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Pharmacology of Drugs Affecting Skeletal Muscles.

Acetylcholine has been recognized as the chemical transmitter at the neuromuscular junction and at ganglia in the sympathetic nervous system, and it probably has the same function as the transmitter in the central nervous system. It is the consensus of opinion that neostigmine acts as an anticholinesterase agent to prolong the action of acetylcholine at the neuromuscular junction and at synapses. Like most quaternary salts, it cannot penetrate the central nervous system. Neostigmine acts as an anticurare agent by building up the concentration of acetylcholine until the threshold for stimulation is reached. Tensilon, a simple analog of neostigmine, is more specific as an anticurare agent than neostigmine, and is believed to act like acetylcholine itself in displacing curare from the site of action and stimulating the muscle directly, but considerable evidence is accumulating that it may act partially as an anticholinesterase agent.

Numerous synthetic curarimimetic agents are now known, and some have found clinical usefulness. These synthetics have been classified into two divisions, the tubocurarine-like compounds and the decamethonium-like compounds. The tubocurarine class acts by competing with acetylcholine for receptors at the neuromuscular junction and the action is antagonized by neostigmine or Tensilon. The decamethonium class acts by depolarizing the muscle membrane just as acetylcholine itself does and, consequently, the action is not antagonized by neostigmine or Tensilon. Intermediate classes having some of the properties of both of the above classes are becoming available, and even decamethonium itself may have a complex mode of action instead of being purely depolarizing. (Authors' abstr.)

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An Evaluation of Intravenous Ether as a Treatment for Psychiatric Patients.

1. Seventy-three committed patients diagnosed as having affective psychoses were divided at random into three treatment groups: one group received intravenous ether, one group intravenous saline, and a third group electric shock treatment.

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2. Of the 37 patients who received intravenous ether 37·8 per cent. were scored as " improved " ; 52·9 per cent. of the 17 patients who received intravenous saline were scored as " improved " ; and 89·4 per cent. of the 19 patients who received electric shock treatment were so scored. A comparison of the results obtained following intravenous ether and intravenous saline showed statistically no significant difference. The improvement following electric shock treatment was significantly higher than that obtained following either intravenous ether or intravenous saline.

3. Twenty-two of the patients who failed to improve with intravenous ether were then given electric shock treatment ; and 19 of these improved sufficiently to leave the hospital ; 7 of the patients who failed to improve with intravenous saline were then given electric shock treatment and all 7 improved sufficiently to leave the hospital. A comparison of the results obtained by electric shock treatment alone with those obtained by a combination of ether and electric shock or saline and electric shock showed no differences considered significant by statistical methods.

4. Autonomic nervous system tests showed that patients whose autonomic reaction was classified as " favourable " as far as electric shock treatment was concerned showed a higher rate of improvement with ether than did patients whose autonomic reaction would indicate a poor prognosis with electric shock treatment. However, the improvement rate in the " favourable " autonomic group cases was poor as compared with the expected improvement rate of similar cases treated with electric shock treatment.

5. It is concluded that intravenous ether as a treatment for affective psychoses showed no specific treatment effect that could not be obtained by intravenous saline, and that electric shock treatment was a much more efficacious treatment than ether in such cases. (Authors' abstr.)

Prefrontal Leucotomy for the Attempted Prevention of Recurring Manic-depressive Illnesses.

Evidence is presented to indicate that recurring manic-depressive illnesses are not inevitable.

" Prophylactic electroshock " prevents some recurrences, but the method requires the prolonged co-operation of the patient and is often distressing and distasteful to the patient. Moreover, electroshock is not without its own hazards.

" Prophylactic leucotomy " also prevents some recurrences. It does not require the continued co-operation of the patient. Follow-up studies in the authors' series of cases indicate that no patient has had a recurrence of symptoms, the maximum length of postleucotomy observation being approximately 4 years. A longer period of study is, of course, necessary, and it is proposed to follow these patients through the after-care department for many years. (Authors' abstr.)

What Happens to Alcoholics.

Approximately 28 per cent. of all alcoholics will drink themselves to death, 7 per cent. will regain partial control of their drinking, 3 per cent. will be able to drink moderately again, and 29 per cent. will continue to have the problem of drinking throughout their lifetime. Twenty-two per cent. will stop drinking during a terminal illness and 11 per cent. will quit drinking exclusive of a terminal illness.

Most alcoholics who quit drinking will probably do so on their own without outside help (7 per cent. of this series of 500 cases). Spiritual reconversion has been the biggest help to alcoholics who have become abstinent (3 per cent. of this series). In the past medical treatment has been of some, but not great help (1 per cent. of this series).

The average age at death of these 500 alcoholics was 52 years. Many alcoholics quit for prolonged periods of time only to relapse at some later date. Eleven per cent. commit suicide. (Author's abstr.)

Differential Indications for the Use of Glutamic Acid.

The 11 epileptics showed a rise of 13 points on medication, and the 9 psychotics showed an average rise of 19 points, but no basic change in the psychotic picture, aside from better contact with reality.

The 106 emotionally immature, mentally retarded, brain-insulted children were of 3 types, as follows :

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1. Twenty-four children suffering from malnutrition in early infancy, 10 having been decidedly premature, showed an average rise in I.Q. of 17 points.

2. Twenty-five children who had suffered from head injuries, 12 of these at birth and 13 at a later date, showed an average rise in I.Q. of 19 points.

3. Fifty-seven children who had suffered from brain insults (12 encephalitics, 6 " character change after high fever," 12 otitis, 7 measles, 5 appendicitis, 3 pneumonias, and the remainder various other illnesses, all followed by change in character) showed an average rise in I.Q. of 16 points.

From the above findings the writer concludes that, while glutamic acid is of little or no use in most cases of mental retardation, it is of decided value where that retardation is accompanied by a history of brain insult and emotional immaturity.

(Author's abstr.)

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Neuropathologic Lesions following Lobotomy : A Study of Fifteen Cases of Bilateral Prefrontal Leucotomy.

The objectives of this survey were the study of the brain changes following lobotomy and the influence of infection, toxins, systemic disease, etc., on the course of healing of the wound. The findings in the cases of long and short survival are compared and evaluated.

1. The brain wound is larger than the original incision in all cases.

2. The process of repair in an aseptic wound is slow and when completed results in cystic necrotic formations in the white matter of frontal lobes.

3. The cortical wound heals faster than the subcortical.

4. The meninges are thickened, and there are often adhesions between the dura, lepto-meninges, and the cortical wound.

5. The process of repair may be greatly retarded by bacterial infections, toxins, focal and systemic infection, nephritis, etc., preceding or following lobotomy.

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6. Because of technical difficulties, more tissue is destroyed than the rationale of this treatment warrants.

7. The clinical expression of this added destruction may account for many symptoms beclouding the release of tension and anxiety achieved by sectioning of the thalamofrontal fibers. (Authors' abstr.)

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Effect of Prefrontal Lobotomy on Intellectual Functioning in Chronic Schizophrenia.

The Wechsler-Bellevue Intelligence Scale, Raven's Progressive Matrices, the Wechsler Memory Scale and the Benton Visual Retention test were used to study the effects of prefrontal lobotomy on intellectual functioning in a group of patients with chronic schizophrenia. By comparison of the scores obtained prior to operation with those obtained at successive intervals of three weeks, three months, six months, and one year after operation, an indication of the gains or losses in intellectual functioning was demonstrated at each period. After the operation all the four tests showed the same general increase in intelligence.

The most important finding in this study is the significance of the time factor in testing intervals. Three weeks after the operation a decrease in intellectual functioning was apparent, but it was followed by a gradual increase, until by the six-month period the intellectual functioning had arisen to equal, if not surpass the pre-operative level. Moreover, further increases in intellectual functioning were demonstrated at the one-year period. This would suggest that any conclusions made before a sufficient period had elapsed after the operation would only be misleading, and probably false.

When the intelligence of psychotic patients was compared with their premorbid intelligence, impairment was exhibited. But when the study was continued over a sufficient length of time, a gradual increase in intellectual functioning was noted, the intelligence exceeding the pre-operative level at least, and with a tendency to equal the premorbid level. It may be suggested, then, that the deficit in intelligence is not due entirely to prefrontal lobotomy, but may be caused in part by the deteriorating effect of the psychosis.

