Part III.—Bibliography and Epitome.

AN attempt is being made to provide as far as possible a complete bibliography compiled from the specialist journals dealing only with Psychiatry and Neurology (which are really inseparable) and their ancillary subjects, psychology, anatomy of the nervous system, criminology, etc.

A number of titles may appear to have a very remote relation to psychiatry, but they are included for the sake of completeness.

If any reader can add the names of journals to the following list, which it is hoped to publish each year in the January number, the addition will be gratefully received and acknowledged.

Those journals which are available in the Library of the Royal Medico-Psychological Association are marked " 1 ", those available in the Library of the Royal Society of Medicine are marked " 2 ", those in the Library of the British Psychological Society are marked " 3 ", and those in the Library of the British Medical Association are marked " 4 ".

The titles of these journals are mostly in the form given by the Board of Editors of Publications of the American Psychological Association, January, 1939. Contributors are requested to use the exact form given below.

PSYCHIATRIC JOURNALS.

2, 4 *Acta Psychiatrica et Neurologica.*
3 *Acta Psychol., Hague.*
Acta Psychol., Keijo.
Aliéniste Français.
2 *Allgemeine Zeitschr. f. Psychiat. u. i. Grenz.*
Altersprobleme.
2, 3 *Amer. J. Ortho-psychiat.*
1, 2, 3, 4 *Amer. J. Psychiat.*
2, 3 *Am. J. Psychol.*
An. Inst. Psicol. Univ. B. Aires.
Analele Psihol (Rumania).
Anales de psicologia, Buenos A.
2, 3 *Année Psychol.*
2 *Ann. Méd. Psychol.*
2 *Ann. Osp-psichiatri. Perugia.*
Arb. Psychiat. Inst. Sendai.
Arch. Anthrop. crim.
2 *Arch. Argentinos de Neurologia.*
Arch. Argent. Psicol. norm. pat.
Arch. Brasileiros de Hygiene Mental.
2 *Arch. Brasileiros de Neuriatrica e psiquiatria.*
Arch. Chilenos de Crim.
Arch. Ital. di Studi Neuropsich.
1, 2 *Arch. Neurobiol.*
4 *Arch. Neurol. Paris.*
Arch. de Neurol. de Bucarest.
1 *Arch. de Neurologia.*
2 *Arch. di Antropol. Criminale.*
Arch. di Criminol. neuropsiquiatria y disciplina conexas.
2, 4 *Arch. Psychiat. Nervenkr.*
2, 3 *Arch. di Neur., Psichiat. Psich. e Psichoter.*

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2, 3 *Arch. ges. Psychol.*
Arch. Internationale de Neurologia.
Arch. Ital. Psicol.
Arch. Krim. Anthrop.
1, 2, 3, 4 *Arch. Neurol. Psychiat.*
2, 3 *Arch. Psychol. Genéve.*
3 *Arch. Psychol., N.Y.*
Arch. Relig. psychol.
Arch. Speech.
Arquivos da Assist. a Psicopatas de Pernambuco.
3 *Austr. J. Psychol. Phil.*

Beih. Z. angew. Psychol.
Beih. Zbl. Psychother.
Bol. Inst. Psiquiatria.
2, 4 *Brain.*
3 *Brit. J. Educ. Psychol.*
2, 4 *Brit. J. Inebriety.*
2, 3, 4 *Brit. J. Med. Psychol.*
2, 3, 4 *Brit. J. Psychol.*
3, 4 *Brit. J. Psychol. Monogr. Suppl.*
2, 4 *Bull. de la Soc. de Psychiatrie de Bucarest.*
2 *Bull. de la Soc. Roumaine Neur. Psychiat., Psychol., Endocrin.*
Bull. du Groupement Français d'études de neuro-psychopathologie infantile.
2 *Bull. Los Angeles Neur. Soc.*
Bull. Menninger Clin.
Bull. Soc. Psihol. med. Sibiu.

4 *Canad. Journ. Occup. Ther.*
3 *Cath. Univ. of Amer. Studies in Psychol. and Psychiat.*
2 *Cervello.*
2, 3, 4 *Character and Per.*
2 *Child Develpm.*
Child Develpm. Abstr.
Child Develpm. Monogr.
Child Study.
Chin. J. Psychol.
3 *Comp. Psychol. Monogr.*
2 *Confinia Neurologia.*
Contr. del Lab. di Psichologia.
Contr. psychol. Theor.

2 *Deutschr. Zeitschrift f. Nervenheilk.*

1, 2, 3, 4 *L'Encéphale.*
2 *Epilepsia.*
Evolut. Psychiat.

Fiziol. Th. S.S.S.R.
2 *Folia Neuropath. Esthon.*
2 *Folia Psychiat. et Neurol. Japonica.*
2 *Fortsch. Neur. Psychiat.*

3 *Genet. Psychol. Monogr.*
Giornale di Psich. e di Neuropat.

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4 *Hum. Factor.*
2, 3, 4 *Hygiène Mentale.*

2, 3 *Imago.*
3 *Indian J. Psychol.*
Industr. Psychol.
Industr. Psychotech.
2 *Int. J. Indiv. Psychol.*
1, 2, 3, 4 *Int. J. Psychoanal.*
3 *Int. Z. Indiv. Psychol.*
2, 3 *Int. Z. Psychoanal.*

Jap. J. appl. Psychol.
Jap. J. Exp. Psychol.
Jap. J. Psychol.
1, 2, 3 *J. Abnorm. Soc. Psychol.*
3 *J. App. Psychol.*
2, 4 *J. Belge Neur. Psychiat.*
2 *J. Comp. Neur.*
1, 3 *J. Comp. Psychol.*
J. Consult. Psychol.
J. Crim. Law and Criminol.
J. Crim. Psychopathol.
J. de Psychiatrie Infantile.
3 *J. Educ. Psychol.*
J. Except. Child.
3, 4 *J. Exp. Psychol.*
2 *J. f. Psychiat. u. Neurol.*
3 *J. Gen. Psychol.*
J. Genet. Psychol.
J. Juvenile Res.
1, 2, 3, 4 *J. Ment. Sci.*
1, 2, 3 *J. Nerv. Ment. Dis.*
1, 2, 3, 4 *J. Neurol. Psychiat.*
J. Neuropath. and Psychiat. Leningrad.
2, 4 *J. Neurophysiol.*
J. Neuropsychiatrique du Pacifique.
J. Parapsychol.
J. of Psichical Research.
J. Psihoteh.
2 *J. Psycho-Asthenics.*
3 *J. Psychol.*
J. Psychol. Moscou.
J. Psychol. Neurol. Leipzig.
2 *J. Psychol. Norm. Path.*
J. Soc. for Psychical Research.
3 *J. Soc. Psychol.*
J. Speech Disorders.

Kriminalistik.
3 *Kwart. Psychol.*

Mag. psychol. Szle.
2, 4 *Mental Hyg., Lond.*
Ment. Hyg., N.Y.
3 *Mind.*
Mschr. Krim. Biol.
2 *Mschr. Psychiat. Neurol.*

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Ned. Tijdschr. Psychol.
2 *Neopsichiatrica.*
2 *Nervenarzt.*
3 *Neue psychol. Stud.*
Nevropath. i. Psikhiat.
Note e Riv. di Psichiatrica.
Nowiny Psychjaryczne.
Nuova Riv. di Clin. ed Assistenza Psichiatrica.

Obshch. Klin. Nevropat.
3 *Occup. Psychol.*
2 *Occup. Ther. and Rehabil.*
2 *Onderzoekingen Psychiat-Neur. Klin. Utrecht.*
2 *Ospedale Psichiatrico.*

Person. J.
Pisani.
Polsk. Arch. Psychol.
Prace Psychol.
Proc. Amer. Assoc. Stud. Ment. Def.
Psicoterapia (*Cordoba*).
Psyche.
2 *Psychiat. en Neurol. Bladen, Utrecht.*
2 *Psychiat. et Neurol. Japonica.*
2 *Psychiat. Neurol. Wochens.*
Psychiatry.
1, 2, 4 *Psychiat. Quart.*
2, 3 *Psychoanal. Quart.*
1, 2, 3 *Psychoanal. Rev.*
2, 3 *Psychol. Abstr.*
3 *Psychol. Bull.*
Psychol. Clin.
Psychol. Exch.
3 *Psychol. Forsch.*
Psychol. Index.
Psychol. Monogr.
Psychol. Rec.
3, 4 *Psychol. Rev.*
3 *Psychol. Rev. Monographs.*
Psychol. wychow.
3 *Psychometrika.*
Psychometr. Monogr.
Psychosomatic Medicine.

Quart. Journ. Speech.

Rass. Neurologia Vegetativa.
Rass. Studi Psichiat.
Rev. di Neur. e Psychiatry, S. Paolo.
Rev. di Psiquiatria, Chili.
Rev. di Psiquiatria y Crim.
3 *Rev. Franç. Psychanal.*
Rev. Ibero-Amer. de Anal. Biblio. de Neurol. y Psiquiat.
Rev. Mex. Neurol. Psiquiat.
1, 2, 4 *Rev. Neurol.*
Rev. Neurol. Psychiat. Praha.

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Rev. Psicol. Pädag.
Rev. Psihol.
Rev. Psiquiat.
Rev. Tchèque de Neurol. et de Psychiat.
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2, 3, 4 *Riv. di Neurol.*
Riv. di Neuro-psiquiatria, Peru.
3 *Riv. di Psichologia.*
Riv. Ital. di Endocrin. e Neurochir.
Riv. Neurol. di Buenos-Aires.
2 *Riv. Patol. nerv. ment.*
Riv. Psichol. Norm. Pat.
2, 4 *Riv. Sper. Freniat.*
1 *Rocznik Psychjatryczny.*
Rorschach Res. Exch.

1 *Schizofrenie.*
2 *Schweiz. Arch. Neurol. Psychiat.*
Skand. Arch. Psychol.
Sov. nevropatol., psichiatri, psichoguoguia.
Sovetsk. Psikhotekh.

Tohoku Psychol. Folia.
Trans. Beritov. Inst. Tiflis.
Trans. Kostchenko Ment. Hosp. Moscow.
Trud. fiziol. Lab. Pavlova.
Trud. tsentral. psikhonevrol. Inst.

Univ. Calif. Publ. Psychol.
Univ. Ia. Stud. Psychol.
Untersuch. Psychol. Phil.

3 *Z. angew. Psychol.*
Z. Arb. Psychologie u. praktische im Allgemeinen.
Z. Berufsbildung des Pflegepersonals.
Z. Individ. Psychologie.
2, 4 *Z. ges. Neurol. Psychiat.*
3 *Z. Pädag. Psychol.*
Z. Parapsychol.
Z. Psychoanalyse (*Tokyo*).
3 *Z. psychoanal. pädag.*
2, 3 *Z. Psychol.*
Z. Psychother. med. Psychol.
Z. Tierspsychol.
2 *Z. Neurochir.*
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Ether-soluble Plasma Phosphatides in Schizophrenia. Jokirartio, E.

The normal mean value of the ether-soluble plasma phosphatides is 10·22 mg.%, with extremes of 8·72 and 12·87. The values for women are generally higher than those for men. In schizophrenics, the 40 acute cases showed a mean value of 5·79 mg.%. 37 out of the 40 cases showed values below the lower limit of normal cases. The 18 chronic cases showed a mean value of 5·76 mg.%. In defective-state schizophrenics the mean value was 8·30 or slightly below the lower limit of normal cases.

Cardiazol or insulin treatment causes no important changes in the phosphatide values. G. W. T. H. FLEMING.

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Age of Onset of Epilepsy: Differences between Deteriorated and Non-deteriorated Patients.

In this study the age of onset of 368 adult non-deteriorated patients with epilepsy was determined and compared with similar data for institutional deteriorated patients.

The trends observed were as follows:

1. Fewer non-deteriorated patients have the onset before 5 years of age.
2. Fewer non-deteriorated patients have the onset before 10 years of age.
3. More non-deteriorated patients have the onset after 20 years of age.
4. More non-deteriorated patients have the onset after 40 years of age.

It is concluded that deteriorated patients with epilepsy differ from the non-deteriorated ones in that there is a tendency to later onset in the non-deteriorated patients. (Authors' abstr.)

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Cell Minerals in Amaurotic Idiocy, Tuberous Sclerosis and Related Conditions, Studied by Microincineration and Spectroscopy. Examples of Degenerative and of Neoplastic Cell Disease.

(1) The ganglion-cell disease of amaurotic idiocy is characterized by demineralization, that of tuberous sclerosis by hypermineralization of the cytoplasm. In this respect the ganglion-cell disease of amaurotic idiocy aligns itself with other degenerative conditions; that of tuberous sclerosis with other conditions of a blastomatous or neoplastic nature. The actively proliferating reactive glia-cells in amaurotic idiocy are hypermineralized, like all actively growing tissues.

(2) The demineralization of the diseased ganglion-cells in amaurotic idiocy is of especial interest in view of the associated increase in lipoid material. In our studies thus far, it appears that wherever lipoid is accumulated, normally or pathologically, heat-resistant mineral ashes are absent. This is well exemplified by the lipoid body of the normal myelin sheath, which is completely lacking in heat-resistant mineral ash.

(3) The "periventricular spongioblastomatous hæmatoma", presumably an attenuated form of tuberous sclerosis, which has been described and three new cases of which are reported here, shows gross hypermineralization which corresponds to that generally found in tumours and other actively growing tissues.

(4) The mineral ash picture of the brain in "mongolian idiocy" (Langdon-Down's disease) does not show significant alterations from the normal.

(Authors' abstr.)

Pathologic Considerations on Insulin Treatment of Schizophrenia.

The study of the present material while confirming the indirect evidence of functional changes based on the type and distribution of the nerve-cell changes, offers direct evidence of the vascular origin of the lesions based upon actual morphologic alteration of the blood-vessels. The striking pathologic changes of the brain blood-vessels described seem to indicate a direct damaging action of insulin, or some other substance formed in hyperinsulinism, upon the cells of the vessel-walls. The reaction of the adventitial and endothelial elements appears to be mainly hyperplastic and, to a lesser extent, degenerative in character. Neo-formation of capillaries may be explained partly as a secondary vascularization of an altered tissue that is undergoing new organization; partly, however, as a direct effect of proliferative stimuli, since cellular proliferation of vessel-walls was also observed in the absence of major parenchyma destruction. The pathologic features of the vascular changes bear striking similarities to the "productive type" of vascular reaction found in lead "encephalitis" (Bonfiglio, Hassin). This type of vascular changes has not been described as yet in insulin-treated patients, although in experimental hyperinsulinism Dunner *et al.* and Accornero have mentioned the finding in the central nervous system of proliferation of vascular endothelium and neo-formation of capillaries.

It seems reasonable to assume that the cellular waste of the brain tissue in severe hypoglycæmia is brought about by a mechanism of anoxia in which not only biochemical factors but also vascular alterations appear to play a role. In the majority of cases of hypoglycæmic shocks the vascular reaction is likely to be functional in character at the beginning. However, high doses of insulin may produce proliferative changes in the wall of the vessel, leading to narrowing and obliteration of the lumen. In both functional and anatomical vascular alterations, the quantity of oxygen conveyed to the tissue by the blood-vessels is forcibly reduced and cellular anoxia, eventually leading to destructive changes of the nerve-cell, is the ultimate result.

Functional disturbances and productive changes of the blood-vessels might be regarded as two successive stages of the same process; evidence has been offered, in fact, in favour of the hypothesis that angiospastic states of long duration and frequently repeated may determine endarteritic proliferation.

(Authors' abstr.)

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Cerebral Damage in Hypoglycæmia: A Review.

Four personal cases are reported, three of which are still alive, but handicapped by varying neurological and psychiatric disabilities.

From a review of the literature and a study of these cases it seems very apparent that continued repeated hypoglycæmia may definitely produce a depression of the cerebral function and even an irreversible degeneration of the brain-tissue and cells, resulting in long-continued or permanent functional damage or even death.

The factors behind the different individual responses to hypoglycæmic insults are at present unknown, hence making it impossible to predict or adequately control the more severe reactions or the resulting brain damage.

(Author's abstr.)

Metrazol Shock Treatment: Pharmacological and Biochemical Studies.

It was found that the level of serum calcium and potassium remained almost unchanged before and after convulsive seizures. The characteristic increase in blood sugar may be due to an increased output of adrenaline. Serum sodium chloride was also slightly increased. The blood sedimentation rate was retarded after convulsions, and is interpreted as reflecting an increase of serum albumin.

Central nervous system stimulants such as carbon dioxide and ephedrine decreased the minimal convulsive dose of metrazol. Adrenalin and pituitrin were less effective in this regard. Strychnine, caffeine and theophylline had no such effect. Hypnotic and narcotic drugs—phenobarbital, sodium barbital and rutonal—exhibited a marked antagonistic action to metrazol, while this effect was less with paraldehyde and chloral hydrate. Sodium bromide also has no antagonistic action. All of these observations tend to corroborate the Pick-Molitor theory of the action of hypnotics. The dose of metrazol required to produce a convulsion during insulin hypoglycæmic shock is much smaller, which tends to show that unconsciousness in insulin shock is pharmacologically and neurologically different from the coma induced by hypnotics and narcotics.

In the human subject the results obtained were similar to those found in animal experiments. Previous administration of thyroxin to rats caused a decrease in the minimal convulsive dose of metrazol.

Metrazol convulsions in man are produced by an intense stimulation of the vegetative and motor centres of the brain-stem. (Author's abstr.)

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Pathologic Laughing and Crying.

From an analysis of the clinico-pathologic material presented, the cases reported in the literature and animal experiments, it is possible to reconstruct the centres and pathways regulating these affective responses.

The cases of cortical lesions indicate that certain cortical areas, namely the frontal, premotor, motor, parietal, temporal and hippocampal, may act as centres for integration of these affective responses. These impulses are mediated by pathways which are in intimate connection with the hypothalamus. This is illustrated best by series of cases in which there were lesions at the cortico-diencephalic level. The hypothalamus or some of the other diencephalic nuclei which are under cortical inhibitory influence are the main centres or stations for the release of affective responses. A lesion of the corticohypothalamic tract removes cortical control, thereby inducing excessive affective responses. The secondary involvement of the nuclei, striatum and pallidum in many of the clinico-pathologic cases, and the œdema of these structures in the experimental animal, suggest that these areas

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may also act as centres for the production of these affective responses and that, by means of pathways, they are in intimate association with the hypothalamus.

The group of cases of selective lesions of the mesencephalon and metencephalon and the animal experiments indicate that there are pathways, and possibly independent centres, in these regions for the production of laughing and crying. Some of these pathways are in intimate connection with the hypothalamus and the facio-respiratory nuclei.

