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Effect of Trimethadione (Tridione) and Other Drugs on Convulsions Caused by Di-Isopropyl Fluorophosphate (D.F.P.).

Trimethadione in doses of 200–400 mg./kg. restores the normal electroencephalogram after the production of *grand mal*-like electrical patterns in rabbits by D.F.P. Trimethadione when administered before D.F.P. prevents the establishment of the seizure pattern, though not of milder types of excessive activity. A profound fall of cholinesterase activity is observed, and presumably acetylcholine accumulates. Despite its valuable therapeutic effects trimethadione does not hinder the extreme decrease of cholinesterase activity.

Atropine, like trimethadione, both prevents the electrical seizures and restores the control electroencephalogram after the abnormal brain waves have been evoked by D.F.P., and yet the cholinesterase activity is also greatly diminished and to the same extent as it is in the absence of atropine. Pentothal has been used successfully to restore the normal electroencephalogram after seizure patterns have been produced. Phenobarbital possesses both preventive and curative effects while dilantin has been used only to keep the convulsive pattern from occurring. Like trimethadione, however, dilantin permits some excessive electrical activity. (Authors' abstr.)

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Continuous Sleep Treatment. Observations on the Use of Prolonged, Deep, Continuous Narcosis in Mental Disorders.

Experience with 70 applications of prolonged narcosis in psychotic and psychoneurotic disorders is presented. One fatality occurred in the series as a result of pulmonary emboli.

Special attention was given to the study of bronchopneumonia, an outstanding complication of prolonged narcosis therapy, and a suggested technique is presented that effectively reduces this and other hazards.

Psychotic excitements, both manic and schizophrenic, respond to narcosis therapy.

Of 7 cases of dementia praecox less than one year in duration, 6 responded well to treatment.

Experience with psychoneurotic patients is not sufficient to warrant conclusions; therapeutic results, however, were sufficient to suggest the possibility that this procedure might be of value in various psychoneuroses, particularly severe anxiety states with prominent phobic features.

The outstanding disadvantage of narcosis is the necessity of constant nursing attention during treatment. (Authors' abstr.)

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The Anticipation and Prevention of Cardiac Complications in Electroconvulsive Therapy. A Clinical and Electrocardiographic Study.

1. It seems likely that "functional" deaths immediately following electroconvulsive therapy are brought about by vagal mechanisms described.

2. Atropine is a safe premedication and consistently prevents vagal post-convulsive cardiac irregularities.

3. The effective administration of oxygen after the convulsion is important in preventing other unfavorable cardiac reactions.

4. The judicious use of digitalis, quinidine, aminophylline, and other supportive medications during treatment period is of value in patients with heart disease. (Authors' abstr.)

Insulin Shock Therapy, A Statistical Survey of 393 Cases.

1. Insulin shock therapy was found to be effective in the treatment of 182 cases of schizophrenia in the following terms: discharged from the hospital, 34·1 per cent.; remained discharged after a period of 21 to 75 months, 19·8 per cent.; and full social recovery (after that period of time) estimated at about 6 per cent. These figures indicate that insulin shock therapy is certainly not sufficient as a sole form of treatment in schizophrenia. It may have more value when used as a preliminary approach to psychotherapy or milieu therapy. On the other hand, the low social recovery rate, after 40 months (average) of evaluation, is discouraging.

2. Race was not a significant factor in this form of therapy.

3. The older the patient the better the remission status following therapy, i.e. fewer relapses occurred.

4. There was no indication that insulin shock therapy is especially effective in any particular type of schizophrenic reaction.

5. The effectiveness was found to decrease as the length of illness prior to therapy was increased.

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6. Of 182 schizophrenic patients showing remission after a course of insulin shock therapy as the first form of shock treatment, 41·9 per cent. later suffered relapses, within a time evaluation period averaging 3⅓ years.

7. Insulin shock therapy was effective in some patients (17·0 per cent. of cases) who had failed to respond with electroshock treatment.

8. Electroshock therapy was effective in some patients (15·0 per cent. of cases) who had failed to respond with insulin treatment.

9. A second course of insulin treatment was found to be of very little value if the patient had failed to respond with the first course.

10. The level of the fasting blood sugar prior to insulin shock therapy had no effect on the outcome of the treatment.

11. Almost invariably a substantial gain in weight was produced during the course of insulin shock therapy. This had little bearing on the ultimate improvement of the patient.

12. The length of treatment was of no value in estimating the prognosis.

13. Convulsive attacks during insulin coma seemed to have a favorable therapeutic effect.

14. There was no marked change in blood pressure following insulin shock therapy.

15. Paranoid schizophrenics required a smaller dosage of insulin to produce symptoms of hypoglycemia than did the other types of schizophrenia.

16. Insulin shock therapy can be expected to produce certain complications and a mortality rate of about 0·5 per cent. (Authors' abstr.)

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Thiopental U.S.P. (Pentothal®) Treatment of Alcoholism.

1. Thiopental (pentothal®) sodium is a valuable addition to the treatment of alcoholism.

2. Thiopental has a remarkable ability to relieve the nervous and emotional tension that so often causes the alcoholic person to drink.

3. Thiopental is best combined with conditioned reflex aversion treatments and psychotherapy.

4. A follow-up study on 479 unusually difficult patients treated with thiopental alone or combined with conditioning and psychotherapy over a period of three years showed that 57 per cent. still were abstinent.

5. Thiopental has a pharmacologic effect in alcoholism over and above the benefits of the associated psychotherapy.

6. The physical and mental relaxation produced by thiopental is much more dramatic in the alcoholic neuroses than in non-alcoholic neuroses.

7. Thiopental therapy is in part a substitutive therapy. It gives much the same relief from tension as that afforded by alcohol, without the harmful effects of the latter. Its use can be controlled by the physician and gradually withdrawn as the patient learns to live without alcohol. (Authors' abstr.)

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Lead in Relation to Disseminated Sclerosis.

(1) A review of the history of association of lead with diseases of the central nervous system has been made.

(2) The lead content of the soil has been studied in the homes of country cases of disseminated sclerosis, all of whom had long been resident in their villages. It was found that in the soil of one village the lead content was significantly high. The incidence of the disease in the two villages studied was abnormally great compared to findings in other areas.

(3) Lead as an occupational hazard is discussed in relation to cases resembling disseminated sclerosis.

(4) The lead content of the teeth of cases of disseminated sclerosis has been found on the average to be significantly higher than control groups.

(5) It is suggested that this evidence implies that lead does play some part in the aetiology of disseminated sclerosis. It is suggested that lead may interfere

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with some essential mineral, vitamin, or enzyme reaction and thus precipitate demyelination. This is discussed in relation to other diseases of the nervous system. (Authors' abstr.)

Survival in Disseminated Sclerosis: A Clinical Study of a Series of Cases First Seen Twenty Years Ago.

(1) A series of 40 unselected patients with disseminated sclerosis, all of whom lived in the same district and were seen twenty years ago, has been reviewed; 28 have died and 12 or 30 per cent. survive.

(2) The average duration of the disease among the 28 dead patients was approximately twenty years; when the whole series has died, this average will naturally be still greater and the inclusion of the survivors at present indicates that the average for the whole series will be somewhat greater than twenty-two years. About 40 per cent. of those now dead lived over twenty years. Possible explanations of this apparently high average have been discussed and it seems probable that it may be due to the natural survival period in the disease being much longer than has hitherto been supposed. Longevity in patients who survived longer than their fellows was usually only purchased at the expense of years of severe disablement. In the majority of those observed half the total illness was spent in this way.

(3) Coma often occurred as a terminal event in severely disabled patients and was sometimes preceded by frequent recurring epileptiform fits. Acute pulmonary complications, sepsis from bed sores and toxaemia from pyelitis are among the most frequent determining causes of death.

(4) Experience with these cases supports the general view that initial recovery of function usually follows a mild type of onset and that with more severe symptoms only partial recovery of function is likely to occur. Many patients, however, with severe initial symptoms have survived long periods though there has been some persistent disability from the onset.

(5) The tendency for symptoms to be repeated in subsequent relapses is observed as also the curious dissociation that exists between ophthalmoscopic appearances and visual acuity after acute retrobulbar neuritis.

(6) The almost stationary clinical condition exhibited by many of the survivors suggests that some self-limiting or defensive process is at work. It is considered unlikely that in these cases the disease is no longer active.

(7) Among the survivors there is relatively little evidence of gross sphincter disturbance, loss of emotional control or intellectual impairment. The preservation of these functions may be an important factor in the prognosis.

(Authors' abstr.)

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Personality Changes After Pre-frontal Leucotomy.

Instead of giving a detailed summary, an attempt will be made to outline the post-leucotomy patient's personality characteristics, in so far as these have been ascertained on the basis of objective tests. This outline supports more clearly after 9 months than after 3 months the hypotheses with which this paper opened.

Measures associated with neuroticism show a decrease; the patient is less suggestible, has smoother work curves, and has a changed attitude towards himself. The decrease in measures characterizing the anxious, depressive, introverted type is very marked. He is less persistent in a situation requiring endurance; he blames himself less and for fewer characteristics; he lives less in the past and more in the present and future; he has lower motor perseveration scores; he goes more for speed and less for accuracy; he shows a greater appreciation of sex jokes in comparison with non-sex jokes. He has dropped in verbal intelligence scores and shows a slight gain in performance scores.

On the intellectual side he shows a loss in verbal I.Q., a particular loss in comprehending social attitudes unrelated to his immediate environment, and a loss in learning ability. He has gained on routine tasks but loses on tests where impulsiveness is penalized. He shows a less critical attitude in his use of language.

Nearly all these changes appeared after 3 months; the confirmation of their presence after 9 months provides strong grounds for believing that with this particular operation these are some of the changes which can be anticipated in this type of population.

The Connecticut Lobotomy Committee (1948) report that if a change is to appear in a leucotomy patient it appears after 3 months. We have found this to be true about many traits, but there are exceptions. Some changes are clearly shown only after 9 months, some tendencies are accentuated and some are damped down. For example, motor perseveration and persistence involving endurance continue to decrease during the year after operation; speed and mistakes continue to increase. Increased distractability manifests itself clearly only after the longer period and reversed the earlier impression. Planning, as measured on the Mazes, appears to improve after the early loss, and so on.

There was a suggestion in the author's results of the relationship between some of the scores on the self-blame questionnaire (and the changes in the degree of self-blame) and prognosis. This pointer will be followed up and the relationship ascertained between the personality pattern prior to leucotomy and the success of the operation. It is hoped also to ascertain the relationship between the extent of the changes and the mental health of the patient after leucotomy.

Some of the changes reported here may be regarded as undesirable. Whether they are inevitably associated with the operation of leucotomy, in which a more anterior, less extensive or unilateral cut is made, remains to be shown. The investigations which have been described are now being carried out on patients who are undergoing rostral, unilateral and bilateral leucotomy at St. George's Hospital. The number of cases to date makes it impossible to give anything but highly tentative conclusions at this stage. There is, however, a distinct impression that some of the changes reported are less marked if the operation is less extensive.

(Author's abstr.)

BULL. LOS ANGELES NEUR. SOC.

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Cranial Injuries in Prehistoric Man with Particular Reference to the Neanderthals. *Courville, C. B.* 1
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Some Observations on the Brain Rhythms After Surgical Removal of a Cerebral Hemisphere.

The surgical removal of an atrophic right cerebral hemisphere in a patient with hemiplegia, epilepsy and mental disturbances was followed by an abolition of the attacks and of the slow activity in the contralateral hemisphere which had previously been greatly disorganized. This finding appears to be an argument in favour of hemispherectomy for the treatment of such cases.

