D. Walter (Chem. Abstr.).

True Cholinesterases with Pronounced Resistance to Eserine. *Hawkins, Rosemary D., and Mendel, Bruno* (*Univ. of Toronto*). [*J. Cellular Comp. Physiol.*, **27**, 69–85 (1946).]

Planaria (*P. dorotocephala*) have a true cholinesterase which shows increasing activity with rising concentrations of acetylcholine (I) up to 0·006 M. To inhibit its activity to the same extent as that of the specific cholinesterase of mammalian brain or erythrocytes, 50 and 1,000 times the concentrations of eserine and Nu-489 (dimethyl-carbamate of o-hydroxybenzylamine-HCl), respectively, are required. Frog brain has a true cholinesterase with maximum activity at a concentration

of (I) about 0·0006 M and with decreasing activity with greater concentrations. Approximately 100 times the concentration of eserine is required to inhibit activity to the same extent as cholinesterase of mammalian brain. Inhibition of activity by excess substrate cannot be considered a primary characteristic of specific cholinesterases. The ratios of activity toward (I) to activity toward β-acetyl-methylcholine differed markedly for the cholinesterases of *Planaria* and frog brain. Caution must be used in interpreting experiments in which there is lack of potentiation of the effects of nerve stimulation on addition of eserine.

H. L. MASON (Chem. Abstr.).

Changes in the Activity of Cholinesterase of Nervous Tissue Under the Influence of Constant Current. Babskii, Eug. B., and Minaev, P. F. (Acad. Med., Moscow). [*Nature*, **158**, 343–4 (1946); *cf. C.A.*, **40**, 1545[8], 2212[7].]

The cathode of constant current lowers the activity of cholinesterase, while the anode produces the opposite effect. This can be explained on the basis of the changes that take place in the distribution of ions in the nerve under the influence of polarization.

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

Mechanism of Action of Cholinergic Substances. III. Moratschek, Johann (Univ. Berlin). [*Arch. exptl. Path. Pharmakol.*, **203**, 278–81 (1944); *cf. C.A.*, **35**, 3328[8].]

In the isolated frog heart acetyl-β-methylcholine chloride (mecholyl) and isobutylenetrimethylammonium chloride (esmodil) produce a prolonged but gradually diminishing decrease in the beat amplitude. Choline and tetramethylammonium chlorides inhibit this negative inotropic action of mecholyl and esmodil. Esmodil acts synergistically with mecholyl and acetylcholine.

IV. Acetylcholine and Choline. Voigt, Manfred (Univ. Berlin). [*Ibid.*, 282–304.]

The action of acetylcholine on the isolated frog heart was studied. The results are in accord with those of other investigators. Choline anatagonizes the action of acetylcholine.

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

VIII. Effect of High Oxygen Pressure on Enzymes; the System Synthesizing Acetylcholine. Stadie, Wm. C., Riggs, Benjamin C., and Haugaard, Niels. [*Ibid.*, 189–96.]

The aerobic synthesis of acetylcholine by slices or homogenate of rat brain is not affected by exposure to O at high pressure. The choline acetylase of rat-brain slices is likewise unaffected, but cell-free preparations of the enzyme are rapidly inactivated by O. The relation of these findings to the problem of O poisoning is discussed.

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

Effect of Adrenaline and Acetylcholine on Excitation, Inhibition and Neuroses. Gantt, W. Horsley, and Freile, M. [*Trans. Am. Neurol. Assoc.*, **70**, 180–1 (1944).]

In normal dogs having excitatory and inhibitory conditional reflexes and in neurotic dogs, adrenaline (I) impaired the higher nervous functions as measured by the motor, salivary, and cardiac conditional reflexes, while acetylcholine (II) improved the differentiation between the excitatory and inhibitory processes. These effects lasted days or weeks after the injection. In the neurotic animals (I) had a less disturbing effect, and (II) a greater improving effect, than in the normal animals. Both drugs became less effective on repeated injection.

MARION HORN PESKIN (Chem. Abstr.).

Muscular Contraction. The So-called Direct Sensitization of Striated Muscle to Acetylcholine. Scheiner, H. (Centre études scientifiques homme, Paris). [*Compt. rend. soc. biol.*, **139**, 1090–2 (1945). *Discussion.*]

An almost unlimited number of substances sensitize frog muscle to acetylcholine. This " direct " sensitization appears to be related to the existence of some mechanism which is present in vertebrate muscle, but absent in invertebrate muscle.

Sensitization of Striated Muscle to Acetylcholine by Tetrahydrofuryl Alcohol. [*Ibid.*, 1092–5.]

Tetrahydrofuryl alcohol (I) sensitizes frog rectus abdominis muscle to acetylcholine. With concentrations of 0·1–2·5 per cent. the effect is proportional to the concentration. When the muscle is washed it returns to its original state of sensitivity. In this respect (I) differs from eserine, since the sensitizing effect of the latter is not abolished by washing. L. E. GILSON (Chem. Abstr.).

The Mode of Action of Acetylcholine on Muscle Tissue. Kometiani, P. A., Klein, E. E., and Dolidze, Sh. V. (Georgian Acad. Sci., Tbilissi). [*Biokhimiya*, **11**, 253–62 (1946); *cf. C.A.*, **39**, 3361[4].]

The specific action of acetylcholine on muscle is due to the transformation of part of the bound K into a form capable of diffusion. Acetylcholine has little effect on muscles with a low degree of excitability. The action of acetylcholine is associated with the physico-chemical state of the cytoplasmic substrate to which the K is bound. H. PRIESTLEY (Chem. Abstr.).

Reaction of the Sympathectomized Dog to Histamine, Acetylcholine and Peptone. Bennati, D., and Bacq, Z. M. (Facultad de med., Montevideo). [*Arch. soc. biol. Montevideo*, **12**, 211–15 (1945) (Pub. 1946).]

Sympathectomized dogs are hypersensitive to the action of acetylcholine, histamine and Witte peptone during 26 days after the last operation.
F. FROMM (Chem. Abstr.).

Effect of Alkaloids on Acetylcholine Synthesis. Torda, Clara, and Wolff, Harold G. (Cornell Univ., Ithaca, N.Y.). [*Arch. Biochem.*, **10**, 247–50 (1946); *cf. C.A.*, **40**, 2211[7].]

The synthesis of acetylcholine (I) by minced frog brain in the presence of 3 per cent. physostigmine salicylate was increased 20–150 per cent. on the addition of adrenaline, cocaine, ephedrine, and ergotamine in concentrations of 0·03 to 0·003 mgm. per cent. Yohimbine and pilocarpine did not modify (I) synthesis, whereas veratrine, quinine, quinidine, strychnine, amphetamine sulfate, morphine, codeine, cinchonine, colchicine, d-tubo-curarine and atropine decreased the synthesis of (I).
VERNON L. FRAMPTON (Chem. Abstr.).

Thiamine and Contraction of Leech Muscle Provoked by Acetylcholine. Saviano, Mario (Univ. Naples). [*Boll. soc. ital. biol. sper.*, **17**, 21–4 (1942).]

Thiamine does not increase the sensitivity of untreated leech dorsal muscle to acetylcholine, but does increase the sensitivity of eserinized muscle.

Relation between Cholinesterase and Sensitization to Acetylcholine by Thiamine. [*Ibid.*, 24–6.]

Thiamine does not exert an anticholinesterase action on leech muscle.
L. E. GILSON (Chem. Abstr.).

Influence of Anticholinesterase on Reflexes of Sino-carotid Origin. Heymans, C. (Univ. Gand). [*Experientia*, **2**, 260 (1946) (*in French*).]

In dogs administration of diisopropylfluorophosphate (DFP) does not affect cardiovascular or respiratory reflexes of carotid sinus origin or the peripheral excitability of the heart vagus nerve. Injection of prostigmine after DFP still induces bradycardia, an increase of vagal excitability, an increase of intestinal peristalsis, and bronchospasm. Thus the theory of central or peripheral cholinergic transmission of cardiovascular and respiratory reflexes induced by stimulation of carotid sinus pressoreceptors is not supported. Several pharmacological actions of prostigmine are not related to the anticholinesterase action of the drug.
WM. M. GOVIER (Chem. Abstr.)

Action of Acetylcholine and Vitamin B_1 on Human Blood Pressure. Rotelli, Luigi (Univ. Pavia, Italy). [*Boll. soc. ital. biol. sper.*, **20**, 508–9 (1945).]

In 80 persons the injection of vitamin B_1 caused no alteration in blood pressure, injection of 200 mgm. acetylcholine caused a depression of 10 to 15 mm. Hg and the injection of combined vitamin B_1-acetylcholine produced no effect other than that caused by the acetylcholine. HELEN LEE GRUEHL (Chem. Abstr.).

Acetylcholine in the Pathogenesis of Peptic Ulcers. Al'pern, D. E. (Med. Inst. Kharkov). [*Byull. Eksptl. Biol. Med.*, **20**, *No.* 7/8, 43–4 (1945).]

More extensive observations confirm the significance of acetylcholine (I) in the formation of gastro-intestinal ulcers. Of 131 patients (I) was found in the blood of 91 per cent. of patients with x-ray-confirmed ulcers, 70 per cent. of patients with other ulcer symptoms, and 3 per cent. of patients recovering from ulcers. It was absent from the blood of 43 patients with non-ulcerous gastro-intestinal symptoms. K. STARR CHESTER (Chem. Abstr.).

Sensitizatiion of Muscle to Choline and Acetylcholine and the Supposed Existence of Choline Acetylase. Babskii, Eug. B., and Minaev, P. F. (Acad. Med., Moscow). [*Nature*, **158**, 268 (1946).]

Nachmansohn and his colleagues (*C.A.*, **39**, 2519[6]) and Feldberg and Mann (*C.A.*, **39**, 4667[9]) have suggested the enzymic synthesis of acetylcholine from choline and acetate in the presence of adenosine triphosphate. The alleged enzyme was named choline acetylase. Repeating their experiments, the authors found that the contraction of rectus abdominis of frogs and of the dorsal muscle of leeches in response to choline is greatly increased by the presence of adenosine triphosphate, this increase depending on the concentration of the latter. The increase of observed muscle contraction may possibly have been due not to the stimulation of acetylcholine synthesis by adenosine triphosphate, but to the sensitizing effect of this substance on the test muscles. E. D. WALTER (Chem. Abstr.).

The Content of Acetylcholine-like Substances and Cholinesterase in the Central Nervous System of Castrated Rats. Kakushkina, E. A., and Tatarko. T. (K. A. Timiryazev Biol. Museum, Moscow). [*Byull. Eksptl. Biol. Med.*, **20**, *No.* 9, 58–60 (1945).]

