Bibliography and Epitome*

* A number of abstracts in this section are reproduced from *Chemical Abstracts*. To the Editors of this Journal we extend our grateful thanks.

A Critique of Psychiatric and Psychological Research on Insulin Treatment in Schizophrenia

After twenty years of research with insulin treatment in schizophrenia the published evidence is inconclusive and contradictory. Wide variations in remission and recovery have been reported but the number of published control studies is meagre. Psychological tests yield no definitive data on prognosis or the effects of treatment. Insulin treatment in schizophrenia continues to pose a major challenge to research.

(Authors' Abstr.)

MAY

Intellectual and Affective Changes in Essential Hypertension

The Rorschach test was administered to 3 diagnostic groups of patients with neurosis, organic brain-damage, and essential hypertension. The subjects were individually matched with respect to color, sex, age, formal education, and I.Q. Intergroup statistical comparisons were made of the mean values on each of the Rorschach variables. The relative frequencies of Rorschach "signs" of organic cerebral damage in the 3 groups were compared using the chi-square technique. The results indicate that the mean scores of the hypertensive group consistently fall between those of the other 2 groups. The Rorschach "signs" of brain damage

occur more frequently in the brain-damage than hypertensive group, but there was no significant difference in this respect between the hypertensives and neurotics. An interpretative review of the protocols in the 3 groups indicates a considerable amount of neurotic symptomatology in each group, but confirms the quantitative results which indicated intellectual impairment due to organic brain damage in some of the patients with essential hypertension.

(Author's Abstr.)

JUNE

Studies of the Process of Aging: Factors that Influence the Psyche of Elderly Persons

1. The cortical activity of persons over the age of 60 shows a definite change as measured by the EEG. A high percentage have focal dysrhythmias which are primarily found in the left temporal areas. The presence of this focal dysrhythmia alone does not seem to impair psychological function, rather there is questionable evidence that it is associated with more flexibility and an increased ability to learn new patterns. In contrast, a diffuse slowing is accompanied by intellectual deterioration.

2. Guilt is not an important psychic determinant in elderly persons and is not the major cause of feelings of depression. Depression is more often related to loss of self-esteem because of feelings of inferiority.

3. A poor relationship between old people and their children is a part of lifelong pattern of neurotic and immature behavior.

4. Psychologically, elderly persons who continue to work beyond the usual age of retirement have a higher intellectual capacity than those who do not.

All of these findings raise many questions which require further thought and investigation before we have achieved a reasonable and useable knowledge of the factors that influence the psyche of elderly persons.

(Author's Abstr.)

JULY

Prefrontal Lobotomy and Transorbital Leucotomy: A Comparative Study of 175 Patients

1. Favorable results with transorbital leucotomy approximate those with lobotomy.

2. Death, undesirable personality changes, and postoperative convulsions were minimal with transorbital leucotomy in contrast with lobotomy.

3. Psychosurgery should be of a type which causes the least cerebral damage.

4. The high rate of psychosurgical failures, the absence of valid prognostic criteria, and the frequency of relapses preclude clear concepts on the specificity of therapeutic effectiveness as well as on the role of the frontal lobes in the psychopathology.

5. Course and pattern of the schizophrenic psychoses seem to be of great prognostic significance.

6. The therapeutic benefits can be dramatic in individual cases but are rather limited on the whole. It seems desirable to narrow the range of applicability still further in order to obtain more satisfactory results.

(Authors' Abstr.)

AUGUST

Effects of Prefrontal Lobotomy on Patients with Severe Chronic Schizophrenia

The authors' experience that patients with severe schizophrenic symptoms tend to improve whether lobotomized or not confirms the need for control cases in studies of the effects of lobotomy.

In series rigorously matched regarding the general and specific severity of symptoms, they find that the lobotomized patients show symptomatic improvement with a frequency reliably greater than that of the controls. They appear more nearly normal. Anxiety is diminished. Resistive isolation and schizophrenic disorganization appear diminished and paranoid projection is diminished.

The hypothesis is presented that the splitting of the schizophrenic process is the result of a conflict, unresolvable to the patient, reflected, on the psychological side, by anxious preoccupation and, on the neurological side, by an unresolving morbid resonance or eddy of neural activity between cortex and diencephalon, which jams the higher circuits and leaves the control of behavior to lower centers capable only of stereotyped inflexible and defensive adjustments. Prefrontal lobotomy is presumed to benefit the schizophrenic patient by destroying circuits involved in the maintenance of this morbid eddy or resonance and permitting him more effectively to integrate and use what he has left.

(Authors' Abstr.)

Ventromedial Quadrant Coagulation in the Treatment of the Psychoses and Neuroses

In appraising their therapeutic results the authors have used no formal tests. Before operation they attempted to evaluate the anxiety factor and the interpersonal socio-economic disability resulting from anxiety. In their series this evaluation is usually based on long acquaintance with the patient, members of his family, and friends. Most of the patients selected for operation have been previously treated by them with other methods such as the various shock therapies and psychotherapy for periods of 4 to 10 years. Their final decision to operate represents a "court of last resort" procedure. This decision is reached after many lengthy interviews with the patient, his friends, and his family. Within a reasonable time (3 to 6 months) after operation, they again evaluate the anxiety factor and the interpersonal socio-economic improvement. They consider an end result as satisfactory if the patient is relieved of anxiety and if he is able to adjust himself reasonably well in an environment which was, to him, unbearable before the operation.

(Authors' Abstr.)

Metabolic Studies in Mongolism

1. In order to study thyroid and lipid function in mongolism, the levels of serum protein-bound iodine, cholesterol, and the fraction of S_f 12–20 molecules of lipoproteins were studied in a group of 74 mongoloid patients, and these were compared with the findings in normals and with a group of 18 cases diagnosed as "undifferentiated mental deficiency".

2. There was no significant difference in the serum protein-bound iodine levels between mongoloid children and "controls" of the same age.

3. Mentally retarded children, whether the diagnosis is mongolism or undifferentiated mental deficiency, have significantly higher serum cholesterol levels than normal children.

4. The most marked differences between mongoloids, normal, and control children occur in the level of large molecule lipoproteins of the S_f 12–20 class, the mongoloids being highest, the cases of undifferentiated mental deficiency intermediate, and the normals lowest.

(Authors' Abstr.)

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Chronic Anxiety Symptomatology, Experimental Stress, and HCl Secretion

The evidence that increased HCl secretion occurs during sustained anxiety is contradictory to the unqualified extension of the emergency theory of emotions to chronic emotions. Results of studies with dogs and monkeys indicate that this increased HCl secretion is a function of the change from acute-emergency to sustained anxiety. The problem of the present experiment was to test this conclusion in humans and to obtain further empirical data of HCl secretion and anxiety in humans.

The procedure consisted of (*a*) comparing the fasting gastric acidity levels of seven subjects presenting chronic anxiety symptoms and of a group of seven subjects not presenting such symptoms; and (*b*) comparing the fasting HCl secretory response of these two groups when subjected to one experimental anxiety-evoking situation based upon pain and pain anticipation stimulation and another consisting only of pain anticipation stimulation.

Because of methodological limitations, the desired differential pretest anxiety in the two groups was not obtained. Therefore the nature of HCl secretion during acute-emergency anxiety could not be studied.

The gastric acidity of the original "chronic anxiety" group was greater than that of the control group, but this difference was of only suggestive reliability. When one subject was eliminated from each of these groups on specified grounds in order to make the groups more homogeneous in anxiety, the gastric acidity of the "chronic anxiety" group was significantly greater than that of the control group. When pain and pain-anticipation stimulation and response interacts with the sustained pretest anxiety, there is a significant increase in HCl secretion.

Both these findings are consistent with previous studies of sustained anxiety and HCl secretion. The accumulated evidence (*a*) reveals the invalidity of the unqualified extension of the emergency theory to the chronic emotions involved in psychosomatic disorders and (*b*) reinforces the belief that the role of chronic anxiety in peptic ulcer etiology merits detailed investigation.

(Authors' Abstr.)

Impairment of Mental Function During Electric Convulsive Therapy

The scores of a word-naming test decreased significantly after five or more electric shock treatments.

Recovery took place within one week following treatment, and the word scores continued to increase during the six weeks of observation after the termination of electric convulsive therapy.

A comparable control group of patients showed no decrease but, rather, a moderate increase in word scores on repetition of the test over a three-week period.

A petit mal or partial convulsion did not impair the word scores.

The decrease in word scores is interpreted in terms of temporary inaccessibility of the word-naming faculty during shock treatment.

(Author's Abstr.)

APRIL

Liver Function and Other Blood Chemistry Tests in Multiple Sclerosis

Fifty-eight nonjaundiced patients with multiple sclerosis were tested with a group of 27 tests for evidence of hepatic dysfunction.

Tests which have been reported to have a significant statistical association with liver cell damage namely, the albumin-globulin ratio, cephalin flocculation, thymol turbidity, and sulfobromophthalein retention tests, and those showing a less degree of correlation, namely highly elevated serum bilirubin and slightly elevated alkaline phosphatase, did not occur in statistically significant numbers in the authors' group of 58 patients. Furthermore, the joint occurrence of abnormalities in these particular tests was also not of statistically significant magnitude.

Total and esterified cholesterol levels, which are said to be depressed below accepted normal standards in instances of liver cell damage, were elevated above the upper limits of normal ranges in a statistically significant number of the authors' patients. The ratio of total to esterified cholesterol was normal in all patients. None of the patients, including those with high cholesterol levels, had jaundice or other clinical disorders associated with high serum cholesterol values.

Abnormalities of total cholesterol, cholesterol esters, lipid phosphorus, serum esterase, inorganic phosphorus, true globulin, Howe albumin, and zinc sulfate turbidity tests occurred with statistically significant frequency in the group of 58 patients studied. These abnormalities are not considered to be related to hepatic function.

(Authors' Abstr.)

Poliomyelitis. The Cerebral Hemispheres

The cerebral hemispheres in 75 cases of bulbar poliomyelitis were studied. Of these cases, 56 were acute and clinically showed no respiratory difficulties, while 19 were subacute and clinically had marked hypoxia prior to death.

Meningeal involvement was extremely common and was observed in 85 per cent. of the authors' cases, all cortical areas being implicated in at least some of the cases. This meningeal involvement was invariably mild and bore little correlation to the inflammatory or neuronal changes within the underlying brain tissue.

In the 56 acute cases, extensive nerve cell damage was observed in 42, or 75 per cent. These neuronal changes were strikingly localized to the large and giant pyramidal cells of Layer 5 and the medium pyramidal cells of Layer 3 of the motor cortex.

The 19 subacute (hypoxic) cases showed neuronal damage in 15, or 79 per cent. The nerve cell damage was more widespread, implicating almost all cortical areas in at least some of the cases. It was felt that the neuronal damage in cortical areas outside the motor cortex in these cases was probably due to hypoxia rather than the disease itself.

A survey of the pathologic changes throughout the nervous system in 10 unselected cases revealed a most consistent and uniform involvement in all areas exclusive of the basal ganglia, suggesting some uniform method of spread of the infection, such as the vascular system.

(Authors' Abstr.)

Poliomyelitis. The Cerebellum

The cerebellum was studied in 75 cases of bulbar poliomyelitis.

It is apparent that the cerebellum is frequently implicated in poliomyelitis, even though clinical manifestations of such involvement are uncommon.

Of the 75 cases studied, 77 per cent. showed at least a minimal amount of inflammatory and/or neuronal change in some areas of the cerebellum.

Inflammatory changes within the meninges were observed in 40 per cent. of the cases and were most frequently encountered over the vermis.

Neuronal changes occurred within all nuclear groups of the cerebellum but were most frequent and severest within the dentate nucleus and the Purkinje layer of the vermis.

(Authors' Abstr.)

MAY

Histopathological Changes in the Brain in Schizophrenia

1. The technological and interpretative precautions which must be exercised in investigations concerning histopathological changes in the brain in schizophrenia are discussed.

2. The literature dealing with such changes in the neurons, glial elements, lipid components, and vascular and perivascular tissues is reviewed. A special section described and comments upon the work of Papez and Papez and Bateman.

3. The findings described are discussed in relation to the design of the investigative procedures used, the precautions necessary for interpreting such findings, and the implications which can be drawn from the contradictory and inconclusive results of 50 years of investigation on the histopathological level.

4. It is suggested that for those who reject the "functional" classification of schizophrenia, the very lack of definitive results from the histopathological approach dictates a new attack on the problem of the etiology of schizophrenia from the level of metabolic dysfunctions in the brain.

(Author's Abstr.)

Laminar Cortical Blocking and its Relation to Episodic Aggressive Outbursts

Experimental studies of the EEG during sleep reveal two types of abnormal EEG responses to auditory stimulation: one, found in patients with organic brain damage, is confined to the side and the site of the lesion; the other, found in some persons with episodic aggressive behavior, is confined to the association cortex of posterior parts of the hemispheres.

The second type of response is characterized by positive bursts that replace the normally occurring biphasic bursts. These evoked bursts are identical with the spontaneously occurring "positive 6- and 14-per-second spikes" observed by Gibbs and Gibbs.

Results obtained by experimental methods showed that positive bursts similar to those seen in the human are reproducible in the animal cortex by blocking of activity of the cortex by topical application of depressant drugs. Positive bursts are also seen during the recovery cycle of "spreading depression" of Leão and in general conditions of depression of cortical activity, like deep anesthesia, low blood pressure, and anoxia.

It is inferred that positive bursts in the human EEG. evoked or occurring spontaneously during sleep, are sleep spindles whose negative phase has been reduced or abolished. This may be due to blocking of activity in the superficial layers of the association cortex in the posterior temporo-parieto-occipital region. The high incidence of positive bursts in the younger

age bracket suggests that delayed maturation of this region may play a role in the production of the electrical abnormalities and clinical manifestations.

The hypotheses that clinical manifestations (rage, assaultiveness, and accompanying autonomic changes) are release phenomena due to transient laminar blocking of inhibitory mechanisms in the superficial layers of the association cortex is discussed.

(Author's Abstr.)

Ansotomy in Paralysis Agitans

A stereotaxic method for localizing and producing lesions of the ansa lenticularis (ansotomy) has been developed using the foramen of Monro and the anterior commissure as reference points.

Ansotomy is able to reduce and, in some instances, almost completely to eliminate the Parkinsonian tremor on the opposite side. These results could be obtained with preservation of volitional movements or without increase of muscle tone or disturbance of sensation. The ability to perform alternate movements, e.g. flexorextensor movements of the fingers, may even be increased and rigidity sometimes diminished.

The electropallidogram failed to show a relationship of its rhythm to that of the tremor or abnormalities indicative of gross pathologic changes.

Based upon these experiences and upon animal experiments (combination of tegmental stimulation and mesencephalic lesions), a working hypotheses regarding the mechanism of the Parkinsonian tremor is outlined. It is assumed that the static tremor is due to a release of the reflex arcs serving static innervation and synapsing in the rhombencephalic and mesencephalic reticulate substance from inhibitory influences that originate chiefly, but not exclusively, in the substantia nigra.

The part of pallidofugal impulses conducted by the ansa lenticularis probably carries facilitating impulses to the tremor-genetic area in the tegmentum. The role of other pallidofugal fibers is being studied.

(Authors' Abstr.)

Isoniazid Treatment of Psychiatric Patients

Of 65 psychiatric patients treated with isoniazid, only 8 showed any improvement that seemed to be definitely related to the drug or its suggestive effect. The effect of isoniazid on the personality is varied and unpredictable, but in general it appears to be that of a stimulant in smaller doses and of a neurotoxin in larger doses.

Isoniazid is of very limited, if any, value in the treatment of psychiatric patients. It occasionally seems to help overcome fatigue, mental sluggishness, or depression associated with any of the various reaction types.

(Author's Abstr.)

JUNE

Autonomic Functions of the Diencephalon

In summary, then, it can be said that the hypothalamus acts as a nerve structure of highly integrative character. Mainly, it seems to activate and organize global activities of the organism which subserve two main purposes. First, there are the mechanisms subserving the purpose of providing the necessary background for externally directed action and reaction; these are the ergotrope activities, mediated in the periphery mainly by the sympathetic nervous system. The second group of mechanisms subserve the purpose of counteracting exhaustion and overstrain and of maintaining the homeostasis of the organism; these are the trophotrope activities and are mediated in the periphery, mainly by the parasympathetic nervous system. Neither activity is purely autonomic in a strict sense, because there is some degree of somato-autonomic integration in these global performances. Each activity is represented in a different area of the basal diencephalon. The ergotrope area covers roughly the posterior medial hypothalamus and shows a pattern of collective representation of ergotrope activities. The ergotrope or "dynamogenous" zone of the hypothalamus is, therefore, functionally homogeneous. Not so the trophotrope zone, which covers an area comprising the septum, the preoptic area, the lateral hypothalamus, and part of the basal medial thalamus. There some

topical organization can be seen, with the exception of the lateral preoptic and anterior lateral hypothalamic area, where a pattern of collective representation of trophotrope mechanism is also encountered.

The main characteristic of the functional organization of the hypothalamus is, therefore, quite different from that of the cortex, where the somatotopic type of representation is dominant. In the hypothalamus another principle of organization is realized; there is collective representation of various organotropic effects into global mechanisms subserving common purposes. This integration of various effectors, autonomic and somatic, into patterns of action, each subserving a definite type of performance, seems to be the main characteristic of the functional organization of the hypothalamus.

(Author's Abstr.)

VOL. 72 JULY

Circulatory Conditions in Electroshock Therapy with and without a Muscle Relaxant

With use of a mechanoelectronic transducer manometer, the intra-arterial pressure was recorded in electroshock therapy with and without succinylcholine iodide as a muscle relaxant. The venous pressure was measured with an aneroid manometer, and the heart rhythm was also recorded.

The arterial blood pressure is found to rise during the electroshock. When the muscular spasms and the asphyxia are eliminated with the administration of succinylcholine and oxygen, a slower and more even rise is noted; the difference between the maximums with the respective methods is almost significant ($P<0{\cdot}05$). The pulse pressure, which undergoes considerable variations with the usual technique, is found to be practically normal when a muscle relaxant is given.

An appreciable rise in the venous pressure takes place in conjunction with unmodified electroshock therapy, whereas only an extremely slight rise is noted under the influence of a muscle relaxant and oxygen. The difference is significant ($P<0{\cdot}01$).

In ordinary electroshock therapy the heart rate is found to be irregular and greatly increased. Muscular relaxation produced by succinylcholine is noted to result in a slower and more even rate. The difference between the increases in the heart rate with and without succinylcholine, respectively, is highly significant ($P<0{\cdot}001$).

It is concluded that with the use of a muscle relaxant and oxygen it is possible to reduce significantly the strain on the circulatory organs caused by electroshock treatment.