Sensory stimulation of the same side of the body as the spared hemisphere produced a depression of the normal cortical rhythms indicating ipsilateral projection of the sensory impulses in this case, in which considerable sensation was also preserved on the left side.

The electrical activity of the spared hemisphere was also conducted physically to the opposite side of the head. (Authors' abstr.)

The Electroencephalographic Changes after Hemispherectomy in Man.

The electroencephalographic findings in four cases of right hemispherectomy are presented. In three cases the voltage of the activity on the unoperated side was markedly diminished; in one case unchanged.

In all four cases a rhythm in the alpha range was present on the hemispherectomized side.

In one case photic stimulation induced a better response on the operated than on the unoperated side; in another case the reverse was true.

(Authors' abstr.)

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The Epileptogenic Effect of Subcortical Alumina Cream in the Rhesus Monkey.

1. Following injection of 0·1–0·2 ml. of alumina cream into various subcortical cerebral sites, recurrent convulsive seizures appeared with lesions in the following positions: medial nuclear groups of the thalamus bilaterally, putamina bilaterally, the region of the subcallosal fasciculus and the white matter adjacent to the cingulate sulcus.

2. No seizures occurred as a result of lesions in: lateral nuclear groups of the thalamus unilaterally or bilaterally, hypothalamus, tegmentum of the pons and decussation of the brachium conjunctivum, or caudate nucleus of one side and putamen of the opposite side.

3. E.E.G. abnormality was associated with all but one of the lesions, but was more pronounced in the monkeys exhibiting seizures.

4. Although the size and shape of the lesions varied markedly, their histologic appearance was uniform. (Authors' abstr.)

Encephalosyncope or Larval Epilepsy: A Follow-up.

1. One hundred and eleven of a group of 180 patients who had "larval epilepsy" or "encephalosyncope" have been followed for a period of 4–6 years.

2. 92 per cent. are gainfully employed.

3. 20 per cent. have remained free of symptoms without medication.

4. 80 per cent. have had spells of some kind.

5. 13 per cent. have had more than 3 convulsions and would justify the clinical diagnosis of epilepsy.

6. Aside from this 13 per cent., the others continue to form a homogeneous group and justify the distinctive diagnosis of "larval epilepsy" or "encephalosyncope." Their commonest symptoms are dizziness, "blackouts" and spells of blurred vision.

7. Of those who originally had a convulsion, 60 per cent. have had none since. When a convulsion has occurred, there has nearly always been a history of severe unusual mental, emotional or physical strain; or alcohol has been an obvious precipitating factor.

8. Only 4 per cent. of those who showed bilaterally synchronous 3/sec. spike and wave patterns have not had a convulsion.

9. About 50 per cent. of those who showed a diffuse dysrhythmia have not yet had a convulsion, though many have had other symptoms, such as sudden loss of consciousness, sudden dizziness, blurred vision, etc.

10. The prognosis of those with 6/sec. rhythms and variants is between these two extremes, and there were only 28 per cent. who did not report a convulsion as yet.

11. Under civilian conditions, the prognosis is quite good, and only a few of these persons are disabled by their illness, if they take simple precautions.

12. Under stress-producing conditions, spells are much more likely to occur, with obvious danger to the patients and those around them.

13. Any person who has suggestive symptoms should have an E.E.G. done, especially if he is placed in a position of responsibility and stress. If the E.E.G. is abnormal, including hypersensitivity to hyperventilation, Metrazol or photic stimulation, he should be eliminated from aircrew, tank operations or similar hazardous occupations.

14. There is considerable presumptive evidence that the disorder is subcortical and that there are three types of E.E.G. disturbances which originate in the upper brain stem. Each of them activates a separate but closely-related group of neurones. (Authors' abstr.)

Effect on the Electroencephalogram of Transorbital Lobotomy.

Electroencephalograms taken before, during and after bilateral transorbital lobotomy on two cases operated with electroshock as anaesthesia failed to show development of slow activity; one case showed a marked but transient increase in alpha activity. Pre- and post-lobotomy records on a third case operated under Pentothal were likewise free of slow activity. No case showed impairment in the amount, frequency and distribution of natural sleep spindle activity.

(Author's abstr.)

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Effects of Glutamic Acid on Maze Learning and Recovery from Electroconvulsive Shocks in Albino Rats.

Two experiments are reported in which the maze performances of rats on diets rich and poor in glutamic acid (calcium l-glutamate) are contrasted. The first experiment used 131 weanling rats in nine groups, involving three different diets and three conditions of testing. The diets were (*a*) a synthetic one of very low (0·5 per cent.) glutamic acid content, (*b*) the same synthetic diet supplemented to six per cent. of glutamic acid, and (*c*) a natural diet naturally rich in glutamic acid. The conditions of testing were the learning of a Warden-U water maze before, during and after, and relearning after a 10-day series of E.C.S. There were no reliable differences in the performances of groups on different diets.

The second experiment used 56 prepubescent rats in four groups, all somewhat debilitated by a diet nutritionally incomplete. The food of two groups was supplemented with glutamic acid. Midway in the training period one group on the supplemented diet and one on the basal diet were given a 10-day series of E.C.S. Again there were no reliable differences in performances due to the different diets.

The results are discussed in relation to the positive results reported from one laboratory and the reported clinical usefulness of glutamic acid. It is suggested that if tests of spontaneous activity should prove to be negative also, then glutamic acid must affect behaviour only in animals suffering a metabolic deficiency of unknown nature. (Authors' abstr.)

Studies of Anxiety : (1) *The Production of a Feeding Inhibition in Dogs.*

1. A feeding inhibition may be produced in normal dogs in one to four shock trials if shock is applied while the eating response is occurring. Feeding inhibitions are not effectively established if shock is applied prior to eating or while the food is being delivered into the food box. The temporal relations of conditioned and unconditioned stimuli, as well as the occurrence or non-occurrence of the response, thus appear to be of considerable importance. Anxiety symptoms may be pronounced even when inhibition is unstable.

2. Once established, the feeding inhibition is relatively stable, lasting for weeks or even months without further shock reinforcement.

3. General changes appear in the behavior of all dogs with the development of the feeding inhibition although the particular pattern of behavior varies considerably from animal to animal. These changes include :

(*a*) Passivity or immobility in the experimental situation, a symptom frequently observed ;

(*b*) Struggle, barking and biting, seen in only a few animals ;

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(*c*) Resistance to entering the stock which may develop slowly over a period of several days ;

(*d*) Tremors, present throughout the experimental session, but which are intensified when food is delivered ;

(*e*) Disturbed respiration throughout the experimental session, and a sudden inspiration when food is delivered ;

(*f*) Tic-like movements conditioned to the appearance of food and persisting long after shocks have been discontinued ;

(*g*) Aversion of the head from the food box ;

(*h*) Retching in the presence of food pellets ;

(*i*) Refusal to eat in the living cage ;

(*j*) Increased aggression against cage-mates ; and

(*k*) Depression in general activity level.

4. A prominent feature of the anxiety symptoms is their tendency to develop and fixate after shock reinforcement has been discontinued.

5. Feeding inhibitions may be temporarily relieved in some animals by altering one or more aspects of the experimental situation. Some animals will eat when the experimenter is present in the room and some will eat when the harness is removed. Other dogs, however, cannot be made to eat in the experimental room even under considerably altered conditions. (Author's abstr.)

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Psychologic Effects of Electric Convulsive Treatments. I. Post-Treatment Amnesias.

(1) Definite and consistent evidence of circumscribed amnesias was found following electric convulsive treatments. Approximately four weeks after the termination of treatments, every one of the 19 electroshock-treated patients was unable to recall some of the memories of past experiences which had been elicited in the pre-treatment interview. Such failures occurred so infrequently among the 11 control patients as to be almost negligible.

(2) In a follow-up study on 5 of the electroshock-treated patients it was found that in each case most of the instances of retroactive amnesia persisted as of two and one-half to three and one-half months after termination of the treatments. This finding bears out the preceding one in supporting the general conclusion that a series of electrically induced convulsions, as administered in standard psychiatric practice, produces circumscribed amnesias for past experiences which persist beyond the usual period of recovery during which the temporary organic reactions to the treatments clear up.

(3) In the post-treatment interviews of electroshock-treated patients it was noted that in addition to the definite retroactive amnesias there were numerous instances of recall failures which were purely temporary in that the patient subse-

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quently was able to remember some material which he could not recall at first. If it is assumed that such temporary recall failures involve the same basic defect as the more persistent recall failures, the post-treatment amnesias may be regarded as recoverable rather than as representing a permanent retention loss.

(4) There is some evidence that following electric convulsive treatments extra effort is required for overcoming the difficulty in producing personal memories, when the patient attempts to remember his past experiences. Observations on motivational aspects of the post-treatment amnesias provide some support for the hypothesis that those memories which tend to evoke guilt, lowered self-esteem, or other painful affective reactions may be less likely than others to be recalled because the patient is motivated, consciously or unconsciously, to avoid expending the added effort required for producing them. According to this hypothesis, the general difficulty in producing personal memories may facilitate the forgetting of certain (disturbing) past experiences. This might prove to be a basis for explaining the occurrence of sustained amnesic gaps following electric convulsive treatments. (Author's abstr.)

Psychologic Effects of Electric Convulsive Treatments. II. Changes in Word Association Reactions.

Seventeen mental patients who received a minimum of 10 electric convulsive treatments were given a word association test before the electroshock series began and again four weeks after the series had ended. When the changes in their performances were compared with those exhibited by an equated control group of 17 patients who received no form of shock treatment during a comparable time interval, the following findings and conclusions emerged :

(1) No reliable change was found on any of the following measures of delayed reaction : (*a*) responses delayed for three seconds or more, (*b*) responses delayed for five seconds or more, (*c*) failure to respond within the 45-second time limit. From these findings it appears that E.C.T. had no observable effect upon the frequency with which delayed associations occurred.

(2) The E.C.T. group exhibited a slight but statistically reliable increase in certain types of deviant associations : (*a*) remote or idiosyncratic associations, (*b*) stimulus repetitions, (*c*) multi-word responses. The E.C.T. patients showed no decrease in other types of association disturbances which would in any way compensate for the average increase in these three types of pathologic association disturbances.

(3) The E.C.T. group exhibited a statistically reliable increase in defective reproductions of the word association responses, indicating that as a result of electroshock treatments the patients tended to give a poorer performance on the reproduction test.

(4) From a qualitative examination of the three types of deviant associations which were found to increase following E.C.T., it appears that a primary characteristic is failure to maintain the " task-set " (imposed by the word association test instructions) which is necessary for producing habitual association responses. The results on defective reproductions of word association reactions are consistent with this interpretation, on the assumption that if the " task-set," is not maintained the associations are not likely to be stable, habitual ones. Consequently the results of this investigation lend tentative support to the following hypothesis : the post-treatment amnesias and related difficulties in producing personal memories following electric convulsive treatments may arise from a basic disturbance in recall processes, consisting of an increased tendency to produce spurious, irrelevant associations which interfere with the production of the habitual associations necessary for evoking the recall of personal past experiences. (Author's abstr.)

Psychologic Effects of Electric Convulsive Treatments. III. Changes in Affective Disturbances.

(1) On a variety of self-rating scales of affective attitudes, the E.C.T. group, when examined approximately four weeks after the last treatment, showed a marked decline in affective disturbance scores, as compared with the equated control group. The results support the general conclusion that a series of electroshock treatments tends to produce a reduction in affective disturbances.