The removal of the sex glands of male or female rats did not have significant effect on the formation of acetylcholine-like substances in the cerebrum, but castration did result in a reduction in cholinesterase activity which led to a relative increase in acetylcholine-like substances. K. STARR CHESTER (Chem. Abstr.).

The Mechanism of Acetylcholine Liberation in Striped Muscles. Abdon, N. O., and Bjarke, T. (Univ. of Lund, Sweden). [*Acta Pharmacol. Toxicol. (Copenhagen)* (**1**), 1–17, (1945) (*in English*).]

Experiments with frog muscles are described. When the muscles are stimulated and contracted, free acetylcholine (I) is liberated from a precursor (II). During the first period the (II) is resynthesized rapidly and no free (I) is found by analysis. The resynthesis requires energy ; when available sources of energy are exhausted the amount of (II) decreases and if cholinesterase is inhibited with eserine the liberated (I) accumulates. Oxidative as well as glycolytic processes can give energy for resynthesis of (II). When skeletal muscles are mechanically injured the (II) is broken down and a corresponding amount of (I) is formed. The rate of (I) formation is considerably more rapid than formerly believed. When resynthesis is blocked as far as possible, as in muscles treated with iodoacetate and KCN, the whole content of (II) can be broken down in 2–3 seconds. When normal frog muscles are continuously stimulated in O no breakdown is seen during the first 10 seconds. This means that all the (II) is broken down and rebuilt at least 200 times during this period. Resynthesis is the normal way for the removal of (I) in skeletal muscles. Neither the breakdown nor the resynthesis of (II) is influenced by eserine in a concentration sufficient to inhibit cholinesterase completely (1 : 50,000). (I) is liberated from (II), whether the muscles are stimulated directly or through their anterior roots. If transmission is blocked with curare, stimulation of the nerves produces no breakdown of (II) and no free (I) appears. Curare does not affect the mechanism for (I) liberation ; when curarized muscles are stimulated directly the (II) is broken down just as in normal muscles. These findings are not in full accord with the humoral transmission theory of Dale.

Effect of Vagal Stimulations on the Acetylcholine Precursor in Rabbit Hearts. Abdon, N. O., and Borglin, N. E. [*Ibid.*, 162–8.]

All the acetylcholine (I) of the rabbit heart is present as precursor (II). In the ventricles the concentration is about the same as in skeletal muscles, in the auricles

it is 2–3 times higher, In the heart (II) is the immediate source of liberated (I). After prolonged vagal stimulation there is a significant decrease in (II). The vagus escape phenomenon is neither due to lack of (II) nor to inhibition of formation of (I) from (II).

Metabolism of Acetylcholine Precursor in Isolated Hearts. Abdon, N. O. [*Ibid.*, 169–83.]

In the isolated rabbit heart (Langendorff preparation) there is a constant breakdown and formation of precursor (II) independent of vagal mechanisms. Part of the liberated acetylcholine (I) is immediately resynthesized to (II) and this reaction is favored by the presence of glucose. Part of the (I) is hydrolyzed to choline by the esterase and lost by diffusion. This loss is remedied by addition of choline to the bath solution, some of the added choline is synthesized to (II). The synthesis requires energy. Anaerobic conditions cause a rapid fall in (II). The (II) metabolism goes on without vagal influences. The liberation of (I) by vagal stimulation means that the resynthesis of (II) is retarded. It is probable that the accumulated (I) secondarily transmits the vagal impulses to other chemical or physical mechanisms in the heart. Atropine has no influence on breakdown or formation of (II). There is a correlation between (II) content and mechanical properties of the heart. Addition of choline to the bath fluid, which enables the heart to maintain its (II) content, has a positive inotropic effect. The (II) is not only the source of the vagal transmitter, but also appears to be necessary for contraction of cardiac muscle.

Liberation of Acetylcholine from the Precursor in Voluntary Muscles without Motor End Plates. Abdon, N. O. [*Ibid.*, 325–35.]

After section of the motor nerves to a voluntary muscle (gastrocnemius) there is a loss of the precursor (II); about a quarter is left after 3 weeks in the rabbit or after 4 weeks in the frog. The decrease in (II) develops considerably slower than the degeneration of motor end plates and is probably more closely connected with the general degeneration of the muscle cell. After complete degeneration of the motor end plates the remaining (II) is readily broken down to free acetylcholine upon direct stimulation. As is known, a part of the normal frog sartorius muscle contains about the same concentration of (II) as the neural region of the muscle. If the muscle is stimulated through the motor nerve until it is completely fatigued, the (II) is broken down in all parts of the muscle and not just in the immediate vicinity of the motor end plates. This suggests that (II) has some other function in addition to that of humoral transmitter from nerve to muscle.

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

Present Views on the Mode of Action of Acetylcholine in the Central Nervous System. Feldberg, W. [*Physiol. Rev.*, **25**, 596–642 (1945).]

All the evidence in favor of acetylcholine as a central transmitter has been obtained by methods previously applied to the peripheral nervous system. There is strong evidence that transmission across a number of synapses in the central pathway of autonomic and motor neurones occurs through the mediation of acetylcholine. However, there is little evidence for such transmission across many other central synapses, and there are facts difficult to reconcile with the theory of acetylcholine as a universal transmitter. The evidence for and against is presented. Acceptance or rejection of the theory depends on the relative value attached to the various findings and the kinds of evidence regarded as decisive. The main danger at present for the theory is not the difficulties opposing it, but the attempt to base it on single facts. If, however, we must assume that acetylcholine is not the universal transmitter, then our concept of its role in the central nervous system will be influenced greatly by views concerning transmission across synapses not affected by acetylcholine. Possibly a completely new approach must be found to settle the question. M. E. MORSE (Psychol. Abstr.).

Pain of Organic Disease Relieved by Prefrontal Lobotomy. Freeman, W., and Watts, J. W. [*Lancet*, **250**, 953–955 (1946).]

Five cases (recurrent carcinoma, tabes dorsalis, thalamic syndrome, trauma to the cauda equina and hysterical contractures) are reported of prefrontal lobotomy

performed for the relief of pain. "The present cases indicate that when pain due to organic disease becomes unbearable and the fear of pain becomes as dreadful as the pain itself, prefrontal lobotomy is a desirable procedure. Psychosurgery alters the subject's reaction to pain without materially changing his ability to feel pain."
A. C. HOFFMAN (Psychol. Abstr.).

Indophenol Oxidase of the Central Nervous System. I. Photometric Quantitative Determination of Indophenol. Mitolo, Michele (Univ. Bari, Italy). [*Bull. soc. ital. biol. sper.*, **20**, 829–31 (1945).]

A mixture of solutions of α-naphthol, *p*-phenylenediamine, and NaOH was added to pulped nerve tissue and stirred from time to time for one hour at room temperature in diffused light. The indophenol formed was dissolved in 97 per cent. alcohol, shaken, filtered off after 25 minutes and determined photometrically.
HELEN LEE GRUEHL (Chem. Abstr.).

Histochemical Differentiation of Lipoids. III. Critical Evaluation and Control of the Petroleum Ether Method for Sudanophile Histolipoids. Giordano, Alfonso. (Univ. Pavia, Italy). [*Boll. soc. ital. biol. sper.*, **20**, 510–11 (1945).]

To determine whether all or only part of the sudanophile fatty substances resist the solvent action of petroleum ether during fixation, tissue sections were treated with petroleum ether for 5 days. After this period, filter paper dipped in the solvent, evaporated and stained with sudan, showed the presence of a moderate amount of such fats in the solvent. For the first 9 to 10 days in petroleum ether the non-ether-soluble histolipoids maintained their sudanophilia. After the 10th day it diminished. The coloration of the fats with sudan was moderate at the 25th day, weak at the 27th and disappeared around the 34th day.
HELEN LEE GRUEHL (Chem. Abstr.).

Two New Colloid Reactions for the Cerebrospinal Fluid. Palma, Eugenio de. [*Rev. asoc. bioquim. argentina*, **13**, 109–12 (1946).]

The results of the Wassermann, Takata-Ara, Lange, benzoin and mastic tests in 120 cases of general progressive paralysis, tables, neurolues, and infectious processes are compared with those of a test with a colloidal solution of 20 per cent. asafetida gum in absolute EtOH and with a filtered, colloidal solution of 10 gm. gum ammoniac in 100 c.c. absolute EtOH. F. FROMM (Chem. Abstr.).

A Method for the Preparation of the Acetalphosphatide of the Brain and its Aldehyde Component in the Form of Dimethylacetal. Klenk, E., and Schumann, E. [*Z. physiol. Chem.*, **281**, 25–8 (1944).]

Thirty gm. of finely divided glycerol phosphatide (I) is thoroughly dried in a vacuum over H_2SO_4. (I) was obtained by ether extraction of human brain. It was dissolved in 225 c.c. C_6H_6 and after the addition of 75 c.c. of a concentrated alcohol Na solution (5·4 gm. Na in 100 c.c. 99 per cent. alcohol) the solution was placed in a pressure bottle and heated for one hour in a boiling H_2O bath. After standing overnight at room temperature it is filtered with suction and centrifuged. It is concentrated in a vacuum and a mixture of acetalphosphatide (II) and Na salts of fatty acids are precipitated with acetone. The precipitant is resuspended in CH_3OH and the Na salts go into solution. (II) remains undissolved and is removed by filtering with suction. The yield of (II) is 4·5 gm. Details for the chemical analysis of (II) are given as well as separation and characterization of aldehyde mixture. R. J. ALLGEIER (Chem. Abstr.).

A Simple Method for the Preparation of Phosphorus-free Cerebrosides and also Concerning the Decomposition Product of the Fatty Acids Formed. XVIII. Report on Cerebrosides. Klenk, E., and Leupold, F. [*Z. physiol. Chem.*, **281**, 208–11 (1944); *cf. C.A.*, **37**, 2762³.]

The preparation of cerebron and kerasin is described. The recrystallized products were analyzed and compared with the theoretical C and H values of the pure substances. The nervone acid fraction was converted to the methyl ester and distilled. The physical characteristics of the various fatty acids obtained are tabulated. R. J. ALLGEIER (Chem. Abstr.).

Comparative Studies of the Histochemistry of Vitamin C and Gold in the Nervous System of Mammals. Sebruyns, Marcel (Univ. Gent.) [*Natuurw. Tijdschr.*, **26**, 83–90 (1944).]