(Authors' Abstr.)

Further Experiences in Use of Thiamylal with Electroshock

Seventy-seven patients have received 1,007 electroshocks in conjunction with thiamylal.

One fatality is reported in which the patient had physical complications severe enough in themselves to cause death.

Electroshock in conjunction with thiamylal is safe, when properly administered, for patients with bony lesions. It is safer than standard electroshock for those with cardiovascular disorders and useful for patients with anxiety regarding the treatment.

(Author's Abstr.)

VOL. 77 BRAIN 1954

Mechanisms of Voluntary Movement

In conclusion, the precentral gyrus can be employed in the performance of skilled voluntary acts even when it has been cut off from surrounding transcortical connexions.

During voluntary dexterous movement of the right hand the resting rhythm of brain waves disappears in the arm area of the pre- and post-central gyri but not in other parts of the Rolandic strip and not on the cortex anterior and posterior to the arm area. It disappears also when the command is given to prepare for movement of the hand. These electrographic observations are consistent with the belief that a subcortico-cortical stream of nerve impulses is directed toward that portion of the precentral gyrus during its employment in willed action.

Many of the final integrative processes that are prerequisite to planned voluntary action must take place in a central position within the brain, in what may be called the centrencephalic system.

The peripheral or efferent connexions of the different portions of the precentral gyrus are arranged in an invariable sequence from one end of the Rolandic strip to the other. These corticofugal connexions are of two kinds: (*a*) to the bulbar and spinal anterior horn areas, and (*b*) to subcortical motor mechanisms, of vocalization, swallowing, breathing, conjugate deviation of eyes, etc. Dexterous, voluntary movements of fingers and toes can only be carried out through the former connexions (*a*).

When the precentral gyrus has been removed, during early infancy when it seems likely that the precentral gyrus is not used, voluntary action is still possible. Under these conditions, dexterous employment of fingers and toes is not possible but skilful use of the subcortical motor mechanisms of swallowing, vocalization, looking, etc., is still possible and gross movement of the extremities as well.

It seems likely that there may be an alternative pathway for directional voluntary impulses. When the motor cortex is not available it would seem that the subcortical motor mechanisms and, to a limited extent, the bulbo-spinal anterior horn centres are controlled by streams of impulses originating in the centrencephalic system without making a detour to the precentral gyrus.

It must remain a matter of speculation as to what use may be made of the direct, extracortical pathway of voluntary control, under normal conditions of adult life.

(Author's Abstr.)

An Experimental Critique of the Effects of Anterior Cingulate Ablations in Monkey

1. Twenty monkeys, 12 with lesions of the anterior cingulate gyrus, were used to study the effects of bilateral anterior cingulectomy.

2. Behavioural observations consisted of testing the performance of the animals on the delayed reaction problem, a visual discrimination problem, their reaction to a "frustrating" situation, and their social behaviour. Only with respect to the reaction to "frustration" was any change in behaviour induced by the cingulectomy. Shortened duration of avoidance behaviour resulted from ablation of the anterior cingulate cortex. Although similar changes follow other frontal lesions, these are accompanied by additional impairment—viz. of performance of the delayed reaction type of problem. Thus, medial frontal and cingulate resections have been shown to shorten selectively the duration of avoidance.

3. Anatomical observations with respect to the projection of the anterior thalamic nuclei are of interest. The more posterior the ablation of the cingulate gyrus extends, the more degeneration is found in the n. anterior ventralis. Resection restricted to the anterior portion of the cingulate gyrus results in degeneration limited to a strip at the junction of the n. anterior ventralis and the n. anterior medialis. Invasion of the medial frontal cortex anterior to the corpus callosum is associated with massive degeneration of the n. anterior medialis. The most ventral portions of this nucleus and the n. paratenialis degenerate when the subcallosal cortex is involved. These observations establish the fact that the projection of the anterior nuclei terminate in an orderly manner in the cingulate and medial frontal cortex. An axis through the anterior thalamic nuclei extending from the dorsolateral to the ventromedial positions projects to the cortex along a postero-antero-ventral arc paralleling the corpus callosum above and bending around its genu. In addition, the evidence suggests that the more medial portions of the nucleus project to the more hilar portions of the cortex. No differentiation of the projection of the antero-posterior axis of the nucleus is apparent.

(Authors' Abstr.)

Delusional Reduplication of Parts of the Body

Four cases are described in which there were reduplicative delusions of the existence of extra parts of the body. One patient with a left hemiplegia confabulated having an extra left hand; another with a left hemiparesis and a fracture of the right leg stated that he had four legs; a man with a cerebellar astrocytoma and meningitis confabulated having multiple heads and a patient with a severe head injury who previously had an eye enucleated expressed the delusion that he had several eyes. In all cases the pathology was of rapid onset and associated with a diffusely slow-wave EEG record.

In each case reduplication of body parts was associated with other forms of reduplication for time, place or person. Accordingly, the phenomenon is considered as being but one manifestation of a general pattern of reduplicative delusions.

Reasons are given why such delusions cannot be explained either as a specific defect resulting from the destruction of any particular area of the brain, as a perceptual disturbance, or in terms of an alteration in "body scheme" in the sense that the body scheme is a three-dimensional image of the body with a representation in the parietal lobe.

The delusion of reduplication occurs under the same conditions of altered brain function as do anosognosia, disorientation for place and time, and "paraphasia". As with these phenomena, the patterns of reduplication may be used as symbolic mechanisms to express some personal motivation, particularly the denial of illness.

(Authors' Abstr.)

A Hypothesis Regarding the Brain Modifications Underlying Memory

It is suggested that in certain cortical regions cytoplasmic transmission supplements neurone surface transmission, and that the memory modification consists in the ordering through many cells of previously disordered or less ordered cytoplasmic protein chains or fibrils, in such a manner that the region thereafter responds more easily to repetition of the same stimulus. These extended orderings constitute pulsating structures which are reinforced by the activity which they facilitate. This hypothesis helps to account for properties which appear not to depend solely on the cyto-architecture of neuronic surfaces, such as synchronous mass action, pattern effects, and the fact that memory traces are normally simpler than the activity which they record.

(Author's Abstr.)

Photogenic Epilepsy: Self-Precipitated Attacks

Seven examples of photic epilepsy in which attacks were precipitated by the subject, have been described in detail.

The common feature was the precipitation of attacks by rhythmical interruption of sunlight falling on the patient's eyes. The flicker may be produced by movement of the fingers or the hand in front of the eyes, or by blinking.

The attacks were usually slight and of brief duration, with varying degrees of impairment of consciousness. If flicker was repeated for a lengthy period jactitation and major attacks might occur. In some of the patients major attacks occurred independently, but these were few.

Electroencephalograms of self-induced attacks showed varying forms of spike and slow wave discharges of high voltage, usually irregular and usually of brief duration.

Encouragement of voluntary inhibition of the provoking movement proved to be the best method of treatment.

(Author's Abstr.)

Effects of Extraneous Poisons on the Nervous System. II. The Alcohols

The effects of alcohol on the nervous system may be either acute or chronic. The acute effects occur in the form of congestion (at times with petechial hemorrhages) and edema and are usually reversible with restoration of the normal state. After repeated severe episodes of intoxication the abnormal physiological processes, reinforced by malnutrition and deficiency states, are translated into cellular and architectural changes which are accompanied with more or less characteristic symptom-complexes. Thus delirium tremens is found to be associated with a widespread pyknosis and acute swelling of the various orders of pyramidal cells of the cortical laminae. Korsakoff's psychosis and psychotic manifestations incident to post-alcoholic pellagra are found to be accompanied by a precocious and almost universal deposit of lipoid material in the nerve cells of the brain and spinal cord. A frontal lobe syndrome, reminiscent of general paresis (alcoholic pseudoparesis) results from atrophy of the dorso-lateral, frontal, and central cortex. A hemorrhagic encephalopathy of the gray nuclear masses adjacent to the third and fourth ventricles and intervening cerebral aqueduct gives rise to extraocular palsies usually associated with impairment of consciousness and disordered mentation. The peculiar syndrome known as Marchiafava-Bignami's disease, with degeneration of the midportion of the commissural pathways, notably the corpus callosum, much less often of symmetrical foci in the frontal cerebral centrum and middle cerebellar peduncles, results from an excessive indulgence in crude Italian red wine in the presence of malnutrition. The sequence of chronic alcoholism and deficiency states is best seen, however, in case of the more common peripheral neuropathy which in some individuals develops quickly after use of muscatel wine even in moderation.

The indirect effects of chronic indulgence in alcohol is typified by degeneration of the

posterior and lateral columns of the spinal cord (posterolateral sclerosis) consequent to atrophic gastritis and anemia. Those effects resulting from alcoholic cirrhosis and uremia are to be classed as toxic, for no specific structural changes in the brain are necessarily to be found.

(Authors' Abstr.)

The Problem of Cerebral Atrophy in the Adult

The history and literature dealing with cerebral atrophy has been briefly reviewed. The recent study of Neumann and Cohn dealing with the clinical and histological characteristics of Alzheimer's disease as seen in a large mental hospital, has been summarized in more detail. In light of these studies it seems logical to conclude that Alzheimer's disease is a definite clinical entity with specific histopathological findings in the brain, and although more common in the older persons, it may be found over a wide age span and is not essentially a presenile or senile manifestation. These conclusions in the literature were apparently based on studies largely from mental hospitals.

The findings in the series of 200 cases of cerebral atrophy, 100 from the records of a general hospital and 100 from the practice of neurology, are contrasted with the findings from mental institutions. In this series 40 per cent of the 55 general hospital patients from 60 to 90 years had mental deterioration or psychosis. Only 7 per cent of 100 patients 25 to 55 years of age seen in neurological practice were deteriorated. Convulsion was the most common single symptom in the entire 200 patients. Various neurological abnormalities, which often resembled other brain diseases, were very common. Although cerebral atrophy is associated with abnormal physical and laboratory findings, air studies are the only means of accurate diagnosis. A problem is presented: Are these apparently idiopathic cerebral atrophies found in the young and middle adult age group related to Alzheimer's disease or are they a separate disease entity or entities? The present writers are of the opinion that they represent a different disease process. No doubt long range studies will be necessary to answer this question.

(Authors' Abstr.)

Cobra Venom Therapy in the Neuroses

1. Cobra venom appears to be an effective therapeutic agent in some neurotic states and should be more thoroughly studied.

2. Cobra venom is a safe therapeutic agent if properly used and its effect appears to be prolonged.

3. The improved concentrated form of cobra venom is preferred for treatment as it gives less side reactions.

(Author's Abstr.)

Analeptic Action of Oral Metrazol in Geriatric Practice

Of the 39 senile patients on whom Metrazol was tried, 30 or 77 per cent were improved. Of these, 11 or 28 per cent were markedly improved while 19 or 49 per cent showed minor improvement. However, even of these cases 7 or 18 per cent were so much improved that they could be transferred to a home for the aged. The other 9 or 23 per cent showed no change in their status.

As a result of the authors' experience all patients admitted to their male geriatric building are now routinely given one week's adjustment period, and then started on Metrazol in increasing dosages until 3 tablets four times a day are given. If no result is obtained at the expiration of 30 days, the patient offers little chance of improvement and the drug is discontinued.

From the described cases they feel that Metrazol has a definite place in the therapy of geriatric and psychiatric cases and should be prescribed for all patients admitted to the geriatric service in the described dosage for at least four weeks. If possible, the drug should be given early to arteriosclerotic and senile patients in an attempt to prevent, or at least delay the onset of a psychosis or a mental confusion necessitation hospitalization.

(Authors' Abstr.)

MAY

JUNE

JULY

Studies on EEG and Sex Function Orgasm

EEG studies were performed during orgasm obtained by self-stimulation. These records showed the following features, common in all the subjects investigated.

1st phase. There is a sudden increase of rapid activity, particularly emanating from the temporal areas. Simultaneously, with the increase in fast activity, there is a sudden rise of muscular action potentials, superimposed in all the cortical areas recorded.

2nd phase. Simultaneously with the ejaculation in male and the corresponding effects of orgasm in the female subjects, there is a generalized slowing of the electrical activity, with three per second generalized activity, and alternating muscular discharges which persist and are followed by a 3rd phase, in which a depression of the electrical activity with alternating rhythmic, clonic muscular discharges, is recorded.

The EEG studies demonstrate the participation of the entire nervous system, specially the autonomic and cortico-diencephalic portions, and the physiological response of an orgasm.

The cortico-diencephalic interrelationship is stressed and the similarity of events in both orgasm and epileptic convulsion is emphasized.

(Authors' Abstr.)

The Effect of Bulbocapnine upon the Spontaneous Electric Activity of the Brain and its Reactivity to Afferent Stimuli

1. In catalepsy producing doses bulbocapnine has a slight depressive effect upon the electric activity of the cerebrum, that may be detected in the prosencephalon, diencephalon and mesencephalon. It affects chiefly the fast activity. Only occasionally slow waves or transitory excitatory states were seen with the doses used.

2. In the cataleptic state the reactivity of the cortex and various subcortical areas (hypothalamus, reticulate substance of the midbrain, cerebellar cortex) to afferent impulses is preserved, or even increased.

3. Simultaneous recordings from cortex and various subcortical areas reveal rather variable differences in the degree in which these regions may be affected, indicating that some degree of independence of the functional states of these regions may exist.

(Authors' Abstr.)

The Sedation Threshold. A Method for Estimating Tension in Psychiatric Patients

1. The main aim of this study was to develop a method for objective quantitative estimation of degree of tension in psychiatric patients.

2. Development of the procedure was based on the common clinical observation that sedation tolerance and degree of tension are closely correlated. Sodium amytal was administered intravenously at a constant rate while the EEG was recorded. The discovery of a definite point of inflection in curves of EEG amplitude plotted against amount of sedative provided an objective threshold value. The EEG threshold point usually coincided with onset of slurred speech.

3. This EEG sedation threshold was found to be highly correlated with clinical ratings of degree of tension in 69 psychiatric patients (including 54 psychoneurotics), who were not psychotic at time of testing. The correlation was low in a group of 11 psychotic schizophrenics.

4. Frequency analyzer studies in 10 tests confirmed the quantitative EEG aspects of the sedation threshold method. They also showed that with progressive sedation, the amplitudes of the frequencies in the frontal EEG were increased in an orderly progression from the faster to the slower frequencies.

5. It was concluded that the sedation threshold method seems to hold exceptional promise as an objective psychiatric test, provided that it is properly developed. The implications of the results for understanding the neurophysiological mechanisms underlying pathological tension were discussed.

(Author's Abstr.)

The Electroencephalogram of Normal Aged Adults

Electroencephalograms were taken on a group of 150 normal males ranging from 65 to 94 years of age. These consisted of routine waking monopolar and bipolar tracings, including 3 minutes of hyperventilation. The following results were obtained:

1. Using a scheme devised by Gibbs and his associates for the classification of dominant frequency, it was found that elderly males have a much higher incidence of "slightly slow" (S_1) electroencephalograms than do young and middle-aged adults.

2. Measurements of occipital alpha frequency reveal a shift in the distribution of individual scores to the slow side. When compared with young adults, there is a decrease in the number of cases with 11 to 12/sec. activity and an increase in cases with 7 to 8/sec. activity.

3. Measurements of per cent-time alpha suggest a slight reduction of alpha activity in old age, but the results here are inconclusive.

4. Frequencies above the alpha range (beta waves) were found in approximately half of the subjects, and were the dominant frequency in about 12 per cent. In this respect the senile EEG is similar to that of middle age.

5. Frequencies below the alpha range (delta waves) appear in only 13 per cent of the entire sample, with a greater incidence in people over 80 years of age (17 per cent) as compared with those under 80 years (9 per cent).

6. Response to hyperventilation was either absent or small, which is similar to the findings in middle age. The results are not conclusive, however, because of the possibility of inadequate gas exchange.

A possible relationship has been proposed between frequency alterations in the aged EEG and cerebral metabolic factors and mental deterioration.

(Author's Abstr.)

The Electroencephalogram in the Senile Psychoses

Analysis was made of the EEGs of 50 mentally normal seniles and 104 patients suffering from senile psychosis. The following are the results and conclusions:

1. Twenty-four per cent of the normal group possessed abnormal EEGs. In normal old persons slow activity does not appear to be a characteristic EEG abnormality, in fact there is a tendency for paroxysmal fast activity to be prominent. Old age is however associated with a significant decrease in alpha frequency, amplitude and per cent time.

2. Fifty-four per cent of the psychotic seniles possessed abnormal EEGs. The characteristic abnormality of the senile psychoses is diffuse delta and theta rhythm or diffuse theta rhythm. There is an association between incidence of non-normal EEGs and degree of senile dementia, the likelihood of a normal EEG being lessened with increased dementia.

3. A significant relationship was found between alpha index and degree of senile dementia: alpha index decreases with increased dementia.

4. The finding that the incidence of abnormal EEGs among depressed and paranoid seniles was not significantly different from that in other forms of senile psychosis, was adduced as favouring a common aetiology for these conditions.

5. Amongst 10 preseniles, only 1 possessed an abnormal EEG and 2 were questionable. Study of larger numbers is indicated before any definite conclusions can be drawn from this finding.

(Authors' Abstr.)

Electroencephalographic Changes in Procainization of the Frontal Lobes

1. Procaine injected into the fronto-thalamic fibers produces transitory slowing in the EEG in the majority of cases.

2. Almost complete electrical suppression was observed following 9 of the Procaine injections in which Procaine escaped into the subarachnoid or ventricular system.

3. Paroxysmal cerebral dysrhythmia was observed in the recovery phase following 9 of the Procaine injections.

4. Isotonic saline produced little change in electrical activity.

(Authors' Abstr.)

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APRIL

Personality Changes Following Transorbital Lobotomy

This study was designed to investigate the personality changes effected by a particular type of psychosurgery, transorbital lobotomy. The experimental or operative group was composed of eight hospitalized psychotic patients. From the parent hospital population, eight control subjects were selected on the basis of their close resemblance to the individual members of the experimental group in regard to seven criteria by which they were matched. The Rorschach test was administered to both groups one month prior to, and one month following, the date on which the experimental group received the operation. During the interim between pre- and post-testing, every effort was made to control environmental rariables; members of each matched pair were treated alike, except that the controls did not veceive the operation. However, the controls did receive electroshock treatments comparable in number to those given the experimental Ss on the day of operation.

Four Rorschach factors significantly differentiated between the control and experimental groups. There was a significant decrease of m% and FK% and a significant increase in W% Reaction Time in the experimental group following the operation. From these data it can be inferred that transorbital lobotomy results in a lessening of inner tension, a lessening of introspective self-awareness and insight, and a loss of ardent enthusiasm and active interest. The significant increase in W% is difficult to interpret except as some change in apperception. These findings and their implications should be considered if psychosurgery of this type is planned.