The various psychologic theories for the emotions are discussed. It is emphasized that the pathways and centres aforementioned, particularly those of the facio-respiratory mechanism, are important for the expression of the emotions, and that the stimuli setting them off may be cortical or subcortical, or both. No single structure is all-important, and all must be integrated for control of feeling and expression.

A psychodynamic study of pathologic laughing and crying indicates that a number of variations may occur. These emotions apparently may be adequate or exaggerated in their form or feeling tone, as described by the patient. The responses may also be actually or seemingly disjointed and inappropriate. The spontaneous laughing and crying in the psychoses and neuroses are not included in this study. Although these will have to be explained on purely psychological grounds, the seat of their origin and their transmission most likely depend on the centres and pathways described. (Authors' abstr.)

Treatment of Schizophrenia with Glandular Extracts.

1. In every case of schizophrenia there is a disturbance in the gaseous metabolism, which begins with decrease in the specific dynamic action of protein.

2. The specific dynamic action of protein depends, at least in part, on secretions from the anterior lobe of the pituitary gland.

3. The treatment of schizophrenic patients with an extract containing anterior pituitary-like substances from the urine of pregnant women produces good therapeutic results, and has the added advantages of not being a dangerous form of therapy. (Author's abstr.)

Capillary Structure in Patients with Schizophrenia.

1. Schizophrenia is associated with a defect in the capillaries.

2. The observations indicate that the severity of the disease is related to the degree of derangement of the capillary structure.

3. The studies suggest that schizophrenia falls in the category of vegetative and metabolic disorders. (Author's abstr.)

Cerebral Changes in Fatal Cases following Treatment with Barbital, Soluble Barbital U.S.P., Insulin and Metrazol.

Barbiturates, insulin and metrazol produce morphologic changes in the ganglion-cells of the brain, often associated with neuronophagia, but without marked macroglial or microglial reactive phenomena.

The changes are diffuse and appear to be somewhat more marked in the medulla, especially the olivary bodies.

Distension of the subarachnoid space and the cerebral tissue spaces—œdema—is a dangerous occurrence, and is much more significant than the changes in the ganglion-cells.

The changes in the ganglion-cells are not specific, for they are the same regardless of the type of poison; they also resemble changes produced experimentally by injections of a variety of organic or inorganic poisons. (Author's abstr.)

Histopathologic Changes in the Brain following Experimental Injections of Metrazol.

Metrazol in a 10% solution was injected intravenously twice a week into rabbits, in imitation of the treatment of dementia præcox in man. The average dose

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injected was 22 mgrm. per kilogram of body-weight, and was sufficient to produce a convulsive seizure. Resistance to metrazol developed gradually, and the initial dose had to be increased after about five to seven injections.

Definite histopathologic changes were observed after injections of a total of more than 700 mgrm. of metrazol. The intensity of these changes was roughly parallel to the dose injected, the number of injections and the time of survival after the last injection. They were characterized by more or less severe shrinkage of both cytoplasm and nuclei of neurons and hyperplasia and hypertrophy of the different types of glia-cells. The pathologic effect was more pronounced in the striatum and hippocampus than in the cerebral cortex. (Authors' abstr.)

Mode of Action of Brilliant Vital Red in Epilepsy.

1. The endothelium concerned with the formation of cerebro-spinal fluid forms an effective protective barrier to the central nervous system.

2. In animals with experimental epilepsy brilliant vital red renders this " barrier " relatively impermeable to the passage of cocaine hydrochloride. The same effect presumably holds for the other convulsive agents (picrotoxin, strychnine, camphor and triphenylphosphite) tested in connection with brilliant vital red.

3. Brilliant vital red affords protection in cases of human epilepsy. This fact, in addition to various other considerations which are discussed, affords strong evidence in support of the hypothesis that " convulsive toxins " and the endothelium of the hæmato-encephalic barrier are factors of ætiologic importance in human epilepsy, and that the relation between them is analogous to that demonstrated in experimental epilepsy. (Author's abstr.)

Skin and Body Temperatures of Schizophrenic and Normal Subjects under Varying Environmental Conditions.

Schizophrenic and normal subjects were exposed to varying mental conditions in the nude and under fasting conditions. Skin and rectal temperatures were measured by means of thermocouples. It was found that immediately after exposure the schizophrenic patients tended to have warmer extremities than the normal subjects. Exposure to cold conditions (15°, 20° and 24° C. [59°, 68° and 75·2° F.]) resulted consistently in greater cooling of the skin in the patients than in the normal controls. Exposure to hot conditions (44° C. [110·2° F.]) resulted in no difference in the response of normal and of schizophrenic subjects. Exposure to high humidity at low and high temperatures showed no difference between the patients and the normal subjects. The rectal temperatures of schizophrenic and normal subjects reacted similarly under all conditions. (Author's abstr.)

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Frontal Lobectomy in Treatment of Tumours in the Anterior Cranial Fossa. *Stookey, B., Scarff, J. E., and Teitelbaum, M. H.* 969

Effect of Epinephrine on Convulsions.

1. The intravenous injection of epinephrine hydrochloride in minute quantities (0·004 to 0·015 mgrm. per kilogram of body-weight) diminishes or inhibits temporarily insulin and metrazol convulsions in rabbits, although the blood sugar remains unchanged in the insulin experiments.

2. The injection of epinephrine may induce sleep in rabbits which have been awakened by metrazol from narcosis induced with soluble barbital.

3. Hyper-reflexia as seen in cats under chloralosane anæsthesia is abolished by epinephrine.

4. Experiments on narcotized cats show that the anticonvulsant action of epinephrine is linked with carotid sinus and depressor reflexes. The action is abolished by bilateral vagotomy and denervation of both carotid sinuses, but is still present after carotid sinus denervation if one vagus nerve is intact. These facts, and the observation that convulsions are frequently increased when the blood-pressure is lowered by amyl nitrite, make it probable that pressor reflexes from the carotid sinus and arch of the aorta regulate the excitability of the somatic nervous system in a manner similar to that shown by Darrow and Gellhorn for the autonomic system.

5. The increase of metrazol convulsions with epinephrine occurs only with higher concentrations and is therefore of pharmacologic rather than of physiologic significance. (Authors' abstr.)

Follow-up Study of Five Hundred Patients with Schizophrenia Admitted to the Hospital from 1913 to 1923.

A survey of 500 schizophrenic patients has been made, 222 of whom have been followed for an average of twenty years.

At the time of discharge from the Phipps Clinic, 42·7% of the patients were well or improved ; slightly more than half (57·34%) left the hospital unimproved.

The course of the illness seems more favourable for women than for men.

At the end of twenty years the picture is less favourable than at the end of nine years, or at the time of discharge. After twenty years 27% of patients show recovery ; an additional 13% give evidence of some productivity.

There is great variability in the course of the disorder as regards rehospitalization : 33·5% of the total series of patients were never able to leave a hospital ; 32·6% were never readmitted to any hospital.

While rehospitalization is frequent, this does not necessarily affect the final outcome.

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A relatively brief period of hospitalization is the rule for patients who recover.

The largest number of deaths occurs in the age decade of 21 to 30. The chief cause of death is tuberculosis. (Authors' abstr.)

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ARCH. PSYCHOL. N. Y.

*Some Psychological Correlates of the Electro-encephalogram. *Williams, A. C.* No. 240.
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Some Psychological Correlates of the Electro-encephalogram.

Depression of alpha rhythm depended on at least two factors designated as stimulation and attention to stimulation. Attention without stimulation produced no depression. Facilitation of the alpha rhythm accompanied a third factor characterized as a change in the general psychological state of the subject. It appeared following the induction in the subject of states of awareness, attentiveness, readiness, relaxation, etc., and as bursts of high amplitude, regular alpha waves, clearly distinguishable from the level of alpha activity in other portions of the record. Stimulation and attention tended to increase the amounts of the beta and delta potentials. Tasks involving a motor response were also accompanied by an increase in the amount of beta and delta. It is suggested that depression of alpha results from interfering impulses coming from sensory stimulation or from other areas of the cortex, whereas facilitation is produced by increasing the activity of pacemakers, possibly located in subcortical areas.

G. W. T. H. Fleming.

BRAIN.

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*The Abnormal Cortical Potentials associated with High Intracranial Pressure. *Williams, D.* 321

Acute and Subacute Necrotic Myelitis.

One case of acute and two of subacute myelitis (Foix and Alajouanine) are described, and their clinical and pathological relationships to previously published cases is discussed.

The clinical picture of progressive amyotrophic paraplegia, with dissociated sensory changes and loss of tendon reflexes and of sphincter control, is sufficiently characteristic, if taken in conjunction with the condition of the cerebro-spinal fluid, to allow of clinical diagnosis.

The condition consists essentially of primary obliterative sclerosis of the small intramedullary and meningeal vessels in the lower segments of the spinal cord, and is associated with great thickening of the walls of the larger meningeal veins, and sometimes also of the larger arteries.

The degeneration of the parenchyma of the spinal cord appears to be altogether secondary to the vascular lesion. (Authors' abstr.)

Some Observations on Central Pain.

An attempt has been made to correlate certain features of pain resulting from central lesions and observations on the consequences of experimental disturbances of the peripheral nerves. Attention is drawn to the occurrence in both of over-reaction to certain stimuli, irradiation, and delay in the perception of pain.

It is suggested that the double conducting pathway in the peripheral nervous system described by Gasser *et al.* exists also in the central nervous system, and that the pathways differ in the rate at which impulses are conducted by them. It is further suggested that, in normal circumstances, the rapidly conducted impulses produce a relatively refractory state centrally, which has a modifying effect on the impulses conducted slowly. (Author's abstr.)

The Abnormal Cortical Potentials associated with High Intracranial Pressure.

The changes in cortical electric potentials in patients with abnormally high intracranial pressure have been studied in relation to the clinical state and the height and duration of the abnormal pressure. There was little correlation between the pressure and its effects on the state of consciousness of the subject and on the changes seen in the electro-encephalogram.

Experimental modification of cerebro-spinal fluid pressure showed that the abnormal waves of electrical potential were due to secondary osmotic changes in the cerebral tissues. Evidence has been produced that this change is probably an œdema of the nerve-fibres in the white matter of the hemispheres.

The underlying mechanisms causing the changes in cortical electrical activity and in consciousness have been discussed. (Author's abstr.)

BRIT. J. MED. PSYCHOL.

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*Some Interpretations of a Painting called "Abstraction". *Pickford, R. W.* 219
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Psychological Observations on Hæmatemesis.

From a study of 50 patients suffering from hæmatemesis the writer arrives at the following conclusions: Hæmatemesis is associated with a certain personality type, characterized by high sensitivity to problems of security, dependence and responsibility. Precipitating conditions are threats to security and independence, or sudden increase in responsibility. In most cases the illness meant a self-punishment, in a few it was used to evade responsibility. Answering the question, Why does the illness take this form ?, some evidence is brought forward to suggest that the abnormal gastric response to threats to security may arise as a late result of abnormal conditions during the breast period of development.

S. M. COLEMAN.

The Symbolic Significance of Glass.

From his experience as an ophthalmic surgeon, the writer has come to regard loss of or damage to glasses as psychologically determined. He finds that glasses are in the unconscious equated with virginity, while broken or lost glasses are associated with the patient's reactions to the act of defloration. Since glasses so closely resemble the cornea, and indeed are frequently worn because of some defect in that structure, the idea is carried further and made the starting-point in the investigation of the psycho-genesis of diseases and injuries of the front of the eye.

S. M. COLEMAN.

The Case of a Middle-aged Embezzler.

An instructive case-history of a man, aged 40, who on two occasions had served sentences for embezzlement. Hypnosis revealed an amnesia of twenty years' duration for certain exceptional and unorthodox war experiences. His antisocial conduct was shown to be directly determined by these experiences, by the attitude of the authorities to his war service, and by his failure to obtain a pension.

S. M. COLEMAN.

Symposium on Aggression.

In the opening paper Dr. Fairbairn discusses how far and in what sense aggression may be regarded as a primary instinctive tendency. The inquiry provides an examination of the McDougall, Drever, Freud and Jung theory of instincts. It is concluded that aggression is a primary instinctive tendency, and therefore an irreducible factor in the economy of human nature. As to how far aggression is a quantitatively irreducible factor, the writer finds that it can be modified in two ways: (i) in an economic sense, by regulation of the channels along which it is distributed, and (ii) in a dynamic sense, by mitigation of the frustrations which provoke it.

Dr. Wolters suggests that the term "aggression" should be reserved to denote a perversion of pugnacious behaviour. He believes that there are two patterns of behaviour—retreat and attack—associated with corresponding indefinite modes of reaction—fear and rage. Destructiveness and aggression should be restricted to

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designate behaviour which is directed immoderately to the mastery of the environment without reasonable regard to profit or safety, and without economy of the material mastered. Applying these concepts to the group, he finds that group members will fight to maintain their integrity; this is a fundamental biological reaction; it should not be termed "aggression". The group may also fight to advance its own interests and do so deliberately. This, in common usage, is aggression. Lastly there is fear-induced aggression, the most dangerous of all, because inaccessible to reason. Dr. Wolters, supporting Dr. Fairbairn, is pessimistic of any absolute reduction of aggression.

Dr. Stephen takes up the subject of aggression in early childhood. She apologizes for never having undertaken the analysis of a young child, but feels that her views should carry weight because she is "constantly in touch with the repressed unconscious side of human nature". S. M. COLEMAN.

Some Interpretations of a Painting called "Abstraction".

A surrealistic oil painting called "Abstraction" is described. It was painted impulsively by a male student in his early twenties, who was not trained as an artist, and who was in a normal state of health at the time. The painting was done in a fit of anger during a period of overwork. Psycho-analytical interpretation shows how the painting expresses the artist's conflicts, particularly aggression directed towards the father and father-surrogates. S. M. COLEMAN.

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L'ENCÉPHALE.

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Cataplexy.

A report of two cases of cataplexy is followed by a study of the pathology of the condition. It is pointed out that persons subject to cataplectic attacks also often suffer from narcolepsy. The writer supports Lhermitte's dual conception of sleep as the physio-pathological basis of cataplexy. Cataplexy presents in a state of isolation the somatic element of sleep, without involvement of the psychical factor, inhibition of consciousness. Regarding the pathology, this is considered to be due to disequilibrium of the subcortical neuro-vegetative tonus. Here it is noted that cataplectics have a well-marked vagotonic constitution. Repercussions from the disordered subcortical centres on the cerebral cortex, in whole or in part (motor areas), will result in narcolepsy or cataplexy.

S. M. COLEMAN.

Pharmacological Estimation of Histamine in the Blood of Schizophrenics and Controls.

The histamine content in the blood of 11 schizophrenics and 15 controls was estimated by the Barsoum and Gaddum method. On the whole the content was higher for women than men. Schizophrenics and controls showed no essential difference, and in some normals the histamine value was far above that of the schizophrenics. It is concluded that the metabolic disorders believed to be associated with schizophrenia are not due to histamine intoxication.

S. M. COLEMAN.

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The Capacity of the Rhesus and Cebus Monkey and the Gibbon to Acquire Differential Response to Complex Visual Stimuli.

Several primate types (three rhesus and two cebus monkeys, and one gibbon) were tested on a progressively complex discrimination task involving ambivalent and antagonistic cue-combinations. The monkeys were all in the very early stages of adolescence and the gibbon was somewhat pre-adolescent. The task included four series of stimulus-combinations representing as many stages of difficulty. The reaching-method was used throughout except that a shift was made to the pulling-in technique when failure occurred at any stage. The norm of mastery for each series was 40 correct trials in succession in random presentation. The criterion of failure on a step was 1,000 trials by the reaching-method, in which no significant progress was made, usually followed by 500 trials by the pulling-in technique. The results of the experiment based upon random order presentation appear to warrant the following conclusions:

1. The rhesus monkeys failed to master Series I, consisting of two pairs of stimuli involving antagonistic cue-combinations.

2. The gibbon was successful on Series I, but failed to master Series II, consisting of two antagonistic stimulus-combinations that represented ambivalence with respect to the pairs in Series I.

3. The cebus monkeys were successful on Series I, II and III, but failed on Series IV, comprising four pairs of antagonistic and ambivalent stimuli, although they showed some progress in the earlier stages of this series.

4. The rank-order of primate types on this task (cebus monkey, gibbon, rhesus monkey) corresponds to the order in which the animals ranked in the frequency in which comparison-behaviour was observed. This type of behaviour favoured correct response.

5. In the final series the task was complicated enough to set up marked "neurotic" behaviour in one of the cebus monkeys, a mild phase of which still remained seven months later.

6. An attempt has been made to explain the main findings regarding limits of ability in the several primate types in terms of structural and behavioural differences. A tentative interpretation of the results in terms of abstraction and related processes has been offered. (Author's abstr.)

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Some Psychometric Observations on the Tuberculous Patients in a National Institution. I. The Otis Self-administering Test of Mental Ability. *Seidenfeld, M. A.* 447

The Goodenough Test in Insulin and Metrazol Treatment of Schizophrenia.

The Goodenough drawings of schizophrenic patients during the awakening from the effects of metrazol seizure or insulin coma show decided signs of organic confusion in gestalt perception and representation. However, these apparent primitive form elements are used by the schizophrenic individuals in the schizophrenic integration which remains incomplete in the first stages of confusion. This schizophrenic integration soon gets the upper hand when the organic confusion expressed in the drawings subsides. The treatment, therefore, introduces a completely new element, organic confusion, into the schizophrenic picture. This corresponds in clinical observations to the aphasic signs and to investigations with Gestalt tests by Orenstein and Schilder.

The effect of the insulin and metrazol therapy lies, therefore, not in a direct attack on the schizophrenic structures. It is an attack on the deeper seated structures. In the process of reorganization of the organic function, finally a reconstruction and reorganization takes place in the deeper layers. This may, in the long run, lead to a reorganization of the schizophrenic process which, although organic, is not of the same massive organic type as the disturbance provoked by the shock therapy. If this reorganization of the schizophrenic process takes place, it reflects in the gradual loosening of the schizophrenic characteristics of the drawings. (Authors' abstr.)

Intelligence in Man after Large Removals of Cerebral Tissue: Defects following Right Temporal Lobectomy.

A case is reported in which an extensive removal from the right temporal lobe was followed by a disturbance of non-language capacities, with an apparently good retention of language capacities. It is thought that the defect as determined psychometrically is one of form perception, visual and non-visual, and that this is possibly accompanied by some disturbance of social comprehension. It is thought improbable that the defects are epileptoid in origin, and they appear at any rate to be related to the locus of the lesion.

The case shows that a good Binet score after cerebral injury is not sufficient evidence of good retention of other abilities, and throws light on the problem of the clinical estimate of intelligence, giving additional reason to regard normal intelligence as a complex whose components may be differently affected by cerebral lesions. (Author's abstr.)