In the gray matter of the brain the highest amount of Au and vitamin C (I) was found in the pyramid cells, but (I) is mostly localized in the Golgi apparatus, while Au is on the opposite pole of the cell. The neuroglia and endothelial cells of the brain are rich in (I) and Au while the white matter of the brain and cerebellum is poor. In the cerebellum the Purkinje cells are richest in Au and (I), both of them diffusely distributed in the cytoplasm. The spinal cord is richer in Au than in (I). The Au is distributed mainly in the anterior column, while (I) is found equally in the anterior and the posterior column. The ependyma cells of the ventricles of the brain and of the aquaeductus mesencephali are free of (I) and have little Au, while the cells of the wall of the spine are rich in (I). The ependymic cells of the spine are free of Au. The plexus choroideus has a great affinity for Au, while only small nuclei of (I) are found there. The cerebrospinal ganglions have a very low content of (I) and Au, the content of the vegetative nerves is appreciably higher. The neuroplasm and the fibrils of the peripheral nerves have neither (I) nor Au. The content of (I) and Au in the epiphysis is low. Conclusion: The content of (I) and Au is an indication of the metabolic activity of the cell. The antagonism of the local distribution of (I) and Au in some cells and its causes are discussed. F. FROMM (Chem. Abstr.).

Sphingomyelins: Their Action on Blood Cells, Particularly Lymphocytes; Their Share in the Nucleinate-like Action of the Ether-insoluble Fraction of Brain Lipoids. Tompkins, Edna H. (Vanderbilt Univ. School of Med., Nashville, Tenn.). [*Bull. Johns Hopkins Hosp.*, **78**, 57–77 (1946).]

Intravenous injections of beef brain protagon (ether-insoluble tissue lipoid fraction) affect circulating leucocytes in the same way as nucleotides. Sphingomyelins, extracted from this protagon, used in identical experiments exert characteristically different effects. A. EDELMANN (Chem. Abstr.).

Pyruvate Oxidation in Pigeon Brain Catalyzed by Fumarate. Long, C. (Queen's Univ., Belfast). [*Biochem. J.*, **40**, 278–83 (1946); *cf. C.A.*, **39**, 5262[5].]

The O consumption of dialyzed pigeon brain suspensions metabolizing pyruvate is stimulated by fumarate only in the presence of PO_4 ion and adenine nucleotide. The rate of disappearance of pyruvate is always decreased somewhat by this fumarate, but since fumarate is also oxidized to pyruvate this exactly balances the decrease in pyruvate disappearance, it is concluded that fumarate does not affect the rate of pyruvate utilization. Under the conditions of the experiments with fumarate PO_4 ion, and adenine nucleotide the ration between O and pyruvate indicates almost complete oxidation to CO_2 and H_2O. The fumarate apparently acts upon some intermediate product formed during pyruvate oxidation.
S. MORGULIS (Chem. Abstr.).

Findings in the Cerebrospinal Fluid. II. Technique and Systematic Interpretation of the Albumin-globulin Ratio in Cerebrospinal Fluids. Lange, Carl (N.Y. State Dept. Health, Albany). [*J. Lab. Clin. Med.*, **5**, 552–9 (1946); *cf. C.A.*, **40**, 1895[3].]

Current methods of determining the albumin-globulin ratio in cerebrospinal fluid are markedly inferior to those for blood. The ratio in cerebrospinal fluid varies widely because of the amount of blood proteins that may be present. In low protein concentration, which prevails in neurosyphilis, misleading results are obtained by using 50 per cent. saturation with $(NH_4)_2SO_4$ to precipitate the globulin. With MeOH it is possible to secure consistent results in normal fluids and to determine the ratio in various pathological conditions. Evaluation of the ratio should, however, be based on a systematic interpretation of the results of various laboratory tests. An attempt to correlate an isolated finding directly with clinical conditions is, as a rule, misleading. It should be interpreted as an integral part of a complete syndrome. The application of this basic principle indicates that determination of the albumin-globulin ratio in cerebrospinal fluids provides, chiefly, information regarding the permeability of the meninges, which is more conclusively indicated by other procedures. LEONARD KAREL (Chem. Abstr.).

Glucolysis in the Brain. Lenti, Camillo (Univ. Torino, Italy). [*Boll. soc. ital. biol. sper.*, **20**, 530–1 (1945).]

Rabbit brain was minced and extracted twice for 20 mintues with Ringer solution. The extracted brain tissue was then incubated in buffered Ringer solution saturated with N_2 and CO_2, deproteinized with CCl_3COOH, centrifuged, and concentrated. The formation of pyruvic acid from glucose by brain tissue was demonstrated by the Jowett and Quastel method (*cf. C.A.*, **31**, 4376[9]). Glucolysis in the brain was discussed. HELEN LEE GRUEHL (Chem. Abstr.).

Further Studies on the Biochemistry of Reflex Activity. I. *Phosphorylation of Glucides in the Spinal Cord During Reflex Activity. Mitolo, Michele (Univ. Bari, Italy).* [*Boll. soc. ital. biol. sper.*, **16**, 721–2 (1941).]

Freshly isolated toad spinal cord contained, in mgm. per cent., inorganic P 3·19, phosphocreatine P 7·6, adenyl pyrophosphate P 19·8, P of difficulty hydrolyzable esters 77·2 and total acid-soluble P 136·5. For spinal cord allowed to stand 4 hours without excitation the corresponding values were 32·5, 0·0, 19·3, 84·8 and 136·5. For spinal cord stimulated at frequent intervals for 4 hours the values were, 35·6, 0·0, 11·3, 61·6 and 108·5.

II. Behavior of the Organic Phosphorus of the Spinal Cord. [*Ibid.*, **17**, 114–15 (1942).]

Freshly isolated toad spinal cord contained 62–68 mgm. per cent. of organic P. After 4 hours' repose in presence of air it contained 68–75 mgm. per cent., and after 4 hours of reflex activity provoked by pinching every 5 seconds it contained 72–78 mgm. per cent. L. E. GILSON (Chem. Abstr.).

Nicotinic Acid of Normal Human Spinal Fluid. Cesaro, Angelo Nunziante (Univ. Siena, Italy). *Boll. soc. ital. biol. sper.*, **17**, 103–5 (1942).]

Values found were 10–50, average 26γ, per 100 c.c.
L. E. GILSON (Chem. Abstr.).

The Relation of Basal Metabolic Rate in Students to the Results of Various Tests for Physical Fitness and Mental Staleness. Jung, Frederick T., Cisler, Lillian E., Maynard, Mason S. (Northwest. Univ. Med. School, Chicago). [*Quart. Bull. Northwestern Univ. Med. School*, **19**, 105–10 (1945).]

As indications of physical condition, hematocrit readings and lymphocyte percentage appeared to have many advantages over basal metabolic rate and Flack test (pulse response to increased intrathoracic pressure) score. Among 37 medical students tested in the first quarter of their freshman year, the b.m.r.'s were, on the average rather low: − 5·94 per cent. and − 6·31 per cent. at two test periods 3–7 days apart (averages obtained after exclusion of one improbable high value from each set). MARION HORN PESKIN (Chem. Abstr.).

Distribution of Intravenously Injected Fructose and Glucose Between Blood and Brain. Klein, J. Raymond, Hurwitz, Ruth, and Olsen, Norman S. (Univ. of Illinois, Coll. of Med., Chicago). [*J. Biol. Chem.*, **164**, 509–12 (1946).]

The authors studied the distribution of fructose and glucose between arterial blood plasma and brain tissue of anesthetized cats after injection of the sugars. The results support a hypothesis that the rate of transfer of fructose from blood to brain is insufficient to meet the metabolic requirements of brain.
KARL F. URBACH (Chem. Abstr.).

Effect of Strong Doses of Lecithin on Lipoid Metabolism. Capraro, V., and Pasargiklian, M. (Univ. Milano, Italy). [*Boll. soc. ital. biol. sper.*, **20**, 454–7 (1945).]

In dogs, doses of 0·23–1·05 gm. lecithin/kgm. body weight diminished the respiratory quotient and greatly increased lipoid consumption.
HELEN LEE GRUEHL (Chem. Abstr.).

Inhibition of Phosphorylation of Glucose in Mouse Brains by Viruses and Its Prevention by Preparations of Diphosphopyridine Nucleotide. Racker, E., and Krimsky, I. (New York Univ. Coll. of Med., New York, N.Y.). [*J. Exptl. Med.*, **84**, 191–203 (1946).]

Glucose utilization in homogenates of brains of mice infected with poliomyelitis virus is inhibited with glucose or fructose-6-phosphate as substrate; no inhibition occurs in the presence of hexose-diphosphate. Purified preparations of the Lansing and the Theiler FA strains of mouse encephalomyelitis virus invariably inhibit glycolysis when added to homogenates of normal mouse brain. A similar but much less consistent inhibition is provoked by adding high concentrations of non-neurotropic viruses (influenza and tobacco mosaic virus) to normal mouse brains. The magnitude of inhibition caused by the purified virus is a function of the virus concentration and depends on temperature and time of incubation of the virus-brain mixture. The inhibition of glycolysis in the brains of mice infected with Theiler FA virus and in normal brain-Theiler FA virus mixtures is prevented by the addition of preparations of diphosphopyridine nucleotide and glucose.

C. J. West (Chem. Abstr.).

The Vitamin C Content of Cerebrospinal Fluid in Natural Malaria. Wozonig, Helmut (Military Hosp., Mariahilf, Munich). [*Z. Immunitats.*, **105**, 411–16 (1946).]

In malaria tropica the loss of vitamin C in the urine is five or six times more than normal. The concentration of vitamin C in cerebrospinal fluid reflects the depletion of the body by this excessive loss in urine. During the second and third post-febrile weeks the vitamin C reserves are gradually restored. The vitamin C content of the organism influences erythropoiesis. J. H. Lewis (Chem. Abstr.).

Changes in the Cerebrospinal Fluid and Blood in Vernal-estival Encephalitis. I. Changes in the Pressure, Morphological Composition, Proteins, and Colloidal Reactions in the Cerebrospinal Fluid in Acute Stages of the Disease. Mandel'boim, A. B. (Inst. Physiol., Acad. Sci. S.S.S.R., and Kazakh. Med. Inst., Alma-Ata). [*Byull. Eksptl. Biol. Med.*, **20**, *No.* 7/8, 45–8 (1945); *cf. C.A.* **39**, 5314[9].]

In tests of 32 patients with acute and chronic vernal-estival encephalitis, the cerebrospinal fluid was clear, colorless, and with significantly high pressure, which reduced with abatement of clinical symptoms. In 25 per cent. of acute cases there was a fibrous precipitant in sterile cerebrospinal fluid, not correlated with symptom differences. In serous meningitis there was moderate pleocytosis, with 30 per cent. of the cells polynuclear and 70 per cent. large or moderate-sized lymphocytes. In 4 acute cases, 4–5 days after onset of symptoms, 8–10 per cent. of the cells were large, plasmatic cells. In early stages of acute cases the globulin and total proteins of the cerebrospinal fluid were supranormal, but these became normal within two weeks. The gold sol (Lange), paraffin (Kafka), and sublimate-fuchsin (Takata-Ara) reactions showed regular changes in the amounts of colloids and their color reactions, and were highly sensitive indexes of biochemical changes in the organism. In all cases the Wassermann reactions of blood and cerebrospinal fluid were negative, a positive reaction only appearing later in luetic cases. The morphological and colloidal changes noted only in early stages of the disease are believed to originate with inflammation of the brain, which later abates.

