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The Search for Intellectual Deterioration Among Epileptic Patients.

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S. B. SARASON (Psychol. Abstr.).

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Obliterative Cerebral Arteriosclerosis: A Characteristic Vascular Syndrome.

Distinctive alterations of the smaller blood vessels as found in the brains of 10 cases with cerebral arteriosclerosis are described. This lesion is characterized by tremendous expansion of the intima, resulting in narrowing or complete obliteration of the vessel lumen. It is proposed that this process be designated as "obliterative arteriosclerosis," and considered as a special type of arteriosclerosis of small cerebral blood vessels. Emphasis is placed on differentiation from "hyperplastic sclerosis."

Histologic changes in the parenchyma of the brain, particularly the cortical gray matter, consisted of diffusely scattered, stripe-like, small, old and recent softening secondary to the obliterative vascular lesions.

A gross finding in the brain which was regarded as characteristic of "obliterative arteriosclerosis" was a granulated appearance of the cortical surface, due to numerous focal areas of glial scarring, often associated with stripe-like areas of softening involving the upper layers of the cortical ribbon.

"Obliterative arteriosclerosis" may occur independently of arteriosclerotic changes of the major cerebral arteries. (Author's abstr.)

The Central Nervous System in Pneumonia (Non-suppurative Pneumonic Encephalitis). II. A Pathologic Study.

1. A survey of the literature regarding pneumonic encephalitis reveals only a small number of sporadic clinical and pathologic case-reports.
2. A careful study of the pathologic lesions of the brain in 10 cases of pneumonic encephalitis revealed that the cerebral alterations are uniform throughout the entire series, even though the cause of the pneumonitis is highly variable.
3. Extensive thrombosis and prominent perivascular haemorrhages are the outstanding microscopic findings observed in the nervous system.
4. Various theories regarding the pathogenesis of this type of encephalitis have been presented. The prodigious number of thrombosed cerebral vessels observed in this study suggests the possibility that some alteration in the clotting mechanism of the blood may cause these cerebral lesions.
5. The constancy of the cerebral lesions, regardless of the type of pneumonia, indicates that the real cause of the encephalitis may be the pulmonary tissue itself. Some factor from the lung parenchyma may possibly accelerate intravascular clotting. (Authors' abstr.)

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Complications in Electric Shock Therapy.

Therapeutic electric shocks produce some reversible cortical changes, probably together with some irreversible neuronal degeneration and gliosis. The typical memory losses are generally recoverable, and the diversified EEG disturbances tend to disappear in several months.

According to reports in the literature, the neuronal discharge may have other effects than the intended *grand mal*: cardiac arrest, autonomic disorders, *status epilepticus*, or manic delirium.

Regardless of operating technique, reported rate of compression fracture of a vertebral body varies from 0.5 per cent. of cases, to 20 per cent. with routine X-raying. Many compressions will remain undiscovered unless spines are routinely X-rayed post-shock. Compression spinal fractures are clinically inconsequential. The humerus, or more rarely some other bony structure, is occasionally fractured; to these instances the technique of shocking seems relevant.

Dislocation at the shoulder or mandibular joint should be technically preventable.

Arterial hypertension may be aggravated by electroshock, and myocardial insufficiencies can lead to a fatal outcome. Curare attenuates the convulsive violence, but may add new dangers; its drawbacks are still under scrutiny.

Aspiration during the coma has been deemed responsible for complicating lung abscesses. Liability to pulmonary complications probably has other unknown causes. Post-shock pneumonias have not always been charged to the therapy. The published mortality rates appear over-optimistic. (Authors' abstr.)

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Toxic Psychoses Associated with Administration of Quinacrine.

A series of 19 cases of toxic psychosis following quinacrine treatment of malaria, as observed in Gorgas Hospital from 1935 to 1943, is reported.

The incidence of quinacrine psychosis in Gorgas Hospital was 0.39 per cent. of all quinacrine-treated patients, or about 1 out of 250 so treated. It appeared to be moderately higher with estivo-autumnal than with tertian malaria.

The clinical characteristics of our observations are described and compared with those in 43 cases previously published by other observers. Case-histories and post-mortem observations are given in one fatal case of quinacrine psychosis, and in one case of quinacrine psychosis superimposed on early dementia paralytica.

The etiologic factor responsible for quinacrine psychosis is probably to be found either in an individual hypersensitivity to the drug or, in some cases, in constitutional psychopathy. Toxic damage to the central nervous system caused by malaria seems to be a contributing factor. The effect of overdosage of the drug remains doubtful. The pathogenesis of quinacrine psychosis is probably determined by hypersensitivity to the drug, and its specific toxic effect on brain tissue previously sensitized by malarial infection.

Prevention of quinacrine psychosis consists in recognizing that a certain few persons are probably hypersensitive to the drug. The dosage should rarely exceed 2.8 gm. in one course of treatment, especially when the therapeutic effect can be attained with a lower dose. Parenteral, in particular intravenous, administration should be limited to cases in which therapeutic results cannot be obtained otherwise. For treatment, high doses of vitamin B preparations and forced intake of fluids are recommended. The prognosis is favorable with few exceptions. No chronic mental ailment has been observed to develop from this condition.

(Authors' abstr.)

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A Note on the Problem of Brain Damage in Rehabilitation and Personnel Work.

The extent of behavior difficulty depends chiefly upon the extent of brain damage and upon the prior personality organization of the individual. The resulting psychological disorders include rigidity and perseveration in attacking new problems, increased distractibility and general slowing of thinking and speed of reaction, heightened emotional response with rapid dissipation, and generally lowered efficiency of adjustment to everyday life situations. Vocational prognosis depends not only upon the extent of damage and the possibility of clinical recovery, but also upon the person's work history and fields of interest.

H. HILL (Psychol. Abstr.).

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The Pyramidal Tract. The Sensitivity of Axons to Maximal Injury of the Cells of Origin in the Cat.

1. The axons of the pyramidal tract with the largest diameters appear to be more sensitive than smaller ones following loss of cells of origin. They disappear within the second and third day post-operatively.

2. The axonal reaction following maximal injury to cells of origin as indicated by the protargol technic is as sensitive a test for secondary degeneration in the pyramidal tract of the cat as that which occurs in the Marchi or acid phosphatase methods.