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*A Longitudinal Study of the Occipital Alpha Rhythm in Normal Children : Frequency and Amplitude Standards. *Lindsley, D. B.* 197

A Longitudinal Study of the Occipital Alpha Rhythm in Normal Children : Frequency and Amplitude Standards.

A study of the frequency and amplitude of the occipital alpha rhythm in 132 children ranging in age from one month to sixteen years of age has been made, and the data grouped for use as standards. Frequency measurements are based on 369, and amplitude on 294 separate examinations at the various age-levels. Serial or longitudinal observations were made on most subjects, and show that the changes in frequency and amplitude with increasing age for individuals confirm those established for the group, cross-sectionally. The alpha rhythm, once established, increases rapidly in frequency during the first year, but more slowly thereafter until the adult average is first reached as an average by the 12-year-old group. Amplitude of the alpha waves increases during the first year or two, but drops sharply during the third year, and more gradually thereafter until the adult average is reached at about 15 to 16 years of age. The changes in frequency and amplitude of the alpha waves as a function of age are not directly related.

(Author's abstr.)

J. NERV. MENT. DIS.

VOL. XC. JULY, 1939.

*A Specific Motility Psychosis in Negro Alcoholics. *Parker, S., Schilder, P., and Wortis, H.* 1
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*Familial Lateral Sclerosis. *Price, G. E.* 51

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A Specific Motility Psychosis in Negro Alcoholics.

Seven cases of a specific syndrome of alcoholic encephalopathy in negroes have been observed. The cases are characterized by confusion and threatening auditory hallucinations in the psychic sphere. The motility imitates the "Ganser-syndrome" of schizophrenia and appears in a playful and manneristic fashion. Nevertheless, the definite organic signs of iteration, retropulsion, falling backwards, rigidity and turning about the longitudinal axis are woven into the pattern. The disease can lead to death or deterioration; milder cases may recover. Only one similar case was observed in a white man. S. M. COLEMAN.

Tumour of the Base of the Brain Simulating an Aneurysm of the Internal Carotid Artery.

A case is reported showing the clinical and rœntgenological signs of an aneurysm of the intracranial portion of the internal carotid artery. Post-mortem examination showed an adeno-carcinoma of the base of the brain, originating from the nasopharynx. S. M. COLEMAN.

Familial Lateral Sclerosis.

Report of a family of familial spastic paraplegia with the disease occurring in seven members of four generations, the condition being either spastic paraplegia in the pure form or in association with ataxia. S. M. COLEMAN.

AUGUST, 1939.

*Cerebral Lesions due to Vasomotor Disturbances following Brain Trauma. *Helfand, M.* 157
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*Physicochemical Mechanisms in Convulsive Reactivity. *Spiegel, E. A., and Spiegel-Adolf, M.* 188
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*Prolonged Non-Hypoglycæmic Coma Occurring During the Course of Insulin Shock Therapy. *Freed, H., and Saxe, E.* 216

Cerebral Lesions due to Vasomotor Disturbances following Brain Trauma.

From a detailed study of post-mortem findings in 22 cases of brain trauma the following observations are drawn. Many lesions following brain trauma may be discovered only with detailed microscopical studies. Lesions may occur distant to the immediate traumatic zone, and may be differentiated from some of the effects of *contre-coup* destruction. The structure of the vessel wall in such lesions may be perfectly retained. Angio-necrosis in traumatic lesions is secondary to tissue destruction. Some pathological findings in brain trauma are functional (reversible) in nature, and due to a disturbance in the regulating influence of the vasomotor apparatus. S. M. COLEMAN.

Blood-pressure Changes during Insulin Shock Treatment.

Observations on blood-pressure changes in four patients undergoing insulin shock treatment were made. All graphs indicate that insulin in doses large enough to produce shock caused a rise in the mean systolic pressure, which occurred from 1 to 2 hours after the injection of insulin and which varied from 8 to 37 mm. of mercury. In two graphs this rise remained throughout the treatment; in two others the mean systolic pressure dropped from this high level, especially during the last half hour, but remained above the initial mean reading. In one graph the

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drop in mean systolic pressure was continuous after the second hour and fell below the initial level at the end of treatment.

Variations in the mean diastolic pressure are much less in degree and slower in onset. In two graphs the diastolic remained relatively constant, and in two others there was a rise of 5 to 13 mm. of mercury, which began two hours after injection of insulin. In one graph the mean diastolic pressure fell gradually during the entire treatment. S. M. COLEMAN.

Physicochemical Mechanisms in Convulsive Reactivity.

The polarization and, indirectly, the permeability of the cellular surface films for ions were determined *in vivo* on the cerebral hemispheres and on subcortical areas by measuring the difference in conductivity (polarization index Δ) at a certain high and a certain low frequency of the alternating current (experiments on cats; a few measurements on the human cortex). A new method is described that makes the determination of Δ independent of changes in the conductivity.

Anoxæmia increases the cellular permeability in the cerebral hemispheres as well as in the subcortex. Cerebral anæmia diminishes the conductivity. In the majority of the experiments an initial drop of Δ also was observed; when the anæmia lasts several minutes the curve of Δ again may rise, probably due to coagulation necrosis of a number of cells. Increase of intracranial pressure also lowers the conductivity. This is associated in the majority of the experiments with the drop of Δ.

Increase in the state of hydration produces a reversible increase of the cellular permeability. Hyperventilation acts in a similar way, as does alkalosis. Acidosis has only a slight effect upon Δ. Anæsthetics and hypnotics increase Δ, indicating an increase in the density of the cellular films.

Epileptogenous agents may act upon the nervous system by either of the following two mechanisms (or by both): (*a*) Production of a change in ion concentration on the surface of the nerve-cells. If the change in concentration reaches the threshold, excitation (convulsion) occurs. (*b*) Diminution of the density of the cellular surface films. The increase in permeability of the cell surfaces that is an important part of the excitation process is facilitated, and the threshold of the cells for metabolic or other stimuli is thus lowered. S. M. COLEMAN.

Periodic Paralysis.

Two isolated cases of periodic paralysis are reported, in which death from respiratory paralysis occurred during the attack. The possibility of a fatal result is always present in each attack of this disorder. There are now 358 cases in the literature, of which 182 are reported in some detail. The sex was stated in 342, of which 242 were males, giving a ratio of 2·4 males to 1 female. An hereditary history was present in 78% of the cases reported. The most effective treatment is the administration of a potassium salt in large amounts during the attacks.

S. M. COLEMAN.

Prolonged Non-Hypoglycæmic Coma Occurring during Insulin Therapy.

Prolonged non-hypoglycæmic coma is an unusual occurrence incident to insulin shock therapy. Nine cases are reported. They have features in common which suggest a symptom-complex, viz., prolonged coma (12 to 72 hours), convulsions, hyperglycæmia, protracted period of confusion, and good prognosis both physically and mentally. The only abnormal chemical finding of any significance was the chloride depletion in the various body fluids—an exaggeration of what is observed during the course of the usual insulin shock and coma. The pathophysiology is one in which the vegetative centres about the hypothalamus are most involved, and in fatal cases hæmorrhages have been shown to occur.

S. M. COLEMAN.

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SEPTEMBER, 1939.

A Form of Congenital Myotonia in Goats. *Clark, S. L., Luton, F. H., and Cutler, J. T.* 297
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A Case of Unilateral Torsion-Dystonia. *Gordin, R.* 344
*A Death Associated with Metrazol Therapy: Report of a Case. *Fellows, R. W., and Koenig, F.* 358

The Reactions and Behaviour of Schizophrenic Patients Treated with Metrazol and Camphor.

The writers describe a series of phenomenological observations dealing with the mental reactions and behaviour of schizophrenic patients undergoing metrazol and camphor therapies. They also offer some tentative theoretical formulations concerning the nature of the psychodynamic processes underlying these phenomena. In their opinion, it is not yet possible to evaluate these therapeutic methods. They are of the opinion that in certain types of schizophrenics metrazol can serve to facilitate development in the direction of social recovery. The value of camphor is considered an uncertain one. It does occasionally appear to have a certain potentiality for forcing a transformation in the chronic, vegetative patient, but the change induced is usually a transitory one. Moreover, it is pointed out, camphor is toxic to a dangerous degree. S. M. COLEMAN.

Preliminary Observations on the Course of the Traumatic Psychoses.

If a patient who has organic brain disease suffers a trauma to the head and develops a psychosis, the prognosis is graver and the course more protracted. This is especially true in those organic conditions where there is impairment of cerebral circulation, as in senility and arteriosclerosis.

Admitting the importance of the severity of the trauma, the significance of the localization of the lesion and the role of other constellatory factors, it is the writers' opinion that the previous personality plays an important role in the course of the traumatic psychoses. This is particularly true in the introverted or schizoid types, who often show significant and peculiar features in their clinical picture.

S. M. COLEMAN.

A Death Associated with Metrazol Therapy.

A case of sudden death with metrazol therapy is presented. A woman, aged 30, suffering from schizophrenia, catatonic type, died following her tenth convulsion. It is pointed out that the effect of this drug when used clinically has not been explained satisfactorily. The clinical picture points towards a specific effect on the central nervous system. In the case presented specific lesions were found in the brain, particularly areas of degeneration in the basal ganglia. Attention is drawn to the possible toxic and even lethal effects of the drug.

S. M. COLEMAN.

J. NEUROPHYSIOL.

VOL. II. NOVEMBER, 1939.

*Physiological Analysis of the General Cortex in Reptiles and Birds. *Bremer, F., Dow, R. S., and Moruzzi, G.* 473
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*Effects of Acoustic Stimuli on the Waking Human Brain. *Davies, P. A.* 494
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*Changes in Retinal Excitability due to Polarization and some Observations on the Relation between the Processes in Retina and Nerve. *Granit, R., and Helme, T.* 556
*The Effect of Eserine on Spinal Reflexes in the Dog. *Merlis, J. K., and Lawson, H.* 566

Physiological Analysis of the General Cortex in Reptiles and Birds.

1. The cerebral cortex of the turtle, *Emys europea*, appears to be electrically inexcitable in the usual sense of the term, i.e., there is an absence of visible motor reaction attributable to the excitation of cortical neurons.

2. The electrical activity of low voltage which it is possible to record from the cerebral cortex of the unanæsthetized turtle is essentially subcortical (striatal) in origin. However, the ability to produce " strychnine spikes ", which are rapidly abolished by superficial cocainization, suggests the existence of a cortical component.

3. The cerebral cortex of the pigeon is electrically excitable by a weak current. The reactions to a unilateral stimulation consist in a conjugate deviation of the head and eyes toward the opposite side, accompanied by a miosis and opening of the palpebral fissure. This response is the expression of the excitation of neurons of the cortical layers, because (i) the response is abolished almost instantaneously by the superficial cocainization of the excited region ; and (ii) an animal which presented a congenital aplasia of the cortex on one side, as verified histologically, did not react to the application of strong stimulation applied to this side, while the opposite cortex, which appeared to be normal, gave the usual response to weak stimulation. These conclusions concerning the reality of motor reaction dependent upon the cerebral cortex of birds confirm and justify by new evidence the studies made by older workers, particularly those of Ferrier and Kalischer. The negative results reported more recently are possibly explained by the use of light anæsthesia, or by the inhibition resulting from failure to apply cocaine to the borders of the wound in the unanæsthetized animal.

4. The simultaneous excitation of two symmetrical points on the right and the left cortex of the pigeon with currents of equal intensity results in rhythmic movements of the head in the vertical plane, suggestive of pecking movements in the intact animal.

5. The spontaneous electrical activity derived from the cerebral cortex of the unanæsthetized pigeon resembles closely that of the rabbit when awake. The partial resistance of this activity to superficial cocainization indicates that it includes a subcortical component. The superficial strychninization of the cortex causes the appearance of the large " strychnine spikes ", which are abolished rapidly by superficial cocainization. A brief cortical faradization releases a short after-discharge of epileptiform type.

6. The cerebral cortex of the pigeon reacts to the illumination of the contralateral eye by a large initial wave (effect " on "). The cessation of the illumination does not provoke a distinct " off " effect.

7. The general conclusion derived from an analysis of the excitability and the

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electrical activity of the cerebral " cortex " of the turtle and the pigeon indicates that, in the pigeon at least, the superficial layers of neurons covering the striatum dorsally and posteriorly have physiological properties and a functional significance—the latter being essentially opto-kinetic—much like those of the neo-pallium of mammals. (Authors' abstr.)

Studies in the Physiology of the Embryonic Nervous System. IV. Development of Acetylcholine in the Chick Embryo.

1. Tissues of chick embryos were ground and assayed for acetylcholine (ACh).

2. ACh increases from 2½ to 4 days of incubation and then shows random fluctuations until the 12th day.

3. There was no indication of a positive correlation between the development of ACh in the chick and the development of reflexes and of the nervous system.

In view of discrepancies between anatomical maturation and the concentration of ACh in relation to the appearance of reflexes, it is tempting to conclude that ACh, as it is found in a mixture of embryonic tissues, is not concerned with transmission of nerve impulse in the embryo. Such a conclusion does not preclude the possibility that the choline ester liberated at a particular moment of nervous excitation may act as a transmitter at synapses or at neuromuscular junctions. Such a possibility, however, remains to be proved. The mere presence of ACh or even an increase in its output at nerve terminals or synapses at the time of excitation is no sure evidence that the ester is actually concerned in transmission. The fact that ACh exists in most animal tissues, including such nerveless structure as human placenta, and can be detected when hydrolysis of the substance is prevented, has not been given satisfactory explanation by the proponents of chemical transmission.

The present results create a more difficult drawback which cannot be lightly dismissed as irrelevant to the theory. They lend support to the demand for better evidence that accumulation of ACh is not merely a result of increased metabolic activity or injury or other pathological process. The claims made by MacIntosh (1938) and by Bacq and Coppée (1938), that in degeneration experiments there is a time at which both the preganglionic fibres and ganglion-cells appear to be still functionally intact, whereas transmission across the synapses no longer occurs (which event coincides with the disappearance of ACh from the ganglion), are important in this connection, but they must be more thoroughly and systematically reinvestigated before they can be fully evaluated. The view that liberation of ACh is a general phenomenon associated with metabolic activities and is not in any way peculiar to nervous excitation also lacks decisive proof. The results of Lorente de Nó (1938) are significant, but not conclusive, and have been contradicted by a more recent investigation (MacIntosh, 1938). The evidence from the chick embryo here reported strengthens the metabolistic point of view, but does not disprove the transmission theory. (Author's abstr.)

Effects of Acoustic Stimuli on the Waking Human Brain.

Acoustic stimuli cause electrical on-effects and off-effects in the waking human brain. Though tones did not always produce visible responses, there appeared to be no difference between alpha and non-alpha types of subjects.

The on-effect, composed of a diphasic and sometimes triphasic wave, was most prominent at the vertex. The first phase was negative. Its latency was about 30 to 40 msec. The total duration of the on-effect was approximately 0·3 sec. or less. The voltage measured from peak to trough ranged from just visible to 100 μV. Frequently there was an off-effect similar to the on-effect, but never prominent.

A checking of the alpha rhythm was sometimes the only visible response. Fast frequencies were checked in two non-alpha subjects, and caused to appear in a third.

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"Anticipatory" on-effects or off-effects appeared at an appropriate interval when a regularly-spaced sequence of tones was unexpectedly stopped or prolonged. If a subject was not aware that random sequences of different tones were to be given, or that regular sequences were going to follow irregular sequences, the "anticipatory" on- and off-effects would become more unpredictable. If the "psychological set" remained unaltered in relation to the experiment, but the physiological condition progressed from alertness to sleep, the on-effect would always become more predictable and more prominent. (Author's abstr.)

Electrical Reactions of the Human Brain to Auditory Stimulation during Sleep.

The electric response of the human brain to auditory stimuli during sleep, previously described and designated as the "K-complex", has been investigated in more detail. It is a multiple, diffuse, delayed, non-specific response to external sensory stimulation. Usually a fast component, consisting of a series of more or less regular waves at frequencies of 8 to 16 per sec., is superimposed on a series of slow (delta) waves, but either component may appear independently of the other. No shift of electrical base-line ("D.C. component") is associated with the K-complex.

Light and electric shocks may elicit K-complexes, but less effectively than do sounds. Typical K-complexes may appear "spontaneously" without assignable external cause.

The latency of the K-complex is usually of the order of 100 msec., and may be half a second or more. Both fast and slow components are more prominent in the central and frontal than in the occipital and temporal regions. The patterns are simultaneous and broadly similar over all these regions, but characteristic differences between central and frontal types of the slow component are described.

The fast component is often identical with the trains ("spindles") of 14-per-sec. waves, which are characteristic of the C and D stages of sleep. The appearance of the fast component seems to represent a partial arousal of the sleeper. The slow component develops progressively from the waking "on-effect", and increases in amplitude and duration as the subject becomes drowsy and goes to sleep. Both components vary systematically with the stage of sleep. The waves become slower as sleep deepens, and do not appear in the E stage of sleep. The characteristics of the spontaneous K-complexes are the chief criteria by which the B, C and D stages were originally identified.

A sound within 3 or 4 sec. after a previous stimulus usually fails to evoke a second slow component. If it succeeds, the second response is delayed and reduced in amplitude. The fast component, on the contrary, appears full-sized at all intervals of stimulation and merges with the fast component of the previous complex.

Forbes and his collaborators have described a "secondary discharge" which appears in the cerebral cortex of the cat under barbiturate anæsthesia following electrical stimulation of the sciatic nerve. The slow component of the K-complex shows the same characteristics as, and is probably strictly analogous to, this secondary discharge. (Authors' abstr.)

Conditioning of Afferent Impulses by Reflex Discharges over the Dorsal Roots.

When the action potential of the sensory impulses conducted through the saphenous nerve of the cat following a gentle tap on the skin is recorded from the side of the nerve, it is found that a deficit in the total number of impulses occurs if the train is immediately preceded by a reflex discharge through the nerve from the spinal cord.

The experiments conducted in the course of the present investigation permit the mention of a number of characteristics of the reflex discharge by the way of the dorsal roots, not included in the previous report:

(*a*) The reflex discharge into the individual fibres is repetitive.

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(*b*) The reflex can be evoked by physiologically selected afferent impulses, as those set up by a tap on the skin or to the patellar tendon.

(*c*) As shown by Barron and Matthews, the size of the reflex is greatly augmented if the cord is cooled. However, well-defined reflexes are regularly present when the cord is at a normal temperature. (Author's abstr.)

Vagal Inhibition of Inspiration, and Accompanying Changes in Respiratory Rhythm.

1. In dogs anæsthetized with sodium barbital, and with both vagi sectioned, one vagus was stimulated centrally during inspiration. Adequate stimulation cuts short the current inspiration. This requires a certain threshold number of afferent volleys (voltage and frequency of stimuli being constant). The threshold number becomes less as inspiration advances.