II. Changes in Pressure, Morphological Composition, and Colloidal Reactions of Proteins in the Cerebrospinal Fluid in Chronic Stages of the Disease. [*Ibid.*, *No.* 9, 25–8.]

In chronic stages of vernal-estival encephalitis, in all syndromes except the hyperkinetic, the pressure of the cerebrospinal fluid was normal; in the latter case it was abnormally high. In chronic stages of encephalitis the quantity of ordinary elements in transparent and colorless cerebrospinal fluid was normal, the globulin reaction was always negative, the quantity of protein varied within normal limits, the Wassermann reactions of cerebrospinal fluid and blood were negative, and the colloidal reactions often gave curves of the type of lues cerebri. Changes in the colloidal reactions in the disease relate to continual disturbance of carbohydrate-salt exchange. K. Starr Chester (Chem. Abstr.).

Acute Porphyria I. The Pathology of the Porphyrins and Identification of the Excretion of Uroporphyrin I. Prunty, F. T. G. (Ti. Thomas's Hosp. Med. School, London). [*Arch. Internal Med.*, **77**, 623–42 (1946); *cf. C.A.*, **40**, 3178[3].]

Two cases of porphyria are described, one being of the Waldenstrom " latent type," and the other a typical case of acute porphyria. Evidence of hepatic impairment was obtained with histologic signs of necrosis. Urinary and fecal excretions of coproporphyrin and of uroporphyrin were followed; also, of urinary porphobilinogen in one case. A type III uroporphyrin was isolated from the urine, which was shown upon further examination to be largely type I porphyrin. Type I uroporphyrin was isolated from the liver and feces and type I coproporphyrin from urine and feces. Moderate amounts of porphyrin were demonstrated in the kidneys by ultraviolet microscopic examination.

J. B. BROWN (Chem. Abstr.).

Gaseous Metabolism of the Brain of the Monkey. Schmidt, Carl F., Kety, Seymour S., and Pennes, Harry H. (Univ. of Pennsylvania). [*Am. J. Physiol.*, **143**, 33–52 (1945); *cf. C.A.*, **38**, 5556.[1]]

Cerebral O metabolism was measured *in vivo* in lightly anesthetized monkeys by measuring cerebral blood flow directly, while samples of cerebral venous and arterial blood were collected for subsequent analysis. Cerebral O uptake changed in the same direction as cerebral functional activity. The physiological range of cerebral O uptake was from about half to nearly double the resting normal value. Convulsions were followed by a period of depressed O uptake of the same order as that produced by a deeply narcotic dose of pentothal. Of the three possible correlations among (*a*) arterial-venous O difference, (*b*) blood flow, and (*c*) O uptake of the brain, that between (*a*) and (*b*) was poorest, that between (*a*) and (*c*) somewhat better, but that between (*b*) and (*c*) the best. Previous work indicating that cerebral circulation of the monkey is affected more consistently and strongly by changes in pO_2 than in pCO_2 was confirmed. E. D. WALTER (Chem. Abstr.).

Maintenance of Respiratory Activity in Stored Peripheral Nerve. Wortis, Joseph, and Lapouse, Rema (N.Y. Univ. Med. Coll., New York, N.Y.). [*Science*, **104**, 247 (1946).]

The proximal portion of the sciatic nerve of the adult white rat can be preserved aseptically in cotton-stoppered flasks in plain Krebs-Ringer solution at 5·5°. The O uptake of fresh nerve in a glucose medium was 0·104 cu. mm. O/hr./mgm. wet tissue, or approximately one-tenth that of whole minced brain. After preservation for 2 and 30 days the O uptake had dropped to 0·055 and 0·044 cu.mm./hr./mgm. respectively. Actually these values should be higher, since the wet weight of the tissue increases by 20 per cent. after immersion in a protein-free solution of the type used. BRUNO VASSEL (Chem. Abstr.).

Oxygen Supply and Oxygen Consumption in the Nervous System. Bronk, D. W., Davies, P. W., Brink, F., jun., and Larrabee, M. G. [*Trans. Am. Neurol. Assoc.*, **70**, 141–4 (1944).]

O tension in various regions of the intact nervous system was studied by recording the current through a circuit through a small metallic electrode in contact with the tissue under investigation and a non-polarizable electrode maintained at an appropriate difference of potential with respect to the first electrode (Davies and Brink, *C.A.*, **37**, 1145[8]). When this potential difference was 0·3–0·8v. the current depended on the electrolysis of O at the surface of the small electrode, and the intensity of current was a linear function of the O concentration and a lightly anesthetized cat, the O tension at various points at or below the surface of the cortex was found to be 5–100 mm. Hg; the values increased as the electrode approached arterioles or venules, and varied greatly with changes in respiration and circulation. In peripheral nerve fibers the rate of O consumption increased as Ca in the environment decreased. MARION HORN PESKIN (Chem. Abstr.).

Nervous System Dysfunction During and Following Oxygen-controlled, High-Altitude Indoctrination. Brown, Gordon A., Cronick, Charles H., Motley, Hurley J., Kokour, Elmer J., and Klingman, Walter O. [*Trans. Am. Neurol. Assoc.*, **70**, 113–17 (1944).]

When the program of high-altitude indoctrination at Maxwell Field was altered to meet 38,000 ft. standards, nervous system reactions occurred that were not observed in the former program of test flights up to 28,000 ft. At 18,000 ft. adequate O_2 by diluter-demand regulator was provided, and above 30,000 ft. 100 per cent. O_2 was used. Despite this, conditions of mild anoxia were present, since at 34,000-38,000 ft. the O_2 saturation decreases approximately 86 per cent. Severe dysfunction of the nervous system occurred not only during the period of great change in atmosphere pressure, but also after exposure to high-altitude conditions and return to ground level despite constant O_2 supply. The symptoms were not relieved by continued O_2 administration, but disappeared spontaneously. Among the reactions seen (occurring in a very small percentage of the 40,000 individuals studied) were: Disturbances in equilibrium, co-ordination, consciousness, and functions of the cortex and large sensory or motor tracts; disturbances suggestive of meningeal irritation, increased intracranial pressure, migraine-like features; disturbances of subcortical mechanisms associated with dyskinesia, hyperkinesia, aphasia; and minor reactions, e.g. scotoma, neuralgia, urticaria, syncope, headache, nausea. MARION HORN PESKIN (Chem. Abstr.).

A Specific Sympathomimetic Ergone in Adrenergic Nerve Fibers (Sympathin) and Its Relations to Adrenaline and Non-adrenaline. v. Euler, U. S. (Karolinska Inst., Stockholm). [*Acta Physiol. Scand.*, **12**, 73–97 (1946).]

The thoracic and lumbar sympathetic chain and the splenic periarterial nerves are very suitable for the preparation of extracts with sympathomimetic activity and contained 30–100 adrenaline equivalent per gm. (determined by blood pressure in cat). The active substance gives the catechol reactions with $FeCl_3$, but resembles noradrenaline more than adrenaline, from which it differs by its effect on blood pressure following ergotamine or dihydroergotamine, by its action on the non-pregnant cat uterus, pregnant rabbit uterus or isolated intestine (cat or rabbit), by its pupil-dilating action and, finally, by the fluorescence test. The active substance is found in greater amounts in the grey sympathetic than in the white rami; in low concentration in sympathetic ganglia, vagus and phrenic nerves and in various parts of the brain, but in fairly high concentration in the sensory nerves of the skin. After the degeneration of the post-ganglionic periarterial splenic nerves the content of the active substance in the spleen is greatly decreased. It is concluded that the active substance is identical with noradrenaline, and is the physiological transmitter of adrenergic nerve action in mammals. Extracts from frog hearts contain an active substance with properties of adrenaline. The ergone obtained from adrenergic nerves exerting the action of noradrenaline should be named sympathin, corresponding to Cannon and Rosenblueth's sympathin E (*cf. C.A.*, **27**, 4288), whereas sympathin (I) corresponds to adrenaline.

S. MORGULIS (Chem. Abstr.).

Vital Studies of the Neuroplasm. Smitten, N. A. [*Am. Rev. Soviet. Soviet Med.*, **3**, 414–25 (1946).]

The purpose of the experiments was to study the colloidal physical state and reactive properties of neuroplasm, after injury and excitation of the neurons. The nerve cells responded immediately to injury and stimulation by uniform structural shifts in the protoplasm and nucleus. The protoplasm of the living nerve cells represents a very soluble liquid, which is able under the influence of injurious factors to pass instantly into the state of a highly viscous gel. Along with gelation of the injured cell there occurred a shift of the intracellular reaction toward the acid range (change in the color tint of methylene blue and neutral red). Gelation and the associated acidosis of the neuroplasm indicate the paranecrosis of the nerve cells. W. R. HENN (Chem. Abstr.).

Endemic Pellagra in Northern Portugal. Monteiro, A. Moura, Coutinho, Herculano, Janz, G. J., and de Loureiro, J. A. (Faculty Med., Lisbon, Portugal). [*J. Hyg.*, **44**, 518–25 (1946).]

A clinical and biochemical study of a group of 30 patients from northern Portugal showed them to have a mild form of pellagra, with no sign of severe malnutrition or of associated deficiencies except dental abrasion caries and pyorrhoea. Their diet was chemically satisfactory in most respects. Apart from very low consumption of animal protein, the gross intake on calories, total protein, minerals, and vitamins, including nicotinic acid, was satisfactory. The syndrome was completely cured by nicotinic acid, but it was suggested that the main characteristic of a diet on which pellagra is likely to occur is not a shortage of nicotinic acid, but a lack of high-grade protein. A maize diet, satisfactory so far as calories and total protein are concerned, may produce pellagra, because maize proteins are deficient in certain essential amino acids. Other cereal diets may also produce pellagra if the general level of nutrition is very low. Such a syndrome can be cured either by very large doses of nicotinic acid without change in diet, or by a moderate dose accompanied by abundant animal protein.

JOHN T. MYERS (Chem. Abstr.).

Food Ration and Brain Work. Binet, L., and Duhamel, G. [*Bull. acad. med.*, **124**, 355–67 (1941); *Chimie and Industrie*, **47**, 255 (1942).]

In brain work, questions of quality are more important than quantity equivalence; but it is, nevertheless, work that represents a certain amount of energy which can be supplied only by food and the organic reserves, and the quality itself of the work depends to a notable extent on the quality of the food. In the intellectual worker the consumption of O is definitely increased, and the working of the brain is accompanied by an increase in the inorganic P content of the blood and in the renal excretion of P. Cerebral activity is generally accompanied by muscular contractions which ultimately increase the amount of energy expended. Brain fatigue is often complicated by insomnia and frequently by headaches due to accumulation of waste matter resulting from excessive working of the brain. Insomnia, in turn, tends to increase this fatigue.