On the evidence presently available, it would be presumptuous and imprudent to conclude that prefrontal lobotomy has no effect on intellectual functioning, but it can be stated that after the lapse of six months no adverse effects on intellectual functioning were demonstrated by the objective psychometric measures utilized in this study. (Author's abstr.)

Test of "the Abstract Attitude" in Chimpanzees Following Ablation of Prefrontal Cortex.

The subjects of this study were two chimpanzees that had undergone bilateral ablation of the prefrontal cortex at the age of 2 months and two normal (control) animals. All four animals were trained on a three-cue discrimination problem, and were then tested with pairs of objects which presented only one of the stimulus differences. Subsequently the animals were trained on the reverse of the original discrimination and were then given single-cue tests based on the reversed habit. It is suggested that the single-cue tests provide an index of sensory abstraction, which is probably the principle function tapped by the sorting tests often used with human patients as a measure of the "abstract attitude." No significant differences between the experimental and the normal subjects were found in the reduced-cue tests, initial learning, or reversed learning. All four animals were able to discriminate on the basis of the component properties of the training stimuli.

The two animals with prefrontal ablations gave more frequent and more violent emotional expression to the frustration of failure than did the slightly older control subjects. (Authors' abstr.)

Relation of Social Attainment to Psychological and Adrenocortical Reactions to Stress.

These findings may be briefly interpreted as follows:

Subjects with higher social attainment, particularly in the area of formal group associations, showed more adaptive responses to the Target Ball Frustration Test. They were less stressed physiologically; i.e., less pituitary-adrenal response, measured by the increase in the rate of excretion of 17-ketosteroids, was evoked. They shifted their goals more realistically after failure.

In the continuation of this study scales of social attainment and adjustment will be constructed, using material from psychiatric interviews with normal men. With the use of these scales, the subject's interpersonal adjustive mechanisms and his pituitary-adrenal and psychologic responses to experimental stresses will be explored further. (Authors' abstr.)

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Personality Factors in Denial of Illness.

The premorbid personalities of 28 patients with brain disease who explicitly denied illness, including such disabilities as hemiplegia and visual loss and the fact that a craniotomy had been performed are reviewed. The findings are compared with those in a group of 28 patients with comparable disabilities, similar lesions and electroencephalographic records, but without explicit verbal denial.

Explicit verbal denial occurred only in patients who had previously demonstrated certain personality attitudes. They were people with compulsive drives, a great need for prestige and the esteem of others, and a record of always having denied felt inadequacies. Illness was regarded as an imperfection which had to be denied or justified. Life experiences had been valued, not for their intrinsic satisfactions, but as a means of maintaining prestige and " security."

In the patients whose attitudes had been expressed predominantly in verbal symbols, in concern with " principles " and " being right," the denial was most complete and the mood was usually affable and serene. In the patients whose feelings were expressed in more " physical " symbols, relating especially to the body, food, and sexual activity, denial was less complete and the predominant mood was paranoid.

Explicit verbal denial is only one of the symbolic expressions of denial. Implicit manifestations include drowsiness and muteness, certain motor acts, alterations in sexual behaviour, and the use of humour. While an altered milieu of brain function is necessary for the existence of all these patterns of denial, the choice of the particular element is determined by personality factors. (Authors' abstr.)

Adrenocortical Responsibility to Electric Shock Therapy and Insulin Therapy.

A study of the adrenocortical responsivity to insulin and/or electric convulsion therapy in 56 patients in a state hospital is presented. The relations of the adrenocortical response to duration of illness, sex, type of treatment, and prognosis are discussed. Of the 56 patients receiving somatic therapy, approximately 91 per cent. had a responsive adrenal cortex. Approximately 9 per cent. showed no response in the function of the adrenal cortex. Of approximately 91 per cent. of the patients in whom the somatic therapy influenced the adrenal cortex, the somatic therapy had an antiadrenocortical effect in approximately 80 per cent. and a stimulating effect on the adrenal cortex, as evidenced by the cellular changes, in approximately 11 per cent. Of the approximately 9 per cent. in whom the adrenal cortex was unresponsive, all remained unimproved. Of the 80 per cent. of patients in whom the somatic therapy had an antiadrenocortical effect, approximately 75 per cent. showed improvement in their mental condition with 15 patients much improved and 18 patients improved.

Although a functional disease may be a result of or a cause of, or may have no direct relation to, an unresponsive adrenal cortex, the eosinophile level may give a clue to the patient's diagnosis, based on the function of the response of the adrenal cortex to stress (somatic therapy).

In general it can be stated that a fair prognosis can be expected in patients on whom the somatic therapy had an antiadrenocortical effect, and that patients with an adrenal cortex unresponsive to somatic therapy have a poor prognosis. There is no correlation between the degree of the depression of the function of the adrenal cortex and the extent of the patient's improvement. (Authors' abstr.)

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A Study of Thalamic and Cortical Rhythms in Petit Mal.

Electrographic records have been obtained from the thalamus, white matter, and cerebral cortex during *petit mal* in children. A large number of attacks have been studied in 6 cases.

The sequence of events in the *petit mal* attack was found to be :

(1) A rhythm of 3-a-second begins in the thalamus. This rapidly increases in voltage and persistence until it reaches the cortex.

(2) When it has done so a fast spike originates deep in the cortex. The " initial spike " usually has a high voltage and it travels down to the thalamus.

(3) When this spike reaches the thalamus the site of origin of the 3-a-second wave alters and becomes more superficial (lateral and ventral) within the thalamus.

(4) The wave which has now arisen in a new position in the thalamus is then followed by a spike which seems to arise deep in the cortex. This process is repeated in a stereotyped way.

(5) As the attack proceeds the speed of the rhythm usually falls slightly from 3 to about 2·5 a second. After it has done so the voltage of the cortical spike rapidly drops. The spike then ceases and the wave then similarly decreases in size and disappears.

(6) Although the thalamic rhythm seems to be responsible for the cortical spike, the spike seems to be essential for the continuation of the 3-a-second rhythm ; for if the rhythmic wave recommences and no spike occurs, the rhythm is not sustained.

(7) The average time taken for the spike to travel from the deep part of the cortex and ultimately to reach the thalamus is about 14 milliseconds, and that for the wave to return is of the same order.

(8) Each step in this chain of events is essential for the complete phenomenon of the " spike and wave discharge " of *petit mal* epilepsy. It seems, for example, to be necessary for the development of an attack for the initial 3-a-second wave to arise in a constant position deep within the thalamus. If this rhythm recurs in the secondary more superficial position which it adopts in a developed attack, it does not initiate a cortical spike. The rhythm then dies and the attack is stillborn.

(9) These results have been related to the results of animal experiments carried out in other laboratories and to observations on patients in stupor.

(10) The hypothesis is advanced that the clinical state of *petit mal* epilepsy is due to a disturbance in the thalamus which causes a rhythmic discharge throughout the cortex. The effect of this is a failure in the integration on the afferent side of the organism. This results in secondary akinesis, flaccidity and amnesia, which form the basis of the disability in the *petit mal* attack. Many of the differences in observed behaviour in *petit mal* and *grand mal* attacks can be explained upon this basis, regarding *petit mal* as a periodic disorganization of the afferent, affector side of the organism, which inhibits all awareness and " spontaneous " behaviour, in contrast to the other forms of epilepsy in which the disorganization occurs in the effector mechanisms. (Author's abstr.)

The Experience and Description of the Human Body.

We should differentiate between the physical body and the perceived body on the grounds of spatial location. The latter should be regarded as being coincident

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in space with the body-image in the brain of the physical body *if the theory of psycho-neural identity is held to be true*. In Broad's terminology (1923) the perceived body is a sense-field or cross-section of a sense-history. The physical body is a physical object. They are connected by Broad's formula *o–R–s*, in which the author has suggested (1952) that *R* stands for connection by signalling mechanism. The perceived body is directly experienced *inside* central consciousness. The existence of even the individual observer's own physical body is inferred. The term body-image should be reserved to describe a visual, mental, or memory image of a human body. Body-images are experienced. The constant visual imagery relating to the body and parts of the body associated with movement and sensation is integrated, largely by the sub-conscious system of servo-mechanisms, into the unitary function of the human organism. The term " body-schema " should only be used in its original sense. It is part of the subconscious mind and thus its presence is inferred. The body-concept is a conceptual constellation, and depends largely upon the proper function of the relevant memory mechanisms.