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(2) The scales on which the E.C.T. patients exhibited the most reliable decline in affective disturbance scores were mainly those which are relevant to the " depression " syndrome, as described in the psychiatric literature. Consequently, the results tend to support the widely-accepted hypothesis that electroshock treatments are primarily effective in alleviating affective disturbances tied up with depressive symptoms.

(3) It was found that even when clinical improvement status was held relatively constant, the E.C.T. patients still tended to show a greater decline in affective disturbance scores than the control group. This finding supports the hypothesis that E.C.T. tends to produce a reduction of affective disturbances even when the treatments fail to alleviate the patient's dominant psychopathologic symptoms.

(4) Various qualitative observations provide some direct evidence for a hypothesis which appears to be plausible in the light of the quantitative findings, namely, that the occurrence of post-treatment amnesias may be closely related to the decline in affective disturbances.

(5) The possible role of post-treatment amnesias in producing the affective changes was discussed in the context of alternative causal sequences. From the available evidence, it appeared to be improbable that the amnesias are the primary causal factor producing the therapeutic changes in affective symptoms. But some qualitative evidence was presented which implies that the amnesias do contribute to the reduction of affective disturbances, probably as a secondary factor which aids in reinforcing and maintaining the therapeutic results of the treatments. The following hypotheses, which appear to be consistent with the findings and observations derived from the present series of investigations, were suggested as warranting further research :

(*a*) By partially eliminating from the patient's consciousness a substantial block of memories which tend to arouse intense affect, the post-treatment amnesias may have the effect of reducing certain areas of affective disturbance. In other words, the post-treatment amnesias may be equivalent to a new mode of defense which has an effect similar to " repression " in facilitating the avoidance of disturbing affect.

(*b*) By providing a new defense mechanism for warding off intolerable subjective states and thereby reducing the frequency and intensity of disturbing affective reactions, the post-treatment amnesias may contribute to the abandonment of some of the pathologic symptoms which had previously functioned as a defense against intense affective reactions. (Author's abstr.)

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Uraemic and Trophic Deaths Following Leucotomy : Neuro-Anatomical Findings.

In a series of 22 leucotomy cases dying within six months of the operation, analysis of the causes of death reveals two distinct groups : Group 1, dying predominantly from uraemia in the third post-operative week, and Group 2, dying predominantly from trophic deterioration (marasmus with trophic skin lesions), between two and five months after the operation. In the latter group blisters or bullae almost always appeared on the extremities between the fourth and sixth post-operative weeks.

Post-mortem anatomical (mainly macroscopic) analysis of the lesions in the frontal lobes of these 22 cases revealed a striking association of death from uraemia with bilateral damage to the posterior (non-granular) orbital cortex, and of death

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from trophic deterioration with bilateral cutting of the region of the subcallosal fasciculus at the level of the head of the caudate nucleus.

The orbital cortex concerned in the uraemic deaths appeared to be posterior area 47, not area 13. Histopathological evidence of nutritional deficiency was not conspicuous among the cases of trophic deterioration.

From evidence supplied by these and other relevant cases, in a total series of 122, it is deduced that connexions between the caudate nucleus and Brodmann's (non-granular) cortical areas 8 and 6 (including their mesial extension towards the corpus callosum), via the rostral parts of the subcallosal fasciculus, may be the structures whose damage determined the fatal trophic deterioration.

The practical intention of the paper is to emphasize the serious danger of delayed operative death from the use of blind leucotomy techniques, including the " deep " transorbital cut. (Author's abstr.)

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The Central Auditory Pathway.

Unipolar recordings of responses to click stimuli have been taken from various stations along the auditory pathway in anaesthetized cats. Monaural and binaural stimulation were employed, and parts of the pathway were deleted surgically in some of the experiments in order to study changes from normal responses at the several stations resulting from elimination of various components.

Latency of response increases at successively higher levels, making possible presumptive determination of number of synapses to a given point. Duration and amplitude of response also increases at successively higher levels, indicating progressive temporal dispersion. This is accompanied by a progressive tendency toward smoothing of the wave form as more and more elements are activated at

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each higher level and their summed potentials merge, obscuring the identity of the various contributions.

Difference in latency of response of inferior colliculus to ipsilateral and contralateral stimulation plus difference in the earliest peak or shoulder of the collicular and brachial responses indicate one more synapse in the ipsilateral pathway than in the contralateral. Second-order fibers form the chief contralateral component up to midbrain level, while the earliest ipsilateral midbrain response is that of third-order fibers. At thalamic and cortical stations, this difference is compensated by longer nuclear delays.

The trapezoid body is by far the most important site of crossing in the cortical projection pathway for hearing. The commissure of the inferior colliculus may contribute slight additional opportunity for decussation, but is more probably principally concerned in commissural communication necessary to integrative processes at midbrain level.

Implications of the data for auditory theory are discussed.

(Authors' abstr.)

Stimulation and Strychninization of Supracallosal Anterior Cingulate Gyrus.

1. By physiological neuronography, the authors confirmed the work of others that fibres from the anterior cingulate gyrus project to areas in the vicinity of areas 31, 32, 6*a* and 4*s*. In addition, they have also found the transmission of strychnine spikes to areas in the presumptive location of 8*s*, 2*s* and 19*s*.

2. Electrical stimulation of the anterior cingulate gyrus was carried out in cats and monkeys, and the following effects were observed: (i) atypical motor movements; (ii) arrest of motor movement; (iii) arrest of respiration; (iv) electroencephalographic changes. All of these effects occurred independently of each other.

3. The electroencephalographic effects were of four types: (i) suppression of strychnine spikes (ipsilateral); (ii) suppression of spindles (ipsilateral); (iii) suppression of spontaneous electrocortical activity (bilateral); (iv) production of a seizure discharge (ipsilateral or bilateral). All of these electroencephalographic effects occurred independently of one another.

4. The independent occurrence of the effects of anterior cingular gyrus stimulation suggests that they are mediated by independent pathways. The authors' results would indicate that suppression of strychnine spikes, suppression of spindles and arrest of motor movements are mediated via the caudate nucleus (not necessarily the same part). (Authors' abstr.)

Chronic Focal Hyper-irritability of Sensory Nervous System in Cats.

1. Chronic focal hyper-irritability of sensory cutaneous areas has been produced in cats by application of alumina cream above the dorsal aspect of the lumbar cord.

2. This hyperesthesia and hyperalgesia develop over a period of days to weeks. Once they become maximal they are permanent for at least nine months (the longest period of the author's observation).

3. The hyper-irritable regions develop first near the spinal segments at the site of injection and then spread to involve many segments in either direction.

4. Light touch, heavy touch or pain stimuli all become disagreeable and apparently painful to the animals over the affected areas. Light touch has seemed to be the most disturbing type of stimulus.

5. There is a hyper-reflexia but no other change in motor status. Proprioception has been normal except in three instances when it was affected for the first week after operation, probably as a result of operative trauma.

6. The condition which develops is similar in many ways to that seen when the same substance has been applied to the motor cortex producing chronic recurrent epilepsy.

7. In many respects it is like the causalgic state which is seen in man.

(Author's abstr.)

Lack of Regeneration in Spinal Cord of Rat.

1. The spinal cord of 159 rats was cut across in the midthoracic region. The cord ends were completely visualized to ensure complete transection.

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2. Fresh sciatic nerve, degenerated sciatic nerve and muscle were both auto- and homo-transplanted into the gap between the cord ends in various groups of animals. A tantalum cuff or cylinder was inserted over the cut cord ends in another group.

3. The animals were kept alive for varying periods up to 168 days.

4. No return of function was found beyond that of a " spinal " animal.

5. Silver-stained sections of the spinal cord showed no evidence of any but the feeblest sort of regeneration. An exception to this was the invasion of the scar tissue by root fibers.

6. Connective tissue invaded the space between the cord ends, but so feeble was the regenerative impulse that it was felt that the presence of the connective tissue was not of primary importance. (Authors' abstr.)

Corticocortical Connections of Posterior Wall of Central Sulcus in Monkey. (Macaca mulatta).

The efferent connections of the cortex of the posterior bank of the central sulcus have been investigated by physiological neuronography in the monkey (Macaca mulatta). This koniocortex, histologically distinct from the homotypical cortex on the postcentral convolution, has strongest connections with the cortex just behind and in front of the central sulcus. The more inferior portions of the buried sensory cortex have strong connections with the cortex between the Sylvian and intraparietal sulci. The mild firing into the posterior end of the superior temporal sulcus is probably the surface extension of firing into the superior walls of the Sylvian fissure, found by exploration after subpial resection of the superior temporal gyrus.

Feeble contralateral connections are localized to corresponding regions of the posterior bank of the central sulcus.

Except for meagre connections with the cortex between the lower parts of the arcuate and central sulci, and those in the posterior part of the superior temporal gyrus, the connections of the sensory koniocortex of the central sulcus do not differ markedly from those of the surface of the post-central gyrus.

No connections were found between the posterior bank of the central sulcus and the cortex behind or below the superior temporal sulcus or with one minor exception, in front of the arcuate sulcus. (Authors' abstr.)

The Repetitive Discharges of Corticothalamic Reverberating Circuit.

1. In response to an afferent stimulation the sensory cortex gives rise to a potential change consisting of a primary response followed by a series of 3–13 regularly spaced waves. Cortical responses of this pattern can be produced in every sensory system, although there may be some variations in frequency in different systems.

2. The frequency of the repetitive discharges is independent of the stimulus intensity but varies with the state of anesthesia.

3. The waves of repetitive discharge can be distinguished from the spontaneous cortical activity by their difference in frequency, wave form and phase relations.

4. The massa intermedia of the thalamus plays no role in the performance of the specific repetitive discharges.

5. Responses of a pattern similar to that recorded from the cortical surface can be recorded also from the corresponding thalamic structures. Such responses can be completely abolished, however, either by removal of the concerned cortex or by the interruption of the corticothalamic connections.

6. A series of waves in a pattern similar to that of repetitive discharge evoked by sound stimulation can be recorded from the auditory cortex by electrical stimulation of a cortical point close to the recording electrode. This cortically-induced repetitive discharge fails to appear after the medial geniculate body is destroyed or the auditory radiation fibers are interrupted.

7. On the basis of the above experimental evidence it is suggested that the periodically recurring cortical waves following an afferent stimulus are the repetitive discharges of reverberating circuit between the thalamic structures and the corresponding sensory cortex.

8. By an analysis of the time relations and the interactions of the primary response and the subsequent repetitive discharges it was found that the ascending

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pathway of the corticothalamic reverberating circuit does not share the same neurons as those mediating the great afferent volleys. (Author's abstr.)

Effect of Bulbar Facilitation and Inhibition on Peripheral Reflex Inhibition.

In anesthetized cats, studies were carried out on the effect of the bulbar inhibitory and bulbar facilitatory systems on reciprocal inhibition as recorded by the actions of the biceps-quadriceps and the tibialis-gastrocnemius pairs in response to ipsilateral or contralateral sensory nerve stimulation. Additional studies were made on the effect of these systems on ipsilateral sensory nerve inhibition of the recurrently elicited knee-jerk.

Stimulation of the bulbar facilitatory system enhances both the excitatory and inhibitory components of reciprocal inhibition, but activation of the bulbar inhibitory mechanism abolishes both of these phases. In the case of reflex inhibition of the knee-jerk, bulbar inhibition sums with and bulbar facilitation opposes the effect. These results are explained on the basis that the spinal projections of the bulbar facilitatory and inhibitory systems influence the involved spinal reflex arcs at some early synapse in the arc. (Author's abstr.)