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

The Determination of Cerebral Blood Flow in Man by the Use of Nitrous Oxide in Low Concentrations. Kety, Seymour S., and Schmidt, Carl F. [*Am. J. Physiol.*, **143**, 53–66 (1945); *cf. C.A.*, **40**, 7355[8].]

A method is described applicable to unanesthetized man for the determination of cerebral blood flow by means of arterial and internal jugular blood concentrations of an inert gas during the first 10 minutes of its inhalation in low concentration. Sixteen determinations of cerebral blood flow on 11 human subjects by this method have been made, and suggest the feasibility of applying it to clinical investigation.

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

Metabolism of Nerve Tissue. V. Creatine and the Phosphocreatine Index: Methods. Ciaccio, C., and Capri, A. (Univ. Messina, Italy). [*Boll. soc. ital. biol. sper.*, **17**, 397–8 (1942); *cf. C.A.*, **33**, 1800[6].]

Known methods of determining creatine and its derivatives are discussed. For obtaining true creatine values the 3,5-dinitrobenzoate method of Langley and Evans (*C.A.*, **30**, 7607[3]) is preferred.

VI. Creatine and the Phosphocreatine Index of the (Toad) Spinal Cord under Various Conditions. [*Ibid.*, 399–401.]

Normally practically all of the creatine is present as phosphocreatine. Small doses of strychnine or stovaine do not change this condition; iodoacetate brings about the liberation of much free creatine.

VII. Phosphorylations in Homogenates Treated with Potassium Chloride. [*Ibid.*, 401–3.]

KCl, $NaHCO_3$, and glucose or glycogen were added to toad spinal cord homogenates. Some unidentified, readily hydrolyzable hexose and triose phosphoric esters were formed in the presence of KCl, but not in its absence.

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

Resorptive Action of Mustard Gas on the Central Nervous System. II. Changes in Subordinate Chronaxia after Applying Mustard Gas to the Skin. Levitina, G. A., and Palatnik, S. A. [*Farmakol. i Toksikol.*, **8**, *No.* 1, 42–6 (1945); *cf. C.A.*, **39**, 3074.[2]]

Mustard gas (I) on the skin of rabbits increases chronaxia of flexor digitorum muscles; chronaxia of extensor digitorum muscles remains constant. The amount and duration of change in chronaxia depend on dosage; after a mild dose of (I) the change gradually relaxes, but not after a lethal dose. Chronaxia of the tibial nerve is also increased. The tests show that (I) lessens the subordination of the peripheral to the central nervous system.

JULIAN F. SMITH (Chem. Abstr.).

Synthetic Antihistamines: New Test of the Part Played by Histamine in Physiology and Pathology. Chauchard, P. [*Rev. sci.*, 466–7 (1943); *Chimie et industrie*, **53**, 405 (1945).]

Histamine injection produces hypotension with vasodilatation, cardiac acceleration, vomiting, diarrhea and asthma, the last three owing to contraction of smooth muscles. Affections which long remained mysterious (urticaria, hay fever, etc.) are now attributed to liberation of histamine in the body. There is now available a compound with a remarkable, specific antihistamine action; it is benzyl (dimethylaminoethyl)-aniline or antergan (No. 2339 R.P.). It protects the guinea-pig against 50–60 lethal doses of histamine, and the therapeutic dose is 175 times smaller than the m.l.d. It abolishes all the effects of histamine, including the cutaneous reaction, and is used successfully in cases of urticaria, hay fever, pruritus, and migraine. A. PAPINEAU-COUTURE (Chem. Abstr.).

The in vivo Inactivation by Cyanide of Brain Cytochrome Oxidase and Its Effect on Glycolysis and on the High-energy Phosphorous Compounds in Brain. Albaum, Harry G., Tepperman, Jay, and Bodansky, Oscar (*Edgewood Arsenal, Md.*). [*J. Biol. Chem.*, **164**, 45–51 (1946); *cf. Keilin, C.A.*, **23**, 3719; *Stotz, et al., C.A.*, **32**, 7934[4].]

Rats injected intraperitoneally with 5 mgm. NaCN per kgm. body-weight showed approximately 250 per cent. decrease in cytochrome oxidase activity in the brain. The brains of these cyanide-poisoned rats showed significant decreases in the concentration of glycogen, phosphocreatine, and adenosine triphosphate, and significant increases in the concentration of inorganic phosphate, lactic acid, hexose diphosphate, phosphoglycerate, and phosphopyruvate. These results indicate that anoxia in tissue induced by inactivation of cytochrome oxidase results in a shift from aerobic to anaerobic metabolism and a depletion of high-energy P compound. LEONARD KAREL (Chem. Abstr.).

Hyperglucemia from Convulsive Seizures. Tolone, Salvatore (*Univ. Napoli, Italy*). [*Boll. soc. ital. biol. sper.*, **20**, 295–7 (1945).]

Convulsive attacks were produced in dogs by injections of metrazole or NH_4Cl. Immediately after the attack the arterial blood contained 0·80 gm./1 glucose; ¼ hour after attack 1·28 gm.; at the 4th hour blood sugar was normal. Venous blood immediately after the attack contained 0·32 gm. glucose; ¼ hour after attack 1·07 gm.; 1 hour after, 1·12 gm. The values diminished to normal at the 4th hour. On the basis of the arterio-venous blood-sugar relationship the cause of the hyperglucemia was attributed to a neuro-dynamic character of the drug used to induce the attack. HELEN LEE GRUEHL (Chem. Abstr.).

A Transitory Decrease in Glucose Tolerance following Experimental Lesions in the Central Nervous System (*of Dogs*). *Keller, Allen D.* (*Baylor Univ., Waco, Texas*). [*Proc. soc. Exptl. Biol. Med.*, **62**, 318–19 (1946).]

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

Neuro-humoral Nature of the Myotonic Syndrome. Minz, B., and Passouant, P. (*Univ. Montpellier*). [*Compt. rend. soc. biol.*, **139**, 950–2 (1945); *cf. C.A.*, **40**, 2218.[2]]

Chiefly discussion. In myotonia the cholinesterase of the blood, spinal fluid, and especially the muscles is below normal and the acetylcholine of the muscles is considerably above normal. L. E. GILSON (Chem. Abstr.).

The Model of Lillie in Connection with the Growth of the Nerve Fiber. Brummelkamp, R. [*Proc. Netherlands Acad. Sci.*, **48**, 360–8 (1945) (*in English*).]

Lillie's model (a stretched iron wire immersed in a HNO_3 solution) furnishes a clue toward explaining the physiological properties of nerve conduction, and may help in explaining the growth of nerve fiber. The powers which influence the growth of nerve fibers may be considered as powers in an electric field, and Lillie's model and the nerve fiber correspond in having the same spatial pattern. The phenomenon of neurobiotaxis can be correlated with results secured using the model.

J. E. WEBSTER (Chem. Abstr.).

Sympathetico-adrenal Discharges in Hypophysectomized Rats. Safford, H., Wells, L., and Gellhorn, E. (*Univ. of Minnesota, Minneapolis*). [*Am. J. Physiol.*, **146**, 386–8 (1946).]

The hyperglycemic response to adrenaline secreted under conditions of anoxia, or to its injection, is present for several days after hypophysectomy. This indicates that the hypophysis plays no direct role in sympathetico-adrenal reactions. However, this effect disappears in the course of several weeks following hypophysectomy, although the fasting blood-sugar level is not significantly altered. This failure of adrenaline to cause hyperglycemia is not explainable on the basis of the regressive changes in thyroid and adrenal cortex, nor is it due to alterations in absorption, since it is observed under conditions of anoxia, when adrenaline is secreted into the blood stream as well as after intraperitoneal injection of adrenaline.

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

The Effect of Hypoglycemia and Age on the Glycogen Content of the Various Parts of the Feline Central Nervous System. Ferris, Shirley, and Himwich, Harold E. (*Union Univ., Albany, N.Y.*). [*Am. J. Physiol.*, **146**, 389–93 (1946).]

The concentrations of glycogen in various parts of the central nervous system of newborn and 6·5-week-old kittens subjected to intense hypoglycemia were determined. In the newborn animal the more caudal parts showed the greater fall in concentration. The spinal cord was depleted most, followed in order by the cerebellum, medulla, thalamus, and corpora quandrigemina, while the cerebral cortex showed the smallest decrease. In the 5–8-week-old kittens the higher parts exhibited a greater decrease. The glycogen in the cerebral cortex was depleted to the greatest extent, followed by the corpora quadrigemina and thalamus, while the concentrations in the cerebellum, medulla oblongata and cord were not changed significantly during hypoglycemia. The higher areas suffered smaller impairments than in the adult, while the phyletically older regions were not depleted, and in this way differ from the newborn. E. D. WALTER (Chem. Abstr.).

Localization of the Two Phosphatases in the Central Nervous System. Carandante, Giovanna (*Univ. Haples*). [*Boll. soc. ital. biol. sper.*, **16**, 443–4 (1941).]

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

Water Intoxication and the Electroencephalogram. Gellhorn, Ernst, and Ballin, H. M. (*Univ. of Minnesota, Minneapolis*). [*Am. J. Physiol.*, **146**, 559–66 (1946).]

A study of the changes in brain function by means of the electroencephalogram during progressing water intoxication. E. D. WALTER (Chem. Abstr.).

Pellagra: A Study in Human Nutrition. The Multiple-factor Principle of the Determination of Minimum Vitamin Requirements. Frazier, Ernestine I., and Friedemann, Theodore E. (*Northwestern Univ. Med. School, Chicago*). [*Quart. Bull. Northwestern Univ. Med. School*, **20**, 24–48 (1946).]

Dietary records obtained by Goldberger and others on 1,863 human subjects have been recalculated for protein, thiamine, riboflavin and nicotinic acid contents. It is concluded that the minimum daily intake of nicotinic acid needed in a marginal diet containing corn products is about 7·5 mgm. This can be decreased to about 5 mgm. by a high level of good quality protein, riboflavin, or other dietary factors in green vegetables. If any of the latter three classes of ingredients are low, the nicotinic acid requirement is increased. On a corn-containing diet supple-

mented by large amounts of milk, or on a diet without corn, the minimum nicotinic acid requirement is about 4 mgm./day. A liberal diet with generous amounts of green vegetables and good proteins (meat, milk, eggs) is the best safeguard against pellagra. MARION HORN PESKIN (Chem. Abstr.).