Before any sense can be made in the scientific approach to the mind-body problem it is essential that everyone, when using a term, should know exactly what it means, and that other people, using the same term, should mean precisely the same thing. This applies especially to terms describing the human body as this appears from various viewpoints—to the body itself and to the small model of itself which it carries within it. Otherwise nothing but confusion can result.

(Author's abstr.)

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An Analysis of Central Responses to Photic Stimulation in Normal Adults.

E.E.G.'s during rhythmic photic stimulation were recorded from 154 young normal adults and 40 mentally normal seniles with the following results and conclusions:

1. There was a significant association between the existence of spontaneous rhythms in the alpha and beta bands and evocation of responses by stimulation at these frequencies. This was attributed to a resonance effect.

2. A similar relation was observed between spontaneous beta rhythm and the occurrence of 2nd and 3rd harmonies of the stimulus frequency, also attributed to resonance.

3. There was no statistical relationship between spontaneous and evoked theta rhythm, nor with the occurrence of subharmonies.

4. There were no significant differences in flicker following characteristics between the young and old groups, but a significantly smaller incidence of 2nd subharmonies was found in the old group. This was tentatively attributed to maturation factors. The old group also showed a significantly greater incidence in the occurrence of 3rd harmonics, possibly related to the tendency for greater amplitudes of spontaneous beta rhythm in these persons.

5. No statistically significant sex differences were observed.

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6. 3·9 per cent. of the young group and 2·5 per cent. of the old showed frankly abnormal responses; 3·25 per cent. of the former and 2·5 per cent. of the latter showed questionable responses. All abnormal responses were epileptiform. Questionable responses were slow and often paroxysmal, usually harmonically related to the stimulus frequency.

7. Significantly greater incidences of following in the beta range and in the occurrence of 2nd and 3rd harmonies were found in these subjects possessing mean alpha frequencies above the mean of 10·3 c./sec. than in those with alpha frequencies below the mean. This was discussed in relation to the temperament variable secondary function, and may provide a possible measure of its behavioural strength.

8. Incidence of beta following and of 3rd harmonics was significantly greater in those subjects with " minus " type alpha rhythms as opposed to those with " responsive " or " persistent " alpha rhythms. This was briefly discussed in relation to imagination.

9. Observations of subjective sensation largely accorded with those of Walter and Walter. Abnormal and questionable responses were usually accompanied by more vivid and disturbing sensations. Subjective sensations are attributed to (i) interaction between spontaneous and evoked activity and/or (ii) augmentation of harmonically related rhythms. These effects may occur in any part of the brain, and in the case of non-visual sensations at least would involve thalamocortical systems. All may be present simultaneously, and all may affect or be altered by mental state, either intellectual or emotional. Subharmonic responses were tentatively attributed to possible instability or immaturity or cortical development.

10. Photic stimulation provides a valuable means for studying the behaviour of different rhythmic processes during changing mental content, since these can be amplified either as fundamentals or harmonically related components by appropriate rhythmic stimulation. A frequency analyser is essential for such study.

(Author's abstr.)

The E.E.G. and Reaction to Photic Stimulation as an Index of Anxiety-proneness.

One hundred and ninety-one subjects (patients and controls) were utilized in an attempt to develop an E.E.G. measure for selecting anxiety-prone individuals. All were carefully studied by psychological tests and psychiatric interviews and rated for their proneness to develop anxiety under stress. E.E.G.'s were taken under resting conditions and during intermittent photic stimulation. An electronic brain wave analyser was used.

There was a significant correlation between the criteria of anxiety-proneness and the following:

1. Per cent. of fast, slow and low alpha activity in the electronically analysed resting E.E.G.

2. Pattern of fundamental driving response.

3. Amount of harmonic driving response, particularly in the 20–30 c./sec. range to stimulation with flicker frequencies half or a quarter this rate.

4. Amount of subjective dysphoria produced by intermittent photic stimulation.

A check list of E.E.G. anxiety indicators derived from the above correlated 0·51 with the validating criterion of anxiety-proneness. (Authors' abstr.)

Value of Electroencephalography for the Differential Diagnosis of Neurosis and Organic Brain Disease.

1. Electroencephalographic findings of 263 patients with a clinical diagnosis of psychoneurosis were evaluated.

2. Sleep electroencephalograms on 200 patients revealed a 19 per cent. significant abnormality with clinical correlation.

3. Epileptic seizure discharges were recorded in 14 per cent. of those patients studied with sleep recordings.

4. The value of sleep electroencephalographic studies in clinical entities with a low titre of electroencephalographic abnormalities is emphasized.

5. A diagnostic electroencephalogram may be of value in a differential diagnosis in presumptive psychoneurotics with such complaints as major convulsions, abdominal complaints, amnesia, visual disturbances, rage attacks, nausea and vomiting and weakness—fainting—blackouts. (Author's abstr.)

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Spontaneous Excitation of the Visual Cortex and Association Areas : Lambda Waves.

1. Lambda waves are seen in the visual areas of relatively few persons, when the eyes are opened, and disappear on eye closure.

2. Lambda waves depend on light entering the eyes, and disappear in darkness.

3. Lambda waves are blocked if vision is fixed on a point, or if the field being viewed is uniform ; they are most frequent during pattern vision.

4. When lambda waves are present, the area showing them also exhibits a large response to photic stimulation. (Author's abstr.)

Cortical and Subcortical Recordings in Natural and Artificially Induced Sleep in Cats.

1. A technique was developed for recording the subcortical and cortical potentials of unrestrained waking animals. Bipolar records were made between points in frontal, parietal and occipital regions of the cerebral cortex as well as from the intralaminar region of the thalamus and from the head of the caudate nucleus. The E.E.G. could be correlated continuously with behaviour.

2. The *resting* rhythm of the cat, unlike the human alpha rhythm, consists of short irregular bursts of high voltage 5–8 c./sec. waves. Feline sleep patterns reveal striking similarity to those in man. There is a stage of *drowsiness* corresponding to the human C-stage in which appear spindles of 11–16 c./sec. waves of 200–400 μV., V-waves (Liberson) and occasional sharp wave-like potentials. In *deep sleep*, corresponding to the human D-stage, there are bilaterally synchronous 1–3 c./sec. high voltage waves predominating for prolonged periods. However, stages comparable to the human B-stage and E-stage cannot be identified with certainty, and spindles are not a reliable indication of the depth of sleep.

3. Subcortical and cortical potentials are similar in form and often occur simultaneously. Synchrony is greater in sleep potentials than in resting rhythm. There is remarkable variability in the crossed and uncrossed association of the potentials of cortical and subcortical levels. A constant site of origin of sleep and rest waves could not be established. However, slow waves are more often observed in subcortical recordings, while spindles are prevalent in the cortical tracings. There is no evidence that sleep potentials constantly arise in the subcortex.

4. As a rule alterations in the E.E.G. run parallel to changes in behaviour, although the latter may precede evident variation in the electrical activity by 20–30 sec. during the onset of sleep. Occasionally there is dissociation of behaviour and E.E.G. during the early stages.

5. The records taken during sleep induced by electrical stimulation of the thalamus and during the akinetic drowsy stage following stimulation of the caudate nucleus bear close similarity to the E.E.G. of normal sleep. There are striking differences between the patterns of normal sleep and barbiturate narcosis. The barbiturate spindles are analogous to the drowsiness spindles of the somnolent animal. However, as narcosis deepens they become altered in form and markedly slowed. Another characteristic of barbiturate anaesthesia is the independent formation of atypical delta waves in the caudate nucleus. (Authors' abstr.)

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The Clinical Significance of Photic Stimulation.

