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Cortical Spread of Epileptic Discharge and the Conditioning Effect of Habitual Seizures.

The cerebral cortex of the epileptic passes through varying phases of stimulability. Simple response, both motor and sensory, may occur as the result of stimulation at a distance. Such distant response is due to focal lowering of threshold and to selective neuronal conduction. In general, cortical stimulation produces movements and sensations which are not like normal movements and sensations, but qualitatively identical with those that may occur in epileptic seizures. The cortex of an epileptic may be found to be refractory to electrical stimulation, and at such times may still be functionally available to the patient for volitional purposes.

An habitual seizure, by virtue of its frequent repetition, may eventually establish a complicated neurone pattern, so functionally organized that it may be stimulated electrically, although no such complicated response could be obtained from stimulation of the normal brain. Induced seizures do not arise from distant stimulation. They begin by discharge in the neighbourhood of the stimulating electrode. This is followed by spread, which is not diffuse, but which is along a definite neurone system, which may be preformed or acquired. By

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" preformed " is meant a system of neuronal connections ordinarily recognized as physiologically functional in all normal brains. By " acquired " is meant a pattern of neuronal connections established by the conditioning influence of previous individual experience. In this sense habitual epileptic seizures should be considered true conditioned reflexes in the cortex of any patient.

In complicated seizures the advance of discharge along this neurone pattern may be slow and episodic as to suggest that isolated ganglionic collections are fired in an advancing series, each collection being set off only after neuronal bombardment of sufficient intensity and duration from other cell collections already discharging. (Authors' abstr.)

A Review of the Results of the Pharmacological Shock Therapy and the Metrazol Convulsive Therapy in New York State.

1. One thousand seven hundred and fifty-seven patients suffering from dementia praecox have been treated thus far with insulin hypoglycaemia in the New York State Department of Mental Hygiene, and 1,140 patients have been treated with metrazol.

2. The recovery and improvement rate in the cases of insulin-treated cases is significantly in excess of the rate in the control group. Metrazol, on the other hand, produced even fewer recovered cases than were found in cases not treated by any shock therapy.

3. Recent reports indicate that metrazol, besides being not especially effective, also produces serious complications, notably fractured spines. While it is effective if used in selected cases in combination with insulin it is a dangerous drug, and should not be used indiscriminately.

4. A follow-up study of cases approximately one year after completion of treatment indicates that a significant proportion of the patients tend to retain their improved state.

5. The prognosis in insulin treatment depends largely on—
   (*a*) Duration of the illness before treatment.
   (*b*) Type of dementia praecox.
   (*c*) Personality prior to the onset of the illness.

6. The adoption of the uniform application of treatment and a standardized method of recording will make possible more uniform success.

(Authors' abstr.)

Results and Observations on the Insulin-shock Treatment of Schizophrenia.

1. In every hospital using insulin-shock the patients treated should be followed for five years. Another group of patients, or other groups, as near alike as possible should be followed for the same time as controls. It seems certain that relapses after favourable responses will follow in all groups.

2. Insulin-shock therapy is not a complete answer. But the transformation of the patient's condition is so immediate and favourable in a majority of cases that it will have place in, or provide suggestions for a future therapy, and this without regard to whether good results last for an afternoon or indefinitely. It is only fair to remember that Sakel spoke of insulin-shock as the artillery in a general combined attack on the disease process.

3. Insulin in convulsive doses alters the metabolic processes of nerve.

(Authors' abstr.)

Regarding Sodium Amytal as a Prognostic Aid in Insulin and Metrazol Shock Therapy of Mental Patients (Dementia Praecox).

A total of 55 cases of dementia praecox were tested by the intravenous injection of prenarcotic doses of sodium amytal prior to treatment with insulin hypoglycaemic therapy.

An ameliorating response to the injection of sodium amytal was obtained in

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30 patients, and of these 23, or 77 per cent., had a favourable therapeutic response to insulin hypoglycaemic treatment.

No ameliorating response to sodium amytal was obtained in 25 cases, and of these, 16, or 64 per cent., failed to respond to insulin treatment.

The results of metrazol convulsant therapy in cases that failed to respond to insulin treatments are also compared with the sodium amytal test.

The response to sodium amytal test appears to be of prognostic value in insulin hypoglycaemic shock therapy. (Authors' abstr.)

Irreversible or Hyperglycaemic Insulin Coma: Its Cause and its Response to Blood Transfusion.

1. Irreversible or hyperglycaemic insulin coma presents a typical picture consisting of a sustained high blood sugar (following intravenous glucose administration), fever, rapid pulse and respiration, and frequently fits, vomiting or diarrhœa. It is a serious complication occurring not only in shock treatment, but no doubt in the management of diabetes as well. It may result in death or in permanent brain damage, but recovered psychiatric cases often show dramatic improvement in their mental state.

2. Hyperglycaemic coma is probably due to over-prolongation of therapeutic coma beyond an hour or an hour and a half.

3. Over-prolongation of coma is often unintentionally allowed, because the presence of gastric retention makes termination by tube-feeding ineffective.

4. As a practical consequence coma should generally not be allowed to last more than an hour or an hour and a half, especially in cases that tend to rouse slowly, and sugar should be given by vein in all cases that do not begin to rouse 15 or 20 minutes after tube-feeding.

5. Treatment of irreversible coma by intravenous glucose and blood transfusion of 500 c.c. of citrated blood appeared effective in three successive cases.

6. It would appear that the whole blood contains substances, other than oxygen or sugar, essential for brain metabolism, which have been destroyed or depleted by protracted coma.

7. The dramatic psychiatric improvement in certain cases following prolonged coma suggests that if a safe method for prolongation of coma could be devised, it would further extend the value of shock treatment. (Authors' abstr.)

Evaluation of Therapeutic Factors in Pharmacologic Shock.

1. Seven of 20, or 35 per cent., of a group of chronic schizophrenic patients were benefited by insulin to the point of social recovery or marked improvement, as compared with a 20 per cent. spontaneous remission-rate in a control group of 30 patients.

2. Coma was found to be essential for the production of improvement, its effectiveness being increased when combined with intensive resocialization activities.

3. Metrazol was only one-half as effective as insulin in chronic schizophrenia, but justified its use because of its greater ease of administration and lesser cost. In chronically disturbed patients its use frequently resulted in moderate degrees of improvement, resulting in better ward adjustment.

4. Paranoid schizophrenia responded best to insulin; agitated catatonia to metrazol.

5. Neither the age of the patient nor the degree of hereditary taint could be correlated with the therapeutic responses.

6. In involutional melancholia and manic-depressive psychosis, depressed phase, metrazol treatment appeared to constitute a direct attack upon the specific psychopathology of the disease. A theoretic formulation to explain this action was offered.

7. The relatively long duration of schizophrenia in first admissions to the Eloise Hospital was noted and the need for earlier recognition and more prompt admission stressed, so as to enhance our therapeutic effectiveness. (Authors' abstr.)

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The Mechanism of the Symptoms of Insulin Hypoglycaemia.

1. Simultaneous observations of clinical symptoms, cerebral oxygen utilization, blood-sugar level and electrical activity of the brain were made on patients with schizophrenia receiving the insulin treatment.

2. Blood sugar decreases during the first hours after the injection of insulin and then remains at a low level until termination with sugar, while the clinical signs continue to develop progressively throughout the entire course of hypoglycaemia.

3. The march of the symptoms is correlated with a gradual decrease of cerebral oxygen uptake and the electrical changes.

4. The regression of the symptoms is accompanied by a gradual increase of the oxygen uptake and a reduction of the delta index. The sequence of the symptoms during regression is in an order which is the reverse of their appearance.

5. During hypoglycaemia the alpha waves disappear approximately at the time when the functions of the cortex are completely suppressed and reappear with the restoration of cortical functions.

6. It is therefore concluded that as a result of the hypoglycaemia caused by the administration of insulin the metabolism of the brain is diminished. This reduction of cerebral metabolism is the cause of the clinical symptoms as well as the alterations of the cerebral electrical activity of the brain.

7. These conclusions concerning the correlations between the clinical and physiological changes are to be regarded only as a working hypothesis because of the small number of the experiments performed. (Authors' abstr.)

Central Nervous System Changes Produced by Insulin.

Findings on a group of animals were restricted to histopathological changes of the ischaemic type. They were in agreeement with the observations of Schmid and of Weil and his associates. They are not as severe as those noted by Tani nor those reported by Steif and Tokay. Variations in technique are sufficient to explain this difference.

The mechanism by which these ischaemic changes are produced is conjectural. A possible explanation which is also subscribed to by Weil and his co-workers is that it results from an inability of the brain to carry on its oxidative processes because of the action of insulin. In support of this are the experiments of Holmes, Dameshek, Myerson and Stephenson and Wortis, showing that insulin reduces the oxygen utilization of the brain. (Author's abstr.)

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Intelligence Level and Occipital Alpha Rhythm in the Mongolian Type of Mental Deficiency.

The present study represents one of a series undertaken to determine whether there are significant correlations between the electro-encephalogram and intelligence

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level. The feeble-minded offer important methodological advantages in the investigation of this question, since they provide the possibility of a wide range of variation in intelligence level, and permit independent control of mental age and chronological variables. Properties of the electro-encephalogram examined were the alpha index, alpha wave frequency, and alpha wave amplitude of the occipital electro-encephalogram. The experimental group was limited to subjects of the mongolian type of mental deficiency. Intelligence level was measured by means of the 1916 form of the Stanford-Binet Scale, supplemented by the Kuhlman-Binet Scale for test levels under three years.

Considerable attention was given to subsidiary conditions which might have led to changes in the electro-encephalogram independently of mental age effects, or which might have obscured the characteristics of any record. The conditions of this sort taken into account were instrumental artefacts, muscle potentials, conditions in subject during recording, such as states of sleep, emotional excitement, and visual stimulation variations in electrode position, inter-electrode resistance, chronological age-variations, and the proportions of the two sexes at different mental age-levels. Procedures for control of such factors occurred by way of selection of subjects, control of experimental conditions, techniques of record-analysis, and statistical corrections in the treatment of data.

The final results obtained after steps were taken to exclude possible errors due to such factors are represented by product-moment correlations between mental age-level and alpha index, alpha wave frequency, and alpha wave amplitude. Statistically significant correlations were obtained of mental age-level with alpha index and alpha wave amplitude, but not with alpha wave frequency. The criteria of statistical significance used were those of Fisher.

The finding of these significant correlations points to the existence of common physiological factors underlying certain properties of the electro-encephalogram and mental age-level in the mongolian type of mental deficiency, and opens the way to the use of the electro-encephalogram in the discovery of the nature of these factors.

(Author's abstr.)

New Methods of Obtaining Neurotic Behaviour in Rats.

Acute neurotic behaviour was produced on 40 occasions in 15 rats, by a graded series of stimuli. The least "severe" stimulus produced seizures in 3 of 6 chronically disordered male rats, had no effect on 24 normal males, and produced a seizure in 1 of 26 normal females. The most "severe" stimulus produced seizures in 11 of 23 normal males. The rats were throughout in good physical condition, as far as could be judged. Experiments are now proceeding to effect a standardization of the stimuli and, since the number of the chronically disordered animals is admittedly small, to confirm the results on a larger scale.