Causes of Experimental Gastroprival Pellagra. III. Therapeutic Experiments on Dogs with Preventative Parenteral Administration of Vitamin B_6 Alone or Together with Vitamin B_1, Lactoflavin, and Nicotinic Acid. Petri, Svend, Norgaard, Flemming, Trautner, Kjeld, and Kiaer, William (Kommunehosp., Patholog. Inat., Copenhagen). [*Acta Med. Scand.*, **117**, 90 (1944); *Chem. Zentr.*, **11**, 233 (1944); *cf. C.A.*, **40**, 1165.]

Studies were made on dogs from which the stomach and the beginning of the duodenum (Brunner glands) had been extirpated. In addition to an otherwise normal diet, the first group (two animals) received the following total amounts of vitamins per animal over a period of 202 days: Vitamin B_1 251, lactoflavin 90·9, nicotinic acid 720 and vitamin B_6 per animal over a period of 384 days. Clinically all the animals appeared to be ill, but none died. The animals showed a retardation of growth, emaciation, certain changes in the blood picture, and other phenomena; in only one animal were slight degenerative changes in the central nervous system observed. The symptoms of pellagra previously observed in such experimental animals (neuro-cutaneous symptom complex) were decidedly influenced by parenteral treatment with vitamin B_6, as the clinical findings indicated. In particular, the treatment prevented changes in the central nervous system and a decrease in the number of red blood corpuscles, and partially prevented changes in the pelts of the animals. The simultaneous administration of the other vitamins appeared at most to have only a supplementary effect on some of the symptoms. Vitamin B_6, therefore, appears to be the only one of the vitamins so far tested which has a definite therapeutic effect on experimental gastroprival pellagra. From these and earlier results it must be assumed that the fundus plays an important role in the behavior of vitamin B_6 in the organism. M. G. MOORE (Chem. Abstr.).

Further Tests on a Fit-producing Dog Food. Morgan, Agnes F., and Groody, Mary. [*J. Am. Vet. Med. Assoc.*, **108**, 179–83 (1946).]

A baked cereal dog food previously found to cause severe running fits in dogs within 5 to 19 days was found by rat growth to be deficient in protein, since its growth value was improved by the addition of 5 casein, 20 wheat gluten, or 20 per cent. baked wheat gluten, but not by the addition of 1 per cent. yeast extract of high vitamin content. RACHEL BROWN (Chem. Abstr.).

The Pseudo-cholinesterase of Serum and the True Cholinesterase of the Red Corpuscles. Casier, H., and Delaunois, A. L. (Univ. Gand, Belgium). [*Experientia*, **2**, 180–2 (1946) (*in French*).]

The sensitive method previously described (*C.A.*, **40**, 4759[2]) showed that the pseudo-cholinesterase activity of dog serum gave higher values with a solution of acetylcholine (I) of 250 mgm. per cent. than with one of 4 mgm. per cent. Similarly tested, the true cholinesterase activity of a solution of hemolyzed cells equivalent to 0·2 c.c. of washed corpuscles was highest for the first 3–5 minutes with a 200 mgm. per cent. solution of I, after which the rate decreased to a slower but constant rate. With a 100 mgm. per cent. solution of (I) the initial period of greater activity lasted about 2 minutes, with the 4 mgm. per cent. solution about 10 minutes. The difference in rate was attributed to the choline liberated. No such rate change was noted with a 50 mgm. per cent. solution. The cholinesterase activities of both serum and corpuscles were inhibited *in vivo* and *in vitro* by prostigmine. C. P. BERG (Chem. Abstr.).

Determination of Nicotinic Acid and Nicotinamide in Cerebrospinal Fluid. Cazzullo, C. L. (Univ. Milano, Italy). [*Boll. soc. ital. biol. sper.*, **16**, 755–7 (1941).]

Methods are discussed. For human spinal fluid the average is 16–20 γ per cent. of total nicotinic acid, of which most is in the form of the amide.
L. E. GILSON (Chem. Abstr.).

Further Studies on the Biochemistry of Reflex Action. Part III. Creatine in the Central Nervous System and Reflex Action. Mitolo, M. [*Fisiol. e Med.*, 9, (1943).]

In *Bufo vulgaris* the creatine content of the axon is compared in the living and dead animal under conditions of apparent quiet and reflex activity. The possibility of a correlation between the glycolytic process and reflex behavior is considered. M. STUPARICH (Psychol. Abstr.).

Electrical Processes in the Rabbit's Cortex During the Development of a Conditioned Defense Reflex in Response to a Rhythmic Stimulation. Livanov, M. N., and Poliakov, K. L. [*Bull. Acad. Sci. U.R.S.S., Ser. Biol., No.* 3, 286–307 (1945).]

A conditioned defense reaction was established in the rabbit, using as CS a rhythmic stimulus with a frequency of 3 stimulations per second, and, as US, shock to the hind leg presented in a corresponding rhythmic pattern. Simultaneous EEG records were taken. Long before the CR developed, oscillations appeared in the EEG record, having either the frequency characteristics of the stimulus or else a frequency of one half the stimulus frequency. Sample records showing this phenomenon are reproduced. It was noted that these oscillations appeared spontaneously outside the conditioning situation, and in response to the presentation of stimuli like CS. The appearance of the CR on about trial 50 was accompanied by the increase in EEG oscillations, however elicited. But by about trial 70, when the CR was firmly established, the 3 per second activity appeared only in response to CS. Whenever EEG activity of one half the stimulus frequency appeared, pneumograms revealed that the breathing rate approximated that of the EEG. Subsequently it was shown that sound, pain, and other stimuli which elicited the defense reflex also produced the brain wave pattern, as did spontaneous movements which duplicated the CR. Finally it was shown that these rhythms disappeared with the development of differentiation, somnolent states, and in extinction. On the basis of these results the authors suggest that conditioning the defense reaction to a flickering stimulus is dependent on the production in the cortex of periodic changes in the excitability of the motor areas.

G. A. KIMBLE (Psychol. Abstr.).

Nerve as a Model Temperature End Organ. Bernhard, C. G., and Granit, R. [*J. gen. Physiol.*, **29**, 257–65 (1946).]

Rapid cooling of mammalian nerve initiates a discharge which is preceded by a local temperature potential, the cooled region being electronegative to a normal portion of the nerve. Similarly, heating the nerve locally renders the heated region electronegative with respect to a region of normal temperature, and a discharge may be initiated from the heated region. The mechanism underlying these " generator potentials " is regarded as the prototype for temperature end organs.

P. KELLAWAY (Psychol. Abstr.).

An Attempt to Analyze the Mechanism of Sleep in Hibernation. Kayser, C. [*Ann. Physiol. Physicochim. biol.*, **16**, 313–72 (1940).]

The external factor responsible for hibernation is reported to be a lowering of the temperature of the environment to between 5° and 13° C. The internal factor appears to be a polyglandular deficit resulting from an involution of the hypophysis. The first behavioral signs of hibernation, food hoarding, and nest building appear when the anterior hypophysis begins involution. Hypophysectomized hamsters placed in an environment of 8° C. showed the behavioral manifestations, but sleep did not follow. The glandular changes, together with sympathetic dysfunction, appear to produce sleep through a disturbance of the thermo-regulatory function. (Psychol. Abstr.).

2. Pharmacology and Treatment.

Ether Concentration iv Blood and Brain in the Early Stages of Ether Narcosis. Dybing, Fred, and Dybing, Ottar (Veterinary Coll., Copenhagen). [*Acta Pharmacol. Toxicol. (Copenhagen)*, **1**, 270–9 (1945) (*In English*).]

During ether narcosis in rabbits, with Et_2O–O_2 mixtures with high concentrations of ether, the ether content of the blood was 0·143–0·158 per cent. and of the brain 0·167–0·187 per cent. at the moment of respiratory and cardiac paralysis

during short periods of narcosis (10–15 minutes). These levels were not significantly raised by prolonging the period to 45 minutes. In experiments on rats with inhalation of ether in known concentrations, a picture of the ether diffusion in the early stages of narcosis was obtained by parallel determinations of ether in blood, brain and muscle after ether administration for 0·5–25·0 minutes. The results are shown as graphs. After 5 minutes the maximum concentrations were, blood 0·077, brain 0·108, and leg muscle 00·46 per cent.; after 25 minutes the maximum values were 0·13, 0·14 and 0·09 per cent. respectively.

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

Respiration of Peripheral Nerves in the Presence of Sulfonamides in vitro. Maleci, O. (Univ. Padova, Italy). [*Boll. soc. ital. biol. sper.*, **17**, 716–17 (1942).]

The respiration of guinea-pig nerve was decreased by a 0·3 per cent. solution of sulfanilamide or a 0·6 per cent. solution of sulfathiazole, but not by solutions of half these concentrations. It is doubtful if the concentrations attained *in vivo* by sulfonamide therapy have any effect on the nervous system.

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

Fixation of Salts of Procaine Base by Brain Powder and by Nerve Tissue in vitro. Regnier, Jean, Bazin, Suzanne, and Fere, Jacqueline (Univ. Paris). [*Compt. rend. soc. biol.*, **139**, 939–40 (1945); *cf. C.A.*, **40**, 4434.[2]]

Dried brain and fresh nerve tissue were soaked in diluted solutions of procaine phenylpropionate, isobutyrate, acid citrate and hydrochloride and the amounts fixed by the tissues determined. L. E. GILSON (Chem. Abstr.).

The Relief of Tic Douloureux with Large Doses of Ferrous Carbonate. Davidoff, Leo M. [*Trans. Am. Neurol. Assoc.*, **70**, 176 (1944).]

In confirmation of an observation made by Benjamin Hutchinson in 1822, Davidoff has found that 4 gm. $FeCO_3$ twice daily relieves at least 50 per cent. of the pain of paroxysmal trigeminal neuralgia.

MARION HORN PESKIN (Chem. Abstr.).

The Vulnerability to Drugs of Various Cortical Regions as Evidenced by the Electroencephalogram. Finesinger, Jacob E., and Brazier, Mary A. B. [*Trans. Am. Neurol. Assoc.*, **70**, 151–4 (1944).]

Na amytal, tried in 17 subjects, and Na pentothal, tried in 20, consistently caused high-voltage fast-activity (waves of 23–28 cycles/second and voltages above 50 μv.) in the electroencephalogram, after intravenous administration. The effects of the drugs appeared first in recordings from the frontal lobes, then in those from the parietal regions, finally in those from the occipitals. Regression was in the opposite direction. The presence of excess O_2 in the inspired air decreased the effect of the barbiturates; intravenous injection of Na succinate, which acts as an extra substrate carrying more O_2 to the cells for metabolism, had the same effect as inspired O_2. MARION HORN PESKIN (Chem. Abstr.).

A Cycle of Morphine Addiction; Biological and Psychological Studies. Part II. Psychological Investigations. Brown, R. R. [*Publ. Hlth. Rep., Wash.*, **61**, 37–53 (1946).]