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An Experimental Analysis of Biochemically Induced Circling Behavior.

1. The unilateral intracarotid injection of D.F.P. produces a reversible biochemical lesion which induces temporary circling behavior arising in a central or cerebral locus.

2. The biochemical lesion, i.e., the decrease in cholinesterase activity as well as the corrective effects of atropine and scopolamine indicate a cholinergic mode of origin for the forced circling behavior.

3. The peripheral vestibular system can influence the cerebral circling response in rabbits and cats but not in monkeys. (Authors' abstr.)

Visual Areas I and II of Cerebral Cortex of Rabbit.

1. The cortical area of the rabbit which responds with typical surface-positive waves to gross contralateral photic stimulation extends about 15 mm. anterior to the occipital margin of the hemisphere. Its medial border is at the splenial sulcus or 1–2 mm. medial to the sulcus and its lateral border is about half-way down the lateral surface of the brain.

2. The portion of the visual area which responds to gross ipsilateral photic stimulation is in the form of a band extending diagonally from the anteromedial to the posterolateral portion of the visual area.

3. The vertical meridian for binocular vision is situated 20 degrees from the sagittal plane of the visual field of the deeply anesthetized animal and when projected on the cortex it divides the binocular area into approximately equal parts. The visual area anterolateral to this line shows a pattern on localized photic stimulation resembling a mirror image, on a smaller scale, of the visual area which lies posteromedial to this line. The authors have designated the larger posteromedial area visual area I and the smaller anterolateral area visual area II.

4. The horizontal meridian projects close to the posterior edge of the dorsal surface of the cerebrum except for a marked anteromedial dip along the vertical meridian for binocular vision. The upper visual field is represented to about 15 degrees above the horizontal meridian and the lower visual field to more than 20 degrees. The lateral visual field has been found to be represented to more than 150 degrees from the sagittal plane in both visual area I and visual area II.

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5. The responses obtained from visual areas I and II under deep anesthesia were similar in form, amplitude and latency. (Authors' abstr.)

Physical Significance of Strength-duration Curve for Excitation of Nerve.

Rectangular current threshold stimuli of various durations were applied to fiber bundles of the frog sciatic nerve from which the perineural sheath had been dissected. In such a system, threshold for the most irritable fibers is attained when the electrotonic potential at the cathode reaches a critical value, regardless of its time rate of change.

It is thought that removal of the sheath allows the system to approximate an ideal one in which a single fibre is surrounded by a very thin film of fluid. In such an ideal system an extrapolar electrotonic potential must be proportional to the potential difference across the membrane capacity induced by flow of the stimulating current.

Hence it is concluded that local attainment of a critical outwardly-directed potential difference across the distributed membrane capacity is sufficient for excitation in the absence of appreciable accommodation. (Authors' abstr.)

Effect of Section of Vestibular Nerve Upon Cortically Induced Movement in Cat.

1. The effect of vestibular nerve section on a cortically-induced motor response has been studied in the cat.

2. Using near-threshold stimulation of the motor cortex, the motor response in a limb is markedly diminished or abolished following section of either 8th nerve.

3. It is concluded that the vestibular nerves contribute afferent impulses which maintain a certain background activity in some part of the facilitatory system. Following section of the vestibular nerve, it appears that such reverberative activity requires a measurable length of time to die out. Furthermore, markedly increasing the strength of cortical stimulation may mask or compensate for this effect in the static animal. (Authors' abstr.)

An Analysis of Primary Response of Visual Cortex to Optic Nerve Stimulation in Cats.

1. The primary cortical response to optic nerve stimulation as picked up by an active electrode leading from the cortical surface of gyrus lateralis of cat under Nembutal anesthesia was differentiated into 6 deflections.

2. The first deflection, consisting of a diphasic or triphasic small wave with a very short latency, was interpreted as being caused by the potential difference in the transient electrical field created by a synchronous volley travelling along the optic nerve in a volume conductor.

3. Deflections 2, 3 and 4, all of which are surface-positive spike-like potentials with the latent periods of 1·6–1·7 m.sec., 2·7 m.sec. and 3·3 m.sec. respectively, were resistant to superficial application of novocaine, strychnine and to mechanical pressure. They are assignable to the activities of three systems of geniculo-cortical neurons.

4. Deflection 5 is the most prominent and broad wave, varying in size with the stimulus strength. It could be abolished selectively by the exertion of mechanical pressure on the cortical surface, attenuated by local application of novocaine, and greatly enhanced by superficial strychninization of the cortex. It disappeared earlier during anoxia by breathing pure N_2 and recovered later on readmission of air than the preceding components. Intracortical neurons were assigned as the origin of this potential.

5. The long-lasting negative potential following wave 5 may be an indication of the passage of impulses in the apical dendrites of pyramids and the activity of other cortical internuncial neurons.

6. It is suggested that the complex form of the primary cortical response to optic nerve stimulation is made up of an initial wave caused by the changing field of action current flowing along the optic nerve and tract and three independent constituent potentials representing the activity of three systems of geniculo-cortical pathways, each of which consists of a spike potential and a slow wave.

7. The triple conducting pathways in the visual system might serve as separate routes mediating impulses underlying trichromatic vision. (Authors' abstr.)

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Impairment of Abstract Behavior Following Bilateral Prefrontal Lobotomy.

1. Thirty-two pre-frontal lobotomy patients were given a battery of psychological tests to investigate changes in intellectual function resulting from lobotomy.

2. The Wechsler-Bellevue Test revealed no significant reduction in general intelligence, or any evidence of impairment which could be attributed to the surgical procedure. Increased intellectual efficiency with increases in full scale I.Q. of 1 to 21 points occurred in 28 out of 32 cases.

3. The Graphic Rorschach indicated a change in personality-structure and traits, corresponding generally with changes in the clinical picture. In a large number of cases, organic features were suggested by the Graphic Rorschach, later retesting indicating they were of a temporary nature.

4. The Grassi Block Substitution Test revealed marked impairment of abstract organization and inability to shift from a concrete to an abstract approach, suggestive of organic pathology resulting from the lobotomy. The impairment, however, disappeared almost entirely within the first year.

5. Prognostic criteria might be established on the basis of the performances on the Grassi Block Substitution Test and the Graphic Rorschach. The presence of decreased scores in block performances immediately following operation, with increased scores six months later, seemed to be significantly related to the degree of clinical improvement manifested. A shift to an extreme form of blot-dominance on the Graphic Rorschach—as a result of the operation—from a previously different level of performance may also prove to be a valuable prognostic criterion.

6. The results of the psychological measurements used do not contraindicate bilateral frontal lobotomy but rather support it as a therapeutic procedure.

(Author's abstr.)

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Stress and the Adrenal Cortex with Special Reference to Potassium Metabolism.

The fact that steroids modify both brain electrolytes and certain aspects of brain function is suggestive in relation to the author's finding of abnormal adrenal stress responses in schizophrenic patients. The author has seen that normal men, in contrast to most schizophrenic patients, fluctuate in rate of potassium excretion with modification of rates of release of their adrenal steroids in response to a wide variety of stresses. The author has also seen that potassium is lost from the brain of rats in response to stress and that this loss may be prevented by certain steroids. It is tempting to consider that repeated failure of normal movement of tissue potassium accompanying a wide variety of stresses may play a cumulative

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role in the development of schizophrenic behavior characterized by the establishment of conditioned responses involving inappropriate affect and disturbances of association, attention and consciousness. While there is no direct evidence for this hypothesis, and it may well be incorrect, the author presents it here as a target for criticism through further experimental tests. (Author's abstr.)

Adaptive Reaction to Stress.

1. Following a brief outline of the endocrine aspects of the General-Adaptation-Syndrome and of the so-called " Diseases of Adaptation," the participation of nervous mechanisms in these biologic reactions is considered.

2. Important alterations in the morphology and function of the nervous system can result from hypo- or hyperactivity of the pituitary-adrenal system, the main endocrine regulator of adaptive processes.

3. The coexistence of disordered endocrine mechanisms with psychoneurotic or psychotic states, suggests some relationship between pituitary-adrenal activity and mental processes. The precise nature of this relationship is not yet established.

4. Alarming stimuli of a neurogenic or psychogenic nature are particularly potent activators of the pituitary adrenocorticotrophic function and produce rapid and intense alarm-reactions.

5. The corticotrophic effect of physical stress is apparently independent from any nervous mechanism ; it is not prevented either by complete deafferentiation of the pituitary, or by the administration of autonomic blocking agents.

6. However, the possibility is considered that, unlike physical stressor agents, neurogenic stimuli may require a neurohumoral mechanism to elicit the release of pituitary A.C.T.H.

7. Recent experiments indicate that many effects of mineralocorticoids are inhibited by simultaneous treatment with glucocorticoids, yet on certain target organs the two types of hormones act synergistically. The importance of these interactions is stressed in connection with the concept of the diseases of adaptation. (Authors' abstr.)

Anxiety, HCl Secretion and Peptic Ulcer Etiology.

1. It is impossible to make a critical evaluation of an oral-dependency and an anxiety hypothesis of peptic ulcer etiology solely on the basis of available anamnestic or psychoanalytic studies of personality processes in peptic ulcer patients. A method which would enable one to do so is briefly described.

2. Both the oral-dependency and the anxiety hypothesis assume that increased HCl secretion is associated with the emotional processes emphasized. There are no published experimental data, positive or negative, concerning HCl secretion during the arousal of unconscious wishes to be loved, to eat, or to be fed. There is evidence that chronic overt anxiety behavior in dogs and conscious chronic anxiety in humans are positively associated with increased HCl secretion. Some of the results are contradictory, however, and further studies, especially at the human level, are needed. Such studies also aid in resolving the contradictory predictions of HCl secretion made by Cannon's emergency theory of emotions and by an anxiety hypothesis of peptic ulcer etiology.

3. A study of the gastric acidity of male students during the undergraduate examination period and during control periods is reported. The gastric acidity of these students was significantly higher during the examination period than during the control periods. The rise in gastric acidity was very closely related to the degree of conscious anxiety manifested by these subjects. These results agree with an anxiety hypothesis of peptic ulcer etiology ; they do not bear directly upon an oral-dependency hypothesis.

4. A recent critique of an anxiety hypothesis of peptic ulcer etiology and of a previous experiment of the writer is considered. It is shown that this critique did not adequately describe the experimental procedure or the results of the study it discounted. The theoretical objections raised in this critique are shown to be a function of confusion of the differential role of anxiety in the conversion neuroses and in the vegetative neuroses. The reluctance to consider the autonomic concomitants of anxiety is regarded as a joint result of the history of psychodynamic theory and the unqualified extensions of Cannon's emergency theory of emotions to chronic emotional processes.

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5. Possible fruitful lines of research for a comparative evaluation of the oral-dependency and anxiety hypotheses of peptic ulcer etiology are discussed. (Author's abstr.)

The Association of Certain Vegetative Disturbances with Psychoses.

The occurrence of various vegetative disorders in relation to psychiatric diagnosis within the population of a mental hospital in Canada has been examined and the relationship determined by statistical evaluation.

No statistically significant association between a particular type of psychosis and bronchial asthma, diabetes mellitus, rheumatoid arthritis and hyperthyroidism could be demonstrated.

A statistically significant association was found between peptic ulcer and the manic type of manic depressive psychosis. This observation is considered in the light of the common hypothalamic mechanisms involved in the two conditions and with reference to the psychoanalytic feature of oral aggressiveness which has been described for both disorders.