2. Certain effects of a near-threshold series of volleys are described.

3. Graded reduction of inspiratory amplitude can be effected by varying the time at which the vagus is stimulated, but not by grading the number of inhibitory volleys. Vagal inhibition affects the respiratory centre in an all-or-none manner.

4. Increase of the respiratory dead space does not raise the " inhibitory threshold " of the centre. Inspiration becomes deeper, but this can be accounted for by a more rapid inspiratory movement, and by the time required for inhibition to be built up to an effective level.

5. The cutting short of inspiration, by the procedure described is accompanied by an acceleration of rhythm. The amplitude and rate effects are related in the following ways :

(*a*) The voltage threshold of the vagus is the same for both.

(*b*) Both effects require temporal summation of a series of vagal volleys. The minimum number of volleys required to accelerate is also the threshold number for inhibition of inspiration.

(*c*) Both effects are simultaneously lost when a cold block of the vagus is gradually induced.

(*d*) The acceleration varies in degree according to the stage at which the inspirations are cut short.

6. It is concluded that the effects upon rate and amplitude are probably due to a common afferent mechanism, the acceleration being dependent upon the reduced motor discharge.

7. A stimulating circuit is described. It permits uniform tetanization for controllable short periods (0·01 to 1·5 sec.), frequency and stimulus strength being independently variable. The circuit can be automatically governed by respiratory changes of intrapleural pressure. (Authors' abstr.)

Cerebellar Action Potentials in Response to Stimulation of Various Afferent Connections.

1. Single shock electrical stimulation of afferent connections to the cerebellum results in a response of the neurons of the cortex in the lobes with which the respective afferent system has connections.

2. Stimulation of the eighth nerve in the unanæsthetized decerebrated cat results in an electrical response in the cerebellum, limited to the flocculo-nodular lobe, the lingula, uvula and the fastigial nucleus.

3. Stimulation of the spinal nerves, or of the spinocerebellar tract in the mid-thoracic cord, produces cerebellar action potentials limited to the anterior lobe, the lobulus simplex, pyramis, and occasionally the lobulus paramedianus. No difference in location of the response depending upon the site of stimulation was seen, except for a response of greater amplitude on the homolateral side.

4. Stimulation of the pons sets up cerebellar action potentials limited to the middle lobe of the vermis (Ingvar), the lobulus ansiformis, lobulus paramedianus, paraflocculus and pyramis. Occasionally potentials are found also in the dorsal part of the culmen.

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5. A stimulus in the region of the inferior olivary nuclei excites synaptically the olivocerebellar connections and produces cerebellar action potentials in all the lobes of the cerebellum. The responses of greatest amplitude are found when leading from the contralateral lobulus ansiformis.

6. In similar afferent systems, such as the nerves of the upper and the lower extremities, the responses led from an identical point may be strikingly similar. With dissimilar afferent systems, such as the inferior olive and the spinal system, potentials of different sign and shape may be led from the same point. The question is raised whether this dissimilarity of potential depending upon the source of the afferent stimulation may not be attributable to a difference in the anatomical connections within the cerebellar cortex.

7. It is thought that these action potentials are due to activity of the neurons of the cerebellar cortex and that they are not potentials of the axons or endings of the afferent fibres. In most instances the activity resulting from single shocks changes to a remarkably small degree the background activity which is characteristic of the cerebellar cortex. Under certain conditions, however, this activity may be initiated or increased by a response to an afferent stimulation. In no instance has a decrease been observed. (Author's abstr.)

Changes in Retinal Excitability due to Polarization and Some Observations on the Relation between the Processes in Retina and Nerve.

The electro-retinogram and the impulses from the optic nerve have been recorded during the passage of a galvanic current across the retina.

" Inside cathode " greatly enhances the discharge in the optic nerve and " inside anode " depresses it.

The complex retinal electrical response is also enhanced by " inside cathode " and depressed by " inside anode ".

After removal of the positive component, P II, of the electro-retinogram the remaining negative, P III, reacts to the polarizing current just as the whole response.

Antidromic impulses through the optic nerve have no effect whatsoever on the electro-retinogram.

Simultaneous records of the retinal and optic nerve responses illustrate the practically negligible nerve-retinal interval at cessation of illumination.

The off-discharge through the nerve is preceded by a small initial retinal positivity passing on into the large retinal off-effect, the main part of which follows a few milliseconds after the discharge in the nerve.

A brief discussion of the localization of the components of the retinal electrical response concludes the paper. (Authors' abstr.)

The Effect of Eserine on Spinal Reflexes in the Dog.

(1) Studies have been made of the effect of eserine on the knee-jerk, tibialis anticus reflex, and the crossed quadriceps reflex in chloralosed and in barbitalized dogs.

(2) Eserine, administered by perfusion through the lumbar subarachnoid space in the intact or spinal animal (cord transected at T10), depresses the knee-jerk and augments the flexion reflex in almost all cases. The crossed extension reflex is augmented in the extremity in which the knee-jerk is depressed.

(3) Eserine given intravenously is predominantly depressant to the knee-jerk, and augmentary to the flexion reflex and the crossed extension reflex.

(Authors' abstr.)

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The Functional Responses of the Sympathetic Nervous System of Man following Hemidecortication.

The authors found, after complete hemidecortication in a girl, that there was equality of sympathetic responses from both sides of the body and from cutaneous stimulation. This suggests that the reflex arcs used in these responses have no cortical cell station in man. G. W. T. H. FLEMING.

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On Localization of Cortical Processes Originated by Visual Stimuli.

Experiments were carried out on puppies and rabbits. Their behaviour at the initial stage of formation of the alimentary motor habit was directed by psychoneural activity, involving the simultaneous functioning of both halves of the brain acting as a whole. G. W. T. H. FLEMING.

The Effect of Minimal Stimulation upon the Chronaxie and Refractory Phase of Muscle.

The largest values of chronaxie were found in the proximal nerveless part of the muscle, ranging from ·7 to 5 σ. At a distance of from 2–4 mm. from the spot where the nerve enters the muscle the value of the muscular chronaxie is almost identical with that of the nerve's chronaxie, i.e., ·2–·3 σ. The absolute refractory phase of this proximal part of the muscle at rest is longer than that determined by stimulation through the nerve. The absolute refractory phase is increased at minimal stimulation. The chronaxie exhibits most marked alterations in the middle sections of the muscle and near the place of entry of the nerve.

The inhibitory effect depends upon alterations of the lability of the nerve-endings, and does not involve the development of heterochronism between nerve and muscle. G. W. T. H. FLEMING.

PART 4.

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On Peculiar Features of Conditioned Defensive Motor Reflexes in Dogs with Unilaterally Transected Spinal Cord.

1. Soon after Brown-Sequard's unilateral severance of the spinal cord the unconditioned defensive motor reflexes exhibit the following peculiarities: (*a*) elevation of the threshold for stimulation with induction current, (*b*) tonic type of movements of the extremity, and (*c*) inversion of reflex response—extension instead of flexion.

2. Conditioned motor reflexes previously worked out disappear after unilateral spinal section and can be restored in the course of several days of training.

3. The re-establishing of motor conditioned reflexes from the extremity affected after section of the spinal cord means the elaboration of new conditioned reflexes, the function of which takes place at other points of the cerebral cortex and over other conducting paths.

4. A characteristic feature of conditioned motor reflexes after hemisection of the spinal cord is their rapid transition into the chronic inhibitory state.

5. This progressing inhibition of conditioned motor reflexes is based on the rapid exhaustion of the cortical elements assuming the role of the central link of reflex arc in those reflexes.

6. Decortication of the brain hemisphere homonymous to the sectioned side of the spinal cord causes all previously trained conditioned reflexes from the affected extremity to disappear.

7. Formation anew of defensive conditioned reflexes in dogs with hemisection following upon decortication of the homonymous hemisphere is exceedingly difficult; conditioned reflexes appear and rapidly vanish instead of becoming stable. As opposed to this, conditioned reflexes of fair stability are very easily developed from the anterior extremity homonymous to the decorticated hemisphere. This justifies the opinion that, in conditioned motor reflexes from the affected extremity worked out after hemisection, the central link of the reflex arc is situated in the hemisphere homonymous to the sectioned side of the spinal cord.

(Authors' abstr.)

The Localization of the Processes of General Inhibition of Antagonistic Muscles, and of Isolated Facilitation of the Agonist in the Neuronic Elements of the Spinal Cord.

In the spinal frog a single induction shock, inefficient with regard to the production of an outward reflex response, calls forth when applied to the receptive field of extension (skin of the calf) a general inhibition of the contraction of the antagonistic muscles of the knee which has produced stimulation of the plantar skin—this inhibition involves both the extensor and the flexor muscles.

The same inefficient stimulation of the flexor field results in facilitation, but not in inhibition of the extensor's contraction when this reflex contraction has been elicited from the extensor area, and not from the flexor field as in the former case.

Considering that one and the same stimulus may at the same time inhibit and facilitate the reflex contraction of one and the same muscle, it must be admitted that inhibition is localized in one set of neurones and facilitation in another.

The conclusion is drawn from the analysis of the experimental data that the general inhibition of the antagonistic muscles is due to development of an inhibitory process chiefly in the motoneurones, whereas the isolated facilitation of the agonist is based upon the development of a process of facilitation in the intraspinal neurone of the agonist. (Author's abstr.)

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Sleep Produced by Electrical Stimulation of Sub-Cortical Ganglia.

The authors, using the method of Hess, easily obtained sleep by stimulating the subcortical ganglia with an intermittent current and an induction current. Sleep resulting from a feeble stimulus was not interrupted by a stronger stimulus, but on the contrary the sleep was deepened.

After repeated stimulations, conditioned sleep appeared where the cat went to sleep without stimulation when it was placed on the apparatus. Electrical hypothalamic sleep does not agree with the localization of sleep put forward by Hess nor with the "sleep centre" of von Economo. G. W. T. H. FLEMING.

The Role of the Sympathetic Nervous System in Sleep Phenomena following Electrical Stimulation of the Sub-cortical Ganglia.

Hypothalamic sleep does not occur in cats which have been deprived of their inferior cervical ganglia, stellar ganglia, abdominal sympathetic trunk and the innervation of their adrenals. It does not occur in cats deprived of their stellar and inferior cervical ganglia. In cats which only had their superior cervical sympathetic ganglia removed or section of the cervical sympathetic performed, electrical stimulation of the hypothalamus produced a condition of somnolence. Stimulation of the cranial end of the cervical sympathetic gave rise to very definite somnolence. These observations do not accord with those of Hess.

G. W. T. H. FLEMING.

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Temporary Changes in Affect and Attitude following Ingestion of Various Amounts of Benzedrine Sulfate (Amphetamine Sulfate).

1. When measured by a newly standardized optimism-pessimism scale, optimism of a personal and general nature is increased by ingestion of benzedrine sulfate. Larger doses operate especially to prolong the effects.

2. As indicated by 9-point, self-rating scales, the generally more desirable kinds and degrees of affect and attitude appear to be produced by smaller doses of

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benzedrine. Larger doses tend to exaggerate some of these feelings, and to produce the undesirable opposites of others.

3. As indicated by other 9-point, self-rating scales, more favourable self-estimates of antecedent work accomplished tend to be produced by ingestion of benzedrine sulfate. These more optimistic evaluations are not completely generalized, in part apparently because the chemical also produces a greater indifference toward inferior performances.

4. The foregoing findings are true only " on the average ". Individual differences in affective response to the drug are profound. Some of these differences are related to initial, or prior, affective states. For others there is at the present stage of the analysis no explanation.

5. Ingestion of benzedrine sulfate appears not to affect the common personality traits measured by the Bernreuter personality inventory in any particular way. If this inventory has some general validity, the findings in the present study might appear to support the contention that personality traits remain unaffected by benzedrine ingestion. It seems to the present writers that the chemical does produce changes in behaviour of a temporary nature that would give the impression of (temporary) changes in personality traits. Since the response to benzedrine tends to be as individualized as it is, and since the Bernreuter inventory appears to have rather severe shortcomings in validity with individual cases and fails to depict individual traits and their inter-relationships, the inventory as originally scored and interpreted does not seem a promising tool for ascertaining at least the more crucial effects of benzedrine on personality. The problem definitely needs further clarification, and, very likely, experimentation along ideographic lines.

6. In general, it is reasonably clear that in a majority of individuals benzedrine sulfate produces a definite heightening of mood, a fairly—but not completely—generalized optimism and interest, together with an increased willingness to work for extended periods of time. In other individuals the same dosages appear to have none of these effects; in still others, opposite effects. With the present state of knowledge regarding benzedrine, a dosage optimal in any sense for given individuals can be determined only by experimentation. (Authors' abstr.)

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The Blood-Cerebro-spinal Fluid Barrier of Normal Children as Determined by the Bromide Permeability Quotient.

1. The " normal " bromide P–Q for white children lies between 3·0–3·5.

2. After the second year of age there are among white children fewer P–Q's below 3·1 than above it.

3. The " normal " bromide P–Q for negro children (and adults as well) presents a different abscissa distribution from that for the white.

4. The P–Q of the negro child lies between 2·5–3·0.

5. After the second year of age there are fewer P–Q's among negro children below 2·6 than between 2·6–3·0.

6. Very young children have P–Q's somewhat below the normal " low " figures for all age-groups of their particular race.

7. Febrility tends to lower the bromide P–Q independently of any correlation with changes in body-fluid chloride content.

8. Minor variations in time of fluid withdrawal, bloody contamination of the spinal fluid or hæmolysis of serum exert no perceptible effect upon the accuracy of the determination.

9. There is no perceptible difference between the chloride P–Q's of negroes and whites.

10. Withdrawal of successive samples of cerebro-spinal fluid from the lumbar cisterna results in a decided but gradual rise of the bromide P–Q figure.

11. Among epileptics there is a tendency for the P–Q to decrease rather than increase (as is the case in normal individuals with age). (Authors' abstr.)

A Method for Differentiating Manic-depressive Depressions from Other Depressions by Means of Parotid Secretions.

1. Parotid gland-rate determinations were made on a series of undifferentiated depressions before they were clinically studied. If the reading were below an average of ·01 c.c. per five minutes over a test of one-half hour duration the depression was recorded tentatively in the experimental records as a " manic-depressive depression ". If the average reading was above ·01 c.c. per five minutes the case was recorded as " not a manic-depressive depression ".

2. The clinical diagnosis in each instance was later made by two psychiatrists

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working independently. The diagnoses of the two psychiatrists were then compared. Only when these agreed was the case included for report in this communication. These clinical diagnoses were then compared with the laboratory diagnoses based on the parotid secretory rate.

3. It was found that the laboratory diagnosis based on the parotid gland determinations agreed with the clinical diagnoses in 47 of 50 cases. Specifically out of 25 clinically determined manic-depressive depressions the parotid index agreed in 23 instances. Of the total of 25 other depressions not clinically diagnosed as manic-depressive, there was agreement with the parotid index in 24.

4. The parotid secretory rate is inhibited in the very early stages of the disorder before it is possible to make a definite diagnosis of manic-depressive depression by the usual psychiatric procedures.

5. Secretory inhibition prevails during the daily mood fluctuations of the patient, but the rate does return to the normal range when the patient recovers from the depression.

6. The rise of the secretory rate when the depression abates may be very sudden.

7. The parotid secretory test can be accomplished within an hour with simple inexpensive apparatus. involving little technical training.

(Authors' abstr.)

The Value of Diphenyl Hydantoinate (Dilantin) in Psychoses with Convulsive Disorders.

1. In individuals in whom seizures are controlled or markedly reduced in number and severity by the administration of dilantin there is a concurrent improvement in the mental condition.

2. When treatment by dilantin is instituted the anti-convulsant drug in current use should be withdrawn gradually. A week or 10 days should elapse before dilantin alone is used.

3. All cases treated had *grand* and *petit mal* attacks and psychomotor equivalents, so that no differentiation was made in the type of reaction.

4. Dilantin in doses over 0·4 grm. daily was definitely toxic in 16 of the 17 cases treated.

5. In three patients who did not tolerate over 0·4 grm. of dilantin well, the administration of 5 to 10 mgrm. of benzedrine sulphate in conjunction with dilantin allowed a maximum dose of 0·6 grm. to be given without toxic symptoms.

6. In one case the use of benzedrine sulphate apparently produced twitching of the arms and hands. This disappeared when the drug was discontinued.

7. Nine individuals were much improved. Eight were unimproved.

8. In one case treatment had to be discontinued because of toxic symptoms, in three patients because of an increase in the number and severity of seizures. Ten are still receiving dilantin. Three died.

9. The use of dilantin should be restricted to that group of patients who do not respond to less toxic forms of therapy. (Author's abstr.)

A Contribution to the Problem of Alcoholic Deterioration.

1. All the cases diagnosed as alcoholic deterioration over a 10½-year period have been re-examined with a view to clarifying the syndrome of alcoholic deterioration. A critical evaluation of all case-records was made, and those patients still available were personally examined. The study includes 32 patients, that is, all cases so diagnosed in a total of 5,824 admissions. Two patients were excluded because they were unavailable.

2. It has been shown that most of the cases so diagnosed do not fulfil the requirements of the entity, but seem to belong in other diagnostic groupings—psychopathic personality, schizophrenia, cerebral arteriosclerosis and others.

3. Four illustrative cases have been described and discussed.

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4. Only 3 cases of the 5,824 admissions, or 0·51%, seem to fulfil the criteria of alcoholic deterioration, and even in these there is an element of doubt present.

5. The diagnosis of alcoholic deterioration is difficult to make within the first few months after admission.

6. Alcoholic deterioration is a much rarer entity than it is commonly held to be. (Author's abstr.)

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1. Physiology, Biochemistry and Pathology.*

Variations in the Cholesterol Level in Multiple Sclerosis. E. Pichler and H. Reisner. [*Wien. klin. Wochschr.*, **51**, 1304–9 (1938).]

A distinct increase in serum cholesterol occurred only in acute cases of multiple sclerosis, and returned to normal on clinical improvement. In cases which had become chronic or improved slowly, if therapy produced an improvement, then a marked hypercholesterolæmia occurred, either as an accompanying symptom or as part of the defence mechanism of the body.

JOSEPH S. HEPBURN (Chem. Abstr.).

The Role of the Hæmato-Encephalic Barrier and the Changes in the Composition and Characteristics of Cerebro-spinal Fluid in Shock and in Traumatism. L. S. Shtern. [*J. Physiol.* (*U.S.S.R.*), **24**, 413–22 (1938).]

Under conditions of traumatic, toxæmic or chemical (peptone or histamine injections) shock, the resistance of the hæmatoencephalic barrier is altered, allowing the passage of ferrocyanides and iodides. The permeability to glucose and Ca is increased, that to K is decreased. In some cases the K/Ca coefficient falls below 1. The concentration of K, which is very low during the depression stage, increases and often rises above normal during the excitation stage. General anæsthesia, applied simultaneously with the shock, prevents these changes from taking place.