3. The glial activity begins early and continues for over 12 months during the process of secondary degeneration.

4. In general, shrinkage in the degenerated field occurs gradually, although there are individual variations.

5. Within the limits of the investigation, the results suggest that diameter of nerve fibers may have pathologic as well as physiologic significance.

(Author's abstr.)

I. *The Olivary Peduncle and Other Fiber Projections of the Superior Olivary Complex.*

1. The origin of the olivary peduncle has been confined chiefly to an area situated medial to the accessory olive and dorsal to the nucleus of the trapezoid body. In this region there are small multipolar cells known as the retro-olivary group. These cells are morphologically of the visceral efferent type, their dendrites intermingle with the fibrous plexus of the superior olivary complex and their axons are directed dorsally.

2. The course and topographical relationship of the crossed and uncrossed limbs of the peduncle are described in detail and a historical review of the various names and interpretations associated with the crossed portion is given.

3. The myelinated fibers comprising the olivary peduncle are 3 to 5 μ in diameter, and the bundle as a whole is remarkably uniform as to topographical relationship and size in the different mammals studied. This constancy is probably related to the fact that this bundle innervates an organ (cochlea) which likewise varies very little in size irrespective of body weights and species.

4. The difficulties encountered by various investigators in tracing peduncular fibers through the distal glial portion of the vestibular nerve were overcome and the method used is described. The peduncular fibers leave the central nervous system between the two divisions of the vestibular nerve and dorsal to the rootlets of the pars intermedia nerve.

5. Initially, the presence of peduncular fibers coursing in the eighth nerve could not be clearly demonstrated by the Marchi method. The difficulty was due to the fact that the peripheral portion of the peduncle underwent a more rapid breakdown than the central glial portion. This was overcome by reducing to one-half the usual time (10 to 14 days) allowed for degeneration. The difference in the degenerative behavior between the central and peripheral portion of nerves has not been generally recognized.

6. The course of the peduncular fibers within the eighth nerve is as follows: From the glial-Schwann sheath junction they course in the inferior division of the vestibular nerve as far as the ganglion associated with the main saccular ramus. Beyond the ganglion the fibers pass into Oort's (vestibulo-cochlear) anastomosis, which was formerly believed to be a bundle of aberrant cochlear fibers. The degenerated bundle accompanies the blood vessels of the cochlea over one half turn of the basal coil; subdividing *en route*, the tiny branches pass toward the spiral ganglion cells. Due to technical difficulties, the fibers have not been followed into the ganglion itself.

7. The morphological features of the olivary peduncle suggest that it is a visceral efferent fascicle which terminates in the cochlea. Presumably it might consist of preganglionic fibers which probably supply the blood vessels of the cochlea and/or the secretory epithelium overlaying the stria vascularis. If this is true, involvement of this bundle by either irritation or destruction might affect proper functioning of the sense organ of hearing, and perhaps the equilibratory mechanism as well. In this respect its significance to certain forms of Ménière's syndrome should be considered.

8. A cochleo-saccular anastomotic bundle, probably that described by Hardy, is closely related morphologically to the vestibulo-cochlear anastomosis (Oort), and on this basis might also represent visceral efferent fibers which innervate the saccule. The proximal portion of this bundle, unrevealed by Hardy, has been displayed by dissection of normal material, but its origin and nature has not been determined.

II. Other Projection Fibers of the Superior Olivary Complex.

1. Contrary to the general belief and teaching, the observations in cats show that the vast majority of fibers ascending from the superior olivary nuclei terminate in the nuclei of the lateral lemniscus, relatively few reaching the inferior colliculus, and none passing as far as the medial geniculate body.

2. The accessory nucleus sends a considerable number of crossed and uncrossed axons via the medial portion of the lateral lemniscus to the ventral and dorsal nuclei of the lateral lemniscus, and to the latter in particular. The proximal course of this group of fibers is with the peduncular fibers, and on this account has been confused with the latter by other authors. So far as it is known, this particular group of fibers has not been described by other investigators.

3. Apparently no peduncular fibers terminate in the sixth nucleus, although this point cannot be determined with certainty in Marchi treated material. Careful studies of Marchi serial sections, however, reveal the probability of an auditory-abducens reflex connection in two other ways: a circuitous connection between the abducens and the cochlear nuclei of the opposite side, and a stronger one between the medial pre-olivary and/or the nucleus of the trapezoid body. This group of fibers, few in number, climb upward with the rootlets of the abducens nerve to the nucleus.

4. Lesions of the rostral half of the medial three olivary segments were productive of bilateral descending degeneration, which successively coursed in the medial longitudinal fasciculus, and then more ventrally in the region of the tectospinal tract and ventral funiculus of the cervical cord. The cells of these axons are located either within the nucleus of the trapezoid body, the accessory olive, or neighboring retro-olivary region. There are about half as many crossed as uncrossed fibers. Presumably, this pathway would affect reflex movements of the head toward the source of sound. In no case of olivary involvement were ascending fibers found in the medial longitudinal fasciculi.

5. In Marchi sections, scattered fibers streamed through the reticular formation, but most if not all passed to higher auditory nuclei. These preparations do not permit the determination of whether some collaterals or terminals connect with cells of the reticular formation, as has been claimed by others on a basis of Golgi preparation studies.

Evidence was found in Golgi preparations that cells of the reticular formation might serve as intermediate connections between the olivary complex and the various motor nuclei of the medulla oblongata.

6. The caudal extremity of the accessory olive appears to distribute a few fibers to the corresponding portion of the motor facial nucleus. This connection may initiate movements of the auricle toward the source of sound and mediate reflex movement of the stapedial muscle.

7. Evidence in Marchi material was found in support of Held's recurrent connection passing from the olive to the cochlear nuclei. (Author's abstr.)

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Studies of Motor Function in Schizophrenia: III. Steadiness.

In order to discover whether schizophrenic patients differ from normal subjects in the ability to make fine neuromuscular co-ordinations, groups of patients and control subjects were tested with the Dunlap steadiness apparatus. The results, which were compared according to two indices of steadiness, indicated that the total patient group performed at a level significantly poorer than the control group. A smaller group of patients was retested twice, and their results were still significantly inferior to that of the control group upon retest. However, when those patients who co-operated as well as the normal group were compared with the latter the differences between the groups disappeared. Such a finding would seem to indicate that schizophrenia *per se* does not carry with it a loss in finer neuromuscular co-ordination. It would seem that in more complicated tasks in which this type of co-ordination is involved this factor may be considered as insignificant in determining differences which may appear between schizophrenic and normal groups. (Authors' abstr.)