(Authors' abstr.)

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Preliminary Analysis of Functions of the Temporal Lobes in Monkeys.

The behavioural effects of the removal of both temporal lobes, including the uncus and the greater part of the hippocampus, were studied in macaques. The monkeys exhibited the following symptoms: (1) Forms of behaviour which seem to be indicative of "psychic blindness"; (2) strong oral tendencies in examining available objects (licking, biting gently, chewing, touching with the lips, "smelling"); (3) a strong tendency to attend and react to every visual stimulus ("hypermetamorphoses"); (4) marked changes in emotional behaviour or absence of emotional reactions in the sense that the motor and vocal reactions generally associated with anger and fear are not exhibited; and (5) an increase in sexual activity. These symptoms also appeared if the olfactory tracts were cut previous to removing both temporal lobes. Even the oral tendencies, except for the "smelling," were present.

The symptoms typical of monkeys with both temporal lobes removed did not appear after (1) bilateral removal of the first temporal convolution; (2) bilateral removal of the second and third temporal convolutions; (3) severing the connections between the temporal and the occipital lobes, i.e. duplicating the posterior margin of the lesion produced by temporal lobectomy. The symptoms also did not appear after unilateral temporal lobectomy, except that there was in some cases a change in the direction of greater "tameness." This "tameness" was also observed when after previous extirpation of both prefrontal areas one temporal lobe was removed.

Differential reactions to visual stimuli established pre-operatively were seriously disturbed after bilateral temporal lobectomy, but it was possible to re-establish the response through training. The ability to "generalize" in responding to visual stimuli did not seem to be impaired. (Authors' abstr.)

Histopathogenesis of Cerebral Abscess.

It is consistent with the histologic and metabolic peculiarities of the tubero-sclerotic nests in the cortex and of the spongioblastic tumours in the ventricles that many of them should eventually become opaque to Roentgen rays. The pronounced tendency to deposition of calcium is indeed a characteristic trait of both varieties of tubero-sclerotic lesions. In the ventricular spongioblastic tumours the calcification begins, and is always more dense, in the centre of the tumour, where calcareous granules, forming clusters, are usually heaped around proliferated, calcified, hyalinized and degenerated capillaries.

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In tubero-sclerotic nodules in the cortex, the relation of calcareous precipitates in the nerve tissue to the nodule is different. Here the calcification tends to occur not in the centre of the nodule, but in the periphery of the subcortical softening facing the white matter, that is, under the cortex in the depth of the convolutions.

The heterotopic nests of monster nerve-cells and glia, forming nodules, may occur not only in the convolutions but also deep in the white matter of the centrum semiovale.

The precipitation of calcium in the nodules is a secondary process developing as a sign of degenerative changes in the congenital neoplastic lesion. At first slight and invisible, the precipitation in the course of years gradually grows denser, and eventually becomes sufficiently opaque to Roentgen rays to appear clearly evident on the plates. Clinically, this is an important roentgenologic sign in cases of tuberous sclerosis, for it is directly related to and is revelatory of specific cerebral pathologic changes underlying the condition.

It is noteworthy that the tendency to calcification of the brain substance is a feature of tuberous sclerosis which it shares with another characteristic congenital neurocutaneous syndrome, namely, trigeminocerebral angiomatosis. The roentgenographic picture of the calcification in the two conditions is, however, quite different. In tuberous sclerosis the opacities resemble " cotton balls " with fuzzy periphery, whereas in angiomatosis the calcareous depositions in the cortex acquire a garland-like appearance, not unlike that of ribbon candy.

There exists another variety of intracerebral calcification demonstrable roentgenographically, and frequently associated with mental deficiency, epilepsy and a neuropathic family history. The intracerebral calcification as shown on roentgenograms in this condition is characterized by a diffuse, massive and remarkably symmetric deposition of calcium, particularly in the region of the basal ganglia. The roentgenographic image obtained is therefore different from that of multiple, discrete and scattered (nonsymmetric) areas of calcification in tuberous sclerosis.
(Authors' abstr.)

Pallidofugal Fibres in the Monkey.

Large, deeply-staining, myelinated fibres arising from the cells of the media division of the globus pallidus form the ansa and fasciculus lenticularis. The pallidohypothalamic tract consists of fibres which run ventromedially into the hypothalamus, passing either through the fornix or over its dorsomedial surface.

Finer striofugal fibres, which probably arise in the caudate nucleus and putamen and possibly also in the lateral division of the globus pallidus, can be traced to the substantia nigra and the subthalamic nucleus.

The cells of the medial division of the Globus pallidus are larger and more angular than those of the lateral division, and they disappear after interruption of the fibres of the ansa and fasciculus lenticularis.

Monkeys in which the ansa and fasciculus lenticularis have been interrupted bilaterally show no gross disturbance of movement. The movements, however, are slow and lacking in spontaneity. The faces of these monkeys are immobile and masklike. (Authors' abstr.)

Dementia Paralytica. Effect of Continuous Intensive Therapy with Tryparsamide and Bismuth on Cerebro-spinal Serologic Reactions and Frequency of Relapse.

Thirty-eight patients with dementia paralytica were treated intensely and continuously, for periods varying from ten months to seven years, with the maximum doses of tryparsamide and thio-bismol until the Wassermann reactions of the spinal fluid were negative or until death supervened ; 84 per cent. of this group also received malarial treatment in the beginning. Of the series, 28·4 per cent. showed complete, and 18·4 per cent. partial remission ; 36·7 per cent. were unimproved or slightly improved ; 5·2 per cent. died of causes other than dementia

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paralytica, and 10·5 per cent. died presumably of dementia paralytica. 2·6 per cent. of the entire group after showing a negative Wassermann reaction of the spinal fluid had a reversal to positive. (Author's abstr.)

Cells of Origin of Fibres of Corpus Callosum. Experimental and Pathologic Observations.

In order to identify the cells of origin of the fibres of the corpus callosum, the retrograde cell changes in fields 4, 6, 8 and 12 of the frontal cortex were studied after destruction of the contralateral frontal lobe in one dog, section of the anterior two-thirds of the corpus callosum in three dogs, and section of the posterior two-thirds of the corpus callosum in another dog. There were also studied the pathologic changes in human brains with lesions in the occipital, parietal, central, frontal and temporal lobes, involving fields 1, 2, 3, 6, 7, 8, 18, 19, 22, 39, 40 and 42.

In the experimental as well as in the human pathologic material there were observed in the corresponding fields of the contralateral hemisphere pronounced pathologic changes in layers III, V and VI, except in field 12, in which no alterations were seen. After section of the corpus callosum analogous alterations were observed in the fields of the two hemispheres. The cells of origin of the fibres of the corpus callosum lie in layers III, V and VI. The last two layers of the cortex must be considered as giving origin not only to efferent but also to efferent commissural fibres.

Only a part of the cells of these layers were affected. The commissural fibres do not all arise from one layer, and their cells of origin in layers III, V and VI are intermingled with cells which have other connections.

The results of this investigation show that the homotopic fields are always injured. Further investigation will be required to elucidate the question of heterotopic connections. (Authors' abstr.)

Diffuse Progressive Leukodystrophy in the Adult, with Production of Metachromatic Degenerative Products (Alzheimer-Baroncini).

The adult form of diffuse sclerosis may have a particularly long evolution (17 years in the case reported), with a clinical picture, at the same time, of pseudoparalysis and athetosis. The clinical diagnosis is always difficult. It is based on the association of mental disturbances with an epileptic spasmodic component and a progressive cerebellar and athetotic evolution with gross disorders of speech, ending in loss of articulation.

In the case reported here the disease was characterized pathologically by a metachromatic disintegrative process. It presents, otherwise, all the histologic characteristics of the heredo-degenerative forms of leukodystrophy, in which the disintegration predominates over the proliferative and exudative vascular process. In the glial and mesenchymal tissue one finds in our case the same functional incapacity to metabolize the derivatives of the myelin that one observes in the familial forms. Formation of these disintegrative products is retarded in the parenchyma in a metachromatic form. Five observations of unequal value, but of the same type, are found in the literature. In the case reported here there is no decisive clinical or histopathologic argument to support a separate nosologic classification. One is dealing with a disturbance, apparently of heredo-degenerative type, in which the disintegration, for some unknown reason, has been observed in a metachromatic stage. (Authors' abstr.)

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A Biochemical Study of Cerebral Tissue and of the Changes in Cerebral Oedema.

(1) Eighty-three specimens of cerebral tissue were analysed and their water, Na, Cl, K and P contents determined. Various parts of both normal and pathological brain were examined.

(2) Cortical grey matter contains considerably more water (average 84·3 per cent.) than the white matter of the cerebral (70·7 per cent.) and cerebellar (70·6 per cent.) hemispheres, while intermediate values are found for thalamus (75·1 per cent.) and corpus callosum (75·7 per cent.).

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(3) By considering the interstitial fluid as a colloid-free ultrafiltrate of serum containing all the chlorides, the composition of the tissue cells themselves is calculated and contrasted with muscle and red cells, the only other tissues for which reliable figures are available. Grey matter has more extracellular tissue (33 per cent.) than white matter (18·3 per cent.), and its cellular tissue contains more water (76·5 and 64·1 per cent. respectively). White matter closely resembles both muscle, which has 15·5 per cent. extracellular tissue and the cellular tissue of which contains 67·8 per cent. water, and red cells, which contain 66·2 per cent. water.

(4) In the cells of white and grey matter there are 7·8 and 6·9 milliequivs of Na per 100 gm. of cell water respectively, whereas in red cells there is only a small quantity (2·5 milliequivs per cent.), and in muscle cells a negligible quantity (0·29 milliequivs per cent.). The amount of potassium (11·3 and 11·2 milliequivs per cent. in white and grey matter respectively) is approximately equal to the amount in both blood and muscle cells (11·4 and 12·4 milliequivs per cent. respectively). The phosphorus, being nearly all organic, is related rather to the solid than the fluid content; it is present in very large amounts in brain cells, being about equal in grey and white matter when expressed as a percentage of the dry weight (40 and 41·7 milliequivs per cent. respectively). This is over twice the quantity present in muscle cells (17·7 milliequivs per cent.), and eight times the quantity in red cells (5 per cent.).

(5) Seven cases of local cerebral oedema, six of which were associated with tumour of the brain and one with a recent vascular haemorrhage, were examined. The differences between water and electrolytic contents of the oedematous brain tissue is restricted to the white matter of the centrum ovale and does not affect the cortex, the thalamus, corpus callosum or internal capsule.

(6) The increases in water, Na, Cl and K in the oedematous tissue are in the same relative proportions as would be the case if the added fluid were a serum filtrate, suggesting that in cerebral oedema, as in oedema of other tissues, there is an increase in the interstitial fluid, derived from the circulating blood. A considerable quantity of additional oedema fluid was found in all cases examined. On the normal side 100 gm. of cellular tissue were associated with an average of 110 gm. extracellular fluid, and on the oedematous side with 249 gm., representing an addition of 139 gm. of oedema fluid.

(7) The phosphorus content is slightly but consistently lower on the oedematous side. This may be related to the breakdown of the coupled organic compounds in the cellular tissue, associated with the degenerative processes which are seen histologically. This change is probably too small to be of significance.