Psychological and psycho-physiological studies were made on two post-addicts before, during and following the developments of tolerance to and dependence on morphine. Both patients were studied every other week over a 2-year period. The following measurements were taken: Johnson code learning, sensitivity to electric current, steadiness, tapping speed, continuous subtraction, Scripture's block oscillations, immediate and delayed recall of nonsense syllables, voice- and hand-response time and physiological reactions (blood pressure, pulse rate, skin conductance, and respiration) to word stimuli. It was found that addiction to morphine was associated with reduction in efficiency, with the possible exception of steadiness in the case of one subject. The amplitude of the electrodermal response to word stimuli was significantly reduced following the administration of morphine, whereas the blood-pressure response to the same stimuli was increased. Statistically significant differences between indifferent and disturbing words were found for both patients with respect to electrodermal response, respiratory changes and

voice-response time. Morphine decreased the response difference between these two types of word stimuli. The suggestion was made that morphine may act to ameliorate the disturbing effects of emotional stress.

C. P. FROEHLICH (Psychol. Abstr.).

Resorptive Action of Mustard Gas on the Central Nervous System. III. Mechanism of the Action of Mustard Gas on Cerebral Cortex after Application to the Skin. Levitina, G. A., and Palatnik, S. A. [*Farmakol. i Toksikol.*, **8**, *No.* 6, 32–5 (1945); *cf. C.A.*, **40**, 6172[6].]

Application of mustard gas (I) to devascularized, denervated rabbit ears, and of mustard oil (II) and croton oil (III) to dorsal and aural rabbit skin, showed that (I) on the skin acts on cerebral cortex through the vascular system, not by stimulating peripheral dermal nerve ends. Effects were measured by determining cerebral cortex chronaxia. The reaction was not the same with (I) as with (II) and (III); it is known that (II) acts by stimulating peripheral nerve ends.

JULIAN F. SMITH (Chem. Abstr.).

Influence of Soviet Synthetic Antimalarials (Acriquine and Plasmocide) on the Nervous System. Shteinberg, A. D. [*Farmakol. i Toksikol.*, **8**, *No.* 4, 6–9 (1945).]

A single wetting with plasmocide (I) solution at 5 p.p.m. noticeably decreases the condition of frog sciatic nerve. For a like effect with acriquine (II) the concentration must be about 1,000 p.p.m. Whereas (I) prolongs the latent reflex period in canine spinal cord, (II) has only a slight effect. While (I) kills by respiratory paralysis, (II) kills by cardiac paralysis. Again, (I) has a slow but pronounced febrifuge action, (II) has scarcely any. To protect the central nervous system (II) may be given along with a bromide, e.g. 2 per cent. aqueous NaBr.

JULIAN F. SMITH (Chem. Abstr.).

Influence of Chinese Schisandra Fruits on Spinal Centers. Pozdyankov, F. E. [*Farmakol. i Toksikol.*, **8**, *No.* 4, 15–19 (1945).]

Finely powdered schisandra fruits, dose 0·5–2 gm./kgm. *per os* or by direct introduction into the stomach, stimulate the spinal reflexes of posterior extremities in dogs after low total chordotomy. Motor activity and general behavior are not significantly changed. Probably similar neurodynamic changes in anterior parts of the body require a different technique, e.g. conditioned reflexes, chronaxia, ergographic tests, or the like. A larger dose (3 gm./kgm.) causes hyperkinesis, emotional stimulation, heightened posterior spinal reflexes and retarded urination and defecation in 1–2 hours. Smaller doses take 4–6 hours; symptoms last 4–20 hours. Schisandra fruits appear to be suitable for use in stimulants for the central nervous system.

JULIAN F. SMITH (Chem. Abstr.).

Toxicological Studies on Mescaline. Tarsitano, F. (*Univ. Napoli, Italy*). [*Boll. soc. ital. biol. sper.*, **20**, 762–3 (1945).]

Tests were carried out on the viscera of dogs previously injected subcutaneously with mescaline sulfate. The most sensitive qualitative method for the identification of mescaline in the viscera was found to be the Bouchardat method. The Mayer reaction was almost as sensitive, followed in order of diminishing sensitivity by the Dragendorff, picric acid and $HgCl_2$ tests. In the viscera the greatest portion of the mescaline was found in the liver and kidney, much less in the brain, and no appreciable amount in the blood and lungs.

HELEN LEE GRUEHL (Chem. Abstr.).

Vitamin B_1 Content of the Blood During Insulin Shock. Bom, Fr., and Petersen, W. Gottlieb. [*Nord. Med.*, **25**, 393–5 (1945).]

By means of a biological method (Lehmann and Nielsen's modification of Schoppfer's phycomycetes test) the thiamine content of the blood was determined in 34 patients who had been given insulin shock therapy. The determinations were made partly while the patients were fasting, partly during the shock. The average fasting blood thiamine value was found to be 8·85 ± 0·30 γ per cent., which agrees with Lehmann and Nielsen's normal value of 9·0 γ per cent. During the shock all the patients showed an average increase in the thiamine value of 1·48 ± 0·19 γ per cent., and a positive correlation was demonstrated between this increase and

the rise in the white blood count, which amounted to $+ 0{\cdot}5 \pm 0{\cdot}2$ ($t = 2{\cdot}4$). This increase in the amine content is accordingly assumed to be largely due to the leucocytosis during shock. The present studies have thus been unable to confirm the hypothesis advanced by various authors that an absolute, perhaps temporary, vitamin B_1 deficit occurs during the insulin shock. The complications encountered in these patients (spasms, clonic convulsions, and difficult in awakening) were very slight. Only in two cases of such complications, however, was there a suggestion of subnormal thiamine values (6·1 and 6·7 γ per cent. respectively), nor were the average fasting values lower in patients with such complications. No connection between the frequency of such complications and possible low fasting thiamine values could thus be demonstrated. The patients with such complications seem, on the other hand, to present a somewhat smaller increase in thiamine and white blood counts than do patients without complications. This suggests that the tendency to complications, among other things, possibly may be due to a failure in the mobilization of thiamine and in the leucocytosis, but the smallness of the present material allows no definite conclusions in this direction.

H. KRINGSTAD (Chem. Abstr.).

The Relationship Between Cholinesterase Inhibition and the Pharmacological Action of Diisopropyl Fluorophosphate (DFP). Koelle, George B., Gilman, Alfred, and Binzer, Bertha D. (Edgewood Arsenal, Md.). [*J. Pharmacol.*, **87**, 421–34 (1946).]

Rats, dogs, and monkeys appeared to show no physiological abnormality when the cholinesterase of the blood and tissues was reduced to a small fraction of its normal activity by DFP. The signs associated with further reduction are described. Determinations of serum and red cell cholinesterase inhibition following administration of DFP do not provide accurate estimates of the activity of the enzyme in the tissues, except perhaps during the period immediately following a single dose. No deterioration was detected in solutions of DFP in peanut oil after autoclaving for one hour or storage at room temperature for one year. The ratio of effective intramuscular to oral dosage for DFP in peanut oil was found to be approximately 1 : 4 in monkeys and human subjects. L. E. GILSON (Chem. Abstr.).

Influence of Dimethylaminoethyl Benzhydryl Ether Hydrochloride (Benadryl) upon Normal Persons and Upon those Suffering from Disturbances of the Autonomic Nervous System. McGarvack, Thomas Hodge, Elias, Herbert, and Boyd, Linn J. (N.Y. Med. Coll., New York, N.Y.). [*J. Lab. Clin. Med.*, **31**, 560–74 (1946); *cf. Curtis and Oivens, Univ. Hosp. Bull., Ann Arbor*, **11**, 25 (1945); *Loew et al., C.A.*, **39**, 2571^2, 2812^5.]

The effects of dimethylaminoethyl benzhydryl ether HCl (I) were studied in normal persons and in those with widely diverse diseases, most of which were associated with some disturbance of the autonomic nervous system. Basal metabolism, circulation time, renal function, erythrocyte and leucocyte counts, hemoglobin, differential white counts, hematocrits, blood urea N, creatinine, glucose, proteins, cholesterol, alkaline phosphatase, icteric index, van den Berg reaction, and cephalin flocculation were not abnormally altered. Orthostatic hypotension was observed in some subjects and a slight elevation in pulse rate in others, although the majority showed no circulatory changes. Pupillary dilatation occurred when (I) was instilled into the conjunctival cavity. Vital capacity and respiratory rate were uninfluenced except in asthma. Capillary permeability was moderately decreased after prolonged treatment with large doses. In some subjects, mild transient reactions resulted from the intravenous injection of (I). Salivary secretion was not influenced, but both free and total gastric acidity were strikingly decreased. The mouth-anus time was not altered in normal subjects. Abdominal pain was relieved in 10 of 17 patients. The degree of reduction in the size of the histamine skin reactions was roughly proportional to the daily dose of drug administered. For a brief period after the drug was discontinued the response to histamine was increased. Definite therapeutic effect was obtained from the drug in certain gastro-intestinal neuroses, asthma, functional dysmenorrhea, and dermal allergy. Untoward reactions to (I) were of mild degree and of infrequent occurrence. They included dizziness, blurring of vision, weakness and somnolence. Each disappeared promptly upon discontinuing the drug or decreasing the dose.

L. KAREL (Chem. Abstr.).

General Systemic Actions of Diisopropyl Fluorophosphate (DFP) in Cats. Modell, Walter, Krop, Stephen, Hitchcock, Philip, and Riker, Walter, F., jun. (Cornell Univ. Med. Coll.). [*J. Pharmacol.*, **87**, 400–13 (1946).]

In cats DFP produces the following general effects: motor unrest, muscular twitching, tremors, ataxia, weakness, pilomotor stimulation, respiratory stimulation, salivation, defecation, diarrhea, convulsions, respiratory depression, and death. Thus the symptoms are both muscarinic and nicotinic. Death appears to result from a combination of respiratory and circulatory failure. In normal non-protected cats the duration of symptoms is usually brief, recovery or death occurring in a few hours. Cats which have received very large doses of DFP and have been protected by other agents against their acute lethal effects frequently develop a permanent injury with nicotine-like symptoms. The duration of action is only partly due to the persistence of the drug; cats which have received doses and are free of symptoms are sensitized to subsequent doses. Specimens of DFP vary in potency and lose potency fairly rapidly in aqueous solutions. The LD 50 of two specimens were 3·6 mgm./kgm. and 1·7 mgm./kgm. respectively. DFP increases the tone and the rate and amplitude of contractions of the gut—effects which are abolished by atropine and adrenaline. In large doses it sometimes slows the heart. It exerts no immediate direct action on blood pressure. Adrenaline produces its typical effects on heart and blood pressure after DFP. DFP markedly sensitizes the vasodepressor response to acetylcholine. It has no effect on red and white corpuscle count, hemoglobin, blood non-protein N, and blood creatine. It causes prolonged miosis after conjunctival application, and sensitivity to miotic stimuli after intravenous injection. Inactivation of cholinesterase is the major action of DFP, but there are other secondary actions which play a part in its toxic effects.

