

## Part III.—Bibliography and Epitome.\*

## ACTAS LUSO-ESPAN. NEUR. PSIQUIAT.

VOL. VI.	1947.
Survey of Symptomatic and Organic Psychoses. <i>Fernandes, B.</i> . . . . .	251
Psychiatry in Seville. <i>Roig, J. D.</i> . . . . .	277
The Syndrome of Arnold-Chiari with Basilar Impression. <i>Furtado, D., et al.</i> . . . . .	298
Two Cases of Exogenous Psychosis in Encephalitis with C.S.F. Syndrome of General Paralysis Type. <i>Polonio, P.</i> . . . . .	318
VOL. VII.	1948.
Progress in Psychiatry. <i>Kleist, K.</i> . . . . .	1
Psychiatric Foundation in Seville and Nuevo Mundo. <i>Roig, J. D.</i> . . . . .	14
Intestinal Infections as Pathogenic Elements in Psychiatry. <i>Orrego, R. F.</i> . . . . .	36
"Tests" of Intelligence. <i>Guera, A., and Tin Lang, A. G.</i> . . . . .	45
Some Peculiarities of the Clinical Picture in "Delirium Tremens" and its Possible Pathogenic Interpretation. <i>Castilla del Pino, C.</i> . . . . .	53
Review of Neurosurgical Work during 1946-47. <i>Obrador, S., and Uriquiza, P.</i> . . . . .	63

## ACTA PSYCHIAT. NEUR.

VOL. XXIII.	1948.
On the Neuromuscular Transmission in Normal and Myasthenic Subjects. <i>Buchthal, F., and Engboek, L.</i> . . . . .	3
Herpes Zoster Following Operation for Facial Pain. <i>Epstein, L.</i> . . . . .	13
"Choked Disc" in Neurosyphilis. <i>Ethelberg, S., and Jensen, V. A.</i> . . . . .	49
Pathogenesis of Cranial Nerve Lesions, etc. <i>Godtfredsen, E.</i> . . . . .	69
Encephalographic Investigations of Psychiatric Patients. <i>Hangen, A., and Hore, J.</i> . . . . .	79
Chronic Meningitis. <i>Laine, V. A. I.</i> . . . . .	95
On the Tensor Fasciae Latae Reflex . . . . .	113
The Cephalin-Cholesterol Flocculation (of Hanger) in Psychiatry. <i>Speijer, N.</i> . . . . .	139
Need of a General Psychological Theory Common to Neuropsychiatry, etc. <i>Wagner Smitt, J.</i> . . . . .	145
Pseudoparalytic Acute Concussion Psychosis. <i>Yde, A., and Bolvig Hansen, E.</i> . . . . .	163

## MAY.

Surgical Treatment of Disturbances of the Cerebral Circulation with Special Reference to Vascular Sections. <i>Riechert, T.</i> . . . . .	81
Psychiatric Foundations in Seville and Nuevo Mundo. <i>Roig, J. D.</i> . . . . .	98
Hernias of Intervertebral Discs. <i>Espinosa, M. G.</i> . . . . .	111
Physiopathology of Schizophrenia. <i>Sagarra, J. S.</i> . . . . .	131

## ACTA NEUROL. PSYCHIAT. SUPPL.

NILS ANTONI NUMBER.	NO. XLVI.
Hereditary Transmission and Prognosis in Epilepsy. <i>Alström, C-H.</i> . . . . .	1
Treatment of Respiratory Paralysis of Poliomyelitis. <i>Bergman, R., and Huld, S.</i> . . . . .	6
An "Early Symptom" of Parkinson's Syndrome. <i>Billström, J.</i> . . . . .	14
Some Observations on Visual Hallucinations and Cerebral Metamorphopsia. <i>Russell Brain, W.</i> . . . . .	28

\* A number of extracts in this section are reproduced from *Chemical Abstracts and Psychological Abstracts*. To the Editors of these two Journals we extend our grateful thanks.

A Contribution to the Study of the Pathogenesis of Babinski's Sign and of the "Toe-spreading Sign." <i>Bringel, R.</i>	41
Supravital Analysis of Disorders in Cerebral Vascular Permeability. <i>Broman, T.</i>	58
Tumors of Peripheral Nerves, with a Special View to Neurogenous Sarcomas. <i>Busch, E., and Christensen, E.</i>	72
*Some Remarks on the Determination of Proteins in C.S.F. <i>Eeg-Olofsson, R., et al.</i>	94
Ergotamine Tartrate Orally in Horton's "Histaminic Cephalgia." <i>Ekbom, K. A.</i>	105
Nerve Fibre Interaction in the Roots. <i>Granit, R.</i>	114
Some Thoughts Concerning the Role of Psycho-analysis in the Treatment of Neuroses. <i>Harding, G.</i>	121
*Course of the Blood-Sugar Curve in Mentally Healthy Subjects and in Schizophrenics during Adrenalin Tolerance Tests for a Day and a Night. <i>Holmgren, H., and Wohlfahrt, S.</i>	132
Radiographic Changes Produced by Intracranial Arteriovenous Aneurysms. <i>Holmgren, B. S.</i>	145
Intraspinal Tumours in Children. <i>Krabbe, K. H.</i>	175
On Macula and its Reflexes in Optic Atrophy due to Retrobulbar Neuritis. <i>Larsson, S.</i>	187
Toxoplasmic Encephalitis in a Child Infected <i>in Utero.</i> <i>Magnusson, J. H.</i>	193
Altered Melody of Language as an Element of Aphasia. <i>Monrad-Krohn, G. H.</i>	204
Subacute Ataxia from Primary Cerebellar Atrophy. <i>Munch-Petersen, C. J.</i>	213
Cytological Examination of the C.S.F. by Means of the Phase Contrast Microscope. <i>Müller, R., and Von Döbeln, W.</i>	226
The Cell and Protein Content of about 12,000 Personally Examined C.S.F.'s and the Technique Employed. <i>v Neel, A.</i>	253
The Surgery of Pain. <i>Olivecrona, H.</i>	268
*Gynergen Abuse in Cases of Migraine. <i>Silverskiöld, B. P.</i>	281
Hereditary Congenital Spinocerebellar Ataxia Combined with Congenital Cataract and Oligophrenia. <i>Sjögren, T.</i>	286
The Mechanism of Laségue's Sign. <i>Sjöqvist, O.</i>	290
A Contribution to the Symptoms of Cerebral Angioma. <i>Sjövall, E.</i>	298
Neostigmine as a Diagnostic Test in Progressive Muscular Atrophy and Dystrophy. <i>Welander, L.</i>	329
Cerebral Angiography. <i>Wickbom, I.</i>	337
Some Neurological and Psychiatric Aspects of Acute and Chronic Poisoning by Carbon Dioxide. <i>Wohlfahrt, G., et al.</i>	353
Hemicrania—Migraine. <i>Öhnell, H.</i>	370
Stuttering and the Psyche. <i>Tamm, A.</i>	381

*Some Remarks on the Determination of Proteins in Cerebrospinal Fluid.*

(1) Izikowitz' method for fractionated protein determination has been used for analysis of total protein, globulin and albumin in pathological lumbar fluids. Mean errors found are 2.9 per cent. for total protein, 4.5 per cent. for globulin and 2.6 per cent. for albumin; these values being higher than the mean errors given by Izikowitz from his material of normal lumbar fluids. The relation between the titration errors and the concentration has been discussed, as well as other possible reasons for the errors observed.

(2) The small amount of protein present in lumbar fluid can be determined by ultra-violet light absorption measurements. The analysis can be performed on the filtrates instead of on the precipitates.

(3) As precipitant an equimolar mixture of mono- and dipotassium-phosphate is to be preferred to ammonium sulphate. The filtrates can be analyzed whether the determination is done by light absorption or by titration.

(4) Electrophoretical analysis is on account of the low protein content in cerebrospinal fluid not yet a method suitable for clinical investigations.

(5) Spiegel-Adolf and collaborators have assumed the presence of compounds containing nucleic acid, probably nucleoproteins, in pathological lumbar fluids. Abnormal globulin/albumin ratios could perhaps be explained by the presence of nucleic acid compounds.  
(Authors' abstr.)

*Course of the Blood-Sugar Curve in Mentally Healthy Subjects and in Schizophrenics during Adrenalin Tolerance Tests for a Day and a Night.*

A distinct difference in the capacity for overcoming the strain on the blood sugar and pulse rate induced by the authors' tolerance tests is clearly shown. As an attempt at explanation, it is tempting to adopt the term introduced by Cannon (1935), "homeostasis," especially as a number of leading physiologists and clinicians, such as Fulton (1938), MacFarland and Goldstein (1939) as well as White and Smithwick (1942), have endorsed his views. In the terminology of Cannon, it may be stated that the aim of the authors' tests was to bring about a temporary disturbance in the "homeostasis" (equilibrium of the body juices). Such a disturbance can apparently be more easily induced in some mentally diseased than in healthy subjects. Thus, the sympathetic nervous system which, according to Cannon, in all such conditions of danger to the organism, intervenes as a regulator of the internal equilibrium, must react more strongly and at an earlier stage in the mentally diseased. This is indicated by the higher blood-sugar percentage in the reported cases. (Authors' abstr.)

*Gynergen Abuse in Cases of Migraine.*

In the present paper seven cases are described in which a great increase in the frequency of the attacks followed on Gynergen (ergotamine tartrate) medication. Apart from an increase in the headaches, these patients suffered from constantly feeling sick, and in two cases cramps were also met with.

In all cases mentioned, the patients had been permitted to dose themselves with Gynergen—in six of them from two injections a week to two a day were taken; the seventh took large quantities of tablets.

In three of the cases the patients refused to give up their abuse of Gynergen for different reasons. Three gave it up entirely, and a very great improvement took place at once. In the seventh case the use of Gynergen was reduced, and the frequency of the attacks also lessened.

With increasing frequency of the attacks it will often be appropriate not to increase the dose of Gynergen (or allow the patient to give himself injections); in such cases it will probably be better to try the usual periodical medication with small doses of phenobarbital or Bellergal, and possibly a change of milieu, etc. (Author's abstr.)

NO. XLVII.

On the Concept of "Psychopathy" and the Treatment of so-called "Psychopaths." <i>Kinberg, O.</i> . . . . .	19
Treatment of Criminal Psychopaths. <i>Sturup, G. K.</i> . . . . .	21
Treatment of Criminal Psychopaths in the Detention Institution and Mental Hospital at Nykøbing. <i>Jacobsen, O.</i> . . . . .	41
On the Diagnosis of Psychopathy in Criminals. <i>Finn, L. J.</i> . . . . .	54
Kurt Schneider's Classification of Psychopaths. <i>Arnfred, A. H.</i> . . . . .	66
The Treatment of Psychopathic Criminals. <i>Kaila, M.</i> . . . . .	75
Biological Investigations in Endogenous Psychoses. <i>Gjessing, R.</i> . . . . .	93
*Preliminary Studies on a Possible Serum Toxicity in Schizophrenia. <i>Sjövall, T.</i> . . . . .	105
The Biology of Schizophrenia. <i>Goldkuhl, E. V. K.</i> . . . . .	118
*Investigations into the Metabolism of Androgen in Normal-haired and in Hypertrichotic Schizophrenic Women. <i>Pedersen, A. L.</i> . . . . .	130
On the Function of the Epiphysis. <i>Borell, U., and Örström, Å.</i> . . . . .	144
*Some Observations on the Hippuric Acid Test in Schizophrenia. <i>Köersner, P.</i> . . . . .	145
Investigations into the Rhodanide Excretion in Manic-depressive Patients. <i>Trolle, C.</i> . . . . .	156
Results of Iterated Adrenalin and Glucose Tolerance Tests, etc., in Certain Cases of Mental Disease. <i>Holmgren, H., and Wohlfahrt, S.</i> . . . . .	162
Some Observations on the Behaviour of the Blood Glutathione Particularly during Insulin Shock Therapy. <i>Ljangberg, E.</i> . . . . .	172
*A Study of the Lipid, Phosphorus and Sugar Content of the Blood in Chronic Alcoholism. <i>Jokirantio, E., and Helve, O.</i> . . . . .	179

*A Study of the Blood Bilirubin, Indican and Ketones, and of the Vitamin B <sub>1</sub> Content in the Urine in Chronic Alcoholism. <i>Jokivantio, E., and Okko, E.</i>	208
EEG Observations in 291 Abnormal and 101 Control Cases. <i>Frey, T. S.</i>	218
On Electrical and Biochemical Dysrhythmia. <i>Madsca, J.</i>	224
Petit Mals and Carbon Dioxide. <i>Tegbbjoerg, H. P. S., et al.</i>	234
Psychoses in Children. <i>Strömngren, E.</i>	245
Hyperkinetic Persevering Psychoses in Children. <i>Sturup, G. K., and Philipsen-Prahm, H.</i>	259
Children and War. <i>Donner, S. E.</i>	271
Sex Delinquencies in Puberty. <i>Schwalbe-Hausen, P. A.</i>	287
Concerning Play Therapy in Connection with Children's Neurosis, etc. <i>Harding, G.</i>	294
Play Therapy in Connection with Children's Neurosis. <i>Seitz, G.</i>	315
A Case of Schizophrenia in Early Childhood. <i>Waal, N.</i>	323
On the Technique of Frontal Lobotomy. <i>Broager, B.</i>	341
Psychiatric Views on the Problem of Leucotomy. <i>Wohlfahrt, S.</i>	348
Ten Years of Shock Treatment. <i>Dedichen, H. H.</i>	368
Psychological Tests and Personality Analysis Before and After Frontal Lobotomy. <i>Rylander, G.</i>	383
*Pneumoencephalographic Findings in Some Cases of Leucotomy. <i>Stjernberg, F.</i>	400
The Influences of Shock Treatment on the Activity in Hospitals for Mental Diseases. <i>Kalpa, I.</i>	416
ECT of Psychoses and Other Mental Diseases. <i>Anchersen, P.</i>	426
Emotional Disorders Affectible by Convulsion Therapy. <i>Egsgaard, J., et al.</i>	443
On the Correlation Between Clinical and EEG Observations in Patients Treated with ECT. <i>Honcke, P., and Zahle, V.</i>	451
Preliminary Report on 737 Psychotic Patients Treated with Insulin Coma. <i>Jaspersen, I., and Ravn, J.</i>	459
Investigations on Manic-depressive Psychosis. <i>Tómasson, H.</i>	472
On the Treatment of Neuro-lues with Special Regard to Hyperthermia Treatment. <i>Boas, J.</i>	481
Experiences of War Psychiatry from Finland's Second War, 1941-44. <i>Donner, S. E.</i>	495
Shock Therapy for Soldiers Suffering from Psycho-somatic Disturbances During the War. <i>Parland, O.</i>	511
Adaptation of a Psychological Plan to Psychopathological Phenomena. <i>Ljungberg, E.</i>	541
Suggestion for the Amendment of the Official Swedish Classification of Mental Disorders. <i>Essen-Möller, E., and Wohlfahrt, S.</i>	551
The Young "Patriots." <i>Frøshang, H.</i>	556
The Incidence of Mental Disorder Among the Norwegian Quislings. <i>Ødegard, Ø.</i>	568
The Problem of Encephalitis. <i>Sjöbring, H.</i>	574
Epileptic Fits and Mental Deficiency. <i>Marthinsen, R.</i>	585
The Neurasthenic Reaction. <i>Saarnio, L.</i>	592
Personality and a Certain Extreme Form of Religiosity. <i>Uddenberg, C. E.</i>	599
Inhibition of Aggressions. <i>Sandström, T.</i>	613
Ambulant Psychotherapy in States of Anxiety Neurosis. <i>Geert-Jorgensen, E.</i>	626
Hypnosis and Criminality. <i>Reistrup, H.</i>	638
Intelligence Evaluation in the Rat by Means of the Maze. <i>Smitt, J. W.</i>	649
War Neuroses Treated by Psychotherapy. <i>Reiter, P. J.</i>	653

*Preliminary Studies on a Possible Serum Toxicity in Schizophrenia.*

The positive result of the investigations may be said to be that, with the technique adopted, a significant difference in serum toxicity can be shown between a group of catatonic and hebephrenic patients on the one hand and a group of normal subjects on the other; and that this difference is presumably in some way connected with a hemolytic principle in the serum of both groups. The task with which the author is now confronted is—by a considerable increase of the existing material and a more thorough analysis thus facilitated—to endeavour to ascertain

whether this difference is really connected with the schizophrenic disease and not with secondary factors, such as medication, diet, essentially different modes of life, and so forth. (Author's abstr.)

*Investigations into the Metabolism of Androgen in Normal-haired and in Hypertrichotic Schizophrenic Women.*

Determinations have been made of the androgen excretion in a total of 64 women (between the ages of 20 and 60). 29 were normal-haired (10 schizophrenics + 19 with no mental or endocrine affections), and 35 were hypertrichotic (masculine-haired) (33 schizophrenics + 2 with other psychoses). The examinations were made according to a slightly modified form of the Zimmerman-Callow colorimetric method, and they were carried out daily on 24-hour urine for 3 or 4 weeks (a total of just over 1000 analyses).

The normal-haired women excreted on an average 4.2 mgm. "steron" in 24 hours; those who were under 41 years of age excreted on an average 5.3 mgm., while those over 40 excreted on an average 3.7 mgm. The hypertrichotic women excreted on an average 5.9 mgm. in 24 hours; those under 41 excreted 7.3 mgm., and those over 40 excreted 4.6 mgm. on an average.

The tendency established here to an increased excretion (output) of androgen in hypertrichotic women seemed to be present no matter whether the women suffered from schizophrenia or another form of psychosis, or were mentally normal. This tendency to increased androgen excretion could not be traced in schizophrenic women with normal growth of hair. Thus the androgen output as such seems hardly to play any pathogenetic part for the schizophrenia, but the question suggests itself whether such a part should not be attributed to other functions of the adrenal cortex. Further investigations will have to be made for an elucidation of this question.

The androgen output from the adrenal cortex seems generally to be of importance for the occurrence of hypertrichosis in women. (Author's abstr.)

*Some Observations on the Hippuric Acid Test in Schizophrenia.*

(1) 69 cases of schizophrenia and 28 normal cases have been tested with the intravenous hippuric acid test according to Quick, and a reduction in many catatonic cases, especially in the so-called active phase, has been established.

(2) If glycine is supplied in cases with reduced formation of hippuric acid, a pronounced or moderate increase is obtained in some cases, while in a smaller group no increase of the secretion is observed. (Author's abstr.)

*A Study of the Lipid, Phosphorus and Sugar Content of the Blood in Chronic Alcoholism. I.*

A study of 21 cases of chronic alcoholism has been made; 7 cases were classified as delirium tremens, 3 as hallucinosis alcoholica, and the remaining 11 as chronic alcoholism. The results may be summarized as follows:

A rise was found in most cases in the total cholesterol and, to a slighter extent, in the ester cholesterol of the plasma.

The total lipin phosphorus and the ether-soluble lipin-P values were observed to be slightly higher than the normal mean.

The ratio between phosphatides and total cholesterol was in almost all cases below the normal mean.

The following phosphorus fractions were studied with relation to whole blood, plasma, and erythrocytes: inorganic phosphate, pyrophosphate-P, hexosephosphate-P, diphosphoglyceric-acid-P, total acid-soluble, and total phosphorus. As regards inorganic phosphate, hexosephosphate-P, total acid-soluble and total phosphorus no divergences from the normal were observed, at least not to any appreciable extent.

The pyrophosphate-P values were lower than the normal mean in all cases except one in whole blood, and in all cases in the red cells.

The diphosphoglyceric-acid-P values were higher than the normal mean in whole blood in the total number of cases excepting one, and in the red cells in all cases.

The P-fraction values of the plasma varied within the normal limits.

It is reasonable to assume that the changes in the plasma lipids are due to unvaried and in most cases inadequate diet. The changes observed in the pyrophosphate-P and the diphosphoglyceric-acid-P may perhaps be ascribed to the same cause, although they may be influenced in part by disturbances in the ester synthesis in the red cells caused by chronic alcoholism.

The patient's blood sugar varied within the normal limits, except for one case of mild hyperglycemia. (Authors' abstr.)

*A Study of the Blood Bilirubin, Indican and Ketones, and of the Vitamin B<sub>1</sub> Content in the Urine in Chronic Alcoholism. II.*

Twenty-one chronic drunkards were examined ; of these 7 belonged to the group delirium tremens, 3 to that of hallucinosis alcoholica, and the remaining 11 to that of alcoholismus chronicus. The results may be summarized as follows :

The serum bilirubin was in no case higher than it can be in a healthy, abstaining person who has fasted for 22 to 36 hours.

A rise in the serum indican was observed in barely one-fifth of the cases. This does not support the opinion that indicanemia would be characteristic of some form of chronic alcoholism.

The ketones in the blood exceeded the highest control value in two-thirds of the cases, which indicates a disposition to ketonemia in chronic alcoholism.

In two-thirds of the cases vitamin B<sub>1</sub> was completely lacking, very low, or very near the lowest limit.

The variations from the normal observed in bilirubin, ketones, and vitamin B<sub>1</sub> seem to be chiefly due to the inadequate and unvaried diet which is characteristic of alcoholics. In addition, the low vitamin B<sub>1</sub> values are apparently influenced by gastro-intestinal disturbances of resorption and the greater consumption of vitamin B<sub>1</sub> caused by alcohol. (Authors' abstr.)

*Pneumoencephalographic Findings in Some Cases of Leucotomy.*

Thirteen leucotomized patients, showing no, or slow improvement after operation, were examined at least one year after operation, with pneumoencephalography. In all these cases signs of a slight to moderate cerebral atrophy were found, in conformity with results previously reported by Freeman and Watts. In four cases porencephalous cysts were observed. The degree of cerebral atrophy and the clinical results of the operation did not show any distinct connection. (Author's abstr.)

Stimulation of the Nucleoprotein-production in the Nerve Cells by Malononitride and its Effect on Psychic Functions in Mental Disorders. <i>Hyden, H., and Hantelius, H.</i> . . . . .	NO. XLVIII
A Psychiatric and Sociologic Study of a Series of Swedish Naval Conscripts. <i>Eklblad, M.</i> . . . . .	XLIX
Total Protein, Globulin and Albumin in Lumbar Fluid in Cryptogenic Epilepsy. <i>Eeg-olofsson, R.</i> . . . . .	L
Intracranial Acute Edema. <i>Donner, S. E.</i> . . . . .	LI

ACTA PSYCHIAT. NEUROL.

VOL. XXII.	1947.
On the Prognosis of Narcomania. <i>Ancherson, P.</i> . . . . .	153
The Course of the Manic Depressive Psychosis. <i>Brodwall, O.</i> . . . . .	195
Quantitative Fractional Protein Determination in the C.S.F. According to Lehmann's Modification of the Biuret Method. <i>Epstein, L.</i> . . . . .	211
Total Vasomotoric Sympathicoschisis. <i>Jacobsen, H. H.</i> . . . . .	243
Can Synchronous Units seen on Electromyography be an Artificial Product. <i>Lundervold, A.</i> . . . . .	249
The Prosodic Quality of Speech and its Disorders. <i>Monrad-Krohn, G. H.</i> . . . . .	255
On Thick and Thin Fibers in the Pyramidal Tract. <i>Verhaart, W. J. C.</i> . . . . .	271
The Protein Content of the C.S.F. in Spinal Subarachnoid Block. <i>Wagner-F. F.</i> . . . . .	283

## AM. IMAGO.

- VOL. IV. 1947.  
 To Further Freudian Psychoanalysis. *Schmideberg, W.* . . . . . 3

## AMER. J. MENT. DEF.

- VOL. LI. 1947.  
 Paraplegias of Hydrocephalics. *Yakovlev, P. I.* . . . . . 561  
 Phenylpyruvic Amentia. *Frazier, R. L.* . . . . . 577  
 Tuberculosis in the Mentally Deficient. *Butler, F. O.* . . . . . 593  
 Observations and Suggestions for Improving the Care of Mental Defectives.  
*Corcoran, M. E.* . . . . . 599  
 The H-T-P, a Projective Device. *Buck, J. N.* . . . . . 606  
 Analysis of Statistics on Individual Psychological Case Studies. *Munson, G.* 611  
 A Comparison of the Personality of Runaway Girls with a Control Group as  
 Expressed in Murray's TAT. *Gothberg, L. C.* . . . . . 627  
 Psychological Services to the Mentally Handicapped in the Chicago Public  
 Schools. *Huesman, M.* . . . . . 632  
 The Problem of Institutional Elopements. *Thorne, F. C.* . . . . . 637  
 The Feeble-minded Parent. *Mickelson, P.* . . . . . 644  
 Some Observations on the High Grade Unstable Mental Defective. *Paddle,*  
*K. C. L.* . . . . . 654  
 Some Problems and Methods in the Education of Mentally Retarded Children.  
*Hegge, T. G.* . . . . . 660  
 The Curriculum of a Prolonged Pre-academic Program. *Patterson, R. M.* . . 666  
 The School Curriculum of the Prolonged Pre-academic Program at the  
 Wayne County Training School. *Weiner, B. B.* . . . . . 674  
 A Plan for the Academic Education of the Mentally Retarded Children.  
*Traill, H. W., and Douglas, M. E.* . . . . . 680  
 The Teachers' College, Columbia, Pre-service Program. *Kelly, E. M.* . . . 686  
 The Mansfield Pre-service and In-service Program. *Turner, E. J.* . . . . 691  
 The Detroit In-service Training. *Engel, A. M.* . . . . . 696  
 The New York City In-service Training Program. *Rosenzweig, L. E.* . . . . 701  
 Our Failures. *MacIntyre, E. M., and Sheck, R. V.* . . . . . 707  
 A Brief Analysis of Recent Statistics on Mental Deficiency. *Whitney, E. A.,*  
*and Caron, R. E.* . . . . . 713  
 Prevention of Mental Deficiency. *Neuer, H.* . . . . . 721  
 Annual Registration of the Entire Population. *Polloch, H. M.* . . . . . 731  
 The Legal Settlement of Mental Defectives. *Hackbusch, F.* . . . . . 735  
 Research and Society. *Cameron, D. E.* . . . . . 738  
 Sterilization in a California School for the Mentally Deficient. *Butler, F. O.,*  
*and Gamble, C. J.* . . . . . 745  
 Mentally Deficient Boys go Camping. *Porter, R. M.* . . . . . 748  
 The Young Retardate Outside his Home Community. *Hungerford, R. H.* . . 758  
 Care for the Mentally Deficient in Switzerland. *Mindlin, D. F.* . . . . . 766

- VOL. LII. 1947.  
 Pneumoencephalography in Mentally Deficient Children. *Levinson, A.* . . . . 1  
 EEG Characteristics of Institutionalized Epileptics. *Belinson, L., and*  
*Cowie, W. S.* . . . . . 9  
 A Personality Study of Institutionalized Epileptics. *Landisberg, S.* . . . . 16  
 A Rorschach Study of Psychopathic Delinquency. *Bowlus, D. E., and*  
*Shotwell, A. M.* . . . . . 23  
 Mental Deficiency as a Symptom of Personality Disturbance. *Sloan, W.* . . . 31  
 A Study of Mental Deficiency by the Rorschach Technique. *Jolles, I.* . . . . 37  
 Where and Whither in Mental Deficiency. *Stevenson, G. S.* . . . . . 43  
 The Relationship of the National Mental Health Act to the Problems of  
 Mental Deficiency. *Ross, M.* . . . . . 48  
 Defective Delinquents and the Problem of Personality Deviation in Relation  
 to Crime. *Smith, G. B.* . . . . . 54  
 The Female Defective Delinquent. *Ireland, E. C.* . . . . . 63

- The Administrator's Responsibility in the Education of the Mentally Handicapped Child. *Stevens, H. A.* . . . . . 71  
 A Program for Reducing Maladjustment in an Institution for the Mentally Deficient. *Harris, L. A., and Kinney, C.* . . . . . 78  
 Family Care of Mental Defectives in Scotland. *Pollock, H. W.* . . . . . 85  
 Case Work with Parents of Mentally Deficient Children. *Wardell, W.* . . . . . 91

## AM. J. ORTHOPSYCHIAT.

- VOL. XVIII. 1948.  
 A Therapeutic Milieu. *Bethelheim, B., and Sylvester, E.* . . . . . 191  
 Personality Adjustment through Social Action. *Wittenberg, R. M.* . . . . . 207  
 Social Psychiatry and Personal Service in a Social Agency. *Reynolds, B.* . . . . . 222  
 The Unmarried Father. *Reider, N.* . . . . . 230  
 High School Mental Hygiene Survey. *Hertzman, J.* . . . . . 238  
 Adoptive Parents in a Child Guidance Clinic. *Judkins, B.* . . . . . 257  
 Rorschach Intelligence Indicators in Neurotics. *Wishner, J.* . . . . . 265  
 Rorschach Study of Prejudiced Personality. *Reichard, S.* . . . . . 280  
 Rorschach Testing in Pre-literate Cultures. *Lantz, H.* . . . . . 287  
 A Validation Test of the Rorschach Movement Interpretations. *Lane, B. M.* . . . . . 292  
 The Concept of the Psychopath. *Cason, H.* . . . . . 297  
 The Pseudo-psychotic Nucleus in the Behavior Disorders. *Gardner, G. E.* . . . . . 309  
 Childhood Mental Disease in America. *Rubenstein, E. A.* . . . . . 314  
 Aspects of Psychiatric Clinic Practice. *Ginsburg, S. W., and Arrington, W.* . . . . . 322  
 Effects of Combat on a Delinquent Boy. *Miller, M. L.* . . . . . 334  
 A Study of Preschool Children. *Conrad, S. J.* . . . . . 340  
 Psychosomatic Significance of Body Orifices. *Vollmer, H.* . . . . . 345  
 Sex Order of Birth and Personality. *Montagu, M. F. A.* . . . . . 351  
 Menarche, Periodicity, Menopause of Feebleminded Women. *Danenhower, H. S.* . . . . . 354  
 Scoring Qualitative Responses on the Wechsler-Bellevue Scale. *Spache, G.* . . . . . 360

## AM. J. PHYSIOL.

- VOL. CLI. 1947.  
 Effect of Thymectomy, Hyperthyroidism and Hypothyroidism on Neuromuscular Atrophy and Regeneration. *Diaz-Guerrevo, R., et al.* . . . . . 91  
 Effects of DFP on Acetylcholine Stimulation of the Frog Rectus Abdominis Muscle. *Finerty, J. C.* . . . . . 107  
 Effect of Partial and Complete Destruction of the Tactile Cerebral Cortex on Correct Conditioned Differential Foreleg Responses from Cutaneous Stimulation. *Allen, W. F.* . . . . . 325  
 Effect of Convulsant and Anticonvulsant Agents on Acetylcholine Metabolism, etc. *Torda, C., and Wolff, H. G.* . . . . . 345  
 Protection of the Cerebral Circulation by the C.S.F. under the Influence of Radial Acceleration. *Rushmer, R. F., et al.* . . . . . 355  
 Reduced Carbohydrate Intake after Fat Feeding in Normal Rats and Rats with Hypothalamic Hyperphagia. *Lundbaek, K., and Stevenson, J. A. F.* . . . . . 530  
 Increased Tolerance to Severe Anoxia on Carbon Dioxide Administration. *Kline, R. F.* . . . . . 538  
 Types of Afferent Fibers in the Phrenic Nerve. *Kohrman, R. M., et al.* . . . . . 547  
 Variations in the Effect of Anoxia on Performance. *Green, D. M.* . . . . . 588

## AM. J. PSYCHIAT.

- VOL. CIV. JANUARY, 1948.  
 A Personality Study of One Hundred Unselected Patients Attending a Gastro-intestinal Clinic. *Klein, H. R.* . . . . . 433  
 Clinical Evaluation of the F Scale on the Minnesota Personality Inventory. *Schneck, J. W.* . . . . . 440  
 The Double-Spike Pattern on the Minnesota Multiphasic Personality Inventory. *Schneck, J. M.* . . . . . 443  
 Psychological Observations of Prisoners of War. *Arntzen, F. I.* . . . . . 446  
 Review of Psychiatric Progress, 1947 . . . . . 448

## FEBRUARY.

*Prefrontal Lobectomy. <i>Peyton, W. T., et al.</i> . . . . .	513
The Struggle For and Against the Individual in Psychotherapy. <i>Zilboorg, G.</i>	524
Delusional and Hallucinatory Experiences in Children. <i>Despert, J. L.</i> . . . .	528
Our Social Heritage. <i>Treadway, W. L.</i> . . . . .	538
The Future of Psychiatry. <i>Chisholm, B.</i> . . . . .	543
*Intelligence and Emotional Stability. <i>Dewan, J. G.</i> . . . . .	548
New Trends in Hospital Design. <i>Haun, P., and Lebensohn, Z. M.</i> . . . . .	555
Self-Inflicted Gun-shot Wounds. <i>Clark, H. E., and Campbell, J. D.</i> . . . .	565
*Comparative Action of Anticonvulsant Drugs. <i>Thorne, F. C.</i> . . . . .	570
Psychiatry in the District of Columbia, 1948. <i>Block, S.</i> . . . . .	579

*Prefrontal Lobectomy (Excision of the Anterior Areas of the Cerebrum). A New Form of Psychosurgery.*

A new type of psychosurgical technique, namely, prefrontal lobectomy, is described. The advantages of this procedure over prefrontal lobotomy are presented.