(8) Identical changes were found in the oedematous tissue related to the recent cerebral haemorrhage as in the cases of tumour, showing that the changes in cerebral oedema from both these conditions are the same.

(9) In this study there was no evidence to support the concept that in association with cerebral tumours there also occurs a condition of swelling of the brain ("Hirnschwellung") which is not due to hyperaemia or excess of free fluid, and which can be differentiated from cerebral oedema. (Author's abstr.)

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The Regulatory Influence of the Sympathetic on Brain Centres.

Stimulation of the cervical sympathetic enhances the rise of blood pressure produced by clamping of the carotid artery. The rise may be higher or longer maintained, or both.

Abolition of sympathetic impulses to the brain by local anaesthesia either causes a lower rise of blood pressure or a less sustained one during clamping of the carotid artery.

After restoration from local anaesthesia the reaction of the vasomotor centre again becomes normal.

From these experiments the conclusion is drawn that the sympathetic exerts an augmentory influence on the vasomotor centre and probably on other vegetative centres of the brain. (Authors' abstr.)

L'ENCEPHALE.

VOL. XXXIV. APRIL, 1939.

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*Some Views on the Scientific and Moral Value of Psycho-analysis. *Ey, H.* 189

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Views on the Value of Psycho-analysis.

A critical appreciation of R. Dalbiez's work, *La méthode psychanalytique et la doctrine freudienne*. For Dalbiez, psychoanalysis is the science of intrapsychic relationships and its objective is the study of unconscious causality. With this aim in view it legitimately makes use of certain rational hypotheses and methods. This paper contains an excellent summary of Dalbiez's arguments in favour of the hypothesis of the unconscious mind. Dalbiez's essential thesis is the acceptance of the method and refusal of the doctrine. Ey's criticism is mainly directed towards the second part of this thesis.

Interpretations can, in Dalbiez's opinion, be subjected to scientific discipline and he propounds five criteria, which would justify the analyst in finding a causal relationship between manifest and latent content. These are: (1) The criteria of evocation, that is to say the simultaneous appearance of sign and signified (for instance, when a subject thinks of a knife, he also immediately thinks of his father). (2) The criteria of similarity, by which is meant an immediately intelligible relationship between two contents of consciousness (penis and sword). (3) The criteria of frequency. (4) The criteria of convergence; this is supplied when a number of symbols can be shown to have the same latent meaning. (5) The criteria of verification; this consists in proving the reality of a psychical relationship between A and B, by showing that this relationship is bound up with C in the past and/or will produce D in the future.

S. M. COLEMAN.

REV. FRANÇ. PSYCHANAL.

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The Relationship between the Ego and the Super-Ego.

Besides the important role played in the endopsychic sphere by the relationship between the ego and super-ego, it is shown that this relationship also functions in the rapport between an individual and other persons. The latter are identified with the super-ego and invested with qualities taken from it. These qualities were derived from the original models out of which the super-ego was first formed.

S. M. COLEMAN.

The Unconscious and the Sense of Time.

A review of the principal methods by means of which the individual under the urge of an unconscious will-to-live, attempts to deny time, as soon as it has acquired consciousness of and realization of its destructive qualities. Some of the components of the time factor studied are: the child's, the adolescent's and the adult's conception of time; the intuition of the flight of time in the mind of the dreamer, the day-dreamer, the lover, the alcoholically intoxicated and the mystic in a state of ecstasy.

S. M. COLEMAN.

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The Effect of Benzedrine Sulphate on Learning.

1. There is a marked difference in the learning scores of a control group and an experimental group which was given daily subcutaneous injections of 0·5 mgm. of benzedrine sulphate. That this marked difference is a direct consequence of benzedrine sulphate is evident.

2. That benzedrine retards appetitive functions has been seriously questioned.

3. That there is a definite retardation of general performance levels has been demonstrated. The exact cause of this retardation remains speculative.

4. Increased activity levels in the white rat injected (and perhaps fed, too) with benzedrine manifest themselves apparently more than thirty minutes (the very minimum) after injection. (Author's abstr.)

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Progressive Interstitial Hypertrophic Neuritis.

A case of interstitial hypertrophic neuritis is reported. The point of interest was the presence of Argyll Robertson pupils in the absence of serological or pathological evidence of syphilis. The clinical picture resembled that of the Charcot-Marie-Tooth type of muscular atrophy, the differentiation depending upon the presence of thickened, palpable peripheral nerves. S. M. COLEMAN.

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Hysterical Amnesia Relieved by Induced Convulsions.

A case of hysterical amnesia lasting eight weeks, resistant to the usual therapeutic methods, was relieved by induced metrazol convulsions. Following the fourth convulsion she was confused for 30 minutes and then gradually regained her memory of her past completely. S. M. COLEMAN.

The Significance of Infantile Sucking.

Sucking appears to satisfy three different aims of the developing organism, namely the getting of nutriment, the better reflex stimulation of the respiratory mechanism, and finally the getting of tactile stimulation, which seems to be as necessary for the progressive development of the higher associative faculties as food is for tissue development. The integration of these elemental drives in sucking activity gives it considerable importance. When it is not easily established, or when it is not sufficiently exercised or prematurely interrupted, significant dissociations take place in general maintenance of reflex tone and in the sensory motor integrations of vision, hearing and grasp which result in retardation of central nervous control. Dissociated thumb-sucking or some habitual object comes about when the infant does not get enough sucking exercise in connection with the taking of nourishment.
S. M. COLEMAN.

Genesis of a Case of Paranoid Dementia Praecox.

A case of paranoid dementia praecox is presented, showing clear evidence of a homosexual conflict, with suppression of the overt homosexual tendencies, occurring just before the onset of the psychosis. The delusional beliefs, also, are shown to reflect the fundamental homosexual bias of the patients' personality.
S. M. COLEMAN.

Convulsive Therapy in the Psychoses.

Forty patients were treated with convulsive shocks. Of the 14 recent schizophrenics 5 improved. Of 15 chronic schizophrenics only 1 showed slight improvement. Three involutional cases reacted promptly with remissions. Of 6 melancholias, 5 had remissions. Two cases of anxiety hysteria with conversion symptoms obtained remissions with insight. S. M. COLEMAN.

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*Activity of Isocortex and Hippocampus: Electrical Studies with Microelectrodes. *Runshaw, B., Forbes, A., and Morison, B. R.* . . . 74

Spinal Cord Regeneration in the Rat.

(1) Spinal rats (cord section between T5 and T13, with tension on the tail causing the cut to gape 2-3 mm. and insuring a complete lesion) will live indefinitely(8 months) with moderate care.

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(2) Oedema and gangrene of the hind legs (as well as hydronephrosis and hydroureters) are the main cause of early death and depend directly on urine retention. Manual expression of urine three times a day during the period of returning bladder control, seven to ten days, eliminates this difficulty.

(3) Flexion reflexes are present immediately after section, crossed responses appear after three days, scratch reflexes after eleven days. Complex and fractional responses of hind legs and tail develop, but with no sign of coordination with the front quarters.

(4) By one month, the typical spinal animal has reached a steady level of behaviour and fails various tests of sensation and voluntary motor control. At the time of sacrifice electrical stimulation of the cerebral peduncle does not evoke motor responses below the level of section. Cell stains show normal neurones close to a complete transverse scar, and silver methods reveal new axones entering and becoming tangled in the connective tissue of the lesion.

(5) In some cases (13 in all), after four weeks of typical spinal performance, further sensory and motor recovery occurred, including voluntary climbing, walking and hopping movements, and placing and seeking based on good proprioception. At sacrifice, stimulation of the brain stem produced hind-leg movements. Silver stains showed a complete scar bridged by bundles of new axones passing continuously between cord tracts on either side of the lesion. The fibres entering and crossing the scar ordinarily arise from both the cord tracts and spinal roots, but when the latter are excluded physiological recovery still occurs.

(6) The most marked recovery was in rats with properly oriented nerve or muscle implants in the cord gap. Recovery was poor with embryonic brain implants which degenerated, formed acinar cell stumps, or developed into small pyramids.

(7) Spinal neurones with adequate blood supply start to regenerate cut processes. These fibres grow along structural pathways like peripheral nerves and using bands of glial nuclei when possible, but are mainly blocked by glia and scar tissue running transversely across the cord. When they successfully cross a scar, restoring anatomical continuity, nervous transmission across the lesion and coordinated function also return.

(8) True anatomical and physiological regeneration can occur in the rat spinal cord. This is aided by an implant of degenerating sciatic nerve. Such implants may find clinical application. (Authors' abstr.)

Paleocerebellar Inhibition of Vasomotor and Respiratory Carotid Sinus Reflexes.

The author's previous experiments have shown that weak faradic stimulation of the vermian cortex of the anterior cerebellum causes strong inhibition, not only (as is well known) of decerebrate rigidity, but also of vasopressor and vasodilator reflexes and of the spontaneous vasomotor waves. The present paper concerns the action of the same cerebellar stimulation on vasomotor and respiratory carotid-sinus reflexes. The following effects have been observed :

1. Inhibition of carotid-sinus vasopressor reflexes brought about by the occlusion of the common carotid arteries. The depressor action on normal blood pressure is less evident or absent.

2. Inhibition of carotid-sinus respiratory reflexes produced by a carotid occlusion as above. There is also less evident inhibitory action on normal respiration.

3. Inhibition of the carotid-sinus reflexes, chiefly respiratory in nature, provoked by an intracarotid injection of potassium cyanide.

Experiments of local cocainization, total or partial curarization and occasional observations show that the vegetative effects observed are (like the somatic ones) due to a central inhibition of bulbopontine centres by the paleocerebellar cortex. We must, therefore, admit the existence of a cerebellar control, not only in the somatic, but also in the vegetative sphere. The mechanism and the functional significance of the vegetative action of the paleocerebellum are discussed.

(Author's abstr.)

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Brain Potential Changes in Man during Cyclopropane Anaesthesia.

1. There are six discrete changes in the frequency of brain potentials in man during cyclopropane anaesthesia and recovery from it. The frequency changes in the approach to anaesthesia are not mirrored in the recovery from anaesthesia.

2. Potential patterns from corresponding regions of the head during anaesthesia and recovery are almost identical. However, the front, top and back of the head form three relatively independent units of activity. Differences in time of onset of slow activity, rate of recovery, amplitude and regularity of potentials in the three units are described.

3. Just as in normal sleep, a well-defined 12 to 14 per second rhythm is found most predominantly on top, less so in front, and least commonly in the back of the head. This rhythm differs from that in normal sleep in that it appears late in the recovery from the anaesthetic.

4. Although there is not as great individuality of potential patterns during anaesthesia as in the waking state, it is nevertheless possible to differentiate between anaesthetized individuals on the basis of their electro-encephalograms.

5. CO_2 hastens the onset of deep anaesthesia and makes slow rhythms more regular.

6. Factors which may contribute to the frequency changes seen in cyclopropane anaesthesia are discussed. (Authors' abstr.)

Conditioned Vestibular Reactions.