L. E. Gilson (Chem. Abstr.).

The Effect of Ethanol, Methanol, Paraldehyde and Acetone on the Pressure of the Cerebrospinal Fluid of the Dog. Bedford, T. H. B. (Manchester Univ.). [*Brit. J. Pharmacol. Chemotherapy*, **1**, 62–4 (1946).]

These compounds have no direct effect on the cerebrospinal fluid pressure of the anesthetized dog, when given by inhalation or intravenously.

Wm. M. Govier (Chem. Abstr.).

Action of Veratrine Sulfate and of Sodium Thiocyanate on the Superior Cervical Sympathetic Ganglion of the Cat. Caldeyro, R., and Bacq, Z. M. (Facultad med. Montevideo). [*Arch. soc. biol. Montevideo*, **12**, 253–60 (1945) (*Pub.* 1946).]

Veratrine sulfate (I) applied directly on the superior cervical ganglion of the cat has an inhibitory effect on the transmission of the nerve impulse. This action is reversible, and proportional to the concentration of (I). NaCNS has no effect under the same conditions, but after a series of quick stimuli (300 per minute) (I) and NaCNS block the ganglion partially for 3–4 minutes. This blocking is also reversible.

F. Fromm (Chem. Abstr.).

Stimulation of the Central Nervous System by Curare (Intocostrin). Cohnberg, Rosellen E. (Washington Univ., St. Louis, Mo.). [*J. Lab. Clin. Med.*, **31**, 866–77 (1946).]

Intocostrin injected subcutaneously, intramuscularly, intraperitoneally, or intravenously into rats, mice, guinea-pigs, rabbits or cats produced clonic convulsions and hyperexcitability in addition to partial curarization. Species in which the stimulatory action predominated (namely, rats, guinea-pigs, and mice) were killed by smaller doses than those in which curarization was the chief effect. Since d-tubocurarine was the active principle of intocostrin, experiments were also made with it. Injection of either drug into the lymph sacs of frogs produced muscular relaxation, but injection into the cerebrospinal canal produced convulsions. In all animals death was due to asphyxia, which in turn was due to a combination of a blocking of the neuromuscular junctions of the respiratory systems with a central stimulation. Sodium amytal and cyclopropane decreased convulsions caused by sodium amytal or d-tubocurarine. Sodium amytal, however, in combination with intocostrin was toxic to rats. Oxygen administration or artificial respiration decreased asphyxia, but did not control convulsions.

N. M. Payne (Chem. Abstr.).

Mechanism of Action of Convulsant Drugs. Robuschi, Luigi (Univ. Bologna, Italy). [*Boll. soc. ital. biol. sper.*, **16**, 557–8 (1941).]

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

A New Method for Determining the Relative Potency of Hypnotic Drugs. Simon, L. (Univ. Pisa, Italy). [*Boll. soc. ital. biol. sper.*, **16**, 561–2 (1941).]

The method consists of determining the maximum dose of the hypnotic (administered by any appropriate route) that will not save the life of a rabbit given one minimum lethal dose of strychnine nitrate (0·6 mgm./kgm.) subcutaneously.

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

Influence of Some Analeptics on the Sechenov Inhibition. Zakusov, V. V. [*Farmakol. i Toksikol.*, **8**, *No.* 5, 3–6 (1945).]

Pentamethylenetetrazole (corazole (I), coramine (II), $PhC(NH_2)Me_2$ sulfate (phenamine (III)), and strychnine (IV) may weaken, but do not halt, the Sechenov inhibition of cerebral stimuli in the central nervous system by crystallized NaCl. Neither does crystallized NaCl halt convulsions caused by (I), (II), (III) or (IV). Inactivity of (I), (II), (III) and (IV) toward the Sechenov inhibition is attributed to excessive stimulation of the thalamic centers of pain sensitivity. The tests were made with frogs, using 50–100 per cent. of the convulsion-inducing dose of (I), (II) or (IV). The dose of (III) which does not cause convulsions in frogs was 4 per cent. of the lethal dose.

JULIAN F. SMITH (Chem. Abstr.).

Tetrazole Derivatives. I. Some Pharmacological Properties of Aliphatic Substituted Pentamethylenetetrazole (Metrazole) Derivatives. Gross, E. G., and Featherstone, R. M. (State Univ. of Iowa, Ames). [*J. Pharmacol.*, **87**, 291–8 (1946).]

The effects of the 25 compounds in experimental animals are described. Most of them exhibited pharmacological effects similar to those of the parent compound (metrazole) and none appeared to possess any advantages over metrazole.

II. Some Pharmacological Properties of 1,5-disubstituted Tetrazoles. [*Ibid.*, 299–305.]

Only TT 020, 21, 27, 79 and 18 had an analeptic action or produced convulsions. Some of the others were slightly sedative. The optimum structural factors for maximum stimulatory action appear to be the presence of a relatively large saturated cyclic or open chain aliphatic group in position 1 and a small group, preferably methyl, in position 5.

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

Action of Metrazole, Associated with Eserine, Acetylcholine, and Adrenaline, on the Isolated Frog Heart. Cera, Brizio (Univ. Genova, Italy). [*Boll. soc. ital. biol. sper.*, **17**, 227–8 (1942).]

On the isolated frog heart metrazole in 0·1–1 per cent. concentration exerts a negative chronotropic action which is augmented by eserine or acetylcholine. Metrazole antagonizes the paralyzing action of pilocarpine and ergotamine. In the presence of very low concentrations of adrenaline metrazole still exerts its negative chronotropic action and also shows some positive inotropic action.

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

Action of Metrazole on Leech Dorsal Muscle. Cera, Brizio (Univ. Genova, Italy). [*Boll. soc. ital. biol. sper.*, **17**, 17–19 (1942).]

Metrazole alone has no action on untreated leech muscle, but in concentrations of 1 : 1000–1 : 10,000 it provokes contraction of eserinized muscle. It acts synergistically with acetylcholine. In rabbits pretreatment with eserine salicylate (0·03 mgm./kgm. given intravenously) markedly increases the convulsant action of metrazole, so that convulsions are produced by doses ordinarily too small to do so.

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

Ergotamine and Convulsive Attacks. Robuschi, Luigi (Univ. Bologna, Italy). [*Boll. soc. ital. biol. sper.*, **17**, 175–7 (1942); *cf. C.A.*, **40**, 3181[2].]

In rabbits the injection of ergotamine tartrate diminishes or prevents the convulsant action of metrazole, esetone (Bayer), or NH_4Cl injected a few minutes later.

Vasomotor Activity and Convulsive Attacks. [*Ibid.*, 177–80.]

In rabbits acetylcholine with or without eserine does not inhibit the production of convulsions by metrazole. The injection of amyl nitrite prevents convulsions by metrazole injected 5 minutes later, but not 10 minutes later. The protective action is ascribed to vasodilation produced by the amyl nitrite. Acetylcholine, although it produces vasodilation, fails because of its other actions on the heart, respiration, etc.

Cholinesterase and Convulsive Attacks. [*Ibid.*, 180–2.]

Either metrazole or ergotamine or both together partially inhibit the action of the cholinesterase of guinea-pig brain *in vitro*. The relation of this action to their antagonistic action in respect to production of convulsions by metrazole is not clear. L. E. GILSON (Chem. Abstr.).

Barbituric Narcosis by Injection into the Bone Marrow. Pagliai, E., and Donatelli, L. (Univ. Firenze, Italy). [*Boll. soc. ital. biol. sper.*, **20**, 691–2 (1945).]

Injections of barbiturates into the bone marrow of guinea-pigs and rabbits showed this route to be as effective in producing narcosis as the intravenous route. HELEN LEE GRUEHL (Chem. Abstr.).

Influence of External Temperature on the Effect of Hypnotics. Sivadjian, Joseph. [*Compt. rend.*, **223**, 339–40 (1946).]

The increased metabolism incident to exposure to cold results in an increased resistence of rats to the action of barbiturates and consequently increases the narcotic dose. RACHEL BROWN (Chem. Abstr.).

Comparative Effects of Analeptics on some Functions of the Central Nervous System. I. Antagonism of Analeptics to Narcotics. Ya, S. [*Arbuzov. Farmakol. i Toksikol.*, **7**, *No.* 6, 31–6 (1944).]

Tests were made with metrazole (I), coramine (II), hexetone (III) and strychnine (IV) as to activity and as to antagonism to urethan (V) and medinal (VI) in male rabbits. The highest antisoporific action was shown by (I) against (V) (1 : 4); against (VI) it was only 1 : 1. Though much weaker in antisoporific effect, (II), (III) and (IV) had a paralytic action, especially when given with (VI). In large doses (I) also had a slight paralytic action when given with narcotics. As an emergency antidote for narcotic poisoning (I) is more effective than (II), (III) or (IV). For biological assays of analeptics against narcotics the method of latent reflex periods (flexor muscles) may be employed. The Zakusov technique (*C.A.*, **34**, 5541^{2}; **36**, 2929^{5}) was used in these experiments.

JULIAN F. SMITH (Chem. Abstr.).

Barbiturate Antagonism of Isonipecaine Potentiation of Barbiturate Depression. Way, E. Leong (George Washington Univ., Washington, D.C.). [*J. Pharmacol.*, **87**, 265–72 (1946).]

Barbital, phenobarbital, amytal, pentobarbital, and evipal, in $\frac{1}{8}$–$\frac{1}{4}$ LD 50 of the Na salt, aborted convulsions and usually prevented death in white mice and rabbits given an ordinary lethal dose of isonipecaine (demerol). But when the dose of each barbiturate was increased to $\frac{1}{2}$ or $\frac{3}{4}$ of its respective LD 50 and $\frac{1}{8}$ to 1 LD 50 of isonipecaine was given, the animals died of respiratory depression, without convulsions. Diphenyl-hydantoin did not act like the barbiturates in the above respects. It is apparent that the isonipecaine-barbiturates antagonize the lethal convulsant effects of isonipecaine, but isonipecaine potentiates the depressive properties of the barbiturates on respiration. L. E. GILSON (Chem. Abstr.).

Electrical Stimulation of the Vagi Increases the Narcotic Action of Magnesium Sulfate and Sodium Barbital. De Nito, Giuseppe (Univ. Naples). [*Boll. soc. ital. biol. sper.*, **15**, 1072–3 (1940).]

It has been shown previously that acetylcholine increases the narcotic action of $MgSO_4$ and Na barbital in rabbits. Electrical stimulation of both vagi in the neck has a similar effect, either through liberation of acetylcholine or by producing hypotension and decreasing the blood supply to the brain.

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