The results of prefrontal lobectomy are reported in 14 patients with 85.7 per cent. showing moderate to marked improvement. This series of cases consisted predominantly of chronic schizophrenia, 11 of the cases being classified as dementia praecox. Moderate to marked improvement followed lobectomy in 82.6 per cent. of the latter group of patients. In general, the results for this new psychosurgical procedure compare well with the published reports for prefrontal lobotomy.

(Authors' abstr.)

*Intelligence and Emotional Stability.*

1. The clinical findings in the examination of over 30,000 men gave a very definitely higher incidence of emotional instability in the men diagnosed mentally retarded than in those diagnosed non-retarded.

2. Down-grading for instability decreased as "M" scores advanced.

3. The rate of decrease in down-grading diminished appreciably in the range of average and superior intelligence.

4. The evidence suggests that the rate of incidence of psychoneurosis and other patterns of emotional instability declines as the degree of intelligence advances, although this becomes much less evident in the upper ranges of intelligence.

5. Possible explanations and interpretations have been discussed.

(Author's abstr.)

*Comparative Action of Anticonvulsant Drugs.*

A comparative study has been made in a group of institutionalized epileptic mental defectives of the anti-convulsant action of dilantin, tridione, and several barbiturate derivatives. The results indicate that dilantin has the most marked anticonvulsant action in most cases, but that maximum action is only achieved with toxic doses in severe cases. Tridione has definite anticonvulsant action against *grand mal* seizures and is particularly effective in combination with dilantin. Tridione has been successfully used intravenously to terminate status epilepticus and is tolerated in high concentration. Barbiturate derivatives are occasionally effective alone in individual cases but are most effectively used with dilantin.

(Author's abstr.)

## MARCH.

The Limitations of Psychiatry. <i>Gregg, A.</i> . . . . .	513
*The Myth of the Psychopathic Personality. <i>Karpman, B.</i> . . . . .	523
The Neuropsychiatrist and the Civil Law. <i>Kozol, H. L.</i> . . . . .	535
New Facts on Prognosis in Mental Disease. <i>Israel, R. H., and Johnson, N. A.</i> . . . . .	540
What Happens to First Admissions to State Hospitals. <i>Meyer, H., and Preston, G. H.</i> . . . . .	546
Psychiatric Treatment of the Veteran Outpatient. <i>Hughes, J., and McLaughlin, B. E.</i> . . . . .	549

Psychiatry and Social Work in Cooperation. <i>Allen, F. H.</i>	554
Training and Certification for the Specialty of Child Psychiatry. <i>Gardner, G. E.</i>	558
Problems of Social Psychiatry in Palestine. <i>Blumenthal, K.</i>	563
Outpatient Treatment of Alcoholics. <i>Wexberg, L. E.</i>	569
Indications for Shock Treatment in Psychiatry. <i>Braatoy, T.</i>	573
Acute Alcoholism in Mental Patients Treated with Insulin. <i>Tillim, S. J.</i>	576

*The Myth of Psychopathic Personality.*

(1) The concept of psychopathic personality is at present in a transitional state. While most clinical workers in the field still move at the superficial descriptive level, some attempt for delimitation is already being made, though it is still mainly at the descriptive level; while a few, as yet in great minority, are attempting to interpret the reaction in terms of underlying dynamics emphasizing motivation rather than behaviour.

(2) One of the greatest difficulties in the whole situation is that the majority of writers do not offer adequately worked up case material, which therefore precludes a dynamic formulation.

(3) Some workers appear to get away from the previously held concept that the condition is hereditary and constitutional. Instead, the emphasis on psychogenesis appears to be gaining ground. Unfortunately, this remains for the most a statement without casuistic material to support it.

(4) Equally, the grouping is being more and more narrowed, and some workers exclude from the consideration of psychopathy the psychotic reaction types, even if and when they have an undoubted antisocial and delinquent character. But the great variety of hysterical and neurotic conditions are still grouped with psychopathy, when these conditions include some definite antisocial and delinquent behaviour.

(5) On the basis of carefully studied material and due consideration being given to dynamics of the situation, the following reorientation is offered, namely:

(a) That what is commonly diagnosed now as psychopathic personality should be divided into main groups; the symptomatic or secondary psychopathy, and primary, essential, or idiopathic psychopathy.

(b) Under the heading of symptomatic or secondary psychopathy are to be included those cases of psychoses and neuroses that have a strong antisocial or delinquent aspect, and the case in question should be put into its proper clinical heading (psychosis or neurosis as the case may be). Thus a case may be diagnosed as manic-depressive psychosis, hypomania, antisocial delinquent trends. The term psychopathic, therefore, may be completely eliminated from this group of cases as being only confusing.

(c) The clinical worker who puts emphasis on motivation rather than behaviour will have no difficulty in uncovering pointed psychogenesis in all these cases. By the same token they are amenable to psychotherapeutic treatment and therefore offer a far more hopeful outlook than is currently given to psychopathic cases.

(d) In the remaining small group are to be put those individuals who do not fit at all into any of the cardinal reaction types; above all they seem to lack any psychogenetic aspect even when definite effort has been made to elicit the same. They form a disease of its own designated as anethopathy, a specific mental disease, characterized by a special personality organization having in particular a virtual absence of any redeeming social reaction; conscience, guilt, binding and generous emotions, etc., while purely egoistic, uninhibited instinctive trends are predominant. They are as close to the constitutional as can be found. The term psychopathic personality may be omitted from these cases too.

(6) With the larger number of psychopathic personality cases being properly put under the respective headings of the cardinal reaction types, and the balance being put in a new group designated anethopathy, nothing remains of the original concept of psychopathic personality, for which reason it should be completely deleted from psychiatric nosology. The term may be left entirely for lay use.

(7) A number of cases have been cited demonstrating the various types of psychopathic personality with emphasis on the dynamics of the situation.

(Author's abstr.)

## APRIL.

- \*The Ceiling Effect of Glutamic Acid upon Intelligence in Children and Adolescents. *Zimmerman, F. T., et al.* . . . . . 593
- \*Clinical and EEG Observations Concerning the Effect of Tridione in Epileptic Patients. *Davidoff, E.* . . . . . 600
- \*The Use of Ergotamine Compounds in the Treatment of Acute Simple Anxiety States. *Kelley, D. McG.* . . . . . 608
- Preliminary Report of an Experience in the Group Psychotherapy of Schizophrenics. *Abrahams, J.* . . . . . 613
- Group Psychotherapy in Veterans' Administration Hospitals. *Kline, N. S., and Dreyfus, A.* . . . . . 618
- Group Psychotherapy with Patients' Relatives. *Ross, W. D.* . . . . . 623
- Art in Psychotherapy. *Bieber, I., and Herkeimer, J. K.* . . . . . 627
- Bibliotherapy as an Adjuvant in Psychotherapy. *Gottschalk, L. A.* . . . . . 632
- Patient-Physician Relationship in Psychotherapy. *Coleman, J. V.* . . . . . 638
- The Techniques of the Initial Interview and Methods of Teaching Them. *Powdermaker, F.* . . . . . 642
- An Exploratory Study of the Usefulness of a Battery of Psychological Tests with Nursery School Children. *Schafer, S., and Leitch, M.* . . . . . 647
- The Concept of Psychogenesis. *Reid, J. R.* . . . . . 653

*The Ceiling Effect of Glutamic Acid upon Intelligence in Children and Adolescents.*

1. Glutamic acid accelerates mental functioning in human subjects.
2. The acceleration is general and is not restricted to segments of the intelligence and personality of the individual.
3. The greatest improvement in intelligence and performance test scores occurs within the initial 6 months of treatment, after which the acceleration is diminished and appears to be approaching a ceiling after one year of therapy.

(Authors' abstr.)

*Clinical and Electroencephalographic Observations Concerning the Effect of Tridione in Epileptic Patients.*

1. Clinically, tridione appears to be of most value in the treatment of the epilepsies associated with cerebral palsies of the milder type. *Petit mal* types responded next best. Tridione appears to be of slightly less value in the treatment of psychomotor epilepsies.
2. Improvement in the EEG, following the administration of tridione, did not necessarily coincide with clinical benefit. *Petit mal* cases showed the best EEG response to tridione. The psychomotor group also manifested EEG response which was somewhat better than that of the spastic group.
3. *Grand mal* types and myoclonias showed consistently the least clinical and electroencephalographical improvement and the greatest number of toxic effects.
4. Severe untoward reactions occurred in 21 per cent. of the cases. Except in 2 cases where severe toxic manifestations were present, clinical improvement did not ensue. Toxic effects were not as evident on the EEG tracings as they were clinically.
5. These toxic effects can be minimized by careful observation in a clinic or hospital and by judicious adjustment of the dosage. However, about 10 or 13 per cent. of the patients did not tolerate the drug well, because of either toxic effect or idiosyncrasy, and in these the drug had to be discontinued permanently.
6. In patients suffering from cerebral palsies, tridione exercised a favorable influence not only on the conduct but also on behavior and coordination, particularly in children.

Tridione apparently produced a better effect on cerebral palsies, *petit mal*, and psychomotor seizures than did the anticonvulsant medications which the patients had received previously. (Author's abstr.)

*The Use of Ergotamine Compounds in the Treatment of Acute Simple Anxiety States.*

A report is made on 59 cases of acute anxiety treated with ergotamine tartrate, 37 cases treated with ergonovine maleate and 36 cases treated as controls with

calcium lactate. Results are given therapeutically and it is indicated that, while these drugs do act as antisymphathetic compounds and to some degree ameliorate symptoms of jitteriness and tension, their potential hazard and the routine required for their administration is sufficiently complex to limit their use to special instances. (Author's abstr.)

## AM. J. PSYCHOL.

VOL. LX.	1947.
Suggestions Toward a Psychological History of the Hominids. <i>Beniley, M.</i>	479
"Facial Vision," Perception of Objects by the Deaf-blind. <i>Worchel, P., and Dallenbach, K. M.</i>	502
On the Firmness of Soft Materials. <i>Harper, R.</i>	554
Conditioned Responses in Curarized Monkeys. <i>Girden, E.</i>	571
Semantic Changes. <i>Thorndike, E. L.</i>	588
The Effect of Boundary Strength on Interference and Retention. <i>Werner, H.</i>	598
Inter-trial Responses as "Rehearsal." <i>Coppock, H., and Mowrer, O. H.</i>	608
The Relation of Distance to the Apparent Size of Figural After-effects. <i>Prentice, W. C. H.</i>	617
An Electronic Chronograph for Measurement of Voice Reaction-time. <i>Roush, R. G., and Hamburger, F., jun.</i>	624
A Note on the Estimation of the Components of Variation in a Two-way Table. <i>Brožek, J., and Alexander, H.</i>	629

## AM. PRACTIT.

VOL. II.	MARCH, 1948.
Certain Reactions Following Spinal Puncture. <i>Emory, M. L.</i>	451
Treatment of the Migraine Attack. <i>Friedman, A. P., and Brenner, C.</i>	467
Neurosyphilis. <i>Kampmeier, R. H.</i>	523

## ANN. MÉDICO-PSYCHOL.

VOL. CVI (1).	FEBRUARY, 1948.
The Problem of Hysterical Anaesthesia and Biological Reality. <i>Boisseau, J., and Gastaut, H.</i>	113
Reeducation of Character Training. <i>Fau, R., and Memin, C.</i>	146

## MARCH.

Pierre Janet and His Original Work on Hypnotism, Suggestion and Hysteria. <i>Quercy, P. and D.</i>	257
Verbal Formulation of Thought in Psychopathic States. <i>Burstin, J.</i>	281

## APRIL.

The Instinct of Ownership. <i>Ley, A., and Wauthier, M-L.</i>	385
The Expression of Thoughts in Psychopathic States. <i>Burstin, J.</i>	415

## MAY.

Prefrontal Lobotomy. <i>Wertheimer, P.</i>	529
Verbal Expression in Psychopathic States. <i>Burstin, J.</i>	548
The Psychological Novel. <i>Charpentier, R.</i>	561

## VOL. CVI (2).

## JUNE.

Normal and Abnormal Men in Psychiatry and Characterology. <i>Boren, W.</i>	1
Psychoses and Results of War. <i>Ey, H., and Cornevin, J.</i>	9
Sakel's Treatment in Schizophrenia. <i>Cossa, P., et al.</i>	24

## ARCH. INT. PHYSIOL.

VOL. LII.	1942.
Contributions to the Study of the General Physiology of the Nerve Centers. I, II and III. <i>Bremer, F., et al.</i>	I, 153, 215
Electrical Interactions Between Two Contiguous Nerve Cells. <i>Arranitate, A.</i>	381

VOL. LIII.	1943.
Neuromuscular Transmission. <i>Coppée, G.</i>	327
VOL. LIV.	1944.
Variations in Local Excitability and Subliminal and Liminal Autorhythmic Activity in the Isolated Axone of <i>Sepia</i> . <i>Arranitake, A.</i>	508

## ARCH. NEUR. PSYCHIAT.

VOL. LIX.	JANUARY, 1948.
Growth and Development of the Cerebral Cortical Pattern in Man. <i>Turner, O. A.</i>	1
*Relation of Personality Problems to Onset and Progress of Multiple Sclerosis. <i>Langworthy, O. R.</i>	13
Hemoconcentration after Electrically Induced Convulsions in Man. <i>Allschule, M. D., et al.</i>	29
*Spatial Organization of Visual Perception Following Injury to the Brain. <i>Bender, M. B., and Tenber, H. L.</i>	39
One Hundred Years of Progress in Neurology, Psychiatry and Neurosurgery. <i>Cobb, S.</i>	63

*Relation of Personality Problems to Onset and Progress of Multiple Sclerosis.*

A number of patients with multiple sclerosis show signs of conversion hysteria either before or after the development of signs of organic disease. The 4 women whose cases are described in detail showed evidence of emotional immaturity at a preadolescent level. They were caught in an entangling neurotic relationship with the mother. There was a tendency to relate themselves to others in a passive way, which led to resentment and hostility. In choosing a husband, they sought a passive person whom they thought intellectually and socially inferior to themselves, in an apparent attempt to assume a dominating role. Sexual relations were never satisfactory. They showed the appearance or accentuation of organic symptoms at a time when the husband became more self assertive and capable.

These patients showed pronounced evidences of vasomotor instability in the extremities. The question arises whether vascular changes in the brain related to the neurotic difficulties could lead, in turn, to organic changes. Since the cause of multiple sclerosis has not been established, it can be thought of as a syndrome, and the data presented here do not necessarily apply in all cases. Psychotherapy offers as hopeful an approach as any other treatment which is now available, and may present one method of understanding these patients better.

(Author's abstr.)

*Spatial Organization of Visual Perception Following Injury to the Brain.*

Disorders in the spatial organization of visual perceptions were found in 12 patients with cerebral lesions in the parietal and occipital regions. In some of these patients (selected from a large series of patients with wounds of the brain incurred in battle) the disturbance was limited to homonymous quadrants of the visual fields and was most pronounced in circumscribed sectors of these quadrants. In these areas the patients were unable to localize (visually) any stationary (and sometimes moving) object in all three dimensions of space. Two patients showed such errors in localization, predominantly in the sagittal plane. Both showed varying amounts of teleopsia. With the teleopsia, there were concomitant changes in apparent size and brightness. The phenomena appeared with binocular vision as well as with monocular vision with either eye.

Direction and extent of apparent displacements of objects perceived in the involved regions of the field of vision were consistent and characteristic for each patient. On the other hand, the disturbances did not assume an all or none character. The apparent displacements were increased by prolongation of exposure, and they were minimized or abolished on tachistoscopic study. Under certain conditions a complete "reversal" of the abnormal depth effect could be observed, so that persistent teleopsia changed momentarily into "pelopsia" (or the illusion of abnormal nearness).

In order to get at the functional correlates of these alterations in space perception, a methodical sampling of perceptual and/or motor performances was undertaken. As a result of these tests, it is concluded that the alterations were not produced by a general reduction in "cognitive ability" or any similarly defined intellectual functions, but by systematic changes in function which had taken place in the most implicated quadrants or half-fields. The implicated quadrants and half-fields seemed "weakened" as compared with the less affected regions of the same field of vision or with corresponding areas in the fields of normal controls. It is pointed out that none of the usually accepted theories of space perception can explain why such generalized "weakening" should be associated with an apparent dropping back of perceived objects in space. Evidently, the patients behaved as though the subjective coordinates of their visual space had been permanently altered. It is submitted that such a change can be best described, even though not explained, in terms of a field theory of visual perception.

(Authors' abstr.)

#### FEBRUARY.

- Schistosomiasis of the C.N.S. *Kane, C. A., and Mort, H.* . . . . . 141  
 Insulin Subshock Treatment of Psychoses and Psychoneuroses. *Sullivan, D. J.* . . . . . 184  
 Etiology of Optochiasmatic Arachnoiditis. *Bruetsch, W. L.* . . . . . 215

#### BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY.

- Problems of Post-traumatic Epilepsy. *Walker, E. A., et al.* . . . . . 254  
 Neurologic Effects of Blast Injury. *Hamlin, H.* . . . . . 258  
 Chronic Rheumatic Encephalitis. *Benda, C. E.* . . . . . 262

#### PHILADELPHIA PSYCHIATRIC SOCIETY.

- Objective Tinnitus Aurium. *Pearson, M., and Barnes, L. J.* . . . . . 265  
 Psychiatric Diagnosis in Military Service. *Brody, M. W.* . . . . . 267  
 Short Term Hospitalization of the Alcoholic Patient. *Davis, C. N.* . . . . . 269

#### ARCH. PSICOL. NEUROL. PSICHIAT.

- VOL. VII. 1946.  
 Psychology and Physiology. *Morselli, G. E.* . . . . . 341  
 Problems of Psychological and Educational Age. *Canestrelli, L.* . . . . . 348  
 Convulsive Tic Syndrome with Coprolalia and Impulsive Tendency to Bile Following Head Injury or Epidemic Encephalitis. *Catalano, A.* . . . . . 367  
 Mental Hygiene in Italy. *Medea, E.* . . . . . 379
- VOL. VIII. 1947.  
 Applied Psychology in the Educational and Industrial Field. *Ponzo, M.* . . . . . 83  
 Functions of Attention in the Performance of a Uniform Task of Selection. *Musatti, C. L.* . . . . . 137  
 On the Genesis of Hallucinations. *Poli, C.* . . . . . 152  
 Apraxia and Construction of Space. *Mantelli, F.* . . . . . 172
- VOL. IX. 1948.  
 Direction and Research in Social Psychology. *Bonaventura, E.* . . . . . 121  
 Angiomatosis of the Central Nervous System. II. *Fracasso, L.* . . . . . 138  
 The Concept of the Hysterical Character. II. *Luzzatto, A.* . . . . . 183

#### ARQ. NEURO-PSIQUIAT.

- VOL. VI. MARCH, 1948.  
 EEG of Intracranial Tumours. *Pupo, P. P., et al.* . . . . . I  
 Psychogenesis and Expert Determination of "Harmfulness." *Carrilho, H.* . . . . . 25  
 Sciatica from Hernia of an Intervertebral Disc. *Thurel, R.* . . . . . 47

## BRAIN.

VOL. LXX.	1947.
Effects of Bladder Distension on Autonomic Mechanism after Spinal Cord Injuries. <i>Guttmann, L., and Whitteridge, D.</i>	361
Dysprosody or Altered "Melody of Language." <i>Monrad-Krohn, G. H.</i>	405
Early Traumatic Epilepsy. <i>Whitty, C. W. M.</i>	416
Hallucinations of Remembered Scenes as an Epileptic Aura. <i>Robinson, P. K., and Watt, A. C.</i>	440
Facial Apraxia and Apraxic Dysarthria. <i>Nathan, P. W.</i>	449
A Partial Form of Familial Myoclonus. <i>Loewen, M. A-V., and Lauwers, H.</i>	479
The Mother-child Incompatibility Problem in Relation to the Nervous Sequelae of Haemolytic Disease of the Newborn. <i>Cappell, D. F.</i>	486
A New Method for Investigating the Nervous System. <i>Feindel, W. H., et al.</i>	495

VOL. LXXI.	1948.
Microgliomatosis. <i>Russell, D. S., et al.</i>	1
Gustatory Sweating. <i>Haxton, H. A.</i>	16
The Influence of Alterations in Posture of the Limbs on Cortically Induced Movements. <i>Gellhorn, E.</i>	26
Observations on Cutaneous Hyperalgesia. <i>Harpman, J. A.</i>	34
On the Central Mechanism of Some Optic Reactions. <i>Rademaker, G. G. J., and Ter Braak, J. W. G.</i>	48
EEG with Pharyngeal Electrodes. <i>Roubicek, J., and Hill, D.</i>	77
The Distribution of Sympathetic Fibres in the Brachial Plexus in Man. <i>Sunderland, S.</i>	88

## BR. J. ADDICTION.

VOL. XLV.	JANUARY, 1948.
Auto-Regulation of Chemical Equilibrium. <i>Golla, F. L.</i>	3
Alcohol and Abnormal Behaviour in Head Injury Cases. <i>Lewis, A. P. R.</i>	15
Alcoholism from the Psychosomatic Point of View. <i>Carver, A. E.</i>	39
Impact of Legislation on the Treatment of Alcoholics in Switzerland. <i>Revil-lod, H.</i>	68
Report for 1946 to the United Nations on the Traffic in Opium and other Dangerous Drugs. <i>East, W. N.</i>	72

## BR. J. EDUC. PSYCHOL.

VOL. XVIII.	JUNE, 1948.
The Development of Educational Research in Great Britain. <i>Schonell, F. J.</i>	53
Symposium on the Selection of Pupils for Different Types of Secondary Schools. IV. <i>Bradford, E. J. G.</i>	67
The Newspaper Reading of Adolescents and Adults. II. <i>Wall, W. D.</i>	87
The Origins of Interest and Motives for Study of Natural Sciences and Psychology Among Adult Students in Voluntary Courses. <i>Flood, W. E., and Crossland, R. W.</i>	105

## BR. J. MED. PSYCHOL.

VOL. XXI.	1948.
Psychiatry at a Time of Crisis. <i>Bion, W. R.</i>	81
The Individual and Collective Psychology. <i>Fordham, M.</i>	90
Emotional Catharsis and Re-education in the Neuroses with the Help of Group Methods. <i>Jones, M.</i>	104
Some Psycho-dynamic Aspects of Disturbed Perception of Time. <i>Scott, W. C. M.</i>	111
A Note on the Treatment of Stammering. <i>Stein, L.</i>	121
Sex in the Fighting Services at an Isolated Station. <i>Rudolf, G. de M.</i>	127
Can Emotional Conflict Induce Disseminated Sclerosis? <i>Inman, W. S.</i>	135

The Play of a Psychotic Child. <i>Norman, E.</i> . . . . .	155
Psychiatric Problems Amongst Evacuated Children. <i>Scott, W. C. M.</i> . . . . .	171
Children's Hostels in War and Peace. <i>Winnicott, D. W.</i> . . . . .	175
Conclusions from Psychiatric Work with Evacuated Children. <i>Alcock, T.</i> . . . . .	181
Unconscious Form-creation in Art. <i>Ehrenzweig, A.</i> . . . . .	185
Social Conflict and the Challenge to Psychology. <i>Money-Kyrle, R.</i> . . . . .	215
Some Notes on Suicide. <i>O'Connor, W. A.</i> . . . . .	222

## BR. J. PSYCHOL.

VOL. XXXVIII.	MARCH, 1948.
Attitudes to Work. <i>Davis, N. M.</i> . . . . .	107
"Aesthetic" and "Technical" Factors in Artistic Appreciation. <i>Pickford, R. W.</i> . . . . .	135
Theory of the Human Operator in Control Systems. II. <i>Craik, K. J. W.</i> . . . . .	142
The Intermittancy of Control Movements and the Psychological Refractory Period. <i>Vince, M. A.</i> . . . . .	149
Perspectives in Modern Psychology. <i>Pear, T. H.</i> . . . . .	158

## BULL. LOS ANGELES NEUR. SOC.

VOL. XIII.	1948.
Angiomas of the Cranial Vault. <i>Courville, G. B., et al.</i> . . . . .	1
*EEG Findings in Measles Encephalitis. <i>Marsh, C.</i> . . . . .	15
Notes on the Pathology of Cranial Tumors. <i>Courville, C. B.</i> . . . . .	19
*The Etiology of Multiple Sclerosis. <i>Andr�n, H. E.</i> . . . . .	42

*Electroencephalographic Findings in Measles Encephalitis.*

By correlating the known pathologic changes with the known changes that occur in the electroencephalogram in measles encephalitis it seems reasonable to conclude that :

1. During the acute stages of the disease the severe dysrhythmia is due chiefly to the diffuse vascular reaction and the associated influence of toxins on the cortical ganglion cells. Most of these disturbances may subside without permanent damage.

2. The electroencephalographic changes found in the post-acute stages are largely due to subcortical demyelination and axonal degeneration, with interruption of the fiber connections between the cerebral cortex and the diencephalon. In this connection the influence of the thalamus and the hypothalamus upon the cortical potentials, as demonstrated by Kennard and Nims, should be kept in mind.

3. The focal and lateralizing disturbances in the electroencephalogram tend to correspond to the clinical localizing signs. (Author's abstr.)

*The Etiology of Multiple Sclerosis. A Short Review.*

1. A brief survey of pertinent facts elicited in the investigation of etiologic factors in disseminated sclerosis has been attempted, with a view to correlating some of the more conflicting concepts.

2. The vascular occlusion theory may be related to that of vasoconstriction or spasm. The vulnerability of the white matter, and possibly of the sympathetic nervous system as a whole, to noxious factors of metabolic, infectious, or other irritative character has been emphasized.

3. The possibility of local allergy, as described by Ferraro and others, does not preclude the possibility of the above concepts, nor does the theory of virus etiology necessarily change the idea of the mechanism involved, although it is possible that the virus theory may hold only in limited cases.

4. It is emphasized that a careful study of the history and nature of the onset as well as of the remissions of the disease be made with the possibility in mind of further eliciting etiologic factors that may become of therapeutic and prognostic significance in the individual cases.

5. A series of careful laboratory studies has revealed somewhat inconstant findings, suggesting possible multiple factors of etiology. (Author's abstr.)