Elevated blood pressure occurred most frequently in the older age group of patients and in those with involutional melancholia. It was significantly low in catatonic dementia praecox and absent among epileptic patients. Statistical analysis indicated a negative correlation of hypertension with epilepsy even when allowing for age. Contrasts can be made between the personality characteristics which have been described for hypertensives with those present in catatonics and in epileptics. (Author's abstr.)

The Incidence of Certain Vegetative Disturbances in Relation to Psychoses.

The incidence of certain chronic vegetative disturbances has been determined among 1,600 patients in a Canadian mental hospital. The previous literature has been discussed concerning the frequency of the disorders among psychotic patients as compared with the general population.

Peptic ulcer appears to be less common among psychotic patients than among non-psychotics. This might favor its status as a " vegetative neurosis."

Bronchial asthma is not significantly less frequent among psychotics than non-psychotics. This emphasizes the importance of physical factors or of emotional factors at a psychotic level.

Diabetes mellitus is approximately as common among psychotic patients as in an unselected population. This either favors physical factors, or the hypothesis that the relevant emotional disorders are at a psychotic level.

Rheumatoid arthritis is rare among psychotics. This might support its designation as a " motor neurosis."

An elevated blood pressure is about as common among psychotic patients as among patients in general medical practice. This might favor the presence of physical in addition to emotional factors, since the high incidence renders psychotic factors less likely.

Hyperthyroidism is not common among psychotics, but no comparative incidence for non-psychotics is available.

With minor exceptions the sex ratios for these disorders are similar among psychotic and non-psychotic individuals. (Authors' abstr.)

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Effect of Iron Preparations on " Antabuse "-Alcohol Toxicosis.

The effect of iron on the " Antabuse "-alcohol toxicosis has been studied in 20 alcoholic patients by intravenous injections of an aromatic iron preparation, the main components of which are : ascorbic acid, 0·05 cg. and ferrous chloride, 0·0228 cg.

The experiments have been of a preliminary nature, but they indicate that intravenous injections of iron in doses as small as about 13 mg. (10 ml. of " Ferroscorbin ") have a distinct curative effect on the toxicosis produced by consumption of alcohol after a previous intake of " Antabuse." This effect is most clearly seen if the iron injection is given immediately after intake of alcohol, when the toxic symptoms can be made to disappear almost instantly (13 cases). If iron is given before intake of alcohol, the appearance of the toxic symptoms is not prevented but their development is slower than in the usual " Antabuse "-alcohol toxicosis (7 cases). The fact that certain and rapid curative effect can be achieved with relatively low quantities of iron (20 cases) will undoubtedly prove valuable in the practical treatment of alcoholism with tetraethylthiuram disulfide.

In the field of psychiatry, the following observation opens interesting therapeutic possibilities. In a rare case of amentiaform psychosis caused by " Antabuse " (without alcohol), " Antabuse "-alcohol toxicosis was produced by administering to the patient 40 ml. of cognac. The toxicosis was then cured by an intravenous injection of 10 ml. of " Ferroscorbin." After two such treatments all symptoms of the psychosis disappeared and the patient has since been able to perform his duties as a responsible official for over a month.

The effect of iron can be explained by the following hypothesis : " Antabuse " can be assumed to act as an enzyme poison in the first phase of the alcohol-oxidizing enzyme system, in the same manner as it evidently has a poisoning effect on the oxidative metabolism of lactic acid. Considering that metals, and specifically also iron, form difficulty-soluble complexes, with " Antabuse," it is reasonable to assume that iron in the blood reacts rapidly with the absorbed " Antabuse." Upon being liberated from the enzyme-poisoning " Antabuse," the alcohol-oxidizing enzyme system can then resume its normal functions. (Author's abstr.)

The Treatment of Acute Alcoholic States with A.C.T.H. and Adrenocortical Hormones.

In summary, it appears from the author's limited series that whereas A.C.E. is effective in Korsakoff's psychosis, A.C.T.H. is not ; and that both A.C.E. and A.C.T.H. are effective in the treatment of acute alcohol intoxication. In the latter condition A.C.E. is probably preferable because of its greater sedative action. In delirium tremens A.C.T.H. is the most effective treatment the author has used ; it is superior to either conventional treatment or A.C.E. (Author's abstr.)

An Evaluation of the Aversion Treatment of Alcoholism.

1. The conditioned-reflex or aversion treatment of alcoholism is of value mainly for the better-circumstanced type of alcoholic patient.

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2. Indigent, inadequate, psychopathic or extremely neurotic patients only occasionally respond to the conditioned-reflex treatment.

3. Although all who apply are accepted for treatment, there is an automatic selection favoring patients who are ready to undergo the treatment voluntarily and able to pay a substantial fee.

4. A follow-up study of 4,096 patients treated during a period of over 13 years by the conditioned-reflex method shows that 44 per cent. have remained abstinent since their first treatment, 60 per cent. have remained abstinent for 1 year or longer, 51 per cent. for 2 years or longer, 38 per cent. for 5 years or longer and 23 per cent. for 10 years or longer after their first treatment. Of 878 patients who relapsed and were treated again during these 13 years, 39 per cent. have remained abstinent since their last treatment. This gives an over-all abstinence rate of 51 per cent. for the period covered by this survey.

5. It is possible to evaluate the effectiveness of the various therapies of alcoholism as objectively as those of cancer, tuberculosis and many other medical conditions.

6. Conditioned-reflex therapy does not preclude other types of treatment for alcoholism and can be used with them in any combination most advantageous for the individual patient. (Authors' abstr.)

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1. Biochemistry, Physiology, Pathology, etc.

The Effect of Vitamin A Deficiency on the Nervous System. Campos, F. A. de Moura (Univ. Sao Paulo Med. School). [*Rev. brasil med. (Rio de Janeiro)*, **4**, 343–9 (1947); *Biol. Abstracts*, **22**, No. 6, 1376 (1948).]

Forty-eight young rats were put on a diet without vitamin A for 3 months. Twenty-two of them showed paralysis and ataxia of the hind limbs 7–12 weeks after the beginning of the experiment. In 18 of these 22 rats the above signs appeared after they had lost weight, and in 17 the eye signs appeared before the ataxia. Campos concludes that the nervous signs have no value for the early diagnosis of the vitamin A deficiency. R. D. H. (Chem. Abstr.).

Determinations of Histamine in Cerebrospinal Fluid in some Neuropsychiatric Cases. Autio, Lauri, and Ermala, Pentti (Lapinlahti Hosp., Helsinki, Finland). [*Ann. Med. Exptl. et Biol. Fenniae*, **27**, 87–101 (1949) (*in English*).]

Histamine was isolated chemically from the cerebrospinal fluid of 26 patients. The average amount obtained was 0·059 γ/ml. Women averaged 0·079, and men 0·038 γ/ml. In lumbar puncture the average was 0·091, while in cisternal it was 0·043 γ/ml. The determinations on fluid from untreated patients were similar, though not as pronounced. Histamine added to the cerebrospinal fluid seems to be bound into an inactive form from which it is gradually released.

DORIT L. NOETHER (Chem. Abstr.).

Characteristics of the Cerebrospinal Fluid in Lymphogranuloma Venereum. Finberg, Lawrence, Lord, Richard E., and Cenac, Mark T. (U.S. Pub. Health Service, Washington, D.C.). [*J. Venereal Disease Inform.*, **30**, 291–4 (1949).]

A considerable number (23·2 per cent.) of cases of lymphogranuloma venereum manifest abnormalities of the cerebrospinal fluid. The component of the cerebrospinal fluid involved appears to be chiefly the protein, with consequent changes

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in the colloidial mastic test. This finding may conceivably represent the only indication of activity. At present there are no data to show that such findings are an indication of activity or that they are of prognostic significance.

J. A. KENNEDY (Chem. Abstr.).

Determination of Proteins in Spinal Fluid. Ederle, Wilhelm (Staatl. Heilanstalt Weissenau, Wurtt, Ger.). [Deut. med. Wochschr., 74, 1411–12 (1949).]

A quantitative method is described, based on the xanthoproteic reaction. About 10,000 determinations were carried out by this method over a period of about 14 years. Two ml. of spinal fluid are mixed with 2 ml. of saturated $(NH_4)_2SO_4$ in a small test-tube. After at least 2 hours the tube is centrifuged and the supernatant fluid decanted into a second tube. The albumins in the second tube are precipitated with 2 ml. 20 per cent. CCl_3CO_2H. After one hour the tube is centrifuged and the supernatant discarded; ½ml. of 25 per cent. HNO_3 is added to both tubes and kept in a boiling water bath for exactly 5 minutes. The color reaction is carried out with the addition of 0·5 ml. 33 per cent. NaOH and the intensity is measured in a Pulfrich photometer with filter S 43. The results are calculated by comparing them with protein solutions of known concentrations. The globulin fraction is usually too high. The results with this method are within ± 8 per cent., and considered of clinical value. Another method by Roberts is mentioned, which does not require expensive instruments. It is based on Heller's reaction of protein with HNO_3. The appropriate dilution of the spinal fluid is found which will still show a turbidity when HNO_3 is added. A calibration table is then used for the calculation.

HERTHA H. TAUSSKY (Chem. Abstr.).

Antistreptolysin Content of the Cerebrospinal Fluid. Lundstrom, R., and Von Reis, G. [Am. J. Diseases Children, 79, 438–41 (1950).]

FELIX SAUNDERS (Chem. Abstr.).

Cholinesterase. III. Specificity of Cholinesterase. Chaudhuri, D. K. (Univ. Coll. Sci. Technol., Calcutta, India). [Ann. Biochem. Exptl. Med., 9, 67–72 (1949); cf. C. A., 39, 3799[3]; 41, 3829a.]

Evidence is presented to show that cholinesterase isolated from cobra venom by the method of Chaudhuri (*C. A.*, **37**, 1458[8]) is specific for choline esters.

IV. Influence of Temperature and Irradiation on the Activity of Cholinesterase. [Ibid., 73–8.]

Purified cobra venom cholinesterase lost one-half of its activity when exposed to a temperature of 44° for one hour. The effect was irreversible. Heat-inactivated cobra venom protein did not protect the enzyme. Exposure of an aqueous solution of the purified enzyme to ultraviolet rays caused inactivation, increasing in degree with increasing duration of exposure. Na_2SO_4 (5 per cent. solution) afforded considerable protection against the effects of irradiation. Crude cobra venom cholinesterase behaved similarly.

V. Effect of Substrate Concentration and Temperature on the Rate of Hydrolysis. [Ibid., 79–84.]

Purified cobra venom cholinesterase increased in activity with increasing acetylcholine concentration to a maximum at about 0·5 per cent. acetylcholine. Excess substrate up to 1 per cent. caused no inhibition.

VI. Optimum pH and Stability in Relation to pH. [Ibid., 85–90.]

The optimum pH for the activity of either purified or crude cobra venom cholinesterase was 8·4, while maximum stability of the enzyme was found to be in solutions of pH 7·4.

W. DONALD GRAHAM (Chem. Abstr.).

The Cholinesterase of the Pancreas: Its Behavior in Presence of some Inhibitors in Comparison with the Cholinesterases of Serum and Brain. Vincent, D., and Lagreu, R. (Univ. Toulouse, France). [Bull. soc. chim. biol., 31, 1043–5 (1949).]