An analysis of central responses to rhythmic photic stimulation among a variety of clinical groups revealed the following results and conclusions:

1. Abnormal responses ranged from 13 to 25 per cent. in groups of patients suffering from probable epilepsy and allied disorders, and were more frequent in cases with minor than major or other type seizures. Incidence of abnormality rose to 36 per cent. among behaviour deviate children without fits and 68 per cent. with fits. Abnormal responses fell largely into three categories: wave-and-spike (W.S.), frontal spike and dysrhythmic, although all may be present in the same individual. Details of questionable responses were also outlines.

2. A significantly greater incidence of 3rd subharmonics and significantly higher mean amplitudes of responses in theta and low alpha (8–10 c./sec.) bands were found amongst patients with probable epileptic and allied disorders than among 154 young normal adults. This was not the case in an African group comprising chiefly major and other type seizures.

3. The importance of harmonic, subharmonic and phase relationships in the formation of seizure activity was stressed, particularly in the occurrence of the W.S. response. Slow components of the latter and slow waves associated with frontal spikes appear to operate in at least two possible ways; one as a release mechanism permitting irradiation of afferent visual responses at a diencephalic level, the other as a protective, self-limiting device prohibiting the occurrence of further spikes. Slow waves in the former category are often 3rd or lower subharmonics and are attributed to resonant excitation at the diencephalic level. It is postulated that this activity is reflective of a constitutional electro-cerebral instability, and that such responses should not be regarded as normal.

4. Abnormal responses to photic stimulation in some psychiatric disturbances may disappear during varying time intervals ranging from a few minutes to several months. The former may be due to soothing and calming, the latter appears to be related to successful treatment, whether it be physical, psychological or both. The involvement of diencephalic structures in certain psychotic and psychoneurotic disorders is implicated, and the need for further research stressed.

5. The high incidence of abnormal responses to photic stimulation among young behaviour deviates, particularly those with fits, was attributed to thalamo-cortical instability and immaturity of cortical development. Amplitudes of theta responses and incidence of 3rd subharmonics were also high among these groups. It was suggested that responses to photic stimulation may provide some measure of psychological and particularly emotional stability in children.

(Author's abstr.)

Sensory and Thalamic Synchronization in the Olfactory Bulb.

1. The electrical activity of the olfactory bulb may be synchronized by blowing air into the ipsilateral nostril (Adrian's induced waves), or during the initial phase of anaemia produced by clamping bilaterally the common carotid arteries. This synchronization is peripheral in nature, since it is observed after severing all connections with the brain.

2. Recruiting responses are recorded from the surface of the olfactory bulb during low-frequency thalamic stimulation. Although smaller in amplitude than the corresponding potentials led from the motor cortex, the recruiting waves represent a genuine thalamically induced synchronization of the olfactory bulb, since they are selectively abolished when this structure is anatomically but not physically disconnected from the brain.

3. Only the centrally induced synchronization is abolished during bulbo-reticular activation. When "wave and spike" patterns timed by the thalamic stimulation

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occur in the olfactory bulb, the wave component may be selectively blocked by appropriate bulbo-reticular stimuli. The significance of these findings is discussed. (Authors' abstr.)

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Deposits of Fluorescent Acid-fast Products in the Nervous System and Skeletal Muscles of Adult Rats with Chronic Vitamin-E Deficiency.

Neuromuscular lesions, in particular the regular occurrence of deposits of fluorescent, acid fast products in the nervous system and skeletal muscles of adult rats that have long been kept on a vitamin-E deficient diet, are reported. The findings generally confirm the earlier observation and description by Einarson and Ringsted (1938) of these neuromuscular lesions, and in particular of lipoid products in the nervous system of adult rats in chronic vitamin-E deficiency. Furthermore, it is demonstrated that the nerve cell changes and the acid fast deposits are far more widely distributed in the nervous system than was previously thought.

A brief account is given of the clinical symptoms displayed by rats, and some remarks on technique.

The histological examination clearly shows that the disease is due to a combination of neurogenic and myogenic lesions as originally maintained by Einarson and Ringsted (1938, 1939). The lesions consist of degeneration of the dorsal roots and posterior fasciculi of the spinal cord, myogenic changes of the skeletal muscles followed by pronounced changes of the visceral and somatic motor and sensory

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cells of the spinal cord and brain stem, as well as of the cells of the spinal and cranial ganglia, and gradually features of neurogenic muscular atrophy are superimposed on the earlier myogenic changes. Somewhat later there appear mild changes in the sciatic nerves and marked diffusely distributed cell changes in the central nuclei of the brain and the entire cerebral cortex, followed by mild cell changes in the cerebellum.

Everywhere the changes are highly characteristic of the lipoid products. Besides staining reddish-orange with fat stains they are characterized by their relative insolubility in lipoid solvents, their affinity for basic aniline dyes (orthochromatic staining), their acid-fastness when stained by Ziehl-Neelsen's carbol fuchsin, their bright, yellow, primary fluorescence on ultra-violet irradiation, and by the fact that they are left completely unstained by gallocyanin-chromalum, a stoicheiometrical staining reaction for nucleic acids. These properties strongly suggest that we are dealing with a lipoprotein combination (ceroid) which does not contain nucleic acids.

The fluorescent acid-fast products appear as fine, rounded granules or coarsely globular particles, sometimes coalescing to compact masses. They lie in the cytoplasm of the nerve cells, in or about glial cells and histiocytes, and in the walls of the blood-vessels, and they occur almost all over the nervous system. In the muscles they lie both inside and outside the muscle fibres. They are regularly absent in controls receiving protective doses of vitamin E.

In the nerve cells the progressive increase of the fluorescent acid-fast substance invariably involves a corresponding decrease in the ribonucleic acid of the cytoplasm until it completely disappears, a cell change accompanied by more or less eccentric displacement, hyperchromatosis, and shrinkage of the nucleus (" cellular lipodystrophy." The early appearance and marked intensity of this cell change in the autonomic centres of the spinal cord and brain stem is particularly emphasized.

The changes must start at a submicroscopic, biochemical level, and their early irreversibility is pointed out.

Fluorescent, acid-fast products comparable with those described in rats may be observed in human necropsy material, more or less mixed with the commonly occurring lipochrome. (Author's abstr.)

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Cortical Response to Activity of Callosal Neurons.

Preliminary to the analysis of callosal potential, the origin and termination of callosal fibers have been considered on the basis of Golgi and Golgi-Cox preparations. Neurons contributing axons or collaterals to the corpus callosum are mainly those situated in the deeper strata and especially layer VI of the cortex, whereas the

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terminals of these fibers are mainly distributed as free endings in the upper layers (layers I, II and III).

The electrical response to stimulation of a symmetrical point on the contralateral cortex was found to be localized in a restricted cortical area with a focus characterized by the appearance of a maximal negative spike. Although its basic pattern remained fairly constant throughout the isocortex the callosal potential varies in detailed wave from from region to region, depending presumably on the distribution of callosal neurons in the respective cortical areas.

On the basis of the distribution of the cortical response to direct callosal stimulation, a topical relationship was found existing between the corpus callosum and the cerebral cortex.

The response pattern of callosal potential varies with the stimulus strength from a simple diphasic wave into a deep and broad positive wave, superimposed by a sharp negative deflection and followed by a prolonged negative phase. This response pattern can be broken up into three partly superimposed constituent parts: The first is an initial positive phase caused by the antidromic volley and the presynaptic orthodromic impulses; the second is a superimposed sharp negative deflection, which is interpreted as representing mainly the activity of the superficially placed callosal afferents and their postsynaptic neurons; and the third is a slightly prolonged positive-negative diphasic wave attributable to the activity of the rather diffused callosal afferents terminating in the second and third layers and the postsynaptic discharges therefrom.

The second component can be readily and selectively abolished by local application of novocaine to the cortical surface. The first components and a part of the third, which are considered as representing the antidromic and the orthodromic incoming volleys, cannot be enhanced by local strychninization of the cortical surface.

(Author's abstr.)

Interaction of Evoked Cortical Potentials.

The interaction in the sensory cortex of the thalamic, callosal and locally induced cortical impulses has been studied by means of various combinations of paired stimuli at different intervals. It is found that the early positive phase of the callosal potential and the locally evoked cortical dendritic potential are mutually exclusive. The negative component of the callosal potential can be completely inhibited by the dendritic potential and, similarly, the dendritic potential will be completely blocked if the direct cortical stimulation is made during the rising phase of the negative component of callosal response.