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Shock Treatment of Psychoses Associated with Pregnancy.

The use of shock therapy in a group of patients with post-partum and gestational psychoses has been presented, and some of the problems discussed. A cardinal question is that of the interval necessary to elapse between delivery and the first convulsive treatment, an interval which we consider to be four weeks. A case of fatality associated with electro-convulsive therapy in a post-partum psychosis is reported. (Authors' abstr.)

J. NEUROPHYSIOL.

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Dorsal Root Potentials of the Spinal Cord.

The dorsal root potentials which are set up in the frog's spinal cord, either by dorsal or by ventral root volleys, have been systematically studied. The results of previous investigations have been confirmed, and in addition the experiments indicate that:

1. The d.r.p. is a catelectrotonic potential propagated electrotonically from a central focus, and is analyzable into an initial active phase and a later phase of passive decay.
2. The d.r.p.'s set up by strong and/or repetitive stimulation of dorsal roots have in addition a prolonged phase due to internuncial after-discharge, which is

increased by the convulsant drugs, strychnine, curarine and veratrine, and diminished by the narcotic, nembital.

3. On the other hand, internuncial after-discharge is not effective in prolonging the d.r.p.'s set up by ventral root volleys, which always show a late phase of passive decay comparable with that of 1, above.

4. Nembital greatly prolongs (up to 10 times) the time constant of decay of the d.r.p.'s set up by dorsal and ventral root volleys, but has relatively little effect on the rising phases.

5. The d.r.p. recorded in a dorsal root is abolished during the spike of a maximum volley fired in through that root, and in part recovers during the decline of the spike, leaving usually 50 to 90 per cent permanently destroyed.

6. The discharges of impulses out along the dorsal root fibres (dorsal root reflex), which often is associated with the d.r.p., has been shown to conform in all respects to the hypothesis that they are fired off by the cathodal polarization of the central terminals of these fibres.

An hypothesis is developed which shows how the synaptic potential set up by the trans-synaptic action of the dorsal root volley could secondarily produce the cathodal focus at the terminals of dorsal root fibres, and hence the spreading catelectrotonus of d.r.p. The mechanism of such a reversed electrical transmission across the synapse is closely related to the mechanism recently postulated for synaptic transmission. This hypothesis explains all the experimental results on the d.r.p. set up by dorsal root volleys, being particularly satisfactory in regard to the relative time courses of the events. It has not yet been possible to develop it for the d.r.p. set up by ventral root volleys. (Authors' abstr.)

Influence of Harmonic Content on the Wave Forms of the Human Electroencephalogram.

It is clearly demonstrated that the compounded harmonic waves generated by physical (electric) oscillators and the compounded harmonic oscillations of bio-electric systems, as observed "spontaneously" in certain human EEGs, have similar contours. This points to a similar electrical mechanism operating in each system. Furthermore, this strongly suggests that asymmetrically peaked waves in general, including square waves, are not intracellular phenomena, hence are not uniquely developed potentials—that is, unless a single neurone is found capable of generating two or more autonomous, and simultaneous, frequencies of oscillation. To date such phenomena have not been observed. It is apparent that the smallest known unit capable of giving rise to the observed electric activity must be two discharging nerve cells. However, in the light of ephaptic phenomena and pacemaker mechanisms in general, it is most probable that the asymmetric wave forms are the resultant combination of the electric output of two functionally independent relatively large aggregates of cells.

That clinically there is a fairly well defined group of subjects who give rise to bursts of square wave activity is worthy of much consideration. Further study will be necessary to determine whether the individuals subject to clinical "psychomotor" seizures have an exceptionally well developed intercellular synchronizing (phasing) mechanism that is essential for the production of square wave discharges. However, the prominent *phase shifting* and the random nature of the square wave discharges, even in clinically appropriate subjects, points to a statistical chance phenomenon in an individual who generates a fundamental frequency with relatively high voltage harmonics. (Author's abstr.)

An Inhibitory Mechanism in the Bulbar Reticular Formation.

Electrical stimulation of the lower brain stem of the cat has revealed a bulbar area capable of inhibiting motor activity whether initiated reflexly, in decerebrate rigidity or from the motor cortex. The excitable region is distributed in the bulbar reticular formation, chiefly its ventromedial part, and efferent connections descend from it in the ventral part of the cord. (Authors' abstr.)

Morphology and Conduction of Bipolar Dorsal Root Ganglion Cells of Selachian Fishes.

1. The dorsal root ganglia of *Raja* and *Squalus* among the selachian fishes are made up exclusively of bipolar cells.

2. The large bipolar cells are covered with a myelin layer, and in addition to the neurolemma capsule have a substantial endoneurial covering.
3. The volume of these bipolar cells ranges from 2,000 to 38,000 cubic micra.
4. Conduction of single volleys over the dorsal root ganglion is simple, and proceeds either centripetally or centrifugally.
5. The dorsal roots and peripheral nerves transmit activity in a multimodal conduction potential. The conduction speeds of the three most rapid groups are 36, 14 and 8 meters per second.
6. Size distribution curves of fiber diameter in peripheral nerve and dorsal root are given. (Author's abstr.)

A Midbrain Mechanism for Facio-vocal Activity.

Central midbrain lesions, destroying the periaqueductal grey matter and adjacent tegmentum beneath the superior colliculus, abolished or greatly reduced facio-vocal behavior in a series of cats. The maintenance of other activities in these animals and the preservation of facio-vocal behavior in other animals after control lesions elsewhere in the rostral brain stem emphasized the specificity of the deficit. Facio-vocal responses had previously been elicited by electrical stimulation within the mesencephalic region destroyed in these experiments. The two lines of evidence point to a central midbrain mechanism for integrating facio-vocal behavior in emotional expression. (Authors' abstr.)

Central Effects of Centripetal Impulses in Axons of Spinal Ventral Roots.

Centripetal volleys of impulses which enter the spinal cord over alpha fibers of ventral (motor) roots in cats and rabbits evoke in the ipsilateral ventral horn action potentials (spikes) which persist, in progressively decreasing numbers, for 30-50 msec. The action potentials do not represent repetitive centripetal discharges from the periphery, and no comparable centrifugal impulses in motor axons have been detected. It is, therefore, inferred that they represent the activity of interneurons located in the ventral horn. The available evidence suggests that the discharges are not injury effects associated with the presence of the recording micro-electrode.