## CANAD. J. PSYCHOL.

VOL. I.	1947.
Research Objectives for Social Psychology. <i>Ketchum, J. D.</i>	105
A Selective Survey of the Wechsler-Bellevue Section of Rapaport's Diagnostic Psychological Testing. <i>Alexander, F. S., et al.</i>	111
Interference and Mirror Position. <i>Cook, T. W.</i>	116
Psychological Aspects of the Social Credit Movement in Alberta. Part III. <i>Irving, J. A.</i>	127
Studies in International Morse Code. III. <i>Morsh, J. E., and Stannard, A. F. B.</i>	141
The Interdisciplinary Approach to Training in the Clinical Fields of Psychology. <i>Milner, E.</i>	145

## CERVELLO.

VOL. XXIV.	MARCH, 1946.
A Contribution to the Study of a Parasagittal Meningioma. <i>D'Agala, A.</i>	73
Therapeutic Remissions in Schizophrenia and their Medico-legal Problems. <i>Perniola, F.</i>	89
A Lesion of the C.N.S. Associated with Affection of the Peripheral Vessels. <i>Capra, P.</i>	114
Frequency and Character of Pyramidal Deficiency Syndrome in Encephalitic Parkinsonism. <i>Nistri, M.</i>	128

## MAY.

Morphological and Topographical Variations of the Intermediate and Posterior Lobes in Man and some Animals. <i>Marcozzi, G., and Stigliani, R.</i>	145
The Syndrome of the Orbital Apex. <i>Fracasso, L.</i>	177
A Clinical Contribution to our Knowledge of Familial Spastic Heredo-syphilitic Paralysis. <i>Correia, M.</i>	198

## JUNE.

Spontaneous Evolution and Treatment of the Spinal Fluid Syndrome in Tubercular Meningitis. <i>Pisani, D., and de Franco, F.</i>	217
Paraphylaxis and Antiparaphylaxis, Acetylcholine and Schizophrenic Psychoses. <i>Poloni, A.</i>	241
Otohaematoma and Otohygroma Recurring in Mental Patients. <i>La Loggia, M.</i>	254
Theory and Hypotheses on Cerebral Mechanisms of Emotion. <i>Petro, C.</i>	260

## DIS. NERV. SYST.

VOL. IX.	MARCH, 1948.
Guillain-Barré Syndrome. <i>Dempsey, W. S., et al.</i>	67
Technique of Retraining in Psychotherapy. <i>Pearcy, F.</i>	80
Recognition of and Distinction Between Post-traumatic and Psychophysical Headaches. <i>Siegal, L. J., and Robins, S. A.</i>	84
Neuro-dermatitis from a Psychosomatic Viewpoint. <i>Scarborough, L. F.</i>	90

## APRIL.

Psychotherapy and the Atomic Age. <i>Perkins, C. T.</i>	99
Problems in Teaching Short Term Psychotherapy. <i>Murphy, W. F., and Weinreb, J.</i>	101
Psychotherapy in the Outpatient Clinic. <i>Sands, S. L., and Malamud, I. T.</i>	112
Teaching of Brief Psychotherapy in a Medical School. <i>Malamud, W., et al.</i>	117
Use of Hypnosis in Psychotherapy. <i>Secunda, I.</i>	125

## MAY.

- \*Effect of Sodium Cyanide and the Human EEG. *Lipton, B., and Gibbs, F. A.* . . . . . 135
- \*Effects of P-aminopropiophenone on Response-times of a Conditioned Reflex of Avoidance. *Freedman, B.* . . . . . 141
- Multiple Neuritis and Hypothyroidism. *Currier, F. P., and Brink, J. R.* . . . . 144
- Study of 700 Discharged Neuro-psychiatric Casualties and Follow-up. *McDaniel, T. W., and Diamond, M. A.* . . . . . 148
- Intervertebral Disc Rupture. *Bradford, F. K.* . . . . . 154

*Effect of Sodium Cyanide on the Human Electroencephalogram.*

While testing the therapeutic value of cerebral anoxia in mental disease, sodium cyanide was administered intravenously in varying dosage to seven "healthy" schizophrenic patients. The following changes in the electroencephalogram were noted: Flattening with "attention" during the injection; followed 15-20 seconds later by a short burst of 6-10 per second waves; succeeded by high voltage slow waves and then by flattening. Recovery followed the reverse course of induction. The duration of unconsciousness corresponded closely to the duration of slowing and flattening of the electrical activity and varied directly with the dosage.

During induction with high doses immediate flattening occurred without preliminary slowing. Hence, when anoxia is abrupt and severe, flattening occurs without slowing.

The electroencephalogram obtained during extreme anoxia is difficult to distinguish from that obtained during attention.

CO<sub>2</sub> does not significantly increase the power of the cerebral nerve cells to resist intracellular anoxia. It follows as a corollary that, with low partial pressure of oxygen in the respired air, the antianoxic effect of carbon dioxide resides in its power to improve oxygen transport.

The electroencephalographic changes produced by cyanide are not qualitatively specific for this substance. They are the common outcome of all types of oxygen lack. They resemble the changes produced by depressant drugs, injury, etc. Differences in the electroencephalographic response to various stimuli may be determined by their time course alone. (Authors' abstr.)

*Effects of P-Aminopropiophenone on Response-Times of a Conditioned Reflex of Avoidance.*

Effects of p-aminopropiophenone (PAPP) on conditioned flexions of avoidance were observed in three dogs. With subcutaneous doses of between 5-10 mgm./K., as 1 per cent. solution in propylene glycol, PAPP tended to produce a lengthening of conditioned response-times. The duration of the lengthening effect tended to increase with the dose. It was independent of seriously toxic effects, and was independent of gross alterations in respiration. Complete blocking of conditioned flexions of avoidance after PAPP was frequent only in a susceptible dog which eventually succumbed.

The lengthening of the conditioned response-times after PAPP is presumably attributable to an anoxia of cortical tissue resulting from methemoglobinemia. An initial chemoreceptive reflex inhibition of the cortex is conceivable, however.

(Author's abstr.)

## EDUC. PSYCHOL. MEASMT.

- VOL. VIII. . . . . 1948.
- Description of the Purposes and Functions of the Diagnostic Reading Tests . . . 3
- The Essay Examination is a Projective Technique. *Sims, V. M.* . . . . . 15
- The Nature of Verbal Fluency. *Fruchter, B.* . . . . . 33
- Practical Suggestions for Improving Testing Procedures. *Chalfen, L.* . . . . . 49
- Counseling Students toward Scholastic Adjustment. *Stromswold, S. A., and Wrenn, C. G.* . . . . . 57
- A Procedure for Overprinting Answer Sheets for Hand Scoring which might be Adapted to Local Scoring. *Traxler, A. E.* . . . . . 65

Self-appraisal of Test Performance as a Vocational Selection Device. <i>Klein, G. S.</i> . . . . .	69
A Factor Analysis of the Bernreuter Personality Inventory. <i>Martin, G. C.</i> . . . .	85
Pupil Performance on the Iowa Every-pupil Tests of Basic Skills, etc. <i>Krvaraceus, W. C., and Lanigan, M. A.</i> . . . .	93
Testing Occupational Training and Experience. <i>Rosenberger, H. T.</i> . . . .	101
Predicting Success in Introductory Psychology. <i>Portenier, L. G.</i> . . . .	117
Implications of a Brief Study of Prediction of Success in the Medical School. <i>Hurd, A. W.</i> . . . . .	127

## GENET. PSYCHOL. MONOGR.

VOL. XXXVI.

1947.

*The Diagnostic Implications of Rorschach's Test in Case Studies of Mental Defectives. <i>Jolles, I.</i> . . . . .	89
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*The Diagnostic Implications of Rorschach's Test in Case Studies of Mental Defectives.*

The author made a careful study of 66 children who, on the basis of psychometric examinations, were seriously retarded in their mental development. This study was based upon, not only the psychometric results, but also case history material and the Rorschach test. Rorschach findings were presented on all of the 66 cases in this study, and a few cases were selected for detailed analysis. The results of the Rorschach test imply that mental deficiency has as a necessary component emotional and personality maladjustment. On the basis of the findings of this study the following conclusions are reached :

1. Mental deficiency of the familial and undifferentiated types is, in many instances, a symptom of personality disorder, and it is unlikely that in such cases it represents a failure of the intellect to develop normally.
2. It is quite probable that many mental defectives may be treated successfully by psychotherapeutic techniques.
3. A study of the retarded child is not complete unless case history material and some projective technique is used to supplement the results of the psychometric examination.
4. It is necessary for educators to carry their responsibility further than merely providing a specialized educational programme for the retarded child. They must add to the curriculum a programme of case work with the family and other aspects of the defective's environment and also provide in the curriculum a psychological programme which will help the child meet his emotional needs satisfactorily. Until this is done our school systems will have failed in their responsibility to the retarded child.
5. It is urgent that other investigators continue with studies of this type in order that we may better understand the problem of the feeble-minded, for the results of this and other studies tend to indicate rather clearly that our present concept of mental deficiency may be based upon a set of false assumptions which are inadequate in dealing with the problem. (Author's abstr.)

VOL. XXXVII.

1948.

The Radio Day-Time Serial. <i>Warner, W. L., and Henry, W. E.</i> . . . . .	3
The Relation of Personality Characteristics and Responses to Verbal Approval in a Learning Task. <i>Grace, G. L.</i> . . . . .	73

## GERIAT.

VOL. III.

JANUARY-FEBRUARY, 1948.

The Effects of Small Doses of Benzedrine upon the Aged. <i>Arnett, J. H., and Harris, S. E.</i> . . . . .	84
Personality Adjustment Following Hospital Treatment in Patients with Involutional Psychosis, Melancholia. <i>Clow, H. E.</i> . . . . .	94

## MAY-JUNE.

The Emotional Problems of Elderly People. <i>Gitelson, M.</i> . . . . .	135
Alcoholism in the Older Age Groups. <i>Seligman, R. V.</i> . . . . .	166
Nitrogen Balance Studies under Prolonged High Nitrogen Intake Levels in Elderly Individuals. <i>Kountz, W. B., et al.</i> . . . . .	171

## INDIV. PSYCHOL. BULL.

VOL. VI.	1947.
The Last Ten Years. <i>Dreikurs, R.</i> . . . . .	1
How I Chose my Careers. <i>Adler, A.</i> . . . . .	9
Preventive Psychiatry. <i>Kramer, H. C.</i> . . . . .	12
Adler's Contribution to Social Adjustment. <i>Lindensfeld, E., and MacDonald, M.</i> . . . . .	22
Alfred Adler's Theory of Compensation Applied to Current Studies on Sidedness. <i>Deutsch, D., and Kadis, A.</i> . . . . .	27
Adler's Place To-day in the Psychology of Memory. <i>Ansbacher, H. L.</i> . . . . .	32
Alfred Adler in American Psychotherapy. <i>Harms, E.</i> . . . . .	41
Some Perspectives on Individual Psychology in Our Time. <i>Friedmann, A.</i> . . . . .	45
Individual Psychology and Pedagogy. <i>Deutsch, L.</i> . . . . .	48
Alfred Adler and the Teachers. <i>Seidler, R.</i> . . . . .	51
Re-educating Parents and Teachers. <i>Zweibel, A. D.</i> . . . . .	54
Developing Social Feeling in the Young Child Through his Play Life. <i>Lewis, A.</i> . . . . .	58
Individual Psychology used in Police Training. <i>Keleher, R. V.</i> . . . . .	61
Adler's Contribution to the Varying Functions of a Psychologist. <i>Mandell, S.</i> . . . . .	65
A Technique in Group Psychotherapy. <i>Zweibel, A.</i> . . . . .	69
Observations About Alcoholics. <i>Beecher, W.</i> . . . . .	71
War and Peace Between the Sexes. <i>Lazarsfeld, S.</i> . . . . .	74
Adlerian Philosophy. <i>Bruck, A.</i> . . . . .	80
Bibliography of Individual Psychology. <i>Dreikurs, R.</i> . . . . .	89

## INTERNAT. J. PSYCHO-ANAL.

VOL. XXVIII.	1947.
Notes on Psycho-analysis and Integrative Living. <i>Brierley, M.</i> . . . . .	57
Narcissistic Equilibrium. <i>Hart, H. H.</i> . . . . .	106
The Super-ego and Other Internal Objects. <i>Stephen, A.</i> . . . . .	114

## J. ABNORM. SOC. PSYCHOL.

VOL. XLIII.	JANUARY, 1948.
Basic Personality in Orthodox Hindu Culture Pattern. <i>Taylor, W. S.</i> . . . . .	3
Studies in Adjustment to Visible Injuries. <i>White, R. K., et al.</i> . . . . .	13
*Convulsive Disorder and Personality. <i>Lisansky, E. S.</i> . . . . .	29
Measuring Attitudes by Error-Choice. <i>Hammond, K. R.</i> . . . . .	38
Insight and Group Adjustment. <i>Green, G. H.</i> . . . . .	49
Social Norms and the Individual. <i>Bovard, E. W., jun.</i> . . . . .	62
Factors Differentiating A.W.O.L. from Non-A.W.O.L. Trainees. <i>Feldman, H., and Maleski, A. A.</i> . . . . .	70

*Convulsive Disorder and Personality.*

1. The author has examined theories about epilepsy, seeking to account for the personalities developed by epileptic individuals. Implicit in most theories, except those the author termed the "stress" and "psychosomatic" theories, is an assumption that there is a typical and fixed "epileptic personality."

2. The experimental findings of various investigators vary but the weight of evidence is against the existence of a typical and fixed "epileptic personality" which characterizes all or even most epileptic patients. Studies of non-institu-

tionalized, non-deteriorated adult patients using projective personality tests are lacking.

3. The author has compared two groups of sick adults, epileptics and diabetics, on a battery of psychological tests. Significant or near-significant differences emerge in mean Wechsler-Bellevue performance IQ (diabetics are higher), in average time per response on the Rorschach (epileptics are slower), and in average number of "neurotic signs" on the Rorschach (epileptics show more "neurotic signs"). The epileptic group shows on the Rorschach more emotional strain and less acceptance of self than does the diabetic group. Among the author's epileptic subjects, nearly all of whom developed epilepsy in adolescence or adulthood, there is a clear trend toward greater maladjustment with shorter duration of illness.

4. On the whole, however, the groups show far more similarity than difference. Both groups show on the Rorschach drive for achievement but limited productivity, tendencies to constriction and withdrawal, and conflict in their tendencies to be outgoing and to withdraw.

5. Generalizations are of necessity limited because of the small number of cases. Their data, as far as they go, do indicate that there is no typical personality picture which characterizes the epileptic group and distinguishes it from other sick or neurotic groups. (Author's abstr.)

## APRIL.

Limitations of the Scapegoat. <i>Zawadzki, B.</i> . . . . .	127
Personal Values as Selective Factors in Perception. <i>Postman, L., et al.</i> . . . . .	142
Theory and Experiment Relating Psychoanalytic Displacement to Stimulus-Response Generalization. <i>Miller, N. E.</i> . . . . .	155
The Non-medical Psychotherapist. <i>Brody, B., and Grey, A. L.</i> . . . . .	179
An Experimental Analogue of Fear from a Sense of Helplessness. <i>Mowrer, O. H., and Vick, P.</i> . . . . .	193

## J. ANAT.

VOL. LXXXII. . . . .	1948.
Internode Length and Fibre Diameter in Developing and Regenerating Nerves. <i>Vizoso, A. D., and Young, J. Z.</i> . . . . .	110

## J. APPL. PSYCHOL.

VOL. XXXI. . . . .	1947.
Studies in Job Evaluation. <i>Lawshe, C. H., jun., and Wilson, R. F.</i> . . . . .	355
Labor Turnover and its Correlates. <i>Kerr, W. A.</i> . . . . .	366
The New USES General Aptitude Test Battery. <i>Dvorak, V. J.</i> . . . . .	372
Test Scores and Efficiency Ratings of Machinists. <i>Anderscn, R. G.</i> . . . . .	377
A Study of Success and Failure Among Student Nurses. <i>Berg, I. A.</i> . . . . .	389
The Construction of a Test of Ability to Repeat Spoken Messages. <i>Snidecor, J. C.</i> . . . . .	397
Visual Acuity in Relation to Illumination in the Ortho-Rater. <i>Feinberg, R., and Wirt, S.</i> . . . . .	406
Reliability of Anecdotal Material in the First Annual Science Talent Search. <i>Edgerton, H. A., et al.</i> . . . . .	413
What Does Americanism Mean to the American People? <i>Link, H. C.</i> . . . . .	425
The Effect of "Look" and "Read" Directions upon the Attention Value of Illustrations and Texts in Magazine Advertisements. <i>Asher, E. J., and Kahn, D.</i> . . . . .	431
Women Students in Liberal Arts, etc., and the M.M.P.I. <i>Lough, O. M.</i> . . . . .	437
A Reply to Winfield's Study of the Multiple Choice Rorschach. <i>Sisk, H. L.</i> . . . . .	446
A Method and Tables for Obtaining Standard Errors of Differences Between Proportions when $N_1$ is Equal to $N_2$ . <i>Lichte, W. H.</i> . . . . .	449
A Five Month Strength Curve. <i>Weinland, J. D.</i> . . . . .	498
The MacQuarrie Test for Mechanical Ability. III. <i>Goodman, C. H.</i> . . . . .	502
A Comparison of Earlier and Later Success in Normal Aviation Training. <i>Norman, R. D.</i> . . . . .	511
A Work Test for Quantitative Study of Visual Performance and Fatigue. <i>Brožek, J., et al.</i> . . . . .	519

Student's Honesty in Correcting Grading Errors. <i>Krueger, W. C. F.</i> . . . . .	533
Critique of Van Allyn's System of Vocational Counseling. <i>Triggs, F. O.</i> . . . . .	536
Selected Factors which Influence Job Preferences. <i>Jurgensen, C. E.</i> . . . . .	553
Learning in Accident Reduction. <i>Ghiselli, E. E., and Brown, C. W.</i> . . . . .	580
Selection of Aircraft Engineering Draftsmen and Designers. <i>Case, H. W.</i> . . . . .	588
Norms for Graduate School Business Students on the Minnesota Vocational Test for Clerical Workers. <i>Strong, E. K., jun.</i> . . . . .	594
Validation of Normal Aviation Cadet Selection Tests Against Training Criteria. <i>Fiske, D. W.</i> . . . . .	601
A Classification and Evaluation of Personnel Rating Methods. <i>Krauft, E. B.</i> . . . . .	617
Confusion Control in Poster Readership Study. <i>Bigelow, C. L.</i> . . . . .	626
An Efficient Method of Obtaining Counts for Computing the Interrelation of Test Items. <i>Mount, G. E.</i> . . . . .	634
A Rapid Method of Computing Standard Scores. <i>Sapperfield, B. R.</i> . . . . .	638
An Experiment on the Design of Tables and Graphs Used for Presenting Numerical Data. <i>Carter, L. F.</i> . . . . .	640

## J. BELGE NEUROL. PSYCHIAT.

VOL. XLVII. . . . .	1947.
Reflections on the Psychoneuroses. <i>Dagnetie, J.</i> . . . . .	211
A Contribution to the Study of Regressive Phenomena in Psychopathology. <i>Bobon, J.</i> . . . . .	219
A Contribution to the Study of Regressive Phenomena in Psychopathology. <i>Bobon, J.</i> . . . . .	327

## J. CLIN. PSYCHOPATH.

VOL. VIII. . . . .	JULY-OCTOBER, 1947.
Homosexuality and Crime. <i>Ernst, J. R.</i> . . . . .	763
Diagnosis and Prognosis in Psychotherapy. <i>Bergler, E.</i> . . . . .	771
A Case of Sexual Psychopathy. <i>Cason, H.</i> . . . . .	785
Psychoses in Military Prisoners. Part II. <i>Weiss, I. I.</i> . . . . .	801
Psychodrama for Mental Hospitals. Part I. <i>Kline, N. S.</i> . . . . .	817
Some Responses of the Psychopath as Interpreted in the Light of Lindner's Suggested Application of the Concept of Homeostasis. <i>Van Vorst, R.</i> . . . . .	827
Frustration of the Unique Individuality. <i>Atkin, I.</i> . . . . .	831
The Psychology of Members. Part III. <i>Fodor, N.</i> . . . . .	841
The Problem of Military Delinquency. <i>Blackman, M. N.</i> . . . . .	849
Prehuman Stages of the Libido. <i>Mott, F. J.</i> . . . . .	863
A Preliminary Report on Extra-mural Treatment of Severe Delirium Tremens with Recovery in Ten Hours. <i>Seliger, R. V.</i> . . . . .	875

## J. COMP. NEUROL.

VOL. LXXXVIII. . . . .	FEBRUARY, 1948.
A Reconstruction of the Diencephalic Nuclei of <i>Macacus rhesus</i> . <i>Kreig, W. J. S.</i> . . . . .	I
The Mammalian Midbrain and Isthmus Regions. Part II. <i>Crosby, E. C., and Henderson, J. W.</i> . . . . .	53
Some Effects of Amputation of the Chick Wing Bud on the Early Differentiation of the Motor Neuroblasts in the Associated Segments of the Spinal Cord. <i>Barron, D. H.</i> . . . . .	93
Commissural Fibers of the Macaque Thalamus. <i>Glees, P., and Wall, P. D.</i> . . . . .	129
The Pes Pedunculi and Pyramid. <i>Verhaart, W. J. C.</i> . . . . .	139

## APRIL.

The Origin of the Fibers of the Anterior Commissure in the Rat. <i>Brodal, A.</i> . . . . .	159
The Representation of Facial and Scalp Muscles in the Facial Nucleus. <i>Szentágothal, J.</i> . . . . .	207

- The Mitotic Patterns in the Spinal Cord of the Chick Embryo and their Relation to Histogenetic Processes. *Hamburger, V.* . . . . . 221  
 The Repair of Severed Motor and Sensory Spinal Nerve Roots by the Arterial Sleeve Method of Anastomosis. *Moger, E. K., and Kimmel, D. L.* . . . . . 285

## JUNE.

- The Chemical Cytology of the Choroid Plexus and the Blood Brain Barrier of the Rhesus Monkey. *Wislocki, G. B., and Dempsey, E. W.* . . . . . 319  
 The Thoraco-abdominal Nervous System of an Adult Insect, *Drosophila melanogaster*. *Power, M. E.* . . . . . 347  
 The Course and Termination of the Medial Lemniscus in Man. *Rasmussen, A. T., and Peyton, W. T.* . . . . . 411  
 Fiber Degeneration in Ammon's Horn Resulting from Extirpations of the Piriform and other Cortical Areas and from Transection of the Horn at Various Levels. *Allen, W. F.* . . . . . 425  
 The Special Visceral Efferent Zone of the Seventh Cranial Nerve on the Canalis Facialis. *Foley, J. O.* . . . . . 439

## J. COMP. PHYSIOL. PSYCHOL.

## VOL. XL. 1947.

- Studies of the Effects of Infantile Experience on Adult Behavior in Rats. I. *Hunt, J. McN., et al.* . . . . . 291  
 An Automatic Shocking-grid Apparatus for Continuous Use. *Skinner, B. F.* . . . . . 305  
 An Experimental Analysis of the Spatial Location Hypothesis in Learning. *Gentry, G.* . . . . . 309  
 Vitamin B-complex Concentrates and the Incidence of Sound-induced Seizures in Young Albino Rats Maintained on Purified Diets. *Patton, R. A.* . . . . . 323  
 The Role of Reward in Discrimination Learning in Monkeys. *Moss, E. M.* . . . . . 333  
 Patterns of Self-selection of Purified Dietary Components by the Rat. *Pilgrim, F. J.* . . . . . 343  
 Simple Reaction Chains and their Integration. I. *Arnold, W. J.* . . . . . 349  
 The Diurnal Course of Water and Food Intake in the Normal Mature Rat. *Siegel, P. S.* . . . . . 365  
 A Time-analysis of Certain Aspects of the Behavior of Small Groups of Caged Mice. *Warne, M. C.* . . . . . 371  
 The Effects of Pregnanolone on the Learning of Normal and of Stressed Albino Rats. *McGinnies, E.* . . . . . 389  
 Studies of Abnormal Behavior in the Rat. XXI. *Maier, N. R. F.* . . . . . 397  
 The Sea-approach Behavior of the Neonate Loggerhead Turtle. *Daniel, R. S., and Smith, K. U.* . . . . . 413  
 Left-right Tendency in the Hermit Crab. *MacKay, D. C. G.* . . . . . 421  
 Simple Reaction Chains and their Integration. II. *Arnold, W. J.* . . . . . 427  
 Electroconvulsive Shock in Rats under Ether Anaesthesia. *Porter, P. B.* . . . . . 441  
 Prediction and Automatic Control of Alertness. *Travis, R. C., and Kennedy, J. L.* . . . . . 457

## VOL. XLI. 1948.

- Simple Reaction Chains and their Integration. *Arnold, W. J.* . . . . . 1  
 Habit Reversal Induced by Electro-shock in the Rat. *Duncan, C. P.* . . . . . 11  
 Relative Strength of Place and Response to Learning in the T-Maze. *Blodgett, H. C., and McCutchan, K.* . . . . . 17  
 A Contribution to the Comparative Physiology of Contact Chemoreception. *Frings, H.* . . . . . 25  
 A Place Theory of Sound Localization. *Jeffress, L. A.* . . . . . 35  
 Cognitive and Emotional Effects of Electro-convulsive Shock in Rats. *Hayes, K. J.* . . . . . 40  
 Analysis of Matching Behavior in Chimpanzee. *Nissen, H. W.* . . . . . 62

## J. CONSULT. PSYCHOL.

VOL. XI.	1947.
Principles for Psychological Consulting with Client Organizations. <i>Covner, B. J.</i>	227
Characteristics of Conscientious Objectors in World War II. <i>Gory, A. E., and McClelland, D. C.</i>	245
Case History Norms of Unselected Students and Students with Emotional Problems. <i>McKinney, F.</i>	258
A Combined Projective and Psychogalvanic Response Technique for Investigating Certain Affective Processes. <i>Carter, H. L.</i>	270
Some Problems in the Adjustment of the Mentally Handicapped. <i>Teska, P. T.</i>	276
Group Opinion as a Predictor of Military Leadership. <i>William, S. B.</i>	283
Comparative Hospital Records of Two Groups Differentiated by Psychological Tests. <i>Bobbitt, J. M., and Newman, S. H.</i>	292
Etiological Studies of Psychopathic Personality. <i>Thorne, F. C.</i>	299
Abbreviated Forms of the Bernreuter Personality Inventory. <i>Anderson, R. G.</i>	310
The Make-a-Picture-Story (MAPS) Projective Personality Test. <i>Shneidman, E. S.</i>	315
Psychological Elements in Work Interference from Physical Disability. <i>Seidenfeld, M. A.</i>	326
A Coding System for M.M.P.I. Profile Classification. <i>Hathaway, S. R.</i>	334

## J. EDUC. PSYCHOL.

VOL. XXXVIII.	1947.
The Prediction of Intelligence at College Entrance from Earlier Test. <i>Thorn-dike, R. L.</i>	129
The Effect of Language Style on Reading Performance. <i>Robinson, F. P.</i>	149
The Ability of Children to Read Cross-sections. <i>Malter, M.</i>	157
A Test to Measure Aptitude in the Hebrew Language. <i>Nardi, N.</i>	167
The Effect of Personality on Language Achievement. <i>Dunkel, H. B.</i>	177
New Ideas for Old. <i>Stendler, C. B.</i>	193
Intensive Classes for Superior Students. <i>Briggs, L. J.</i>	207
Remembering and Forgetting Arithmetical Abilities. <i>Davis, R. A., and Rood, E. J.</i>	216
A Study of the Truthfulness with which High School Girls Answer Personality Tests of the Questionnaire Type. <i>Damrin, D. E.</i>	223
Some Factors Affecting College Success. <i>Stright, I. L.</i>	232
Relation Between Ability and Social Status in a Mid-Western Community. III. <i>Havighurst, R. J., and Breese, F. H.</i>	241
Lecture Demonstration—2. <i>Lawshe, C. R., jun., and Dawson, R. I.</i>	248
Growth in the General and Verbal Bi-factors from Grade VII-IX. <i>Swineford, F.</i>	257
Notes on the Use of the Normal Distribution in Psychometrics. <i>Leverett, H. M.</i>	283
The Ability of Children to Read a Process-diagram. <i>Malter, M.</i>	290
A Study of the Consistency of Informant Responses to Questions in a Questionnaire. <i>Gerberich, J. B.</i>	299
A Comparative Study of the Academic Ability and Achievement of Two Groups of College Students. <i>Assum, A. L., and Levy, S. J.</i>	307
Factoring Factors. <i>Holzinger, K. J.</i>	321
The Power of the Test and the Estimation of Required Sample Size. <i>Deemer, W. L., jun.</i>	329
The Relation Between IQ and Trait Differences as Measured by Group Intelligence Tests. <i>Tilton, J. W.</i>	343
A Study of Certain Aspects of the Lee-Thorpe Occupational Interest Inventory. <i>Lindgren, H. C.</i>	353
Basal Metabolism and Academic Performance in a Sample of College Women. <i>McCurdy, H. G.</i>	363

XCIV.

58

The Effect of Distractions on Test Results. <i>Super, D. E., et al.</i> . . . . .	373
The Relation Between Scores Obtained by Harvard Freshman on the Kuder Preference Record and their Fields of Concentration. <i>Baggaley, A. R.</i> . . . . .	421
Group and Individual Variability on the Goodenough Draw-a-Man Test. <i>McCurdy, H. G.</i> . . . . .	428
Relations Between Ability and Social Status in a Mid-Western Community. IV. <i>Schulman, M. J., and Havighurst, R. J.</i> . . . . .	437
Note on an Unnecessary Source of Confusion in Statistical Terminology. <i>Goodenough, F. L.</i> . . . . .	443

## VOL. XVIII.

FEBRUARY, 1948.

The Development of Educational Research in Great Britain. Part II. <i>Schonell, F. J.</i> . . . . .	I
Symposium on the Selection of Pupils for Different Types of Secondary Schools. <i>Moore, V. J.</i> . . . . .	16
The Future of Measurements of Abilities. <i>Thorndike, E. L.</i> . . . . .	21
The Newspaper Reading of Adolescents and Adults. <i>Wall, W. D.</i> . . . . .	26
Assessment of Interest in Practical Topics. <i>Peel, E. A.</i> . . . . .	41

## J. EX. PSYCHOL.

## VOL. XXXVIII.

FEBRUARY, 1948.

The Relation of Secondary Reinforcement to Delayed Reward in Visual Discrimination Learning. <i>Grice, G. R.</i> . . . . .	I
Reactively Heterogeneous Compound Trial-and-Error Learning with Distributed Trials and Serial Reinforcement. <i>Hull, C. L.</i> . . . . .	17
Retroactive and Proactive Inhibition after Five and Forty-eight Hours. <i>Underwood, B. J.</i> . . . . .	29
Drive Specificity and Learning. <i>Walker, E. L.</i> . . . . .	39
*Problem Solving by Monkeys after Bilateral Removal of the Prefrontal Areas. VI. <i>Settlage, P., et al.</i> . . . . .	50
Experimentally Acquired Drives. <i>May, M. A.</i> . . . . .	66
Favorable Versus Unfavorable Propaganda in the Enjoyment of Music. <i>Rigg, M. G.</i> . . . . .	78
The Ability of Rats to Learn the Location of Food when Motivated by Thirst. <i>Kindler, H. H., and Mencher, H. C.</i> . . . . .	82
Studies of Fear as an Acquirable Drive. I. <i>Miller, N. E.</i> . . . . .	89

*Problem Solution by Monkeys Following Bilateral Removal of the Prefrontal Areas. VI. Performance on Tests Requiring Contradictory Reactions to Similar and Identical Stimuli.*

(1) A series of tests was designed to compare the performance of five normal and five prefrontal monkeys on problems involving contradictory reactions to similar or identical stimuli.