The interaction between the thalamic and callosal volleys is characterized by the following phenomena: (i) The first negative component of callosal potential has a blocking effect on the positive component of the primary cortical response to auditory (thalamic) stimulation. (ii) The negative component of the cortical response to sound stimulation suffers severe and prolonged inhibition from the callosal potential. The former is believed to be due to the partial involvement of apical dendrites of common neurons in both kinds of potentials, and the latter can be taken as an indication of inhibitory effect from the activity of intracortical internuncial neurons. (Author's abstr.)

Linear Relationship between Fiber Diameter and Velocity of Conduction in Giant Axon of Squid.

1. Conduction velocity and fiber diameter have been measured in the main trunk of the largest stellar nerve ("ultimate") of the common squid. The diameter and conduction rates have thus necessarily been studied over a very limited range (260–543μ and 18·2–34·8 m./sec. respectively). The range of the fiber sizes studied in this animal should be extended.

2. The conduction velocities given in this paper are considerably faster than those reported previously. This discrepancy is shown to be due to technical defects of earlier experiments.

3. Conduction velocity increases approximately 6·5 m./sec. with an increase in diameter of 100μ.

4. The relationship between diameter and conduction velocity is a linear one, and is in accordance with the accepted correlation for verbetrate and myelinated

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nerves. The square root relationship previously described for this cephalopod nerve is shown to be in error, and due in large measure to some of those technical faults which gave the low conduction rates. (Author's abstr.)

Effects of Nembutal in Baboons with Frontal Lesions.

After receiving six months of intensive post-operative training three baboons with dorsolateral frontal lesions and three with ventromedial frontal lesions were trained while under the effects of Nembutal on a delayed-alternation problem. The scores of three animals showed significant improvement, demonstrating that barbiturates may facilitate performance even though prior to sedation animals have been allowed an extended recovery period. It is suggested that prolonged training with sedation is an important though not a sufficient condition for improvement. No consistent relationship appeared, however, either between the locus of lesion or the previous performance level and the effect of the drug. (Authors' abstr.)

Action Potentials in " Motor " Cortex Evoked by Peripheral Nerve Stimulation.

1. The presence and pattern of distribution of action potentials in the motor cortex evoked by peripheral electrical stimulations as previously described has been confirmed in monkeys.

2. These action potentials are unaltered by resection of either the post-central gyri or the cerebellum, or both, The known anatomical pathways are insufficient to account for these results.

3. These action potentials can be evoked from electrical stimulation of both muscle and skin nerves. (Authors' abstr.)

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Perceptual Constancy in Schizophrenia. I : Size Constancy.

This paper presents, as part of a larger investigation, a study of size constancy in schizophrenia. The subjects utilized in the experiment were 30 paranoid schizophrenic patients, 30 nonparanoid schizophrenic patients, and 30 college student controls.

A consideration of the possible relationship between ego-structure and the constancy mechanisms led to the formulation of the following hypotheses: (1) paranoid schizophrenics would tend to show higher constancy scores than normals; (2) nonparanoid schizophrenics would tend to show lower constancy scores than normals; (3) the groups would tend to approach each other in their scores when the number of cues was increased.

The hypothesis that the paranoids would show higher constancy scores than the normals was confirmed. The hypothesis that the nonparanoid schizophrenics would show lower constancy scores than normals was not confirmed. There was a trend for differences between the groups to be reduced when the number of cues was increased; this trend was significant, however, only for the paranoid-normal comparison. Some limitations and possible implications of these results are discussed. (Author's abstr.)

An Experimental Study of Schizophrenic Interpretations of Non-representational Painting.

The question that stimulated the present study was whether the schizophrenic, by virtue of the breakdown of his own repressive mechanisms, was thereby rendered more sensitive to the expression of unconscious material on the part of others. To test this hypothesis a series of nonrepresentational paintings by recognized contemporary artists was presented for interpretation to a group of thirty-one schizophrenics and an equal number of non-schizophrenic controls. Analysis of the protocols by experts in projective techniques revealed an over-all tendency for the schizophrenics, in comparison with the controls, to respond on a more "symbolic" level that was less in keeping with the manifest content of the picture. Moreover, the task seemed to absorb their interest more completely, resulting in notably greater productivity.

A breakdown of the data with respect to specific paintings on the whole confirmed the general trend, but reached statistical significance for only the Kandinsky and Picasso selections. To determine the basis of the special value of these particular pictures an empirical content-analysis was undertaken. Although no reliable group differences were found, there was a tendency for the schizophrenic subjects to respond in greater detail. This was interpreted as a reflection of greater projectivity of the psychotics in response to the ambiguity of these pictures, rather than as an intuitive grasp of the artists' unconscious symbolism.

The second part of the experiment was concerned with the interpretations of paintings by a psychotic patient. "Correct" interpretations obtained through the records of therapy sessions were available for comparison with those made by the subjects. Analysis of the experimental protocols failed to reveal the schizophrenics as more sensitive than non-schizophrenics to the symbolism of the artist. The only reliable intergroup difference was the schizophrenics' greater reactivity to color regardless of specific symbolism.

We may conclude that within the limits of the evidence reported in this experiment, the hypothesis that the schizophrenic responds to pictorial art on a more symbolic and less realistic level than the non-schizophrenic is supported. The corollary, however, that dependence on archaic, symbolic modes of thinking makes the schizophrenic more sensitive to the specific unconscious symbolism of others received no confirmation from the present date. It still remains a heuristic hypothesis that should be put to further experimental check. (Author's abstr.)

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Histamine Therapy in Psychiatric Disorders.

1. The effects of histamine therapy were clinically evaluated in 23 psychiatric patients, all of whom had been in the hospital for less than one year.

2. The diagnoses of these 23 patients included: Schizophrenia, 16; manic-depressive, depressed type, 2; involutional paranoid, 1; psychoneurosis, conversion hysteria, 2; and organic psychosis, 2.

3. The results in this group of 23 patients were as follows: two patients with psychoneurosis, conversion hysteria, responded favourably. Fourteen patients showed no change. Seven patients had aggravations of symptoms when therapy was completed.

4. Histamine therapy is ineffective in the treatment of psychiatric disorders.

(Author's abstr.)

PSYCHOANAL. QUART.

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PSYCHOSOM. MED.

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Autonomic Response Specificity: An Experimental Study.

Eighty-five male college students were subjected to four stresses in sequence. The stresses were mental arithmetic, hyperventilation, letter association, and the cold pressor test. Palmar conductance, heart rate, and variability of heart rate were simultaneously and continuously recorded. The results were analysed in terms of autonomic tension and autonomic lability. Autonomic tension was defined as the maximum level a physiological function reaches during stress. Autonomic lability was defined as the maximum displacement a physiological function exhibits during stress.

The experiment was designed to test the hypothesis of relative response specificity which states that for a given set of autonomic functions individuals tend to respond with a pattern of autonomic activation in which maximal activation occurs in the same physiological function, whatever the stress. This hypothesis was decisively supported.

The detailed results suggested an extension of the principle of relative response specificity. The revised hypothesis is: For a given set of autonomic functions there exists quantitative variation among individuals in the degree to which a pattern of response is stereotyped. Some individuals are so constituted that they

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will respond with a given hierarchy of autonomic activation whatever the stress; others will show greater fluctuation from stress to stress, although they will exhibit one pattern more frequently than others; still other individuals randomly exhibit now one pattern, now another. In addition, although the rank order of reactivity remains the same from stress to stress, the quantitative difference between the degree of activation of the different physiological functions will fluctuate markedly.

(Authors' abstr.)

Photically-activated Electroencephalogram: Research Tool in Psychiatry: Preliminary Observations.

1. Electroencephalography used in conjunction with intermittent photic stimulation seems a promising tool for psychiatric research. The results of a preliminary investigation on 20 psychiatric patients and 45 control subjects are reported.

2. Brief psychiatric and psychological screening examinations revealed that 26 of the 45 "normal controls" showed some evidence of maladjustment. This group was found to have an increased response to photic stimulation at frequencies of 20 to 30 c.p.s., and showed some tendency to greater second harmonic response than 19 subjects who had little or no evidence of personality maladjustment.