Impulses in many motor axons regulate the discharges. In general, as the size of an antidromic volley is increased, individual neurons respond with an increasing number of spikes at increasing frequencies and decreasing latencies. The first action potential has a *minimum* latency, measured from the time of arrival of the centripetal volley at the somas of the motoneurons, of 0.7 msec. The first two or three action potentials are sometimes spaced at intervals as short as 0.6-0.7 msec., i.e. the frequency is about 1,500 per second. The succeeding impulses, which may total as many as fifteen, are spaced in a regular pattern at progressively increasing intervals.

A neuron's discharge to a centripetal volley in one deafferented motor nerve can be conditioned (augmented or decreased) by simultaneous or preceding volleys in a second deafferented motor nerve. The neurons frequently are not discharged by dorsal root volleys sufficing to activate relatively few motoneurons; in other instances the same neuron can be thrown into activity by either an antidromic motor volley or a dorsal root volley.

It is reasonable to extrapolate the present findings to instances in which motoneurons are synaptically rather than antidromically stimulated. Thus the internuncial system in the ventral horn may act as a significant correlating system.

Attention is directed to the regular pattern of discharge at surprisingly high initial frequencies, and it is suggested that some types of interneurons may normally exhibit this type of activity. (Author's abstr.)

Tonic and Reflex Functions of Medullary Sympathetic Cardiovascular Centers.

1. In confirmation of previous studies, pressor and depressor regions in the medulla of the cat have been identified by exploratory stimulation with the aid of the Horsley-Clarke stereotaxic instrument. The pressor center was found to occupy an extensive region of the lateral reticular formation in the rostral two-thirds of the medulla, while the depressor centre includes a greater part of the medial reticular formation in the caudal half of the medulla.

2. The functional significance of the pressor center is confirmed by the fact that transections designed to remove a portion of the pressor region produce an equivalent reduction in blood pressure and cardio-accelerator tone, the latter having been observed directly by recording the activity in the inferior cardiac nerve.

3. The depressor center is shown to be functionally significant in that it is capable of tonically inhibiting the activity of the spinal cardiovascular centers.

4. Somatic pressor reflexes produced by stimulating the sciatic nerve are dependent upon the integrity of the bulbar pressor center.

5. Depressor reflexes remain functional as long as the depressor center in the medulla is intact.

6. Recordings from the peripheral nerves demonstrate that stimulation of the bulbar pressor center of one side produces increased activity in the inferior cardiac nerves bilaterally, while in the cervical sympathetic the excitatory influence of the bulbar pressor center of one side is restricted to the ipsilateral nerve with a reciprocal inhibition of activity in the contralateral nerve. In the case of the cervical sympathetic this indicates the possibility of selective control over the activity in the sympathetic outflow to structures on one side of the head. (Author's abstr.)

Brain Stem Facilitation of Cortical Motor Response.

In cats and monkeys, cortically induced movements are facilitated by exciting a ventral diencephalic mechanism (sub- and hypothalamus) which appears to receive functional contributions from the globus pallidus and the midline and other nuclei of the thalamus.

An uninterrupted continuity of facilitatory sites may be followed from the ventral diencephalon backward through the central gray and tegmentum of the midbrain, the pontile tegmentum and the bulbar reticular formation.

Ventral diencephalic sites, whose stimulation facilitates cortically induced movement, are also effective in facilitating motor activity evoked from the bulbar pyramid, even after cortical extirpation.

From these results, diencephalic stimulation would appear to facilitate cortically induced movement, not at the cortex, but within the spinal cord, to which its influence is conducted by connections descending through the lower brain stem.

Impairment of this brain-stem facilitatory system may be responsible for the hypokinesia, resembling that of Parkinson's disease in man, which follows experimental destruction of the globus pallidus and ventral diencephalon.

(Authors' abstr.)

Properties of Maximal Seizures and Their Alteration by Anticonvulsant Drugs and Other Agents.

1. Seizures produced in rabbits, cats, and rats by electroshock intensities not far above threshold are usually characterized by extreme tonic extension, and are relatively constant in duration. This tonic extensor type of seizure is not altered by further increase in stimulus intensity or by lowering of threshold. Once it has begun it cannot be modified by additional stimulation while in progress. When the tonic extensor component is abolished by repeated electroshock, it may be restored by stimulation during a seizure. The depression following tonic extensor convulsions is uniform in duration and greater than for purely clonic seizures, although the latter are often considerably longer. The tonic extensor seizure would appear to represent the maximum rate of dissipation of energy of which the brain is capable.

2. The clinically recognized antiepileptic agents abolish the tonic phase of major seizures even when these drugs fail to raise appreciably the threshold for electroshock or metrazol seizures. Diphenylhydantoin and phenobarbital show the highest protective index. Several new agents, including tridione rank, with phenobarbital in efficacy.

3. A rapid and simple method for detecting and evaluating experimental antiepileptic agents is presented.

(Authors' abstr.)

Transmission of Impulses in Peripheral Nerves Treated with Di-isopropyl Fluorophosphate (DFP).

1. Local application of eserine or di-isopropyl fluorophosphate (DFP) in Ringer solution to segments of isolated nerves of the cat or bullfrog led to a block of nerve

impulses, indicated by the failure to record action potentials in the nerve beyond the region of application.

2. Such a block was not irreversible, but was abolished by washing the exposed segment of the nerve in Ringer solution, or in the case of DFP by merely lifting the nerve out of solution of the drug.

3. Eserine salicylate in the same concentration (0.01-0.02 M) had no blocking action when applied locally.

4. The *in vivo* administration of DFP to bullfrogs produced a reduction in the cholinesterase content of the nerves to a mean value of 2.3 per cent. of that from the control nerves. This indicates that the experimental nerves had virtually no acetylcholine-splitting activity. Such nerves, however, were found to conduct impulses equally as well as the control nerves following either single or repetitive shocks at frequencies as high as 43 per second.

5. The conclusion is reached that in nerve fibers there is no parallel relationship between the magnitude of the action (spike) potential and the cholinesterase activity as determined on the nerves after homogenization. It appears that the block which was produced by local application of DFP was not one resulting from the anticholinesterase action of this compound. (Authors' abstr.)