In four dogs, using a galvanic current between the external auditory meatuses as unconditioned stimulus to produce vestibular reflexes (loss of balance, falling to one side, characteristic head and body movements), these reflexes readily appeared as conditioned responses to an auditory stimulus. Differentiation in these animals was also attained (by reversing the current to produce opposite movements which became conditioned to a new auditory stimulus). Prolonged sleep and peculiar motor phenomena developed in one dog. The conditioned vestibular responses persisted without practice for at least eight months. (Authors' abstr.)

Modification of the Cortical Frequency Spectrum by Changes in CO_2, Blood Sugar and O_2.

The responses of the electrical activity of the human cortex to alterations in normal blood constituents have been analysed with the Grass frequency analyser. Decrease in CO_2 content in the internal jugular blood is associated with a shift in energy distribution in the cortical frequency spectrum toward the slow side, an increase with a shift in energy distribution to the fast side; these effects become less marked with extremely high or extremely low CO_2 tensions. Oxygen and glucose, on the other hand, can be varied within wide limits with little change in the cortical frequency spectrum, but when the O_2 saturation or glucose concentration in the internal jugular falls to a critically low level, there is a sudden shift of energy distribution to the slow side. With exceedingly high concentrations of glucose, the energy distribution in the cortical frequency spectrum shifts toward the fast side. Experiments on rabbits indicate that the effects of high O_2 tension are similar to the effects of high concentrations of glucose.

The results suggest that the electrical activity of the cortex is a manifestation of the activity of a great number of chemical oscillators having different natural periods. Though differing in their periods, these oscillators tend to respond similarly to any given factor. A factor which affects one frequency tends to affect all frequencies in the same direction, though not necessarily to the same degree. (Authors' abstr.)

Ocular Rotation in Anaesthesia and under the Influence of Supranuclear Centres.

1. Under the influence of anaesthetics, particularly of the so-called brain-stem anaesthetics, various types of ocular rotation (heteronymous and homonymous rotation) occur.

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2. Stimulation of the cortical oculogyric centres may produce, besides conjugate deviation in a horizontal or vertical direction, a slight rotation (most frequent reaction: rotation of the opposite eye towards the side of stimulation). Tonic effects of the cortex upon the position of the eyeballs in regard to rotation could not be found. Elimination of the cortex plus subcortical ganglia in front of the midbrain produces moderate degrees of rotation, but not such high degrees of rotation as are observed under the influence of anaesthetics.

3. After unilateral labyrinthectomy, rotation to the side of the operation is more marked on the opposite side than on the homolateral eye; this rotation may outlast the spontaneous nystagmus. A similar homonymous rotation may be produced by a unilateral lesion of the vestibular nuclei, suggesting that disturbances of the equilibrium between the vestibular nuclei of the two sides may play a part in the genesis of homonymous rotation observed in barbiturate anaesthesia.

4. Ocular rotation is still produced by brain-stem anaesthetics such as dial-urethane in mid-brain animals. It is inferred that the ocular rotation produced by anaesthetics is only partly due to depression of prosencephalic and diencephalic activity and partly to direct action upon the lower centres.

5. Separation of the mesencephalon from the rhombencephalon in normal as well as in mid-brain animals diminishes the rotation produced by barbiturates, but does not abolish this rotatory effect; this indicates a direct action of the anaesthetic upon the midbrain, besides the action upon rhombencephalic supra-nuclear centres. (Authors' abstr.)

Effect of Various Cortical Lesions on Development of Placing and Hopping Reactions in Rats.

Complete removal of that area of the cortex which in rats one to five days old corresponds to the sensorimotor area of the adult results in a permanent deficiency of the placing and hopping responses. This deficiency is indistinguishable from that caused by a similar operation of the other hemisphere of the same rat after it had reached maturity.

Small lesions confined to the fore-leg or hind-leg areas produce permanently detectable deficiencies in these postural reactions. It is possible to determine the position and extent of the lesion by a study of the deficiencies in the placing and hopping reactions. The deficiencies following incomplete ablation of the sensori-motor area are not as great as those resulting from complete removal of this portion of the cortex.

There is no detectable improvement in the placing and hopping reactions after they have been rendered deficient by removal of the sensorimotor cortex. Even when lesions are made in the sensorimotor cortex immediately after birth, the remaining cortical and subcortical tissues are unable to assume, as they mature, the function normally executed by that portion of the sensorimotor cortex which has been ablated. (Authors' abstr.)

Activity of Isocortex and Hippocampus: Electrical Studies with Micro-electrodes.

1. Micro-electrode techniques suitable for examination of electrical changes occurring in the nervous system are described. A satisfactory type of micro-electrode has proved to be a micropipet, filled with Ringer-agar, into which dips a chlorided silver wire. Its limitations are discussed.

2. The following two predictions have been verified by experiments on the iso-cortex and on the hippocampus: (*a*) large potential differences should be recorded from micro-electrodes at certain positions in active tissue (i.e. from positions close to active elements); (*b*) under certain conditions micro-electrodes should record predominantly the activity of only a small volume of tissue immediately adjacent to them.

3. Deep pentobarbital anaesthesia greatly simplifies the electrical patterns recorded from the isocortex (cat). Only isolated voltage changes of considerable

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size and duration appear; their characteristics are such that they must be due to organized activity in groups of related neurons.

4. Further experiments have been performed on the hippocampus (cat; rabbit) because of its relatively simple structure. In addition to changes manifestly due to stimulation by injury three types of activity may be described.

5. "Slow waves" appear as spontaneous excursions of 20–70 msec. duration. They are recorded from the surface of the hippocampus as well as from micro-electrodes placed at various positions within it. Their nature is obscure, but there is no evidence that they are composed of overlapping spikelike components.

6. Rapid deflections of about one millisecond in duration and always negative in their predominant phase are recorded only from micro-electrodes placed in or very near the strata containing the cell bodies of the pyramidal cells of the Ammonshorn.

7. The stimulation of the afferent fibres going to the hippocampus from the Area entorhinalis results in responses which may be recorded from the surface of the hippocampus and from points within it. The surface response ordinarily appears after a latency of one or a few milliseconds, and is characterized by an initial surface positive phase (10–20 msec.), followed by a smaller, longer and more variable surface negative phase. The responses recorded from micro-electrodes inserted within the hippocampus appear of opposite sign when the micro-electrode (monopolar lead) is in the deeper parts of the Ammonshorn. In a significant atypical experiment the response was surface negative and reversed at a shallower depth in the hippocampus. The results have been analysed in terms of potential theory and the membrane hypothesis. It is concluded that the responses to stimulation are due largely to potential changes characterizing the activity of the perikarya of the pyramidal cells of the Ammonshorn. (Authors' abstr.)

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Nitrogen Metabolism in Catatonia.

The author investigated girls between 16 and 21 years of age suffering from catatonia of from two to eighteen months' duration. He found an increase in the residual nitrogen in the blood and the ammonia nitrogen reaching pathological proportions. Urea and uric acid nitrogen were normal. With the passage from acute to chronic the residual nitrogen returned to normal. The ammonia nitrogen returned sharply to normal.

The writer thinks that in dementia praecox there is an auto-intoxication with intermediate products of protein metabolism with retention of these abnormal nitrogenous products in the body. G. W. T. H. FLEMING.

The Treatment of Schizophrenia with Hyposulphite.

This treatment is based on the theory that schizophrenia is due to toxic products which are neutralized by the sodium hyposulphite injected. Sulphocyanate and double ethylsulphuric acids are formed. The author treated 377 cases of acute schizophrenia. In 27 there was a rapid cure, the patients leaving the hospital cured. In other cases after a short amelioration the disease flared up again. A course of 10–15 intravenous injections of 10 c.c. of a 20 per cent. solution of sodium hyposulphite was given. G. W. T. H. FLEMING.

The Effect of a Mixture of Bromide and Caffeine in Mental Diseases.

The author based his work on the effect of bromide and caffeine on experimental neuroses in animals in Pavlov's laboratory. He gave 8–15 intravenous injections of sodium bromide and caffeine. The chief effect was on sleep, which was restored, and on motility, which was diminished. Hallucination diminished and the effect lasted from 2–10 days. G. W. T. H. FLEMING.

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A Critical Appraisal of the " Shock Therapies " in Major Psychoses. I. Insulin.

Insulin shock therapy has been used in a fair number of cases in which the diagnosis remained uncertain. This is the more evident because many institutions have followed the recommendation that treatment be carried out in acute cases from the very onset of the psychosis, and even before completion of the diagnosis.

Considering that there is no consistent relationship between the therapeutic results, on one hand, and, on the other hand, the number of individual treatments and intervals between them, the number of comas and the kind and severity of other reactions, it stands to reason that aside from the pharmacodynamic effect of insulin there must be other influences at work.

The great care taken of the patient, and its spectacular form, the creation of a situation for the patient in which he needs the help of the physician and personnel and gets plenty of it, result in a betterment of patient-physician rapport, whose effect in making the patient more receptive to other types of treatments cannot be ignored.

The evaluation of various degrees of improvement—social recovery, remission, much improved, improved—obtained with insulin is more influenced by the subjectivity of the examiner than is the evaluation of similar conditions of patients under usual hospital management only.

In estimating the therapeutic successes with insulin one should also bear in mind the high rate of so-called spontaneous remissions and the relapses which occur in the insulin patients just as well as in the non-insulin patients.

While the high figures for success with insulin cannot be accepted without serious reservations, the fact remains that in certain cases one succeeds with insulin where the usual hospital treatments had failed.

It would, therefore, be unwise to drop the insulin therapy altogether—after the era of enthusiasm is over. But it is indeed unwise to use it indiscriminately, as if it were a panacea for all cases of schizophrenia. (Author's abstr.)

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The Surface Tension of the Cerebro-spinal Fluid in Nervous and Mental Pathology.

The writer examined 150 spinal fluids with the ring tensiometer of Du Nouy. The results were of value only in cerebro-spinal meningitis and in cerebral syphilis.

G. W. T. H. FLEMING.

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1. Biochemistry, Pathology and Physiology.*

A Chemical Study of Brain Swelling. Riebeling, Carl. [*Z. ges. Neurol. Psychiat.*, **166**, 149–60 (1939).]

Increase in brain-size, as observed in neurosyphilis patients, may be due to both oedema and " swelling." The oedema is due to increase in intercellular water content, while the " swelling " is due to increase in tissue protein, generally accompanied by a decrease in the ratio of brain dry substance to water. For the diagnosis of " swelling " the protein-N rather than the dry-weight should be determined. No increase in urea content could be determined microchemically in cases of brain " swelling " in man. MARION HORN (Chem. Abstr.).

Function of Nervous System and Oxidations Occurring in it. Mansfield, G. [*Magyar Orvosi Arch.*, **39**, 626–37 (1938).]

The concentration of narcotic which paralyses the isolated frog spinal cord does not affect its oxidation processes ; with concentrations 10–20 times greater, oxidation is depressed. Deep narcosis does not affect the O_2 consumption of a rabbit brain. Acetylcholine formation is unaffected by narcosis.
B. C. P. A. (Chem. Abstr.).

Metabolism of Brain Tissue. Noyons, A. K. M., and Goor, H. van. [*Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.*, **9**, 167–9 (1939) ; *cf. C.A.*, **33**, 6410^6.]