S. A. KARJALA (Chem. Abstr.).

The Permeability of the Cerebro-spinal Barrier to Sugar and Lactic Acid. A. P. Fridman and R. Kh. Arkina. [*Arch. sci. biol.* (*U.S.S.R.*), **50**, Nos. 1–2, 129–37 (1938).]

The coefficient of permeability of the cerebro-spinal barrier to sugar is practically constant in dogs, horses, cows and rabbits, varying within the limits 1·0 to 1·81. The quantity of lactic acid (I) in the cerebro-spinal fluid is not constant and is independent of its concentration in the blood. Conclusion: I is most probably of local origin in the brain.

S. A. KARJALA (Chem. Abstr.).

Blood-brain Barrier in Shock. G. I. Chvoles. [*Proc. Shock Congress, Kiev*, 1937, 57–9.]

Peptone shock in cats and dogs is abolished by (subcutaneous) injection of atropine, followed by NaH_2PO_4, into the cerebro-spinal fluid; each of these

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measures alone improves the condition, but does not save the animal. Intravenous KCl aggravates the condition. B. C. P. A. (Chem. Abstr.).

Potassium Compounds in the Brain. I. B. Arenshain and B. L. Al'bitskii. [*Biochimiya*, **4**, 30–4 (1939).]

A ligroin extract of K compounds of the brain, after repeated washings with water, caused only a certain part of its K content to pass into the aqueous solutions. It is suggested that human brain matter contains organic K compounds besides K salts. HILMEYER COHEN (Chem. Abstr.).

Are there Action Substances in Nerve Excitation? Alexander von Muralt. [*Naturwissenschaften*, **27**, 265–70 (1939).]

A review of the present knowledge of transmission of excitation in the nerve itself and the transmission of excitation from nerve to muscle. The former is assumed to be predominantly electrical, although accompanied by chemical reactions of low heat effect. The latter takes place by means of acetylcholine or adrenaline depending on the type of nerve-fibre. As to the "action substances" formed inside the neuron during the transmission of excitation impulse, their isolation is difficult owing to the extremely short period of their existence. By fixation with liquid air indications have been found of an acetylcholine-like substance (*C. A.* **31**, 7504[7]). Besides this, separation of aneurin (vitamin B_1) from excited nerves has been found (Minz, *C. A.* **32**, 5887[8]).

N. J. C. VAN DER HOEVEN (Chem. Abstr.).

Role of the Cervical Sympathetics in the Regulation of Thyroid and Thyrotropic Function. Unto U. Uotila. [*Endocrinology*, **25**, 63–70 (1939).]

The anterior pituitary is the principal activator of the thyroid. Hypophysectomy in rats is followed by thyroid atrophy which cannot be compensated by sympathetic stimulation (cold). FELIX SAUNDERS (Chem. Abstr.).

A Vagus-post-pituitary Reflex. VI. Phenomena of Exhaustion and Recuperation. Hsi-Chun Chang, Jen-Jo Huang, R. K. S. Lim and Kun-Jen Wang. [*Chinese J. Physiol.*, **14**, 1–8 (1939).]

The phenomena of progressive diminution of the pressor response to repeated vagal stimulation is correlated with the gradual exhaustion of the secretory granules in the pituicytes of the pituitary gland. By allowing a suitable period of rest, the pressor response to vagal stimulation recurs with the reformation of secretory granules in the pituicytes. The vagal pressor response in the non-eserinized animal can therefore be taken as a physiological index of secretory reserve in the pituitary gland.

VII. Non-eserinized Vagus Response in Different Vertebrates. Yunming Lu. [*Ibid.*, 9–18.]

A pressor response has been elicited in the toad, turtle, chicken, duck, rabbit and cat. It disappears after hypophysectomy. It cannot be shown in the snake fish (*Ophiocephalus argus* Cantor), although its pituitary gland contains pituicytes and pressor principle. W. H. SEEGERS (Chem. Abstr.).

The Glucolytic Activity of Brain. I. Macerated Brain Tissue. Alexander Geiger and Jonathan Magnes. [*Biochem. J.*, **33**, 866–76 (1939).]

The glucolytic rate of brain was lower in adult than in young rats; it was increased by dilution of the tissue with isotonic solutions, and was greater in Ringer solution than in phosphate buffers at the same pH; the addition of adenosine triphosphate (I) increased the rate in phosphate to that in Ringer solution; glucolysis was prevented by extracting the brain with water, and was irregularly

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activated by glutathione (II). Only small amounts of lactic acid (III) were formed by brain from glycogen. Brain extracts had the same glycogenolytic activity as brain tissue, but a low glucolytic activity. No III was formed from hexose diphosphate (IV) by brain, the small amount of III found being formed from triose phosphate. Brain pulp was partly inactivated by incubation in N or O at 37°, but the glucolytic activity was partly restored by I and II. I could be replaced by adenylic acid (V) plus IV. Brain inactivated at pH 8·0 could not be reactivated. I may be regarded as the co-enzyme of brain glucolysis. P was transferred by brain from IV to V but not from phosphopyruvic acid. No phosphoric esters were formed from inorganic phosphate by brain. The breakdown of glucose in the brain departs in every respect from the breakdown of glycogen in muscle.

II. Effect of Cytolysis, the Presence of a Glucolytic Inhibitor. Alexander Geiger. [*Ibid.*, 877–84.]

Cytolized brain tissue showed no glucolytic activity, a reduced ability to oxidize III and no reduction in its succinate-oxidizing power. A heat-labile glucolysis inhibitor was present in cytolized brain tissue.

E. W. Scott (Chem. Abstr.).

Lactic Acid Oxidation in the Brain of B_1-Avitaminous Animals. Localization of the Chemical Lesion in Mammals and Birds. P. E. Galvao and J. Pereira. [*Arquivos inst. biol.* (*Sao Paulo*), **9**, No. 3, 25–37 (1938).]

Extra O uptake in presence of lactate (with minced tissue) is decreased in the cerebrum (motor region) of rats and optic lobes of fowls showing nervous symptoms; in rats without symptoms a decrease was found in the mid-brain.

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

The Metabolism of Cerebral Tissue. A. K. M. Noyons and H. van Goor. Nederland. Tijdschrift Geneeskunde, **83**, II, 2527–9 (1939).]

The O_2 consumption and CO_2 production of brain tissue *in vitro* differs in various animals, being larger in rats than rabbits or guinea-pigs.

R. Beutner (Chem. Abstr.).

Glucolytic Capacity of Various Parts of the Nervous System in Relation to the Substrate. E. B. Skvirs'ka. [*Biochem. J.* (*Ukraine*), **12**, 5–14, *in English*, 16–17 (1938).]

Minced grey matter, white matter and sciatic nerve from rabbits were incubated in a M/15 phosphate medium at 37° for 1½ hours. Lactic acid production was measured, without any additional substrate and with the addition of glucose, fructose, galactose and glycogen. The highest glucolytic capacity was exhibited by grey matter in the presence of glucose. White matter and sciatic nerve showed almost identical glucolytic capacity in the presence of all substrates. In relation to their capacity to form lactic acid with all types of nerve tissue, the substrates can be classified in the following descending order: glucose, fructose, galactose and glycogen.

R. Levine (Chem. Abstr.).

The Effect of Darkness and Illumination on the Oxidation Reduction Potential of the Visual Zone of the Cerebral Cortex. A. I. Safarov. [*Biochem. J.* (*Ukraine*), **12**, 177–85 (*in English*, 185–7) (1938).]

The visual zone of the cerebral cortex has a definite E_h value of about 370 mv., differing from the E_h value of other tissues. After an animal (rabbit) has been blindfolded for 5–15 days, the E_h value decreases in the area striata. Strong illumination of the eyes after temporary blindfolding leads to an increase in the E_h value. The oxidation-reduction potentials were determined potentiometrically *in vivo* and *in situ*, by exposing the occipital area of the brain.

R. Levine (Chem. Abstr.).

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Arginine in Individual Brain Areas of Various Animals. *Yu. V. Lakhno.* [*Biochem. J. (Ukraine)*, **12**, 19–28 (*in English*, 29–30) (1938).]

The arginine content of the brain of rabbits, cats and pigeons is distributed as follows: highest in the cerebellum, lowest in the spinal cord, with the cerebral hemispheres exhibiting intermediate values. The whole brain of carp and frog shows a higher concentration of arginine than does the cerebellum of mammals and birds. Conclusion: There is a tendency toward a decrease of brain arginine with the ascent in the phylogenetic scale. R. LEVINE (Chem. Abstr.).

Brain Creatine During the Embryonic Development of Vertebrates. *A. V. Palladin and E. Ya. Rashba.* [*J. Physiol. (U.S.S.R.)*, **24**, 265–76 (1938).]

The content of creatine (I), total N and H_2O in the brains of rabbit and guinea-pig embryos is higher during the second half of embryonic development than in mature animals. During development these values decrease until they reach those characteristic of mature animals during the 1st month of post-embryonic growth. The content of these substances in the hemispheres, cerebellum and medulla oblongata of cow embryos from the 3rd to the 8th month of growth is highest during the earlier stages, and reaches the maturity level in the 6th or 7th month of embryogenesis. Beginning with the 3rd month I is highest in the cerebellum, while the medulla oblongata is richest in total N and H_2O.

S. A. KARJALA (Chem. Abstr.).

Age Variations in the Reduction Capacity of the Brain and other Animal Tissues. *G. G. Ivanov.* *Bull. biol. med. exptl. U.S.S.R.*, **7**, 216–18 (1939).]

The brain tissue, cardiac and striated muscle, spleen and testicles of white rats show three stages in the reduction of methylene-blue (I) during the course of animal life. In the 1st stage, at ages from 2 weeks to sexual maturity (3 months), a high reducing capacity is shown by rapid decolorization of I. The 2nd stage (3 months to 2 years) is characterized by a slow reduction of I, while in the 3rd stage a comparatively rapid decolorization of I again occurs. The liver and kidneys, however, in the 1st stage show a minimum with extremely slow decolorization of I. During the 2nd stage the reduction capacity increases markedly, followed by a new decrease in the 3rd stage. An electrometric study showed the brain tissues of young and old animals to have similar E_h values, while that of adult animals was considerably lower. S. A. KARJALA (Chem. Abstr.).

Factors Influencing the Oxygen Supply of the Brain at Birth. *J. Barcroft, D. H. Barron, K. Kramer and G. A. Millikan.* [*J. Physiol. (U.S.S.R.)*, **24**, 43–55 (1938).]

The O_2 saturation of the blood of sheep was determined by projection of a beam of light through the blood and through a colour-filter of suitable wave-length on to a photo-electric cell. The extent of obscurity as a result of hæmoglobin reduction gave a measure of the O_2 content. Pulmonary respiration increases the O_2 saturation of the carotid blood from 40–50 to 90%. During this respiration period the respiratory efforts seem to be connected with a rise in arterial blood-pressure of approximately 40 mm. of Hg., which increases the O_2 supply of the brain by increasing the rate of circulation of the blood, which has become more highly saturated with O_2 through respiration.

S. A. KARJALA (Chem. Abstr.).

Nature of the Reducing Substances of Brain. *A. Baudouin and J. Lewin.* [*Compt. rend. soc. biol.*, **131**, 730–2 (1939).]

Fresh rabbit brain contains reducing substances equivalent to about 0·1% of glucose. About 50% of the reducing action is due to creatine and creatinine and 20–25% to fermentable sugar. L. E. GILSON (Chem. Abstr.).

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Pyruvate Oxidation System in Brain. I. Banga, S. Ochoa and R. A. Peters. [*Nature*, **144**, 74–5 (1939).]

Cocarboxylase, fumarate, inorganic phosphate, adenylic acid and cozymase are components of the pyruvate oxidation system in brain.

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

Pyruvic Acid Exchange in the Brain. P. E. Simola and Hella Alapeuso. [*Suomen Kemistilehti*, **12***b*, 9–10 (1939).]

Buffered brain tissue *in vitro* at 37°, when treated with pyruvic acid (I), gives rise to 50% of the amount of I destroyed as lactic acid (II) in an O_2 atmosphere and 33% of II in a N_2 atmosphere. In each case 10–12% alanine is formed. A rather large increase in α-ketoglutaric acid (III) and a small increase in succinic acid was observed. Little citric acid (IV) was formed in O_2 and none in N_2. No differences in malic and fumaric acid formation and no appreciable formation of AcOH were observed. The direct formation of AcOH from I in the animal organism is questioned. It is suggested that III is formed from glutamic acid. The formation of III from IV in liver tissue has been observed, but in the case of brain tissue, although a distinct consumption of IV is observed, little formation of III takes place. Studies of the action of tissues on AcOH and I do not support the theory that III is formed from these two compounds. S. A. KARJALA (Chem. Abstr.).

Pyruvate Oxidation in the Brain. V. Evidence Derived from the Metabolism of α-Ketobutyric Acid. Cyril Long and Rudolph A. Peters. [*Biochem. J.*, **33**, 759–73 (1939).]

Cocarboxylase is essential for the decarboxylation by yeast of α-ketovaleric acid (I) as well as for pyruvic (II) and α-ketobutyric (III) acids. Vitamin B_1 increases the rate of decarboxylation of I and III only in the presence of cocarboxylase. II and III are equally reactive with the pyruvate dehydrogenase system in brain under anaërobic conditions in the presence of methylene-blue. I is much less reactive. The Krebs' dismutation proceeds to the same extent with II and III, but I is less affected. Washed brain tissue causes oxidative decarboxylation of III, presumably to form propionic acid. I is oxidized only slightly. The purity of the acids used is essential. I and II enter into competitive inhibition with III in both normal and avitaminotic brains respiring *in vitro*. There is no inhibition of the indophenol oxidase system. II and III are oxidized at exactly the same rate under identical conditions. In the first case most of the initial oxidation product undergoes complete combustion to CO_2 and water. This indicates that there is a common initial path (A) for oxidative decarboxylation, and that in the case of II a further system (B) causes complete oxidation of part of the intermediate.

Appendix. R. W. Wakelin. [*Ibid.*, 773.]

The residual substrates in pigeon brain tissue are almost completely removed by washing with Ringer phosphate, pH 7·3, and then with either 0·2 or 0·3% KCl followed by the former solution to reduce swelling. The tissue still contains succinic acid oxidase and pyruvic acid dehydrogenase.

E. W. SCOTT (Chem. Abstr.).

Experimental Studies on the Sugar Puncture. II. Origin of the Hyperglucæmia occurring after the Sugar Puncture. Mikio Miyake. [*Arb. med. Fakultat Okayama*, **6**, 265–78 (1939).]

Adrenaline produced hyperglucæmia in normal rabbits, but not in splanchnectomized rabbits. Ergotoxine (I) had no effect on the blood sugar in normal rabbits, but those treated with I and then subjected to sugar puncture (by Eckhard's method) showed no difference in blood sugar as compared with controls. Electrical stimulation of the base of the brain of rabbits treated with I did not

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cause hyperglucæmia, but it did in normal animals. Adrenaline, added to the perfusion liquid of the toad liver, caused an increased percentage discharge of the sugar in the perfusate, but the absolute quantity was reduced on account of reduction in the amount of perfusate due to contraction of blood-vessels. Previous perfusion with I checked adrenaline reaction by paralysing the sympathetic nerve-endings of the blood-vessels so that the absolute quantity of sugar neither decreased nor increased. These experiments show that the sugar-puncture hyperglucæmia is adrenaline hyperglucæmia, which, however, results from a mechanical rather than a chemical action on a mother substance of sugar, such as glycogen. Increasing the circulation of blood by contraction of the blood-vessels in the skin and muscles washes out the reserve of sugar in the liver.

MAURICE M. RATH (Chem. Abstr.).

Changes in Lactic Acid, pH and Gases Produced in the Blood of Normal and Schizophrenic Subjects by Exercise. Joseph M. Looney. [*Am. J. Med. Sci.*, **198**, 57–66 (1939).]

The gases, pH and lactic acid were determined in the venous blood of 35 schizophrenic subjects and 35 normal subjects (living in the same environment) before and after running for 10 minutes up and down stairs. For the normal and schizophrenic subjects, respectively, the mean of work performed was 690 ± 24·6 and 812 ± 19·5 kg./m./min., the increase of lactic acid content was 65 ± 4·2 and 56 ± 4·7 mg./100 c.c., and the lactic acid production per kg./m./min. was 0·097 ± 0·007 and 0·065 ± 0·005 mg. These results indicate marked muscular inefficiency of the schizophrenic patients in regard to lactic acid production per work done. Before exercise, 4 minutes after exercise and 2 hours after exercise respectively the normal subjects showed blood pH values of 7·44, 7·36 and 7·47, O_2 contents of 10·5, 15·5 and 11·2 volume %, and CO_2 values of 57·8, 42·5 and 56·2 volume %; the corresponding values for the schizophrenic patients were pH 7·44, 7·35 and 7·46, O_2 contents of 11·5, 11·9 and 11·2 volume %, and CO_2 contents of 57·2, 41·1 and 56·3 volume %. The rate of disappearance of lactic acid was the same for both groups and dependent only on the blood level. As a result of the stress from exercise, the CO_2 mechanisms of the schizophrenic patients tended to approach more nearly that of the normal subjects. MARION HORN (Chem. Abstr.).

The Influence of Polyneuritis on the Lactic Acid and Glycogen Content of Pigeon Muscles Subjected to Different Types of Fatigue. L. I. Palladina and L. A. Dubovtseva. [*Biochem. J.* (*Ukraine*), **12**, 41–53 (in *English*, 57–61) (1938).]

Rhythmic stimulation of normal pigeon muscle causes a constant increase in lactic acid and a decrease in glycogen. Tetanic stimulation of the same muscles causes, instead, a decrease in lactic acid, although the glycogen content falls. The same results are obtained with muscles from polyneuritic pigeons except that the rate of glycogen decrease is considerably greater than in normal muscles. The differences in respect to lactic acid production after rhythmic and tetanic stimulation is being investigated. R. LEVINE (Chem. Abstr.).

Changes in the Blood of Neuropaths during Fatigue. I. M. Turovets. [*J. Med. Ukraine*, **8**, 807–18 (*in French*, 817–18) (1938).]

Aside from certain paradoxic reactions, no differences were observed in biochemical and neurovegetative reactions between neurotic and healthy subjects as a result of muscular fatigue. S. A. KARJALA (Chem. Abstr.).

Vitamin B_1 in Cerebro-spinal Fluid. Gilberto Guimarães Villela. [*Science*, **89**, 251 (1939).]