Effect of Di-isopropyl Fluorophosphate (DFP) on Action Potential and Choline Esterase of Nerve.

1. DFP, like other anti-choline esterases, abolished the action potential of the fin nerve of squid. The same effect at the same concentration and in the same period of time is observed on the abdominal chain of lobster.

2. When the nerves are washed in sea water immediately after the disappearance of the action potential, the response reappears completely or nearly completely.

3. If, however, the nerve is kept in DFP for various additional periods of time, reversibility becomes increasingly incomplete and eventually the action potential is irreversibly abolished.

4. The degree of reversibility of the action potential is strikingly parallel to the amount of choline esterase which reappears in the nerve preparation of the lobster.

5. The experiments indicate that choline esterase inhibition by DFP in nerves of cold-blooded animals is partly reversible for a certain period of time.

6. This is confirmed by observations on *in vitro* inhibition of choline esterase solution.

7. The observations are consistent with the concept that the release and rapid removal of acetylcholine is an essential event during conduction. (Authors' abstr.)

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Electrospinogram (ESG). Spinal Cord Action Potentials Recorded from a Paraplegic Patient.

1. Records are presented which are believed to represent electrical activity within the isolated portion of the spinal cord in a "spastic" paraplegic patient.

2. It is proposed that such recordings be called an Electrospinogram or ESG.
3. Attention is directed to the probability that subclinical as well as clinical mass discharges may occur within the spinal cord of paraplegic patients, which may represent "cord convulsions" or "spinal epilepsy."
4. ESG tracings are presented which are believed to represent post-stimulus "after-discharge" and action potentials coincident with isolated muscle twitch.
(Author's abstr.)

Sensations of Electric Shock on Flexion of the Neck as a Sign of Head Injury.

In a series of 17 cases of gunshot or shrapnel wounds and other types of injuries to the head, the patients complained of sensations of electric shock or paresthesiae in the extremities. These sensations were symmetrical, radiated along well-known anatomical dermatomes, and could be elicited on flexion of the head. They appeared during the post-traumatic period (several weeks after the injury), changed from one set of dermatomes to another, and lasted for a short time (weeks to months). It is believed that the syndrome is caused by a simultaneous contrecoup injury to the spinal cord. The occurrence of such a syndrome after a head trauma should be considered as a significant sign of injury to the nervous system, and should remove existing doubts as to the organicity of the case. (Authors' abstr.)

Ventricular Electroencephalography: A Description of the Technique.

A technique is described for recording the electrical activity of the brain by means of wire electrodes inserted in the ventricles. After one and one-half years of experience with monkey recordings, we believe the method to be simple, safe, and adaptable to routine use in conjunction with ventriculography. By application of this method to man, it may be possible to lateralize deep subcortical lesions and to demonstrate the subcortical origin of various abnormal waves.
(Authors' abstr.)

Penetrating Craniocerebral Injuries. Evaluation of the Late Results in a Group of 200 Consecutive Penetrating Cranial War Wounds.

1. The late results in a series of 200 severe cranio-cerebral war wounds have been evaluated at the time the patients were discharged from an Army General Hospital in the zone of the interior. All of these men had sustained injury severe enough to have dural penetration.
2. It is recognized that this is not a report of end results, but rather an intermediate evaluation.
3. The great majority of injuries were caused by artillery shell fragments. Over one-third of the injuries were in the parietal regions.
4. There was evidence of infection in 47, or 23 per cent of the cases. In 15 of these there was only superficial wound infection, while in 32 there were deep or major infections, including 17 brain abscesses. There were 6 cases of extensive cerebral fungi.

The average time of debridement following injury for the whole series was 33 hours, with extremes of 2 and 504 hours. The average time of debridement in the group with infections was 25.3 hours or less than that for the series as a whole.

All patients with infection had essentially the same type of drug therapy as those that remained uninfected.

In this series foreign bodies retained in the brain seemed to have little influence on the incidence of infection.

It is felt that these statistics confirm the opinion that the most important single factor in treating penetrating craniocerebral injuries is careful and complete debridement.

5. Some type of convulsive disorder following their injury occurred in 34 or 17 per cent. of the patients. Of these one-third had a history of convulsive seizures during the acute stage of their injury, and only three continued to have epilepsy at the time of disposition from the hospital. The remaining two-thirds developed their first seizure from 2 weeks to 8 months after injury, and the majority of these continued to have seizures until seen at this hospital and controlled medically.

One-half (56 per cent.) of the patients with convulsions had no evidence or history of infection. However, all but 3 of the remaining 44 per cent. had major or deep

infection. Time of debridement, unconsciousness, and retained foreign bodies seem to have little to do with the development of convulsions. This stresses the feeling that it is the cerebrodural scar and not the foreign body that is epileptogenic.

6. Twenty per cent. of the patients with dural penetration had no neurological residua, and another 15 per cent. had only convulsive seizures without localized residua. Motor, speech, and visual defects were the most common. Headaches and dizziness were conspicuous because of their infrequency.

It was of interest that in 34.7 per cent. of this group of severe injuries, there was no loss of consciousness.

7. There were 174 (85 per cent.) patients separated from the military service—a figure which is influenced by military necessity and medical department policies, as much as by the patients' physical condition.

There were 159 (79.5 per cent.) soldiers returned either to their homes or to some type of duty. These men must be considered capable of being completely or partially self-supporting. Twenty-six (18 per cent.) patients had severe enough residua to necessitate further hospital care in the Veterans' Hospitals. These men for the present must be considered completely incapacitated.

There were 2 (1 per cent.) fatalities in this group, both occurring in patients with deep cerebral infection.

Stress has been laid on the importance of organized rehabilitation of these patients. (Author's abstr.)

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The Role of Feeble-mindedness in Criminality.