The CO_2 output of the brain tissues of guinea-pigs decreased from 8·448 mm.^{3}/g. tissue/minutes 30 minutes after death to 6·184 mm.^{3}/g. 50 minutes after death in an atmosphere of 20·9463 per cent. O_2. As the percentage of O_2 in the air increases the CO_2 production also increases. The brain stalk has a more intensive metabolism per unit of weight than the brain cortex.
E. CURZON (Chem. Abstr.).

Glucolysis and Glucogenolysis in Brain and Blood of Normal and Psychotic Persons. Maruyama, H. [*Fukuoka Acta Med.*, **31**, 145–7 (1938).]

Glucolysis and glucogenolysis in brain tissue from psychotic patients are accelerated. Glucolysis in the blood of such patients is within normal limits. Glucogenolysis in the blood is within normal limits, save in patients with mania, in which it is somewhat accelerated. B. C. P. A. (Chem. Abstr.).

Glycogen of Brain. I. Microdetermination of Glycogen and other Reducing Substances in Brain. Naka, S. [*Japan. J. Med. Sci. II Biochem.*, **4**, 121–31 (1938).]

Fresh tissue is boiled for two hours under reflux with 30 per cent. aq. KOH, the solution is left overnight, 96 per cent. alcohol is added, and the precipitated glycogen, after washing with 66 per cent. alcohol, is dissolved in boiling water

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and hydrolyzed with concentrated HCl. The reducing power of the hydrolysate is determined by the method of Bang (*cf. C.A.*, **12**, 2333), or Hagedorn and Jensen (*cf. C.A.*, **14**, 2352). The glycogen of brain is accompanied by reducing galactosides partly soluble in 66 per cent. alcohol.

II. Distribution of Glycogen in Brain: Comparison of Chemical and Histological Methods of Determining Glycogen. [*Ibid.*, 133–43.]

The results of the chemical and histological methods agree. By the histological method, which can be applied to material stored for several years, 0·02–0·17 per cent. of glycogen is determined in fresh cerebral cortex and 0·04–4·5 per cent. in fresh liver. Fresh, healthy, human cerebral cortex contains 20 mgm. of glycogen per 100 gm., but in disease the value rises to 170 mgm. or more; glycogen is found rarely and in small proportion only in the medulla.

III. Effect of Disease on Glycogen Content of Brain. [*Ibid.*, 145–65.]

The glycogen content of human cerebral cortex is independent of sex or age, but varies greatly in disease. After death the content decreases only slowly, no appreciable diminution being observed until 26 hours have elapsed.

IV. Constancy of Content of Reducing Substances in Brain. [*Ibid.*, 167–92.]

The glycogen and galactoside contents of the brain of *Uroloncha domestica* are not affected by fasting, fatigue or certain other factors (e.g. administration of insulin), which affect general carbohydrate metabolism; the galactoside content increases from birth until maturity. B. C. P. A. (Chem. Abstr.).

Pyruvate Oxidation in the Brain. VI. The Active Form of Vitamin B, and the Role of the C_4-Dicarboxylic Acids. Banga, I., Ochoa, S., and Peters, R. A. [*Biochem. J.*, **33**, 1109–21 (1939); *cf. C.A.*, **32**, 2596[8]; **33**, 5459[8], 7370[6].]

The system of Szent-Györgyi for the C_4 dicarboxylic acids is catalytically concerned in the oxidation of pyruvate in the brain. With brain slices and brei from avitaminous pigeons co-carboxylase (I) is less active in the catatorulin test than free vitamin B_1 (II). With two types of finely-ground brain, I is much more active than II, one preparation reacting not at all with II. The monophosphate of II is no more active than II. Brain preparations which respond to II are able to synthesize I in amounts which account for the additional O uptake. The maximum response to I is produced with a $1{\cdot}5 \times 10^{-7}$ *M* concentration; each molecule of I catalyzes optimally the uptake of 1,500 molecules of O per minute. The hypothesis of Lohmann and Schuster (*C.A.*, **32**, 1289[6]) that the active form of I in animal tissues is the pyrophosphate is considered to be proved. E. W. Scott (Chem. Abstr.).

Vitamins and the Nervous System. Grünthal, E. [*Z. Vitaminforsch.*, **9**, 255–80 (1939).]

A review devoted to anatomical findings in the nervous system in vitamin deficiency, vitamins A, B_1, C, D and the irradiation products of ergosterol, and E, lactoflavin and nicotinic acid. Bibliography of 3⅓ pages.
Joseph S. Hepburn (Chem. Abstr.).

Chemical Pacemakers. I. Catalytic Brain Iron. II. Activation Energies of Chemical Pacemakers. Hadidian, Z., and Hoagland, H. [*J. Gen. Physiol.*, **23**, 81–99 (1939).]

Fe spicules found in the brains of general paretic patients are formed from endogenous brain Fe normally present in haematin derivatives such as cytochrome. Cytochrome-cytochrome oxidase is especially abundant in the brain. The critical

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thermal increment, μ, of 16,000 calories for α-brain wave frequency in advanced paretics is a measure of cortical respiration. It results from the slowing of an Fe-catalysed link in cortical respiration, and thus is a chemical pacemaker. To test the theory of chemical pacemakers, the succinate-fumarate enzyme system containing succino-dehydrogenase and cytochrome-cytochrome oxidase acting sequentially was studied. The μ value of the normal system is 11,200 calories. When a critical amount of NaCN (a specific poison of the cytochrome-cytochrome oxidase system but not of the dehydrogenase) is added, becomes 16,000 calories in agreement with theory. The addition of selenite, a specific poison of the dehydrogenase, stops all respiration without shifting also in agreement with theory. When it is shifted from 11,000 to 16,000 calories by NaCN, and a critical amount of selenite is then added, again returns to 11,000 calories. Conclusion: Approximately 11,000 calories is the energy of activation of the succino-dehydrogenase-catalysed step, and 16,000 calories that for the cytochrome—cytochrome oxidase step. These are the most frequently encountered values in physiological systems. The shift of μ for α-brain-wave frequency from 11,000 to 16,000 calories occurs in advancing syphilitic brain infection and is accompanied by a change in the form of brain Fe. C. H. RICHARDSON (Chem. Abstr.).

Brain-tissue Phosphates in Various Animals. Kotkova, K. I. [*Biochem. J.* (*Ukraine*), **13**, 19–31 (*in Russian*, 31–3; *in English*, 33–4) (1939).]

Brain phosphates (I) exhibits two pH optima (at 4·3–5·6 and at 8·9–9·6). Tissue from the following animals was examined (arranged in descending order of I activity): hedgehog, dog, sparrow, pigeon, frog, rat, rabbit and grass snake. The substrate was β-glycerophosphate. Mgrm. $^{++}$ activates the alkaline I. F^- inhibits the acid I. R. LEVINE (Chem. Abstr.).

Buffer Properties of Nervous Tissue. Kovalskii, V. V. [*Trans. Conf. Med. Biol.*, **82**, 6, 269–70 (1937).]

The buffering capacity of nerve tissue rises in the series: starfish, skate, haddock, cod, carp, frog, turtle, pigeon, siskin, hedgehog; this order corresponds with that of the position of these animals in the phylogenetic scale. The results for different mammalian species are diversified, but in general buffering capacity falls with higher phylogenetic development; this is ascribed to increasing efficiency of the blood-brain barrier. The buffering capacity of nerve tissue is less that than of blood, and is less variable; that of grey matter exceeds that of white matter. B. C. P. A. (Chem. Abstr.).

Some Metabolic Investigations in Endogenous Psychoses with Special Reference to Liver Function. Lundquist, G. [*Z. ges. Neurol. Psychiat.*, **166**, 546–56 (1939).]

No evidence of liver-function disturbance was obtained in studies of the blood protein and quinine-resistant lipases in 18 patients with schizophrenia or depression. However, variations in the blood total protein and protein fractions during the day were somewhat different in the schizophrenic and non-schizophrenic patients. MARION HORN (Chem. Abstr.).

Protein Swelling of the Liver in Psychoses. Riebeling, C. [*Z. ges. Neurol. Psychiat.*, **166**, 170–7 (1939).]

Riebeling has observed swelling due to high protein content in the liver in three psychotic patients with, and in two psychotic patients without similar swelling in the brain. One psychotic patient with brain protein-swelling showed a low liver protein content. The results are discussed in relation to Riebeling's theory of the importance of liver injury in psychosis. MARION HORN (Chem. Abstr.).

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The Determination of Liver Insufficiency by Santonin in Melancholic Patients. Gökay, F. K., and Polvan, N. [*Z. ges. Neurol. Psychiat.*, **165**, 470–3 (1939).]

Santonin excretion tests revealed hepatic insufficiency in all of three patients with melancholia, and in neither of two control human subjects.

MARION HORN (Chem. Abstr.).

Disturbances of the Carbohydrate Metabolism of Cerebral Origin. Lups, S. [*Z. ges. Neurol. Psychiat.*, **164**, 644–56 (1939).]

Lups describes two cases of carbohydrate disturbance attributed to lesions in the diencephalon region of the brain, and gives the results of metabolic studies on 13 patients with acromegaly. One of the patients believed to suffer from diencephalon lesions exhibited migraine, a temporary period of glucosuria and a diabetic blood-sugar curve, and periods of hypoglucaemia during the migraine attacks; the other patient exhibited excessive thirst, rapid loss of weight, psychic disturbances and abnormalities in the urinary and blood sugar, finally developing into diabetes. Among the 13 acromegalic patients diabetic blood-sugar curves were found only in the three exhibiting very large pituitary tumours. No disturbances in carbohydrate metabolism were found in the other acromegalic patients, including four with fairly large pituitary tumours.

MARION HORN (Chem. Abstr.).

The Role of Potassium in Familial Periodic Paralysis. Pudenz, R. H., McIntosh, J. F., and McEachern, D. [*J. Amer. Med. Assoc.*, **111**, 2253–8 (1938).]

Attacks of paralysis were associated with a marked fall of serum K. Administration of KCl, 5–10 gr., produced rapid recovery. During the paralysis K was drained from the serum to meet the needs of the tissues. Experiments indicate that the chemical defect responsible for paralysis lies in the central nervous system and not in the muscles. F. P. GRIFFITHS (Chem. Abstr.).

Respiration in the Central Nervous System. Quastel, J. H. [*Physiol. Rev.*, **19**, 135–83 (1939).]

The respiration and R.Q. of the brain, the effects of various substances and ionic environment on brain respiration, the breakdown of carbohydrate, oxidation of lactic acid, pyruvic acid, succinic acid and many other substances by the brain, the effects of drugs and poisons on respiration in the central nervous system, and the content of vitamins concerned with respiration and of glutathione in the central nervous system are discussed. F. B. SEIBERT (Chem. Abstr.).

The Dry-substance Content of Various Parts of the Brain. Strobel, Th. [*Z. ges. Neurol. Psychiat.*, **166**, 161–9 (1939).]

The proportion of dry substance to water was markedly low in brains from senile patients, and high in brains from catatonic, hyperkinetic or uraemic patients. These phenomena were more marked in the cerebral cortex than in the medulla.

MARION HORN (Chem. Abstr.).