Acidify 10–15 c.c. samples to pH 4.L and adsorb on frankonite. Wash the adsorbate and dry at 100°. Divide the powder into two portions. Add graduated

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amounts of one portion to a synthetic medium and inoculate with spores of *Phycomyces blakesleeanus* (Schopfer and Jung, *C. A.*, **32**, 6298[8]). Determine thiamine in the other portion by the thiochrome method. The *Phycomyces* test gave higher values than the thiochrome method. Catatonia and depressive state showed the highest values. In myxœdema and epilepsy with cretinism no trace of thiamine could be found by either test. FELIX SAUNDERS (Chem. Abstr.).

Vitamin B_1 Content of Spinal Fluid. Gilberto Guimarães Villela. [*Compt. rend. soc. Biol.*, **130**, 1493–4 (1939).]

In 36 samples of spinal fluid from normal subjects and patients with chronic mental and other diseases the vitamin B_1 content was close to 2γ per 100 c.c. After intravenous injection of 10 mgrm. of vitamin B_1 a transient increase occurred in the spinal fluid 30–60 minutes after the injection. Three hours later the original level was regained. L. E. GILSON (Chem. Abstr.).

Chemical Method for Vitamin C Determination in the Cerebral Fluid. A. P. Fridman. [*Lab. Prakt.* (*U.S.S.R.*), 1939, No. 4, 9–11.]

Into a 50 c.c. Erlenmeyer flask is introduced 7 volumes of distilled water, 1 volume of cerebral fluid, 1 volume of 10% $Na_2WO_4\,2H_2O$ solution, and 1 volume of $\frac{1}{3}$ NH_2SO_4. After the mixture is shaken and filtered, the clear filtrate is titrated with Tillman's reagent (2, 6-dichlorophenol-indophenol) until a light pink colour is obtained. The end-point must be carefully watched. Two methods for the preparation of Tillman's reagent and the calculation method are given. The amounts of vitamin C found in different fluids are: Rabbits 2–3 mgrm. %, dogs 3–6 mgrm. %, horse 2–4 mgrm. %, cow 3–5 mgrm. %, human 0·5–2·5 mgrm. %. W. R. HENN (Chem. Abstr.).

The Vitamin C Content of the Cerebro-spinal Fluid. J. W. Camerer. [*Monatsschr. Kinderheilk.*, **77**, 240–58 (1939).]

The average concentration of ascorbic acid in the cerebro-spinal fluids of healthy breast-fed infants is 4·2 mgrm. %; that of rachitic and of healthy artificially-fed infants was only slightly lower. Spasmophilia caused a marked decrease, to 0·85 mgrm. %. Findings were inconstant with inflammatory diseases and digestive disturbances of brief duration, but chronic illness tended to lower the concentration. In older children the average concentration was 2·13 mgrm. %. The concentration is quickly influenced by low or high intake of vitamin C. The maximum concentration obtained by giving ascorbic acid was 5·5 mgrm. %.
ELEANOR M. HUMPHREYS (Chem. Abstr.).

Estimation of the Alkaline Phosphatase in the Cerebro-spinal Fluid. H. H. Fleischhacker. [*Ensymologia*, **6**, 144 (1939).]

The phosphatase activity of normal cerebro-spinal fluid is 0·1–0·2 Bodansky units for β-glycerophosphate and less for α-glycerophosphate. The values are higher in some cases of brain tumour. FELIX SAUNDERS (Chem. Abstr.).

Crystal Formations Obtained by Evaporation of Mixtures of 0·85 % *Sodium Chloride Solutions with Serum. I. Normal Human Serum, Serum Deprived of Complement by Heat, Serum Extracted with Ether and Serum from Patients in Insulin Shock. Mario Coppo and Mario Levi.* [*Sperimentale*, **93**, 68–85 (1939).]

Characteristic patterns of crystallization were obtained with each type of serum. Twenty-six different normal human serums gave only three different types of crystallization. A. E. MEYER (Chem. Abstr.).

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The Urea Content of Cerebro-spinal Fluid at Different Stages of Insufficient Blood Circulation. M. L. Aviosor. [*J. med., Ukraine*, **8**, 1159–68 (*in French*, 1168) (1938).]

The urea content of cerebro-spinal fluid (I) is generally lower than that of the blood. During insufficient circulation of the blood the urea content of I rises, together with the rise in urea in the blood. A greater increase in the urea content of I than is observed in the blood indicates an increased permeability of the hæmato-encephalic barrier. S. A. KARJALA (Chem. Abstr.).

Estimation of Tryptophane in the Cerebro-spinal Fluid. M. Kraus and K. Mezey. [*Schweiz. Arch. Psychiat. Neurol.*, **42**, 77–87 (1938).]

A simple method of estimating tryptophane in the cerebro-spinal fluid is described. Tryptophane was found in the fluid in cases of syphilitic diseases of the central nervous system. It was found only in those cases in which other signs of syphilis were present in the fluid. B. C. P. A. (Chem. Abstr.).

The Passage of Tryptophane into the Cerebro-spinal Fluid. Mitio Kasahara and Ituo Gammo. [*Klin. Wochschr.*, **18**, 686 (1939).]

The amount of tryptophane in the cerebro-spinal fluid is increased after intravenous injection of tryptophane. H. L. MASON (Chem. Abstr.).

The Role of the Nervous Factor in Chronic Intoxication by Industrial Poisons. P. Ya. Mytnik. [*J. Physiol. (U.S.S.R.)*, **26**, 120–7 (*in English*, 127) (1939).]

The experimental injury of the nervous system of animals results in visceral hæmorrhage, trophic ulcers and leucocytosis. Poisoning by subcutaneous injections of C_6H_6 results in leucopenia and visceral hæmorrhages. With preliminary subjection to nervous trauma, C_6H_6 causes only a slight reduction in the number of leucocytes, followed by leucocytosis. S. A. KARJALA (Chem. Abstr.).

The Content of Labile Phosphorus Compounds in the Brains of Cats. S. F. Epshtein. [*Bull. biol. med. exptl. U.S.S.R.*, **7**, 94–97 (1939) (*in German*).]

The contents of easily hydrolysable H_3PO_4 phosphorus (7 minutes at 100° with N HCl) and creatinephosphoric acid P in the brains of cats under chloral hydrate narcosis are 19·3–22·7 and 5·1–8·7 mgrm.% respectively. Under somnifen narcosis the values are 14·3–16·2 and 6·0–7·4 mgrm.% respectively, and under urethane (I) narcosis 9·6–14·5 and 3·8–5·0 mgrm.% respectively. Under I narcosis the Ba fraction of the P compounds yielded 2·3–4·3 mgrm.% of amino N from the desaminase splitting of adenylic acid and 1·7–18·8 mgrm.% of H_3PO_4 phosphorus. The molar P/N ratio was 1·9–2·1. S. A. KARJALA (Chem. Abstr.).

A Method for Shortening the Duration of Lower Motor Neurone Paralysis by Cholinergic Facilitation: A Preliminary Report. Alexander Wolf and Abner Wolf. [*Trans. Amer. Neurol. Assoc.*, **64**, 205–7 (1938).]

Daily feeding of acetyl-β-methylcholine, KCl or prostigmine led to recovery from paralysis induced in cats by injection of alcohol into the sciatic nerve, or by section and resuture of the nerve. No recovery occurred in paralysed control cats not treated with the above compounds. The medicated cats showed better appetite, vigour and general health than the controls. The beneficial effect of prostigmine in promoting recovery from paralysis has also been observed in a clinical series now under investigation. In the single case cited, daily administration of 75–90 mgrm. prostigmine orally for 2 weeks led to considerable recovery from a postmastoidectomy facial palsy that had previously shown little improvement during the past 9 years. The beneficial effects of cholinergic drugs in paralysis

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are attributed to their facilitation of the passage of impulses through the lower motor neurone by preservation of acetylcholine bombardment at the dendrites of the anterior horn-cells. This constant stimulation apparently maintains the tone and body of the denervated muscles against atrophy and hastens neural regeneration. The cholinergic drugs may prove useful not only in traumatic nerve lesions but also in other types of lower motor neurone lesions, perhaps even in amyotrophic lateral sclerosis, progressive spinal muscular atrophy or chronic poliomyelitis.

MARION HORN (Chem. Abstr.).

Does a Diabetic Polyneuritis Exist? F. Rathery and Pierre Klotz. [*Bull. mém. soc. méd. hôp. Paris*, **54**, 574–80 (1938).]

Daily subcutaneous injections of 1 mgrm. (500 I.U.) crystallized vitamin B_1 and the ingestion of several vitamin B_1 tablets daily produced a rapid improvement in the polyneuritis in a diabetic patient. Vitamin B_1 caused a distinct increase in the carbohydrate tolerance, which remained high after discontinuation of the treatment. The parallel regression of the nervous symptoms and of the glucosuria apparently favours the theory of the diabetic nature of the nervous disturbances. Diabetic polyneuritis is probably of an avitaminotic character.

J. Haguenau. Ibid., 644–5.

Haugenau does not believe that the data of Rathery and Klotz justify the conclusion of the existence of a specially diabetic polyneuritis.

R. BERGGREN (Chem. Abstr.).

Blood Proteins in Delirium Tremens. J. M. Thomas, E. V. Semrad and R. M. Schwab. [*Amer. J. Med. Sci.*, **195**, 820–3 (1938).]

The serum albumin of 18 patients with delirium tremens during the acute phase was below 4 grm.%. In 12 of 22 cases serum albumen was lower after the acute phase had subsided. There was no significant alteration in serum globulin.

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

The Blood and Spinal Fluid Sugar and Chloride Content in Meningitis. Esther Hendry. [*Arch. Disease Childhood*, **14**, 159–72 (1939).]

Sugar concentrations in non-meningitic cerebro-spinal fluids were 50–83 mgrm.% (average 64), in tuberculous fluids 5–86 mgrm.% (below 50 in 25 of 28 cases), and in purulent fluids 0–52 mgrm.% (below 35 in 11 of 15 cases). The ratio of cerebro-spinal fluid sugar to blood sugar was above 0·6 in non-meningitic fluids, was lowered in tuberculous fluids usually to less than half, and further lowered in the purulent fluids of meningococcus menigitis, etc. Values above the normal minimum for concentration and ratio were found in poliomyelitis, benign lymphocytic meningitis, and non-meningeal tuberculosis. Cl concentrations of tuberculous cerebro-spinal fluids were substantially reduced from the normal values of 635–770 mgrm.% as NaCl, those of purulent fluids somewhat less, while no change in ratio to blood Cl was observed. Apparently blood Cl level determines that of the cerebro-spinal fluid, while other factors also operate on the sugar concentration. As diagnostic aids, cerebro-spinal fluid sugar and its ratio to blood sugar are considered more satisfactory than Cl values.

KATHRYN KNOWLTON (Chem. Abstr.).

Effects of Sorbitol and Sucrose on Cerebro-spinal Fluid Pressure and Urine Output. Henry G. Schwartz and Robert Elman. [*Proc. Soc. Exptl. Biol. Med.*, **39**, 506–8 (1938).]

In dogs, 50% sorbitol solution, 2·5 c.c./kgrm. injected intravenously causes a more marked and protracted fall in spinal fluid pressure, and a greater diuresis than does an equivalent amount of sucrose. Sorbitol is non-toxic.

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

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The Arsenical Content of the Brain in Cases of Encephalitis, Inflammatory Occlusion of the Aqueduct, and Acrodynia. A. D. Ecker. [*Proc. Staff Meetings Mayo Clinic*, **14**, 43–8 (1939).]

Brain As concentrations of 0·10–0·83 mgrm.% (similar to the concentrations found in acute arsenical poisoning or arsphenamine hæmorrhagic encephalitis), in 2 of 4 cases of non-neoplastic occlusion of the aqueduct of Sylvius and in 1 of 2 cases of acrodynia. It is suggested that As may play an ætiologic role in these diseases. MARION HORN (Chem. Abstr.).

Symmetrical Cerebral Calcification Associated with Parathyroid Insufficiency. L. M. Eaton. [*Proc. Staff Meetings Mayo Clinic*, **14**, 48 (1939).]

Of 8 patients with symmetrical cerebral calcification, 3 had parathyroid insufficiency. Treatment of the parathyroid insufficiency in 2 patients followed was successful in stopping the convulsive seizures and improving the mental status. Dihydrotachysterol (A.T. 10) was used in 1 patient.

MARION HORN (Chem. Abstr.).

Presence of Acetone in the Cerebro-spinal Fluid in Meningitis. J. Fournier and L. Feissolle. [*Compt. rend. soc. biol.*, **131**, 566–8 (1939).]

Acetone was found in the spinal fluid in meningitis due to various types of infection. It is ascribed solely to malnutrition. This is in harmony with its high frequency in tuberculous meningitis. L. E. GILSON (Chem. Abstr.).

Apparent Relation between Hypophyseal Tumours and Benzopyrene Injected into the Cerebrum of the Rat. C. Oberling, C. Sannie, P. Guerin and M. Guerin. [*Compt. rend. soc. biol.*, **131**, 455–7 (1939).]

In a new series of experiments the injection of crude or pure benzopyrene or methylcholanthrene into rat brains did not produce tumours of hypophysis; hence the cases previously reported (*C.A.*, **31**, 3134[1]) should be ascribed to coincidence. Spontaneous hypophyseal tumours are not uncommon in rats more than 20 months old. L. E. GILSON (Chem. Abstr.).

The Variations of Cholinesterase in the Brain and Spinal Cord of Tetanized Animals. Giacomo Pighini. [*Biochim. terap. sper.*, **26**, 226–7 (1939).]

The cholinesterase in the cord and still more in the cerebral cortex is increased in animals poisoned with tetanus toxin. A. E. MEYER (Chem. Abstr.).

Method for Comparative Determination of Cholinesterase in Various Sectors of the Nervous System. Giacomo Pighini. [*Biochem. terap. sper.*, **26**, 157–9 (1939); *cf. C.A.*, **33**, 7393[3].]

Triturate a 0·2-grm. sample with quartz sand and emulsify in 50 c.c. physiological NaCl solution. Neutralize with 0·01 N NaOH (phenolphthalein) and add 2·5 c.c. of a solution containing 1 grm. acetylcholine in 10·5 c.c. Keep at 37° and titrate with NaOH every 5 minutes to a total of 6 titrations. The optimum pH for the action of the enzyme is 8·2–8·4, which corresponds to a pink colour of phenolphthalein. By repeated titration a considerable shift from the optimal condition is prevented. A. E. MEYER (Chem. Abstr.).

Synthesis of Acetylcholine by Brain Tissue. E. R. Trethewie. [*Australian J. Exptl. Biol. Med. Sci.*, **16**, 343–6 (1938).]

Synthesis of acetylcholine in the presence of glucose was demonstrated for guinea-pig brain. EDWARD EAGLE (Chem. Abstr.).

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Chemical Transmission Agents in Nerves : Acetylaneurin. Richard Kuhn, Theodor Wieland and Heinrich Huenschmann. [*Z. physiol. Chem.*, **259**, 48–52 (1939).]

Heating 2-methyl-4-amino-5-bromomethylpyrimidine-diHBr with 4-methyl-5-acetoxyethylthiazole gave 4-methyl-5-β-acetoxyethyl-N-(2-methyl 4-aminopyrimidyl(5)methyl)-thiazolium bromide-HBr (acetylaneurin), m. 235·5–6° (decomp.). This substance is as active on intestinal strips as choline. Aneurin itself has no action. MILTON LEVY (Chem. Abstr.).

Acetylcholine Metabolism in the Central Nervous System. The Effects of Potassium and Other Cations on Acetylcholine Liberation. P. J. G. Mann, M. Tennenbaum and J. H. Quastel. [*Biochem. J.*, **33**, 822–35 (1939).]

The addition of K ions (0·027 M) to an eserine-containing medium in which intact brain slices were respiring caused a large increase in the rate of formation of acetylcholine (I). High concentrations of K ions inhibited the synthesis of I. The effect of K ions did not occur in a substrate-free medium. The additional I formed by K ions was all in the free form. The accelerating action of K ions was neutralized by the addition of Ca or Mg ions. Rb and Cs ions had an effect similar to, but smaller than, that of K. The addition of K ions to minced brain tissue did not cause as great an increase in the formation of I. The addition of K ions to brain slices or mince, when I was not being formed, caused a fall in the amount of " combined " I and a correspondingly equal increase in the amount of free I. The effect of K ions was less in a phosphate medium than in a bicarbonate medium. The direct effect of the K ions was to increase the permeability of the nerve-cells, so that I diffused from the cells at a greater rate. The addition of I to a medium containing brain slices depressed the formation of I. NH_4 ions acted like K ions in causing a breakdown of " combined " I with an increase in free I. E. W. SCOTT (Chem. Abstr.).

The Mechanism of the Biological Synthesis of Acetylcholine. II. Edgar Stedman and Ellen Stedman. [*Biochem. J.*, **33**, 811–21 (1939).]

A study was made of the formation of acetylcholine (I) brain tissue *in vitro* under various conditions. The amount of I formed when minced ox brain in eserinized Ringer solution was shaken at 37° was approximately equal to that produced by grinding the minced tissue with $CHCl_3$-eserine and keeping it at room temperature for the same period, 2 hours. Et_2O resembled $CHCl_3$ in its ability to promote the formation of I in brain tissue, but was more efficient. The effect of Et_2O was greater at 37° than at room temperature, but the reverse held for $CHCl_3$. The amount of I formed at 0° with $CHCl_3$ was very small compared to the amount formed at 37°—a finding contrary to that of Mann *et al.* (*C.A.*, **32**, 4645[1]). The addition of Na acetoacetate to the $CHCl_3$ or Et_2O preparations increased the yield of I. The addition of glucose to the eserinized Ringer preparation did not appreciably increase the amount of I formed, contrary to Mann's finding. Stedman and Stedman suggest that acetoacetic acid is the precursor of I and that the " preformed-precursor " of Mann does not exist. E. W. SCOTT (Chem. Abstr.)

Function-testing the Vegetative Nervous System with Acetylcholine. I. Tests on the Healthy. Ryūzō Tanahasi. [*Nagoya Igakkai Zasshi*, **48**, 195 (1938).]

As a result of pharmacological tests, 22 healthy subjects were classified in 4 types; their vegetative nervous systems were vagotonic, sympatheticotonic, stable or labile. The injection of 10–30 mg. acetylcholine per kgrm. of body-weight into subjects having labile or vagotonic nervous systems caused reductions in the leucocyte and erythrocyte counts, hæmoglobin, blood sugar, pulse-rate and blood-pressure. Miosis also occurred. The body temperature tended to fall. In subjects with stable or sympatheticotonic vegetative nervous systems, the effects

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were slight and appeared only with 30-mgrm. doses. Since there is no discomfort or unfavourable after-effects from its use, acetylcholine is preferable to pilocarpine in pharmacological function-tests on the vegetative nervous system.