3. Rhythmic photic stimulation can, in susceptible subjects, induce subjective sensations, frequently of a dysphoric nature. In psychiatric patients such sensations may take the form of previously experienced symptoms.

4. A lowered convulsive threshold has been demonstrated by the production of seizures by photic stimulation alone in 4 patients with psychiatric disorder whose symptoms included "attacks" with motor manifestations. Myoclonic reactions or generalized seizures were also produced in five control subjects with no personal history of convulsive disorder, all of whom had either some personality disturbance, a personal history of syncope, a family history of convulsive disease, or some combination of these. In individuals in whom seizures were produced certain frequencies seemed critical, whereas adjacent frequencies could produce a less severe reaction or only subjective dysphoria.

5. These findings indicate that a tendency to paroxysmal response may be found in subjects other than those with manifest convulsive disorder, and that such a tendency may occur in subjects who present primarily psychiatric disorders.

(Author's abstr.)

MARCH–APRIL.

*The E.E.G. in Psychological Disorders. *Kennard, M. A.* 95
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The Electroencephalogram in Psychological Disorders.

1. The evidence of many authors, publishing over a period of fifteen years, on the subject of the E.E.G. in psychological disorders has been assembled and evaluated. In the light of the evidence presented certain answers to the questions postulated in the introduction seem clear.

2. There is a greater proportion of abnormal E.E.G.'s in individuals with psychopathology.

3. A certain number of these abnormal records can be correlated with organic focal disturbances of the central nervous system, as indicated by clinical signs and by objective laboratory test other than the E.E.G. At the present time the sole practical significance of an abnormal E.E.G. in a patient with psychopathology lies in the detection and isolation of such cases.

4. There is a far larger group of individuals with psychological disorders who have abnormal E.E.G.'s for which no focal organic pathology has as yet been found. A primary psychological disturbance exists in these cases.

5. The pattern of the E.E.G. in both normal individuals and in those with psychological disturbances is thought to have some relation to personality type.

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Instability of personality and instability of E.E.G. pattern have been thought to coincide in many instances.

6. The most obvious abnormality of pattern which is related to psychopathology is one of lowered threshold to various environmental stimuli. Diminished alpha activity and increased fast activity occur also, and the sensitivity may result in paroxysmal dysrhythmia.

7. It is suggested by these data that the factors underlying the pathological sensitivity of electrocortical activity may be one or many of several known to be related to lowered threshold excitability. Hereditary factors play an important part. Changes in the structure and chemistry of the nervous system, as well as psychological factors may contribute.

8. It is very likely that further study of the E.E.G. and psychopathology may produce a better definition of their interrelations. These should be of great theoretical value in the study of both the etiology and therapy of disorders of behaviour. (Author's abstr.)

MAY–JUNE.

*Emotional Reactions of Rheumatoid Arthritics to ACTH. *McLaughlin, J. T., et al.* 187
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Psychotherapy of a Hospitalized Orthopedic Patient. *Perman, J. M., and Rapoport, J.* 252
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Emotional Reactions of Rheumatoid Arthritics to ACTH.

The size of the series is not such as to justify absolute conclusions. However, the following points are rather strongly supported by the data:

1. The administration of moderate amounts of ACTH to the rheumatoid arthritics of this series produced a significant objective clinical improvement in 50 per cent. of those treated. The preliminary use of a placebo in 8 patients, 5 of whom subsequently responded to ACTH, failed to produce even a slight objective response.

2. The administration of ACTH to patients of this series produced emotional effects that included, but went distinctly beyond, the suggestive effect and passive-dependent gratifications of a highly publicized treatment regime.

3. Patients of this series who received average amounts of ACTH (60 to 80 mgm. per day) did not show gross personality changes. True euphoria did not occur in those patients treated with moderate amounts of ACTH. Two instances of severe emotional disturbance occurred when an average amount of ACTH had failed to evoke a satisfactory clinical response and higher dosages (90 to 120 mgm. per day) were employed.

4. A frequently seen emotional response to ACTH in the patients of this series consisted of an enhanced aggressiveness handled variously according to the established reaction patterns of the individual patient.

5. Feelings of well-being, decreased tension and lessened fatigue were prominent in the patients who gave positive clinical responses to ACTH, whereas increased tension and irritability were seen in the unresponsive cases.

6. An apparently significant relationship was rated between dream recall of arthritics and their clinical response to ACTH.

7. There was an apparently significant relationship between changes in stress levels and clinical response to ACTH. (Authors' abstr.)

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1. Biochemistry, Physiology, Pathology, etc.

Migraine, its Forms, Causes and Treatment. de Wit, J. C. [*Geneesk Bladen Klin. Lab. Praktijk* (*Haarlem*), **43**, 291 (1949) (*in Dutch*) ; *Excerpta Med., Sect. VIII*, **3**, 397 (1950).]

The pathological and physiological aspects are discussed. Hormones play only a secondary role in migraine. The attacks are attributed to an increased output of cholinesterase (I) which breaks up acetylcholine (II). To abort an attack ergotamine is the best drug. For prophylaxis to prevent attacks, prostigmine (III) (with or without (II) is recommended). (III) inhibits the formation of (I), is well tolerated in prolonged use, and is effective in very small doses.

W. C. Tobie (Chem. Abstr.).

Diagnosis and Localization of Organic Lesions of the Central Nervous System using Radioactive Diiodofluorescein. Davis, L., and Goldstein, S. L. [*Radiology*, **59**, 514 (1952).]

Radioactive diiodofluorescein was used in the study of 536 patients with the diagnosis of an intracranial lesion and observations correlated with the preoperative clinical diagnosis, electroencephalography, pneumography, angiography, and surgical and autopsy observations. The results indicate that this radioactive isotope dye test is a valuable diagnostic adjunct in neurosurgical problems not only because of its high degree of accuracy in determining the presence of brain tumours, but also because of its relatively precise focal localization. The possibility of prognosticating in a general fashion the relative degree of cellularity and vascularity of the tumour also appears to be feasible. Approximately 1·1 millicuries of the radioactive dye contained in a sterile 8 to 10 per cent. solution is injected intravenously, with appropriate radioisotopic precautions to prevent contamination of the skin of the patient and operator. The uptake in the brain is then determined by external counting with the aid of a single-channel differential radiation localizer.

G. L. Clark (Chem. Abstr.).

Lipides and Total Nitrogen in the Central Nervous Tissues of Vertebrates. Mihara, T. [*Kyushu Mem. Med. Sci.*, **3**, 11 (1952) ; *cf. C.A.*, **46**, 9181*b*.]

Cephalin, sphingomyelin, cerebroside, total cholesterol, crude protein and total ash were present in the whole cerebrum in higher concentration in mammals than in lower-class vertebrates, but lecithins, total N and ash were in lower concentration in mammals than in lower-class vertebrates. The distribution pattern of the lipides in the white and grey matter was alike in all species examined. There was no significant difference in the constituents of cerebellum, medulla oblongata and spinal cord among the various species. J. D. Taylor (Chem. Abstr.).

Permeability in Relation to Nerve Function. (IV) Effect of Glutamate and Aspartate on the Rate of Entrance of Potassium into Brain Cortical Slices. Korey, S. R. [*Biochim. et Biophys. Acta*, **9**, 633 (1952) ; *cf. C.A.*, **46**, 4633*h*.]

Rabbit cortical slices were kept in oxygenated Krebs-Ringer solution for 25 minutes to adjust the cells to the medium, then placed in a solution of the same composition in which part of the K had been replaced by K^{42}. Slices were removed after various times at 23°, washed, plated, dried, and counted. To test the effect of pH slices were pre-exposed in solutions at a given pH for 25 minutes, then incubated for 20 minutes in a solution at the same pH but containing K^{42}. Experiments were also conducted in which 0·03 M L-glutamate or aspartate were added, reducing the concentration of NaCl to maintain isotonicity. Variations in pH from 5·0 to

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8·0, and the addition of glutamate or aspartate, did not affect the rate of entry of K^{42} into the cortical cells. Suggestions are presented to explain the lack of effect of the amino-acids on the rate of penetration of K, in view of the work of Krebs.