(2) The tests differentiated clearly between the two groups of animals. The performance of the prefrontal animals was consistently and significantly inferior to that of the normal group. Error scores averaged for blocks of 30 or 40 tests for each animal showed no overlap between the groups. The best score of each operated animal was in each instance poorer than the poorest comparable score of any normal animal. Evidence was presented to show that the operated animals were well motivated.

(3) Two of the operated animals in this series were previously compared with normal monkeys in delayed reaction studies, and were found to perform as well as some normal animals.

(4) Statistical manipulation showed that it was possible to assign the occurrence of some of the wrong choices to the persistence of erroneous choice-response patterns in both groups of animals. There were no significant differences between the two groups in test series B and C, but the earlier series A showed a virtual absence of the tendency in normal animals as contrasted with a strongly manifested tendency in the operated group. The erroneous choice-response tendencies sometimes persisted for as long as 100 trials on the same test.

(5) The inferior performance of the operated animals was interpreted as resulting largely from perseverative interference, i.e. from impairment of the ability to relinquish previously acquired, interfering reaction patterns.

(6) It was suggested that performance of human and animals Ss with injury to the prefrontal areas may profitably be re-evaluated in terms of the hypothesis of perseverative interference. (Authors' abstr.)

## APRIL.

Response Fixation under Anxiety and Non-Anxiety Conditions. <i>Farber, I. E.</i>	111
An Investigation into the Causes of Retroactive Inhibition. <i>Osgood, C. E.</i>	132
A Probability Formulation of the Hunter-Sigler Effect. <i>Schlosberg, H.</i>	153
"Superstition" in the Pigeon. <i>Skinner, B. F.</i>	168
Discriminative Conditioning. II. <i>Eshes, W. K.</i>	173
*The Effects of Mild Anoxia on Simple Psychomotor and Mental Skills. <i>Russell, R. W.</i>	178
Visual Field Articulation in the Absence of Spatial Stimulus Gradients. <i>Brown, C. R., and Gebhard, J. W.</i>	188

*The Effects of Mild Anoxia on Simple Psychomotor and Mental Skills.*

An investigation of the effects of mild anoxia on three simple psychomotor and mental skills has been conducted. The skills studied were finger dexterity, arm-hand coordination and simple addition.

Two hundred and forty-four Army Air Corps Cadets served as Ss. Each S participated in only one experiment. They were divided into sub-groups equal in initial level of performance on the skill in question. The experimental sub-group in each case was subjected to mild anoxia, while the control sub-group was tested always under normal oxygen conditions. The mild anoxia was induced by reducing the barometric pressure in a high-altitude chamber of the variety used throughout the war by the Army Air Forces. Time under anoxia was held constant at 35 minutes, since the study was concerned with the short-duration effects of the anoxic conditions.

The results justify three conclusions: (1) A decrement in level of performance appeared immediately after the introduction of mild anoxia. (2) Following an initial decrement in level of performance rapid adjustment occurred as the time under mild anoxia increased. (3) In addition to the adjustment process there occurred improvement with continued practice under the anoxic conditions.

(Author's abstr.)

## JUNE.

Factors Influencing Thresholds for Monocular Movement Parallax. <i>Graham, C. H., et al.</i>	205
Task-Orientation and Ego-Orientation as Factors in Reminiscence. <i>Alper, T. G.</i>	224
Reminiscence in Motor Learning as a Function of Length of Interpolated Rest. <i>Kimble, G. A., and Horenstein, B. R.</i>	239
The Effect of Using Differential End Boxes in a Simple T-Maze Learning Situation. <i>Denny, M. R.</i>	245
An Experimental Study of Waking Postural Suggestion. <i>McCurdy, H. G.</i>	250
Motor Effects of Strong Auditory Stimuli. <i>Davis, R. C.</i>	257
The Relationship Between Unimanual and Bimanual Handedness. <i>Davison, A. H.</i>	276
New Observations of "Binocular Yellow." <i>Prentice, W. C. H.</i>	284
Reactively Homogeneous Compound Trial-and-Error Learning with Distributed Trials and Serial Reinforcement. <i>Gladstone, A. I.</i>	289
The Illusory Perception of Movement Caused by Angular Acceleration and by Centrifugal Force During Flight. II. <i>Clark, B., et al.</i>	298
Brightness Constancy and the Nature of Achromatic Colors. <i>Wallace, H.</i>	310
Studies in Space Orientation. I. <i>Asch, S. E., and Wilkin, H. A.</i>	325
The Conditioning of the Human Fetus <i>in Utero</i> . <i>Spelt, D. K.</i>	338

## J. GEN. PSYCHOL.

VOL. XXXVIII.	JANUARY, 1948.
*The Differential Effect of Prolonged Mild Anoxia on Sensory and Sensory-Motor Reactions and on Such Subjective States as Sleepiness, Irritability and Boredom. <i>Smith, G. M.</i>	3
Social Influences upon Psychological Trends. <i>Pastore, N.</i>	15
Experimental Comparisons Between Generalizations and Problems as Indices of Values. <i>Harding, L. W.</i>	31
The Statistical Concept of Normal. <i>Morton, G. K.</i>	51
An Experimental Study on "Mental Numbers" and a New Application. <i>Hsü, E. H.</i>	57
The Relations of Vaso-motor Conflict to Personality Traits and Cardio-vascular Activity. <i>Brower, D.</i>	69
Emotional Stability and Level of Aspiration. <i>Klugman, S. F.</i>	101

*The Differential Effect of Prolonged Mild Anoxia on Sensory and Sensory-motor Reactions and on such Subjective States as Sleepiness, Irritability and Boredom.*

At intervals during an eight-hour exposure to an altitude of 10,000 ft. (simulated in a nitrogen dilution chamber), and also during a control run, 16 male college students were given tests of visual, auditory, and sensory-motor efficiency and were asked to rate themselves on 10 subjective conditions, including sleepiness, irritability, and boredom.

The detailed results for three of these measures, previously reported in separate journals, are here summarized, together with some new material, and the differential reactions to prolonged mild anoxia are discussed. The principal findings were:

(1) A progressive and statistically significant increase in the size of the peripheral blind areas of the eye throughout the run. This anoxic effect on the angioscotomata was augmented by a hearty protein lunch.

(2) A progressive and statistically significant increase in sleepiness, feeling of fatigue, boredom, wandering of attention, irritability, headache, and depression, and a corresponding decrease in motivation, coordination, and general feeling of well-being. These maladaptive reactions reached their maximum after 6-25 hours, but were somewhat reduced by an end-spurt after 7-25 hours, when the subjects became aware that their ordeal was almost over.

(3) An appreciable loss of auditory efficiency after 2 to 5 hours when the subjects were tested for their ability to perceive the sounds most frequent in common speech, by methods and materials employed in an earlier study involving a brief exposure at higher altitudes. However, an end-spurt was evident in this test also, suggesting that the poor performance at this moderate altitude was due more to a wandering of attention than to any genuine auditory defect. (In the earlier tests at higher altitude, a significant loss in the ability to perceive speech sounds occurred at altitudes as low as 16,900 ft.)

(4) No loss of efficiency on such a simple test of eye-hand coordination as the Minnesota Block Test, in contrast to the other positive findings.

As judged by the magnitude, persistence, and statistical significance of the changes at altitude, and by the relative imperviousness to subjective compensatory effort (the absence of an end-spurt), the angioscotoma test appears to be the most sensitive indicator of the encroachments of prolonged mild anoxia on the subjects' efficiency.

Taken as a whole, the results indicate a moderate but progressive loss of efficiency and a generally poorer emotional adjustment as the exposure to the relatively low altitude is prolonged. (Author's abstr.)

## J. GENET. PSYCHOL.

VOL. LXXI.	DECEMBER, 1947.
Development of a Young Blind Child. <i>Wilson, J., and Halverson, H. M.</i>	155
Constancy of IQ in Mental Defectives. <i>Sloan, W., and Harman, H. H.</i>	177
The Psychological Follow-up Study of a Case of Lead-Poisoning. <i>Elonen, A. S., and Onken, M. A.</i>	187
Behavior Notes on <i>C. conica</i> . <i>Wells, F. L.</i>	195
A Behaviorist Explanation of Concept Formation. <i>Welch, L.</i>	201
The Transition from Simple to Complex Forms of Learning. <i>Welch, L.</i>	223

## VOL. LXXII.

MARCH, 1948.

Children's Attitude Toward Homogeneous Groupings. <i>Luchins, A. S. and E. H.</i> . . . . .	3
Growth of Intelligence During Adolescence. <i>Thorndike, R. L.</i> . . . . .	11
An Evaluation of the Adult Intellectual Status of Terman's Gifted Children. <i>Thorndike, R. L.</i> . . . . .	17
Manual Dominance in Nursery School Children. <i>Hildreth, G.</i> . . . . .	29
The Correlation Between Perseveration Test Scores and the Intelligence Quotient. <i>Collins, J.</i> . . . . .	47
A Further Observation on the Effect of Physically Enforced Inaction on the Activity Level of the Rat. <i>Siegel, P. S.</i> . . . . .	57
The Development of Verbalized Space in the Young Child. <i>Ames, L. B., and Learned, J.</i> . . . . .	63
The Relations of Older Children to their Parents. <i>Jurovsky, A.</i> . . . . .	85
Children's Intergroup Attitudes. <i>Zeligs, R.</i> . . . . .	101
Adult Recall of Unpleasant Experiences During Three Periods of Childhood. <i>Thompson, G. G., and Wityrol, S. L.</i> . . . . .	111

## J. GERONT.

## VOL. III.

JANUARY, 1948.

Death Rate in a Concentration Camp as a Criterion of Age. <i>Bergman, R. A. M.</i> . . . . .	14
The Effects of Progesterone, Oestradiol, Thyroid Hormone and Androsterone on the Artificial Premature "Climacteric" of Pure Gonadal Origin Produced by Ovariectomy in Rats. <i>Korenchevsky, V., and Jones, V. E.</i> . . . . .	21

## J. NERV. MENT. DIS.

## VOL. CVI.

NOVEMBER, 1947.

*EEG Changes Induced by Water Intoxication. <i>Cohn, R., et al.</i> . . . . .	513
Some EEG Findings in Subcortical and Hypothalamic Lesions. <i>Laufer, M. W.</i> . . . . .	527
Blocking of Chemical Decerebration by Pontile Pathology. <i>Lipton, B. S.</i> . . . . .	537
*Study of Carbonic Anhydrase in 37 Brains with Reference to Symmetry of Distribution. <i>Ashby, W., and Weickhardt, G. D.</i> . . . . .	540
Objective (Behavioristic) Criteria of Recovery from Neuropsychiatric Disorders. <i>Eissler, K. R.</i> . . . . .	550
Observations on Emotional Currents in Interview Group Therapy, with Adolescent Girls. <i>Spotnitz, H.</i> . . . . .	565
Diary of a War Neurosis. <i>Stern, R. L.</i> . . . . .	583
Mental Hospitals: To-day and To-morrow. <i>Thomas, P. W.</i> . . . . .	587

*EEG Changes Induced by Water Intoxication.*

Water intoxication gave rise to low frequency activity in the EEG in nearly all the subjects studied in this series. The bioelectric charges observed are similar to those produced by insulin-induced hypoglycemia and oxygen poisoning.

The pitressin water test is not a specific test for epilepsy.

Water intoxication, in common with hypoglycemia and oxygen metabolism collapse, is probably a phenomenon of intraneuronal dysfunction.

In certain epileptics a positive water balance apparently disturbs already poorly functioning neurones, as determined by the EEG low frequency activity, and thereby acts as the detonating mechanism for the convulsive discharge.

The absence of abnormal brain electric activity in water intoxication does not indicate that the observed patient does not suffer from clinical epilepsy. As a diagnostic test for epilepsy in the type of patient herein reported, pitressin hydration is of limited value. (Authors' abstr.)

*Study of Carbonic Anhydrase in 37 Brains with Reference to Symmetry of Distribution.*

Data are given from the examination of 37 brains in which a total of 138 comparisons of carbonic anhydrase content from the same areas in the right and left

hemispheres were made. These would seem to indicate focal irregularity of quantitative distribution of that enzyme in diffuse organic brain disease and in the presence of a chronic pathogenic stress capable of affecting the brain. This degree of irregularity was not found in the absence of such organic compounds.

(Authors' abstr.)

#### DECEMBER.

- \*Serial EEG's in Brain Injury. *Lauffer, M. W., and Perkins, R. F.* . . . 619  
 The Neurologic Examination of the Soldier. *Bellis, C. J.* . . . 631  
 \*Three Types of Thinking Disorder. *Rashkis, H. A.* . . . 650  
 A Follow-up Study of Army Enlisted Psychoneurotic Dischargees. *Feldman, F., and Kezur, E.* . . . 671  
 Tubercle Bacilli in C.S.F. of Dementia Praecox. *Darke, R. A.* . . . 686

#### *Serial EEG's in Brain Injury.*

There is a definite effect of time on serial EEG findings following cerebral trauma. Percentage of EEG improvement increases as time lapses after injury. The wider the cranial injury, the greater the likelihood of eventual EEG normality. "Amplitude asymmetry" is a valuable indicator and localizer of cerebral trauma.

(Authors' abstr.)

#### *Three Types of Thinking Disorder.*

The behavior of selected groups of schizophrenics, general paretics and cerebral arteriosclerotics on sorting tests which utilized words and numbers as manipulative objects, indicated that the three diagnostic categories tended to be behaviorably distinct from one another in a statistically significant manner.

These differences were demonstrable in terms of the patients' performance and their explanation of that performance. The schizophrenics were found to perform generally in an operationally defined "co-ordinated" manner, and to offer an explanation for their performance. General paretics tended to perform in an operationally defined "unco-ordinated" manner, and to offer no explanation for their performance. Cerebral arteriosclerotics tended to perform in an "unco-ordinated" manner that was statistically no different from that of the general paretics, but excused or apologized for their performance.

Schizophrenics and cerebral arteriosclerotics performed generally in a significantly different manner, but were alike in that they both tended to display some critical evaluation of their behavior.

The thinking disorder of the parietic is interpreted as both a deficit in performance potentialities and in organization. The thinking disorder of the cerebral arteriosclerotic is interpreted as a deficit in performance potentialities; the factor of intellectual organization is essentially unimpaired. The schizophrenic shows no deficit in performance potentialities. His disorder is interpreted as one of organization which appears as a non-correspondence between performance and explanation of performance.

(Author's abstr.)

#### VOL. CVII.

JANUARY, 1948.

- Neurologic Signs and Complications of ECT. *Karliner, W.* . . . 1  
 Psychosomatic Disorders and their Significance in Antisocial Behavior. *Abrahamson, D.* . . . 11  
 Acute Psychiatric War Casualties. *Klein, E.* . . . 25  
 A Dynamic Study of the So-called Psychopathic Personality. *Rodgers, T. C.* . . . 43  
 The "Concept of the Self" in Acute Traumatic Neurosis of War. *Buchenholz, B., and Frank, R.* . . . 55  
 Neighborhood Quarrels. *Arieff, A. J., et al.* . . . 62  
 Evaluation of Dynamics in Functional Mental Conditions. *Kant, O.* . . . 71

#### FEBRUARY.

- \*EEG Patterns in Experimental Epilepsy. *Pacella, B. L., et al.* . . . 99  
 A Fatality in Electroshock Therapy. *Will, O. A., et al.* . . . 105  
 Chronic Alcoholism. *Sillman, L. R.* . . . 127

- Hepatolenticular Degeneration. *Carter, H. R.* . . . . . 150  
 Vasopressor Activity in Cerebral Vascular Disease as Measured by the Cold  
 Pressure Reaction. *Becker, A. H., et al.* . . . . . 160  
 The Differences in Attitudes Toward Return to Duty of Neurotic and  
 Psychotic Soldiers in an Army General Hospital. *Porter, R. T., and  
 Michaels, J. J.* . . . . . 167

*The EEG Patterns in Experimental Epilepsy.*

In monkeys in which chronic recurrent epilepsy has been produced by the application of alumina cream to the motor cortex of one side of the brain, the following typical EEG patterns have been presented :

- (a) unilateral focus, consisting of irregular random and serial show activity, spike potentials and variants of spike and dome formations ;  
 (b) bilateral abnormalities, showing the above features on both sides of the brain.

It has also been demonstrated that subconvulsive doses of metrazol increased the focal discharges where the abnormality was minimal or moderate, but did not appreciably influence abnormalities which were already marked.

(Authors' abstr.)

MARCH.

- Cerebral Schistosomiasis. *Perkins, R. F., and Uihlein, A.* . . . . . 207  
 \*The Significance of Abnormal EEG Prior to ECT. *Taylor, R. M., and  
 Pacella, B. L.* . . . . . 220  
 Somato-psychic Factors in Anxiety Neurosis. *Ferraro, A.* . . . . . 228  
 The Role of Psychosis in Amyotrophic Lateral Sclerosis. *Friedlander, J. W.,  
 and Kesert, B. H.* . . . . . 243  
 \*Heredity as an Etiological Factor in Homosexuality. *Darke, R. M.* . . . . . 251  
 The Comparison of the Psychodiagnostic Findings of Graphology and Hand  
 Pathology. *Scheimann, E. J.* . . . . . 269  
 Amelioration of Anxiety Symptoms Accompanying the Healing of a Peptic  
 Ulcer. *Ziegler, D. K.* . . . . . 276

*The Significance of Abnormal Electroencephalograms Prior to Electroconvulsive Therapy.*

(1) Fifty-six patients all showing abnormal electro-encephalograms were treated with electro-convulsive therapy.

(2) The electro-encephalograms did not retain the marked slow wave activity characteristically observed following electro-convulsive therapy for periods significantly longer than in patients with normal pre-treatment electro-encephalograms, with 6 exceptions.

(3) Two patients developed spontaneous convulsions, which persisted in one of the patients for a long period of time.

(4) Four patients with a history of epileptiform seizures maintained on anti-convulsant medication during treatment showed no tendency to increased seizures.

(5) Patients with signs of arteriosclerosis showed more marked and more prolonged amnesia and confusion than did the remainder of the group, regardless of the character of their electro-encephalograms.

(6) Electro-encephalographic abnormalities of whatever degree do not by themselves constitute a contraindication to electro-convulsive therapy except where a focal or expanding lesion is suspected. (Authors' abstr.)

*Heredity as a Factor in Homosexuality.*

The application of Goldschmidt's developmental theory, derived from his study of gynandromorphs, gives no evidence in this study of an hereditary etiologic determination of homosexuality in human beings.

Individuals who continued passive sodomy beyond the age of 25 had a greater than expected number of female siblings.

There was a significant deviation from expectance among the siblings of passive penile fellators under the age of 25, with a predominance of male siblings. This deviation was not found in the group of older passive penile fellators.

## APRIL.

Motility, Behavior and the Brain. <i>Yakovlev, P. I.</i> . . . . .	313
Alterations of Behavior Produced in Cats by Lesions in the Brainstem. <i>Bailey, P.</i> . . . . .	336
*The Basic Pathology of Schizophrenia. <i>Nielsen, J. M.</i> . . . . .	340
*Studies in Electronarcosis Therapy. <i>Somion, A., et al.</i> . . . . .	358
*Studies in Electronarcosis Therapy. <i>Harris, R. E., et al.</i> . . . . .	371
ECT in General Paresis. <i>Solomon, H. C., et al.</i> . . . . .	377
The Significance of the Phenomenon of Extinction. <i>Wortis, S. B., et al.</i> . . . . .	382
Cerebral Localization of Psychological Processes Occurring during a Two-minute Experience. <i>Ingham, S. D.</i> . . . . .	388

*The Basic Pathology of Schizophrenia.*

(1) Many persons who appear superficially to be psychoneurotics in early life but show a paranoid personality trait develop into cases of true schizophrenia.

(2) Many persons who show true schizophrenia in later life have the elements of the diagnosis in their personality make-up years before the reactive psychosis develops. It is concluded that they have schizophrenia before the psychosis develops.

(3) Females who later develop schizophrenia commonly have subnormal menstrual function, perhaps even actual amenorrhea sometimes for years before a schizophrenic psychosis develops. They, in common with the males, show a persistent juvenility with inadequacy in the sexual sphere with lack of interest, dyspareunia or maternal inadequacy and emotional instability.

(4) The males show persistent juvenility in sexual as well as in general behavior. They also show outbursts of negativism or violent anger with control of such behavior if they find it necessary to exert the control. Thus they respond to discipline and such response differentiates them from psychopaths.

(5) All groups of apsychoic dementia praecox show intellectual-emotional dissociation, a true splitting of the personality. There is no actual cortical disturbance until possibly very late in the disease. The fundamental pathology must be in the diencephalon, a specific defect, not a gross lesion in the usual sense.

(Author's abstr.)

*Studies in Electronarcosis Therapy.*

(1) A study of the 17-ketosteroid excretion of a group of psychotic and psychoneurotic patients did not reveal a significant decrease or increase in daily excretion as compared to normals, nor is the rate of excretion significantly different during or after electroshock or electronarcosis therapy; nor was it confirmed that the sleep/waking excretion of 17-ketosteroids was lower in psychotic patients than in normals.

(2) Electroshock initiates a hyperglycemia which reaches a peak of 25 mgm. per cent. above pre-treatment levels 20 minutes after current is applied in *grand mal* reactions, and of 7 mgm. per cent. above pre-treatment levels 10 minutes after current is applied in *petit mal* reactions. In the electronarcosis-treated patients a 52 mgm. per cent. increase occurs 20 minutes after application of current. It is postulated that this may be evidence of sympathico-adrenal stimulation, most intense in electronarcosis, less so in *grand mal* electroshock therapy and least evident in *petit mal* electroshock reactions.

(3) There is no significant change in the blood cholesterol level in either *grand mal* or *petit mal* reactions resulting from electroshock or in electronarcosis.

(Authors' abstr.)

*Studies in Electronarcosis Therapy.*

In summary of the findings on intellectual functions, we may say: (1) the patients selected for electronarcosis therapy cover the usual range of intelligence, and do not differ from other clinical groups; (2) some of the patients show psychomotor retardation which is found to be associated with relatively good prognosis; (3) the therapy produces no marked changes in intellectual functioning.

Data on the Multiphasic may be summarized as follows: (1) the patients selected for electronarcosis show scores on the Multiphasic similar to those of other psychotic groups, and they resemble most closely those who respond to electroshock or insulin therapy; (2) patients responding best to electronarcosis tend to have high scores only on the Depression scale; and (3) within the electro-narcosis group, the majority of those responding well can be identified, and with somewhat more assurance, more than half of those who respond poorly can be identified without doing injustice to any cases who are marked much improved or recovered after therapy.

The most important theoretical implication of the psychological findings with respect to intellectual functions and personality is that the patients who respond best to this kind of therapy are those who are depressed and show psychomotor retardation. Patients with other kinds of intellectual impairment and with attitudes of social and emotional alienation, ideas of unreality and other psychotic symptoms respond relatively poorly. A secondary implication of the findings, suggested by the similarity of the criteria for poor response to the convulsive therapies (psychotics) and to psychotherapy (neurotics), is that the *Multiphasic* can identify relatively unmodifiable aspects of mental disorder, and that these aspects cut across the traditional separation of the psychoses from the neuroses.

(Authors' abstr.)

*Bilateral Fractional Resection of Frontal Cortex for the Treatment of Psychoses. Heath, R. G., and Pool, J. L.	411
Cyclopia, Arhinencephalia and Callosal Defect. Marburg, O.	430
A Study of the Plantar Response in Hypnotic Age Regression. Gidro-Frank, L., and Bowersbuch, M. K.	443
Notes on Group Psychotherapy. Lipkin, S.	459
Aleukemic Leukemia with Involvement of the C.N.S. Lipton, B. S., and Bucy, P. C.	480
Evidence and Clinical Significance of Homosexuality in 100 Unanalyzed Cases of Dementia Praecox. Norman, J. P.	484

#### MAY.

##### *Bilateral Fractional Resection of Frontal Cortex for the Treatment of Psychoses.*

(1) Bilateral circumscribed extirpation of frontal cortex was done on four psychotic patients. Two made a social recovery. Of the other two, who were deteriorated schizophrenics, one improved sufficiently to be at home under supervision and the other improved only temporarily.

(2) Complications frequently seen following lobotomy did not occur in this series.

(3) This is the first report of bilateral removal of cortical tissue in brains without gross cellular pathology. There were no deleterious effects on behavior.

(4) A more extensive report on a larger series of psychotic patients with circumscribed bilateral cortical ablation will be made shortly. (Authors' abstr.)

#### JUNE.

Eight Years Psychiatric Work in England. Sargant, W.	501
Electroshock Therapy. Mosovich, A., and Katzenelbogen, S.	517
Psychometric Changes During ECT. Luborsky, L. B.	531
The EEG in Cerebral Complications of Infectious Mononucleosis. Bercel, N. A.	537
The Management of Islet-cell Tumors of the Pancreas Correlated with Neuropsychiatric Phenomena. Malcolm, J. A., et al.	545
Social and Clinical Features of Chronic Alcoholism. Ellermann, M.	556
Dynamic Neurology. Aring, C. D.	569
A Case Study of a Proselyte from Catholicism to Judaism. Kupper, W. H., and Rubin, B. G.	575
ECT in Advanced Pregnancy. Simon, J. L.	579

## J. NEUROPATH. EX. NEUROL.

VOL. VII.

APRIL, 1948.

Studies in the Treatment of Experimental Hydrocephalus. <i>Ingraham, F. D., et al.</i>	123
*Carcinomas of the Tongue in Monkeys with Pathological Changes in the C.N.S. <i>Klüver, H., and Weil, A.</i>	144
Golgi Apparatus in Autonomic Ganglion Cells and Peripheral Neuroglia and its Modification Following Stimulation and Induced Hypertension. <i>Sulkin, N. M., and Kuntz, A.</i>	154
*Subcortical Changes in Cerebral Concussion. <i>Spiegel, E. A., et al.</i>	162
Cerebrospinal Fluid. <i>Hassin, G. B.</i>	172
*A Second Motor Cortex in the Monkey. <i>Sugar, O., et al.</i>	182
*Kernicterus. <i>Becker, P. F., et al.</i>	190
*Histometabolic Change and Neuropathologic Selectivity in the Light of Recent Investigations. <i>Roizin, L.</i>	216

*Carcinomas of the Tongue in Monkeys with Pathological Changes in the Central Nervous System.*

The histopathology of the central nervous system of two cases of carcinoma of the tongue in rhesus monkeys is described.

While the carcinoma in the first monkey was spontaneous in origin, the carcinoma in the second monkey was produced by an injection of an emulsion of the carcinomatous tissue from the first monkey into the tongue of the second.

Motor nuclei of the brain stem and the anterior horns of all spinal cord segments were affected. The lesions were characterized by intracytoplasmic vacuoles frequently containing a small, roundish body and by other severe cell changes.

In order to explain the limited distribution of the lesions in the brain stem and spinal cord, Galkin's experiments have been cited. They demonstrate direct connections between the lymphatic system of the pharynx and the subarachnoid spaces. It is assumed that the etiological factor responsible for the damage of the neurons (carcinoma toxin? virus?) invaded the central nervous system via such lymphatics. (Authors' abstr.)

*Subcortical Changes in Cerebral Concussion.*

(1) Subcortical areas, hypothalamus, nucleus ruber, and cerebellum show in the electroencephalogram quite similar disturbances as those observed on the cerebral cortex, and in some cases the disturbances of these areas may be more intense than in the cerebral cortex. Withdrawal of cerebrospinal fluid preceding the concussion does not prevent the development of these changes of electrical activity.

(2) Following cerebral concussion there may develop, in some instances, edema of the subependymal zone around the aqueduct in the subacute stage and proliferation of the subependymal glia fibers around the third ventricle in the chronic stage. (Authors' abstr.)

*A Second Motor Cortex in the Monkey (Macaca mullata).*

A second motor cortex has been described in the monkey, lying on the lateral (exposed) and medial (buried) walls of the fronto-parietal operculum and the posterior portion of the insula.

The arrangement of body-parts in this area is roughly that of the arrangement in the second sensory cortex which lies posteriorly, overlapping the motor cortex; the face region is anterior-superior and comes onto the lateral hemispheric surface; the foot region is posterior-inferior, adjacent to the supratemporal plane; the hand region, by far the largest, lies between the others. The movements obtained with 4/second stimulation are individual isolated ones; those from the distal portions of the body are much more readily obtained than those from the proximal portions. In all cases, the movements were contralateral to the area stimulated.

Stimulation of the anterior half of the insula caused respiratory slowing and

arrest in expiration. Movements of the vocal cords were obtained from the operculum anterior to the inferior precentral dimple. Eye movements were obtained in two monkeys from the anterior-superior portion of the insula near the infra-frontal plane.

Stimulation of the posterior third of the superior (buried) surface of the middle temporal gyrus produced ipsilateral twitches of the pinna; stronger stimulation caused spread to other muscles innervated by the facial nerve.

(Authors' abstr.)

#### *Kernicterus.*

Seven cases of kernicterus are described. They were all associated with erythroblastosis fetalis. This condition was confirmed in the authors' cases by means of serologic and histologic studies. In five cases the infants were Rh positive and the mother Rh negative with anti-Rh agglutinins. In one case the erythroblastosis was presumably due to the A factor and in another case the erythroblastosis was due to the Rh factor.

Slow movements of the extremities, suggestive of choreoathetoid movements were recorded. In five cases, jaundice appeared during the first day of life; post-mortem studies disclosed the discoloration to be present most frequently in the following structures: hippocampus, basal ganglia, midbrain, medulla and floor of the fourth ventricle. The microscopic findings, except for the sixth and seventh cases, were uniform. In regions grossly bile-stained the nerve cells were shrunken and stained readily with eosin, some containing dark staining nuclei. Some nerve cells displayed poorly stained cytoplasm and vacuolization. These alterations are not improbably the result of venostasis. No alterations of the glia cells, microglia, or connective tissues were detected.

In two cases, there was yellow pigment present in scattered nerve cells in the hippocampus, basal ganglia, pons, cerebellum (Purkinje cells) and medulla oblongata (olives).

Perivascular aggregations of undifferentiated neuro-epithelial cells were found scattered in their usual distribution. Extramedullary erythropoiesis, chiefly in the liver and spleen and visceral hemorrhages were other anatomical findings.

(Authors' abstr.)

#### *Histometabolic Changes and Neuropathologic Selectivity in the Light of Recent Investigations.*

An attempt has been made to emphasize the correlation between the morphologic and histometabolic organization of the nerve cells, to demonstrate the interaction between histometabolic components of the nerve cells and various endogenous and exogenous processes and to trace the interrelationship between various histometabolic disorders (histometabolic dysergia) and certain neuropathologic conditions.