(Authors' Abstr.)

JULY

VOL. 3 J. CHILD PSYCHOL. 1954

The Etiology of Mongolism

This paper is based on detailed case histories of 150 mongoloids, taken by the personal interview method, and on personality studies of their mothers. According to the probably leading etiologic factor in each case, the material was divided into three main groups with several subgroups.

Advanced maternal age does not play a dominating role in the material presented here. The "functional" age is more important than the chronological age. Those mongoloids who were born the first children of young mothers out-number the "menopausal babies".

Adolescence in the mother may bear the risk of mongolism in her first child, especially in those very young women who had a late menarche or menstrual irregularities before marriage. In these young mothers, as well as in some older ones (see Cases 10 and 14 of this paper), the mongoloid does not mark the end, but the beginning or regaining of fertility.

Attention should be paid to ovarian cysts and obliterated tubes. These local disorders were obviously responsible for the development of a mongoloid in several cases of this material.

A nervous, emotional disposition of the mother appears to be a frequent conditioning factor in mongolism of her offspring. It was found in 66 per cent of the younger mothers in this material. In 24 instances, psychic disorder or severe emotional disturbance in the mother at the time of conception was considered to be the leading etiologic factor.

The experiences of this study, in agreement with generally accepted facts concerning the physiology and pathology of sexual functions, support the old "germinal" hypothesis regarding the etiology of mongolism, which may be formulated as follows.

The mongoloid develops as the result of fertilization of a subnormal ovum, just at the borderline between sterility and fertility. The startling multiplicity of "conditioning factors", which are operating before or at the time of conception, are only different roads leading to the same destination: the ovary. They all cause a temporary or permanent ovarian dysfunction with consecutive production of a subnormal ovum. The fate of the mongoloid is already sealed with the fertilization of a "borderline" ovum.

Whether or not all the pathologic constellations discussed in this paper lead to the development of a mongoloid only under the condition that a hereditary gene is present at the same time, cannot be decided. The evaluation of various "conditioning factors", as presented here, does not pretend to be a final solution of the complex problem of mongolism, but may bring us closer to its understanding. It helps to explain 95 per cent of the cases of mongoloids and to give constructive advice to their unfortunate mothers.

(Authors' Abstr.)

VOL. 10 J. CLIN. PSYCHOL. APRIL, 1954

The Conditioned Reflex in the Chronic Schizophrenic

The results of two experiments, with different patients, experimenters, and conditions, agree in showing (1) greater reactivity of the PGR to the UCS in normals and in chronic schizophrenics who have been through three months of problem solving than in chronic schizophrenics who did not receive the learning treatment; and (2) that normals and treated chronic schizophrenics are more readily conditioned than are untreated chronic schizophrenics.

Since evidence presented in a previous paper indicates that the test patients were in better clinical condition than the controls, and of course the normals may be safely assumed to be so, these results bear out Gantt's positive finding that CR is an indicator of clinical condition.

These results are also in agreement with Pavlov's "pathological inertia" hypothesis of the nature of schizophrenia. The relatively low level of reactivity of the chronic schizophrenic's PGR to UCS and the low conditionability are evidence of the characteristic rigidity or inertia of the schizophrenic. Furthermore, the results of these studies suggest that this inertia occurs on the reflex as well as the cortical level.

In the opinion of the writers the major significance of the results of these conditioning studies lies in the support they lend an hypothesis about cortical functioning in chronic schizophrenia. If a part of chronic schizophrenia is a condition of the cortex approximating functional decortication, then a prolonged period of activity which forces the patient to use his cortex—such as the learning problems used with the test patients here—should to some extent improve the functioning of the cortex. Assuming that the CR is an indicator of the level of this cortical functioning, the present results can be interpreted as verifying this hypothesis.

(Authors' Abstr.)

JULY

Disorders of Neuro-Psychiatric Patients in Perceiving Pictures

Samples from eight categories of neuro-psychiatric patients were shown twelve colored magazine photographs and asked to describe all that they saw in each. Twenty-three variables in their descriptions were defined and counted and the categories were statistically compared in regard to each variable. It was concluded that there are two chief classes of perceptual disorders in this situation, those dependent on general intellectual impairment or inefficiency and those not so dependent but related to bizarre thinking.

(Author's Abstr.)

Judgments of Premorbid Intellectual Functioning in Severely Impaired Psychiatric Patients

In order to study psychologists' estimates of premorbid intelligence based on the Wechsler-Bellevue and the case history, seven psychologists were asked to rate the Wechsler-Bellevue protocols and the case histories of ten severely impaired patients for their premorbid intelligence. The results indicate that, while there is some agreement among judges in the estimates made, there is sufficient disagreement to indicate that this is an area that needs further research if the psychologist is to fulfill more adequately his responsibility in evaluating premorbid intelligence.

(Authors' Abstr.)

A Transposed Factor Analysis of Schizophrenic Performance on the Bender-Gestalt

1. In an attempt better to understand the classification of the schizophrenias and diagnostic features of the Bender-Gestalt Test, the performance of thirty-two male schizophrenics on the Bender-Gestalt was subjected to a transposed factor analysis. Ratings of psychiatric characteristics provided information about individuals with particular types of Bender performance.

2. The factor analysis disclosed a large commonness among the Bender performances of the individuals in this study. Four types of schizophrenics were suggested. They are as follows: (*A*) Chronic Undifferentiated Schizophrenic, (*B*) Disorganized Schizophrenic, (*C*) Conforming and Non-defensive Schizophrenic, and (*D*) Actively Defensive Schizophrenic.

3. No general factor of "schizophrenia" appeared. The results of the study are discussed in relation to previously reported schizophrenic types.

(Author's Abstr.)

VOL. 100 J. COMP. NEUR. 1954

VOL. 118 J. NERV. MENT. DIS. OCTOBER, 1953

Effects of ACTH on Mental Function

An attempt was made to determine if ACTH regularly produces striking, specific changes in mood and behavior as has been reported by some observers. Special attention was directed toward controlling several factors which have complicated evaluation of previous studies. Among these variables are:

1. The presence of severe or chronic illness.
2. The patient's previous personality patterns.
3. Current environmental stress.
4. Attitudes of the investigators.

A group of 11 young male soldiers only mildly ill with acute hepatitis was chosen for investigation and subdivided into control and treatment groups. The pattern of distribution was kept secret from all observers. Periodic psychiatric observations were made before, during, and after the administration of the drug (or placebo).

Psychiatric observations revealed no gross intellectual, affective, or behavioral changes; controls could not be differentiated from patients getting the drug. A battery of psychologic tests was administered during the base-line period and repeated during the course of the drug administration. The psychologic test results did not demonstrate any sharp distinctions between the two groups, either before or after the initiation of treatment. Over-all level of intelligence, patterns of frustration-aggression, and imaginative responses to projective tests remained largely unchanged for both groups. Such fluctuations in test scores and performance as were observed were minor in nature and occurred with equal frequency in the two groups.

It is concluded that major psychologic changes need not invariably occur with the use of ACTH. It is believed that such changes are probably rare in patients who do not have chronic, severe illness either physical or mental.

Although this is a small sample, the strikingly uniform lack of major psychologic changes suggests that the central pharmacologic action of ACTH on the central nervous system (as shown by EEG evidence) has no specific effect on mood and behavior when administered in the usual clinical dosages. It is further postulated that the variables which this study attempted to minimize are probably among the chief factors responsible for the production of mental changes when they occur.

The advantages of close co-operation between psychiatrists and other medical specialists in the evaluation of therapeutic drugs and problems of rehabilitation are discussed.

(Authors' Abstr.)

Relationship Between Capacity for Abstraction in Schizophrenia and Physiologic Response to Autonomic Drugs

1. The relationship between abstraction capacity and blood pressure response to intramuscular mecholyl was investigated in a group of 20 chronic schizophrenic subjects.

2. Abstraction capacity was measured by ability to interpret proverbs. Three related aspects of the systolic blood pressure reaction to mecholyl were measured—maximum fall, area under resting blood pressure levels, and time for recovery.

3. The results indicate a positive correlation ($p = \cdot 05$) between abstraction capacity and each measure of the blood pressure response following mecholyl.

4. The results confirm previous investigations on a group of acute schizophrenic patients.

5. Results of a series of experiments on schizophrenia from the Boston Psychopathic Hospital research laboratories suggest two polar types of schizophrenia: one with poor abstraction, disorganization of personality, slight response to mecholyl, and poor prognosis; the other with good abstraction, good personality organization, marked response to mecholyl, and relatively good prognosis.

(Authors' Abstr.)

Intravenous Sodium Iodide in the Treatment of Advanced Senile Psychoses and Arterio-sclerotic Cerebrovascular Disease

Sodium iodide in the treatment of advanced senile psychoses and arteriosclerotic cerebrovascular disease resulted in no improvement in this series of 15 patients in the dosages given and in the number of treatments given. The 2 deaths in the authors' series made them hesitate to continue the treatment further by either enlarging the dosage of iodides or extending the number of treatments beyond ten. The fact that no improvement was noted in any of the 15 patients treated makes the authors doubt the efficacy of the use of sodium iodide in advanced senile or arteriosclerotic psychoses.

(Authors' Abstr.)

NOVEMBER

The Effect of 1-Isonicotynl 2-Isopropyl Hydrazide (IIH) on the Behavior of Long-term Mental Patients

1. Three groups of 30 female patients each were selected from a ward housing between 115 and 120 female patients. The three groups were matched for behavioral averages according to the L-M Fergus Falls Behavior Rating Scale and for body weight. One group received IIH (Marsilid), another group received identical placebos, and the third group received neither IIH nor placebos. The patients were rated once a week for a 24-week period.

2. The differences between the groups were never great enough to be of practical significance.

3. (*a*) In the behavioral area "attitude toward other patients" the drug group showed itself to be significantly superior to its pre-experimental level. (*b*) The untreated control group showed itself to be worse than it was before the experiment started in regard to psychomotor activity and speech. At certain times, especially in the period after the drug was removed, the drug group showed itself to be significantly worse in terms of psychomotor activity.

4. (*a*) The drug group showed numerous trends in practically all areas of behavior (and weight) superior to the other two groups during the 16 weeks the drug was administered. These trends are of theoretical and statistical significance as they indicate that something must be occurring as a result of the drug, although this "something" is not very much. After the drug was removed, the drug group showed no significant differences from the other two groups. (*b*) The untreated control group showed certain downward trends in most behavioral areas.

5. One must conclude that there is a certain small positive effect of the drug over and above that which could be attributable to either chance or to the effect of increased attention. The trends and changes observed existed only as long as the drug was being administered. One must also conclude that the untreated group showed a worsening of behavior that separates it in a minor way from both the placebo and the drug-treated groups.

6. The ward as a whole now requires less sedation, less EST, and less nursing attention to details of dress and toilet habits than it did before the experiment.

7. "Total Psuh" is far more effective than Iproniazid in the treatment of long-term mentally ill people.

8. Iproniazid used alone is not a "miracle cure" in the sense of bringing about major improvement in the long-term mentally ill which would make for their being better adjusted hospital citizens or for remission of their psychosis. Further research will be necessary to determine whether it is useful as an adjunct to other form of therapies.

(Authors' Abstr.)

Electroencephalographic Studies in Posthypoglycemic Coma

1. Twelve cases of posthypoglycemic coma were studied by the EEG.

2. The comas varied in length from one to 20 hours.

3. In contrast to the routine treatment comas, the EEG in these cases showed persistent abnormality for many days after recovery from the coma.

4. There was a close correlation between the length of the coma, organic confusion, remission of mental symptoms, and the degree of abnormality in the EEG.

5. The EEG did not portend the posthypoglycemic coma.

6. The posthypoglycemic coma was not considered as an indication to terminate insulin treatment.

7. It is postulated that the posthypoglycemic coma is a convulsive phenomenon which leads to an iso-electric condition across the semipermeable membranes of the neurones. The iso-electric condition is felt to be a postictal exhaustion state resulting from an excessive electrical discharge of highly suppressed cells.

8. It is felt that interruption of coma could be brought about by the re-establishment of potentials across the membranes which would again permit cellular exchange of metabolites.

9. The administration of anticonvulsants during insulin therapy might in some instances function as a safeguard against posthypoglycemic coma.

10. Further investigation referable to the possibility of an iso-electric state is contemplated.

(Authors' Abstr.)

DECEMBER

VOL. 119 JANUARY 1954

The Long Term Evaluation of Prefrontal Lobotomy in Chronic Psychotics

Forty-six lobotomized subjects were studied by the control method eight and one-half years after surgery.

1. It was found that one-third of the patients developing convulsions had their initial seizure between five and six years postoperatively.

2. Of the 20 operatees showing the greatest degree of improvement 25 per cent reached their peak of adjustment within one year after surgery and 60 per cent within five years, but an additional 40 per cent continued to improve up to eight years postoperatively.

3. A regression in behavior was observed in some cases, apparently independent of age, where a high peak of adjustment had been maintained for a number of years after lobotomy.

4. There was no relationship found between degree of improvement and sex, nor between degree of improvement and the occurrence or absence of convulsions.

5. There was a statistically significant positive correlation between degree of improvement and age at time of operation, and a significant negative correlation between degree of improvement and length of time of institutionalization prior to surgery. These findings were thought to emphasize the importance of psychic tension in the selection of patients for lobotomy since the individuals showing the least degree of improvement were those patients with an early age of onset of psychosis and the patients who had been hospitalized for the longest periods of time. In both instances, preoperative psychic tension would be at a minimum.

6. While only 4 per cent of the control subjects (no surgery) showed marked improvement or complete recovery and 88 per cent of the controls remained the same or became worse, 44 per cent of the matched operatees reached the top adjustment levels and only 8 per cent remained the same or became worse. Subdivision of the two groups into reaction types (schizophrenia and affective psychosis) showed a much greater degree of improvement of the operatees for both diagnostic groupings.

7. There was no statistically significant difference in the mean degree of improvement between the two main diagnostic categories of the operatee group.

8. Within the control group there was found to be a statistically significant difference in degree of improvement favoring the affective psychosis group. While the affective disorder group had showed a certain degree of improvement without treatment, the schizophrenic group had become somewhat worse.

9. There was a statistically significant difference favoring the control group on the Picture Arrangement test of the Wechsler and on the Porteus Mazes. This would suggest a permanent decrease in ability after lobotomy in these particular areas of test performance which are believed to relate to the ability to look ahead planfully and to size up total aspects of social situations.

(Authors' Abstr.)

On the Glucose Tolerance Test and the Effect on the Formed Elements of the Blood of Glucose and Epinephrine in Schizophrenia

1. The observation of Freeman and Elmadjian as well as others concerning the delayed rise of blood sugar during the oral glucose tolerance test in schizophrenia has been found valid statistically for a group of schizophrenics, but not as a uniform response in all schizophrenic individuals.

2. The intravenous glucose tolerance test shows no features distinguishing schizophrenics from normals at the one half, one or two hour points but does show a significant continuing fall in sugar value at three hours in the schizophrenics group.

3. No concomitant failure of eosinopenia or lymphopenia has been found in schizophrenics as compared to normal individuals.

4. The Thorne test of schizophrenics shows no statistically significant defect in response.

5. The observed statistical deviation from the norm in the glucose tolerance of schizophrenics is apparently related to an alteration in the uptake of sugar from the gut. The mechanism underlying this alteration is as yet not clear.

6. It is concluded that the observed alteration in absorption is associated with schizophrenia, but has no direct relation to the process in the sense of either etiologic significance or a necessary consequence of whatever physiologic processes may prove to be concomitant with the psychologic disturbance.

7. It is further concluded that neither glucose nor epinephrine constitutes a sufficient stress for the differentiation of a schizophrenic from a nonschizophrenic population, where the response of formed blood elements are utilized as an index of adrenal responsivity.

(Authors' Abstr.)

FEBRUARY

Clinical Reactions of Schizophrenics to Sodium Amytal, Pervitin Hydrochloride, Mescaline Sulfate, and D-Lysergic Acid Diethylamide (LSD 25)

1. Sodium amytal, pervitin hydrochloride, and mescaline sulfate were administered independently to each of 55 schizophrenic patients, of whom 25 received LSD 25 in addition. The resultant effects were described and analyzed in terms of normalization (reduction) and intensification (increase) of the pre-existent clinical symptomatology.

2. Each of these drugs produced specific effects in two categories (*a*) direct or basic or primary pharmacologic activity, (*b*) characteristic effects on mental symptomatology which were a more or less direct consequence of the pharmacologic action. In the latter category, amytal may be classified as preponderantly a normalizer of clinical symptomatology; mescaline and LSD 25 as intensifiers; while pervitin tended to produce an unstable state with grossly equal representation or normalization and intensification responses.

3. A subgroup of subjects existed, each of whom showed intensification reactions with each drug that was administered. This and other findings which have been presented indicate that the total effects of drug administration seem to require explanation in terms of secondary, indirect or interaction factors in addition to drug specificity.

(Author's Abstr.)

The Adjunctive Use of an Intravenous Amphetamine Derivative in Psychotherapy

1. The use of intravenous Methedrine is a valuable addition to the psychiatrist's armamentarium. The comparative freedom from any dangerous complications permits its general application.

2. In the appropriately selected individual verbalization of otherwise unacceptable material promotes a better understanding of his difficulties. The cathartic effect and the newly gained insight enhance the chances of a faster recovery.

3. The best response was found in the more severely inhibited individuals, irrespective of the diagnostic label.

4. With adequate preparations and certain precautions intravenous Methedrine could also be used in the general practice of medicine.

(Author's Abstr.)

The Effect of a Distractor on the Rate of Conditioning of Normal Subjects and Patients Suffering Anxiety

Welch and Kubis (8) found a highly significant difference in the rate of conditioning the psychogalvanic reflex to a nonsense syllable paired with a buzzer between normals and patients with pathologic anxiety. Adding a wire-recording, which either gave instructions to concentrate, or emitted a continuous "E" sound, to the Welch and Kubis procedure, resulted in the following:

1. There was a statistically significant decrease in the rate of conditioning in both normals and patients, as whole.

2. There was no longer a statistically significant difference between the conditioning rates of normals and patients as a whole.

3. Analysis of the rates of conditioning of patients with varying clinical diagnoses seemed to indicate that patients with some types of illnesses (neuroses, schizophrenia) are less affected by a distractor in a conditioning situation than are others (depressions).

(Authors' Abstr.)