The inhibiting action of ibogaine on horse serum cholinesterase (I) is about 40 times as great as on dog pancreatic cholinesterase (II) and sheep brain cholinesterase

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(III). Eserine inhibits all three to approximately the same degree. Caffeine inhibits (III), but not (I) and (II). These results show that (II) is distinct from (I) and (III). L. E. GILSON (Chem. Abstr.).

Inhibition of Rat-brain Cholinesterase by β-Chlorinated Amines. Bain, James A. (Univ. of Illinois, Coll. of Med., Chicago). [*Am. J. Physiol.*, **160**, 187–94 (1950).]

Brain cholinesterase combined with 2 molecules of acetylcholine to form an inactive complex with a dissociation constant of 0·016 M. The structure necessary for inhibitory activity by the β-chlorinated amines was correlated with that necessary for convulsant activity; in both cases the minimum necessary for activity was $CH_3N(C_2H_4Cl)_2$ or $CH_3N(C_2H_5)C_2H_3Cl_2$. Strychnine and nicotine were inhibitors of cholinesterase, but metrazole and pictrotoxin were not inhibitors. The anticonvulsants, phenobarbital, trimethadione, phenacetylurea, diphenylhydantoin and atropine had no effect on the enzyme, nor did they reverse the effect of any of the inhibitors studied. Inhibition of the enzyme by the β-chlorinated amines was reversed by cysteine. The results are discussed with regard to the mechanism of action of convulsant drugs. E. D. WALTER (Chem. Abstr.).

Cholinesterases of Cerebrospinal Fluid—Data for Normal Fluids and Fluids from Patients with Syphilis, Meningitis, or Poliomyelitis. Colling, K. G., and Rossiter, R. J. (Univ. Western Ontario, London, Can.). [*Can. J. Research*, **27E**, 327–40 (1949).]

The true cholinesterase activity increases in the spinal fluid of the syphilitic, while that of pseudocholinesterase increases in fluids of patients with meningitis and polio. There is a correlation of pseudocholinesterase activity with protein concentration and less with cell count. J. S. WARAVDEKAR (Chem. Abstr.).

Investigations into Cholinesterase Levels in Serum and Cerebrospinal Fluid of Psychotic Patients. Early, D. F., Hemphill, R. E., Reiss, M., and Brummel, E. (Mental Hosp., Bristol, Eng.). [*Biochem. J.*, **45**, 552–6 (1949).]

The true cholinesterase value of the serum in 55 psychotic males (59–85 years) was within normal range in 56 per cent., high in 24 per cent., and below normal in 20 per cent., and among 16 mental defectives 94 per cent. had normal values. No correlation could be found between true and pseudocholinesterase values, or between serum and cerebrospinal-fluid values. Only after repeated electroconvulsive shocks was the serum cholinesterase level lowered, but 1 to 90 minutes following such treatment the cholinesterase level may go down or up, or remain unchanged. S. MORGULIS (Chem. Abstr.).

Serum Cholinesterase and Functional Cardiac Neurovegetative Disorders. Merlen, J. F. (Faculty Med., Lille, France). [*Ann. Biol. clin. (Paris)*, **7**, 429–44 (1949).]

Normal serum cholinesterase values were found in a large majority of patients showing various cardiac and related disorders.

FRED. H. SNYDER (Chem. Abstr.).

Electrophysiological Analysis of Action of Acetylcholine on Nerve Centers. I. Artem'ev, V. V., and Babskii, E. B. (Moscow State Pedagog. Inst.). [*Fiziol. Zhur. (J. Physiol.)*, **35**, 623–30 (1949).]

Application of acetylcholine (concentration 10^{-6} to 10^{-4}) to the visual lobes of the frog, without eserine, causes a variable and temporary increase of electrical activity. At 10^{-6} to 5×10^{-8} concentration combined with $2{\cdot}5 \times 10^{-6}$ concentration of eserine a considerable and lasting enhancement of spontaneous electrical oscillations takes place, with large amplitudes of both slow and fast oscillations. Eserinized acetylcholine solutions of higher that 10^{-6} concentration repress electrical activity of nerve centers. Hence acetylcholine appears to act in the regulation of the state of central nervous stimulation.

G. M. KOSOLAPOFF (Chem. Abstr.).

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The Use of Acetylcholine in the Objective Determination of Circulation Time in Man. Schlichter, Jakub G., Wilburne, Morris, and Grossman, Milton (Michael Reese Hosp., Chicago). [*Am. J. Med. Sci.*, **216**, 523–7 (1948).]

The rapid injection of 0·2–1·2 c.c. of a 5 per cent. solution of acetylcholine chloride (10–60 mgm.) afforded a simple, accurate and objective measurement of circulation time in man, according to tests on 37 patients. The end-point of the determination was the time an expected auricular or ventricular response on the continuous electrocardiogram failed to occur on time. However, a serious hazard of such an injection is the induction of multiple premature extra-systoles and auricular fibrillation. The latter was observed in 2 cases of the present series; in these, sinus rhythm was re-established by oral administration of quinidine. The margin of safety of the compound may be small; in one case 20 mgm. acetylcholine had no effect on the patient, while 25 mgm. produced asystole followed by auricular fibrillation. M. H. P. (Chem. Abstr.).

Acetylcholine Release at Parasympathetic Synapses. Emmelin, Nils, and Muren, Anders (Univ. Lund, Sweden). [*Acta Physiol. Scand.*, **20**, 13–32 (1950).]

The submaxillary gland of cats was perfused with eserinized plasma. The perfusate was tested for acetylcholine by cat's blood pressure. Stimulation of the chorda tympani caused an increase in acetylcholine content, though small amounts of acetylcholine were always present in the venous outflow. In the presence of curare (10^{-4} intocostrin) stimulation of the chorda tympani produced only about $\frac{1}{3}$–$\frac{1}{4}$ of the acetylcholine output as was obtained without curare. The average output of acetylcholine was 0·144γ without curare, and only 0·05γ with curare. It is assumed that curare prevents transmission of nerve impulses across the synapses in the parasympathetic submaxillary ganglion, as it does in the superior cervical ganglion, but without interfering with the release of transmitter substance from the preganglionic endings of the chorda tympani. This idea is further supported by the pharmacological evidence, and by the fact that the chorda tympani contains a relatively high concentration of acetylcholine.

S. Morgulis (Chem. Abstr.).

The Mechanism and Significance of the Convulsing Action of Acetylcholine. Ardini, A., and Machne, X. (Univ. Parma, Italy). [*Boll. soc. ital. biol. sper.*, **24**, 884–5 (1948).]

Masticatory epilepsy and Jacksonian movements were observed in rabbits after application to the masticatory cortical area of 4–10 per cent. solutions of acetylcholine (I), or of 1 per cent. eserine (II), followed by 1 per cent. (I), or of 2–3 per cent. (II). Intravenous injection of 1–3 mgm./kgm. adrenaline (III) inhibited the Jacksonian movement thus produced, but did not counteract the effect of 20 per cent. (I). (III) had no effect on epilepsy produced by Amantea's method of strychninization when applied locally, but inhibited in 0·2 per cent. local application the Jacksonian mastication produced by (I). The convulsing action of (I) is not an osmotic effect, but is caused by the ester in concentrations much higher than the physiological ones. F. Fromm (Chem. Abstr.).

Experimental, Comparative, and Clinical Investigations of the Action of Amidopyrine, with Special Consideration of Nervous Reactions. Nitsch, Kurt (Univ. Gottingen, Ger.). [*Z. Kinderheilk.*, **67**, 366–422 (1949.)]

An extensive review and numerous original experiments on the effect of amidopyrine are presented. It possesses a regulative action on capillary permeability and exerts its influence via the nervous system. Its action on the water balance, body temperature, blood sugar, serum-iron level and blood-cell level, when administered intravenously, are described. In clinical observations it was found to possess a regulative action in disturbances involving the sympathetic and parasympathetic nervous system. Its influence on bronchial asthma, migraine and rheumatic fever are discussed in the light of the experimental observations.

D. L. Noether (Chem. Abstr.).

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Effect of Parpanit on Brain Wave Changes Induced by Diisopropyl Fluophosphate. *Essig, C. F., Hampson, J. L., Bales, P. D., Willis, Alice, and Himwich, H. E.* (*Army Chem. Center, Md.*). [*Science*, **111**, 38–9 (1950).]

Parpanit (2-diethylaminoethyl 1-phenylcyclopentanecarboxylate) effectively abolished the *grand mal*-like patterns produced by diisopropyl fluorphosphate (D.F.P.). Monopolar corticograms from each side of the brain of albino rabbits and an electrocardiogram (I) were recorded simultaneously on a four-channel Grass apparatus. D.F.P. (1 mgm./ml. in distilled H_2O) was injected into one carotid artery at 12-minute intervals in doses of 0·5 mgm./kgm. From 2 to 3 doses were required to produce bilateral *grand mal*-like patterns on the electroencephalogram (II). Parpanit in doses of 2–4 mgm./kgm. was then given intravenously. All spiking ceased within 3–4 minutes, and was supplanted by patterns characterized either by delta-like waves or somewhat low potential aperiodic activity, resembling the control (II). Although parpanit abolished the abnormal (II) activity, the cholinesterase levels of both cerebral cortexes and right mid-brain remained depressed. The influence of parpanit on the heart was manifested in those instances where the cholinergic action of D.F.P. produced bradycardia and altered (I) patterns concomitantly with convulsive-type (II) records. Parpanit appears capable of restoring such (I) records to normal pattern and rate.

WESLEY H. HARTUNG (Chem. Abstr.).

The Affinity of the Nerve Fiber for Tetanus Toxin. *Roofe, Paul G.* (*Univ. of Kansas, Lawrence*). [*J. Kansas Med. Soc.*, **49**, 60–1 (1948).]

In one group of guinea-pigs the sciatic nerves were exposed near the knee-joint and tetanus toxin placed on the central cut ends of the nerves. In 72 hours all the animals were dead of tetanus. In a second group the sciatic nerve was exposed and frozen with CO_2 snow to degenerate the axis cylinder. After 16 days toxin was applied as with the first group. None of the animals developed tetanus. The toxin was found to travel at an average of 3·35 mm./hr. along the nerve fiber.

E. K. WEISBURGER (Chem. Abstr.).

Effect of Stimulation on the Phosphate Esters of the Brain. *Dawson, R. M. C., and Richter, D.* (*Whitchurch Hosp., Cardiff, S. Wales*). [*Am. J. Physiol.*, **160**, 203–11 (1950); *cf. C. A.*, **43**, 745*h*.]

Electric stimulation of the rat brain produces a rapid fall in the phosphocreatine level, and a corresponding transient rise in the hexose phosphate fraction. The initial changes are followed by the return of the hexose phosphate fraction to the normal level, accompanied by the liberation of inorganic phosphate. These changes are evident in brains fixed up to 10 seconds after electric stimulation, and occur before the onset of convulsions. Brains fixed at 15 to 45 seconds after stimulation show a return of the phosphocreatine and of the phosphate level to normal. The adenosine triphosphate fraction shows only a slight fall after stimulation, with a return to normal after 25 seconds. The brains of rats taken during emotional excitement give a mean phosphocreatine level 13 per cent. higher than that of normal controls. There is no significant change in the other phosphate esters.

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

Reversibly Depressive Action of Steroid Hormones on the Central Nervous System. *Hofmann, H.* (*Univ., Jena, Ger.*). [*Endokrinologie*, **26**, 57–60 (1949).]

Desoxycorticosterone acetate, testosterone propionate, progesterone, and estradiol benzoate have no anesthetic effect on the central nervous system (mice, rats), even in large doses. Of the generally used solvents, propylene glycol has anesthetic action.