Amount and Distribution of Lipoid Pigments in the Normal Human Cerebral Cortex at Various Ages. Keller, Ludwig. [*Z. ges. Neurol. Psychiat.*, **164**, 259–72 (1939).]

The lipoid pigment contents of the ganglia cells, glia and blood vessels of the human cerebral cortex tended to increase somewhat with age. However, marked individual variations prevented determination of any norm for a given age.

MARION HORN (Chem. Abstr.).

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The Rapidity of the Re-establishment of the Normal Chemical Composition of the Cerebro-spinal Fluid after Artificial Derangement. *Kassil, G. N.* [*Bull. biol. med. Exptl. U.R.S.S.*, **3**, 50–2 (1937); *Chem. Zentr.*, **1**, 2390 (1938).]

From the cerebro-spinal fluid of narcotized dogs suboccipitally administered glucose and $CaCl_2$ were eliminated very slowly; KCl was eliminated very promptly; Na_2HPO_4 was eliminated in part rapidly, in part slowly. During excitation elimination is more rapid than during rest or under narcosis.

M. G. Moore (Chem. Abstr.).

Organic Phosphorus in the Spinal Fluid. *Germain, A., and Morand, P.* [*Bull. mém. soc. méd. hôp. Paris*, **55**, 793–9 (1939).]

Values of organic P in the spinal fluid higher than 0·5 mgm. per cent. are evidence of the disintegration of phospholipides and nucleoproteins of the nervous tissue regardless of the nature of this disintegration, provided only that it is extensive and rapid. These are also the conditions for the production of a high cholesterol content in the spinal fluid (*cf. C.A.*, **33**, 9390[4]). The P test, however, is apparently a little more sensitive. Ruth Berggren (Chem. Abstr.).

New Notes on the Cholesterol in the Spinal Fluid. *Germain, A.* [*Bull. mém. soc. méd. hôp. Paris*, **54**, 1592–6 (1938).]

The earlier results (*C.A.*, **33**, 3444[8]) are confirmed and extended. Disintegration of the nervous tissue, regardless of its nature (haemorrhagic, ischaemic, bacterial, parasitic), must be sufficiently extensive and rapid if the cholesterol of the spinal fluid is to exceed 1 mgm. per cent. Ruth Berggren (Chem. Abstr.).

A Study of Enzymes in Normal and Pathologic Cerebro-spinal Fluid. *Kaplan, I., Cohn, D. J., Levinson, A., and Stern, B.* [*J. Lab. Clin. Med.*, **24**, 1150–71 (1939).]

Normal fluids and that from patients with a diagnosis of tuberculous meningitis (I), purulent meningitis (II), hydrocephalus (III), brain tumour, abscess and cyst (IV), and a miscellaneous group (V), were examined for trypsin, antitrypsin, phosphatase, lipase, tributyrinase, esterase and amylase, as well as for cellular contents, sugar, chlorides, total protein and non-protein N. The fluid of I had increased enzymic activity; trypsin, which was never found in normal fluid, was always present; antitrypsin and tributyrinase were found in 75 per cent.; phosphatase and amylase were above normal; and lipase was found in an appreciable number of these cases. The fluid of II contained trypsin and phosphatase in much greater amounts than in I; values for antitrypsin, tributyrinase and lipase were similar to those found in I; esterase was present in a few fluids; and amylase was practically normal. In III there were two groups, depending on whether there was a lesion of the brain which invaded the meninges or ventricles. Those with lesions showed xanthochromia, high protein content, lipolytic activity, high antitryptic power, elevated phosphatase and tributyrinase activity; those without were normal except for occasional marked lipolytic activity. In IV increased enzymic activity occurred with lesions of meninges or ventricles; if not, the deviations from the normal were much less. In V the fluids were normal except for a patient with suspected polio-encephalitis, and isolated cases of multiple sclerosis, CO poisoning and cerebral arteriosclerosis. The possible sources of the enzymes found in normal and pathological fluids are discussed, and the possible application of enzyme studies in diagnosis is considered.

Howard W. Robinson (Chem. Abstr.).

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The Vitamin C Content of the Cerebro-spinal Fluid. VII. The Seasonal Variation of the Vitamin C Content of the Cerebro-spinal Fluid of Nursing Infants. Kasahara, M., and Gammo, I. [*Z. ges. Neurol. Psychiat.*, **164**, 492–3 (1939).]

In 33–40 Japanese nursing infants, the vitamin C contents of the cerebro-spinal fluid were determined by dichlorophenolindophenol titration after metaphosphoric acid deproteinization. The average values were lowest in March, April, August, September and October (3·7–4·1 mgm. per cent.), and highest in February, May, July, November and December (4·7–5·3 mgm. per cent.). (*Cf. C.A.*, **33**, 5048[8].) MARION HORN (Chem. Abstr.).

Changes in the Composition of Cerebro-spinal Fluid in Circulatory Disturbances. Aviosor, M. L. [*Conf. Insuff. Circ.*, 229–37 (1938); *cf. C.A.*, **33**, 6431[6].]

In circulatory insufficiency P, Ca and uric acid are within upper normal limits, while non-protein-, amino acid- and urea-N, and K are considerably above normal. The results vary according to the nature of the associated complications.
B. C. P. A. (Chem. Abstr.).

The Diagnosis of Schizophrenia by the Lehmann-Facius Test of the Cerebro-spinal Fluid. Roeder, F. [*Z. ges. Neurol. Psychiat.*, **165**, 462–7 (1939).]

Roeder has found the Lehmann-Facius test for schizophrenia (a flocculation reaction between the cerebro-spinal fluid of the patient in question and a phosphatide-containing extract of brain) highly unreliable as a diagnostic agent.
MARION HORN (Chem. Abstr.).

The Phosphatide Metabolism in the Cerebro-spinal Fluid. I. Report of a New Extraction Method for Small Amounts of Fluid. Roeder, F. [*Z. ges. Neurol. Psychiat.*, **166**, 557–67 (1939).]

Phosphatides are determined in 0·5–1 c.c. cerebro-spinal fluid by drying the fluid, extracting the residue with alcohol-$CHCl_3$, evaporating and ashing the extract, and colorimetrically determining the P by the molybdate reaction. The use of $CHCl_3$ in the extraction permits the extraction of alcohol-insoluble phospholipides which were missed by previous methods employing alcohol-ether.
MARION HORN (Chem. Abstr.).

Acetylcholine Synthesis in a Sympathetic Ganglion. Kahlson, G., and MacIntosh, F. C. [*J. Physiol.*, **96**, 277–92 (1939); *cf. C.A.*, **33**, 718[8].]

The finding of Brown and Feldberg (*C.A.*, **31**, 1087[3]) that the perfused superior cervical ganglion can synthesize acetylcholine during prolonged stimulation is confirmed. Only a limited synthesis can occur when the perfusion fluid contains only inorganic salts. A ganglion so perfused rapidly fatigues when its preganglionic fibres are stimulated, since its acetylcholine soon becomes exhausted. Fatigue can be removed by the addition to the perfusion fluid of glucose, mannose, galactose, lactate or pyruvate. These substances promote the synthesis of acetylcholine. Fructose, lactose, arabinose, dl-glyceraldehyde, acetate, acetoacetate, succinate and acetaldehyde are ineffective.
E. D. WALTER (Chem. Abstr.).

Liberation of Potassium by Acetylcholine in the Central Nervous System. Dulière, Walter, and Loewi, Otto. [*Nature*, **144**, 244 (1939).]

Acetylcholine, when applied after eserine, liberates ionic K in the isolated nervous system of the frog. E. D. WALTER (Chem. Abstr.).

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Central Action of Anticholinesterases. Schweitzer, Alfred, Stedman, Edgar, and Wright, Samson. [*J. Physiol.*, **96**, 302–36 (1939); *cf. C.A.*, **32**, 3486[6].]

The action on the reflex activity of the spinal cord of various anticholinesterases and the derived phenolic bases, after removal of the urethane grouping, was examined in cats under chloralose anaesthesia. The potency of the action on the spinal cord in vivo and the inhibitory action on cholinesterase in vitro were compared. Eseroline (the phenolic base derived from eserine-HCl) has a negligible anticholinesterase action in vitro and a very feeble stimulating action on spinal reflexes in vivo. Eserine methiodide is a central depressant, in contrast to eserine-HCl or $-H_2SO_4$, which are powerful central excitants. Preparation 3393 (dimethylcarbamic ester of [m-hydroxyphenyl] diethylmethylammonium iodide) and miotine methiodide are central depressants. Stedman's " meta "-HCl is a central convulsant, in contrast to the corresponding " meta " methiodide, which is a central depressant. Miotine-HCl has a mixed depressant and excitatory action on the spinal cord. Eseroline methiodide has a weak anticholinesterase activity in vitro. It has very little action on spinal reflexes. (m-Hydroxyphenyl) trimethylammonium iodide has a much weaker anticholinesterase activity in vitro and a much feebler central inhibitory action in vivo than the parent substances (prostigmine or " meta " methiodide). The central excitatory anticholinesterases are tertiary ammonium compounds; the central inhibitory ones are quaternary ammonium compounds. E. D. WALTER (Chem. Abstr.).

The Existence of an Acetylcholine Complex in the Brain and in Various Organs. Gautrelet, J. [*Bull. acad. méd.*, **120**, 285–91 (1938).]

In determining acetylcholine it is essential to distinguish between the free and bound base. Tables are given presenting the acetylcholine content in various organs of a variety of animal species, including mammals, birds, amphibia, molluscs, crustacea and insects. A. E. MEYER (Chem. Abstr.).

The Cholinesterase Content of Nervous Tissue. Hellauer, H. [*Arch. ges. Physiol. (Pflüger's)*, **242**, 382–8 (1939).]

Organs in which acetylcholine is presumed to function as a chemical mediator contain acetylcholine and its esterase in proportionate quantities. Adrenergic nerves, on the other hand, contain much esterase in proportion to their small acetylcholine content. ARTHUR GROLLMAN (Chem. Abstr.).

Adenylpyrophosphoric Acid in the Brain at Various Stages of Embryonic and Post-Embryonic Development. Khaikina, B. I., and Epel'baum, S. E. [*Biochem. J. (Ukraine)*, **13**, 261–8 (*in Russian*, 269–72; *in English*, 272–4) (1939).]

Adenosinetriphosphoric acid (I) was estimated by hydrolysing the Ba precipitant of the nonprotein filtrate of brain for 15 minutes. The values obtained were checked by using adenosinetriphosphatase prepared from liver. It was shown that the I content continually decreased during embryonic existence and for some time after birth. This is correlated with the intensity of glucolysis, which decreases concurrently. R. LEVINE (Chem. Abstr.).

Cerebral Lesions in Hypoglucaemia. III. Experimental Investigations. Baker, A. B. [*Arch. Path.*, **28**, 298–305 (1939); *cf. C.A.*, **33**, 1394[4].]

Rabbits were subjected to repeated hypoglucaemic reactions and their nerve tissues studied months after the last reaction to evaluate the resulting chronic and permanent damage of the brain. Although nerve-cell changes did occur, these were by no means as striking as the cerebral haemorrhages, the areas of demyelination and encephalomalacia and the glial reactions. No correlation

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could be found between the total dose of insulin administered and the severity of the damage of the brain. It is suggested that the cerebral damage in hypoglucaemia might be due to a qualitative circulatory disturbance, inasmuch as the blood reaching the brain is deficient in the proper nutritive materials.