MARCH

The Influence of Mescaline on Psychodynamic Material

This paper deals with the relationship of productions during mescaline intoxication to psychodynamic material obtained in drug-free psychotherapeutic sessions. The 59 patients in the study include 17 with pseudoneurotic schizophrenia (Group I), 26 with more overt schizophrenia, but without deterioration (Group II), and 16 deteriorated schizophrenic patients (Group III). It was found that the pseudoneurotic group was more accessible to study both in the drug-free and the mescalinized states, while the deteriorated schizophrenics were least accessible. Confirmation or elaboration of dynamic material obtained in the drug-free state was relatively common in mescalinized patients in Groups I and II while confirmation of dream material occurred less frequently and the appearance of new material was noted in only half of the patients in Group I and a quarter of Group II. The findings in Group III were minimal with reference to these types of data. The ego defenses are weakened and simplified during mescalinization and the patient is aware of much more frank and acute anxiety. Social and sexual behavior is less inhibited. Much of the elaboration of material represents an expansion of previous condensations. Displacement of affect from usual content to somatic discomfort was frequently observed. The mescaline hallucinations include definite scenes which appear to be specific to the patient's personality and contain material which had been condensed and repressed in the drug-free state. The present study suggests that mescaline has a definite effect on dynamic material and presents a useful technique for investigating personality structure. Its value in therapy is not evident at the present time.

(Author's Abstr.)

Clinical Effects of a "Stimulant" Barbiturate in Schizophrenics

The "stimulant" barbiturate, sodium 1,3-dimethylbutyl ethyl barbiturate, was administered intravenously to 20 patients with various forms of schizophrenia in a preliminary assay of its therapeutic value.

1. The drug exerted an irregularly occurring therapeutic effect (55·0 per cent) which was of most complete degree in pseudoneurotic schizophrenics. It has not been deemed advisable to establish further the therapeutic efficacy because of the relatively high toxicity which would preclude therapeutic application.

2. In accord with the literature that the drug is a convulsant in animals, 2 patients in this series had myoclonic seizures; in the remaining subjects the dosage was maintained at a subconvulsant level. A small minority of subjects showed weak signs of central nervous system depression in the form of slight drowsiness; the central-depressant action has not been reported in animals.

3. The therapeutic effect of the drug usually occurred independently of its weak and infrequent central-depressant action. No evidence was obtained that the drug acted as a "psychic stimulant" in the sense of heightening of mood and psychomotor processes.

4. Several explanations of the mechanism of the therapeutic action were offered and the desirability of further investigation of the stimulant barbiturate series indicated.

(Author's Abstr.)

APRIL

The Hypophysis Cerebri in Psychosis

1. One hundred hypophyses from mentally ill patients were examined post-mortem by means of saline suspensions under oil immersion, dark contrast, phase microscopes at magnifications of 970 diameters. Handling and equipment were sterile.

2. Suspensions of distal and neural parts were made by placing a drop of sterile saline on a wide microslide, and gently dipping a cut surface of the gland in the drop to make a turbid suspension. Coverglass was sealed to the slide with Vaseline.

3. Immense numbers of living and dead zoospores were seen in all their variations in the cytoplasm of secretory cells and pituicytes.

4. Two alternate generations of zoospores were found in all parts of the gland in various stages of development.

5. The first generation came from small brown or purple, globular cysts or spore-cases which were lodged in the cytoplasm of the hypophysial cells. The spore-cases became pigmented and sporulated: they gave rise to fine pigmented, dot-forms or elementary bodies, which invaded the surrounding cytoplasm where they formed a colony. The dot-forms were seen as fine, black dots surrounded by a clear space within a thin membranous enclosure.

6. The small dot-forms grew into large ring-forms with a clear center inside of a purple ring, and an outside enclosure. Many of these ring-forms died and became crinkled lipofuscin granules.

7. The second generation was a development of some large ring-forms into large sacs. The clear center was filled with a thick brown secretion. In this, a filament developed. At first it was short and smooth, then long and segmented and finally it broke up into globules. The brown secretion became blue-green and was used up during this period of growth of filament into globules. It was replaced by dark pigment between the globules. These round bodies escaped from the sac to form swarms of freely moving globules. They were pink-brown or purple in color, and entered the hypophysial cells. In the cells they formed a new crop of pigmented spore-cases that sporulated and gave rise to the dot-forms of the first generation.

8. Some ring-forms gave rise to large, purple, angular gamete cysts with a pigmented eye on their inside and one or two flagella with which they explored vigorously.

9. Statoblasts or resting seeds were composed of the brown substance filled with globules. Hooks of flagella projected from the surface and often gave rise to short, stout, moving filaments. Statoblasts were a resting seed. They gave rise to mucoid sacs.

10. Mucoid exudates exuded from opened enclosures in damaged colonies. They attracted and collected wandering zoospores which entered them and became small resting spores. Zoospores had a number of ways of insuring widespread propagation, transport, attachment and survival under various conditions.

11. New crops of zoospores overlapped old ones. Growth was slow, from nine to 13 years, for the two generations. Cell cytoplasm was locally destroyed; what remained was normal.

12. Zoospores appeared to be blue-green algae of Nostoc species. Dead colonies in ring stage of development were surrounded by fat to form lipofuscin granules.

(Authors' Abstr.)

VOL. 17 J. NEUR. NEUROSURG. PSYCHIAT. 1954

Memory Disturbances in Third Ventricle Tumours

One hundred and eighty patients with verified intracranial lesions have been interviewed by psychologists in a neurosurgical unit in order to ascertain whether there is any area of the brain the destruction of which is specifically associated with impairment of memory.

The data obtained have been analysed from three aspects: (*a*) Four cases in which impairment of memory and site of lesion were clearly defined and well localized are described in detail; (*b*) the incidence of memory disturbances in tumours of the third ventricle has been compared with that in other well localized intracerebral tumours; (*c*) patients with obvious and clear-cut defects of memory have been examined for the most common site of lesion.

All analyses support the conclusion that memory impairment is most common and specific when the area surrounding the floor and walls of the third ventricle is disturbed.

The relationship between memory disturbances and other possible causal mechanisms is briefly discussed.

(Authors' Abstr.)

A Rare Presenile Dementia Associated with Cortical Blindness (Heidenhain's Syndrome)

A case is described which was characterized clinically by a rapid course, cortical blindness, and dementia. Pathologically there was a diffuse cortical degeneration with particular emphasis on the occipital cortex, in which there was a spongiose state.

The condition closely resembles that previously described by Heidenhain, which has been classified as belonging to the Creutzfeld-Jakob syndrome.

In order to distinguish Heidenhain's and the authors' cases from other varieties of the Creutzfeld-Jakob group, the name "Heidenhain's syndrome" is suggested.

(Authors' Abstr.)

Autonomic Changes After Unilateral Leucotomy

Autonomic reflexes have been studied in four patients before and after unilateral leucotomy. The results provided no evidence of the presence of prefrontal cortical autonomic centres for the focal control of vascular or sweating responses. However, changes in responsiveness, different in sign in different subjects, support the suggestion that the frontal lobes exert both inhibitory and excitatory influence on centres which do have focal autonomic functions. Earlier experimental work and clinical observations suggest that such cortical autonomic control is centred around the sensorimotor areas.

(Authors' Abstr.)

A Comparison of Isoniazid with Modified Insulin Therapy in Neurotic States

An investigation was carried out in two groups of male subjects to test the relative merits of isoniazid and modified insulin therapy in the physical treatment of neurotic disorders.

In the group of subjects undergoing modified insulin therapy there was a significantly greater increase in weight than was to be found in the group treated with isoniazid. This observation was supported by the subjective response of the patients to treatment and was in agreement with the clinical impressions of those in charge of the investigation.

Reference is made to the possible mode of action of isoniazid in inducing a rapid gain in flesh in tuberculous and non-tuberculous conditions.

It is concluded that isoniazid is unsuitable as a substitute for modified insulin therapy in the treatment of neurotic states.

(Author's Abstr.)

Rapidly Progressive Cerebral Degeneration (Subacute Vascular Encephalopathy) with Mental Disorder, Focal Disturbances, and Myoclonic Epilepsy

A clinical, electroencephalographic, and pathological description is given of two cases of a rapidly fatal illness in late adult life in which myoclonic epilepsy and progressive impairment of consciousness were striking features. The EEG showed an unusual pattern of recurrent sharp-wave discharges over both hemispheres, and its significance in relation to the histological findings is discussed. In both patients death ensued within 15 weeks of the onset of the illness. In one there was a marked status spongiosus of the cortex, a general loss of cortical neurons, marked glial overgrowth, and numerous acute softenings in the basal ganglia. In the other, similar but less marked cortical changes were present. A vascular aetiology is postulated for the cerebral lesions, and for rapidly progressive cases of this type the name subacute vascular encephalopathy is suggested. Cases in the literature which are possibly similar are briefly discussed.

(Authors' Abstr.)

A Persisting Change in Palmar Sweating Following Prefrontal Leucotomy

Studies on palmar skin resistance (palmar sweating) have been carried out on 16 patients undergoing bilateral standard leucotomy, four undergoing unilateral leucotomy, and three undergoing rostral cortical undercutting.

A group of 12 patients subjected to standard leucotomy showed post-operatively a significant increase in skin resistance which was present, though to a diminished extent, more than

six months after leucotomy (mean follow-up time two years). This effect was not detected in the group of seven patients undergoing minor psychosurgical procedures.

Individual studies showed that the alterations in skin resistance which followed prefrontal leucotomy were related to the changes which occurred in the mental state. They were not related to changes in thermo-regulation.

The literature on the effects of prefrontal leucotomy on palmar skin resistance is reviewed.

(Authors' Abstr.)

The Effect of Cardiazol Convulsions on the Distribution and Activity of some Phosphatases in the Area Postrema of the Rat

The effects of "cardiazol" convulsions upon the distribution and activity of enzymes hydrolysing adenosine triphosphate, adenosine monophosphate, aneurin pyrophosphate, and glycerophosphate in the area postrema of the rat are described.

There are clear differences between the cytological enzyme activity observed in the normal animal and in the animal injected with "cardiazol".

The significance of the normal distribution of enzyme activity and of the changes after "cardiazol" convulsions is discussed.

(Authors' Abstr.)

VOL. 13 J. NEUROPATH. EX. NEUROL. 1954

VOL. 17 J. NEUROPHYS. 1954

Thalamic Loci of Electrical Activity Initiated by Afferent Impulses in Cat

1. This paper presents a study of the characteristics of thalamic activity evoked in the cat by electrical stimulation of afferent pathways and mechanical stimulation of various skin areas.

2. The thalamic activity is characterized by the time relations and amplitudes of the potentials, their loci and their causative afferent pathways.

3. Responses in the thalamus evoked by stimulation of any pathway are located primarily in the ventral posterior nucleus, but are only poorly localized in that nucleus. Evidence for the relative absence of localization is derived from a number of sources: (*a*) At a given locus in the nucleus responses are observed as a consequence of activation by several afferent nerves or tactile stimulation of different skin areas, ipsilateral as well as contralateral. (*b*) The activity evoked via one afferent path interacts with activity evoked from another source.

4. The findings reported here, which indicate relatively poor localization within the thalamus, are discussed in relation to opposed findings of precise localization.

(Authors' Abstr.)

Relations Between Caudate and Diffusely Projecting Thalamic Nuclei

A study of alterations in the electrical activity of the forebrain induced by stimulating the head of the caudate nucleus, in cats under nembutal anesthesia, has revealed two major projections from this part of the basal ganglia.

One of these to stations along a descending extrapyramidal pathway confirms the generally held view that the basal ganglia function in the motor sphere.

A second major system of connections passes to the diffusely projecting nuclei of the thalamus. Upon caudate stimulation, burst-tripping, driving or desynchronization can be recorded from these nuclei and from cortical regions with which they are connected.

The findings indicate the important functional significance of pathways from the basal ganglia to the thalamus revealed by the anatomical studies of Ranson and Papez a decade ago. They suggest that in addition to their motor function, the basal ganglia may participate in regulating the electrical activity of the brain and hence may play a role in more general cerebral processes.

(Authors' Abstr.)

Absence of Color Vision in Cat

This experiment was designed to assess the color vision of cats. The test situation was arranged so that discrimination of spectral composition would be facilitated, but with controls for odor, position, and luminance cues. In 1,000 trials the cats were unable to distinguish between red and green; in a subsequent 1,000 trials they failed to discriminate between green and blue. A brightness discrimination was formed under the same conditions within 200 trials. It is concluded that cats are completely color-blind. This finding is consistent with the dominator-modulator theory, but not with the laminar theory in its present form. It does not support the inference that potentiation of electrocortical responses to geniculate stimulation indicates the presence of a trichromatic mechanism in this species.

(Authors' Abstr.)

Central Influences on Spinal Afferent Conduction

1. In curarized cats it has been shown that stimulation of various central structures influences the size of an afferent volley evoked by a dorsal root stimulus and recorded from dorsal and ventral columns, midbrain, cerebellum and sensory cortex.

2. The relayed response in the dorsal column and the dorsal root reflex were invariably depressed by stimulating certain central structures. The afferent volley in the ventral column as well as the afferent response in the midbrain, cerebellum and sensory cortex was depressed by similar stimulation. The primary afferent spike in the dorsal column was unchanged, however.

3. Depression of the test responses has been obtained by stimulating the bulbar and midbrain reticular formation, the ventral part of the anterior vermis, the postcentral sensory cortex, the second somatic sensory area, the precentral motor cortex and the anterior part of the cingulate gyrus. So far, no increase in the afferent response, except as a rebound, has been seen on stimulating these structures.

4. The effect of the central stimulation upon the afferent responses was completely abolished by a moderate dose of anesthesia. Anesthesia also caused a marked increase in the control size of the afferent ventral column response. A similar effect was produced by a high transection of the spinal cord in curarized animals.

5. It is concluded that synaptic afferent transmission in the spinal cord can be influenced in a physiological manner by descending pathways from certain structures in the brain. Furthermore, this sensory-regulating mechanism can evidently act in a tonic fashion.

(Authors' Abstr.)

Shivering Suppression by Hypothalamic Stimulation

Electrical stimulation of certain points within the hypothalamus of shivering cats under pentobarbital anesthesia causes a sudden termination of shivering. The anatomical region within the brain stem from which this suppressor effect can be evoked has been mapped by the use of the Horsley-Clarke stereotaxic apparatus, and the region extends throughout the hypothalamus and midbrain. The most sensitive region for shivering suppression, without the complications of movement, is the preoptic region of the hypothalamus. It is proposed that the suppressor effect is a mechanism for suppression of shivering when the musculature is needed for skeletal movement.

(Authors' Abstr.)

Speech Disturbance in Association with Parasagittal Frontal Lesions

1. Impaired language function of varying degree and type and convulsive seizures characterized by vocalization may occur in patients with lesions of the medial portion of the frontal lobe of the dominant cerebral hemisphere.

2. The clinical features of 11 cases in which disturbed speech occurred in association with parasaggital tumors are presented and similar findings in other reported cases are cited.

3. Reports of language disorders after interruption of the anterior cerebral artery of the dominant cerebral hemisphere are noted.

4. Electrical stimulation studies of mesial cerebral cortex suggest a neurophysiological basis for language difficulties associated with lesions of the medial portion of the dominant cerebral hemisphere.

(Authors' Abstr.)

MAY

Water Exchange in the Brain and Cerebrospinal Fluid

1. Small amounts of D_2O can safely be put into the cerebral ventricles without causing abnormalities in the EEG or general clinical status of a patient.

2. In the normal state D_2O placed in the cerebral ventricles is in equilibrium with the total body water in about 3 hours.

3. The D_2O exchange half-times after intraventricular D_2O were in very good agreement with the D_2O appearance half-times after intravenous D_2O.

4. In obstructive hydrocephalus, the tracer appearing in the lumbar region is probably carried there by the blood after being absorbed from the ventricle.

5. In spite of the upset of physiological status following an intraventricular injection of saline, there seems to be very little gross movement of CSF in an infant with non-communicating hydrocephalus.

6. Studies on patients with non-communicating hydrocephalus and on patients with communicating hydrocephalus undergoing subarachnoidureterostomy show that the exchange of water is independent of the accumulation of CSF.

(Author's Abstr.)

Anterior Cingulectomy in Man

1. After an account of its introduction and development, the technique of anterior cingulectomy is described.

2. A series of 50 cases is reported. The best clinical results are found in cases of intractable irritability, aggressiveness, violence, and agitation, especially when associated with chronic epilepsy. Patients with obsessive-compulsive neurosis also react very favorably to cingulectomy. The follow-up period extends from 5½ years to 6 months.

3. Cingulectomy is seldom followed by a significant post-operative clinical syndrome during the first weeks, in contrast with the "frontal" post-operative syndrome often observed after topectomy of the convexity.

4. A psychological study, with objective behaviour tests, discloses after cingulectomy no lowering at all of intelligence, no indication of augmented extraversion, a decrease in neuroticism, and a marked decrease in psychoticism.

5. The main EEG findings after cingulectomy are given. Chronic epilepsy is often improved by the operation.

6. The main physiological interest of anterior cingulectomy seems to be the now well-substantiated suggestion of a difference in function between dorsal granular cortex (areas 9 and 10) and mesial agranular cortex (area 24).

(Author's Abstr.)

The Increasing Importance of Lung Cancer as Related to Metastatic Brain Tumors

Pulmonary carcinoma, which very definitely seems to be undergoing an absolute increase in frequency, accounted for almost one-fourth of the metastatic tumors of the brain in this series, and must be given very serious consideration in attempting to locate the primary site of a metastatic lesion. Carcinoma of the breast, however, is the most frequent primary site in females, and accounted for exactly half of the metastases in the females in this series. The necessity of careful study of the lungs in patients showing symptoms of cerebral tumors was further emphasized by the finding of either primary or secondary cancer in the lungs of 77 of the 102 patients.

(Author's Abstr.)

VOL. 22 J. PERSONAL. 1954

VOL. 18 J. PROJ. TECHN. 1954

Failures of the Rorschach Technique

This review of the failures of the Rorschach technique has found the following outstanding relationships:

1. Global evaluations of the Rorschach seem to work when the Rorschach worker and the clinician work closely together.
2. Atomistic evaluation, as well as global, of the content of the Rorschach protocols (as distinct from the perceptual scoring) seem to work.
3. Atomistic analysis of the perceptual factors is a failure.
4. Factor analysis of atomistic scores of both the perceptual as well as the content variety, seems to work.

The best hypothesis to explain these four facts is that the Rorschach is an interview and that its correct evaluation, like the correct evaluation of any interview, is dependent upon its content. If we provide scales for analyzing its content, we shall be well on the way towards clarifying many of the present day contradictions and obtain a better perspective on the evaluation of personality.

(Author's Abstr.)