S. MORGULIS (Chem. Abstr.).

Histamine as a Specific Constituent of Certain Autonomic Nerve Fibers. *Euler, U. S. v.* (*Karolinska Inst., Stockholm*). [*Acta Physiol. Scand.*, **19**, 85–93 (1949.]

The highest amounts of histamine (60–100 γ histamine dihydrochloride per gm.) are found in nerves containing post-ganglionic sympathetic nerves (adrenergic fibers) like the splenic, splanchnic or mesenteric nerves, whereas the smallest amounts are found in spinal roots and central nervous system, and intermediate

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amounts are found in preganglionic autonomic fibers. Although nerves rich in histamine are also rich in noradrenaline, no definite correlation can be established. However, the large proportion of histamine to noradrenaline in such nerves as the mesenteric or cephalic postganglionic sympathetic fibers suggests that these fibers may have some relation to secretory function like the nerves supplying digestive glands, or to the smooth muscles. Liberation of histamine may serve to activate peripheral structures, and the nerve fibers promoting this may be true histaminergic nerves. The fact that the histamine-rich amyelinated fibers of the splenic nerves belong to the C fiber class suggests that perhaps the histaminergic fibers are all of this kind. S. MORGULIS (Chem. Abstr.).

Distribution of Sympathin N and Sympathin A in Spleen and Splenic Nerves of Cattle. Euler, U. S. v. (*Karolinska Inst., Stockholm*). [*Acta Physiol. Scand.*, **19**, 207–14 (1949).]

Small but measurable quantities of adrenaline are found in adrenergic nerves, together with noradrenaline, indicating that both biologically different substances acting as nerve transmitters in adrenergic nerves are formed in the nerve itself. The sympathin formed in the adrenergic nerves of the spleen (cattle) is noradrenaline. The small amounts of adrenaline are formed by methylation of noradrenaline. The splenic nerves contain, on the average, 2·2 per cent. adrenaline, which is very much less than the 7·2 per cent. contained in spleen extracts.

S. MORGULIS (Chem. Abstr.).

Neuroregulation of the Ovaries. Emanuel, Rainer (*Univ.-Frauenklinik, Bern, Switz.*). [*Z. Geburtshulfe u. Gynakol.*, **124**, 44–58 (1942).]

Injection of acetylcholine or pilocarpine shortened the ovarian cycle of growing female rats, while adrenaline and atropine lengthened the cycle. In old female rats the sexual cycle was renewed by one injection of pilocarpine, while in castrated female rats pilocarpine alone, or with below-threshold doses of follicular hormone, did not renew the cycle. Pilocarpine did not bring about ovarian function in immature rats. E. K. WEISBURGER (Chem. Abstr.).

Action of Sympathomimetic Amines on the Central Nervous System and the Blood Sugar; Relation of Chemical Structure to the Mechanism of Action. Leimdorfer, Alfred (*Loyola Univ., Chicago*). [*J. Pharmacol. Exptl. Therap.*, **98**, 62–71 (1950); *cf. C. A.*, **43**, 6744*b*.]

Effects of intracisternal injection of sympathomimetic amines in dogs were investigated. Adrenaline, N-isopropylarterenol, l-arterenol and butanephrine exhibited an analgesic, anesthetic, and hypnotic action and induced hyperglycemia. Adrenaline showed the most prolonged action, and also stimulated the respiratory center without change in blood pressure or electrocardiogram; the other three affected both blood pressure and heart action. Synephrine produced short-lasting sedation, and neosynephrine provoked excitement. Both caused an increase in blood sugar for a short time, and raised the blood pressure and disturbed the heart action. Ephedrine, benzedrine and propadrine produced no analgesia, no anesthesia, no sleep, and no change in blood sugar. They produced great excitement and severe disturbances in the electrocardiogram. The 2-aminoheptanes (tuamine and oenethyl) induced no anesthesia but caused very marked excitement, stimulation of motor areas of the cerebral cortex, and large increase in blood pressure, with little or no change in blood sugar. The relation between structure and activities is discussed, as well as the possibility of intrathecal injection of adrenaline as an aid in spinal anesthesia. L. E. GILSON (Chem. Abstr.).

Effect of Methadon Isomers on the Respiration of Rat Brain Homogenates. Watts, Daniel T. (*Univ. of Virginia Med. School, Charlottesville*). [*Arch. Biochem.*, **25**, 201–7 (1950).]

The oxidation of glucose, succinate, or ascorbate by rat brain homogenate was inhibited by 0·003–0·007 M. methadon (I), and slightly more by isomethadon. For (I) the variation of inhibition with concentration was the same for all three substrates, and anaerobic glycolysis was protected rather than inhibited. That

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the latter effect might be due to inhibition of some autolytic enzyme, such as diphosphopyridine nucleotidase, could not be shown. The *l*- and *d*- forms of the two drugs inhibited to a similar degree.

MARSHALL E. DEUTSCH (Chem. Abstr.).

An Approach to the Solution of Mental Dysfunction Through Brain Enzyme Studies. Ashby, Winifred (St. Elizabeth's Hosp., Washington, D.C.). [Am. J. Psychiat., **106**, 491–96 (1950).]

Discussion with a summary of Ashby's work on carbonic anhydrase in brain (*C. A.*, **42**, 3827*f*, 5105*h*; **43**, 4747*d*). WARREN M. SPERRY (Chem. Abstr.).

Effect of Insulin Hypoglycemia on Brain Glutamate. Dawson, R. M. C. (Whitchurch Hosp., Cardiff, Wales). [Nature, **164**, 1097 (1949).]

Insulin hypoglycemia produced a significant decrease in the level of L-glutamic acid in rat brain; the extent of decrease depended on the severity of the hypoglycemia. In deep coma the level was 100 mgm. per cent. compared with the control value 148 = 8 mgm. per cent. At the same time there appeared to be a slight rise in the glutamine level. These observations suggest that in hypoglycemic emergency the brain is able to obtain energy by metabolizing its glutamic acid reserves.

B. W. (Chem. Abstr.).

Water Economy in Epilepsy. Weinland, Wolf L. (Anstalt Bethel, Bielefeld, Ger.). [Arch. Psychiat. Nervenkrankh., **183**, 402–17 (1949).]

There was no relation between daily variations in body weight and occurrence of seizures in 18 epileptics. As a test procedure 800 ml. of warm tea was given early in the morning, and the rate of urine secretion was determined during the following 24 hours with bed rest, fasting, and no fluid intake. In 25 epileptics the total excretion was usually normal 2 days before or after seizures, but there was more hour-to-hour variation than in normals. When a spontaneous seizure occurred at the beginning of an experiment it did not affect the excretion of urine, but when it occurred during an experiment it was preceded and followed by an inhibition of excretion. WARREN M. SPERRY (Chem. Abstr.).

Studies of the Adrenals of Genuine Epileptics, with Particular Attention to the Cholesterol Content. Wendt, G. Gerhard (Anstalt Bethel, Bielefeld, Ger.). [Arch. Psychiat. Nervenkrankh., **183**, 418–22 (1949).]

Analysis of the adrenals from 9 epileptics and 12 non-epileptics, who had died of various diseases, showed that the average wet weight, dry weight, ether extract, EtOH extract, and cholesterol (I) content were all higher in the epileptics than in the controls. The differences for (I) was about 300 per cent. and was statistically significant. WARREN M. SPERRY (Chem. Abstr.).

Cytochrome and Cytochrome Oxidase in Multiple Sclerosis. Huzák, I. (Univ. Szeged, Hung.). [Confinia Neurol., **10**, 104–7 (1949).]

Cytochrome- or indophenol oxidase (I) was determined spectroscopically in brain slices treated with dimethyl-p-phenylenediamine. Whereas no (I) was found in white matter from normal brains, it was present in sclerotic plaques, both in white and gray matter, from persons with multiple sclerosis.

WARREN M. SPERRY (Chem. Abstr.).

The Adrenaline Picture of the Blood in Electroshock. Hann, Joseph, and Kinzius, Hansjörg (Max Planck Inst. Arbeitsphysiol., Dortmund, Ger.). [Deut. Z. Nervenheilk., **163**, 82–92 (1949).]

Adrenaline (I) was determined in the blood before and at frequent intervals after electroshock (II) in schizophrenic patients, dogs, rabbits, and rats. (I) concentration usually dropped immediately after (II), and then rose above the original concentration about 5 minutes after (II).

WARREN M. SPERRY (Chem. Abstr.).

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The Effect of Bilirubin on the Pathogenesis of Brain Injury in Erythroblastosis Fetalis. Kuster, Fritz, and Krings, Heinz (Med. Akad., Dusseldorf, Ger.). [*Z. Kinderheilk.*, **67**, 503–16 (1950).]

In rabbits, blood containing a bilirubin concentration of 100 mgm. per cent. causes fatal brain injury. Increased capillary permeability in human nuclear icterus makes bilirubin, in lower concentrations, a fatal poison.

D. L. N. (Chem. Abstr.).

Histochemistry of Lipides in Destructive Processes of Central Nervous System. Hominskii, B. S. [*Arkh. Patol, S.S.S.R.*, **9**, No. 5, 35–45 (1947).]

A histochemical study was made of 10 cases of Wallerian degeneration of the spinal cord and cerebrum resulting from compression due to tumors or trauma; similar data were obtained in 2 cases each of tabes dorsalis, ergotism, and amyotrophic lateral sclerosis, and in 4 cases of multiple sclerosis with numerous foci in the cerebrum and spinal cord. A new term, "destructive-resorptive steatosis," is suggested to characterize the destruction of nervous tissue and the transformation of lipide substances in the bodies of glial cells. The process is described in six consecutive stages; it is mainly characterized as cholesterol ester fatty degeneration. In the early stages a splitting up of the glycerophosphatides occurs; other phosphatides and cerebrosides are disintegrated in the later stages.

B. A. (Chem. Abstr.).

Psychophysical Correlations. VII. Adjuvant Therapy of the Liver in Schizophrenia. Fischer, Roland, Georgi, F., Weber, Rolf, and Piaget, R. M. (Psychiatric Univ. Clinic, Basle, Switz.). [*Schweiz. med. Wochschr.*, **80**, 129–35 (1950).]

Liver dysfunction was determined by the Quick test as a diminution of hippuric acid excretion. The liver damage is considered reversible in character, because in spontaneous remissions as well as in remissions after specific treatment of schizophrenics the dysfunction disappeared. Specific adjuvant therapy consisted of 2 gm. methionine, 1·5 gm. choline, 1 gm. inositol, 50 gm. glucose, and 6 tablets of cobezym daily. The diet was high in protein and carbohydrates and low in fat (maximum 60 gm. per day). E. MAIER (Chem. Abstr.).

New Findings in the Brains of Victims of Methanol Poisoning. Orthner, Hans (Gottingen, Ger.). [*Zentr. allgem. Path. u. path. Anat.*, **85**, 11–16 (1949).]

Individuals poisoned by MeOH exhibited necrotic foci restricted to the putamen in the brain. The lesions were characteristic, and their size was proportional to the time of survival after intake of MeOH. The liver showed signs of a serous exudation. J. H. WEISBURGER (Chem. Abstr.)

Lead Encephalopathy: Treatment and Recovery. Binder, Israel (Women's Homeopathic Hosp., Philadelphia, Pa.). [*Arch. Pediatrics*, **67**, 51–5 (1950).]