HARRIET F. HOLMES (Chem. Abstr.).

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2. Pharmacology and Treatment.

Prostigmine in Neurology. Fortes, A. Borges. [*Hospital*, **14**, 1121–7 (1938).]

The treatment of bulbospinal myasthenia with physostigmine or eserine seems to produce good results. The therapy with prostigmine, however, is better since this substance has no action on the heart. Its oral administration gives the best and most permanent effects. Its combination with other substances (KCl, veratrine, etc.) proves a failure. Vitamin B_1 seems to have an action assisting that of acetylcholine, the liberation of which is deficient in this disease. The use of vitamin B_1, however, seems to be indicated in the treatment of myastheniform syndromes only in addition to prostigmine. GEORGE NACHOD (Chem. Abstr.).

Effect of So-called Extrapyramidal Poisons, Bulbocapnine, Harmine and Harmaline upon the Glutathione Content of the Liver, Spleen and Blood of Rabbits. Asakawa, Hisasi. [*Arb. med. Fakultat Okayama*, **6**, 279–94 (1939).]

The glutathione content (I) of normal rabbits as determined by the Tunnicliff method is on the average 0·031 per cent. for blood, 0·280 per cent. for liver, 0·260 per cent. for spleen in rabbits. Bulbocapnine in small and moderate amounts (1–10 mgm.) diminishes, but in large amounts (20–25 mgm.) increases I in the blood; in moderate and large doses it decreases I of the liver, but increases it in the spleen. Harmine and harmaline in small to large doses (1–15 mgm.) decrease I of the blood and liver, but increase it in the spleen. The decreasing order of action on I of the blood is harmaline, harmine and bulbocapnine, but the last differs from the other two in that it also can augment I. These three drugs act by stimulating the sympathetic nervous centres. The decrease of I of the liver by these drugs depends upon an increased breakdown of glutathione in the liver, which is brought about by stimulation of the sympathetics, followed by increased secretion of adrenaline from the suprarenal gland. The increase of I in the spleen effected by these drugs appears to be due to a compensatory contribution of the spleen in decreasing I of the liver. Forty-nine references.

M. M. RATH (Chem. Abstr.).

The Effects of Adrenaline on the Reflex Excitability of the Autonomic Nervous System. Darrow, Chester W., and Gellhorn, Ernst. [*Amer. J. Physiol.*, **127**, 243–51 (1939).]

The experiments indicate an inhibitory action of adrenaline on mechanisms controlled by both branches of the autonomic system. The effect on reflex excitability is opposite to that of metrazole and the two pharmacologic agents may counteract one another in this respect. E. D. WALTER (Chem. Abstr.).

The Influence of Hypnosis on the Course of Narcosis in Cold-Blooded Animals. Ströder, Josef. [*Schmerz, Narkose-Anesthesie*, **12**, 86–7 (1939).]

From the observation that hypnosis causes vasoconstriction in the frog swim-bladder and viscera, Ströder deduces that it may cause similar vasoconstriction in the brain; this cerebral vasoconstriction is postulated as the means by which hypnosis facilitates urethane narcosis in the frog (cf. Ströder, *C.A.*, **33**, 7896[8]).

MARION HORN (Chem. Abstr.).

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The Brain after Nitrous Oxide Narcosis. Horst, L. van der. [*Ned. Tijdschr. Geneesk.*, **83**, 4191–3 (1939).]

Nitrous oxide is more harmful than other anaesthetics. Frogs kept for five-and-a-half minutes in N_2O lose their reflex irritability, whereas in H_2 the irritability is still preserved after one-and-a-half hours. Lowering of the O_2 present below 9 per cent. increases the anaesthetic action. The pathologic lesions which occur after N_2O death are more extended if no O_2 has been added. A rabbit kept under N_2O for 100 hours with adequate O_2 supply showed injection of cerebral vessels, petechial bleeding and vacuolary degeneration of nerve cells. In another rabbit kept under N_2O with only 9 per cent. O_2 the nervous tissue was killed after 100 hours. R. BEUTNER (Chem. Abstr.).

Narcosis and Metabolism. Noyon, A. K. M., and Goor, H. van. [*Ned. Tijdschr. Geneesk.*, **83**, 3962–5 (1939).]

Using the thermic diaferometer, Noyon determines the metabolism of nervous tissue from various sections of the brain; this amounts to 14·88 cu. mm. per min. for the prosencephalon, 14·94 for the mesencephalon, 18·08 for the cerebellum, 8·60 for the medulla oblongata, 5·40 for the medulla spinalis and 2·47 for the nerves. He then determines the depression of this metabolism by some of the well-known soporifics like veronal or chloral hydrate. These drugs do not act alike on different tissues, thus e.g. veronal sodium depresses more strongly the metabolism of the mesencephalon than that of the prosencephalon, while the opposite holds for chloral hydrate. The relationship between drug concentration and the magnitude of the depressing effect is investigated, with the result that a completely different type of curve is needed for veronal and chloral hydrate graphically to represent this relationship. These curves indicate that veronal sodium acts after being adsorbed to the brain tissue, while with chloral hydrate a saturation in the brain tissue occurs. R. BEUTNER (Chem. Abstr.).

Treatment of Acute Narcotic Poisoning with Fatal Doses. Ebes, A. J. H. [*Acta Brevia Neerland. Physiol., Pharmacol., Microbiol.*, **9**, 137–40 (1939).]

The therapeutic effects of strychnine, picrotoxin, piperidine, sparteine, metrazole, coramine, neospiran, cycliton, and combinations of them were determined with 587 white rats poisoned by intramuscular injection of one to two times the fatal dose of sodium barbital. The best results were obtained with the combinations metrazole-strychnine and metrazole-picrotoxin. A complete scheme for the treatment of narcotic poisoning is included.

E. CURZON (Chem. Abstr.).

The Action of Bile Salts and Cholesterol on the Central Nervous System. Köllensperger, F. K. [*Wien. klin. Wochenschr.*, **52**, 593–7 (1939).]

Small doses of Na cholate, decholin and cholesterol, that are in themselves without noticeable effect, sensitize frogs to galvanic narcosis; narcosis is produced at lower current strengths than normally. The narcosis-supporting action of these substances suggests an action on the central nervous system.

D. B. DILL (Chem. Abstr.).

The Rare Earths and the Nervous System. Gehreke, E., Lau, E., and Meinhardt, O. [*Z. ges. Naturw.*, **5**, No. 3, 106–7 (1939).]

Traces of inhaled vapours of the compounds of the rare earth elements had a definite influence on the skin nerves. They caused a heat sensitivity and itching irritation of the skin. A rubbing of the skin with the dry rare earth compounds caused no such effects. The effects (on respiration, heart, blood pressure, etc.) caused by inhaling the vapours of the compounds were different for different individuals. The finely pulverized praseodymium hydroxide (green), when inhaled, caused after only two to three minutes an itching irritation which started first in

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the nose, then in different parts of the head, in the arms and legs, etc. Similar effects were observed with neodymium hydroxide (light violet), although to a smaller degree. Lanthanum (white) behaved like neodymium, while erbium (pink) produced (besides the itching irritation) a stronger heat sensitivity and a sharper sense of odour and taste sensation. Samarium (white) showed the least effects: except for a slight influence on the respiration and on the pulse no other irritation was observed. Dysprosium was investigated in the form of its oxide (cocoa-brown), and it caused a pleasant heat sensitivity which lasted for several minutes and re-occurred several times. Cerium in the form of the quadrivalent hydroxide (yellow) caused deeper respiration without any itching irritation. The results of the experiments are explained by the conception of a positive " nervespectrum " which is present in a metal or in some other substance.

W. R. HENN (Chem. Abstr.).

Effect of Thorotrast (Colloidal Thorium Dioxide) on Ependymal Lining and Related Parts of the Brain. *Beers, D.* [*Arch. Path.*, **28**, 49–57 (1939).]

Thorotrast (colloidal ThO_2) is not readily excreted by the central nervous system and may remain in the ventricular cavity for long periods (in this case, for 27 days), in spite of the absence of obstruction to the flow of the cerebro-spinal fluid. Thorotrast produces extensive inflammatory and destructive changes in the ependymal lining. The source of the macrophages which ingest the granules of thorotrast may be traced in part at least to ependymal cells. The use of thorotrast for the visualization of ventricular cavities is unsafe.

HARRIET F. HOLMES (Chem. Abstr.).

Injury of the Nervous System by Uliron. *Kranz, H.* [*Z. ges. Neurol. Psychiat.*, **165**, 269–72 (1939).]

Kranz describes five cases in which uliron therapy of gonorrhoea (one to three courses of 20 gm. each) led to nerve injury, consisting of paralysis, loss of reflexes, atrophies and alterations of the electrical excitability of the muscles. One of the patients had indulged excessively in alcohol, another had consumed alcohol regularly and two others had undergone marked physical exertion just prior to or during the period of drug treatment. Kranz concludes that a pre-existent nerve or muscle injury is an important factor predisposing to adverse reactions to uliron.

MARION HORN (Chem. Abstr.).

Carbon Disulphide Poisoning of the Nervous System. *Baumann, C.* [*Z. ges. Neurol. Psychiat.*, **166**, 568–80 (1939).]

Special sensitivity of cerebellar cells to CS_2 was indicated by neurological studies on a patient and histological studies on a cat, both subjected to CS_2 poisoning.

MARION HORN (Chem. Abstr.).

Experimental Investigation of the Local Action of Thiophene in the Central Nervous System. *Upners, T.* [*Z. ges. Neurol. Psychiat.*, **166**, 623–45 (1939).]

" Analytically purest " thiophene, injected subcutaneously into dogs, caused greater histological injury in the cerebellum, especially the granulose elements, than in other parts of the central nervous system. Older dogs showed symptoms of thiophene poisoning more rapidly and severely than younger.

MARION HORN (Chem. Abstr.).

The Effect of Poisoning by Strychnine, Cocaine and Chloral Hydrate on the Dehydrogenase Activity of Nerve Tissue. *Khvoinits'ka, M. A., and Romanyuk, N. M.* [*Biochem. J.* (*Ukraine*), **13**, 97–102 (*in Russian*, 103; *in English*, 103–4) (1939).]

Chloral hydrate poisoning leads to a diminution in the intensity of methylene blue decoloration by brain tissue. The other nerve tissues examined were not affected at all by the poisons mentioned.

R. LEVINE (Chem. Abstr.).

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The Passage of Arsenic into the Brain Substance after Application of p-Hydroxy-m-Acetylaminophenylarsonic Acid. Tomita, T., and Hozyô, T. [*Folia Pharmacol. Japon.*, **27**, 128–32 (*Breviaria* 15–16) (1939).]

After intravenous injection of a 4 per cent. solution of the drug dissolved in NaOH, As was practically always found in the brain. This was not the case when the drug was given by mouth. The quantities were at a maximum twelve hours after injection. G. H. W. Lucas (Chem. Abstr.).