VOL. 38 J. PSYCHOL. 1954

VOL. 39 J. SOC. PSYCHOL. MAY, 1954

Metabolic Reactions to Cold Stress of Rats with Hypothalamic Lesions

By means of a newly devised stereotaxic instrument, lesions were placed in various areas of the hypothalami of Sprague-Dawley albino rats with electrodes which traversed the brain from side to side in the horizontal plane. Such lesions resulted in a high mortality rate and produced various hypothalamic syndromes in many surviving animals.

Upon evaluation of the physiologic and anatomic data it was found that the operated animals fell within four groups:

1. Animals with posterior hypothalamic lesions showed a high oxygen consumption rate and a relatively normal body temperature.
2. Animals with dorsal tuberal hypothalamic lesions demonstrated low oxygen consumption rates with low body temperatures.
3. Animals with ventral tuberal hypothalamic lesions did not exhibit any change in oxygen consumption rates or body temperatures.
4. Animals with anterior hypothalamic lesions showed gradual falls in oxygen consumption rates and a concomitant gradual lowering of body temperatures.

(Authors' Abstr.)

Present Concepts in the Treatment of Purulent Meningitis

In summary, there are a number of principles which should be followed if the optimum results in the treatment of purulent meningitis are to be achieved and if disabling sequelae are to be reduced to a minimum:

1. Early diagnosis of the infection, both clinical and bacteriologic.
2. Proper choice of antibiotic agents.
3. Prompt institution of therapy, rapidly achieving and maintaining high serum and cerebrospinal fluid levels of two complementary acting antibiotics.
4. Avoidance, when possible, of dangerous drugs and unnecessary intrathecal injections which may be injurious to the patient.
5. Elimination of focal suppurative lesions.
6. Early recognition of possible complications, such as subdural effusions, relapse of infection, or development of hydrocephalus.
7. Supervision of the total needs of a patient critically ill with purulent meningitis.

(Author's Abstr.)

Experiences With RO-2-3059 as an Anticonvulsant

RO-2-3059, a new benzhydryl derivative with anticonvulsant properties, has been used alone and in combination with phenobarbital in 43 patients in the neurology out-patient clinic of the Ohio State University College of Medicine. These were comprised of patients with grand mal, petit mal, and temporal lobe seizures, singly or in combination. A combination of RO-2-3059 with phenobarbital was chosen for continuing therapy in approximately 40 of these, in view of symptoms suggesting excessive central nervous system stimulation when RO-2-3059 was given alone. Of the original group of patients so treated, 20 have continued follow-up observation; this report covers the details of treatment and observations for the preceding six months. In eight patients of this group, the RO-2-3059 and phenobarbital combination was the sole anticonvulsant agent; the remaining 12 received one or more additional anticonvulsants or supplementary doses of phenobarbital as adjunctive therapy. The observations included repeated physical examinations and blood counts; in several instances the effects of discontinuing medication temporarily were also determined.

In general, RO-2-3059 combined with phenobarbital was found to be moderately effective against grand mal seizures, rather ineffective against temporal lobe attacks, and relatively ineffective or perhaps worthless against petit mal attacks. Side effects were mild even at high dosage levels, and consisted chiefly of nervousness, low amplitude muscle tremors, and euphoria; this last feature was considered in most cases as more of an advantage than otherwise.

On the basis of limited experience to date, RO-2-3059 in combination with phenobarbital is considered worthy of more extensive study.

(Author's Abstr.)

Spontaneous Rhythmic Ocular Movements

The occurrence of spontaneous rhythmic eye movements is described. Their possible relationship to mental concentration is discussed. It is suggested that these eye movements may lend themselves to further clarification by means of electroencephalographic studies.

(Author's Abstr.)

Cerebrospinal Fluid Changes Following Closed Cranio-cerebral Injuries

1. In a study of 43 patients with a closed head injury, the protein level was the most accurate cerebrospinal fluid guide to the severity of cranio-cerebral injury. The frequency of protein elevation generally varied directly with the length of unconsciousness. The level was increased in patients with permanent neurologic deficits and those who had neuropsychiatric disturbances.

2. When the determination was made within 90 hours following injury, the cerebrospinal fluid sugar value varied inversely to the period of unconsciousness and indicated the acuteness of the craniocerebral injury.

3. The presence of more than 100 erythrocytes per cu. mm. in the cerebrospinal fluid was not a reliable guide to the severity of the craniocerebral injury with absence of fracture through the calvarium. Protein elevations were usually independent of the elevated number of red cells in the cerebrospinal fluid.

4. There was no correlation between the state of consciousness and the intracranial pressure. However, most of the patients who had headaches following injury had an increased manometric reading.

5. The chloride level of the cerebrospinal fluid was of little diagnostic importance in closed craniocerebral trauma, but did show a change following severe vomiting.

(Author's Abstr.)

Isolated Fear

Seven cases, consisting of two meningiomas, four gliomas, and one aneurysm, each with a feeling of unaccountable fear as an aura, are presented. Three similar cases from the literature are cited.

It is concluded that the aura of fear in symptomatic epilepsy has a focal significance, indicating abnormal physiologic activity in the temporal lobe on either side. It is suggested that localization for the neuronal mechanism which, during epileptic activity, results in the aura of fear is on the medial aspect of the temporal lobe. The cortical portion of the mechanism of the emotions proposed by Papez is also considered in this situation.

The importance of a consideration of the aura of fear rests not merely in that it might be the initial symptom of a gross and at times reversible underlying cerebral pathology, neoplastic or vascular; knowledge concerning the physical basis of the emotions, which play such an important role in the realm of human behavior and endeavor, is still limited. A study of cases such as these affords an approach along physical lines to the study of at least one form of emotional activity in man.

(Author's Abstr.)

Epileptic Sleep Terrors

Electroencephalographic studies of a large group of patients experiencing sleep terrors have confirmed Robin's clinical concept. Two types of sleep terrors may be distinguished: (1) epileptic sleep terrors during which the patient is unconscious and for which there is amnesia, and (2) terrifying nightmares, or banal or common sleep terrors in which unconsciousness and amnesia are only partial.

In cases of banal or common sleep terrors studied, the electroencephalogram was normal and the family and personal histories were negative for epilepsy. Psychologic studies in these cases showed existence of neurotic conflicts.

As stated by Robin, unconscious and amnesic sleep terrors are clinical manifestations of epilepsy, which the authors' studies indicate is associated with a cortical focus in the parietotemporooccipital region. This has been proved by the following facts: (1) 94·5 per cent of cases with this type of sleep terror showed abnormal focal activity in the parietotemporooccipital region in interictal records; (2) in ictal records they showed epileptic discharges originating in the same region; and (3) in one case of sleep terrors with a focus in the parietotemporooccipital region, terrors disappeared after removal of the focus.

Clinically, sleep terrors are considered automatisms preceded by terrors and are classified with secondary automatisms. Terrors are a minor manifestation of an epileptic discharge originating in the temperoparietooccipital region.

Differentiation between epileptic sleep terrors and other types of automatisms, especially simple sleep walking, may be made. The latter may be physiologic and may show normal electroencephalographic records, or may be due to an epileptic attack precipitated by an epileptic discharge originating outside of the parietotemporooccipital region.

Clinical differential diagnosis between epileptic and banal or common sleep terrors is difficult, and the electroencephalogram may be used to distinguish between them.

(Authors' Abstr.)

Headache. Studies by Means of the Basal Electroencephalogram

In 61 individuals electroencephalographic studies were obtained applying a new technique for the recording from the base of the brain.

Thirty-six patients were suffering with headache, and there were 25 normal subjects. The basal brain activity found has been arbitrarily divided into three grades: I, low voltage symmetrical type; II, higher voltage, 7-14 waves per second, usually asymmetrical, dominant in the left side; III, when the latter activity becomes intermingled with sharp waves or spikes.

Both Grades II and III increase during mental activity and emotional conflict. This so-called basal rhythm has been found in 28 per cent of normal subjects, in 30 per cent of simple headache, and in 61·5 per cent of the migraine group. The basal rhythm of Grade III has not been found in our normal subjects.

The rhythm described is probably an electrical activity related to a function of the rhinencephalic area including the temporal lobes.

(Authors' Abstr.)

The Effect of Thiamin Deficiency Produced by Oxythiamin, by Neopyrithiamin, and by Diet, on the Metabolism of Alcohol

Doses of ethyl alcohol (1 g. per kg. of body weight) which produced only mild intoxication in normal dogs resulted in severe illness or death when given to dogs pretreated with oxythiamin. This increased toxicity of alcohol after oxythiamin was accompanied by a marked fall in blood glucose but the blood acetaldehyde did not increase.

A slow intravenous infusion of acetaldehyde also produced a fall in blood glucose in oxythiamin-treated dogs but did not change the glucose level of the blood in normal animals.

Dogs treated with neopyrithiamin or made thiamin-deficient by means of a thiamin-free diet were only mildly intoxicated by 1 g. of alcohol per kg. and both their blood glucose and blood acetaldehyde remained within normal limits.

The rate at which alcohol disappeared from the blood in all their treated dogs was unchanged from that found in the same animals without treatment.

These results are interpreted as evidence that thiamin plays some role in the usual pathway for the metabolism of acetaldehyde (stage II of alcohol metabolism), and that this role is beyond the first step in the metabolism of acetaldehyde.

(Authors' Abstr.)

Investigations of the Acid-base Balance of the Blood During the Disulfiram-Alcohol Reaction

The normal pH of the blood of human subjects after half an hour at rest was determined as 7·445 in arterial blood and 7·413 in venous blood.

After intake of alcohol alone a distinct shift toward increasing acidity was observed, accompanied by lowered values of bicarbonate (acidosis). There were no accompanying changes in the electrocardiogram.

In subjects pretreated with disulfiram, intake of alcohol was followed by a constant shift toward the alkaline side. This shift is typical of the disulfiram-alcohol reaction and is accompanied, as a rule, by reduction of the carbon dioxide content of the blood. It is emphasized that the condition is an alkalosis.

The pH of the blood tended to increase with increasing doses of disulfiram up to a total dose of 3 g. during the 3 days preceding the experiment.

(Author's Abstr.)

1. Biochemistry, Physiology, Pathology, etc.

Oxidative Deamination of L-Glutamic Acid in Brain Homogenates. Klein, E. E. [*Soobshcheniya Akad. Nauk. Gruzin., S.S.R.* **13**, 273 (1952).]

Homogenates of hamster brains were prepared in 1·1 per cent aq. KCl. Data are for 30-minute runs in a Warburg respirometer at 0°. By using K phosphate buffer at pH 7·3 maximum. Qo2 was at 0·04 M PO_4^{3-}; similarly, optimum concentration of adenosinetriphosphate was 0·03 M. The addition of codehydrase 1 (I) and preparations containing diaphorase and cytochrome c (II) accelerate the deaminative oxidation. Nicotinamide is of value in that it inhibits decomposition of (I). (II) alone has no influence on the reaction.

J. P. Danehy (Chem. Abstr.)

Evidence for a Neutral Proteinase in Brain Tissue. Ansell, G. B., and Richter, D. [*Biochim. et Biophys. Acta*, **13**, 92 (1954).]

Fresh rat-brain tissue was shown to contain a system which liberates amino acids on brief incubation at pH 7·4. The system is unstable; it is active for only 1-1·5 hours after death. The amino acids are not derived from a simple peptide or polypeptide present in the brain tissue; at least 9 different amino acids were liberated and the peptide-bound N in the tissue did not decrease. It is concluded that the amino acids are released by the action of an intracellular proteinase active at pH 7·4. The system is not activated by 0·01 M cysteine or KCN, and is almost completely inhibited by 0·01 M 1 CH_3COO^- or 0·005 M $CuSO_4$. It is 75 per cent more active in the gray matter than in the white matter of rabbit brain. Its initial activity in the rat brain resulted in the release of 1·8 γ amino N/mg. dry wt./hr., which rate fell off rapidly.

Morton Pader (Chem. Abstr.)

Proteolytic Activity of Brain Tissue. Ansell, G. B., and Richter, D. [*Biochim. et Biophys. Acta*, **13**, 87 (1954).]

The properties and activities of the cathepsin (1) in human and other brain tissues were investigated. Active (1) was found in rat, rabbit, bovine, and human brain in the following concentrations ((1) units/g. dry wt. $\times 10^{-4}$): rat whole brain, 32; cow cortex, 52; rabbit cortex, 31; human white matter, 12; human cortex, 72. The (1) activity of human frontal cortex and of isolated nuclei was of the same order of magnitude. (1) is stable at 4°, has maximum

activity at pH 3·5–3·8, and its activity is not affected by the presence of 0·002 M cysteine, glutathione, CN^-, or 1 CH_2CO^{2-}. The presence in brain tissue of a polyepetidase and a dipeptidase was confirmed. The "gelatinase" of Takasaka was not confirmed.

MORTON PADER (Chem. Abstr.)

Insulin Tolerance and Hypoglycemic Convulsions in Sheep. Jarrett, I. G., and Potter, B. J. [*Australian J. Exptl. Biol. Med. Sci.*, **31**, 311 (1953).]

Intravenous injection into fasted adult sheep of 4 units of insulin (I) per kg., and in 1 animal 10 units of (I) per kg., failed to cause convulsions even though the concentration of blood glucose was reduced to very low levels for long periods. Adult splanchnicotomized sheep were more sensitive to (I) injected intravenously and convulsions resulted after a single dose of 4 units of (I) per kg. The subcutaneous injection of 3–5 units of (I) per kg. into adult sheep was followed by long periods of hypoglycemia terminating in severe and prolonged convulsions. Once the convulsions have begun, after subcutaneous (I), apparently an irreversible state was often reached which was usually refractory to intravenous glucose therapy in spite of a return to normal blood glucose level. Young lambs were much more sensitive to intravenous (I) than adult sheep. As the lambs became older, their tolerance to (I) increased. Young lambs behaved like nonruminants in their response to both intravenous and subcutaneous (I).

N. R. STEPHENSON (Chem. Abstr.)

Analeptic Effect of Succinate in Coma and in Confusional States. Trautner, E. M., and Trethewie, E. R. [*Med. J. Australia*, **2**, 848 (1953).]

Guinea pigs were injected intraperitoneally with 25–75 mg. of Na pentobarbital (I)/kg. Half of the animals were given 3·0 ml./kg. of an 18 per cent solution of anhydrized Na succinate (II) by intraperitoneal, intravenous, or intracardiac injection. If the dose of (I) was above the LD_{80}, no life-saving effect of (II) was detected. With doses of (I) around the LD_{50} or less, the injection of (II) soon after the onset of narcosis caused only a temporary restlessness. With LD_{10} to LD_{20} doses of (I) the injection of (II) caused non specific signs of a temporary lightening of narcosis. In rats the results were similar, except that with the lighter doses of (I) the injection of (II) shortened the period of narcosis. In a few experiments on cats and dogs no consistent or outstanding effects of (II) were observed. In normal humans the slow intravenous injection of 50–100 ml. of a 5 per cent solution of anhydrized (II) caused a short spell of coughing, increased strength and (or) frequency of the radial pulse, and deepened respiration. A red flush occurred in the sweat area of the cervical sympathetic. The injection of 30–50 ml. of the 5 per cent solution into schizophrenics undergoing insulin treatment caused a transient lightening of the hypoglycemic coma. In prolonged insulin coma, where intravenous glucose was ineffective, 100–150 ml. of 5 per cent (II) wakened the patients. Patients under thiopental narcosis were readily awakened by the injection of (II). Manometric experiments with guinea-pig brain failed to reveal any stimulating effect of (II) on respiration other than that due to the oxidation of (II) itself.

E. DONALD GRAHAM (Chem. Abstr.)

Migraine: Laboratory Findings and the Prophylactic Managements of Patients with Hypoglycemia. Earle, Sister M. P. [*Australasian J. Med. Technol.*, **2**, *No.* 2, 15 (1953).]

A selected group of 300 migraine patients were shown to have a permanently low blood-sugar level, even when in complete health (30–120 mg/100 ml. blood, as compared with 80–170 for normal persons). The symptoms were caused by ketosis resulting from the low sugar, with a consequent fall in pH and disturbed water balance. Patients responded to a diet of selected carbohydrate foods of moderately high caloric value, moderate protein, and low fat.

G. J. WYLIE (Chem. Abstr.)

Cerebral Hemodynamics and Metabolism in Subjects over 90 Years of Age. Fazekas, J. F., et al. [*J. Am. Geriatrics Soc.*, **1**, 836 (1953).]

The cerebral blood flow and metabolic rate of 18 subjects, 90–102 years of age, were lower than in normal subjects who were under 50 years, but the same as in normal subjects 50–91 years of age. Correlation between the mental status of the subjects and cerebral blood flow or metabolism was not good.

THERESA SEVERN (Chem. Abstr.)

Spreading Factor and Mucopolysaccharides in the Central Nervous Systems of Vertebrates. Bairati, A. [*Experientia*, **9**, 461 (1953).]

Modification of the cohesive material among nerve-cell bodies, fibers, glia, and blood vessels with hyaluronidases and positive Hotchkiss reactions and metachromasia tests strongly indicates that mucopolysaccharide substances exist in the intercellular spaces of vertebrate central nervous systems.

D. S. FARNER (Chem. Abstr.)

An Ultramicrospectrophotometric Study of the Purkinje Cells of the Albino Rat. Attardi, G. [*Experientia*, **9**, 422 (1953).]

The anterior lobe of vermis cerebelli was treated by freezing-drying method imbedded in paraffin, and sectioned. Absorption measurements were effected on sections immersed in glycerol. Cytoplasmic ultraviolet extinction values at 2650 and 2800 A. for individual cells showed rather pronounced modal values, about 0·14 and 0·1, respectively. Digestion with protease-free ribonuclease preparation caused a reduction in extinction values at 2650 and 2800 A. Reduction of extinction values at 2650 A. is assumed to be the result of loss of pentose nucleic acid (PNA) and to a lesser extent of protein attached to PNA. The reduction of extinction at 2800 A. is due to the same but primarily to loss of protein bound to PNA.

D. S. FARNER (Chem. Abstr.)

Detection of New Abnormal Metabolites in the Urine of Phenylketonuria. Boscott, R. J., and Bickel, H. [*Scand. J. Clin. and Lab. Invest.*, **5**, 380 (1953).]

Two-dimensional paper chromatography of the phenolic acid fraction 1 from the urine of children with phenylketonuria showed deviation from the normal pattern. $C_6H_5CH_2COCO_2H$ (I) was detectable when the patients received a normal diet or daily supplements of 1–10 g. DL-phenylalanine (II) but disappeared on a (II)-free diet. Large amounts of p-$HOC_6H_4CH_2$-CO_2H (III) and lesser amounts of p-$HOC_6H_4CH_2CH(OH)CO_2H$ (IV) were consistently found in the urine of all phenylketonuric urine. The ortho isomer of (III) was excreted in large amounts, whereas the meta isomer found in normal urine was not excreted by these patients. Fractions 2 and 3 of the urine consistently contained 5-benzalhydantoin (an artefact from (I) and urea) as well as (III) when (II) was fed, but the excretion of (IV) and (III) was unchanged. The pathway of (II) metabolism in phenylketonuria is discussed.