Pb poisoning in a child 3 years old was due to chewing crayons; it was characterized by basophilic stippling of the erythrocytes, the Pb line in the long bones on X-ray examination, blood Ca 7·3 mgm./100 c.c., and spinal fluid with increased pressure and containing 74 mgm. sugar, 730 mgm. chlorides/100 c.c. with no increase in protein. Treatment was directed at storage of the Pb in the bones by administration of Ca gluconate and vitamins C and D.

JOSEPH S. HEPBURN (Chem. Abstr.).

The Connective Tissue Sheath of the Nerve as Effective Diffusion Barrier. Feng, T. P., and Liu, Y. M. (Acad. Sinica, Shanghai). [*J. Cellular Comp. Physiol.*, **34**, 1–16 (1949).]

Study of depolarization and action potentials of intact and sheathless toad and frog nerves confirmed the conclusion (*Proc. Exptl. Biol. Med.*, **27**, 1073 (1930)) that the sheath is an effective diffusion barrier, and that the greatly increased rate of action of various kinds of solutions on the sheathless nerve must result essentially from removal of this barrier. The sheath could not be imitated by a coat of gelatin, even with a thickness greater than that of the sheath. Even though the sheath is an effective diffusion barrier, hemoglobin escaped through the sheath under pressure of a few cm. of H_2O. H. L. M. (Chem. Abstr.).

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Biochemical Development of the Brain of the Chick Embryo. I. Nucleic Acids. Mandel, P., Bieth, R., and Stoll, R. (Univ. Strasbourg, France). [*Bull. soc. chim. biol.*, **31**, 1335–40 (1949).]

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

The Statistical Organization of Nervous Activity. McCulloch, Warren S., and Pitts, Walter. [*Biometrics*, **4**, 91–9 (1948).]

It is demonstrated mathematically that the actions of neurons and their mutual relations can be described by the calculus of propositions subscripted for time; that the nervous system as a whole is ordered and operated on statistical principles, thereby adjusting the all-or-none laws governing its elements to a physical world of continuous variation; that the nervous system detects universals; that the nervous system conserves its own level of activity, the condition of the body it inhabits, and its relation to the physical world, by activity in closed paths, such that a change in its output causes a change of opposite sign in its input; that it chooses between ends; that it alters its structure by experience.

(Psychol. Abstr.)

2. Pharmacology and Treatment.

Action of Narcotics on the Metabolism of Brain. Rosenberg, Albert J., Buchel, Leya, Etling, Nicole, and Levy, Jeanne. [*Compt. rend.*, **230**, 480–2 (1950).]

The effects of several drugs on the metabolism of rat brain slices and homogenate were studied in the Warburg apparatus. To obtain a 50 per cent. inhibition of O uptake, 1·5 mgm. of chloral, 0·9 mgm. of gardenal, 0·6 mgm. of chloretone, or 0·3 mgm. of soneryl per ml. of medium were required. These values correspond to the relative physiological activities of the drugs. Along with the depressed respiration were found increases in glucose consumption and in lactic acid production. These results were interpreted as indicating that the drugs studied acted as inhibitors of the Pasteur effect. W. D. GRAHAM (Chem. Abstr.).

The Influence of Calcium and Parathormone on the Sensitivity of Narcotic and Convulsive Poisons. Haas, H. T. A., and Kraushaar-Baldauf, E. (Univ. Bonn, Ger.). [*Arch. klin. Chir.*, **260**, 641–55 (1948).]

One to 9 mgm. Ca gluconate per 100 gm. body-weight given subcutaneously or orally to rats has a protective action against procaine and pontocaine. Ca is antagonistic to pontocaine in mice. The average lethal dose of pontocaine is higher if the drug is administered perorally than subcutaneously. Intraperitoneal injections of 0·25, 0·5 and 1 c.c. parathormone per 100 gm. body weight protect rats against procaine and pontocaine. No protection with parathormone and Ca is obtained in cases in which cardiazole, strychnine, avertin and evipan were given subcutaneously. In diuresis experiments in rats parathormone does not alter urinary excretion. Ca has an enhancing effect during the first few hours after subcutaneous administration. GERTRUDE E. PERLMANN (Chem. Abstr.).

Quantitative Investigations on the Antagonism of Picrotoxin and Barbital Sodium on Rabbits. Jarvinen, P. A., and Vartiainen, A. (Univ. Helsinki, Finland). [*Ann. Med. Exptl. et Biol. Fenniae*, **27**, 78–86 (1949) (*in English*).]

Rabbits were anesthetized with 0·2–1·0 gm./kgm. doses of barbital sodium. The quantitative results are tabulated, and show that 0·9–43·7 mgm./kgm. picrotoxin in 1–13·3 intravenous injections were needed for the final awakening of the animals. Picrotoxin treatment decreases the anesthetic mortality, shortens the duration of anesthesia and increases the lethal dose of barbital sodium.

D. L. NOETHER (Chem. Abstr.).

Convulsions in Cerebellum and Cerebrum Induced by β-Chlorinated Amines. Pollock, Geo. H., and Bain, James A. (Univ. of Illinois, Coll. of Med., Chicago). [*Am. J. Physiol.*, **160**, 195–202 (1950); *cf. preceding abstr.*]

The convulsant activity of 25 β-chlorinated amines was studied in cats. The threshold dose is approximately halved, and the time of seizure greatly reduced by inhalation of gas mixtures containing 15–30 per cent. CO_2. Seizure discharge was first observed in the cerebellar leads. E. D. WALTER (Chem. Abstr.).

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Respiration of Brain Cells under the Influence of Hypnotics. Influence of Alkalosis. Buchel, Leya. [*Compt. rend. soc. biol.*, **143**, 613–15 (1949).]

The inhibiting action of EtOH, chloral hydrate, and several barbiturates on O consumption of brain slices was considerably weaker at pH 8·4 than at pH 7.

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

Absence of Localization of Barbital in Divisions of the Central Nervous System. Maynert, E. W., and Van Dyke, H. B. (*Columbia Univ.*). [*J. Pharmacol. Exptl. Therap.*, **98**, 184–7 (1950).]

An isotope dilution experiment with the urine from a dog after ingestion of barbital labelled with N^{15} confirmed the view that barbital does not undergo any change *in vivo*. Hence the determination of excess N^{15} extracted from tissues is equivalent to the determination of barbital. The concentration of isotopic barbital was determined in various parts of the brain of 4 dogs after doses of 25–250 mgm./kgm. No localization in any particular division of the central nervous system such as the diencephalon (as suggested by other investigators) was detected.

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

Synergism Between Narcotics and Myanesin. Levi, A. (*Univ. Modena, Italy*). [*Giorn. ital. anestesiol.*, **15**, 79–84 (1949).]

Myanesin (α, β-dihydroxy-γ-(methylphenoxy)-propane) (I) in small, non-myolytic doses increases the activity, especially of the thiobarbiturates, pentothal and thionarcon, and to a less extent barbital, phenobarbital, evipan, morphine, amidone, chloral, urethan, NaBr, ether, and $CHCl_3$ in dogs and rabbits. When the narcotic and (I) were injected at the same time, synergism was noted even at inactive, but determined, doses of the narcotic. When (I) was injected on awakening from the narcotic sleep the animal fell again into a profound sleep, sometimes of greater duration than the one due to first narcotic action.

M. ELLIOTT (Chem. Abstr.).

Chemical Constitution and Nerve Action. II. Gabelein, Klaus (*Paulsdorfferstr.* 9, *Munich, Ger.*). [*Med. Monatsschr.*, **4**, 130–3 (1950); *cf. ibid.*, **3**, 619 (1949).]

An attempt is made at explaining the effect on sensory organs (taste, smell) as well as the pharmacological action on nerve function of compounds on the basis of their valence deformation.

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

Effect of Strychnine on the Cat Electrocerebellogram. Johnson, Herbert C., Browne, Kenneth M., Markham, James W., and Walker, A. Earl (*Johns Hopkins Univ., Baltimore, Md.*). [*Proc. Soc. Exptl. Biol. Med.*, **73**, 97–9 (1950).]

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

Effect of some Drugs on the Polarization State of Spinal Cord Elements. Van Harreveld, A., and Feigen, Geo. A. (*California Inst. of Technol., Pasadena*). [*Am. J. Physiol.*, **160**, 451–61 (1950); *cf. C. A.*, **43**, 9260*b*.]

Et_2O, Na pentobarbital, dial, pentothal, avertin, and $CHCl_3$ caused a uniform depolarization of the spinal neuron. Chloral seems to depolarize the nerve cell more than the fibers. The anticonvulsants, dilantin and mesantoin, produced considerable uniform depolarization in doses which did not affect the knee-jerk and flexion reflex. Cocaine produced a uniform depolarization. Morphine and strychnine did not depolarize the spinal cord elements. The strychnine convulsions, however, produce a functional depolarization. Na 1, 3-dimethylbutylethylbarbiturate probably caused functional depolarization owing to the convulsive discharges, but in higher concentrations depolarization like the narcotic barbiturates.

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

Action of Picrotoxin and Paraldehyde on Cerebral Excitability. Fernandez, Elvira de Echalecu (*Facultad. med., Madrid*). [*Farmacoterap. actual* (*Madrid*), **6**, 140–2 (1949).]

Intravenous picrotoxin lowers the threshold of excitability in dogs with electrodes permanently fixed to the cerebral cortex. Electric stimuli, normally ineffective, cause a variety of motor reactions. Paraldehyde has the opposite effect.

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

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Influence of Certain Neurotropic Substances on Central and Synaptic Transmission in Callianassa. Turner, R. S., Hagins, W. A., and Moore, A. R. (Stanford Univ., Stanford, Calif.). [*Proc. Soc. Exptl. Biol. Med.*, **73**, 156–8 (1950).]

Eserine and atropine produced a marked increase in the "spontaneous" activity of the ganglion cells when applied to the exposed ventral nerve cord of the macrurous anomural crustacean *Callianassa californiensis*. These drugs had no appreciable effect on conduction characteristics of the giant fibers in the nerve cord, on the transmission across the synapse between the giant fibers and the nerves to the flexors of the telson, or on denervated muscle. Nicotine, methylamine, triethylamine, and diisopropyl fluophosphate reversibly block synaptic transmission for varying periods of time. L. E. GILSON (Chem. Abstr.).

Quantitative Studies on the Autonomic Actions of Curare. Guyton, Arthur C., and Reeder, Robert C. (Univ. of Mississippi). [*J. Pharmacol. Exptl. Therap.*, **98**, 188–93 (1950); *cf. C. A.*, **44**, 2116*f*.]

The relative amounts of curare required to paralyse various sympathetic and parasympathetic functions in the dog were determined. In all cases the doses were considerably higher than those producing skeletal nerve paralysis.
L. E. GILSON (Chem. Abstr.).

Pentothal and Curare for the Modification of Electric Convulsions. Rising, Jesse D. (Univ. of Kansas Med. School, Kansas City). [*J. Kansas Med. Soc.*, **48**, 456–8 (1947).]

In dogs intravenous doses of pentothal up to 15 mgm./kgm. elevated moderately the convulsive threshold after electric shock, while 20 mgm./kgm. prevented convulsive seizures. Pentothal reduced the period of apnea and reduced or eliminated post-shock excitement. Curare in doses of less than 1 unit/kgm. was not reliable to lessen convulsions, and larger doses produced severe depression of respiration with prolonged apnea. A combination of 0·5 unit of curare/kgm. and 10 mgm./kgm. of pentothal lessened convulsions and reduced apnea and post-shock excitement. E. K. WEISBURGER (Chem. Abstr.).

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