Of 1,293 criminals examined from 1900 to 1942 in the Psychiatric Hospital of Munsingen, 321 were feeble-minded. While psychopaths showed greater tendency to crimes against property and against body and life, the feeble-minded leaned heavily to incendiarism and crimes against morality (incest, rape, exhibitionism, and unchastity). Idiots were not involved criminally; imbeciles slightly, morons markedly involved. Of moral crimes, unchastity was the most frequent offence of imbeciles and morons. Difficulty in finding a sex partner, their wooing being rejected or ridiculed, forces them to masturbation, exhibitionism, finding of sex-object in children, old people, animals, or to prostitution. Lack of intelligence for making fine moral discriminations, early exposure to free sex relations among domestics, stimulation by obscene talk, shyness, and an intellectual inferiority feeling contribute to an immoral or harmful approach to the sex partner. Motives to incendiarism in the feeble-minded are momentary impulse to vengeance, homesickness, sheer delight in fire, or desire for omnipotence and personality enhancement. In the feeble-minded the crime rate is highest between 15 and 19, and is four times more frequent in males than in females; two-thirds are pure oligophrenes, the rest mixed with psychopathy, epilepsy, or alcoholism. *Propfschizophrenie* (feeble-mindedness plus psychopathy) is the most common blend.

F. C. SUMNER (Psychol. Abstr.).

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 *Effect of CaCl₂ and of its Combination with Bromine, etc., on Higher Nervous Activity in Dogs. *Petrova, M. K.* 142

Experimental Phobia.

An experimental phobia of depth was produced and controlled in a dog. It was found that the pathological symptom could be produced by any factor which tended to weaken the animal's inhibitory capacities. The procedures considered responsible for the development of the phobia were early castration and a long history of performance in difficult discrimination experiments. Such experimental variables as alternation of positive and negative stimuli and prolonged stimulation by the negative stimulus were found to be adequate to produce the phobia, which appeared as an intense fear of the edge of the stairs where the dog was ordinarily fed.

G. A. KIMBLE (Psychol. Abstr.).

Skin Diseases in Experimental Dogs; Their Origin and Therapy.

Cases of functional skin disorders in dogs are described. It is demonstrated that eczema sometimes develops in the case of dogs who become neurotic in the conditioning situation. Local methods of treatment fail to cure the disease, but rest and removal of the dog from the laboratory frequently effect a cure of the skin disease which is coincident with the disappearance of the nervous symptoms. Valuable auxiliary methods of therapy include the use of bromine and veronal as well as the induction of a trance-like state in the dog.

G. A. KIMBLE (Psychol. Abstr.).

Inhibition as a Factor of Restoration of Nervous Activity.

Two types of therapeutic procedure are shown to be effective in treating dogs suffering from experimental neuroses. A considerable change was noted in animals subjected to two 8-day periods of veronal sleep in that, following such treatment, they were able to resist experimental neurosis to a greater extent than prior to narcosis. The treatment was particularly effective in treating functional skin diseases such as ulcers, eczema, and baldness. It is shown that the amount of the drug necessary to produce a favorable effect is directly proportional to the severity of the neurosis. The second method of treatment was an hypnotic technique. The rate of disappearance of the neurotic symptoms was closely related to the depth of the trance induced in the subject.

G. A. KIMBLE (Psychol. Abstr.).

Effect of CaCl₂ and of its Combination with Bromine and Caffeine on Higher Nervous Activity in Dogs belonging to the Strong Type and Suffering from Experimental Neuroses.

Small doses (.05 gr. to .5 gr.) of CaCl₂ were shown to aggravate an experimental neurotic syndrome in dogs. Larger doses (3.0 gr.) produced a positive effect and restored normal conditioned reflexes in the animals. When treatment was discontinued, the dogs returned to neurotic behavior. Dosages of 5.0 gr. alleviated the neurotic symptoms, but dogs treated with this dosage became overexcitable. 2.5 gr. of CaCl₂ was finally shown to be the optimal dosage. A combination of 2.0 gr. CaCl₂ and .5 gr. NaBr produced a better effect than CaCl₂ alone, while a dose of .005 gr. of pure caffeine added to the above mixture produced a still better effect. The importance of correct dosage is emphasized.

G. A. KIMBLE (Psychol. Abstr.).

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Z. RASSENK.

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1. Anatomy, Physiology, Psychology, Biochemistry, &c.

- Release of Phosphate by the Brain upon Stimulation. Cicardo, Vicente H. (Centro
 Investigaciones Fisiológicas, Buenos Aires, Argentina). [Am. J. Physiol.,
 145, 542-8 (1946).]*

The stimulation of the brain of the dog by a tetanizing electric current or by
 cardiazole or picrotoxin causes a release of P which is indicated by the increase of
 the total acid-soluble plasma P of the blood collected from the superior longitudinal
 venous sinus. E. D. WALTER (Chem. Abstr.).

Production of Hypovitaminosis C by Medication. II. The Barbiturates. Frommel, E., Piquet, J., and Loufi, M (Univ. Genève). [*Helv. Physiol. Pharmacol. Acta*, 3, 391-8 (1945) (in French); cf. *C. A.*, 40, 402⁷.]

In guinea-pigs heavy doses of the common barbiturates produced decreases in the ascorbic acid of most of the tissues in 1-4 hours. The liver and the lungs showed the greatest decrease; the brain and the spleen were but little affected. The adrenals frequently showed an increase, as though ascorbic acid were being mobilized.

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

Lesions of the Central Nervous System in Experimental Avitaminosis B₁. Austregesilo, A., and Borges-Fortes, A. (Univ. Brazil, Rio de Janeiro). [*Rev. neurol.*, 73, 305-25 (1941).]

H. L. WILLIAMS (Chem. Abstr.).

Effect of Pellagra-producing Diet in Dogs, with Special Reference to the Histological Changes in the Central Nervous System. Jensenius, Hans, and Nørgaard, Flemming (Kommune-Hospitalet, Copenhagen, Denmark). [*Acto Path. Microbiol. Scand.*, 19, 433-47 (1942) (in English).]

A pellagra-producing diet fed young dogs caused a morbid condition resembling black tongue, but lacking the oral symptoms. The condition, however, caused the same changes in the central nervous system, the changes in the ganglion cells being particularly pronounced. Similar changes were observed in the sympathetic ganglia.

H. L. WILLIAMS (Chem. Abstr.).

The Effect of Introduction of Isotonic Sodium Chloride Solution into the Cisterna Magna of the Dog on the Cell Content of the Cerebrospinal Fluid. Bedford, T. H. B. (Manchester Univ., Eng.). [*J. Physiol.*, 104, 299-304 (1946).]

Isotonic saline introduced into the cisterna magna of dogs under nembutal anesthesia resulted in the appearance of polymorphonuclear leucocytes in the cerebrospinal fluid, which effect was not observed following introduction of distilled water or Ringer's solution, Dale's formula.