BERNARD KLEIN (Chem. Abstr.)

The Inhibition of Brain Hexokinase by Adenosinediphosphate and Sulfhydryl Reagents. Sols, A., and Crane, R. K. [*J. Biol. Chem.*, **206**, 925 (1954).]

Brain hexokinase preparations require free SH groups for activity as indicated by cysteine-reversible p-Chloromercuribenzoate inhibition and o-iodosobenzoate inactivation. Purified preparations of brain hexokinase are sensitive to heavy metals and are protected by metal-binding agents. Activity is maximum in the pH range 6–8. Q_{10} is 2·2 in the range 30–40° and is greater at lower temperatures. A half-maximum rate is obtained at 0·0008 M Mg. When Mg is not limiting, the half-maximum rate occurs at 0·00013 M adenosinetriphosphate (ATP). Adenosinediphosphate inhibits the enzyme competitively with (ATP). The enzyme has the same apparent affinity for both nucleotides.

FELIX SAUNDERS (Chem. Abstr.)

Influence of Phenothiazine Compounds on the Respiration of Brain Homogenates. II. Nature of the Oxidative Inhibition and Antagonistic Pharmaceuticals. Balestrieri, A., and Berti, T. [*Boll. soc. ital. biol. sper.*, **29**, 1669.]

Phenothiazine compounds, especially Largactil, inhibit glucose oxidation and that of related compounds in brain homogenates similar to phenobarbital. The latter requires 10 times higher concentration for equal effects. The oxidation of succinate is not inhibited. Methylene blue is an antagonist with respect to this inhibition.

A. E. MEYER (Chem. Abstr.)

The Exchange of Polysaccharides in Brain of Animals under Different States of Functioning. Khaĭkina, B. I., et al. [*Ukraĭn Biokhim. Zhur.*, **24**, 39 (1952).]

The activity of several enzymes was measured at various parts of the brains of dogs and rats for normal brain, brains in electro-convulsions, after termination of same and brains in a state of narcosis. In the gray and white marrow of a dog brain, both the phosphorylase (I) and the amylase activities increase in a state of electro-convulsions, which increase is noticed also some time after the end of the convulsions. Such convulsions cause the bound polysaccharide (II) fraction to increase up to 100 per cent, and the free (II) fraction diminishes. In rats the convulsions were caused by cardiazole, and the whole brain was taken for the determinations. The (II) exchange in both animals shows the same trend. Dog brains show under narcosis with ether (III) or evipan a (II) synthesis which does not require a primer. The (I) is much more active in the state of narcosis than in the normal state; phosphorolysis and amylolysis are somewhat lower. The amount of (II) under narcosis goes up, and the proportion of bound and free (II) remains unchanged. Rats were narcotized by aid of (III) or with hexenal (IV). Narcosis with (III) does not show any change of the (II) exchange, but a narcosis by (IV) shows an increase of the synthesis of (II) and of the activity of (I), which results in a decrease of the amount of (II), because the amount of free (II) drops. Thus narcosis affects the exchange of (II) in a multiple manner. The diminishing of the nerve functions under the experimental conditions does not always have the same effects on the dynamics of the (II) exchange, but the activity of (I) increases both in the state of convulsion and in the state of narcosis. The activity of (I) leading to a synthesis of (II), is high both in the cases of excitation and depression, whereas the activity of enzymes which split (II) is lowered in the case of depression. Any influence which diminishes the functioning of the nervous system leads to an accumulation of the bound (II).

WERNER JACOBSON (Chem. Abstr.)

Diffuse Sclerosis in an Infant: Metachromatic Leucoencephalopathy. Feigin, Irwin. [*Bull. N.Y. Acad. Med.*, **30**, 74 (1954).]

An abnormal material was deposited as granules and small globules within the tissues and phagocytes of the central white matter of the infant's cerebrum. The material was basophilic; metachromatic to toluidine blue in an aqueous medium, but not after passage through alcohol; it stained tan with phosphotungstic acid hematoxylin and blue with azocarmine; it gave positive tests with the periodic acid leucofuchsin, Sudan black, phosphomolybdic acid, Nile blue, modified acid hematin, acid-fast, and alloxanleucofuchsin methods; it was negative with the mucicarmine, Sudan IV, Feulgen, and Shultz methods; it was iostropic in polarized light, and insoluble in H_2O and organic solvents after formalin fixation. It was interpreted as a complex lipoprotein, having phosphatide and glycolipide constituents similar to those in myelin, and related to myelin formation.

THERESA SEVERN (Chem. Abstr.)

The Pathology of Tay-Sachs Disease. Aronson, Stanley M. [*Bull. N.Y. Acad. Med.*, **30**, 72 (1954).]

The primary cellular alterations resulting in this disease occur in the neurons. The neurons lose their angularity, become enlarged, and gradually dissolve because of the accumulation of pale-staining, hematoxylinophilic, refringent granules of prelipide substance. Demyelination, which occurs in the infantile disease, is probably the result of the arrest of myelin formation. As the neurons break down, large numbers of activated microglial cells, filled with intensely sudanophilic material, accumulate in areas of gray matter. The difference in staining between the neuronal prelipide and the liberated neutral lipide indicates that chemical breakdown occurs in the latter. The microglia move to neighboring perivascular areas, and finally endothelial cells become involved and distend with lipide. Parts of the retina undergo similar changes; the ganglionic cells become swollen and contain prelipide material.

THERESA SEVERN (Chem. Abstr.)

Relation Between Asymmetric Acetylcholinesterase Activities in Rabbit Brain and Three Behavioral Patterns. Aprison, M. H., et al. [*Science*, **119**, 158 (1954).]

The right common carotid artery of rabbits was injected with 0·1 mg./kg. of diisopropyl fluophosphate. The acetylcholinesterase (I) activity of the right and left frontal cortex and right and left caudate nucleus was measured 20 minutes later. In animals that had shown a definite behavior pattern of circling to the right or left, the decrease in (I) was very much greater in the right side of the brain than on the left. Animals that did not circle showed no difference between the right and left side of the brain.

J. D. TAYLOR (Chem. Abstr.)

The Quantitative Histochemistry of Brain. I. Chemical Methods. Lowry, Oliver H., et al. [*J. Biol. Chem.*, **207**, 1 (1954).]

General analytical procedures and tools are described for making various determinations with as little as 10γ of brain or other tissue. The measurement of the riboflavine in 10γ of brain (3×10^{-5} of riboflavine) is described. A method for determining chloride (4×10^{-10} mole) in 10γ of tissue is prevented; it involves the precipitation of chloride with Ag at a volume of 2·5 microliters, followed by measurement of excess Ag with 5-(p-dimethylaminobenzylidene)-rhodanine. A more sensitive means of measuring phosphate is given, together with directions for the determination of 5 P fractions from 20γ of brain.

II. Enzyme Measurements. Lowry, Oliver H., et al. [*Ibid.* 19].

Methods are described for measuring 6 enzymes with as little as 5–10 γ of brain. Adenosinetriphosphatase (I) and acid (II) and alkaline phosphatase (III) are measured with adenosinetriphosphate (ATP) and di-Na p-nitrophenyl phosphate by incubation at 10 microliters and final color measurement at 50–100 microliters. Cholinesterase (IV) is measured by the color change from acetylcholine hydrolysis in 10 microliters of a buffer-indicator pair (barbitol and phenol red) having nearly the same pK. An almost linear relation between enzyme activity and color change is achieved. Fumarase (V) is measured by determination of malate by an unpublished sensitive method of John Speck. This fluorimetric procedure has a sensitivity far in excess of present needs. Aldolase (VI) measurement is based on the macro-procedure of Sibley and Lehninger. Certain changes required on the micro scale may also be helpful for macro work. The 6 methods have a coefficient of variation of about 5 per cent with 10–20 γ of brain. All 6 enzymes were partially purified or separated from soluble components of rabbit brain and added to crude brain homogenates to test for summation of activity. No inhibition was observed, but slight enhancement was found for (II) and (VI). All 6 enzymes withstand freezing, drying, and storage up to a year at 20°. The pH optimum for (II) is more alkaline when Mg is present than without it (pH 5·9 vs. 5·3); this difference is due to the presence of 2 phosphatases, one of which has a marked requirement for Mg, with an optimum of about 6·5. (III) activity is increased about 30 per cent by Mg. (VI) is relatively pH-independent from pH 7·2 to 9·5. (I) of rabbit brain is inactive without a bivalent cation. It is 50 per cent activated by 2×10^{-4} M Mg. Ca activation is only one-third that of Mg or Mn and Ca competes with Mg and inhibits the activity when both are present. Well-defined Michaelis constituents were obtained for (II), (III), and (V): 1·58, 0·89 and 1·83 millimoles,

respectively. The K_s for brain aldolase is probably not more than 10^{-5} M. The K_s for (I) is too low to determine. (I) falls off most with increasing product formation. (II) and (III) are both unstable, and are largely insoluble. The 6 enzymes have very different temperature coefficients. (IV) is least sensitive to temperature; $Q_{10}=1\cdot21$ between 10 and 38°. (VI) is the most temperature-sensitive; $Q_{10}=4\cdot1$ between 4 and 15°. The energy of activation for brain (V) at pH 6·7 is 6600 calculated at 25–38°, and 14,600 calculated at 4–15°.

III. Ammon's Horn. Lowry, Oliver H., et al. [*Ibid.*, 39–49.]

By direct microchemical procedures, 6 histologically distinct layers of Ammon's horn of the rabbit were analyzed for dry-weight protein, total lipides, 4 lipide fractions, 5 P fractions, 6 enzymes, and riboflavine. There was remarkably little range in the concentration of 14 constituents in 15 rabbit brains. The predominant type of cell body present (small pyramidal cell) is much lower in total lipides than is the rest of the brain. Its general composition resembles that of the cells of an organ such as the kidney. The dendrites are at least as rich in metabolic enzymes as are the cell bodies. They probably account for the bulk of the brain metabolism. Substantial amounts of lipides are associated with dendrites (about equal amounts of cholesterol, lecithins, and cephalins), but the question is raised whether these lipides are not in but around the cytoplasm of the dendrites. The lipides of the myelinated fibers are comparatively rich in sphingomyelin and cholesterol. Because the enzyme activity and content of acid-soluble P in the myelinated layer are larger than would be expected from the axons and glia, it is suggested that the myelin itself may be metabolically active.

F. Saunders (Chem. Abstr.)

Symposium on Neurohumoral Transmission. Philadelphia, 1953. [*Pharmacol. Revs.*, **6**, 3–131 (1954).]

L. E. Gilson (Chem. Abstr.)

Progressive Changes in Acid-soluble Phosphorus Compounds During Development of the Rat Brain. Bieth, R., et al. [*Compt. rend. soc. biol.*, **147**, 1273 (1953.)]

Quantitative data are given for 6 CCl_3CO_2H-soluble P fractions of brains of rats from 3 days to 12 months old.

L. E. Gilson (Chem. Abstr.)

Alkaline Phosphatases of Nerve Cells. Irazoque, J., and Demay, M. [*Bull. microscop. appl.*, **1**, 102 (1951).]

In beef, endothelia of nerve center capillaries, molecule layer of cerebellum, Rolando's gelatinous substance of the spinal cord, spinal ganglia, capsular cells and capillaries of ganglia are rich in phosphatases (I); in superior nerve centers (I) reaction is weaker on account of the smallness of the cells but capillaries of the conjunctive tissue and Schwann membrane gave negative (I) reaction. In snail, large ganglionar and peripheric nerve cells are rich in (I) but their extensions are not.

Francoise Richard (Chem. Abstr.)

Transformation of Glucose-1-phosphoric Acid in the Brain. Bhaĭkina, B. I. [*Ukraĭn. Biokhim. Zhur.*, **20**, 342 (1948).]

In a 1st series of experiments the phosphorylative splitting of glycogen (I) was studied in rabbit brain. Phosphorolysis (II) takes place only during splitting of (I). The presence of adenylic acid does not promote it. The optimum of the enzyme action lies at pH 6·2. Disappearance of inorganic P accompanies the breakdown of (I), but there is no direct relation between the amount of (I) split and the amount of inorganic P esterified. More (I) breaks down in an acetate than in a phosphate buffer, showing that the path does not necessarily include (II). In a 2nd series of experiments the formation in the brain of polysaccharides (III) from glucose-1-phosphoric acid (IV) was investigated. Two facts are noted: (I) a large synthesis of (III) takes place from added (IV), (2) several different (III) are synthesized, of the type of (I), dextrin (V), and starch (VI). More (VI) is synthesized at pH 6·2–5·7, and at 6·0–6·5 more (I). At more acid pH (V) and some (VI) are formed. Addition of NaF (VII) does not prevent the synthesis, at pH 5 it even promotes it; but (VII) does prevent a branching of the chains. The seasons of the year influence the experiments. During the summer brain will prepare from (IV) almost exclusively (I), but during the winter both (I) and (VI) will be synthesized. In a 3rd series of experiments the dephosphorylation of (IV) by phosphatase (VIII) was followed by increase of inorganic P and change of the reducing power of the glucose. (VIII) has its optimum pH at 6·7 and acts on (IV) exclusively. Thus all glucose-6-phosphate in the brain, before it can be utilized, must be transformed into (IV) by the action of phosphoglucomutase.

Werner Jacobson (Chem. Abstr.)

The Adenosinetriphosphatase of Brain. Palladin, A. V., and Shtutman, Ts. M. [*Ukraĭn. Biokhim. Zhur.*, **20**, 311 (1948).]

The adenosinetriphosphatase (I) of brain can be extracted with distilled H_2O in the ratio 1:20. Its optimum activity is at pH 7·4–8·0. The activity of (I) in aqueous rabbit-brain extracts at acid pH is higher in glycine (II) buffer than in barbital buffer, since (II) protects the enzyme against denaturation by acids. The (I) of brain is activated by Mg++, but not

by Ca++. Cysteine and $1CH_3COOH$ do not affect its activity, NaF depresses it. (I) is less sensitive toward the ions of the medium than is (I) bound to myosin. The aqueous extracts of rabbit and cattle brains remove both labile phosphate groups from adenosinetriphosphoric acid; the cattle brain extracts also split adenylic acid and inosinephosphoric acid. The (I) of rabbit brain extract is bound to 2 protein fractions which can be precipitated by addition of 0·01 and 0·4 N Na_2SO_4, respectively. If extracts and precipitates are diluted with 0·01 N Na_2SO_4, the activity of (I) is increased; this does not occur if the centrifugate is diluted in the same way. Conclusion: In rabbit brain there is an inhibitor for (I) which precipitates upon addition of 0·01 N Na_2SO_4 almost completely from the aqueous extract together with part of the enzyme.

WERNER JACOBSON (Chem. Abstr.)

Phosphate Exchange in Brain Phospholipides in vivo and in vitro. Streicher, E., and Gerard, R. W. [*Proc. Soc. Exptl. Biol. Med.*, **85**, 174 (1954).]

When rat-brain homogenate was incubated at 37° in phosphate buffer labeled with P^{32}, the phospholipide phosphate reached a maximum specific activity in 20 minutes. In live rats the specific activity of the same brain fraction rose continuously for at least 20 hours after the intraperitoneal injection of $Na_2HP^{32}O_4$. When the lipide extract was divided into several fractions by different organic solvents the specific activities of these fractions were markedly dissimilar in the in vitro experiments, but were closely similar in the in vivo experiments.

L. E. GILSON (Chem. Abstr.)

The Chemical Properties of the Neurosecretory Substance in the Hypothalamus and Neurohypophysis. Schiebler, T. H. [*Exptl. Cell Research*, **3**, 249 (1952).]

Freshly fixed hypothalamus-hypophysis tissue from man, dog, cat, rabbit, cattle, rat, and fish was analyzed cytochemically. The neurosecretory substance appeared to be a glycolipoprotein complex. No species difference was apparent.

HERMANN I. CHINN (Chem. Abstr.)

Effects of Fluoroacetate Poisoning on Citrate, Lactate, and Energy-rich Phosphates in the Cerebrum. Pscheidt, G. R., et al. [*Am. J. Physiol.*, **176**, 483 (1954).]

Chemical changes in the cerebrum associated with fluoroacetate poisoning were studied in morphinized dogs, the tissue specimens being obtained after the brain had been frozen in situ. When a large dose of methyl fluoroacetate is injected there is a latent period of about 40 minutes after which the citrate in the brain increases rapidly to a maximum, which is reached soon after the beginning of epileptiform seizures. During the preconvulsive period, in which the inhibition in the tricarboxylic cycle is apparent from the rise in citrate, the metabolic block is not of sufficient degree to induce changes in the lactate, creatine phosphate, or inorganic phosphate in the cerebral tissue. During the convulsive stage the lactate is increased and some breakdown of creatine phosphate occurs. In the post-convulsive state the electrical pattern and chemical findings resemble those of extreme anoxia in that the lactate is very high and the phosphate bond energy reserves are depleted. Application of fluoroacetate to the exposed cortex induced local excitation, while application of Na citrate did not. The results support the view that neither the blocking of oxidations nor the presence of excess citrate in the brain is the cause of fluoroacetate seizures.

E. D. WALTER (Chem. Abstr.)

Effect of Adrenalectomy on the Anticonvulsant Action of Glutamic Acid in Mice. Fuller, J. L. [*Am. J. Physiol.*, **176**, 367 (1954).]

Results are consistent with the hypothesis that genetically controlled differences in seizure susceptibility in one type of mouse are mediated through metabolic differences in the central nervous system, and that the protective effect of glutamic acid may be due to a central rather than a peripheral action.

E. D. WALTER (Chem. Abstr.)

Experimental Studies on Focal Epileptic Seizure. Nakahama, H. [*J. Physiol. Soc. Japan*, **16**, 61 (1954).]

Application of isonicotinic acid hydrazide (I), absorbed in filter paper, on the cerebral cortex of cats induced seizures. (I) applied to the motor area was enough to induce generalized seizures when 0·02 mg./sq. mm. of (I) existed on an area of 4 sq. mm. When the cat was anesthetized with Na barbital, (I) induced not generalized, but focal seizures at an opposite fore-leg.

I. TYUMA (Chem. Abstr.)

Changes in Serum Proteins after Brain Operations and Other Procedures Applied to the Central Nervous System. Schmidt, C., et al. [*Deut. Z. Nervenheilk.*, **170**, 119 (1953).]