II. Test in Various Diseases. [*Ibid.*, 257.]

The acetylcholine method was applied to 36 patients with various diseases involving abnormal tonus of the vegetative nervous system. Of 32 subjects with vagotony or lability, 31 were positive to both the acetylcholine and the pilocarpine tests. Results on 4 sympatheticotonic patients were negative in both tests. In two cases the use of acetylcholine caused asthmatic symptoms, as did also the ingestion of the acetylcholine-containing foods, yams (*Dioscorea*) and taro (*Colocasi antiquorum*). In various disease conditions also, acetylcholine is preferable to pilocarpine in testing the vegetative nervous system.

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

Tissue Acetylcholine. VI. The Liberation of Acetylcholine from Nerve Trunks during Stimulation. H. C. Chang, W. M. Hsieh, T. H. Li and R. K. S. Lim. [*Chinese J. Physiol.*, **14**, 19–26 (1939).]

Electrical stimulation of the nerve-trunk, isolated from the body or *in situ* mobilizes free acetylcholine (I) from the nerve-trunk into the saline solution (containing 0·1 mgrm. eserine per c.c.) in which it is immersed and increases the amount of free I as revealed by subsequent saline extraction. The total amount of alcohol-extractable acetylcholine may not be changed appreciably. A nerve-trunk previously incubated at 37° for 2 hours contains more total alcohol-extractable acetylcholine and liberates more I when stimulated than non-incubated nerves.

WALTER H. SEEGERS (Chem. Abstr.).

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2. Pharmacology and Treatment.

A Paradoxical Phenomenon of Insulin Shock Treatment. S. Lups. [*Klin. Wochschr.*, **18**, 813–16 (1939).]

The coma of 3 patients deepened when sugar was given by stomach-tube. This coma was prolonged, and restoration was effected only by intravenous administration of glucose. Adrenaline had no effect on the blood-sugar.

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

Blood Sugar and Cerebro-spinal-Fluid Sugar during Insulin Shock Treatment of Schizophrenia. V. Schretzenmayr. [*Arch. Psychiat. Nervenkrankh.*, **108**, 680–93 (1938).]

Three patients with schizophrenia, already under insulin treatment for some time, showed high readings of blood sugar and cerebro-spinal fluid sugar before breakfast and while not under treatment. After insulin coma the blood sugar returned more quickly than the fluid sugar to normal.

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

Changes in Blood Lipides during Insulin Treatment of Schizophrenia. L. O. Randall, D. E. Cameron and J. M. Looney. [*Amer. J. Med. Sci.*, **195**, 802–9 (1938).]

Five schizophrenic patients who showed a good remission during insulin treatment developed a significant rise in whole blood phospholipide, total cholesterol, and total lipide. In 9 of 11 patients who failed to respond to treatment a transitory mild lipæmia occurred. Insulin did not significantly affect the post-absorptive level of the blood lipides.

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

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Physiological Studies in Insulin Treatment of Acute Schizophrenia. Serum Lipides. Lowell O. Randall and E. M. Jellinek. [*Endocrinology*, **25**, 105–10 (1939).]

Twenty-two patients in the acute stage of schizophrenia were tested for serum lipides (phospho-lipides, total cholesterol, free cholesterol, cholesterol ester and total lipides) in the 2 weeks preceding and the 2 weeks following insulin treatment. All the mean lipide values, except free cholesterol, were initially significantly lower than the values obtained in normal controls. After medication the levels of all the lipides, except free cholesterol, were increased significantly and reached the normal level in the " recovered " as well as in the " not recovered " patients. The increase in lipide values was maintained by the " recovered " patients during the 2 weeks after termination of the insulin treatment, but the " not recovered " patients tended to drop back toward the initial level. The cholesterol ester/free cholesterol ratio became stabilized in " recovered " patients, but instability was increased in the " not recovered " group after insulin treatment.

F. SAUNDERS (Chem. Abstr.).

Serum Potassium and Serum Calcium in Insulin Shock Therapy. J. L. Clegg. [*Lancet*, **1**, 871–2 (1939).]

The serum Ca was usually normal and the K higher than normal in patients under treatment with hypoglucæmic shock. During the shock the concentration of serum K became lower than the initial concentration, while that of Ca remained the same. E. R. MAIN (Chem. Abstr.).

Changes in the Oxidation-Reduction Potential of the Blood of Schizophrenic Patients under the Influence of Insulin. M. Merezhins'kiĭ. [*Biochem. J.* (*Ukraine*), **12**, 189–205 (*in English*, 207–8) (1938).]

Venous blood was used for measurements. The administration of insulin leads to an increase in the E_h value of the blood. This rise may be nullified by the administration of glucose, to counteract the insulin effect. Glucose alone will not change the E_h value in any direction. There is no correlation between the changes in the E_h of the blood and its content of O, glutathione and reduced ascorbic acid. No prognostic significance can be attached to the changes in E_h. The oxidation-reduction potential of the blood merely indicates a tendency in metabolic processes, but is not of absolute significance.

R. LEVINE (Chem. Abstr.).

Changes in the Glucose-Tolerance Test Occurring During and After Insulin Shock Therapy for Schizophrenia. H. Freed, S. De W. Ludlum and E. A. Strecker. [*Amer. J. Med. Sci.*, **196**, 36–44 (1938).]

The glucose-tolerance curve was abnormal in 41% of 22 cases of schizophrenia. During and after insulin shock therapy a biphasic change in the character of the glucose-tolerance curve was found. The immediate effect was to produce a hyperglucæmic (diminished tolerance) type of curve. In 10 of 12 patients followed 2–10 months after their last treatment a hypoglucæmic (increased tolerance) curve occurred. B. C. P. A. (Chem. Abstr.).

Physiological Studies in Insulin Treatment of Acute Schizophrenia. The Choline Esterase Activity of the Blood Serum. Lowell O. Randall and E. M. Jellinek.]*Endocrinology*, **25**, 278–81 (1939).]

The choline esterase activity of the blood-serum of 22 schizophrenic patients in the acute stage was determined by the gasometric method (Ammon, *C.A.*, **28**, 1734[9]). The choline esterase level of the patients was initially somewhat lower than that of the normal controls, but the difference was not significant. After insulin treatment the choline esterase level increased significantly whether the patients recovered or not. In the 2nd week after medication the esterase level tended to decrease to the normal level. FELIX SAUNDERS (Chem. Abstr.).

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Blood Minerals. J. M. Looney, E. M. Jellinek and Cora G. Dyer. [*Ibid.*, 282–5.]

K, Ca and P of the blood were determined on 22 schizophrenic patients 4 times in the 2 weeks preceding and 4 times in the 2 weeks following insulin treatment. K and Ca showed no significant changes after medication. The mean level of the inorganic P of the blood was initially significantly higher than in normal controls. The P level of the 10 patients who recovered dropped after treatment to the normal level.

The " not-recovered " patients showed only an insignificant decrease.

FELIX SAUNDERS (Chem. Abstr.).

Intensifying the Effect of Insulin with Acetylcholine. E. E. Gorodetskii. [*Problemy Endokrinol.*, **2**, No. 1, 69–76 (1937).]

The simultaneous injection of acetylcholine along with insulin considerably increases the action of the latter ; this effect is regularly observed in rabbits, while with diabetic individuals the results are less uniform. The blood sugar was determined only for the first 2 hours of the insulin's action. Conclusion : Through the effect on the vegetative nervous system conditions affecting the action of insulin can be influenced in either the positive or negative direction.

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

Effects of Insulin Treatment on the Cerebro-spinal Fluid of Schizophrenics. Mona Spiegel-Adolf and Herbert Freed. [*Proc. Soc. Exptl. Biol. Med.*, **40**, 398–400 (1939).]

The non-electrolyte/electrolyte ratios were measured by combined methods on spinal fluids of schizophrenics treated with insulin. A marked parallelism was found between increases in this ratio and the occurrence, frequency and severity of the convulsions. These findings confirm previous observations in epileptics and in metrazole-treated schizophrenics (*cf. Confinia Neurol.*, **2**, 1 (1939).

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

Heart Action of Camphor, Metrazole and Coramine. G. Kahlson. [*Skand. Arch. Physiol.*, **80**, 209–13 (1938).]

Rhythmical activity of frog ventricle after a Stannius ligature was maintained by electrical stimulation ; the electrocardiogram was recorded from the base and the apex. Local administration of therapeutic concentrations of metrazole and coramine on the apex electrode does not alter the monophasic action current. Camphor (1 : 10,000–1 : 25,000) diminishes the size and duration of the action potential.

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

A Comparative Study of the Stimulant Analeptics Picrotoxin, Metrazole and Coramine. H. W. Werner and A. L. Atum. [*J. Pharmacol.*, **66**, 260–78 (1939).]

Picrotoxin is a somewhat more effective analeptic agent than metrazole against severe depression produced in rabbits by intraperitoneally injected nembutal. Coramine is relatively ineffective. Coramine is sometimes depressant, picrotoxin and metrazole are not. Of the three compounds, metrazole has the highest factor of safety when convulsions *per se* are desired in normal rabbits. It is safest when given by rapid intravenous injection. Metrazole and picrotoxin are inactivated at about the same rate *in vivo* ; coramine is inactivated much more slowly.

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

Micro-identification of Metrazole in Mixed Aqueous Solutions. Vincent E. Stewart. [*Ind. Eng. Chem., Anal. Ed.*, **11**, 345–6 (1939).]

A modification of Wollner and Matchett's method (*C.A.*, **32**, 1520[2]) is used to separate metrazole from alkaloids and other drugs in body fluids. The sensitivity

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of the test is 1 part in 10,000, the smallest amount of metrazole that can be extracted and identified is about 0·1 mgrm. per 100 ml. of sample.

T. H. DUNKELBERGER (Chem. Abstr.).

The Pharmacologic Antagonism of Metrazole and Sodium Amytal as Seen in Human Individuals (Schizophrenic Patients). Louis H. Cohen. [*J. Lab. Clin. Med.*, **24**, 681–4 (1939).]

Rapid, simultaneous injections of both drugs result in the inhibition of the hypnotic effects of Na amytal by metrazole and the rise in the convulsant threshold of metrazole by Na amytal, so that certain combinations of drugs produce no effects. The convulsant threshold of metrazole seems to bear a direct relationship to the amount of Na amytal. HOWARD W. ROBINSON (Chem. Abstr.).

The Analeptic Action of Synephrine-Azoman and Metrazoleveritol in Poisoning by Hypnotics. F. Hildebrandt and J. Bruns. [*Schmerz, Narkose-Anesthesie*, **11**, 112–19 (1938).]

In rats under the influence of various hypnotics, a combination of metrazole with veritol exerted greater analeptic action than a combination of synephrine with azoman. The analeptic effects were greatest against soluble barbital and avertin, weaker against chloral hydrate, paraldehyde and pernocton and weakest against urethan. The analeptic effects of the combination of metrazole with veritol were no greater than those of metrazole alone.

MARION HORN (Chem. Abstr.).

Cerebro-spinal Fluid During Convulsions due to Cardiazole. [*B. Niketic and Z. Susic. Arch. Psychiat. Nervenkrankh.*, **108**, 562–71 (1938).]

In 15 patients treated with cardiazole (metrazole), lumbar puncture was performed during the convulsion. The lumbar cerebro-spinal fluid pressure increases during the initial " myoclonic " phase, reaches its peak of over 100 cm. of water during the tonic phase and decreases again. The cerebro-spinal fluid is chemically normal. B. C. P. A. (Chem. Abstr.).

The Colorimetric Identification of Barbiturates in the Urine and other Organic Fluids with Cobalt, as Described by W. Parri. M. Aiazzi Mancini and E. Pecciarini. [*Biochem. terap. sper.*, **26**, 119–22 (1939); *cf. C.A.*, **19**, 1176.]

Extract 10 c.c. of urine 3 times with 5 c.c. $CHCl_3$ and dry the solutions thoroughly with Na_2SO_4. Mix 1 c.c. of the $CHCl_3$ solution with 10 drops of a 0·2% solution of Co acetate in MeOH and add carefully 4–6 drops of a 2% solution of NaOH in MeOH. A violet ring at the surface indicates the presence of moderate quantities of barbiturates. The reaction appears if the $CHCl_3$ contains at least 0·5 mgrm. veronal. Concentration of the solution by evaporation increases the sensitivity. The reaction is rendered more sensitive if the urine is treated with $KMnO_4$ in presence of H_2SO_4 until no more $KMnO_4$ is reduced.

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

The Effect of Certain Barbiturates upon the Oxygen Uptake and Anaërobic Reduction of Methylene-blue by Rat Liver and Brain. Carla M. Zorn, Edward Muntwyler and O. W. Barlow. [*J. Pharmacol.*, **66**, 326–35 (1939).]

The O uptake of rat liver slices without added substrates was inhibited more or less by 0·01% of the following Na barbiturates, listed in decreasing order of effectiveness: amytal, pentobarbital, neonal, ortal, phenobarbital, evipan, alurate and dial. Within the concentration range 0·001–0·1% inhibition increased with the concentration. Na barbital did not inhibit O uptake even when increased to

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0·5%. The order of O effectiveness in producing narcosis in rats is—pentobarbital, alurate, amytal, dial, neonal, evipal, phenobarbital, ortal and barbital. The anaërobic reduction of methylene-blue by liver tissue without added substrates was markedly decreased by 0·1% of the above Na barbiturates excepting barbital. In rat brain the anaërobic reduction of methylene-blue was less affected by the barbiturates than in liver. L. E. GILSON (Chem. Abstr.).

Detoxication of Barbiturates and the Influence of the Method of Administration. Demonstrated with Nembutal and Pentothal. Richard Kohn-Richards and Clyde Grimes. [*Anesthesia and Analgesia*, **18**, 139–45 (1939).]

The detoxication of these two barbiturates was studied in rabbits by giving a single intravenous dose or a slow intravenous infusion. After this, the degree of detoxication was measured by the determination of the supplementary dose after certain time intervals which were necessary to cause respiratory paralysis. A mathematical formula has been worked out by which the rate of destruction of the drugs can be calculated during a constant infusion from the results obtained from single-injection experiments. G. H. W. LUCAS (Chem. Abstr.).

Picrotoxin-Barbiturate Antagonism in Decorticated Animals. H. R. Miller and E. A. Spiegel. [*Yale J. Biol. Med.*, **11**, 497–500 (1939).]

In 15 animals (9 incomplete and 6 complete decortications) the intraperitoneal injection of picrotoxin awakened the animals from barbiturate sleep.
G. H. W. LUCAS (Chem. Abstr.).

Formation of Acetylcholine in Brain in vitro in the Presence of Methylene-blue and Cobra Venom. Elisabeth Corteggiani. [*Compt. rend. soc. biol.*, **131**, 883–7 (1939).]

The addition of a little methylene-blue greatly increases the amount of acetylcholine liberated by cobra venom under the conditions previously described (*C.A.*, **32**, 9292[3]). L. E. GILSON (Chem. Abstr.).

Comparative Study of the Liberation of Acetylcholine from Brain Tissue in vitro by Cobra and Vipera aspis *Venoms, Lysocythin and Saponin. J. Gautrelet and E. Corteggiani.* [*Ibid.*, 951–4; *cf. C.A.*, **32**, 9292[3].]

Viper venom has a weaker action than cobra venom, and lysocythin and saponin have a much weaker action than either venom.
L. E. GILSON (Chem. Abstr.).

Acetylcholine and Cholesterol. Fritz Zinnitz. [*Arch. exptl. Path. Pharmakol.*, **190**, 594–604 (1938).]

The effect of cholesterol acetate (I) on the action of acetylcholine (II) was studied on the hearts of intact and spinal frogs. In small doses I increases the effect of II; in large doses I causes a reversal of II action leading to systolic contracture of the heart. The effect of I is reversible.
EDWARD EAGLE (Chem. Abstr.).

Action of Toxic Doses of Atropine on the Central Nervous System. Theodore Koppanyi. [*Proc. Soc. Exptl. Biol. Med.*, **40**, 244–8 (1939).]

The effects of large and near lethal doses in frogs, dogs and cats are described. Atropine, like morphine, has a two-fold action on the central nervous system, depressing and stimulating. The mechanism of the action is not clear. Whether or not the actions can be explained by the acetylcholine-blocking effect still remains to be determined. L. E. GILSON (Chem. Abstr.).

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Concentration of Sulphanilamide in Human Spinal Fluid and Blood after a Single Intrathecal Injection. E. Neter, D. H. Weintraub and A. L. Dayman. [*Proc. Soc. Exptl. Biol. Med.*, **40**, 164–6 (1939).]

Four hours after a single intrathecal injection of 80 mgrm. sulphanilamide in patients free of meningitis concentrations of 10–16 mgrm.% were found in the spinal fluid. All was eliminated in 18–24 hours. The maximum found in the blood at any time was 0·7 mgrm.%. L. E. GILSON (Chem. Abstr.).

Disturbances of Excitability in Narcosis. A. Richard. [*Anesthésie et analgésie*, **4**, 472–6 (1938).]

Evidence is cited from the literature to demonstrate that the influence of cerebral cortical centres on peripheral excitability is abolished completely by $CHCl_3$ (I) and gardenal (II), but not by chloralose (III) or morphine (IV). Thus disturbances in peripheral excitability due to centrally acting toxins, e.g., alcohol, ether, Pb, Mn or As are abolished by I and II, but not by III or IV. In addition, III does not suppress subordination reflex mechanisms, such as the reflex influence of the labyrinth on peripheral neuromuscular excitability.

MARION HORN (Chem. Abstr.).

Action of Asphyxia on Nervous Excitability. A. Richard. [*Anesthésie et analgésie*, **4**, 477–82 (1938).]

Asphyxia, produced in dogs mechanically (by prevention of inspiration) or chemically (by administration of CO or HCN), first causes disturbances in peripheral excitability via both the local effect of the asphyxiated blood on the neuromuscular appearance and the central effect of disturbances of subordination. Later the asphyxia produces a disappearance of cortical excitability, which can be counteracted by convulsants, e.g., caffeine, coramine or camphorated oil. However, such analeptics are of use in asphyxia only if the neurocirculatory excitability is still functioning. Coramine gives good results in asphyxia when injected intraspinally, since this avoids the cardiovascular depression (due to carotid sinus excitation) which occurs on intravenous administration.

MARION HORN (Chem. Abstr.).

The Influence of "Animal Hypnosis" on the Course of Narcosis in Cold-blooded Animals. Josef Stroder. [*Schmerz, Narkose-Anæsthesie*, **11**, 82–4 (1938).]

The time required for a frog to reach deep narcosis after injection of 25% urethan solution into the dorsal lymph-sac was reduced 50% by " hypnosis ".

MARION HORN (Chem. Abstr.).