MORTON PADER (Chem. Abstr.).

The Changes in Cerebral Vascular Resistance of Man in Experimental Alkalosis and Acidosis. Schieve, J. F., and Wilson, W. P. [*J. Clin. Invest.*, **32**, 33 (1953).]

Metabolic acidosis, as produced by giving 3 per cent. $NaHCO_3$ solution intravenously, increases cerebral blood flow (C.B.F.) 65 per cent. above resting normal values. Isotonic bicarbonate solutions (1·2 per cent.) causes a 30 per cent. increase. The increase in C.B.F. after $NaHCO_3$ is not primarily caused by changes in intravascular volume, because an equivalent degree of hemodilution produced by the infusion of NaCl does not produce an increase in C.B.F. Infusion of 2 per cent. NaCl does cause a demonstrable increase in C.B.F. It is not of the order of magnitude produced by the infusion of an equally hypertonic solution of $NaHCO_3$. Intravenous infusion of 0·8 per cent. NH_4Cl reduced the C.B.F. about 20–25 per cent. In the absence of anoxia, cerebral vascular tone is more closely related to total CO_2 content of arterial blood than to arterial pH levels.

JOHN T. MYERS (Chem. Abstr.).

Animal Experiments on the Mechanism of Action of the Blood-brain Barrier. Becker, H., and Quadbeck, G. [*Z. Naturforsch.*, **7B**, 493 (1952).]

Intravenously injected astraviolet FF (I) penetrates the blood-brain barrier some time after death, similar to triphenyltetrazolium chloride (II). In the presence of (II), (I) appears in the brain earlier owing to the acidity generated by the reduction of (II). Permeability is increased by a decrease of the brain pH or an increase of the blood pH. The barrier appears to carry an electric charge, as C_6H_6 soluble dyes penetrate it readily, while C_6H_6 insoluble dyes penetrate only if they can be reduced to C_6H_6 soluble compounds or at a pH where they are partly non-ionic.

ERICH HEFTMANN (Chem. Abstr.).

Investigations of Functional Disturbances in the Blood-brain Barrier in Anoxia and Carbon Monoxide Poisoning with the New Barrier Indicator Astraviolet FF. Becker, H., and Quadbeck, G. [*Z. Naturforsch.*, **7B**, 498 (1952).]

Lowering of the blood-brain barrier by anoxia and CO poisoning could be detected with astraviolet FF (I) or (I) and triphenyltetrazolium chloride before it was indicated by trypan blue. ERICH HEFTMANN (Chem. Abstr.).

Convulsions Viewed from the Isoelectric Point of Cells in the Brain Centres. (II) Examination for the Change in the Isoelectric Point. Yutaka, Hori. [*Osaka Daigaku Igaku Zasshi*, **5**, 49 (1952).]

The isoelectric point (I) of rabbit brain cells was estimated histochemically. Convulsions always accompany suffocation, but suffocation itself does not turn (I) towards the acid side as much as convulsions do. In metrazole (II) convulsions, change in (I) is not proportional to the amount of (II) injected, but is proportional to the intensity of convulsions. I. TYUMA (Chem. Abstr.).

Disturbed Metabolism of Inorganic Compounds in the Brain. (II) Disturbances of Iron and Copper Metabolism. Volland, W. [*Med. Monatsschr.*, **3**, 246 (1949); *Excerpta Med., Sect. VIII*, **3**, 27 (1950).]

The mechanism of deposition of cerebral Fe in dementia paralytica is obscure, the more so as the blood Fe is low in this disease. In hemochromatosis (with high blood Fe) Fe is deposited in the choroid plexus. Cu is connected with pigmentation (especially melanin formation), and is found in rather large amounts in the substantia nigra in man. In Wilson's disease Cu is increased in the liver and in parts of the brain. W. C. TOBIE (Chem. Abstr.).

Metabolism of DL-α-methylglutamate in the Brain. Braganca, B. M., et al. [*Arch. Biochem. Biophys.*, **41**, 478 (1952).]

Under conditions in which glutamine synthesis takes place, NH_3 absorption by DL-α-methylglutamate also occurs with the formation of α-methylglutamine.

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DL-α-methylglutamate (0·01 M) inhibits glutaminase activity in brain tissue by 73 per cent. The inhibition is comparable with that brought about by D- and L-glutamate. F. SAUNDERS (Chem. Abstr.).

Histamine in Nerves : III. Werle, E., and Palm, D. [*Biochem. Z.*, **323**, 255 (1952) ; *cf. C.A.*, **44**, 7964*b*.]

Histaminase acts in a diminishing order to destroy histamine, mono- or dimethyl histamine. Antistine in pharmacologically equivalent amounts inhibits to the same degree histamine , mono- or dimethyl-histamine. By means of chromatographic analysis it is now established, thus corroborating previous findings by biological testing, that the substance in the ischiadic nerve or in the stellate ganglion of the cow is identical with histamine, but that neither mono-, di- or trimethyl-histamine is present there. Minute amounts of acetylhistamine are also found in the stellate ganglion or in the lungs, but no methyl derivatives of histamine are found there. Neither histamine nor any derivative has been found in the adrenal glands. No enzyme capable of splitting acetylhistamine is present in aqueous extracts of the stellate ganglion. S. MORGULIS (Chem. Abstr.).

Nucleic Acids and other Protein-bound Phosphorus Compounds of Cat Brain. Incorporation of phosphorus ^{32} after an Intracisternal Injection. Strickland, K. P. [*Can. J. Med. Sci.*, **30**, 484 (1952).]

There was a considerable incorporation of P^{32} into the P compounds of cat brain following an intracisternal injection of $P^{32}O_4^{3-}$. The relative specific activities (specific activity of P fraction/specific activity of tissue PO_4^{3-}) determined for a number of P fractions showed that incorporation was most rapid into the acid-soluble P fraction followed in descending order, by phosphoprotein, " diphosphoinositide," pentose nucleic acid, acid-insoluble residue, phospholipides and deoxypentosenucleic acid. The specific activity of the nucleic acids depended on the method of preparation. RICHARD F. RILEY (Chem. Abstr.).

The Oxygen Uptake of Human Cerebral Cortex Slices and the Effects of Some Inhibitors. Elliott, H. W., and Sutherland, V. C. [*J. Cellular Comp. Physiol.*, **40**, 221 (1952).]

The O^2 uptake of brain tissue removed from psychotic patients during prefrontal lobotomy was measured manometrically. In Ringer solution an initial Qo_2 (wet weight basis) of 1·6 decreased to less than 0·8 in 3 hours. Addition of glucose, fructose, galactose, pyruvate or lactate maintained the Qo_2 essentially constant for 3 hours. Addition of succinate increased the initial Qo_2, which then decreased at a rate parallel to that of the endogenous uptake. Mixed amino-acids and glutamic acid, but not alanine, also supported respiration in the absence as well as presence of glucose. The endogenous respiratory quotient (RQ) suggested hexose oxidation followed by utilization of O-rich compounds. With added compounds, only the RQ associated with pyruvate oxidation approached the value calculated for complete oxidation. The RQ associated with the amino-acid mixture suggested utilization of more than 1 component. Inhibition by fluoride, azide and malonate was more effective when they were added at zero time than at 90 minutes. Cyanide, dibucaine and pentobarbital also inhibited respiration. In Ca- free medium endogenous respiration was decreased slightly, but addition of glucose and amino-acids increased respiration. H. L. MASON (Chem. Abstr.).

Effects of Creatinine on the Central Nervous System. II : Anticonvulsant Action. Pfeifer, A. K., et al. [*Acta Physiol. Acad. Sci., Hung.*, **3**, 153–64 (1952) (*in English*) ; *cf. C.A.*, **46**, 1656*a*.]

Prophylactic subcutaneous administration of creatinine (1), 2 mgm./100 gm. to rats in the summer, 10 minutes prior to convulsive doses of pentamethylenetetrazole, protected 50 per cent. of the animals similarly to protection afforded by barbiturates. Increasing dosage of (I) did not improve protection, but administration of 2 mgm. of (I) 2 hours and 10 minutes prior to the convulsant drug increased protection to 75 per cent. In fall or winter (I) exhibited no anticonvulsant action in doses up to 20 mgm./100 gm., but raising the environmental temperature to 28°

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(from 18–20°) partially restored the anticonvulsant action of (I). No protection was given by (I) against electrically induced convulsions, but the increased sensitivity to electric convulsions produced by hydration was abolished.