Studies on the Subjective Effects of the Cephalotropic Amines in Man. I. β-Phenyl-isopropylamine Sulphate. Jacobsen, E., and Wollstein, A. [*Acta Med. Scand.*, **100**, 159–87 (1939).]

Cephalotropic amines are phenyl-substituted aliphatic amines which irritate the central nervous system, causing motor unrest. A large number of young male subjects were tested with β-phenylisopropylamine sulphate and the results are described in detail.

II. A Comparison between β-Phenylisopropylamine Sulphate and a Series of other Amine Salts. Jacobsen, Erik. [*Ibid.*, 188–202.]

Tests were made with β-phenylisopropylamine, N-methyl-β-phenylisopropylamine, N-ethylphenylisopropylamine, ephedrine and β-phenylethylamine. All except the last exerted a definite antagonism to hypnotics.

III. The Action of the Cephalotropic Amines on Intelligence Scores. Wollstein, Artur. [*Ibid.*, 203–7.]

No definite objective effects on the intelligence scores of the experimental subjects could be detected. S. Morgulis (Chem. Abstr.).

The Analeptic Potency of Sympathomimetic Amines. Tainter, M. L., Whitsell, L. J., and Dille, J. M. [*J. Pharmacol.*, **67**, 56–70 (1939).]

The analeptic potencies of 22 representative sympathomimetic amines and four other stimulants were tested in white rats against the hypnotic actions of avertin (I), chloral (II) and pentobarbital (III). The times required for recovery of corneal and righting reflexes and of responses to faradic stimulation were measured. Most of the compounds were ineffective or nearly so. Cobefrine hastened recovery markedly under all conditions. Large doses of benzedrine generally delayed recovery, while small doses hastened recovery of the righting reflex alone under II and III. *l*-Pseudo-ephedrine hastened recovery of all three reflexes after I only. Metrazole was effective after I, but not after II. 2-Phenyl-l-aminopropane and phenylethylamine hastened recovery after II but not after I. No correlation between molecular configuration and responses was found. Some of the amines produced no shortening of recovery time although, when the animals' reflexes returned, violent excitation occurred. This indicates that there are other modes of stimulation than those evidenced by speed of recovery from a hypnotic.
L. E. Gilson (Chem. Abstr.).

A Quantitative Comparison of Different Analeptics. Chakravarti, M. [*J. Pharmacol.*, **67**, 153–74 (1939).]

Picrotoxin, strychnine, ephedrine, benzedrine, cardiazole and coramine were compared for toxicity in mice, power to awaken mice narcotized with nembutal, power to antagonize the toxic action of nembutal, convulsive and emetic action in pigeons, power to stimulate respiration in cats and mice depressed with nembutal and power to increase the carotid sinus reflex. In relation to toxicity benzedrine had the greatest awakening power. Picrotoxin and cardiazole are the only ones which antagonize the toxic action of nembutal. Picrotoxin, cardiazole and ephedrine

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cause vomiting in pigeons. Benzedrine and ephedrine stimulate respiration in mice and are similar to lobeline in potency. Compared to lobeline the others are extremely weak. The medullary stimulants increase the carotid sinus reflex when this is depressed but the doses required are too large for therapeutic use.

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

Strengthening by Cyanide of the Convulsant Action of Brucine and Hydrastine. Bergstermann, H., and Krauskopf, B. [*Arch. exptl. Path. Pharmakol.*, **191**, 46–54 (1938).]

Combination of subthreshold doses of brucine (I) with subthreshold doses of HCN causes violent strychnine-like convulsions in frogs. With larger doses of I it was found that the paralysing action of I on the motor nerve end-plates is reinforced by subthreshold doses of HCN. Subthreshold doses of hydrastine likewise caused typical hydrastine convulsions when administered in combination with subthreshold doses of HCN. Subthreshold doses of both coramine and HCN are highly toxic. Combination of veratrine and HCN showed no mutual toxicity-increasing action.

EDWARD EAGLE (Chem. Abstr.).

Electro-cardiographic Investigations during (Insulin) Shock and (Metrazole or Azoman) Convulsion Treatment of Schizophrenia. Schmitt, Doris. [*Z. ges. Neurol. Psychiat.*, **166**, 108–27 (1939).]

Electro-cardiograms taken in 32 cases of schizophrenia during various stages of insulin hypoglucaemia revealed various abnormalities, including sinus arrhythmia, extra systole, widening of the Q-R-S-interval, diminution of the S-T interval, and flattening or inversion of the T wave. Electrocardiograms taken in 30 cases of schizophrenia after metrazole or azoman convulsions showed either arrhythmia or tachycardia, the response being consistently characteristic in each patient. Generally the cardiac effects of the hypoglucaemia or convulsions were reversible. However, of 60 patients who showed normal hearts before therapy, ten showed myocardial damage after therapy.

MARION HORN (Chem. Abstr.).

Effect of Tetracor (Pentamethylenetetrazole) and p-Methyltetracor on the Central Nervous System. Issekutz, B. [*Magyar Orvosi Arch.*, **39**, 582–97 (1938).]

p-Methyltetracor has a stimulating effect on the central nervous system 10–16 times that of tetracor. For rapid injections the lethal dose is eight times that producing convulsions. Subcutaneous injection of p-methyltetracor and tetracor has one-fifth the effect of intravenous injection, and the lethal dose is much nearer that producing convulsions. Both compounds are excreted at the rate of 20–25 per cent. per hour. The therapeutic administration of the drugs in the treatment of schizophrenia and paralysis of the respiratory and vasomotor centres is discussed.

B. C. P. A. (Chem. Abstr.).

Cardiazole in Schizophrenia. Nyberg, P. [*Upsala Läkarefören. Förh.*, **43**, 147–68 (1938).]

In the treatment of schizophrenia, leucocytes were increased by 3600 ± 700 per cu. mm. two hours after injection of cardiazole. Changes in the different types of leucocytes are described. The increase in the neutrophile cells is the same whether the patient improves or not and changes in these cells are of no prognostic significance. Blood sugar is increased after injection independently of whether a fit ensues. The range of blood coagulation time is increased in schizophrenia (value obtained, 3–6 minutes; normal, 4–5 minutes). After a cardiazole fit the coagulation time was lowered one hour after the fit with only partial recovery after two hours. This effect was not due to a direct influence of cardiazole on the blood. During treatment the body-weight first diminished with good recovery later. Pathological changes in the heart and central nervous system of rabbits treated with cardiazole are described.

B. C. P. A. (Chem. Abstr.).

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The Symptom Complex "Hypoglucaemic Convulsions" in Childhood. Hungerland, H. [*Arch. Kinderheilk*, **117**, 132–8 (1939).]

During severe morning convulsions the blood sugar of a boy aged 4 was found to be 54 mg. per cent. Preconvulsive symptoms appeared at 43 to 47 mg. per cent. A normal rise in blood glucose followed subcutaneous adrenaline, but not oral or rectal glucose. Laparotomy revealed no pancreatic abnormality, but a liver rich in glycogen. Post-operative fasting blood glucose values of 46 to 54 mg. per cent. were not accompanied by convulsions. Hypoglucaemia is considered to be a necessary, but alone not a sufficient, basis for this symptom-complex.

KATHRYN KNOWLTON (Chem. Abstr.).

The Effect of Insulin on Glutathione Content of the Blood in Schizophrenia Patients. Merezhins'kiĭ, M. F., and Kligman, M. I. [*Biochem. J. (Ukraine)*, **13**, 87–94 (*in Russian*, 94–5; *in English*, 95–6) (1939).]

Insulin in doses of 20–150 units produces a rise in the total glutathione content of the blood during the hypoglucaemic reaction. The administration of sugar brings the glutathione content back to normal. These results are not consistent from patient to patient, or in the same patient on different occasions.

R. LEVINE (Chem. Abstr.).

Alterations in Insulin Tolerance and Body Weight in the Course of Insulin Shock Treatment of Schizophrenia. Plattner, P. [*Z. ges. Neurol. Psychiat.*, **166**, 136–48 (1939).]

The beneficial effects of insulin hypoglucaemia in schizophrenia paralleled the ability of the insulin to increase the body-weight. Marked mental improvement appeared less often in patients who became increasingly sensitive to the hypoglucaemic action of insulin during therapy than in the patients who did not. The increase in sensitivity paralleled the original tolerance for insulin and the duration of therapy. Epileptic attacks during insulin hypoglucaemia occurred less often in patients showing habituation than in those showing sensitization.

MARION HORN (Chem. Abstr.).

Relations between Blood-Sugar Changes and Clinical Symptoms and Course of Recovery during Insulin Treatment of Schizophrenia. Hofmann, Ernst. [*Z. ges. Neurol. Psychiat.*, **164**, 531–4 (1939).]

An analysis of 175 blood-sugar curves during wet and dry insulin shocks in 20 schizophrenic patients. The curves generally became less sharp as mental improvement began. MARION HORN (Chem. Abstr.).

The Convulsions of Insulin Hypoglucaemia in Relation to Water Balance. Corwin, W. C. [*Proc. Staff Meetings Mayo Clinic*, **14**, 515–8 (1939).]

Withdrawal of water for 1–8 days failed to alter significantly the response of non-diabetic dogs to insulin, either in the amount of insulin or the length of time required to produce convulsions. A similar failure to influence insulin convulsions followed hydration with water retention amounting to approximately 10 per cent. of the body-weight produced in periods up to 21 days by daily administration of 2 gm. NaCl/kgm. body-weight by stomach tube, and replacement of the drinking water by 1 per cent. NaCl to which the animals had free access.

MARION HORN (Chem. Abstr.).

Effect of Stellate Ganglionectomy on Carbohydrate Metabolism and on Hypoglucaemic Convulsions caused by Administration of Insulin. Corwin, W. C. [*Proc. Staff Meetings Mayo Clinic*, **14**, 374–6 (1939).]

In dogs, unilateral or bilateral stellate ganglionectomy did not prevent convulsions following administration of insulin, and did not alter the fasting blood-sugar values, the results of glucose-tolerance tests or the blood-sugar curves following insulin administration. MARION HORN (Chem. Abstr.).

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Action of Vitamin B_1 on Epileptiform Attacks during Insulin-shock Treatment of Schizophrenia. *Ákos, V.* [*Wien. klin. Wochenschr.*, **52**, 39–42 (1939).]

In three cases previous intramuscular administration of vitamin B_1 in 2–5-mgm. doses prevented the occurrence of epileptiform attacks during insulin shock. Flooding the organism with the vitamin is believed to favour sugar oxidation and to prevent accumulation of a hypothetical neurotoxic " N factor."

D. B. DILL (Chem. Abstr.).

The Pharmacology of Acetylcholine. *Vasil'eva, V. V.* [*Bull. biol. med. Exptl. U.R.S.S.*, **3**, 96–7 (1937 ; *Chem. Zentr.*, **1**, 3359 (1938).]

The action of acetylcholine on frog blood vessels in Fröhlich and Loewen-Trendelenburg preparations was investigated. Almost without exception, contraction of the blood vessels was obtained. At the same time, comparative experiments with adrenaline, caffeine, atropine and histamine were carried out on the same preparations.

M. G. MOORE (Chem. Abstr.).

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