H. L. WILLIAMS (Chem. Abstr.).

Can the α -Waves of the Electroencephalogram Originate Outside the Cerebral Cortex? Cate, J. ten, et al. [*Arch. néerl. Physiol.*, 25, 366-80 (1941).]

Working with cats under dial narcosis, the authors were able to elicit typical alpha waves from all parts of the neopallium, and also from the cornu ammonis (archipallium), the lobus piriformis (palaeopallium), and the thalamus. No alpha waves could be obtained from the nucleus caudatus or globus pallidus of the corpus striatum, the corpora quadrigemina, or the cerebellum. Those arising in the thalamus are of so small amplitude that, in the opinion of the authors, they do not play a part in the EEGs obtained from the other brain parts mentioned above.

C. P. STONE (Psychol. Abstr.).

Continued Investigations into the Nitrogen Metabolism in Manic-depressive Patients with a Special View to Amino Acids and Non-protein Nitrogen in the Plasma. Schou, H. I., and Trolle, C. (Hosp. Nervous Mental Disorders, Filadelfia, Dianalund, Denmark). [*Acta Psychiat. Neurol.*, 19, 495-516 (1944) (in English).]

During the recovery period from cardiazole shock the plasma N.P.N. fell to 12-14 mgm. per cent. Similar values were observed during the recovery phase from electric shock and during spontaneous recovery. The fraction of the N.P.N. responsible varied, but it can be the amino acids. The N output of the urine was decreased also.

H. L. WILLIAMS (Chem. Abstr.).

Studies of the Water Excretion in Recovery from Manic-depressive Psychosis (Depressive Phase). [*Ibid.*, 20, 235-45 (1945).]

The renal water excretion and N excretion were parallel.

H. L. WILLIAMS (Chem. Abstr.).

Blood Sugar and Cholesterol in Electric Shock. Silfverskiöld, Boris, and Stenberg, Sven (Psychiatric Clinic, Stockholm, Sweden). [*Acta Psychiat. Neurol.*, 18, 339-48 (1943) (in English).]

There was a statistically significant increase in the blood sugar and cholesterol immediately after electric shock with convulsions, the values returning nearly to normal in 1 hour.

H. L. WILLIAMS (Chem. Abstr.).

Biological Syndrome of Air Encephalography. Delay, Jean, Soulairac, A., and Desclaux, P. (Univ. Paris). [*Compt. rend. soc. biol.*, 139, 296-7 (1945).]

Discussion of results previously reported (*C. A.*, 40, 943¹).

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

The Effect of Methylene Blue on the Cells of the Central Nervous System. Näätänen, E. (Univ. Helsinki, Finland). [*Acta Path. Microbiol. Scand.*, 22, 603-14 (1945) (in English).]

The subcutaneous injection of 0.2-4.5 ml. of 1 per cent. methylene blue into rats resulted in sclerotic tissue changes in all parts of the central nervous system. The use of methylene blue in the treatment of CO poisoning is contraindicated.

H. L. WILLIAMS (Chem. Abstr.).

An Attempt to Produce Brain Tumors in Mice (with Negative Results). Christensen, Erna, and Engelbreth-Holm, J. (Univ. Inst. Path. Anatomy, Copenhagen, Denmark). [*Acta Path. Microbiol. Scand. Suppl.*, 54, 71-6 (1944) (in English).]

Pellets of 5 mgm. 9,10-dimethyl-1,2-benzanthracene dissolved in a mixture of cholesterol-lecithin were implanted in the brains of mice of Street, AKA and D1b strains. No brain tumors developed, but subcutaneous sarcomas appeared in a few cases.

H. L. WILLIAMS (Chem. Abstr.).

Effect of Anesthetics and Convulsants on Brain Acetylcholine Content. Tobias, J. M., Lipton, M. A., and Lepinat, A. A. (Univ. Chicago). [*Proc. Soc. Exptl. Biol. Med.*, 61, 51-4 (1946).]

Both free and total acetylcholine (I) contents of the whole rat brain are higher after nembutal or CHCl₃ anesthesia (diffuse diminution of activity) than in the unanesthetized rat. The free (I) change is greater after CHCl₃, whereas the total (I) change is greater after nembutal. The total (I) of frog brain is increased after administration of nembutal. Neither free nor total (I) of rat brain changed significantly after the onset of strychnine or picrotoxin convulsions (diffuse increase of activity) from that found in quiet, awake rats. Strychnine did not alter the total (I) content of frog brain. By the methods used, normal whole rat brain was found to contain about 0.7γ of free (I) and 2.0γ of total (I) per gm. wet weight. Frog brain contained approximately 4.9γ of total (I) per gm.

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

The Production of Acetylcholine and Antidromic Vasodilation. Matthew, L., and Bach, N. (Univ. of Calif., Berkeley). [*Am. J. Physiol.*, 145, 478-82 (1946).]

Acetylcholine is definitely formed as a result of stimulation of the vasodilator fibers of the dorsal roots of the rabbit. Adrenoxine is not produced in significant amounts. The role of histamine in this and other types of vasodilation is discussed; this substance is probably formed after the initiation of the vasodilation and so is not the causal factor. The mechanism of reflex activation and action of the parasympathetic type fibers in antidromic vasodilation is suggested.

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

The Brain-wave Pattern, an Hereditary Trait; Evidence from 74 "Normal" Pairs of Twins. Lennox, W. G., et al. [*J. Hered.*, 36, 233-43 (1945).]

Among 55 monozygotic twins, electroencephalographic tracings were judged to be identical in 85 per cent., non-identical in 4 per cent., and in doubt in 11 per cent. of the records. Among 19 dizygotic twins (including a triplet), tracings were found unlike in 95 per cent. and alike in 5 per cent. Among the total of 74 twins examined, the results of the brain-wave test agreed with standard physical criteria

as to identity for 88 per cent., disagreed for 4 per cent., and were in doubt for 8 per cent. Results indicate that brain-wave pattern is hereditary, and that the encephalogram can be used in human genetic studies and in tracing the heredity of neuropsychiatric diseases associated with cerebral dysrhythmia, provided that acquired conditions have not modified the brain-wave pattern and that test conditions are standard, apparatus dependable, and record-readers experienced. Ten figures of brain-wave paired tracings and one table accompany the article.