KARL F. URBACH (Chem. Abstr.).

Effects of Glutamic Acid, Sodium Cyanide and Mono-iodoacetic Acid on the Potential Changes of the Isolated Toad Brain. Ebe, M. [*Tohoku, J. Exptl. Med.*, **56**, 3 (1952).]

Spontaneous potential waves (I) had an amplitude of 10–50 mv. and a frequency of 4–5 cycles/sec. When the brain was soaked in 1 per cent. glutamic acid solution, convulsive waves of 100 mv. and 10–20 cycles per second were produced. Alk. Ringer solution caused an increase in amplitude, but acid Ringer solution caused a decrease. High pH caused convulsive waves. NaCN (10^{-5} M) increased, but at 10^{-2} M concentration it abolished (I). Iosoacetate (10^{-5} and 10^{-2} M) abolished (I), but at concentrations of 10^{-3} and 10^{-4} M it increased (I). High concentration of either NaCN or iodoacetate abolished the convulsive effect of glutamic acid.

J. D. TAYLOR (Chem. Abstr.).

Disturbances of Autonomic Regulation after Cerebral Operations. Bernsmeier, A., et al. [*Excepta Med., Sect. VIII*, **4**, 44 (1951).]

Following various operations on the brain, blood sugar responses to insulin and adrenaline and the effects of priscol on the circulation were determined. After removing a hypophyseal adenoma, there was a paradoxical inversion of the adrenaline reaction for 4 days. After operations on the sylvian or the posterior fossa, the insulin-blood sugar curve showed a paradoxical inversion (increased sugar) lasting for 2 weeks. Shifts in water metabolism also occurred.

W. C. TOBIE (Chem. Abstr.).

The Concept of Anticerebral Antibodies in the Etiology of Multiple Sclerosis. Laignel-Lavastine, M., and Koressios, N. T. [*Arch. intern. neurol.*, **68**, 41 (1949); *Excerpta Med., Sect. VIII*, **3**, 32 (1950).]

In multiple sclerosis the blood plasma contains proteins (from the foci of gliosis) which cause the formation of anticerebral antibodies (I) which are γ-globulins. During menstruation large amounts of (I) are released into the blood, causing intensified demyelination.

W. C. TOBIE (Chem. Abstr.).

The Incorporation in vitro of Carbon^{14} into Amino-acids of Control and Virus-infected Mouse Brain. Moldave, K., et al. [*J. Biol. Chem.*, **200**, 357 (1953); *cf. C.A.*, **47**, 2857*f*.]

The incorporation of C^{14} from glucose, acetate, formate, and bicarbonate into the various amino-acids of control and infected 1-day-old mouse brain was investigated. C^{14} from acetate was recovered in glutamic acid, aspartic acid, histidine, alanine, proline, serine and glycine. Propagation of Theiler's GD VII virus (I) inhibited the incorporation of $3C^{14}$ into histidine, but did not markedly affect the other amino-acids. C^{14} from formate was recovered in serine, methionine, histidine, tyrosine plus phenylalanine, cystine, glutamic acid and aspartic acid. In the presence of (I), the incorporation of C^{14} into serine, methionine, tyrosine plus phenylalanine and cystine was stimulated; incorporation into histidine was inhibited; aspartic and glutamic acids were not affected. C^{14} from bicarbonate was recovered in aspartic and glutamic acids only. C^{14} from glucose was converted to all the amino-acids except proline and threonine. Infection with (I) stimulated incorporation into all the amino-acids except histidine and lysine.

F. SAUNDERS (Chem. Abstr.).

Role of Depot Fat in the Hypothalamic Control of Food Intake in the Rat. Kennedy, G. C. [*Proc. Roy. Soc.* (*London*), **B140**, 578–592 (1953).]

The young rat adjusts its food intake so precisely to its energy requirements that its fat stores remain almost constant. Damage to the hypothalamus permits excessive intake and causes obesity. The degree of obesity is a function of the degree of damage to the region of the tuber cinereum.

JOSEPH S. HEPBURN (Chem. Abstr.).

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Changes in the Cerebrospinal Fluid during the Treatment of Tuberculous Meningitis with Streptomycin. Marchal, J. G. [*Bull. assoc. diplômés microbiol. fac. pharm. Nancy, No.* **45**, 23 (1951).]

Changes in cells, proteins and chlorides are discussed.

W. C. TOBIE (Chem. Abstr.).

Electrophoretic Studies on Cerebrospinal Fluid. Hoch, Hans et al. [*Proc. Soc. Exptl. Biol. Med.*, **81**, 628 (1952).]

A study of 49 patterns of the most frequently encountered type and 16 atypical patterns is reported. A component (X-protein) migrating about 20 per cent. faster than the albumin was demonstrated in every fluid by electrophoresis in phosphate buffer of pH 7·85 and ionic strength 0·05. Another component (X_1) migrating 8–14 per cent. faster than the X-protein was observed in 20 per cent. of the samples. No single component was responsible for the higher protein concentration observed in some of the fluids. A possible relation between the X_1 component and the occurrence of convulsions in some patients was indicated.

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

Differential Rates of Diffusion of Nitrous Oxide into the Cerebrospinal Fluid. Bessman, A. N., et al. [*J. Lab. Clin. Med.*, **40**, 851 (1952).]

Over a 30-minute period N_2O diffused at a more rapid rate into the cisternal fluid than into the lumbar or ventricular cerebrospinal fluids, the latter two showing essentially equal rates. An initial lag was found in the ventricular curve only. N_2O may enter the cerebrospinal fluid *via* routes other than the choroid plexus.

J. D. TAYLOR (Chem. Abstr.).

Cholinesterase Content of the Brain in Cases of Brain Tumors and Parkinsonism. Weber, G. [*Bull. schweiz. Akad. med. Wiss.*, **8**, 263 (1952) (*in German*).]

In 33 out of 40 brain tumours, cholinesterase was found in the tumour tissue in varying concentrations. In 2 cases of postencephalitic parkinsonism there were no appreciable amounts in the putamen and the globus pallidus, which are usually rich in choline esterase. DORIT L. NOETHER (Chem. Abstr.).

2. Pharmacology and Treatment.

Cortisone as an Adjunct in the Rehabilitation of the Hemiplegic Patient. Russek, H. I., et al. [*Am. J. Med. Sci.*, **225**, 147 (1953).]

Cortisone (I), administered orally in connection with a programme of training in 26 patients with hemiplegia following a cerebrovascular accident, promoted a sense of well-being, improved motivation, diminished pain, and in some of the patients accelerated the rate of improvement in ability to perform daily functions. Under the conditions of the study (I) did not significantly affect the electrocardiogram, hemogram or blood-pressure, nor did it appear to induce thromboembolic phenomena. MARION HORN PESKIN (Chem. Abstr.).

Inhibition of Induced Seizure Potentials by β-hexachlorcyclohexane. Herken, H., et al. [*Experimentia*, **8**, 432 (1952) (*in German*); *cf. C.A.*, **45**, 9710*i*.]

Single doses of 150 mgm./kgm. doses in rabbits prevent for many days the development in the electroencephalogram of seizure potentials induced by electric simulation of an epileptogenic brain area. The appearance of metrazole seizure potentials is also prevented. D. S. FARNER (Chem. Abstr.).

Anticonvulsant Properties of Apocaffeine. Mercier, J., and Lespagnol, C. [*Compt. rend. soc. biol.*, **146**, 744 (1952).]

When caffeine is treated with HCl plus $KClO_3$ there is formed a bicyclic compound sometimes called apocaffeine, which may be regarded as consisting of 3-methyl-2, 4-oxazolidinedione and 1-methylhydantoin with the number of 5 C atom in common. Although oxazolidinediones and hydantoins are anticonvulsant drugs, apocaffeine has no anticonvulsant activity. L. E. GILSON (Chem. Abstr.).

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