Attention was drawn to the fact that cell activities in physiologic conditions are in a state of structural as well as functional balance (integrated structure-function synergism). This anatomo-functional unit is not acting as an individual particle but acts through various neural, vegetative, and hormonal reflexes, as an integrating part of the entire system. If this mechanism is disturbed by one or several of the factors which may be structural or functional in nature, a state of histometabolic dysergia may take place.

It was stressed that histometabolic dysergia is not sufficient in itself to bring about a pathologic disorder but represents a potentially reversible condition of predisposition or sensitization to vulnerability which, if aggravated by additional endogenous or exogenous precipitating factors, may react along certain functional or structural patterns, thus leading the way to a more or less permanent pathologic disturbance of the involved system.

Although it is necessary to realize that there is probably in each case an interplay of several factors, it seems reasonable to believe that histometabolic dysergia may play a very important pathogenic role in determining patterns of reaction and neuropathologic selectivity in various neurologic and psychiatric conditions.

(Author's abstr.)

## J. NEUROPHYSIOL.

VOL. XI.	JANUARY, 1948.
*Total and Free Acetylcholine in Rat Peripheral Nerves. <i>Prajmovsky, M., and Welsh, J. H.</i>	1
*Absence of Spinal Cord Regeneration in the Cat. <i>Davidoff, L. M., and Ramshoff, J.</i>	9
*The Cingular Gyrus: Area 24. <i>Ward, A. A., jun.</i>	13
*Phasic Inhibition of the Light Reflex of the Pupil during Retinal Rivalry. <i>Barany, E. H., and Hallden, U.</i>	25
*The Occipital Alpha Rhythm. <i>Cohn, R.</i>	31
*Some Respiratory, Vascular and Thermal Responses to Stimulation of Orbital Surface of Frontal Lobe. <i>Delgado, J. M. R., and Livingston, R. B.</i>	39

*Total and Free Acetylcholine in Rat Peripheral Nerves.*

1. Minced rat spinal nerves synthesize ACh *in vitro*.
2. A variable amount of ACh is synthesized during the determinations of free/total ACh ratios of rat spinal nerves. This synthesis is probably nearly complete within the first few minutes of the extraction procedure.
3. The ACh content of rat spinal nerves is variable. In a series of eleven experiments it averaged about 6  $\mu\text{g./g.}$
4. The ACh in normal rat spinal nerves is about 70 per cent. water-extractable. The free/total ACh ratio is constant within experimental error.
5. The ACh in the nerves of rats acutely poisoned with DDT or paralyzed by spinal transection or cold block is almost entirely water-extractable. The total ACh content of the nerves shows no change. (Authors' abstr.)

*Absence of Spinal Cord Regeneration in the Cat.*

No evidence was obtained of any regenerative power from the upper or lower ends of transected spinal cords in cats. A note of warning can be sounded on the basis of a fortuitous section which might have been interpreted as representing regeneration save for the persistence of a ganglion cell in the midst of the fibers in question. (Authors' abstr.)

*The Cingular Gyrus: Area 24.*

1. Electrical stimulation of area 24 causes respiratory, cardio-vascular and pupillary responses as well as piloerection. It also causes profound suppression of all motor activity, abolition of the deep reflexes and suppression of the electrical activity of the cerebral cortex. It may evoke complex bilateral tonic movements.
2. Marchi degeneration extends from area 24 through the cerebral peduncles to the medial reticular formation of the pons.
3. Ablation of area 24 causes a loss of fear of man, social indifference to fellow monkeys and loss of mimetic activity, grooming and signs of affection. (Author's abstr.)

*Phasic Inhibition of the Light Reflex of the Pupil During Retinal Rivalry.*

The pupillary reactions to short foveal flashes of constant intensity striking one eye were observed during retinal rivalry in normal subjects. A flash of suitable intensity, arriving during the phase of dominance of the stimulated fovea was shown to have a greater chance of eliciting a pupillary contraction than one arriving during suppression of the fovea. This shows that during rivalry a phasic inhibition possibly as far down as the level of the retinae takes place. The similarity with the retinal inhibition in cases of squint, previously demonstrated by other investigators, is pointed out. (Authors' abstr.)

*The Occipital Alpha Rhythm. A Study of Phase Variations.*

1. The pericalcarine cortex forms four functional oscillators of potential difference.
2. The potential fields (or dipoles) of the oscillators are oriented with maximum negativity around the calcarine fissure.

3. Thus certain out-of-phase electric activity may be observed as a result of the orientation of the potential fields.

4. Other apparent out-of-phase activity is the result of variations in frequency of the generators of potential difference.

5. The frequency regulation of any pericalcarine oscillator is not generally constant, but fluctuates around a mean value.

6. Precision methods are presented for the recording and observation of phase relations of the potential waves derived from the human brain.

(Author's abstr.)

*Some Respiratory, Vascular and Thermal Responses to Stimulation of Orbital Surface of Frontal Lobe.*

1. Electrical stimulation of the orbital surface of the frontal lobe in the dog and monkey results in certain blood pressure, respiratory and thermal responses.

2. An almost instantaneous fall in blood pressure (8-10 mm. Hg) resembling vagal effect may occur on stimulation of the orbital surface. Or there may be a slow rise occurring after a delay of 5-10 seconds and lasting about 30 seconds. In the monkey respiration can be arrested at any phase of the respiratory cycle by stimulation of active cortical areas in the region of the posterior orbital gyrus. In the dog respiration can be inhibited, but without complete arrest, by excitation of the lateral olfactory gyrus. Blood pressure and respiratory effects have slightly different thresholds and each can be obtained independently.

3. Mechanical, thermal and electrical excitation of the cortex of the orbital surface may result in a rapid rise of 6-8° F. in temperature of the extremities.

4. After bilateral chronic ablation of the posterior orbital gyrus in the monkey, temperatures of the extremities are markedly elevated and show less pronounced and less prolonged reaction to cold environment.

5. The frontal lobe has much cortex hidden within depths of sulci. Certain cortical areas in the sulcus principalis of the monkey and sulcus presylvius of the dog closely approach the cortex of the orbital surface and appear to have related function.

6. Changes in frequency and intensity of stimulation in the same cortical point are capable of bringing about different effects and may serve as a means of distinguishing different functional components of a single region.

(Authors' abstr.)

VOL. XI.

MARCH, 1948.

*The EEG in Experimental Concussion and Related Conditions. <i>Ward, J. W., and Clark, S. L.</i>	59
*Observations on Sensory Paralysis Produced by Compression of a Human Limb. <i>Sinclair, D. C.</i>	75
*Observations on Electrical Stimulation of Pain Fibres in an Exposed Human Sensory Nerve. <i>Pattle, R. E., and Weddell, G.</i>	93
*An Anatomical Basis for Alterations in Quality of Pain Sensibility. <i>Weddell, G., et al.</i>	99
*Site of Action of Acetylcholine. <i>Rothenberg, M. A., et al.</i>	111
*Retinal-nerve Interval in the Grasshopper. <i>Wulff, V. J., and Jahn, T. L.</i>	117
*Effect of DFP on Action Potential and Cholinesterase of Nerve. IV. <i>Feld, E. A., et al.</i>	125
*Calibre Spectra of Motor and Sensory Nerve Fibres to Flexor and Extensor Muscles. <i>Rexed, B., and Therman, P-O.</i>	133
*Effect of Nicotine on Spinal Synaptic Conduction and on Polarization of Spinal Cord. <i>van Harreveld, A., and Feigen, G. A.</i>	141

*The Electroencephalogram in Experimental Concussion and Related Conditions.*

(1) Concussion produced by a blow on the head, or an impact to a plunger in a saline-filled tube leading to the intracranial activity, was accompanied by changes in the EEG which were similar to each other and to those produced by instantaneous or fairly rapid rises of intracranial pressure.

- (2) Such changes produced in the EEG were reversible.
- (3) Changes in the EEG with concussion were not specific for concussion.
- (4) Of the slow waves produced in the EEG in these experiments, some were synchronous with the heart rate and peaked at the time of the T-wave of the EKG. The basis of these waves was not determined.
- (5) The EEG of animals receiving about the body simulated blast impacts of lethal character was not that of concussion. (Authors' abstr.)

*Observations on Sensory Paralysis Produced by Compression of a Human Limb.*

As a result of study of the sensory changes following the application of pressure to the intact human arm, Lewis, Pickering and Rothschild put forward the view that "sensory nerve fibres become more sensitive to ischaemia as they are traced back from their endings towards the central nervous system."

This work has been repeated, using a more critical technique, and it has been found that the generalizations upon which the theory is based do not survive a close examination. It is possible, however, to explain all the experimental observations in terms of currently accepted physiological principles, by a consideration of some of the anatomical factors involved in compression of the upper limb.

In the course of the investigation it was found that the mechanism of the sensation of touch aroused from the skin appears to be more susceptible to the effects produced by compression of the limb than that aroused from hairs. It is possible that the sensory endings may have some influence in modifying the manner in which the various sensory modalities are lost in compression experiments.

(Author's abstr.)

*Observations on Electrical Stimulation of Pain Fibres in an Exposed Human Sensory Nerve.*

Condenser shocks were applied to an isolated human digital nerve in which, following the injection of a local anaesthetic into the region, only a few fibres appeared to respond to stimuli. The only sensation which could be produced was that of pain which was felt after a delay of 1.25 seconds following the application of the stimulus. It is suggested that at least part of this delay is due to central and not peripheral factors.

The voltage threshold necessary to elicit pain was determined for a number of condenser discharges of different time-constants. The values so obtained are in satisfactory agreement with the theoretical voltage condenser time-constant curve of Hill, the time-constant "k" being about 6.5 milli-seconds.

The possibilities that one condenser shock gives rise to repetitive impulses in the nerve, and that pain is due to the temporal summation of impulses which singly would not cause pain, have been discussed, and rejected. (Authors' abstr.)

*An Anatomical Basis for Alterations in Quality of Pain Sensibility.*

Biopsies were taken, after sensory testing of the areas concerned, from a series of patients with either cutaneous scars or areas of partially denervated skin. It was found that in every case where pain of an unpleasant quality could be elicited by means of a needle-prick, the underlying nerve nets and terminals subserving pain were isolated from their neighbours. Conversely, in no case where this isolation was not found microscopically could pain of unpleasant quality be produced. It was also found that alterations in the quality of pain sensibility were not correlated with the presence of morphologically abnormal pain endings. Such endings were, however, associated with disturbances of the threshold of pain sensibility.

Further evidence concerning the association of pain of unpleasant quality with a reduction in the normal peripheral pattern of innervation was obtained from a number of compression experiments on the normal arm. It is considered that this association is a significant one, and that the occurrence of "over-reaction" to painful stimuli in various clinical conditions is caused by a reduction in the normal pattern of impulses presented to consciousness. The suggestions put forward by previous workers have been discussed in the light of this hypothesis.

(Authors' abstr.)

*Site of Action of Acetylcholine.*

1. Giant axons of squid were exposed to trimethylamine in 0.02 M and to acetylcholine in 0.1 M. concentration, both labelled with  $N^{15}$ . After exposure, the axoplasm was extruded and the  $N^{15}$  concentration determined.

2. It was found that the tertiary base, trimethylamine, penetrates into the interior. After 25 minutes' exposure, 7.1 micromoles N were found per gram of axoplasm or 39.5 per cent. of the external concentration. After one hour, the concentration was 15.9 micromoles N per gram as compared with 20 micromoles N per c.c. outside.

3. In contrast, acetylcholine did not penetrate into the interior. In spite of an outside concentration of acetylcholine amounting to 1430  $\mu\text{g}$ . N per c.c., only 86  $\mu\text{g}$ . N were found inside or 0.67 per cent. of the N outside. But even this negligible amount must be attributed to the impurities of non-quaternary N in the acetylcholine which were found to be 55  $\mu\text{g}$ . N per c.c.

4. The experiments demonstrate conclusively why the pharmacological effect of acetylcholine is limited to the synapse in contrast to the well-established physiological role of the ester in the surface membrane during conduction of nerve and muscle fibers. (Authors' abstr.)

*Retinal-nerve Interval in the Grasshopper.*

Stimulation of the eye of grasshoppers (*Melanoplus differentialis*) results in electrical responses in the visual system that can be recorded in the following order: (i) the retinal action potential, and (ii) a slow negative variation on the surface of the nerve between the optic ganglion and the brain. The latency of these responses, measured from the beginning of the light stimulus, increases as the stimulating intensity decreases. This relationship is such that the time interval between the beginning of the retinal response and the beginning of the optic nerve response, called the retinal-nerve interval, also increases as the intensity of stimulation decreases. This regular increase in the retinal-nerve interval is correlated with a reduction in magnitude of the retinal action potential and an increasing delay in the time of the occurrence of the peak of this action potential. This progressive increase in the retinal-nerve interval supports the hypothesis that the retinal action potential is the process or a sign of the process which is responsible for the activation of nervous elements in the optic pathway. (Authors' abstr.)

*Effect of Di-isopropyl Fluorophosphate (DFP) on Action Potential and Cholinesterase of Nerve.*

The stellar nerves (giant axons) of squid were exposed to two anticholinesterases, DFP and eserine. The concentration of these compounds in the axoplasm at the time of abolition of conduction was determined.

1. On exposure of the nerves to DFP in two concentrations, 2.2 and  $5.5 \times 10^{-3}$  M, the inside concentration was found to be less than 0.5 per cent. of that on the outside. The order of magnitude of the concentration in the axoplasm was  $10^{-5}$  to  $10^{-6}$  M. It varied in four cases from 1.3 to  $8.4 \times 10^{-6}$  M, in the fifth being  $3 \times 10^{-5}$  M.

2. Upon exposing the nerves to eserine in concentrations varying from  $2 \times 10^{-3}$  to  $1 \times 10^{-3}$  M, the inside concentration was much higher than in the case of DFP at the time when the action potential had disappeared. When the eserine concentration outside was  $1 \times 10^{-3}$  M, that in the axoplasm was about the same. With higher outside concentrations, the eserine inside increased slightly, but not proportionally.

3. The experiments show that the concentration of a compound applied externally to a nerve fiber does not indicate the concentration at the site of action. Some of the many factors determining the effectiveness of a compound applied externally are discussed.

4. Recent claims that conduction is possible in complete absence of cholinesterase activity have been re-examined. It was found that the data stem from use of inadequate technique. (Authors' abstr.)

*Calibre Spectra of Motor and Sensory Nerve Fibres to Flexor and Extensor Muscles.*

The tibialis anticus muscle and the gastrocnemius muscle in cats were de-afferented or de-efferented and the number and size of motor and sensory myelinated nerve fibres to the muscles studied separately, using a histological method described by Rexed.

No differences in fibre size were noticed between extensor and flexor. The motor nerve fibres ranged from 2 to 17 microns, and were collected in two groups from 2 to 7 microns and 7 to 17 microns respectively. The peak of the small-sized group lay at 4-5 microns, and that of the large-sized group at 11-13 microns. The sensory nerve fibres ranged from 1 to 17 microns and were collected in three groups from 1 to 4 microns, 4 to 10 microns and 10 to 17 microns respectively. The peaks of these groups lay in the small-sized group at 2-3 microns, in the medium-sized group at 6-8 microns and in the large-sized group at 12-13 microns. Shrinkage was not corrected for.

The number of sensory fibres corresponded to half of all nerve fibres in the flexor nerve, but only to a third of all fibres in the extensor nerve. The flexor nerve thus had a relatively larger number of sensory fibres—chiefly small fibres—than the extensor nerve. A similar difference between flexor and extensor motor fibres was less definite. (Authors' abstr.)

*Effect of Nicotine on Spinal Synaptic Conduction and on Polarization of Spinal Cord.*

1. Nicotine in small doses (5 mgm./kgm. body weight) suppresses the knee-jerk by central action.

2. The flexion reflex is suppressed by larger doses of nicotine (about 20 mgm./kgm. body weight). This is due to the peripheral curare-like action of nicotine.

3. The monosynaptic spike of the reflex action potential is depressed or abolished by nicotine in small doses (5 mgm./kgm. body weight), but reappears after the administration of large amounts of the drug (100 to 200 mgm./kgm. body weight).

4. The multisynaptic activity is much less affected by nicotine. The changes are qualitatively similar to those of the knee-jerk.

5. Since synaptic conduction in multisynaptic pathways of the spinal cord is hardly suppressed by nicotine, and since the monosynaptic spike, during its depression by small and moderate doses of nicotine, can be restored by appropriate facilitating procedures, it is concluded that nicotine does not interfere with the essential processes of synaptic conduction in the spinal cord. (Authors' abstr.)

## VOL. XI.

MAY, 1948.

Electrographic Evaluation of Mechanical Response in Mammalian Skeletal Muscle in Different Conditions. <i>Loofbourrow, G. N.</i> . . . . .	153
*The EEG in Curarized Mammals. <i>Girden, E.</i> . . . . .	169
*Corticospinal Connection of the Superior Surface of the Temporal Operculum in the Monkey. <i>Sugar, O., et al.</i> . . . . .	175
*Corticospinal Connections of the Superior Bank of the Sylvian Fissure in the Monkey. <i>French, J. D., et al.</i> . . . . .	185
*The Babinski Sign. Estimation During Bilateral Simultaneous Cutaneous Stimulation. <i>Cohn, R.</i> . . . . .	193
Afferent Fibres in Muscle Fibres. <i>Lloyd, D. P. C., and Chang, H. T.</i> . . . . .	199
Double Discharges in Human Motor Units. <i>Denslow, J. S.</i> . . . . .	209
Secretary Innervation of the Cats' Footpad. <i>Patton, H. D.</i> . . . . .	217
An Extension of the "Law of Denervation" to Afferent Neurones. <i>Drake, C. G., and Stavrakys, G. W.</i> . . . . .	229
Neural Organization of the Retinal Elements, as Revealed by Polarization. <i>Grant, R.</i> . . . . .	239
The Mammalian Colour Modulators. <i>Grant, R.</i> . . . . .	253
*Differential Action of Anoxia, Asphyxia and Carbon Dioxide on Normal and Convulsive Potentials. <i>Gellhorn, E., and Heymans, C.</i> . . . . .	261

*The EEG in Curarized Mammals.*

Evidence for the depression of inter-neural excitability by curare in the mammal is discussed. Data are offered to support the view that the spontaneous resting potentials, of which the EEG is an indicator, remains undisturbed in curarized mammal from rat to monkey. Evidence suggesting the contrary is analysed in terms of possible artefacts arising from types of anaesthesia, dosage of curare and inadequate respiration. (Author's abstr.)

*Corticospinal Connections of the Superior Surface of the Temporal Operculum in the Monkey.*

The method of physiological neuronography has been applied to the study of the connections of the supratemporal (s.-t.p.) plane of the monkey. The acoustic receptive cortex, lying on the s.-t.p. behind the inferior extremity of the central sulcus, has strong projections to the upper part of the frontal eye field (area 8), the fronto-parietal "face" area (6b, 44, 43, 1) and the visual association areas (18 and 19), as well as to other portions of the temporal lobe (areas 21, 22 and 37). It has connections by way of the corpus callosum (posterior fourth) with the homologous cortex of the opposite side.

The extra-auditory region of the s.-t.p. lacks the extensive afferent connections of the auditory cortex; it fires the neighbouring regions and is connected with its homologue of the opposite side by tracts which traverse the anterior portion of the middle of the corpus callosum.

Other connections of the supratemporal plane with areas in the frontal, opercular, prearcuate and parietal regions are also described. (Authors' abstr.)

*Cortico-cortical Connection of the Superior Bank of the Sylvian Fissure in the Monkey.*

By local strychninization and recording induced activity, the connections to and from the infraparietal and infrafrontal planes (i.-p.p. and i.-f.p.) and other cortical areas have been mapped in the macaque monkey. These studies, in agreement with cytoarchitectonic studies and the results of stimulation, indicate a fundamental difference between the i.-p.p. and the i.-f.p.; the dividing line between these two areas probably lies at about the level of the anterior subcentral dimple.

The i.-p.p. corresponds to the second sensory receptive zone of Adrian and of Woolsey. It has afferent and efferent connections with the pre- and post-central convolutions bilaterally. The connections are stronger with the first sensory cortex than with the first motor cortex. In general, the posterior portion of the i.-p.p. is connected with the leg and shoulder regions of the sensorimotor cortex and the anterior portion with the thumb and face regions. There was firing into isolated regions of areas 6 and 8 from restricted zones of the i.-p.p. Extensive connections were found between the i.-p.p. and the parietal operculum.

The i.-f.p. has no connections with the sensorimotor cortex with the possible exception of the face regions, but does project to isolated portions of area 6 and to the frontal operculum on the convexity of the hemisphere.

The i.-f.p. and i.-p.p. are each connected across from one hemisphere to the other homeotopically. There were no projections from the i.-f.p. of one side to the i.-p.p. on the opposite side, whereas region c of the i.-p.p. fired the contralateral i.-f.p. (region e).

The connections of the i.-p.p. and i.-f.p. with the sensorimotor cortex give a somatotopic arrangement which agrees well with that found by Woolsey and others using the method of evoked potentials from cutaneous stimulation.

(Authors' abstr.)

*The Babinski Sign.*

The extinction of the unilateral positive Babinski sign by effective simultaneous bilateral sensory stimulation has been demonstrated in three patients (transient in one) with ipsilateral (to the Babinski sign) hemidysesthesia.

It is hypothesized that the Babinski reflex may be triggered at thalamic and cortical levels as well as in the spinal cord. (Authors' abstr.)

*Differential Action of Anoxia, Asphyxia and Carbon Dioxide on Normal and Convulsive Potentials.*

Anoxia induced by inhalation of 4 per cent. O<sub>2</sub> or of N<sub>2</sub> abolishes convulsive potentials at a time when normal potentials are practically unchanged. On readmission of air normal potentials appear in the previously convulsive areas before the convulsive spikes reappear. There is no indication of an excitatory phase in anoxia.

Asphyxia induced by cessation of artificial respiration abolishes likewise spikes before normal potentials and leads to an earlier reappearance of the latter on readmission of air. In addition, asphyxia causes a temporary excitation characterized by an increased frequency of spikes and, in the normal cortex, by an increase in background potentials and a decrease in dial potentials.

When anoxia or asphyxia is carried out until convulsive and normal, grouped (dial) potentials are abolished, their restitution on reoxygenation is preceded by continuous small potentials which are considered to be the equivalent of the increased post-anoxic excitability.

Convulsive potentials may be replaced in the course of anoxia or asphyxia by dial potentials which were absent in the same cortical area as long as convulsive activity persisted. Moreover, under favourable conditions, progressive anoxia and asphyxia are accompanied by a decreasing spike amplitude while on reoxygenation their magnitude increases. These data seem to indicate that anoxia and asphyxia induce a progressive decruitment of cortical cells and reoxygenation a progressive recruitment. The limiting factor which determines the number of discharging neurons and the degree of their activity (convulsive *is* non-convulsive) seems to be the supply of oxygen.

The restitution of normal oxygenation of the blood after anoxia and asphyxia is often accompanied by a rebound which is shown in the normal cortex in the form of more frequently appearing groups of dial potentials and in the convulsive cortex as increase in frequency of spikes. During this rebound convulsive potentials may appear which were absent under control conditions due to the application of sub-threshold concentrations of the convulsant drug.

Hypercapnia induced by inhalation of 10.6 per cent. CO<sub>2</sub> causes excitation of normal and particularly of convulsive potentials (increase in frequency).

### J. NEUROSURG.

VOL. V.	MARCH, 1948.
Benign Cysts of the Brain. <i>Drew, J. H., and Grant, F. C.</i>	107
The Conservative Treatment of Third Ventricle Tumors. <i>Ward, A., and Spurling, R. G.</i>	124
Posterior Fossa Meningiomas. <i>Campbell, E., and Whitfield, R. D.</i>	131
Sacral Nerve Innervation of the Human Bladder. <i>Heimburger, R. F., et al.</i>	154
Physiologic Studies of Arteriovenous Anomalies of the Brain. <i>Shenkin, H. A., et al.</i>	165
Psychometric Testing of Patients who had Brain Tumors Removed During Childhood. <i>French, L. A.</i>	173
Changes in Internal Carotid Pressure during Carotid and Jugular Occlusion and their Clinical Significance. <i>Sweet, W. H., and Bennett, H. S.</i>	178

### MAY.

The Torkildsen Procedure. <i>Fincher, E. F., et al.</i>	213
Experiments on the Bridging of Gaps in Severed Peripheral Nerves of Monkeys. <i>Watson, D. M., et al.</i>	230
Should Extirpation be Attempted in Cases of Neoplasm in or near the Third Ventricle of the Brain? <i>Torkildsen, A.</i>	249
The Technique of Anterolateral Cordotomy. <i>Kahn, E. A., and Peet, M. M.</i>	276
Suture of Facial Nerve after Injury at Base of Skull. <i>White, J. C.</i>	284
*Unilateral Prefrontal Lobotomy with Relief of Ipsilateral, Contralateral and Bilateral Pain. <i>Scarff, J. E.</i>	288

*Unilateral Prefrontal Lobotomy with Relief of Ipsilateral, Contralateral and Bilateral Pain.*

Three cases are here reported which indicate that unilateral prefrontal lobotomy will relieve ipsilateral, contralateral and bilateral pain. Symptoms commonly associated with the withdrawal of morphine from patients previously heavily addicted to its use because of pain did not occur following unilateral prefrontal lobotomy in the cases here reported. (Author's abstr.)

**J. PARAPSYCHOL.**

VOL. XI.	1947.
E.S.P. Tests in Light and Darkness. <i>Beran, J. M.</i> . . . . .	76
Rhythms of Success in PK Test Data. <i>Pratt, J. G.</i> . . . . .	90
Physical or Non-physical. <i>McConnell, R. A.</i> . . . . .	111
Personality Measurements and ESP Tests with Cards and Drawings. <i>Stuart, C. E., et al.</i> . . . . .	118
Simultaneous High and Low Aim in PK Tests. <i>Humphrey, B. W.</i> . . . . .	160
A Review of the Evidence for Dowsing. <i>McMahon, E. A.</i> . . . . .	175
Restricted Areas of Success in PK Tests. <i>Pratt, J. G.</i> . . . . .	191
A New Displacement Effect in ESP. <i>Bindrim, E.</i> . . . . .	208

**J. PERSONAL.**

VOL. XVI.	DECEMBER, 1947.
A Study of the Novels of Charlotte and Emily Brontë as an Expression of their Personalities. <i>Mccurdy, H. G.</i> . . . . .	109
Aspects of Personality and Culture in a Guatemalan Community. I. <i>Billig, O., et al.</i> . . . . .	153
Asch on "Forming Impressions of Personality." <i>Mensh, I. N., and Wishner, J.</i> . . . . .	188
Testing the Claims of a Graphologist. <i>Pascal, G. P., and Suttell, B.</i> . . . . .	192
A Controlled Association Test as a Measure of Neuroticism. <i>Crown, S.</i> . . . . .	198
The Structure of Sentiments. III. <i>French, V. V.</i> . . . . .	209

**J. PHYSIOL.**

VOL. CVII.	MARCH, 1948.
The Local Electric Charges Associated with Repetitive Action in a Non-medullated Axon. <i>Hodgkin, A. L.</i> . . . . .	165
The Stimulating Action of Phosphate Compounds on the Perfused Superior Cervical Ganglion of the Cat. <i>Feldburg, W., and Hebb, C.</i> . . . . .	210

**J. PSYCHOL. NORM. PATH.**

VOL. XL.	1947.
Pierre Janet and the Theory of Tendencies. <i>Meyerson, I.</i> . . . . .	5
The Problem of the Self and the Technique of the Novel in the Hands of Virginia Woolf. <i>Le Breton, M.</i> . . . . .	20
Remarks on the Means of Expression "Person" in Modern Greek. <i>Miramabel, A.</i> . . . . .	35
The Bimbora's Concept of Personality. <i>Dieterlen, G.</i> . . . . .	45
A Test of Imagination: the I.J.S. Verbal Test. <i>Stora, J.</i> . . . . .	94
"La Perception de la Causalité" d'Albert Michotte. <i>Guillaume, P.</i> . . . . .	112
Animal Language. <i>Vandel, A.</i> . . . . .	129
The Child and Geometric Figures. <i>Michaud, E.</i> . . . . .	154
The Gulliver Theme and Laplace's Postulate. <i>Schuhl, P-M.</i> . . . . .	169
Flaubert and the Development of the Actor. <i>Pommier, J.</i> . . . . .	185
The Restorative Power of Sleep and its Measurement. <i>Viaud, G.</i> . . . . .	195
Comments on Verbalism. <i>Belaval, Y.</i> . . . . .	232

## J. PSYCHOL.

VOL. XXV.	JANUARY, 1948.
The Religion of the Post-war College Student. <i>Allport, G. W., et al.</i>	3
Personal Factors Associated with Leadership. <i>Stogdill, R. M.</i>	35
Rorschach Evaluation of the Schizophrenic Process following a Prefrontal Lobotomy. <i>Van Waters, R. O., and Sacks, J. G.</i>	73
Observation and Hypothesis in Psychology. <i>Welch, L.</i>	89
The Performance of Girls and Women on the Grove Modification of the Kent-Shakow Formboard Series. <i>Wylie, R. C.</i>	99
The Diagnosis of Neurotic Traits by Means of a New Perceptual Test. <i>Angyal, A. F.</i>	105
Experiments in Psychotherapy. <i>Ruesch, J.</i>	137
A Preliminary Investigation of Color Discrimination in the Florida Cricket Frog. <i>Smith, R. G., jun.</i>	171
Finger Painting for the Blind. <i>Napoli, P. J., and Harris, W. W.</i>	185
Catabiotic Autosusception. <i>Ledgerwood, R.</i>	197