The concentrations of total protein (I), albumin (II), and α-, β-, and γ-globulin (II) in the blood plasma were determined before and at several times after brain operations in 11 patients (group A), and before and after less drastic procedures (e.g. ventriculogram) in 6 patients (group B). In group A the average (I) and (II) concentrations decreased, and the (III) concentra-

tions tended to increase after operation. In group B there was little or no change in (I), but (II) and (III) tended to change as in group A after the application of procedures to the central nervous system.

WARREN M. SPERRY (Chem. Abstr.)

Dextrin Conversion in Brain Tissue. Rashba, O. Y. [*Ukrain. Biokhim. Zhur.*, **21**, 247 (1949).]

The presence of amylase (I) in brain tissue has been previously demonstrated. It was also shown that the action of phosphorylase (II) is basically that of a polysaccharide (III) synthesizer. It became desirable to establish the ways in which primary breakdown of (III) occurs in the simultaneous presence of (I) and (II) in brain tissue. Brain tissue (II) was obtained by cold extraction with distilled H_2O. Dextrin was prepared by the action of purified brain on glycogen of rabbit liver and on amylodextrin of potato starch. Following incubation of the reacting mixtures, determinations were made of (III), inorganic P, and in some instances of glucose-1-phosphate (IV). A study was made of the synthesizing action of (II) by adding the dextrins as priming agents, as well as of the phosphorolytic action of these dextrins. It appeared that in both instances dextrins serve as suitable substrate for the action of (II). Results of (I) reactions at various stages of the experiments indicate that brain tissue (II) has an affinity for dextrins down to those of smallest mols. It is, therefore, thought that the hypothesis of simultaneous action of (I) and (II), utilizing the same substrate, appears probable, although it still remains unknown whether the two act at different foci of the same mols. The conversion of dextrins may take place as a result of the action of (I), forming maltose and glucose, as well as a result of the action of (II), forming (III) and (IV). The dextrins arising from the action of brain tissue (II) are also being converted through the simultaneous action of (I). The intermediate products in both reactions are, therefore, in part the same.

B. S. LEVINE (Chem. Abstr.)

The Enzymic Synthesis of Polysaccharides of the Brain. Khaikina, B. I., and Goncharova, K. O. [*Ukrain. Biokhim. Zhur.*, **21**, 239 (1949).]

Phosphorylase of the brain of the rabbit is highly active in polysaccharide synthesis and is independent of any external priming influences. However, the addition of appropriate enzymes increases the original synthesis. At pH 6·2 polysaccharides of the type of glycogen are synthesized; at pH 5·7 starch type. Time and pH are of considerable importance. Iodine coloration experiments indicate that in the brain (of the rabbit), in addition to phosphorylase, which synthesizes polysaccharides of the starch type, there is an enzyme capable of converting starch into a polysaccharide of a branching structure and which is named starch glycoisomerase (I). Phosphorylase and (I) can be isolated by fractional precipitation with $(NH_4)_2SO_4$.

B. S. LEVINE (Chem. Abstr.)

Electroencephalographic Modifications During Anoxemia and Variations under the Influence of Certain Substances. Tabusse, L., et al. [*J. physiol.*, **44**, 331 (1952).]

Subjects were given a gas mixture containing 7·5 per cent O in N. Electroencephalographic (EEG) changes appeared after a latent period of variable duration depending on the speed and intensity of the hypoxia and on the resistance of the subject. The paradoxical effect of O administration at this time was noted by the persistence or accentuation of the EEG changes for several seconds. A respiratory stimulant and glucose caused delay in appearance of EEG changes.

HERMANN I. CHINN (Chem. Abstr.)

Cerebral Arteriography with Sodium Acetrizoate (Urokon Sodium 30 per cent). Seaman, William B., and Schwartz, Henry G. [*Arch. Surg.*, **67**, 741 (1953).]

The results indicate this to be a satisfactory medium for cerebral arteriography.

JOHN T. MYERS (Chem. Abstr.)

Effect of Hypothalamic Stimulation on the Adrenaline Secretion of the Adrenal Glands in Cats. Suzuki, Tatsuji and Arai, Tsutomu. [*Tohoku J. Exptl. Med.*, **58**, 105 (1953).]

In cats, anesthetized with evipal, the hypothalamus was stimulated electrically with a frequency of 20 cycles/sec. and a duration of 60 seconds. Blood was collected from the adrenal vein. Stimulation of the ventro-medial and ventro-lateral portion caused an abrupt rise in blood pressure and a corresponding increase in adrenaline secretion from 0·03–0·1 to 0·5–5 γ/kg./min. The secretion rate of adrenaline fell to normal soon after the removal of the stimulus.

J. D. TAYLOR (Chem. Abstr.)

Cholinergic and Inhibitory Synapses in a Central Nervous Pathway. Eccles, J. C., et al. [*Australian J. Sci.*, **16**, 50 (1953).]

The depression of excitability of cat spinal motoneurones when adjacent motoneurones were activated by antidromic impulses was studied by recording intracellular potentials. Evidence is presented that the depression is produced by inhibitory synaptic activity through interpolated interneurones which are excited cholinergically by the motoraxon collaterals. The cholinergic mechanism was supported by experiments with drugs. The repetitive interneuronal response to an antidromic impulse was not affected by d-tubocurarine chloride

(1 mg/kg. body weight) and only moderately diminished by atropine sulfate; but 0·1 mg./kg. of dihydro-β-erythroidine hydrobromide, by blocking the action of acetylcholine, caused a prolonged depression of rhythmic response. Similarly, 1 mg./kg. of prostigmine bromide had no effect; but 0·1 mg./kg. of eserine sulfate or the dimethylcarbamate of 3-hydroxy-2-dimethylaminomethylpyridine dihydrochloride, by inactivating cholinesterase, greatly prolonged the repetitive discharge. Acetylcholine chloride (threshold dose 8 γ) evoked a series of discharges from an interneurone that was also activated repetitively from the motor-axon collaterals. Prior injection of eserine sulfate increased 10-fold, while dihydro-β-erythroidine hydrobromide decreased 10-fold the response to a given dose of acetylcholine.

J. F. KEFFORD (Chem. Abstr.)

Brain Potassium Exchange in Normal Adult and Immature Rats. Katzman, Robert and Leiderman, P. Herbert. [*Am. J. Physiol.*, **175**, 263 (1953).]

Sixty-eight normal adult male rats were injected intraperitoneally with K^{42}. The animals were killed at intervals of 4, 16, 39, 54, and 72 hours by decapitation, and plasma and brain activity and total K were measured. The K influx and outflux were calculated from a general exchange equation. The influx of K into the brain of normal adult rats was 2·89 meq./kg./hr.; the outflux rate 3·64 meq./kg./hr. and the influx/outflux ratio 0·80. Since a steady state occurs, the outflux must be equivalent to influx. Therefore 20 meg. K/kg. of wet brain is not exchangeable with K^{42}. The influx in 4- and 15-day-old animals is 3·9 meq./kg./hr., and in 35-day-old animals the influx is 3·1 meq./kg./hr. All brain K was exchangeable in 4-, 15-, and 35-day-old rats. Brain K exchange in older rats is similar to that of normal young adults.

E. D. WALTER (Chem. Abstr.)

Glycerylphosphorylethanolamine in Rat Brain. Ansell, G. B., and Norman, Joyce M. [*Biochem. J.*, **55**, 768 (1953).]

Glycerylphosphorylethanolamine (I) is present in the acid-solution P fraction of rat-brain tissue (2·3 mg. per cent) prepared from frozen material. From experiments with injected P^{32} it is concluded that (I) is not an in vivo breakdown product of phosphatidylethanolamine (II). Radioactive (I) was synthesized by minced rat brain, but in vitro synthesis of (II) was not accomplished.

S. MORGULIS (Chem. Abstr.)

Effect of Metabolic Inhibitors on Respiration and Glucolysis in Electrically Stimulated Cerebral-Cortex Slices. Heald, P. J. [*Biochem. J.*, **55**, 625 (1953).]

Brain cortex slices in vitro may show increased O uptake, increased glucolysis, increased levels of inorganic phosphate and a decreased concentration of creatine phosphate which parallel those produced under similar conditions in vivo. Iodoacetate, in concentrations which had little effect upon stimulated O uptake, depresses the stimulated accumulation of lactic acid due to a lowered rate of lactic acid production. NaF has similar effects except that lactic acid production is not lowered at concentrations of F which suppress stimulated O uptake. Neither iodoacetate nor NaF at concentrations which reduce stimulated oxidation of glucose, decrease the stimulated oxidation of lactate. Up to 0·01 M malonate decreases stimulated O uptake and increases stimulated lactic acid production, while the unstimulated response is unaffected; 0·1 M malonate suppresses unstimulated O uptake and increases aerobic glucolysis. Malonate up to 0·01 M has no effect on electrically stimulated lactate oxidation.

S. MORGULIS (Chem. Abstr.)

Accumulation of Citrate During Oxidation of Pyruvate by Breis and Slices of Pigeon Brain. Coxon, R. V. [*Biochem. J.*, **55**, 545 (1953).]

The oxidation of pyruvate by breis and slices of pigeon brain, is associated with an accumulation of citrate. Of the pyruvate metabolized by breis about 20 per cent undergoes only oxidative decarboxylation to acetate, 10 per cent undergoes anaerobic dismutation to lactate, while 67 per cent is completely oxidized to CO_2 and H_2O, leaving 3 per cent (estimated 2–4 per cent) for the formation of citrate.

S. MORGULIS (Chem. Abstr.)

Study of the Steroids of the Brain by the Chromatographic Method. Polyakova, N. M. [*Doklady Akad. Nauk. S.S.S.R.*, **93** (1953).]

Human brain tissues (white and gray matter, separately) after saponifying with alcohol KOH and extraction with Et_2O was subjected to chromatographic separation on Al_2O_3 using $(CH_2Cl)_2$ solvent, with elution of mechanically separated portions with MeOH. The zones were detected by the fluorescence method. The white matter contains 4·2 per cent unsaponifiable matter, the gray 1·26 per cent (14 per cent and 8 per cent on dry basis). The steroids comprise 90 per cent of the former and 85 per cent of the latter. The products contain various oxidation products of steroids with double bonds in the B ring. In addition, unidentified nonsteroid substances with low m.p. were isolated. The results are: the gray matter contains 0·02 per cent oxidation products of steroids, 48 per cent isomers of cholesterol, 36·8 per cent cholesterol, 0·15 per cent 7-hydroxycholesterol; the white matter, respectively, 0·02, 47·3, 45·5 and 0. The 7-hydroxy derivative was identified spectrographically.

G. M. KOSOLAPOFF (Chem. Abstr.)

Enzyme Activities of Nerves. I. Cholinesterase Activities in Various Parts of the Human Brain. Goto, Juya. [*Nisshin Igaku*, **37**, 434 (1950).]

Isolated tissues of the human brain were homogenized in Ringer solution (pH 7·4), and the cholinesterase (I) activities of these homogenates were determined with a Warburg apparatus at 37° using 0·015 M acetylcholine as the substrate. The (I) activity in the human brain was 0·5–200 cu. mm. Co_2/mg. dry wt. tissue/60 minutes. The activities in various parts of the brain were listed. The distribution of (I) was independent of age or sex. The (I) activity in the medulla was less than one-fifth of that in the cortex. The (I) activities in the brain of the rat, rabbit, and dog were different from each other, but were the same in the same kind of animals.

TETSUO KONO (Chem. Abstr.)

Biochemical Researches on the Brain and Some Practical Applications of the Results Attained. Naka, Shuzo. [*Kyushu Mem. Med. Sci.*, **3**, 203 (1953).]

A review with 35 references.

E. P. HALPERN (Chem. Abstr.)

Determination of Largactil in Biological Liquids Passage in the Animal Organism. Durost, Paul and Pascal, Suzette. [*Ann. pharm. franç.*, **11**, 615 (1953).]

Largactil is 3–chloro–(dimethylamino–3–propyl)–10–phenothiazine and used as an anesthetic of long action. It gives a red colour with H_2SO_4, red-orange with H_4SO_4 and CrO_3, dark wine colour with $PdCl_2$, and a pale yellow precipitate with NaOBr. The free compound can be extracted from blood with Et_2O and estimated with the H_2SO_4, reaction. If both the free and the conjugated compounds are to be determined the blood is subjected to hydrolysis with HCl at 100° and subsequently extracted. Urine is extracted after the addition of 2 cc. 20 per cent Na_2CO_3 solution to 20 cc. urine. Hydrolysis can be effected by refluxing with an equal volume of 20 per cent NaOH or by boiling 20 cc. with 16 cc. HCl. Single doses of 0·25 g. per kg. of largactil given orally or subcutaneously are well tolerated by rabbits but oral doses of 0·4 to 0·5 g. cause death in 24 to 48 hours. The concentration in the blood after various levels and routes of administration does not exceed 4–6 mg. per 1. Only 6–8 per cent appears in the urine which suggests a far-reaching destruction in the organism.

A. E. MEYER (Chem. Abstr.)

Recent Advances in Acetylcholine. Okinaka, Shigeo and Yoshikawa, Masaki. [*Nisshin Igaku*, **37**, 415–24, 467 (1950).]

A review, dealing mainly with the effects of various conditions on and the mechanism of acetylcholine biosynthesis, and the role it plays in the nervous stimulation. 172 references.

M. NAKAMURA (Chem. Abstr.)

Recent Advances in Cholinesterase. Okinaka, Shigeo and Yoshikawa, Masaki. [*Nisshin Igaku*, **37**, 1 (1950).]

A review, dealing with enzymic, physiological, pharmacological and clinical aspects of cholinesterase. 169 references.

M. NAKAMURA (Chem. Abstr.)

Observations on Brain Phosphatases. Gordon, J. J. [*Biochem. J.*, **55**, 812 (1953).]

The pyrophosphatase (PP-ase) and adenosinetriphosphatase (ATP-ase) of rat-brain homogenates lose activity on dialysis and both can be activated by cysteine. The 2 activities can be separated by fractionation with $(NH_4)_2SO_4$ or EtOH. In respect to (PP-ase), highly nucleated regions are generally much more active than the conducting regions; cerebellar cortex is much more active than cerebral cortex (PP-ase) activity is strongly inhibited by metal salts, mapharside, HCHO and suramin, most of which have relatively little effect on (ATP-ase) activity. It is concluded that (PP-ase) and (ATP-ase) are different systems in brain.

S. MORGULIS (Chem. Abstr.)

Glycogen in the Animal Brain. Palladin, A. V., and Khaĭkina, B. I. [*Ukrain. Biokhim. Zhur.*, **22**, 462 (1950).]

In dog and rabbit brain, glycogen was determined on freeze-dried material homogenized in acetate buffer at pH 6. Glucose–1–phosphate+buffer+enzymic preparation from the brain was incubated for 60 minutes at 37°. Enzymic action was blocked by addition of CCl_3–COOH. Polysaccharide synthesis was estimated by the increase in inorganic P, and from iodine coloration. Phosphorylase activity involved in the synthesis was estimated by the amount of P split from added glucose–1–phosphate, expressed in per cent P remaining. Enzymic activity was estimated with and without the addition of glycogen as a primer. P was determined by the ordinary procedure, glucose–1–phosphate by enzymic procedure, and glycogen by the method of Kerr. The enzyme activity which results in synthesis of polysaccharides, including glycogen substrate, is about the same in the separate brain portions as for the total brain; this indicates that glycogen is synthesized in various portions of the brain. Glycogen was found also in the cortex, caudate nucleus, thalamus, cerebellum, and medulla oblongata. More glycogen was found in the cerebral cortex than in any other part of the brain. Glycogen

synthesis is possible in different portions of the central nervous system of normal, as well as of pathological, animals. The enzyme system that causes synthesis of polysaccharides is highly active, and a considerable quantity of glycogen occurs in those portions of the brain that are characterized by high physiological activity. Failure of others to find glycogen in the central nervous system is attributed to postmortem decomposition of glycogen by amylase.

CLAYTON F. HOLOWAY (Chem. Abstr.)

Investigation of the Enzymic Activity of Different Portions of the Brain. Kometiani, P. A., and Klein, E. E. [*Ukrain. Biokhim. Zhur.*, **22**, 410 (1950).]

Cl was determined according to Sandrow; acetylcholine according to Feldberg adrenaline according to Shaw as modified by Utevskii and Buton; succinic dehydrogenase activity according to Warburg, as modified by Quastel and Wheatley; succinic oxidase activity by O_2 absorption after succinate addition, O_2 being measured manometrically; cholinesterase activity manometrically in the Warburg apparatus; amine oxidase manometrically as described by Blashko *et al.*; glutamic dehydrogenase by O_2 absorption in a Warburg respirometer according to Edlbacher and Wiss. In 9 bovine brains average values for dry matter, Cl, intracellular water, and extracellular water, respectively, were: white matter of the cerebrum 31·8 per cent, 1·39 mg./g., 30·2 per cent, and 38·0 per cent; gray matter of cerebrum 17·9 per cent, 1·66 mg./g., 36·9 per cent, and 45·2 per cent; cerebellum 21·0 per cent, 1·47 mg./g., 39·0 per cent, and 40·0 per cent; thalamus 27·7 per cent, 1·36 mg./g., 36·3 per cent, and 36·0 per cent; medulla 30·3 per cent, 1·37 mg./g., 32·8 per cent, and 37·1 per cent. Water distribution between extra- and intra-cellular phases of brain tissue was calculated on the assumption that all the Cl is in the extracellular phase; thus the calculation is only approximate, since some Cl is intracellular. Succinic dehydrogenase and succinic oxidase activities in microliters of gas/mg. of dry weight tissue/hour, are: lobar white matter 7·2, 0·8; lobar gray matter 24·8, 4·0; cerebellum 24·3, 3·8; thalamus 15·0, 2·6; medulla 11·5, 2·1. The ratios of intracellular dry substance to intracellular water are 0·47 for lobar white matter, 0·22 for gray matter, 0·26 for cerebellum, 0·38 for thalamus, and 0·43 for medulla. This ratio gives a conception of the quantity of protoplasm and the extent of its water supply; the data indicate that the activity of oxidative enzymes depends upon the amount of protoplasm and its water content, and that the intracellular phase possesses the greater enzymic activity which contains the more water. Cholinesterase activity decreases in the order lobar gray matter>cerebellum>thalamus>medulla>lobar white matter; which is the same sequence as with succinic dehydrogenase and succinic oxidase. It is inversely proportional to the ratio of dry substance to intracellular water. Adrenaline content in γ/g. dry substance, and amine oxidase activity (in microliters O_2 consumed/mg. dry substance/hr.), respectively are: lobar white matter 0·78, 1·7; lobar gray matter 1·86, 7·0; cerebellum 1·08, 6·9; thalamus 1·54, 2·6; medulla 0·99, 1·9. In peripheral nerve, most of the acetylcholine is intracellular; most of the adrenaline, extracellular. This is explained by assuming that acetylcholine is intracellularly synthesized, and adrenaline is brought to the cell. Of all amino acids, oxidative deamination of glutamic acid is most intense in the brain. Glutamic acid is oxidized in the brain by glutamic dehydrogenase, in the presence of codehydrase 1, diaphorase, the cytochrome system, adenosinetriphosphate, and pyridoxal. Glutamic dehydrogenase activity in microliters O_2 consumed/hour/mg. dry tissue: lobar white matter 0·09, lobar gray matter 0·59, cerebellum 0·58, thalamus 0·23, medulla 0·18. Glutamic dehydrogenase appears to be a more characteristic enzyme for nerve-cell formation than any of the other enzymes studied.