The Mode of Action of Narcotics with Brief Action. I. Comparison of the Activity of Evipan and Eunarcon in Animals. Heinz W. Voigt. [*Schmerz, Narkose-Anæsthesie*, **11**, 44–50 (1938).]

The average lethal doses for mice of the various narcotics, injected as their Na salts, were as follows (in mgrm./kgrm.): evipan (I) 298, eunarcon (II) 176, phanodorn 302, numal 200 and noctal 104. The rates of elimination in rabbits were 0·8–0·9 and 0·65–0·7 mgrm./kgrm./min. for I and II respectively. II increased the Co-combining power of the blood when injected into rabbits. The greater toxicity and narcotic power of II, as compared with I, is attributed to the presence of Br in II.

II. Attempts to Localize the Point of Action of the Side Reactions. [*Ibid.*, 50–6.]

Repeated injection of narcotic doses of I in rabbits causes anatomical alterations in the brain ganglion cells, possibly related to the functional central nervous side effects of I. MARION HORN (Chem. Abstr.).

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The Action of 1, 2-*Benzopyrene on the Central Nervous System. Ivan Bertrand and Jean Cruner.* [*Bull. assoc. franç. étude cancer*, **27**, 697–705 (1938).]

Introduction of crystals of 1, 2-benzopyrene suspended in lanolin or paraffin oil into the brain of rabbits led sometimes to a glial reaction resembling hepatolenticular syndromes, but never to tumour production.

MARION HORN (Chem. Abstr.).

Influence of Mescaline (*Trimethoxy-*3*-Phenyl-Ethylamine*) *and of Dimethoxy-*β*-Phenylethylamine on Arterial Tension. A. Geesink and W. A. den Hartog Jager.* [*Arch. neerland. physiol.*, **24**, 79–82 (1939).]

Mescaline does not have any effect on arterial pressure. In the cat 100 mgrm. of dimethoxy-β-phenyl-ethylamine increases the arterial pressure 20%. The effect on the pressure is not the cause of the experimental catatonia.

FELIX SAUNDERS (Chem. Abstr.).

*The Effect of Acetyl-*β*-Methylcholine* (*Mecholyl*) *on the Gastric Secretion in Animals and in Man. James Flexner and Irving S. Wright.* [*Amer. J. Digestive Diseases Nutrition*, **5**, 736–9 (1939).]

In rabbits subcutaneous injections of 2 and 4 mgrm. mecholyl chloride caused no outpouring of mucinous alcoholic gastric secretion and no change in the free and total acid of the gastric contents; in cats no free HCl was present in the fasting gastric specimen and none appeared after injection of 2, 4 and 10 mgrm.; in man subcutaneous injection of 25 mgrm. caused no marked change in the character of the gastric secretions and a slight rise in flow of mucinous and alchoholic saliva; accidental swallowing of this neutralizes the rise in gastric acidity.

E. EAGLE (Chem. Abstr.).

*Human Autonomic Pharmacology. XVII. The Effect of Acetyl-*β*-Methylcholine Chloride on the Gall-bladder. Purcell G. Schube, Abraham Myerson and Ruth Lambert.* [*Amer. J. Digestive Diseases Nutrition*, **5**, 687–90 (1938).]

Acetyl-β-methylcholine (mecholyl) has practically no effect on the size and shape of the gall-bladder, but definitely inhibits the emptying of the gall-bladder after ingestion of a fat meal. EDWARD EAGLE (Chem. Abstr.).

*Autonomic Drugs and the Biliary System. II. Changes in Liver Secretion and their Relation to Alterations in Respiration, Arterial Pressure and Portal Pressure Produced by Acetyl-*β*-Methylcholine Chloride, Adrenaline and some Related Compounds. James Flexner and Irving S. Wright.* [*J. Pharmacol.*, **66**, 171–81 (1939).]

Acetyl-β-methylcholine, histamine, benzedrine and adrenaline do not directly affect the rate of bile flow; the changes in liver secretion noted are apparently related to sudden arterial blood-pressure changes. The response to all the effective drugs is diminished when they are injected into the portal vein.

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

Comparative Pressor Efficiency of Sympathomimetic Amines in the Normal State and in Decerebrate Shock. Cathrine A. Crismon and M. L. Tainter. [*J. Pharmacol.*, **66**, 146–70 (1939).]

The maintenance of pressor efficiency in the circulatory depression of decerebrated cats was studied with cobefrine, adrenaline, *m*-hydroxyephedrine, propadrine, 3, 4-dihydroxy-ephedrine, phenylethanolamine, epinine, *m*-hydroxynorephedrine, arterenol, tyramine, paredrine, benzedrine, neo-adrenaline. The efficiency of the compounds decreased in the order named. The last three were effective only in very large doses. In general, greater absolute and percentage responses to given doses

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of the amines were noted after destruction of the central vasomotor mechanisms; hence these amines do not produce their usual circulatory stimulation through central nervous mechanisms. L. E. GILSON (Chem. Abstr.).

"Anencephalic Blood Picture" or "Contra-striatal Blood Picture" Produced Pharmacologically. A Second Possibility of Topical Diagnosis of Brain from Blood Picture Alone. Akira Sato and Saburo Kuribayasi. [*Tôhoku J. Exptl. Med.*, **35**, 522–36 (1939) (*in English*).]

Rabbits were given subcutaneous injections of 210–400 mgrm. morphine-HCl per kgrm. of body-weight frequently enough to keep them in a paralysed state for about 5 days. The number of large and small peroxidase granules in the pseudo-eosinophilic leucocytes was increased 3 hours after the first injection and continued to increase for about 2 days, then declined in numbers but not always to normal values. Smaller amounts of morphine had almost no effect. Conclusions: The "peroxidase centres" discovered by Sato are located in the diencephalon or mesencephalon. Normally the telencephalon regulates the action of these centres in stimulating the production of peroxidase (which appears as granules in the pseudo-eosinophiles), but its regulatory effect may be inhibited by heavy doses of morphine. Increased numbers of peroxidase granules in human cases would be of diagnostic significance, indicating some injury to the telencephalon (cerebrum).
W. C. TOBIE (Chem. Abstr.).

Effect of Sulphanilamide on the Viability of Meningococci in Spinal Fluid. Erwin Neter. [*Proc. Soc. Exptl. Biol. Med.*, **39**, 84–6 (1938).]

Cerebro-spinal fluid from patients with meningococcal meningitis was mixed with sulphanilamide and incubated. Subcultures made from these mixtures were delayed or inhibited in growth in dependence on the concentration of sulphanilamide and the duration of the original incubation. B. C. P. A. (Chem. Abstr.).

Experimental Rabies, with Special Attention to the Vitamin C (Reducing Compound) of the Brain as well as that of the Aqueous Humour and of the Cerebro-spinal Fluid. Toziro Uno. [*Orient. J. Diseases Infants*, **21**, 79–80 (1937); *Chem. Zentr.*, **1**, 1819 (1938).]

Rabbits which were infected with five different strains of rabies showed in most cases no reduction in the vitamin C content of the brain and cerebro-spinal fluid. Thus vitamin C was retained in the most vital organs. A decrease, however, was frequently observed in the aqueous humour. M. G. MOORE (Chem. Abstr.).

Alcohol in the Cerebro-spinal Fluid. F. N. Riklin. [*Schweiz. Arch. Neurol. Psychiat.*, **41**, 173–92 (1938).]

Alcohol was given by mouth and its concentration determined at intervals of 10–20 minutes in the blood and the lumbar and cisternal fluid. The alcoholic concentration in cisternal fluid more closely parallels that in the blood than the concentration in the lumbar fluid. The first symptoms of intoxication (the tested persons were patients with general paralysis or schizophrenia) were observed after 43 minutes, when the concentration in the blood was 0·099%, in the cisternal fluid 0·085, and in the lumbar fluid 0·045; the symptoms disappeared after 160 minutes, when the respective concentrations were 0·080%, 0·099% and 0·095%.
B. C. P. A. (Chem. Abstr.).

Effect of Percaine on the Myelinated Fibres of the Sympathetic Nervous System. A. Donaggio. [*Boll. soc. ital. biol. sper.*, **13**, 241–3 (1938).]

Percaine (nupercaine) in rabbits causes modifications of the cervical sympathetic nerves, appropriate staining methods indicating a spiciform structure.
B. C. P. A. (Chem. Abstr.).

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The Pharmacology of Bismuth: Its Effect on the Reactions of the Vegetative Nervous System. I. A. Storozhev. [*Arch. sci. biol.*, No. 2, 29–42 (*in English*, 41–2) (1937).]

The intravenous injection of 0·1–1 mgrm. of Bi tartrate produces a noticeable increase in the excitability of the sympathetic nerve-endings of the nictitating membrane of the cat, and increases its reaction to adrenaline. Only a slight effect in diluted solution was observed on the surviving vessels of isolated organs. A depressor effect was observed on the isolated heart of warm-blooded animals, and the injection of 2–4 mgrm., or repeated small doses, produces a momentary stoppage of the heart which is not checked by preliminary atropinization. Diluted solutions have a depressing action on the isolated intestine. Mixed with calomel, Bi has a synergistic action on the secretory function of the small intestine.

S. A. KARJALA (Chem. Abstr.).

Absorption of Sulfonal in the Body Fluids. Ganassini. [*Boll. soc. ital. biol. sper.*, **14**, 234–5 (1939).]

Experiments *in vitro* showed that the solubility of sulfonal was increased by the presence of bile-salts and in conditions of alkalinity and temperature similar to those of intestinal juice. Administration of sulfonal to rabbits in pills and in keratin capsules indicated that sulfonal did not generally reach the intestinal juice intact. With dogs there was no difference in results of the two modes of introduction. HELEN LEE GRUEHL (Chem. Abstr.).

The Prevention by Vitamin B_1 of Paralysis Caused by Feeding Uliron. W. Engelhardt and H. Hullstrung. [*Klin. Wochschr.*, **18**, 774–5 (1939); *cf. C.A.*, **33**, 234[9].]

The paralysis that results in 10–15 days when pigeons are fed 1·5 grm. per kgrm. of body-weight of uliron (4-amino-4[1]-(dimethylsulfamyl) benzenesulfonanilide) is entirely prevented by parenteral administration of 10 mgrm. of vitamin B_1. Paralysis of short duration is healed by vitamin B_1, but if it is stopped after a few days the symptoms return, possibly as the effect of uliron, which is stored in the body. H. L. MASON (Chem. Abstr.).

The Concentration of Procaine in the Cerebro-spinal Fluid of the Human Being After Subarachnoid Injection. H. Koster, A. Shapiro and R. Warshaw. [*Arch. Surgery*, **39**, 97–103 (1939).]

The concentration of procaine at the site of injection, 3 mm. above the site of injection and at the cisterna magna, after the injection of 33 mgrm. of procaine-HCl in 7 c.c. of cerebro-spinal fluid parallels the findings previously described (*cf. Amer. J. Surgery*, **33**, 245–81 (1936); *C.A.*, **30**, 7608[5]; **33**, 237[6]), where 150 mgrm. of the anæsthetic dissolved in 3·5 c.c. of spinal fluid was injected. Procaine spreads rapidly away from the site of injection in a cephalad direction so that the concentration falls there and rises in the dorsal region. At no time does the concentration become as high as that found simultaneously in the lumbar region.

JOHN T. MYERS (Chem. Abstr.).

Caffeine and Cholinergic Nerves. H. Fredericq and Z. M. Bacq. [*Bull. acad. roy. med. Belg.*, **3**, 341–67 (1938).]

Caffeine (0·5%) increases the inotropic and chronotropic effects of vagal stimulation on the tortoise auricle. In higher concentrations (5%) it reduces these effects. These sensitizing and desensitizing effects are completely reversible. In the cat, caffeine increases the inhibiting action of excitation of vagal fibres. In the dog, the drug increases the vasodilator action of acetylcholine and the action of the *n. erigens*. Caffeine does not increase the response of frog skeletal muscle to

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maximum indirect stimulation and delays relaxation ; it has only a slight potentiating action in the cat. In the cat, the drug transforms an acetylcholine contraction of muscle into a contracture, and this latter is succeeded by non-responsiveness to nerve stimulation. B. C. P. A. (Chem. Abstr.).

Quinine in Myotonia Congenita : Its Antagonism to Prostigmine. Grace Briscoe. [*Lancet*, 1939, i, 1151–2.]

The effect of quinine, injected intravenously, on normal skeletal muscle (cat quadriceps *in situ*) is antagonistic to prostigmine and synergistic with curarine. The effect of quinine is produced both by raising the threshold on the motor end-plates and by direct action on the muscle-fibre. It is suggested that in myotonia congenita there is hyperexcitability to normal amounts of acetylcholine.
E. R. MAIN (Chem. Abstr.).

Changes in Spleen Size, Blood-pressure and Erythrocyte Count After the Administration of Benzedrine Sulphate in Dogs. J. L. Pinkston and J. O. Pinkston. [*J. Lab. Clin. Med.*, **24**, 1038–45 (1939).]

Benzedrine sulphate (1 mgrm. per kgrm. of body-weight administered intravenously to anæsthetized dogs) caused a contraction of the exposed spleen, accompanied by promptly occurring erthyrocytosis and a definite, transitory rise in blood-pressure. A second injection of the same amount caused either no change in the blood-pressure or a slight transitory fall. These changes were also obtained in adrenalectomized dogs, but did not occur in splenectomized animals with intact adrenals. HOWARD W. ROBINSON (Chem. Abstr.).

Some Effects of Stimulation of Sympathetic Nerves and Injection of Pressor Drugs in Adrenalectomized Cats. C. W. J. Armstrong, R. A. Cleghorn, J. L. A. Fowler and G. A. McVicar. [*J. Physiol.*, **96**, 146–63 (1939).]

In the terminal stage of adrenal insufficiency, splanchnic nerve stimulation or the intravenous injection of nicotine had but negligible pressor effects. Adrenaline, on the contrary, elicited a very marked rise in blood-pressure, and dilatation of the pupil and strong and sustained contraction of the nictitating membrane. The injection of adrenaline in cats in adrenal insufficiency caused visible constriction of splanchnic vessels, and an immediate decrease in the volume of the intestine as determined by the plethysmograph. Animals kept in good condition by cortical extract treatment after adrenalectomy showed responses to brief stimuli and to drugs which compare favourably with results obtained on acutely adrenalectomized controls. E. D. WALTER (Chem. Abstr.).

Ratio of Reduced Ascorbic Acid to Ascorbic Acid in the Clinic. Relation to the Autonomic Nervous System. G. Michetti, B. Bartoline and E. Roncallo. [*Minerva med.*, 1939, **1**, 549–53.]

Drugs which stimulated the sympathetic or inhibited the vagus (adrenaline, atropine) in general increase the ratio and the total elimination of ascorbic acid in the urine, while drugs which stimulated the vagus (pilocarpine, prostigmine) diminished the ratio and the elimination of ascorbic acid. The ratio of reduced/oxidized ascorbic acid was considered the expression of the oxidative-reductive processes of the tissues. H. L. GRUEHL (Chem. Abstr.).

Nicotinic Acid in the Treatment of Atypical Psychotic States. H. M. Cleckley, V. P. Sydenstricker and L. E. Geeslin. [*J. Amer. Med. Assoc.*, **112**, 2107–10 (1939).]

In 19 patients the usual criteria for clinical diagnosis of pellagra were largely absent. Hebetude grading into profound stupor may be the only sign of severe acute pellagra, and administration of nicotinic acid is justified as being the only method for diagnosis of such cases. F. P. GRIFFITHS (Chem. Abstr.).

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The Effect of Circulatory Drugs on Narcosis. E. Werle and J. Lentzen. [*Arch. exptl. Path. Pharmakol.*, **190**, 328–40 (1938).]

Callicrein deepens and prolongs the anæsthesia, having the maximum effect with evipan and the least effect when urethan is used. Acetylcholine or adenylic acid has no effect on evipan (I), urethan (II), or eunarcon (III) narcosis. Histamine deepens and prolongs evipan narcosis. With small doses of I (10–25 mgrm./kgrm.) the maximum effect is obtained. Frequent injections of histamine do not increase the effect. The result obtained from subcutaneous injection of 500 γ of histamine at the beginning of narcosis is less than that caused by 200 γ injected intravenously. Vasopressin causes marked deepening and prolongation of narcosis. One-half unit of vasopressin causes death in a rabbit given 25 mgrm./kgrm. of III. With small doses of III the prolongation of narcosis declines more strongly than the deepening. Large doses of III cause a more rapid decline of depth of narcosis. Vasopressin affects I narcosis in the same manner as it affects III narcosis. Several injections at long intervals strengthen the effect, particularly at the middle and end of narcosis. When II is used only vasopressin in large doses (1·5 units per animal) is without effect. Adrenaline and sympathol have an effect similar to that of vasopressin, the former being the more effective. Both have their greatest effect against small doses of I, and frequent injections cause a more prolonged effect.

EDWARD EAGLE (Chem. Abstr.).

The Effect of Benzedrine Sulphate on Metabolism and the Cardiovascular System in Man. Karl H. Beyer. [*J. Pharmacol.*, **66**, 318–25 (1939).]

Benzedrine sulphate, 30 mgrm. orally, increased the normal metabolic rate an average of 15·4% within the first 2½ hours. Return to normal required more than 9 but less than 24 hours. The per minute volume of inspired air was not significantly altered owing to compensatory increase in tidal volume whenever the rate of respiration was reduced. Buccal temperature rose about 1° F. Blood-pressure rose about 30% in about 1½ hours and then slowly returned to normal in somewhat less than 24 hours. Pulse-rate was unaffected or very slightly increased.

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

The Electrical Impedance of Muscle During the Action of Narcotics and Other Agents. Rita Guttman. [*J. Gen. Physiol.*, **22**, 567–91 (1939).]

Na, K and Mg had little effect on the electrical impedance of sartorius muscle of *Rana pipiens*; but Ba and Ca caused it to fall. Physiologically unbalanced salt solution did not seem to affect impedance. When a sugar solution was permitted to circulate past both sides of the muscle, half the effect on impedance was over in ¾ minute; this indicates that inorganic cations and organic narcotics reach cell surfaces quickly, whereas their action on the muscle is much slower. Penetration of sugar into the intercellular spaces of muscle follows the diffusion law. Saponin, $CHCl_3$, Na taurocholate, BuOH, AmOH, isoamyl carbamate, chloral hydrate and Na salicylate depress 1,000-cycle resistance of muscle when used in sufficient quantity. A detailed study of isoamyl carbamate showed that low concentrations increase, high concentrations decrease, resistance. Over a wide frequency range, the resistance of the fibre membranes first increases, then decreases; at sufficiently great narcotic concentration, membrane resistance may disappear entirely. Membrane capacity is only slightly affected.

C. H. RICHARDSON (Chem. Abstr.).

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