## APRIL.

The Projective Expression of Needs. I. <i>McClelland, D. C., and Atkinson, J. W.</i>	205
Problem Solution by Monkeys Following Extensive Unilateral Decortication and Pre-frontal Lobotomy of the Contralateral Side. <i>Moss, E., and Harlow, H. F.</i>	223
Reaction Time as a Measure of Span of Attention. <i>Saltzman, I. J., and Garner, W. R.</i>	227
Reliability of an Absolute Scale for Rating Familiarity. <i>Nixon, H. K.</i>	243
Dynamic and Cognitive Categorization of Qualitative Material. I. <i>Frenkel-Brunswick, E.</i>	253
Dynamic and Cognitive Categorization of Qualitative Material. II. <i>Frenkel-Brunswick, E.</i>	261
The Evaluation of Instruction in Air University. <i>Greene, J. E.</i>	279
The Attainment of Concepts. IV. <i>Heidbreder, E., et al.</i>	299
On a Possible Use of the Root Nodules of Leguminous Plants for Research in Neurology and Psychiatry. <i>Klüver, H.</i>	331
The Vocational Interests of Engineering and Non-engineering Students. <i>Speer, G. S.</i>	357
Some Factors Determining Intercultural Behavior and Attitudes of Members of Different Ethnic Groups in Mixed Neighbourhoods. <i>Saenger, G., and Shulman, H. M.</i>	365
A Preliminary Study of the Relationships Between the Bernreuter Personality Inventory and Performances on the Army Alpha Examination and the George Washington Social Intelligence Test. <i>Eimicke, V. W., and Fish, H. L.</i>	381
A Brief Description of a Reliable Criterion of Job Performance. <i>Ferguson, L. W.</i>	389
Visibility on Cathode-ray Tube Screens. I. Problems and Methods. <i>Williams, S. B., and Bartlett, N. R.</i>	401
Academic Success in College of Public and Private School Students. <i>Seltzer, C. C.</i>	419
"Higher" and "Lower" Needs. <i>Maslow, A. H.</i>	433
Minor Studies of Aggression. II. <i>Miller, N. E., and Bugelski, R.</i>	437
The Psychogalvanic Response and its Relation to Changes in Tension and Relaxation. <i>Standt, V. M., and Kubis, J. F.</i>	443
Visibility on Cathode-ray Tube Screens. II. <i>Williams, S. B., et al.</i>	455

## VOL. XXVI.

## JULY.

A Bas-relief Projective Technique. <i>Harris, W. W.</i>	3
Directory of Clinical Psychologists Engaged in Correctional Psychology. <i>Burton, A.</i>	19
Relation of the Brightness Differences of Colors to their Apparent Distances. <i>Johns, E. H., and Sumner, F. C.</i>	25

A Finger Painting Record Form. <i>Napoli, P. J.</i> . . . . .	31
The Attainment of Concepts. V. <i>Heidbreder, E., and Overstreet, P.</i> . . . .	45
A New Apparatus for the Controlled Administration of ECT. <i>Russell, R. W., et al.</i> . . . . .	71
Psychologists Should Study Psychology. <i>Babcock, H.</i> . . . . .	83
An Analysis of an Operant Discrimination. <i>Frick, F. C.</i> . . . . .	93
The Relationship of Testing Conditions and Intellectual Level to Errors and Correct Responses in Several Types of Tasks Among College Women. <i>Standt, V. M.</i> . . . . .	125
The Children's Form of the Rosenzweig Picture—Frustration Study. <i>Rosenzweig, S., et al.</i> . . . . .	141
The Attainments of Concepts. VI. <i>Heidbreder, E.</i> . . . . .	193
Use of the Hildreth Feeling and Attitude Scales with College Students. <i>Lehner, G. F. J., and Hunt, E. L.</i> . . . . .	217
Observation of Initial Visual Experience in Rats. <i>Miller, M.</i> . . . . .	223
Application of the MMPI in Differentiating A.W.O.L. Recidivists from Non-recidivists. <i>Clark, J. H.</i> . . . . .	229
The Affective Tone of Tactual Impression. <i>Hunton, V. D., and Sumner, F. C.</i> . . . . .	235
An Experimental Study of the Validity of the Non-directive Method of Teaching. <i>Gross, L.</i> . . . . .	243
Methods of Learning as Factors in the Prediction of School Success. <i>Carter, H. D.</i> . . . . .	249

## J. SOC. PSYCHOL.

VOL. XXVII.	FEBRUARY, 1948.
The Formation of Group Norms in Waking Suggestion. <i>McCord, F.</i> . . . .	3
The "Black Hole" of Calcutta. Fact or Fiction. <i>Hartmann, G. W.</i> . . . .	17
A Study in the Application of Socio-psychological Research to the Problems of Business and Industry. <i>Henry, W. E.</i> . . . . .	37
Variations in Role and Group Identifications as Frames of Reference. <i>Kay, L. W.</i> . . . . .	63
A Skeptical Note on the Use of Attitude Scales Toward War. III. In 1946. <i>Ericksen, S. C.</i> . . . . .	79
Some Psychological Hypotheses on Nazi Germany. II. <i>Kecskemeti, P., and Leites, N.</i> . . . . .	91

## J. SPEECH HEAR. DIS.

VOL. XIII.	MARCH, 1948.
Present Concepts of Laryngeal Disease. <i>Lederer, F. L.</i> . . . . .	11
Leopold Treitel on Stuttering. <i>Jones, M. V.</i> . . . . .	19
Twenty-five Years of Cleft Palate Prosthesis. <i>Harkins, C. S., and Baker, H. K.</i> . . . . .	23
Infant Speech. <i>Irwin, O. C.</i> . . . . .	31
Fundamentals in the Treatment of Communicative Disorders Caused by Hearing Disability. <i>Pauls, M. D., and Hardy, W. G.</i> . . . . .	35
Studies in Clinical Techniques. Part III. Mandibular Facet Slip. <i>Palmer, M. F.</i> . . . . .	44
Speech Survey Methods in Public Schools. <i>Suydam, V. R.</i> . . . . .	51
Ohio Looks Ahead in Speech and Hearing Therapy. <i>Irwin, R. B.</i> . . . . .	55
Make Mother a Clinician. <i>Lillywhite, H.</i> . . . . .	61
The Speech Correctionist on the Cerebral Palsy Team. <i>Snidecor, J. C.</i> . . . .	67
Practical Techniques in Speech Training for Cleft Palate Cases. <i>Wells, C. G.</i> . . . . .	71

## JUNE.

Fundamentals in the Treatment of Communicative Disorders Caused by Hearing Disability. <i>Pauls, M. D., and Hardy, W. G.</i> . . . . .	97
Personnel Counseling and the Speech Clinic. <i>Bryngelson, B.</i> . . . . .	107
The Wish for Defective Speech. <i>Freestone, W. M.</i> . . . . .	119
Supplementary Technique to Use with Secondary Stutterers. <i>Clark, R. M.</i> . . . .	131

## L'ENCEPHALE.

VOL. XXXVII.	1948.
The Value and Significance of Some Heredo-degenerative Correlations. <i>van Bogaert, L.</i> . . . . .	I
The Paranoia of Kleist. <i>Delay, J., et al.</i> . . . . .	18
The Self and the Role in Psychoanalytic Technique. <i>Nacht, S.</i> . . . . .	33
The Action of Sodium Amytal in Catatonic and Depressive Psychoses. <i>Delay, J., et al.</i> . . . . .	57
The Rorschach Test after Amphetamine Shock in the Diagnosis of Schizo- phrenias. <i>Delay, J., et al.</i> . . . . .	73
Sodium amytal in Neuro-psychiatry and in Psychosomatic Medicine. <i>Delay,</i> <i>J., and Mallet, J.</i> . . . . .	99
Localized Cranio-facial Pain. <i>Taplas, J-N.</i> . . . . .	109
Sodium Amytal. Experimental Data Relative to its Psychiatric and Psychosomatic Applications. <i>Delay, J., and Mallet, J.</i> . . . . .	132
A Cerebellar Syndrome of Frontal Origin. <i>Ferreiro, C.</i> . . . . .	147

## L'EVOLUTION PSYCHIAT.

VOL. IV.	1947.
Fugue and Flight from Oneself. <i>Lagache, D.</i> . . . . .	I
Child Psychiatry During the War. <i>Male, P.</i> . . . . .	17
The Role of the Self in the Structure of Character and Behaviour. <i>Nacht, S.</i> . . . . .	39
The Psychopathology of Puberty and Adolescence. <i>Rouart, J.</i> . . . . .	67
Child Psychiatry and War. <i>Rouart, J.</i> . . . . .	81

## MED. J. AUSTR.

VOL. XXXIV.	1947.
Modern Trends in British Psychiatry. <i>Stoller, A.</i> . . . . .	765
Psychosomatic Medicine. <i>Edwards, A. T.</i> . . . . .	772
Psychosomatic Medicine. <i>Ross, D.</i> . . . . .	774

VOL. XXXV.	1948.
The Treatment of Psychoses and Psychoneuroses by Electroplexy in a General Hospital. <i>Bostock, J., and Philipps, B. J.</i> . . . . .	I
The Individual and the Environment. <i>Abbie, A. A.</i> . . . . .	321
The Hypothalamus and Obesity. <i>Brooks, C.</i> . . . . .	327
The Pharmacology of Junctional Transmission. <i>Shaw, F. H.</i> . . . . .	453
EEG—the Localization of Cerebral Lesions. <i>Trahair, G., and Garvon, A. K.</i> . . . . .	458
The Occurrence of Rapid Potential Changes in the EEG. <i>Draper, M. H.,</i> <i>et al.</i> . . . . .	465

## MENNESKE MILJØ.

VOL. I.	1946.
The Psychiatric Consideration of Conditions and Viewpoints Toward the Law Permitting Abortion. <i>Helwig, H.</i> . . . . .	6
Investigation of Political Activity from Social Psychology, Criminology and Psychiatric Viewpoints. <i>Rasmussen, T.</i> . . . . .	34
Future Criminal Tendencies. <i>Stürup, G. K.</i> . . . . .	37
Nazism and Mental Hygiene. <i>Ødegard, Ø.</i> . . . . .	51
Influence of Factors of Social Psychology on Trial by Jury Procedures. <i>Kinberg, O.</i> . . . . .	60
Mother's Pension and the Law Permitting Abortion. <i>Skalts, V.</i> . . . . .	71
A Study of Treason. <i>Rubin, E.</i> . . . . .	86
Old Age and Environment. <i>Bræchner-Mortensen, G.</i> . . . . .	119
Work and Publications on Psychological Contributions in Norway During the Years 1940-45. <i>Fluge, F.</i> . . . . .	122
Type and Form of Productive Psychiatric Research in Denmark. <i>Helwig,</i> <i>H.</i> . . . . .	145

Psychiatric Research in Finland. <i>Kaila, M.</i> . . . . .	147
Program of Legalized Psychiatric Research in Norway. <i>Evenson, H.</i> . . . . .	150
Procedures in Legalized Research in Sweden. <i>Berghin, C-G.</i> . . . . .	161
Testing the Intelligence of Adults. <i>Husén, T.</i> . . . . .	175
Practical Mental Hygiene. <i>Stürup, G. K.</i> . . . . .	185

## MIND.

VOL. LVII. . . . .	APRIL, 1948.
Boole and the Revival of Logic. <i>Kneale, W.</i> . . . . .	149
Can God's Existence be Disproved. <i>Findlay, J. W.</i> . . . . .	176
Necessary Propositions and Entailment-Statements. <i>Strawson, P. F.</i> . . . . .	184
Mental Acts. <i>Ewing, A. C.</i> . . . . .	201

## JULY.

A. N. Whitehead. The Last Phase. <i>Emmet, D.</i> . . . . .	265
The Meaning of Some Metaphysical Propositions. <i>Körner, S.</i> . . . . .	275
Differences. <i>Haldane, J. B. S.</i> . . . . .	294
The Function of Philosophical Aesthetics. <i>Gallii, W. B.</i> . . . . .	302
Some Arguments Against Moore's View of the Function of "Good" in Ethics. <i>Halzrahi, P.</i> . . . . .	322

## NED. TIJDSCHR. PSYCHOL.

VOL. I. . . . .	1946.
The Socio-psychological Background of the World Crisis. <i>van der Horst, L.</i> . . . . .	2
The Basis of the Human Being. <i>Révész, G.</i> . . . . .	30
The Content of Perception and Apparent Perception of Duration. <i>van der Waals, H. G., and Roelof, C. O.</i> . . . . .	45 and 150
The Influence of War on the Intelligence Level of Youth. <i>de Groot, A. D.</i> . . . . .	80
VOL. II. . . . .	1947.
The Relations Between Psychology and Psychopathology. <i>Prick, J. J. G.</i> . . . . .	4
Psychological Observations on the Post-war Man. <i>Hugenholtz, P. T.</i> . . . . .	20
Observations on the Wiersma-Bourdon Test. <i>Huiskamp, J., and de Mare, H.</i> . . . . .	75

## NERV. CHILD.

VOL. VII. . . . .	1948.
Hospital Personality. <i>Tanner, M. P.</i> . . . . .	149
Institutional Needs in the Field of Child Welfare. <i>Clothier, F.</i> . . . . .	154
Institutional Treatment of Children. <i>Davidoff, E.</i> . . . . .	178
The Out-patient Child Guidance Clinic. <i>Sloman, S. S.</i> . . . . .	195
Child-Parent Problems and the Hospital. <i>Jensen, R. A., and Comly, H. H.</i> . . . . .	200
Pediatric Convalescence. <i>Liss, E.</i> . . . . .	204

## OCCUP. PSYCHOL.

VOL. XXII. . . . .	1948.
Satisfactions in Work. <i>Mace, C. A.</i> . . . . .	5
The Measurement of Human Skill. <i>Bartlett, F. C.</i> . . . . .	31
Payment and Incentives. <i>Madge, C.</i> . . . . .	39

## OCCUP. THER. REHAB.

VOL. XXVII. . . . .	FEBRUARY, 1948.
Geriatric Rehabilitation. <i>Affleck, J. W.</i> . . . . .	1
The Relation of Music to Diseases of the Brain. <i>Reex, H. H.</i> . . . . .	12
Conscious and Unconscious Factors in Rehabilitation. <i>Liss, E.</i> . . . . .	19
On the Moral Treatment of Insanity. <i>Leuret, F.</i> . . . . .	27

## APRIL.

- The Physiotherapist and the Physical Training Instructor. *Stanton Woods, R.* . . . . . 71

## JUNE.

- Occupational Therapy and Quadriplegia. *Gingras, G., and Hardy, G.* . . . . . 159  
 "Self-Help Aids" in the Rehabilitation of the Quadriplegic Patient. *Clarke, M. D., et al.* . . . . . 167  
 Driving Devices for the Quadriplegic Patient. *Slant, P. L., and Whiting, H. S.* . . . . . 172

## PROC. ROY. SOC. MED.

- VOL. XLI. . . . . 1948.  
 Discussion—Juvenile Delinquency with Special Reference to Remand Homes . . . . . 197  
 Discussion on the EEG in Organic Cerebral Disease . . . . . 237  
 Electromyography. *Bauwens, P.* . . . . . 291

## PSYCHIAT. QUART.

- VOL. XXI. . . . . OCTOBER, 1947.  
 Modern Concepts of Genetics in Relation to Mental Health and Abnormality  
 Personality Development. *Kallmann, F. J.* . . . . . 535  
 Systematic Psychotherapy of the Psychoses. *Gottschalk, L. A.* . . . . . 554  
 Psychotherapies I Encountered. *Brill, A. A.* . . . . . 575  
 The Control of Enteric Infections in Mental Hospitals. *Ingraham, H. S.* . . . . . 592  
 Telepathy and Psychoanalysis. *Ellis, A.* . . . . . 607  
 Experience with Mixed Insulin and ECT. *Niver, E. O., and Callin, K. A.* . . . . . 660  
 Psychological By-Products of a Physical Examination. *Fries, M. E.* . . . . . 671

- VOL. XXII. . . . . JANUARY, 1948.  
 Psychosomatic Aspects of the Korsakoff Syndrome. *Davidson, G. M.* . . . . . 1  
 The Song of the Sirens. *Roheim, G.* . . . . . 18  
 A Critique of Intravenous Barbiturate Usage in Psychiatric Usage. *Burnett, W. E.* . . . . . 45  
 The Biological Purpose of the Dream. *Brody, M.* . . . . . 64  
 The Myth of a New National Disease. *Bergler, E.* . . . . . 66  
 Psychotherapy in a Veterans' Administration Mental Hygiene Clinic. *Blackman, N.* . . . . . 89  
 Analysis of a Presumptively Telepathic Dream. *Eisenbud, J.* . . . . . 103  
 The Use of Bulgarian Belladonna Root in the Treatment of Huntington's Chorea. *Lazar, M.* . . . . . 136  
 Clinical Investigations of Simple Schizophrenia. *Kant, O.* . . . . . 141

## PSYCHIATRY.

- VOL. XI. . . . . 1948.  
 The Meaning of Anxiety in Psychiatry and in Life. *Sullivan, H. S.* . . . . . 1  
 Obeah: Magic and Social Structure in the Lesser Antilles. *Sereno, R.* . . . . . 15  
 Delusion, Belief and Fact. *Money, J.* . . . . . 33  
 Color Denial in the Negro. *Myers, H. J., and Yochelson, L.* . . . . . 39  
 A Study of Mental Derangements in Africans, etc. *Carothers, J. C.* . . . . . 47

## PSYCHOANAL. QUART.

- VOL. XVII. . . . . JANUARY, 1948.  
 Alcoholism and Addiction. *Simmel, E.* . . . . . 6  
 Comments on the Correlation of Theory and Technique. *Lorand, S.* . . . . . 32  
 Feminine Significance of the Nose. *Saul, L. J.* . . . . . 51

Dynamic Aspects of Psychopathic Personality. <i>Bromberg, W.</i> . . . . .	58
A Problem of Ego Structure. <i>Scott, W. C. M.</i> . . . . .	71
The Influence of Unrecognized Difficulties. <i>Frank, R. L.</i> . . . . .	84
Three Tributaries to the Development of Ambivalence. <i>Bergler, E.</i> . . . . .	173
The Concurrent Analysis of Married Couples. <i>Mittelman, B.</i> . . . . .	182
Problem of Psychoanalytic Training. <i>Gitelson, M.</i> . . . . .	198
Boswell: The Biographer's Character. <i>Hitschmann, E.</i> . . . . .	212
The Effects of Shock Treatment on the Ego. <i>Frosch, J., and Impastato, D.</i> . . . .	226
The Dynamic Basis of Anti-Semitic Attitudes. <i>Ackerman, N., and Jatroda, M.</i> . . . . .	240

## PSYCHOANAL. STUD. CHILD.

VOL. II.	1946.
Comments on the Formation of Psychic Structure. <i>Hartmann, H., et al.</i> . . . . .	11
The Child's Laughter. <i>Jacobson, E.</i> . . . . .	39
Twins. <i>Burlingham, D. T.</i> . . . . .	61
The Pre-oedipal Phase in the Development of the Male Child. <i>De Groot, J. L.</i> . . . . .	75
The Child's Ego Development and the Training of Adults in his Environment. <i>Fries, M. E.</i> . . . . .	85
Hospitalism. <i>Spitz, R. A.</i> . . . . .	113
The Psychoanalytic Study of Infantile Feeding Disturbances. <i>Freud, A.</i> . . . .	119
The Psychogenic Tic in Ego Development. <i>Gerard, M. W.</i> . . . . .	133
Psychoanalytic Contributions to the Problems of Reading Disabilities. <i>Blanchard, P.</i> . . . . .	163
The Analysis of a Case of Night Terror. <i>Hall, J. W.</i> . . . . .	189
Experiences with Enuretics. <i>Katan, A.</i> . . . . .	241
A Case of Superego Disintegration. <i>Maenchen, A.</i> . . . . .	257
Headline Intelligence. <i>Olden, C.</i> . . . . .	263
A Contribution to the Problem of Psychoses in Childhood. <i>Geleerd, E. R.</i> . . . .	271
Diaries of Adolescent Schizophrenics. <i>Hoffer, W.</i> . . . . .	293
Anaclitic Depression. <i>Spitz, R. A.</i> . . . . .	313
Psychoanalytic Orientation in Child Guidance Work in Great Britain. <i>Friedlander, K.</i> . . . . .	343
Ego Development and Historical Change. <i>Erikson, E. H.</i> . . . . .	359
Incentives to Development and Means of Early Education. <i>Peller, L. E.</i> . . . .	397

## PSYCHOL. BULL.

VOL. XLV.	MARCH, 1948.
The Measurement of Transfer of Training. <i>Gagné, R. M., et al.</i> . . . . .	97
Analysis of Variance—Repeated Measurements. <i>Kogan, L. S.</i> . . . . .	131
Personnel Research and Test Development in the Bureau of Naval Personnel. <i>Flanagan, J. C.</i> . . . . .	144

## MAY.

Binaural Summation. <i>Hirsh, I. J.</i> . . . . .	193
Color Terms and Definitions. <i>Brennan, J. G., et al.</i> . . . . .	207
Techniques in Olfactometry. <i>Wenzel, B. M.</i> . . . . .	231
Techniques for the Diagnosis and Measurement of Intergroup Attitudes and Behavior. <i>Deri, S., et al.</i> . . . . .	248

## PSYCHOL. REV.

VOL. LV.	MARCH, 1948.
The Postulates and Methods of "Behaviorism." <i>Spence, K. W.</i> . . . . .	67
Factor Analysis in a Test-Development Program. <i>Guilford, J. P.</i> . . . . .	79
On a Distinction Between Hypothetical Constructs and Intervening Variables. <i>MacCorquodale, K., and Meehl, P. E.</i> . . . . .	95
Reaction to Frustration. <i>Sargent, S. S.</i> . . . . .	108
Relations Between Philosophy and Psychology. <i>Balz, A. G. A.</i> . . . . .	115

## MAY.

The Nature of Psychological " Traits." <i>Anastasi, A.</i> . . . . .	127
Mechanomorphism. <i>Waters, R. H.</i> . . . . .	139
Psychoanalysis and Theories of Learning. <i>Misbach, L.</i> . . . . .	143
The Meaning of Rigidity. <i>Kounin, J. S.</i> . . . . .	157
Some Hypotheses for the Analysis of Qualitative Variables. <i>Coombs, C. H.</i>	167
Behavior Theory and the Behavior of Attitudes. <i>Chein, I.</i> . . . . .	175

## PSYCHOMET.

VOL. XII.	1947.
Factor Analysis and Physical Types. <i>Burt, C.</i> . . . . .	171
Multiple Bi-serial and Multiple Point Bi-serial Correlation. <i>Wherry, R. J.</i> . . . . .	189
Confirmation and Clarification of Primary Personality Factors. <i>Cattell, R. B.</i> . . . . .	197
The Consistency of the Items of an Activity Preference Blank. <i>Fowler, H. M.</i> . . . . .	221
A Factorial Study of Fluency in Writing. <i>Taylor, C. W.</i> . . . . .	239
A Note on the Reflection of Signs in the Extraction of Centroid Factors. <i>Holley, J. W.</i> . . . . .	263
P-technique Demonstrated in Determining Psycho-physiological Source Traits in a Normal Individual. <i>Cattell, R. B., et al.</i> . . . . .	267

## PSYCHOSOM. MED.

VOL. X.	JANUARY-FEBRUARY, 1948.
Psychodynamics in Parkinsonism. <i>Booth, G.</i> . . . . .	1
Instincts and Homeostasis. <i>Kubie, L. S.</i> . . . . .	15
" Experimental Neurosis " Resulting from Semistarvation in Man. <i>Schiele, B. C., and Brozek, J.</i> . . . . .	31

## MARCH-APRIL.

Studies on Epilepsy : The <i>Petit Mal</i> Attack. <i>Barker, W.</i> . . . . .	73
Psychiatric Implications of the Kinsey Report. <i>Kubie, L. S.</i> . . . . .	95

## QUART. J. EXPER. PSYCHOL.

VOL. I.	1948.
Traumatic Amnesia. <i>Ritchie Russell, W.</i> . . . . .	2
The Breakdown of Vigilance during Prolonged Visual Search. <i>Mackworth, N. H.</i> . . . . .	6
Increase in Strength of a Secondary Drive as a Cause of Disorganization. <i>Davis, D. R.</i> . . . . .	22
Studies in Spaced and Massed Learning. I. <i>Tsao, J. C.</i> . . . . .	29
Discontinuous Functioning of the Human Operator in Pursuit Tasks. <i>Hick, W. E.</i> . . . . .	36

## Q. J. STUD. ALCS.

VOL. VIII.	MARCH, 1948.
The Failure of Pyruvate and Arsenite to Alter Alcohol Metabolism. <i>Hulpieu, H. R., et al.</i> . . . . .	553
Constructive Teamwork in the Treatment of Alcoholism. <i>Thimann, J.</i> . . . . .	569
Abstract Archive of the Alcohol Literature. <i>Jellinek, E. M., et al.</i> . . . . .	580
Instruction on Alcohol Problems in the Public Schools. <i>McCarthy, R. G., and Douglass, E. M.</i> . . . . .	609
A Survey of Local Church Activities and Pastoral Opinions Relating to Problems of Alcohol. <i>Landis, B. Y.</i> . . . . .	636

## VOL. IX.

JUNE.

- Some Sociological Concomitants of Excessive Drinking as Revealed in the Life History of an Itinerant Inebriate. *Straus, R.* . . . . . 1
- Conditioned Reflex and Psychodynamic Equivalents in Alcohol Addiction. *Freedman, B.* . . . . . 53
- Research Project on the Etiology of Alcoholism. *Diethelm, O.* . . . . . 72
- The Alcohol Problem and the Law. III. *Baird, E. G.* . . . . . 80
- A Sociohistorical Survey of Alcoholics Anonymous. *Ritchie, O. W.* . . . . . 119

## RASS. NEUR. VEGETAT.

## VOL. VI.

1947.

- Internal Frontal Hyperexostosis and Similar Syndromes in Mental Diseases. *Cortesi, M. C.* . . . . . 213
- Congenital Hemicaniosis with Associated Chronic Fronto-basilar Inflammation. *Bassi, M.* . . . . . 252
- Birth-rate and Mortality in the Goitre Zone. *Bussinco, L., and Antoniotti, F.* . . . . . 269
- The Working of the Neuro-vegetative Centres in Toxic and Toxi-infective Series. *Pansini, R.* . . . . . 289
- Testosterone and the Hemoclastic Reaction of Amato. *Comi, G.* . . . . . 303

## REV. NEUROL.

## VOL. LXXIX.

OCTOBER-NOVEMBER, 1947.

- The First Automatic Movements. *Thomas, A., and Harron, F.* . . . . . 641
- Causalgia from Spinal Shock. *Patrikios, J.* . . . . . 649

## DECEMBER.

- The "Suppressive" Area of the Premotor Cortex in Man. *Hecaen, H., et al.* . . . . . 726
- Mesencephalic Tractotomy by the Sub-Temporal Route. *Guiot, G., and Forjaz, S.* . . . . . 733
- Bulbo-spinal Myasthenia and Unilateral Carotid Sinus Innervation. *Thévenard, A., et al.* . . . . . 741
- Electromyographic Researches into the Sequelae of Poliomyelitis. *Rohmer, F., et al.* . . . . . 748

## VOL. LXXX.

JANUARY, 1948.

- Thrombosis of the Internal Carotid and its Branches. *Taplas, J. N., and Pecker, J.* . . . . . 3
- The Clinical Analysis of Frontal Affections of Equilibrium. *Halpern, L.* . . . . . 17

## FEBRUARY.

- A Histological Study of 130 Meningiomas. *Bertrand, I., et al.* . . . . . 81
- The Experimental Syndrome in Man of Section of the Splenium of the Corpus Callosum. *Maspes, P. E.* . . . . . 100

## MARCH.

- Experimental Forms of Human Epilepsy. *Gastaut, H., et al.* . . . . . 161
- Similar Heredity in Parkinson's Disease. *Scarpalezos, S.* . . . . . 184

## REV. OTO-NEURO-OFLAL.

## VOL. XXIII.

1948.

- Chronaxia of Extraocular Muscles. *Isola, W.* . . . . . 9

## REV. PSICOL. GEN. APLIC.

VOL. II.	1947.
The Life and Work of Charles Spearman. <i>Cattell, R. B.</i>	337
The Psychological and Psycho-physiological Significance of the EEG. <i>Darrow, C. W.</i>	349
Tests in Clinical Psychiatry. <i>Guera, A., and Lang, T.</i>	409
The Philosophy of Language. <i>Durán, P. P.</i>	449
Contribution to the Study of Psychological Cause and Predisposition to Accidents in Metallurgical and Timber Industries. <i>Lamich, E. M.</i>	459

## REV.-PSYCHOL., MONTREAL.

VOL. I.	1947.
Psychological Aspects of the Problem of Mental Retardation. <i>Mailloux N.</i>	135
Factorial Analysis of Character Traits and Aptitudes of the Good School Teacher. <i>Laurier, B.</i>	145

## RIV. DI PSICOL.

VOL. XLIII.	1947.
Research on Stereoscopic "Acuteness" and the Perception of Distance. <i>Bonaventura, E.</i>	97
Love, Friendship and Aggression in the Existential Anthropology of Ludwig <i>Binswanger. Cagnello, D.</i>	111
The Complex Word-Mimicry-Emotion and the Pathological Variation. <i>Otonello, P.</i>	143
The Psychological Structure of the Reaction of Bedini. <i>Migliorino, G.</i>	154

## RORSCH. R. EXCH.

VOL. XI.	1947.
Rorschach Sequence Analysis in a Case of Paranoid Schizophrenia. <i>Miale, F. R.</i>	3
Psychodiagnostic Testing in Group Work. <i>Epstein, H. L., and Schwartz, A.</i>	23
Psychodrama and the Make a Picture Story Test. <i>Fantel, E., and Shneidman, E. S.</i>	42
Rorschach Patterns of a Group of Hard of Hearing Patients. <i>Zucker, L.</i>	68
The Rorschach Psychodiagnostic as Applied to Deaf-mutes. <i>Attable, J. P.</i>	74
Notes on Initial Experiments with Bar-Relief Projective Material for Blind Subjects. <i>Harris, W. W.</i>	80

## SCHWEIZ. ARCH. NEUR. PSYCHIAT.

VOL. LV.	1945.
The Expert Psychiatric Witness and Determinism. <i>Belart, W.</i>	1
Compulsion and Criminality. <i>Binder, H.</i>	4
The Case of Ellen West. <i>Binswanger, L.</i>	16
Nail-biters and Blushers. <i>Boren, W.</i>	41
Shock Treatments in Depressions and Schizophrenias. <i>Chapuis, R., and Georgi, F.</i>	66
Katamnoses of a Few Schizophrenic Inventors. <i>Tramer, M.</i>	175
VOL. LVI.	1946.
Psychopathology of Schizophrenia. <i>Haffter, C.</i>	54
Studies on the Problem Schizophrenia. <i>Binswanger, L.</i>	191
A Curious Attempt at Suicide by Voluntary Immurement. <i>Flournoy, H.</i>	220
On the Psychopathology of Incendiarism. <i>Schneider, H.</i>	239
Microdiencephaly of Man. <i>De Snoo, K.</i>	260

## VOL. LIX.

1947.