CLAYTON F. HOLOWAY (Chem. Abstr.)

Electrophoretic Studies of Cerebrospinal Fluid. Steger, J. [*Deut. Z. Nervenheilk.*, **171**, 1 (1953).]

The proteins (I) of normal and pathological CSF were concentrated by dialysis and subjected to electrophoresis. The V fraction concentration was higher in normal ventricular than in cysternal or lumbar CSF, but the ratio of the sum of the V and albumin fractions to the globulin was relatively consistent. Pathological changes in the (I) pattern are described.

WARREN M. SPERRY (Chem. Abstr.)

Glucose in the Cerebrospinal Fluid of Normal Persons and Patients with Neurosyphilis. Daza Plata, C. [*Rev. fac. med., Univ. nacl. Bogota.*, **21**, 359 (1953).]

The glucose content in 123 normal cerebrospinal fluids was 0·071–0·080 per cent. The same values were observed in 77 cases of neurosyphilis.

F. FROMM (Chem. Abstr.)

Cortisone and Hydrocortisone in Cerebrospinal Fluid. Baron, D. N., and Abelson, D. [*Nature*, **173**, 174 (1954).]

Cerebrospinal fluid was extracted and chromatographed. In 5 out of 7 samples, doubtful traces of cortisone (I) and hydrocortisone (II) were identified. In 2 pooled extracts, representing 500 ml. each of fluid, (I) and (II) were isolated in concentrations of 0·1–0·2 γ per cent and 0·2–0·4 γ per cent, respectively. Abstract identification was not done.

LEO LUTWAK (Chem. Abstr.)

Cholinesterase. III. The Cholinesterase of Cerebrospinal Fluid in Various Diseases. Okinaka, Shigeo, et al. [*Tohoku J. Exptl. Med.*, **58**, 133 (1953).]

Cholinesterase (I) activity in the cerebrospinal fluid (II) of 140 patients with various nervous diseases was determined manometrically with the Warburg app. In 10 normal subjects (I) averaged 16·9 (range 14·5–19·0) cu. mm. CO_2/ml. (II)/30 minutes. The value of (I) was lower in (II) than in serum or brain tissue and was independent of any change in the serum value. Increased activity of (I) was found in tuberculous meningitis and tumor of the brain and spinal cord. Decreased activity was found in poliomyelitis, progressive paralysis, and epilepsy. No abnormal activity was found in flaccid and spastic hemiplegia following cerebral hemorrhage, paralysis agitans, chorea minor, spastic spinal paralysis, myasthenia gravis, myotonia congenita, progressive muscular dystrophy, polyneuritis, syringomyelia, herpes zoster, and diabetes mellitus.

IV. The Relation between Cholinesterase of Basal Ganglia and Liver Disease. Okinaka, Shigeo, et al. [*Ibid.*, 139 (1953).]

The cholinesterase activity in the basal ganglia was not influenced by ordinary liver disease in 14 patients.

J. D. TAYLOR (Chem. Abstr.)

Pyruvic Acid Content of Cerebrospinal Fluid and its Diagnostic Significance. Lasch, Fritz. [*Klin. Wochschr.*, **31**, 941 (1953).]

The normal pyruvic acid content of cerebrospinal fluid is around 1 mg. per cent, the same as in serum or slightly higher. In severe diseases of the central nervous system it rises in the cerebrospinal fluid, but not in the serum.

ERICH HEFTMANN (Chem. Abstr.)

Formation, Flow, and Reabsorption of Cerebrospinal Fluid in Man. Sweet, Wm. H., and Locksley, Herbert B. [*Proc. Soc. Exptl. Biol. Med.*, **84**, 397 (1953).]

By use of isotopic tracers it was shown that water and electrolytes enter the cerebrospinal fluid (CSF) rapidly both in the ventricles and throughout the subarachnoid space. The formation of (CSF) is thus not confined to the choroid plexus. Water and electrolytes leave directly into the blood at roughly similar rates; this occurs both in the ventricles and the subarachnoid space. (CSF) does not suddenly come into being at any point with all its constituents in their proper ratios, but each constituent is exchanging with blood at its own characteristic rate. Protein is absorbed largely from the subarachnoid space, presumably from the arachnoid villi. The villi thus play a role in the (CSF) system analogous to the lymphatics of the general circulation. The net amount of new (CSF) elaborated per day in the ventricles is probably about 10–20 cc. in man.

L. E. GILSON (Chem. Abstr.)

2. Pharmacology and Treatment

Treatment of Acute Heroin Intoxication with Nalorphine (Nalline) Hydrochloride. Strober, M. [*J. Am. Med. Assoc.*, **154**, 327 (1954).]

The toxic effects of heroin, and many other narcotics, can be reversed by the administration of nalorphine.

EDWARD J. VAN LOON (Chem. Abstr.)

Experimental Anticonvulsive Activity of N-benzyl-β-chloropropionamide. Quevauviller, A., and Garcet, S. [*Thérapie*, **8**, 749 (1953).]

Experimental results of Harned *et al.* are confirmed.

GEO. SAG (Chem. Abstr.)

Barbiturates in General Medicine and in Psychiatry. Le Mappian, M. [*Semain hop. Paris*, **30**, 161 (1954).]

A review on barbiturates.

GEO. SAG (Chem. Abstr.)

Epilepsy Treatment with 5-phenyl-5-ethylhexahydropyrimidine-4, 6-dione. Beley. [*Semaine hôp., Paris*, **29**, 3463 (1953).]

Mysoline 1·25–1·50 g./day had anticonvulsive effect without hypnotic activity. Evolution of white counts during the cure is given for 17 cases.

GEO. SAG (Chem. Abstr.)

Effect of Aconitine on the Metabolism of Brain Tissue. Sorm, F., and Berankova, Z. [*Chem. Listy*, **48**, 80 (1954).]

The influence of aconitine upon metabolism of the gray matter was followed. Low concentrations of aconitine (0·02–0·2 mg. per cent) stimulate considerably the metabolism. Higher concentrations first stimulate, then inhibit metabolism. The stimulation which is specific for the brain tissue is ascribed to the activation of the O bond.

M. HUDLICKY (Chem. Abstr.)

Pharmacological Properties of Tetraethylthiuram Disulfide (Antubuse) and Certain of its Derivatives. Czyzyk, A. [*Polska Akad. Umiejetnosoi, Rozprawy Wydziatu Lekarski*, **12**, *No. 11, 38 pp.* (1951).]

Tetraethylthiuram disulfide (I) produces supersensitivity to EtOH. (I) was prepared by the method of Grodski, a yellow powder, insoluble in water, moderately soluble in alcohol, very soluble in $CHCl_3$, m. 70°. (I) was administered in suspension. The work of Larsen *et al.* was repeated. AcH level in the blood reaches its highest values 3–4 hours after administration by stomach of EtOH, whereas EtOH blood level falls after 1–3 hours. (I) increases EtOH toxicity for mice. EtOH in blood was determined according to Widmark. EtOH rabbit blood level is not affected by stomach administration of (I), nor was according to Stotz. Blood sampling by cutting the rabbit marginal vein gave fluctuating results, depending upon rapidity of blood outflow, the slower the flow, the less the blood AcH value; necessity for rapid blood sampling is emphasized. After administration of EtOH+(I), AcH blood level is 5–10 times higher than when EtOH is administered alone. After administration of EtOH, increased O consumption and increased CO_2 evolution were noted (after 4 hours, 37·2 per cent for O_2 and 26 per cent for CO_2). Respiratory quotient for EtOH was 0·7. Dosage was 1·5 g. abs. EtOH/kg. Change occurred only during 2–4 hours after EtOH. With a dosage of 2·0–3·0 g. (0·5 g./day) of (I) to the stomach+1·5 g. abs. EtOH/kg. dosage there was no increased O consumption, and the conclusion is reached that EtOH metabolism is somewhat hindered, and at the AcH stage, since AcH accumulates. Only at 0·5 g. (I) daily dose for rabbits is there noted increased AcH in rabbit blood after administration of EtOH, decrease in gas exchange being observed. (I) in direct contact with cells (rat-liver homogenate in Warburg app.) had no noticeable effect, nor did (I) show any increase in AcH of isolated tissue. (I) may be the precursor of another substance which acts in some characteristic manner upon cellular enzymes. Tetramethylthiuram disulfide (II) and dipiperidinothiuram disulfide (III) were, respectively prepared according to Braun and Ethrenburg. (II) exhibited the same pharmacological action on animals typical for (I).

CLAYTON F. HOLOWAY (Chem. Abstr.)

Chemical Constitution and the Depression of the Central Nervous System. Mingoia, Q. [*Arquiv. biol.*, **37**, 103 (1954).]

A review.

F. FROMM (Chem. Abstr.)

Antagonists of Decamethonium Iodide at the Neuromuscular Junction. Dallemagne, M. J., and Philippot, E. [*Experientia*, **9**, 427 (1953).]

Pentamethonium iodide, tubocurarine, paludrine, and di-2-heptylamine-HCl are effective inhibitors of the neuromuscular inhibiting effect of decamethonium iodide in the cat 4,4′-Diamidinostilbene, 4,4′-diamidino-α, ω-diphenoxypentane, and monolaurate of sorbitan are less active. These compounds are histamine liberators.

D. S. FARNER (Chem. Abstr.)

The Action of Synaptotropic Substances on Certain Efferent and Afferent Structures of the Autonomic Nervous System. Konzett, H., and Rothlin, E. [*Experientia*, **9**, 405 (1953).]

A review with 167 references.

D. S. FARNER (Chem. Abstr.)

Convulsions in Young Infants as a Result of Pyridoxine (Vitamin B_6) Deficiency. Molony, C. J., and Parmelee, A. H. [*J. Am. Med. Assoc.*, **154**, 405 (1954).]

Six infants artificially fed a compound preparation developed a peculiar convulsive disorder. These seizures ceased when fed another milk formula containing adequate amounts of pyridoxine.

EDWARD J. VAN LOON (Chem. Abstr.)

Glutamic Acid in the Mental Functioning of Mentally Defective Children. De la Fuente Muniz, R., and Zuniga, M. C. [*Bol. med. hosp. infantil*, **8**, 160 (1951).]

In 28 out of 36 cases classified in the clinical categories of primary mental deficiency, mental deficiency with cerebral palsy, mongoloid mental deficiency, and mental deficiency subsequent to encephalitis, an improvement was noted in the intellectual functioning and in the personality as a whole. The doses of glutamic acid used fluctuated between 12 and 24 g., and the duration of the treatment, between 4 and 20 months. No important toxic symptoms were found. Conclusion: The glutamic acid had a favorable but limited action in the treatment of mentally retarded children.

EVA SOTO-FIGUEROA (Chem. Abstr.)

Concentration of Antibiotics in the Brain. Wellman, W. E., et al. [*J. Lab. Clin. Med.*, **43**, 275 (1954).]

One of several antibiotics was given prophylactically to patients undergoing prefrontal lobotomy. At the time of operation specimens of blood, cerebrospinal fluid, and brain tissue

were collected for assay. Only Neopenil (diethylaminoethyl ester hydroiodide salt of penicillin G) and Aureomycin were found consistently in significant amount in the brain tissue. Terramycin was found in the brain tissue of 3 of 4 patients.

EDWARD J. VAN LOON (Chem. Abstr.)

Inactin and Cerebral Depression. Boerle, L. A. [*Der Anaesthesist*, **3**, 6 (1954).]

Pharmacological properties of thiopental-Na and Na 5-ethyl-5-(1-methylpropyl)-2-thiobarbiturate (inactin) are compared. The latter has less hypnotic and depressant activity and stimulates the vagus less than thiopental-Na.

KARL F. URBACH (Chem. Abstr.)

The Behavior of Serum Proteases in Electroshock Treatment. Konyves-Kolonics, L., and Kovacs, B. [*Monatsschr. Psychiat. Neurol.*, **126**, 184 (1953).]

Fibrinolysin (I) activity was determined by precipitating fibrin from diluted (1:19) citrated plasma with Ca, incubating it at 37° for 24 hours in plasma, and determining the amount undissolved. No (I) was found in plasma from 101 mental patients before electroshock (II), whereas after (II) there was complete fibrinolysis in 51 and partial in 11. The (I) activity had disappeared by 15 minutes after (II). Tryptase, determined by the method of Schmitz, increased after (II) in patients whose plasma (I) increased, but remained the same when there was no (I) activity.

WARREN M. SPERRY (Chem. Abstr.)

Distribution of Chloral Hydrate in Various Areas of the Central Nervous System Under the Action of Analeptics. Kudrin, A. N. [*Fiziol. Zhur. S.S.S.R.*, **40**, 65 (1954).]

Dogs treated intravenously with chloral hydrate and various analeptics were examined after killing for distribution of the former substance in the body. The largest concentrations of the drug are found in the cerebral cortex, thalamus, and lesser amounts in the medulla and the spinal cord, blood, and spinal fluid. Analeptics (combinations of caffeine, corazole, strychnine, picrotoxin) accelerate the destruction of chloral hydrate in the organism, reduce its concentration in the brain, spinal cord tissues, and the thalamus, but increase it in the blood and spinal fluid. They also improve or hasten the waking process in the central nervous system and the animals on waking show relatively higher concentrations of chloral hydrate in the brain, spinal cord, blood and other tissues in comparison with the conditions in the narcotic state.

G. M. KOSOLAPOFF (Chem. Abstr.)

Effect of Narcotic and Convulsant on Lactic Acid, Phosphate Esters, and Acetylcholine Content of the (Rabbit) Brain. Kozawa, Shunji, et al. [*Japan. J. Pharmacol.*, **3**, 50 (1953).]

Lactic acid (I), inorganic phosphate (II), creatine phosphate (III), pyrophosphate (IV), hexose phosphate (V), free acetylcholine (VI), and total acetylcholine (VII) were determined on rabbit brain immediately after intravenous treatment with Na amytal or metrazole. Na amytal produced a 37 per cent fall in (IV) with less impressive decrease in (III) (10 per cent) and (II) (7 per cent). A 10 per cent decrease in (VII) was observed and a 6 per cent fall in (I). Metrazole produced a 24 per cent increase in (IV) with 11 per cent increases in both (III) and (V). (VI) increased 53 per cent and (I) increased 33 per cent. The authors concluded that under anesthesia glycolysis and (I) production of the cerebral cortex are depressed and (VII) content decreases slightly. In convulsive states glycolysis and (I) production are accelerated and (VII) increases.

FRANK IBER (Chem. Abstr.)

Pharmacologic Studies on a New Central Stimulant, α(2-piperidyl) Benzhydrol Hydrochloride. Brown, B. B., et al. [*J. pharmacol. Exptl. Therap.*, **110**, 180 (1954).]

The compound is a new type of central stimulant which induces a coördinated hyperactivity in experimental animals and causes changes in behavior patterns. Convulsions do not occur with less than $L.D._{50}$ doses, and the convulsions are not followed by an after-depression as are those induced by amphetamine. The drug weakly antagonizes barbiturate depression, but not the lethal action of barbiturates. Its own lethal action is poorly antagonized by barbiturates. It has little or no pressor action.

L. E. GILSON (Chem. Abstr.)

Influence of Various Narcotics on Cerebral Circulation. Tokita, N. [*Tohoku J. Exptl. Med.*, **59**, 149 (1953).]

The influence of various narcotics on the blood flow in the cortex and medulla oblongata was followed in cats by using the Schmidt and Pierson thermocouple. Bilateral ligature of the carotid arteries caused a decrease and adrenaline injections an increase in cerebral circulation. In all cases tested, the blood flow in the cortex and medulla oblongata changed simultaneously. Et_2O inhalation gave a slight decrease in blood flow which returned to normal with the cessation of the anesthesia. $CHCl_3$ and EtCl increased the blood flow, which in many

cases decreased below normal levels when the anesthetic was stopped. Na amytal and Na evipal decreased the blood flow, but recovery was faster with the latter. Morphine–HCl decreased the blood flow immediately after intravenous injection.

A. DIETZ (Chem. Abstr.)

Nicotine and Neurohypophysis. Denninger, K. [*Arzneimittel-Forsch.*, **4**, 79 (1954).]

Nicotine has a well-defined influence upon the water regulation through the diencephalon-posterior hypophysis. This effect can be used for the differential diagnosis of polydipsia and may also be significant therapeutically.

K. SCHOEN (Chem. Abstr.)

Neurological Complications Following the Use of Efocaine. Nowill, Wm. K., et al. [*Arch. Surg.*, **67**, 738 (1953).]

After the administration of efocaine transverse myelitis occurred in 2, Brown-Sequard syndrome in 1, intercostal nerve block in 1, and sympathetic nerve block in 2 cases.

JOHN T. MYERS (Chem. Abstr.)

Effect of Electroshock Therapy on Blood Lactic Acid and Pyruvic Acid. Eiduson, Samuel, et al. [*Proc. Soc. Exptl. Biol. Med.*, **84**, 364 (1953).]

Determinations were made on blood of neuropsychiatric patients before and after extreme muscular excitation induced by electroshock therapy (EST). Blood lactic acid rose sharply to a peak of about 6 times pre-shock level within 3–5 minutes after EST and returned to normal in 1–1·5 hours. The blood pyruvic acid of all patients rose immediately after EST for 30 seconds, then fell to a minimum (2·3 mg. per cent) within 3–5 minutes and rose again to a peak 3 times the pre-shock level 20 minutes after EST. Blood glucose, Na, K, and Ca varied considerably over a 60 minute period following EST, rising and falling several times during this time interval.

L. E. GILSON (Chem. Abstr.)

Action of Hypnotic Drugs on the Carbohydrate Metabolism of the Brain. I. Formation and Utilization of Hexose Phosphates in Normal Cerebral Tissue. Etling, Nicole. [*Bull. soc. chim. biol.*, **35**, 751 (1953).]

Rat brain was shown to contain all the enzymes concerned in the first stages of phosphorylative glycolysis: phosphorylase, phosphoglucomutase, hexokinase, oxoisomerase, and phosphohexokinase.

L. E. GILSON (Chem. Abstr.)