- Studies of the Schizophrenia Problem. *Binswanger, L.* . . . . . 21  
 So-called Constitutional Psychopathic States. *Humbert, F.* . . . . . 179  
 The Existential Problem of Schizophrenics. *Storch, A.* . . . . . 330  
 Revision of the Concept of "Constitutional Psychopathy." *Repond, A.* . . . . . 394  
 Remarks Concerning the Attempt at a Structural, Analytic, Multidimensional Conception of Psychopathic Personality. *Moos, W.* . . . . . 400

## SCHWEIZ. Z. PSYCHOL. ANWEND.

## VOL. III.

1944.

- New Points of View in the Psychology of Panic. *Brinkmann, D.* . . . . . 3  
 The Forms of Language and their Utilization in the Teaching of Deaf and Dumb Children and those Hard of Hearing. *Bieri, E.* . . . . . 15  
 Repression or Disinhibition? *Schwartz, L.* . . . . . 37 and 148  
 The Woman as the Inventor of Cultural Objects in Melanesia. *Speiser, F.* . . . . . 46  
 A New Theory of the Choice of Object. *Holzappel-Meyer, M.* . . . . . 55  
 Experimental Studies in Child Psychology, from the Geneva Institute. *Inhelder, B.* . . . . . 128  
 Contribution to the Psycho-linguistic Analysis of Wit. *Brinkmann, D.* . . . . . 138  
 Basic Methodological Questions of Psychology. *Walter, E. J.* . . . . . 141  
 Our Fund of Biological Concepts and their Changes. *Portmann, A.* . . . . . 165  
 The Significance of Micturition and Defecation in Wild Animals. *Hediger, H.* . . . . . 170  
 Valence and Attention in Animal Behavior. *Russell, E. S.* . . . . . 190  
 The Foundations of a Paleo-psychology. *Bilz, R.* . . . . . 202 and 272  
 Linguistic Comments on Drive and Instinct. *Suter, R.* . . . . . 212  
 A Phenomenological Counter Hypothesis to Szondi's Theory of Sympathy. *Keller, F.* . . . . . 232  
 Defensive Movements of the Newborn in the Primitive Grasping Space. *Stirnimann, F.* . . . . . 245  
 "Equating by Analogy" as a Source of Errors in Psychoanalytic Research. *Flescher, J.* . . . . . 263  
 Basic Forms and Knowledge of Human Existence in Ludwig Binswanger's Work. *Storch, A.* . . . . . 280  
 Some Remarks about the Szondi Discussion. *Wagner-Simon, T.* . . . . . 285

## VOL. VI.

1947.

- Forgetting. *von der Steiner, W.* . . . . . 161  
 Present-day French Positions on the Philosophical Problem of Emotion. *Jeanson, F.* . . . . . 183  
 On the Psychology and Psychopathology of Daydreaming. *Stern, E.* . . . . . 187  
 The Problem of the Group in Psychotherapy. *Fierz, H. K.* . . . . . 215  
 The Anthropological Significance of Phantasy. *Storch, A.* . . . . . 221

## TR. NEW YORK ACAD. SCI.

## VOL. X.

FEBRUARY, 1948.

- The Nature of Social Perception. *Cantril, H.* . . . . . 142  
 Methods of Controlling Psychological Frauds. *Wolfe, D.* . . . . . 169

## Z. KINDERPSYCHIAT.

## VOL. XIV.

1947.

- The Child-Observation Center "Gotthelf-Haus" in Biberist. *Schubiger, F.* . . . . . 13  
 "Dry-diet" for Treatment of Nocturnal Enuresis. *Beyme, F.* . . . . . 16  
 A Brief Glance at Child Psychiatry. *Boret, L.* . . . . . 27  
 An Almost Tragic Misunderstanding. *Branimay, H.* . . . . . 31  
 The Development of an Educational Institution. *Braun, F.* . . . . . 32  
 In Criticism of the So-called Super-ego. *Christoffel, H.* . . . . . 36  
 Child Psychiatry in a Paediatric Hospital. *Creak, M.* . . . . . 39  
 Clinical Considerations Regarding Epilepsy in the Child. *Fontes, V.* . . . . . 41

Regarding Medical and Non-medical Psychotherapy. <i>Hanselmann, H.</i> . . . . .	53
Electro-convulsive Therapy with Children. <i>Heuyer, G. D., and Lebovici, S.</i> . . . . .	60
The True Disease of Guy de Maupassant. <i>Ladarre, C.</i> . . . . .	64
Combination of a Pubertal Anorexia with a Catatonia-like Condition. <i>Lutz, J.</i> . . . . .	68
Some Notes on the "Climate" of the Rorschach Cards. <i>Minkowska, F.</i> . . . . .	77
The Problems of the Beginning of a Psychic Development in the Film. <i>Min- kowska, M.</i> . . . . .	87
Remarks on the Development of Psychotherapy with Children. <i>Repond, A.</i> . . . . .	94
Typological Analysis of Rorschach Protocols of Three "Only" Children. <i>Schachter, M.</i> . . . . .	96
Role and Results of Medico-psychological Treatment in Cases of Educative Failure. <i>Dellaert, R., and Stordian, L.</i> . . . . .	101

## Z. PSYCHOL.

VOL. CLIII. . . . .	1942.
On the Estimation of Size of Circular Disks. <i>Van Heuren, J. A.</i> . . . . .	81
Investigations on the Color Sense in Different Races of Hens. <i>Rische, O.</i> . . . . .	91
The Anthropology and the Science of Peoples According to Arnold Gehlon . . . . .	102
Causal and Metacausal Modes of Thinking in Psychology. <i>Hüssler, F.</i> . . . . .	123

## Z. TIERPSYCHOL.

VOL. VI. . . . .	1944.
Experiments on Fear in Horses. <i>Grzimek, B.</i> . . . . .	26
The Reaction of the Cyclist. <i>Grzimek, B.</i> . . . . .	41
Mice and Mouse-traps. <i>Herter, K.</i> . . . . .	87
Recognition of Human Beings by Horses. <i>Grzimek, B.</i> . . . . .	110

## 1. Biochemistry, Pathology, Physiology, etc.

*Effect of the Injection of Glucose into the Cerebrospinal Fluid. Lackey, Robert W. (Southwestern Med. Coll., Dallas, Texas). [Science, 106, 618 (1947).]*

During repeated experiments L. was unable to corroborate the findings of Marinelli and Giunti (*C. A.*, 41, 5211a) that the injection of small amounts of glucose into the cisterna magna results in a hypoglycemic reaction in dogs.

JOHN R. CLOPTON (Chem. Abstr.).

*Qualitative Spinal Fluid Protein Determination. A Comparative Study. Binkley, Geo. W., and Johnson, Herbert H., jun. (Western Reserve Univ. School of Med., Cleveland, O.). [Am. J. Syphilis, Gonorrhoea, Venereal Diseases, 31, 657-60 (1947).]*

Protein analyses of spinal fluids were compared with several qualitative tests for elevated protein concentrations (greater than 40 mg./100 c.c.). Saturated phenol solutions gave positive tests in almost all spinal fluids. Saturated (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and 5 per cent. phenol solutions gave the most satisfactory differentiation between normal and elevated protein content, the former having a slightly greater specificity.

A. DIETZ (Chem. Abstr.).

*The Blood-Glucose Curve in the Tolerance Test and High Glucose in the Spinal Fluid Produced Artificially. Marinelli, Luigi, and Giunti, Valentino (Univ. Perugia). [Arch. sci. med., 84, 298-302 (1947).]*

After the ingestion of 0.75 gm. per kgm. of glucose and while the blood glucose was increasing, a few c.c. of spinal fluid was withdrawn and replaced by a solution containing 0.3 to 0.4 gm. of glucose. The increase of glucose in the blood showed within 10-15 minutes a significant depression, as compared with control tests without spinal injections and the maximum level of glucemia remained lower.

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

*Lipoid Content in the Spinal Fluid in Epilepsy.* Carrega Casaffousth, C. F., Brage, Diego, and Rivas, Lucio. [*Semana med. (Buenos Aires)*, **11**, 81-4 (1947).]

In 18 patients during epileptic attacks and in the intervals the spinal fluid had a high lipid content with reduction of free cholesterol and fatty acids. While fatty acids were reduced and phospholipides increased during the attack, the blood showed no such changes. A. E. MEYER (Chem. Abstr.).

*An Acetylcholine Complex in Nervous Tissue.* Welsh, J. H., and Prajmovsky, M. (Harvard Univ.). [*J. Biol. Chem.*, **171**, 829-30 (1947).]

The acetylcholine complex found in skeletal muscles has been partially demonstrated in brain and peripheral nerves. The effects of various methods of tissue preparation on acetylcholine are discussed. H. O. SINGHER (Chem. Abstr.).

*Effect of Alkaloids on Acetylcholine and Potassium Sensitivity of Striated Muscle.* Torda, Clara, and Wolff, Harold G. (Cornell Univ. Med. Coll., New York, N.Y.). [*J. Lab. Clin. Med.*, **32**, 1374-7 (1947).]

Shortening of the excised rectus abdominis muscle of the frog was induced by immersion in Ringer solution (1) containing 50  $\gamma$  acetylcholine-Br per 100 c.c. for 2 minutes, or by immersion in a 20 m. M Cl solution for the same period. Between shortenings, the muscle was washed with (1) for 10 minutes, or with (1) for 5 minutes and (1) containing the alkaloid for 5 minutes. The sensitivity of the muscle to acetylcholine was increased by physostigmine, colchicine, adrenaline (II), ergotamine, pilocarpine, morphine, and yohimbine, and was decreased by atropine (III), amphetamine (IV), cinchonine (V), cocaine (VI), codeine (VII), ephedrine, quinidine (VIII), quinine (IX), strychnine (X), d-tubocurarine (XI) and veratrine (XII). All alkaloids except (II) and (VI) increased K sensitivity. K sensitivity was decreased by (II) and (VI) and, in higher concentrations by (III), (VIII), (IX), (X) and (XI). A curare-like effect was shown by (III), (IV), (V), (VII), (VIII), (IX), (X), (XI) and (XII) in that they induced a decrease of acetylcholine sensitivity in low concentrations which did not modify K sensitivity.

MARSHALL E. DEUTSCH (Chem. Abstr.).

*Acetylcholine and Body Temperature.* Burn, J. H., and Dutta, N. K. (Oxford Univ., Eng.). [*Nature*, **161**, 18 (1948).]

Atropine, benadryl, pethidine, and quinidine cause a fall in body temperature of mice as does procaine. The fall is augmented by adrenalectomy. Since a depressant action on acetylcholine is common to all these substances it is postulated that maintenance of body temperature depends upon a mechanism in which acetylcholine plays a part and that the adrenal glands support such a mechanism against the depressant action of these substances.

BERNARD WOLNAK (Chem. Abstr.).

*New Data of the Function of Acetylcholine in the Transmission of Excitation in Neuromuscular Synapses.* Angyan, A., and Lissak, K. [*Byull. Eksptl. Biol. Med.*, **23**, 166-8 (1947).]

Short and rapid contractions of isolated muscle fibers of the subhyoid membrane of the frog were observed after small and, sometimes, very small doses of acetylcholine, but no effect on the threshold to indirect excitation was noticed. With larger doses of acetylcholine indirect excitation is caused, and with still larger doses the paralytic action of acetylcholine is observed.

W. R. EICHLER (Chem. Abstr.).

*A Substance in Brain which Sensitizes Muscle to Acetylcholine, and a Biological Method for the Determination of Acetylcholine in Nerve Tissue.* Babskii, E. B., and Minaev, P. F. (*Acad. Med. Sci., Moscow*). [*Byull. Eksptl. Biol. Med.*, **22**, No. 4, 5-8 (1946).]

It was found that emulsions of rabbit or guinea-pig brains in which the acetylcholine (1) was destroyed increased the action of added (1) on the rectus abdominis of the frog. The nature of the increase is not known, although it was found that the K ion produced a similar effect. It is suggested that the difficulty in the assay procedure introduced by this factor can be avoided if the total activity of

the fresh tissue emulsion is compared with that found after the addition of a known quantity of (I) to the preparation after the complete destruction of the (I) originally present.

EUGENE ROBERTS (Chem. Abstr.).

*Old-time Antiacetylcholine Medication. Potency and Duration of Action of the Alkaloids of the Poisonous Solanaceae, Morphine, Barbituric Acid, and some Synthetic Compounds as Measured by the Aerosol Method with Guinea Pigs.* Favre, M., Frommel, Ed., and Vallette, F. (Univ. Geneva, Switz.). [*Acta Pharmacol. Toxicol.*, **3**, 41-50 (1947) (in French).]

The protective action of the compounds in guinea pigs forced to inhale an aerosol of acetylcholine was studied. Atropine (75-100  $\gamma$ /kgm.), hyoscyamine (50  $\gamma$ /kgm.), and scopolamine (30  $\gamma$ /kgm.) were highly protective. Morphine barbitalurates, and 2-diethylaminoethyl diphenylacetate (trasentin) had little or no protective action.

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

*The in vitro Reversibility of Cholinesterase Inhibition by Diisopropyl Fluorophosphate (DFP).* Nachmansohn, David, Rothenberg, Mortimer A., and Feld, Emily A. (Columbia Univ.). [*Arch. Biochem.*, **14**, 197-211 (1947); cf. *C. A.*, **39**, 3798<sup>1</sup>.]

The reversal of the inhibition of cholinesterase by diisopropyl fluorophosphate is dependent on the temperature and the inhibitor concentration. The cholinesterase used in these studies was obtained from the tissues of *Electrophorus electricus* and from the nucleus caudatus of the ox. The percentage of reactivation decreases with time of exposure to the inhibitor; it decreases with increasing temperature and with increasing concentration of the inhibitor. The reversal of inhibition is obtained on dilution of the enzyme inhibitor solution.

VERNON L. FRAMPTON (Chem. Abstr.).

*Studies on Cholinesterase. IV. The Mechanism of Diisopropyl Fluorophosphate Action in vivo.* Nachmansohn, David, and Feld, Emily A. (Columbia Univ.). [*J. Biol. Chem.*, **171**, 715-24 (1947); cf. *C. A.*, **41**, 5155a.]

Injection of 1 mgm./kgm. of diisopropyl fluorophosphate (I) into a rabbit is lethal within a few minutes and cholinesterase (II) of the brain tissue is completely inactivated. At the threshold dose of 0.3 mgm. of (I) negligible amounts or none of (II) is found in the brains of those animals that die. But in the brain of the surviving rabbits (II) is always present. In view of the specificity of the action of (I) and the powerful effect on (II) in low concentration, the coincidence of death and inactivation of (II) suggest that the toxicity of the compound is due to its action on the enzyme.

H. O. SINGHER (Chem. Abstr.).

*Comparative Activity of Serum Cholinesterase and Globular Cholinesterase of Normal Human Blood in the Presence of Folic Acid. (1) Preliminary.* des Marais, Andre (Univ. Laval, Quebec, Can.). [*Rev. can. biol.*, **6**, 802-7 (1947).]

The cholinesterase of normal human blood is divided into 2 fractions; serum cholinesterase and globular cholinesterase. A study of the activity of each of these fractions by the Warburg manometric method shows that only globular cholinesterase is activated in the presence of folic acid. The action of folic acid, as shown, could form the basis of a method for differentiating between the specific cholinesterase and the pseudocholinesterase.

A. PAPINEAU-COUTURE (Chem. Abstr.).

*Effect of Undernutrition and Alterations in Diet on the Cholinesterase Activity of Serum.* McCance, R. A., Widdowson, E. M., and Hutchinson, A. O. (Univ. Cambridge, Eng.). [*Nature*, **161**, 56-7 (1948).]

Numerous observations have revealed that the general level of nutrition and certain changes in diet may exert considerable influence on the total or true cholinesterase (1) activity of serum. The results also suggest that the average level of total esterase in the serum is a delicate index of the state of nutrition of any group of men in Germany to-day. Thus a rise in (1) has twice been observed to follow an improvement in the diet of a group of subjects. When weight was

lost, the (I) content also fell. It is not thought that these increases in (I) were due to digestion, absorption, and metabolism of fat setting free nonspecific esterases into the serum, for when six men were given a supplement of 100 gm. of fat daily for 3 days, there was no increase in total (I) of their serums.

BERNARD WOLNAK (Chem. Abstr.).

*Cholinesterase Activity in Cerebrospinal Fluid.* Reiss, M., and Hemphill, R. E. (Bristol Mental Hospital, England). [Nature, **161**, 18 (1948).]

Cholinesterase activity was determined by Warburg's method at 37.5° and the result expressed in cu. mm. of CO<sub>2</sub> produced by 1 ml. cerebrospinal fluid in a 30-minute period. From 1.6 to 2.0 ml. of the fluid with 0.2 ml. 2 per cent. bicarbonate was put in the main vessel and in the side arm 0.2 ml. of the substrate solutions, which consisted of 0.3 M acetylcholine (I), 0.3 M acetylmethylcholine (II), or 0.06 M benzoylcholine (III). The fluid was obtained from patients suffering from organic and nonorganic psychoses. The cholinesterase activities were: (I) 6.6 to 28.4 cu. mm. CO<sub>2</sub>; (II) 5.4 to 23.6 cu. mm. CO<sub>2</sub>; (III) 2.3 and 6.2 cu. mm. CO<sub>2</sub>. The ratios of cholinesterase activity of cerebrospinal fluid to activity of blood serum were: (I) 1/90 to 1/150; (II) 1/8 to 1/40; (III) 1/125 to 1/300. The cholinesterase was not absorbed by Permutit, kieselguhr, or alumina.

BERNARD WOLNAK (Chem. Abstr.).

*Selective Inhibition of Pseudochoolinesterase by Diisopropyl Fluorophosphate.* Hawkins, R. D., and Mendel, B. (Univ. of Toronto, Can.). [Brit. J. Pharmacol., **2**, 173-80 (1947).]

Diisopropyl fluorophosphate (DFP) inhibits both true and pseudochoolinesterases, but higher concentrations of DFP are necessary in the case of the former. This renders it possible to inhibit pseudochoolinesterase selectively. Acetylcholine is hydrolyzed *in vitro* by both enzymes; therefore this substance cannot be used as substrate to correlate the degree of inhibition of true cholinesterase by DFP and the effects resulting from this inhibition *in vivo*. Since true cholinesterase is responsible for hydrolysis of acetylcholine at nerve endings, its inhibition must be determined when a correlation between anticholinesterase action and pharmacological effects is investigated.

WM. M. GOVIER (Chem. Abstr.).

*Influence of the Anticholinesterase Diisopropylfluorophosphate on Cardiovascular and Respiratory Reflexes of Carotid Sinus Origin and on the Pharmacological Actions of Prostigmine and Eserine.* Heymans, C. (Univ. Gand, Belg.). [Compt. rend. soc. biol., **140**, 1194-5 (1946); cf. C. A., **40**, 5837<sup>9</sup>, 6663<sup>2</sup>.]

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

*Diisopropyl Fluorophosphate (DFP) and Cholinesterase.* Heymans, C., and Jacob, J. (Univ. Gand, Belg.). [Arch. intern. pharmacodynamie, **74**, 233-52 (1947).]

Diisopropyl fluorophosphate (5 mgm./kgm.) in nonanesthetized dogs produces convulsions, muscle twitchings, bronchospasm, hyperperistalsis and bladder contractions but no increased blood pressure or change of heart rate. Larger doses slow the heart. Atropine suppresses the effects except the convulsions and muscle twitchings. Nembutal decreases the convulsions. The muscle twitchings persist in denervated muscle but do not occur after axon degeneration. Injection of DFP into the perfused dog head does not increase the direct or reflex excitability of the cardio-inhibitory vagal and respiratory centers.

M. L. C. BERNHEIM (Chem. Abstr.).

*Studies on Sleep. IV. Serum Cholinesterase Activity of Chickens when Awake and During Natural Sleep.* Frommel, E., Beck, I. T., Favre, M., and Vallette, F. (Univ. Geneve, Switz.). [Helv. Physiol. et Pharmacol. Acta, **5**, 361-3 (1947) (in French); cf. C. A., **41**, 5626c.]

The cholinesterase activity of chicken blood obtained by decapitation is always considerably higher than that of blood obtained by vein puncture. During natural sleep the cholinesterase activity of the serum decreases 10-40 per cent.

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

*Development of Nervous Activity and the Chemical Factors of Nervous Excitation in Chick Embryos.* Kakushkina, E. A. (*Biol. Museum, Moscow*). [*Byull. Ekspil. Biol. Med.*, **22**, No. 8, 21-3 (1946) (*in Russian*): *C. A.*, **41**, 7489f.]

Total acetylcholine increased in chick embryos from the second to the fourth day of incubation, dropped on the fifth day, remained almost constant through the seventh day, rose on the eighth day, dropped on the ninth day, and rose again on the tenth day. The activity of cholinesterases did not follow the same pattern. The esterases increased up to the second day, remained approximately stationary on the third day, then increased on the fourth day. From the fourth to the fifteenth day (the end of the period studied) there were minor fluctuations. Kakushkina points out that chickens have a precocious development. Shortly after hatching, they can walk and feed themselves. Their nervous system, therefore, must be developed and ready to function in embryonic life. The early development of acetylcholine esterases roughly parallels the early development of the nervous system.

NELLIE M. PAYNE (Chem. Abstr.).

*Chemistry of the Nervous System.* Alsterberg, G. [*Arkiv. Zool.*, **36A**, No. 8, 13 pp. (1945); (*Reprint*).]

A review of the author's histochemical studies on the nervous system.

C. L. B. (Chem. Abstr.).

*Experiments Supporting the Phase-boundary Theory of the Electric Potential in Nerve.* Barnes, T. Cunliffe, and Beutner, R. (*Hahnemann Med. Coll. and Hosp., Philadelphia, Pa.*). [*Exptl. Med. Surg.* (**3**), 325-9 (1945).]

The old permeability theory of the action current in nerve is inadequate in the light of recent experiments showing the pronounced phase-boundary potential produced by acetylcholine in contact with lipides. The phase-boundary theory provides an explanation of the distinctive electric features of adrenergic and cholinergic nerves. Experiments with oil layers provide a phase-boundary mechanism for the sensitization of oil "membranes" to acetylcholine.

MARION HORN PESKIN (Chem. Abstr.).

*Korsakow's Syndrome in Relation to Atrophy of the Brain and Carbon Monoxide Poisoning.* Bilikiewicz, T. [*Polski Tygodnik Lekarski* (**1**), 1256 (1946); *Brit. J. Ind. Med.*, **4**, 247 (1947).]

Korsakow's syndrome (memory defects, compensatory fantasies, and lowering of the intelligence standard), with radiological evidence of brain atrophy and internal hydrocephalus, and encephalographic evidence of uniform enlargement of all cerebral ventricles were found in a man 21 years after severe CO poisoning. The patient had been in coma for 5 days after the poisoning and had then suffered from grave neuromotor and mental impairment, with improvement after 5 months.

MARION HORN PESKIN (Chem. Abstr.).

*A Fluid Electrode for Nerve-stimulation Experiments.* Ross, D. A. (*McGill Univ., Montreal, Can.*). [*Rev. can. biol.*, **6**, 544-7 (1947) (*in English*).]

An electrode is described which fulfills the following requirements: the nerve is kept warm and moist; fluid of appropriate composition is supplied and removed continuously to remove toxic products of tissue activity; the c.d. throughout the area in which the nerve is free to move is so nearly uniform that adventitious changes of position produce negligible changes in response; the nerve can be placed in position easily and maintained there throughout an experiment without risk of mechanical abuse such as stretching or sharp bending; the electric pathway within the electrode presents to the stimulation apparatus a constant and reasonable electric impedance.

A. PAPINEAU-COUTURE (Chem. Abstr.).

*Variations in Nervous Excitability Produced in Man by Breathing Air Enriched in Carbon Dioxide.* Beyne, J., Chauchard, B., and Chauchard, P. (*Sorbonne, Paris*). [*Compt. rend. soc. biol.*, **141**, 368-70 (1947); *cf. C. A.*, **40**, 5480<sup>a</sup>; **41**, 1744c.]

Breathing air containing 1.5-6.0 per cent. of CO<sub>2</sub> caused an important increase in the chronaxia of the peripheral nerves after 7-15 minutes. Air containing 0.25-0.50 per cent. caused a transient decrease in chronaxia after 15-20 minutes, followed by a rise to a little above normal.

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

*Biochemical Development of the Chick Embryo Brain: Action of Testosterone Propionate.* Mandel, P., Stoll, R., and Bieth, R. (Univ. Strasbourg, France). [Compt. rend. soc. biol., **141**, 676-8 (1947); cf. C. A., **42**, 656c.]

Testosterone propionate, 0.1-2.5 mgm. in oil, was applied to the embryo at the start or 2 or 7 days after beginning incubation. The growth of the brain was retarded and its lipide content was found below normal when examined on the 13th or 19th days of incubation.

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

*Biochemical Development of the Brain of the Chick Embryo During the Second Half of the Incubation Period.* Mandel, P., Stoll, R., and Bieth, R. (Univ. Strasbourg, France). [Compt. rend. soc. biol., **141**, 416-18 (1947).]

Total protein, total lipides, lipide N, protein P, and lipide P were determined at intervals from the 10th to the 19th day of incubation. The results indicate that during this period nucleoproteins increase less rapidly than the other constituents. The percentage of total ash decreases. The water content decreases from 88.6 per cent. on the 10th day to 84.2 per cent. on the 19th.

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

*The Distribution of the Lipoids in the White Matter of the Spinal Cord.* Alsterberg, Gustaf (Eksjo, Sweden). [Arkiv. Zool., **36B**, No. 3, 1-6 (1945).]

The author's extraction and pregation method (C. A., **35**, 7433<sup>3</sup>; **36**, 7096<sup>3</sup>) was used on the spinal cord of cow. Alternate extraction with acetone and water gives the carnitine fraction; acetone gives the cholesterol fraction (fatty acids and cholesterol); ethanol, ether, methanol, pyridine, and CHCl<sub>3</sub> extracts are combined as the third fraction (lecithin, cephalin, sphingomyelin, cerebrosides); the residue is the dry-substance fraction. Cholesterol and cerebrosides are the chief constituents of the myelin sheath, whereas lecithin and sphingomyelin constitute the axis cylinder. Sphingomyelin is possibly present in the axilemma of Mauthner; perhaps also protein-bound cephalin. Serine cephalin and inosite cephalin are surely present in the glia-structures; cerebrosides and sphingomyelin also may be present; the presence of colamine cephalin is uncertain.

E. VASSEUR (Chem. Abstr.).

*Hyperglycemia Induced by the Action of Adrenaline on the Central Nervous System.* Leimdorfer, A., Arana, R., and Hack, M. H. (Univ. of Illinois Coll. of Med., Chicago). [Am. J. Physiol., **150**, 588-95 (1947).]

The barrier between blood and cerebrospinal fluid was found to be practically impermeable to adrenaline. Adrenaline injected into the subarachnoid space, although it fails to affect blood pressure or electrocardiogram, causes a rapid, high and sustained rise in the concentration of the glucose in blood. The site of action and the efferent paths are undiscovered in spite of lesions made to prevent participation of the autonomic nervous system and the hypophysis.

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

*Central Excitant Action of Diisopropyl Fluorophosphate.* Chennells, Mary, and Wright, Samson (Middlesex Hospital Med. School, London). [Nature, **160**, 503 (1947).]

Diisopropyl fluorophosphate (I) is a central excitant like eserine, but larger doses of (I) were required to produce similar effects. In large doses (I) produced convulsions violent in character and long-sustained; in decerebrate animals marked increases or phasic fluctuations in tone occurred. Reflex changes such as enhancement of the knee jerk occurred independently of alterations in blood pressure, respiration, or of peripheral potentiation of the nerve-muscle response; they are independent of the presence of the anesthetic, chloralose, or of the cerebrum. (I) thus acts on the central nervous system facilitating excitatory transmission in the spinal cord and brain stem.

BERNARD WOLNAK (Chem. Abstr.).

*The Influence of pH on the Silver Staining of Nervous Tissue.* Lascano, Eduardo F., [Rev. asoc. med. argentina, **61**, 357-60 (1947).]

The keeping of nervous tissue in 10 per cent. formol for a long time facilitates silver staining owing to acidification of the fixative by the formation of formic acid.

The same results can be obtained by fixing the tissues in 10 per cent. formol acidified with other acids ( $H_2SO_4$ ,  $HCl$ ,  $CH_3COOH$ ).

E. S. GUZMAN BARRON (Chem. Abstr.).

*Gargoylism. Review of the Literature and Report of the Sixth Autopsy Case with Chemical Studies.* Strauss, Reuben, Merliss, Reuben, and Reiser, Raymond (Cedars of Lebanon Hosp., Los Angeles, Calif.). [*Am. J. Clin. Path.*, **17**, 671-94 (1947).]

A case of gargoylism is discussed with detailed chemical, clinical, X-ray and necropsy studies. Chemical analyses of the tissues revealed a significant increase of lipide in the lymph nodes, but not in the brain, liver, or spleen. The increase was simple fat, probably in combination with complex protein. The fact that it is not a phospholipide, cerebroside, or cholesterol separates this disturbance from the idiopathic lipide dystrophies.

JOHN T. MYERS (Chem. Abstr.).

*Biochemical Processes in the Brain in Direct Irradiation by X-rays.* Blokhin, N. N., Graevskaya, B. M., and Keilina, R. Ya. (Central Roentgenol. Radiol. Cancer Inst., Leningrad). [*Byull. Eksptl. Biol. Med.*, **23**, 338-42 (1947).]

X-ray irradiation of dog brain, at 160 kv., at 23-mm. distance by using 0.5 Cu-3.0 Al filter, each dog receiving a total of 5 unit skin doses of irradiation in 4 exposures with alternate irradiation of the right and the left temple area, was investigated in respect to biochemical effects by determination of blood sugar (femoral artery and sinus venosus cerebri), spinal fluid sugar, blood serum protein, and the albumin-globulin fractions of the latter. As the total irradiation increased, the total serum protein rose until on the 90th day (after the 1st irradiation) it reached 200 per cent. of the initial value. In the same period the albumin fraction rose by only 26 per cent. for arterial and 32 per cent. for venous blood, while the globulin fraction rose 324 and 323 per cent., respectively. The absolute amount of protein in the spinal fluid remained within experimental variations, but its albumin/globulin ratio gradually changed to 1.0 from 0.56. Arterial blood sugar remained normal, but it fell in the venous blood, until the sugar utilization by the brain at the 90-day period was 370 per cent. of initial. Spinal fluid sugar did not increase. The changes are ascribed to a colloidal swelling of the brain cells, with decreased amount of intracellular fluids.

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

*Role of the Nervous System in the Regulation of the Absorptive Processes of Carbohydrates in the Animal Organism.* Blokhin, N. N., and Lyzlova, S. N. (Lenin Univ., Leningrad). [*Byull. Eksptl. Biol. Med.*, **22**, No. 4, 21-3 (1946).]

Dogs were prepared by London's technique of angiostomy with a cannula in the portal vein. The glucose contents of arterial blood from the femoral artery and of venous blood from the portal vein were determined prior to the introduction of 2.5 gm. of glucose per kgm. into the gastro-intestinal tract and at various time intervals thereafter following the injection of calcium gluconate (I) or potassium phosphate (II) into the subarachnoid space. (II), which acts on the sympathetic centers, was found greatly to increase the rate of absorption of glucose. The maximum blood levels of glucose were attained in  $\frac{1}{2}$  hour, instead of the 1-1 $\frac{1}{2}$  hours required when no salt was injected, and a maximum arterial-venous difference of 93 mgm. per cent. was reached. (I), which acts on the parasympathetic centers, caused a marked delay in the rate of absorption; it resulted in very small arterial-venous differences. The absorption curve in the latter instance is similar to that shown by animals under anesthesia, in which case it has been established that the absorption of glucose becomes a simple diffusion process.

EUGENE ROBERTS (Chem. Abstr.).

*Basal Metabolism Affected by Experimental Lesion in the Cerebral Cortex of the White Rat.* Wu, Yun-jui, Chiu, Tso-Lin, and Ping, Chi. [*Contrib. Biol. Lab. Sci. Soc. China, Zool.*, Ser. **16**, 97-108 (1942) (in English).]

In white rats with fronto-parietal cortical lesions the body temperature was unchanged and the R.Q. deviations were within 10 per cent. of the normal value. Basal metabolism was subject to greater deviations, particularly after fasting, and also underwent cyclic changes.

J. G. YOSHIOKA (Chem. Abstr.).

*Sex Hormones and the Nervous System.* Chauchard, P. (*École pratique hautes études, Paris*). [*Arch. intern. pharmacodynamie*, **74**, 286-94 (1947).]

A single injection of sex hormones into rats and guinea pigs causes medullary excitation and cerebral depression regardless of the sex of the animal. Repeated doses cause excitation in all parts of the central nervous system. Excitation produced by folliculin is counteracted by testosterone or progesterone, but the reverse is not true.  
M. L. C. BERNHEIM (Chem. Abstr.).

*Central Nervous Ketosis.* Schrade, W. (*Städt. Krankenhaus, Arnstadt, Germany*). [*Deut. Gesundheitsw.*, **2**, 409-11 (1947).]

Injection of air into the cerebral ventricles of rabbits caused a hyperketonemia in about 20 minutes, lasting 1-3 hours. Hyperglycemia also was seen, but the curves of blood-sugar and ketone-body levels seemed to be independent of one another. About 3 or 4 hours after the injection, a hypolipemia lasting 4 or 5 hours was manifested, and in certain cases was followed by hyperlipemia. These reactions are thought to be due to an increase in fat catabolism caused by central nervous stimulation. A human case is described in which a ketosis of about 24 hours' duration followed a cerebral embolism.

MARSHALL E. DEUTSCH (Chem. Abstr.).

*Potassium and Periodic Paralysis. A Metabolic Study and Physiological Considerations.* Gass, Harvey, Cherkasky, Martin, and Savitsky, Nathan. [*Medicine*, **27**, 105-37 (1948).]

Attacks of paralysis were induced on each of two occasions in a patient with periodic paralysis by the ingestion of 300 gm. of glucose in hypertonic solution. The attacks were accompanied by falling serum K levels but not excessive K excretion, a less sustained fall in serum P level, an increased excretion of creatine and creatinine, and bigeminal cardiac rhythm. A suppression of urinary excretion of both P and K was noted during the phase of maximum paralysis and a rise during recovery. Evidence is presented which supports the hypothesis that hepatic intermediate carbohydrate metabolism plays an important role in periodic paralysis by lowering K content of muscle.  
F. B. SEIBERT (Chem. Abstr.).

## 2. Pharmacology and Treatment.

*The Effect of Ascorbic Acid in Reducing the Inhibition of Brain Metabolism Produced by Pentobarbital in vitro.* Greig, Margaret E. (*Vanderbilt Univ. Med. School, Nashville, Tenn.*). [*J. Pharmacol. Exptl. Therap.*, **91**, 317-23 (1947); cf. *C. A.*, **40**, 5145<sup>8</sup>.]

Ascorbic can reduce the inhibiting action of pentobarbital (nembutal) on oxidation of carbohydrate by rat brain *in vitro*. It also decreases the acceleration of anaerobic glycolysis provoked by pentobarbital when glucose is the substrate. Cytochrome c increases the effect of ascorbic acid to a variable degree by further reducing the inhibition produced by pentobarbital. It may be that by alternate oxidation and reduction the ascorbic acid acts to provide an alternate route for oxidation; this by-passes the block at the flavoprotein-cytochrome b stage produced by pentobarbital.  
L. E. GILSON (Chem. Abstr.).

*Role of the Liver in the Detoxication of Thiopental (Pentothal) and Two other Thiobarbiturates.* Shideman, F. E., Kelly, A. R., and Adams, B. J. (*Univ. of Michigan, Ann Arbor*). [*J. Pharmacol. Exptl. Therap.*, **91**, 331-9 (1947).]

In mice, CCl<sub>4</sub> liver damage significantly prolonged the duration of the effects of 5-allyl-5-(1-methyl-butyl)-2-thiobarbituric acid, 5-ethyl-5-isoamyl-2-thiobarbituric acid (thioethamyl), and Na 5-ethyl-5-(1-methylbutyl)-2-thiobarbiturate (pentothal). Subtotal hepatectomy in rats significantly prolonged the action of pentothal. Diminished blood flow through the liver, as produced by an Eck fistula in rats, increased the duration of action of all three compounds. Pentothal was degraded *in vitro* by rat liver slice and mince.

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

*Effect of Ether and Pentobarbital on the Polarization State of Central Nervous Elements.* Van Harrevelt, A. (California Inst. Technol., Pasadena). [*Am. J. Physiol.*, **150**, 541-50 (1947).]

The administration of the narcotics, pentobarbital and ether, does not produce a constant voltage between the gray and white matter of the spinal cord. During asphyxiation of the cord, the gray matter becomes negative with respect to an anterior root. Pentobarbital and ether depressed this asphyxial depolarization potential. It is concluded that these narcotics cause a uniform depolarization of the neuron. Asphyxial depolarization potentials were led off from the cerebral cortex, and were similarly influenced by pentobarbital as the spinal asphyxial potentials. An attempt is made to combine these other known effects of narcotics on nervous structures in a theory of narcosis.

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

*Detoxification of Barbiturates.* Dorfman, Albert, and Goldbaum, Leo R. (Army Med. Research Dept., Washington, D.C.). [*J. Pharmacol. Exptl. Therap.*, **90**, 330-7 (1947).]

Pentothal and seconal are rapidly destroyed in the intact mouse, phenobarbital is destroyed to a lesser extent, and barbitol apparently not at all. Rabbit liver slices degrade pentothal, seconal, amytal and pentobarbital, and to a slight extent aleurate. Liver homogenate shows no such activity. Pentothal was the only barbiturate among those tested which was degraded by rabbit kidney slices. Finely chopped rabbit muscle and brain did not destroy any of the barbiturates tested, except for a slight action on pentothal by brain. There is considerable evidence that the kidney breaks down only the malonylthiourea ring, while liver acts on both the malonylthiourea and malonylurea rings. The speed with which the rings are attacked varies with the nature of the side chains.

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

*Antagonism Between Barbiturates and Picrotoxin.* De Soto, F. Fernández, Núñez, A. Ortega, and Ventura, A. Estades. [*Farmacognosia (Madrid)*, **6**, No. 10, 113-51 (1947).]

Dogs and cats who received toxic doses of phenobarbital (I) by mouth or intravenously can be awakened and kept alive with picrotoxin (II). Suboccipital administration of (II) is faster and more intensive than intravenous, and smaller doses are required. As the action of (II) disappears after 1-2 hours and that of (I) lasts up to 5-6 days, repeated injections of (II) is necessary. The value of an oil solution of (II) for prolonged effect is studied.

K. SCHOEN (Chem. Abstr.).

*Effects of Dithiobiuret on the Central Nervous System.* Altschul, Sol (Illinois Neuro-psychiatric Inst., Chicago). [*Proc. Soc. Exptl. Biol. Med.*, **66**, 448-51 (1947).]

Dithiobiuret is an effective anticonvulsant in rats only when given in toxic doses. The most probable site of action is the efferent system of the spinal cord. Moderate doses do not affect the electroencephalogram.

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

*The Comparative Value of Pentothal Sodium, Curare, and Magnesium Sulfate for the Modification of Metrazole Convulsions.* Rising, Jesse D., and Carroll, M. C. (Univ. of Kansas, School of Med., Kansas City, Kansas). [*J. Kansas Med. Soc.*, **47**, 297-9 (1946).]

Preliminary experiments on fairly large dogs indicated that Mg-SO<sub>4</sub> might be the most desirable "softening agent" were it not for the possibility of sudden cardiac arrest. Pentothal-Na is superior to Mg-SO<sub>4</sub>, and far superior to curare as a modifying agent for metrazole convulsions. It has the added advantage of few toxic possibilities. The question of its applicability in the treatment of mental disorders is not settled, but the work on Na amytal justifies the belief that pentothal may be clinically useful.

RUTH BERGGREN (Chem. Abstr.).

*Action of Digitalis Glycosides on the Central Nervous System with Special Reference to the Convulsant Action of Red Squill.* Gold, Harry, Modell, Walter, Cattell, McKeen, Benton, Joseph G., and Collove, Elaine W. (Cornell Univ. Med. Coll., New York, N.Y.). [*J. Pharmacol. Exptl. Therap.*, **91**, 15-30 (1947).]

A study was made of the convulsant and cardiac actions of various principles of the digitalis group obtained from red squill (I), white squill, digitalis species, oleander, convallaria and strophanthus. Contrary to prevailing opinion, the conspicuous convulsant action of (I) in the rat is not only a peculiarity of the drug but also of the rat. Evidence is presented that the convulsant action of (I) in the rat is not due to a special convulsant principle but is a function of its cardiac glycosides or perhaps their genins. Amorphous scilliroside (II) from (I) causes poisoning in the rat by a slow convulsant action on the central nervous system after small doses and by a rapid cardiac action without convulsions after large doses. The white squill glycoside, scillicin, is less potent than (II). (II) acts like a typical digitalis glycoside in frogs, cats and man. Ouabain, folinerin, gitalin and digitoxin (most active) produce convulsions in the rat. There is indication that differences in the convulsant activity of the different digitalis drugs are partly due to differences in fixation or speed of elimination and partly to differences in the molecule structure. The convulsant response of the rat provides a means for their qualitative differentiation.

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

*Mechanisms Underlying Pulmonary and Cardiac Complications of Electrically Induced Convulsions.* Altschule, M. D., and Tillotson, K. J. (Harvard Med. School, Boston, Mass.). [*New Engl. J. Med.*, **238**, 113-15 (1948).]

Pulmonary and cardiac complications of therapeutic electric shock can be minimized by use of curare. A solution of d-tubocurarine is the drug of choice, since intocostarin may contain impurities that dangerously exaggerate the vagal impulses that influence cardiac rhythm.

MARION HORN PESKIN (Chem. Abstr.).

*Intensity of Brain-tissue Respiration; the Brain and the Muscle Supply of Oxygen, Carbohydrates, and Products of Decomposition of Carbohydrates During Insulin Intoxication.* Merezhinskii, M. G. and Cherkasova, L. S. (Med. Inst., Kazan). [*Byull. Eksptl. Biol. Med.*, **22**, No. 1, 31-4 (1946) (in Russian).]

Guinea pigs, rabbits and dogs were investigated as to brain-tissue respiration in insulin shock by using the Warburg technique on minced tissue in Ringer-bicarbonate suspension. In guinea pigs the brain tissue shows a  $Q_{O_2}$  in insulin shock which is 54.3 per cent. of normal value. In rabbits the white brain substance gave 67 per cent., grey matter 52.2 per cent. In dogs the white matter gave 76.1 per cent., grey matter 63.2 per cent. The animals were killed in the condition of deep coma (3-7 hours after insulin administration). Thus insulin shock leads to severe depression of brain respiration. Analysis of arterial and venous blood (to the brain and to the hind quarters) showed that the supply of glucose to the muscle is depressed (37.8 per cent. of normal in deep coma), although the O supply is substantially normal. As the shock developed, the muscle lost its ability to retain glucose, and the venous blood carried as much as 44 per cent. of normal glucose level; the O in venous blood in this case was 143 per cent. of normal. The brain tissue tends to retain glucose in early shock stage but later begins to lose glucose like the muscle. The venous blood from the brain showed severe increase over normal (164 per cent.). In early shock stages glycogen tends to be retained in the muscle and especially in the brain; in deep shock this tendency is substantially lost. Blood lactic acid rises in early shock (probably because of the convulsions); this condition moderates when coma stage is reached. Brain tissue does not utilize lactic acid but actually supplies it to the blood. Pyruvic acid level does not vary significantly.

G. M. KCSOLAPOFF (Chem. Abstr.).

*The Metabolic Fate of Chloral Hydrate.* Butler, Thomas C. (Johns Hopkins Univ., Baltimore, Md.). [*J. Pharmacol. Exptl. Therap.*, **92**, 49-58 (1948).]

Methods, based on the Fujiwara reaction (*C. A.*, **11**, 3201), are described in detail for the separate determination of  $CCl_3CH_2OH$ , chloral hydrate, and

$\text{CCl}_3\text{CO}_2\text{H}$  when present together in plasma. When chloral hydrate is given intravenously to dogs, its concentration in the plasma falls rapidly.  $\text{CCl}_3\text{CH}_2\text{OH}$  and  $\text{CCl}_3\text{CO}_2\text{H}$  appear very quickly in the plasma and reach such concentrations as to indicate that very little of the chloral hydrate is oxidized and that a high proportion or perhaps all of the remainder is reduced to  $\text{CCl}_3\text{CH}_2\text{OH}$ . The disappearance of  $\text{CCl}_3\text{CH}_2\text{OH}$  from the plasma is relatively slow, and the concentrations reached are sufficient to account for most or all of the depressant effect of administration of chloral hydrate.

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

*Influence of Atropine and Scopolamine on the Central Effects of Diisopropyl Fluorophosphate (DFP).* Wescoe, W. Clarke, Green, R. E., McNamara, B. P., and Kropf, Stephen. [*J. Pharmacol. Exptl. Therap.*, **92**, 63-72 (1948); *cf. C. A.*, **41**, 207f.]

Numerous electroencephalograms (EEG) of cats and monkeys are shown. Intocostrin given intravenously in doses sufficient to produce complete skeletal and respiratory paralysis did not affect the EEG pattern. Intravenous DFP produced changes in the EEG which could be prevented or abolished by intravenous injection of atropine or scopolamine. Atropine and scopolamine had no prophylactic or therapeutic effect on convulsions caused by metrazole, strychnine, or gammexane. The experimental data indicate that atropine prevents or annuls the central actions of acetylcholine.

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

*Comparative Actions of Sparteine and of Procaine on the Autonomic Nervous System.* Hazard, Rene, Cheymol, Jean, and Corteggiani, Elisabeth. [*Compt. rend.*, **224**, 1307-9 (1947).]

Sparteine cuts the conduction at the level of the ganglia of the autonomic nervous system; it opposes the action of nicotine and of the nicotine-like substances. Procaine has a formula very different from that of sparteine, but it exercises the same action as the latter. The similarity extends to the modification in excitability of post-ganglionic fibers: both oppose the action of acetylcholine on the heart and arterial pressure, and both accentuate the effects of adrenaline. Only one of the nicotine-like poisons, hordeine, seems to be an exception in that it maintains its action on the arterial pressure and on the intestine in the presence of sparteine, whereas it is suppressed by procaine. In reality when one uses a high dose of sparteine, hordeine exerts no noticeable action on the intestine. A true difference of action is noted between them in the matter of adrenaline inversion by yohimbine. In spite of the presence of an adrenolytic, sparteine renders adrenaline hypertensive, but procaine does not oppose and sometimes accentuates adrenaline hypotensive. Sparteine and procaine have very different actions in the latter instance.

ELVA G. SHIPLEY (Chem. Abstr.).

*Effect of Tetraethyl Pyrophosphate on Sympathetic Ganglionic Activity.* Koppanyi, Theodore, Karczmar, Alexander G., and King, Theodore O. (Georgetown Univ., Washington, D.C.). [*Science*, **106**, 492-3 (1947).]

The nicotinic (pressor) responses of various doses of acetylcholine were measured in atropinized dogs treated with tetraethyl pyrophosphate (I). The curve relating pressor response to dose of (I) peaked at 0.12 and 15 mgm./kgm. and dropped to 0 at about 70 mgm./kgm. The initial portions of similar curves for (I), hexaethyl pyrophosphate, diisopropyl fluorophosphate, and eserine have different slopes, making strict comparisons difficult; (I) is the most active anti-cholinesterase studied to date.

CARL C. SMITH (Chem. Abstr.).

*Results of Administration of Varying Doses of Sodium Bromide.* Millikan, Clark H., Paul, William D. (Univ. Hosps., Iowa City, Iowa). [*J. Iowa State Med. Soc.*, **36**, 39-48 (1946); *cf. C. A.*, **39**, 4144<sup>4</sup>.]

Varying doses of NaBr were given to 36 hospital patients over long periods of time. Eleven patients developed the syndrome of Br intoxication. The lowest blood Br level at which any patient developed Br intoxication was 195 mgm. per cent. Eight patients first showed evidence of intoxication with blood Br levels between 200 and 300 mgm. per cent. One patient exhibited toxic signs at a

blood Br level of 319 mgm. per cent. A toxic delirium (bromide psychosis) was produced in 9 patients; 8 had blood Br levels between 200 and 300 mgm. per cent. at the time they became psychotic. This syndrome was not produced in any patient with a stable personality. In most patients where bromism occurred there was a marked difference in the blood Br level at which symptoms first appeared and the level at which the subject returned to normal. The fact that some patients do not clear mentally from the effects of bromides until a low blood level is reached may explain the unusually low NaBr levels quoted by some authors as being toxic amounts of the drug. A bromoderma appeared in 4 patients while taking the drug. None of the 36 patients showed any evidence of addiction or habituation to the drug.

RUTH BERGGREN (Chem. Abstr.).

*Effects of Drugs on Nerve Activity.* Gilman, Alfred (Edgewood Arsenal, Md.). [Ann. N.Y. Acad. Sci., **47**, Art. 4, 549-58 (1946).]

A short description of the pharmacological effects of Na fluoroacetate, which interferes with acetate metabolism and diisopropyl fluorophosphate which almost irreversibly inhibits cholinesterase.

C. C. SMITH (Chem. Abstr.).

*Sympatholytics and the Rigidity of Decerebration.* Minz, B., and Veil, Catherine (Sorbonne, Paris). [Compt. rend. soc. biol., **141**, 573-4 (1947); cf. C. A., **41**, 807e, 5606d.]

Sympatholytic drugs of such diverse structures as yohimbine, corynanthine, and piperidinomethylbenzodioxan (F 933) temporarily relax the rigidity of decerebration in rabbits. The rigidity reappears upon elimination of the drug. As a hypothesis it is suggested that the central lesion provokes the liberation of an adrenaline-like agent which augments the formation of acetylcholine in the muscles involved.

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

*Effect of Acid and Alkali on the Excitation of Central Nervous System by Caffeine and Alcohol.* Kaku, Bundan. [Nagoya Igakkai Zasshi, **59**, 29-36 (1944).]

Excitation of central nervous system in mice elicited by subcutaneous injection of caffeine or EtOH, as determined by their tracks made on smoked paper flooring of an inverted glass jar into which the animals were placed, was found to be weakened by simultaneous injection of 1 per cent. lactic acid and strengthened by a similar injection of 0.1 N Na<sub>2</sub>CO<sub>3</sub>.

J. G. YOSHIOKA (Chem. Abstr.).

*Metabolic Action of the Cardiac Glycosides. I. Influence on Respiration of Heart Muscle and Brain Cortex.* Wollenberger, Albert (Harvard Med. School, Boston). [J. Pharmacol. Exptl. Therap., **91**, 39-51 (1947).]

Ouabain,  $2-3 \times 10^{-7}$  M, increases the O uptake of slices of guinea-pig heart muscle in the presence of glucose or lactate; at higher concentrations this increase (maximally 50 per cent.) is followed by a depression (maximally 80 per cent.). Of various other guinea-pig tissues studied, only brain cortex responded in a similar manner, and the effect was only about 0.2 as great as with heart muscle. Oxidation of succinate in heart slices is not inhibited by ouabain; in brain it is slightly inhibited. In the presence of ouabain the O uptake of heart slices, which is high initially, is depressed by ouabain without preceding stimulation. The effect of ouabain on O uptake of brain cortex slices is the same with pyruvate as with glucose or lactate. The inhibition of the respiration of brain cortex slices by ouabain cannot be reversed by washing. Ouabain has no significant effect on respiratory activity of homogenized heart and brain and of isolated oxidative systems. This indicates that ouabain does not directly interfere with the catalytic function of respiratory enzymes and that its site of action is probably the cell surface. Its probable action *in vivo* is discussed from this viewpoint.

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

*The Physiological Effects of Curare and its Use as an Adjunct to Anesthesia.* Harroun, Phyllis, Beckert, Frederick E., and Fisher, Carl W. (Univ. of California Med. School, San Francisco). [Surg., Gynecol. Obstet., **84**, 491-8 (1947).]

The physiological effects of 40 mgm. to 4 gm. of curare were studied in un-anesthetized dogs. No deaths were attributed to the specific toxicity of curare.

Apneic doses (56 or 88 mgm.) did not produce anesthesia or analgesia, but a rise in blood sugar averaging 49.9 mgm. per cent. and glycosuria occurred. Electrocardiographic tracings resembled those seen in K poisoning, and electroencephalograms showed cerebral dysrhythmia. Repeated administrations caused no change in the animal's reaction to the drug. Curare neither passes the placental barrier nor paralyzes the uterine musculature of the dog. After intravenous injection of the apneic dose (about 200 mgm.) of curare in man, there was an immediate transient fall in the blood pressure which returned to normal within 5 minutes, a blood sugar rise averaging 13 per cent., and a slight decrease in liver function. There were no significant changes in electrocardiograph tracings or in kidney function.

B. R. MURRAY (Chem. Abstr.).

*Antagonism Between Curare and the Potassium Ion.* Quilliam, J. P., and Taylor, D. B. (King's Coll., Univ. of London). [Nature, 160, 603 (1947).]

At constant temperature from 25° to 40°, the antagonism, as measured by paralysis of the rat diaphragm, is linear. Three times more curare is required at 25° to antagonize the K ion normally present in tissue than at 40°. Conclusion: Voluntary muscle seeks positive charges and curare displaces the K ion.

I. M. KLOTZ (Chem. Abstr.).

*A Chemical Method for the Determination of Streptomycin in Blood and Spinal Fluid.* Boxer, George E., and Jelinek, Viola C. (Merck & Co., Inc. Rahway, N.J.). [J. Biol. Chem., 170, 491-500 (1947); cf. C. A., 41, 6594e.]

A method of analysis of streptomycin (I) was devised sensitive to 1  $\gamma$  of (I) and based on the formation of a hydrazone with 9-hydrazinoacridine hydrochloride (prepared by refluxing 9-chloroacridine and H<sub>2</sub>NNH<sub>2</sub>·H<sub>2</sub>O in EtOH). After the removal of the excess reagent and hydrazones of acid, neutral, and weakly basic compounds by extraction with C<sub>6</sub>H<sub>5</sub>CH<sub>2</sub>-OH-CCl<sub>4</sub> solution, the amount of hydrazone of (I) was determined fluorometrically.

W. S. PORT (Chem. Abstr.).

*New Investigations on the Anticonvulsant Action of Cocaine.* Gutiérrez-Noriega, C., and Ortiz, V. Zapata (Facultad med., Lima). [Rev. med. expil. (Lima, Peru), 4, 249-67 (1947); cf. C. A., 41, 2173c.]

Into rats which had received a lethal dose of strychnine subcutaneous injections of 10-70 mgm./kgm. cocaine-HCl (I) or phenobarbital (II) or both together were made. (I) inhibited the convulsions, reduced the intensity of the attack, and increased the latent period of convulsions and the time of survival. There was a close parallel between the percentage of suppressions of convulsions and the time of survival. The optimal action was observed with 40 mgm./kgm. of (I). (II) had less anticonvulsive effects but the percentage of survival, the period of convulsions and the period of survival increased progressively with the dose. The anticonvulsant and antilethal effect of (I) was antagonized by (II). Conclusion: (I) inhibits the convulsions by nervous excitation, (II) by depression of oxidation of the nervous tissue.

F. FROMM (Chem. Abstr.).

*Experimental Catalepsy Produced by Cocaine.* Gutiérrez-Noriega, C., and Ortiz, V. Zapata (Inst. nacl. Hygiene, Lima). [Rev. med. expil. (Lima, Peru), 4, 268-83 (1945).]

A dog which received 5 mgm. cocaine-HCl (I) per kgm. body weight on alternating days began to show cataleptic reactions 1 month after beginning of treatment. The reaction was proportional to the dose of (I) (up to 10 mgm. per kgm.) and was preceded and followed by motor excitation which was shorter with higher doses while the time of catalepsy increased. The hyperthermy caused by (I) was less in catalepsy but did not disappear completely. Catalepsy was not produced by (I) if 10-20 mgm. nembital or phenobarbital per kgm. were injected; only motor unrest was observed in this case. Injection of 30 mgm. sodium caffeine benzoate previous to treatment with (I) intensified the catalepsy while injection of caffeine, metrazole, and nikethamide alone did not produce catalepsy. In the cataleptic state the blood glucose was slightly increased; inorganic P in the blood decreased. Alkaline phosphate, urea, alkaline reserve, and Ca in the blood showed no changes.

Conclusion : Cocaine catalepsy is a more intense excitation of the nervous centers than that which produces motor unrest, but not so intense as that in cocaine convulsions.  
F. FROMM (Chem. Abstr.).

*The Toxicity and Narcotic Action of Bromochloromethane with Special Reference to Inorganic and Volatile Bromide in Blood, Urine and Brain.* Svirbely, J. L., Highman, B., Alford, W. C., and Oettingen, W. F. v. (Natl. Inst. Health, Bethesda, Md.). [J. Ind. Hyg. Toxicol., 29, 382-9 (1947).]

In mice, the LD<sub>50</sub> for CH<sub>2</sub>ClBr is 2994 p.p.m., for CH<sub>2</sub>-Cl<sub>2</sub>, 16,186 p.p.m., and for CCl<sub>4</sub>, 9526 p.p.m. Repeated exposure for 7 hours to 1000 p.p.m. of CH<sub>2</sub>ClBr on 5 days per week for 14 weeks was tolerated by rats, rabbits, and dogs without evidence of toxic reaction. No significant changes were observed in the blood picture of dogs and rabbits. No evidence of liver damage was noted in the dogs. Repeated examination of the urine gave no evidence of kidney injury. Data are presented on the concentration at various times of inorganic bromide in serum, urine, and brain, and of organic bromide in blood and brain of the exposed and control animals. The histopathologic findings in these and other animals indicate that CH<sub>2</sub>ClBr will cause temporary degenerative changes of the liver, but, in contrast to CCl<sub>4</sub>, no cirrhosis of the liver was found under the conditions of these experiments.  
G. M. PETTY (Chem. Abstr.).

*A Theoretical Note Concerning the Action of Drugs on the Central Nervous System.* Barany, E. H. (Univ. Uppsala, Sweden). [Arch. intern. pharmacodynamie, 75, 222-6 (1947).]

The action of drugs affecting synaptic transmission should be more marked in functional systems based on long chains of neurones than in short-chain systems.  
M. L. C. BERNHEIM (Chem. Abstr.).

*Action of some Curare-like Drugs of the Triethylcholine Phenolic Ether Series on the Superior Cervical Ganglion of the Cat.* Depierre, France. [Compt. rend., 225, 956-7 (1947).]

In the chloralose-anaesthetized cat, the contraction of the nictitating membrane (following postganglionic electric stimulation) is not modified by [C<sub>6</sub>H<sub>5</sub>OCH<sub>2</sub>CH<sub>2</sub>N(C<sub>2</sub>H<sub>5</sub>)<sub>3</sub>I] (I); [C<sub>6</sub>H<sub>4</sub>(OCH<sub>2</sub>CH<sub>2</sub>N(C<sub>2</sub>H<sub>5</sub>)<sub>3</sub>I)<sub>2</sub>] (II); or [C<sub>6</sub>H<sub>3</sub>(OCH<sub>2</sub>CH<sub>2</sub>N(C<sub>2</sub>H<sub>5</sub>)<sub>3</sub>I)<sub>3</sub>] (III). However, following preganglionic stimulation, intravenous injection of 2 mgm./kgm. of (I) abolishes the contraction. (I) is as powerful in this respect as the tetraethylammonium ion (cf. Acheson and Pereira, C. A., 40, 6162<sup>2</sup>) but is not as long acting. For the same effect, 50 and more than 100 mgm./kgm. are needed in the case of (II) and (III) respectively. Hypotensive action parallels that on the sympathetic ganglion. The order of potency for curare-like action, however, is (III) > (II) > (I). Tubarine (from natural curare) has a curarization : paralysis potency ratio of 1 : 5, and (III) differs from tubarine in having a ratio of 1 : 100.

CARTER D. JOHNSTON (Chem. Abstr.).

*Comparison of Dihydroergotamine, Ergotamine, and Other Agents in the Treatment of Migraine.* Danenberg, Thurman. [Permanente Foundation Med. Bull., 4, 96-103 (1946).]

In 15 cases of true migraine headache injected ergotamine tartrate gave the highest percentage relief followed with decreasing effectiveness by dihydroergotamine, O inhalation, oral ergotamine tartrate, and EtCl spray. Epinephrine and placebos were ineffective.  
KARL F. URBACH (Chem. Abstr.).