G. C. SCHWESINGER (Psychol. Abstr.).

Electroencephalogram in Syncopal Reactions: Collapse at 18,000 Feet Simulated Altitude in the Low Pressure Chamber. Sugar, O. [*War Med., Chicago*, 8, 9-13 (1945).]

Sixty-four cadets were chosen at random from the 2.5 per cent. suffering neuro-circulatory collapse with unconsciousness and in some cases convulsive movements at 18,000 ft., and from 20 normal controls. Abnormal EEGs were obtained from 20.8-22.8 per cent. of the former and from 15 per cent. of the controls. Only one record suggested *petit mal*. The others were considered abnormal because of non-pathognomonic slow-wave activity (6-7 per second). This syncopal reaction probably represents a psychosomatic disorder. Persons under emotional stress are liable to react poorly to reduction in oxygen pressure, since the mechanisms involved in the two states are similar (sympathetic nervous system). Motivation is of considerable importance in processing cadets through pressure chambers because the men look on it as a test.

M. E. MORSE (Psychol. Abstr.).

Porphyrin Fluorescence in the Livers of Pellagrins in Relation to Ultraviolet Light. Gillman, J., Gillman, T., and Brenner, S. (*Univ. Witwatersrand, Johannesburg*). [*Nature*, 156, 689 (1945).]

Porphyrin fluorescence in the liver can occur during the acute phases of pellagra. The great accumulation of Fe pigment in many livers of adult African pellagrins is probably caused by the disruption of an intracellular Fe porphyrin complex, such as catalase and cytochrome, present normally in the liver cell. Treatment with vitamin B complex is not required to resolve the porphyrin fluorescence in the livers of pellagrins while on a carbohydrate vitamin-poor diet. Ultraviolet light can excite a recrudescence of the porphyrin fluorescence in the liver without causing an exacerbation of the other external manifestations of the disease. Massive quantities of porphyrins can appear in the liver cells without any detectable amounts in the urine. These experiments emphasize the close interrelationship between the reactivity of the skin to ultraviolet light and the deposition of Fe and the appearance of porphyrin fluorescence in the liver in African pellagrins.

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

Electrical Correlates of Peripheral Nerve Injury: A Preliminary Note. Grenell, R. G., and Burr, H. S. [*Science*, 103, 48-9 (1946).]

In experiments on rabbit sciatic nerves, the potential relationships between the outer limb surface and the nerve were investigated under normal conditions, after severing or crushing the nerve, and after procaine infiltration. In humans the ulnar nerve was procaine infiltrated. Records obtained on the rabbit preparations between outer limb surface and selected points along the nerve, both before and after nerve damage, showed that potential gradients along the nerve are present. Potential differences recorded from the surface of the limb showed that the differences were correlated with the state of the nerve supplying the area. Functional nerve blocking (procaine infiltration) results in a shift in potential in humans over a range of 50-60 mv. in the surface EMF of the functionally disturbed area. It is clear from such experiments that the condition of the peripheral nerve is reflected in the changing surface potential differences.

F. A. MOTE (Psychol. Abstr.).

Recent Advances in the Study of the Brain as the Implement of the Mind. Berry, R. J. A. [*Proc. roy. Soc. Edinb.*, 62B, 85-96 (1944).]

Correlations between brain size and/or brain weight are considered. As an index of brain size, a rough measure of volume (length \times breadth \times height) is employed. It has been demonstrated that the brain develops rapidly in the normal

individual, doubling its weight in 2 months after birth and trebling it in 12. Beyond 12 months, the increase in brain weight proceeds more slowly. In a selected group of mental defectives, it is shown that the normal brain weight of the 2½-year-old child is not attained until the age of 25 years. The development of brain volume presents an almost exactly parallel picture. It is further shown that mean brain weight and mean brain size decrease with an increase in the degree of mental deficiency. The measurements resulting in these generalisations were made post mortem, using a technique which eliminates errors that have vitiated the results of many earlier experiments. A theory of brain function is advanced according to which the cortex is divided into three functionally discrete layers: (1) The infra-granular cortex is assumed to mediate the function of instinctual activities; (2) the granular cortex has a receptive function; and (3) the supragranular layer is the locus of control, inhibition and educability. The various types of mental disturbance and deficiency are postulated to be the result of dysfunction in different cortical layers.

G. A. KIMBLE (Psychol. Abstr.).

The Results of Unilateral and Bilateral Extirpation of the Forebrain of Amblystoma.
Detwiler, S. R. [*J. exp. Zool.*, **100**, 103-17 (1945).]

Two types of operations were performed on *Amblystoma* embryos in Harrison's stage 21: (1) Complete removal of the forebrain, the presumptive nasal placodes, and the rudiments of the eyes; and (2) removal of the right half of the forebrain. Seventeen of the embryos subjected to the first type of operation were joined parabiotically with normal embryos, which served both as nurses and controls. The larvae devoid of cerebral hemispheres, eyes, and nasal sacs were able to lead an autonomous existence; the motor activities concerned with lurching, engulfing food, chewing, and swallowing were carried out in an integrated manner, but with slightly less vigor than in normal larvae; spontaneous foraging reactions were reduced and growth was greatly retarded; no morphogenetic influence upon the medulla was noted, but there were striking deformities in the morphology of the head. After removal of the right half of the forebrain no regeneration was observed; there was cellular hyperplasia in the contralateral hemisphere, and the ipsilateral nasal sac showed a compensatory size increase.

L. C. MEAD (Psychol. Abstr.).

An Electrical Hypothesis of Synaptic and Neuromuscular Transmission. Eccles, J. C. [*Nature, Lond.*, **156**, 680-3 (1945).]

The author offers an electrical theory of junctional transmission in which the sequence of events is envisaged as follows: "(1) Impulse in terminal nerve fibre generates a current which gives a diphasic effect at the junctional region of the effector cell with a total duration of probably not more than 1 m.sec. in mammalian muscle and spinal cord: (a) initial anodal focus with cathodal surround; (b) more intense cathodal focus with anodal surround. (2) This cathodal focus sets up a brief and intense local response at the junctional region. (3) From this local response a catelectrotonus spreads decrementally over the effector cell membrane. (4) A propagated impulse is set up in the effector cell if this catelectrotonus is above a critical value; if it is below, then as the local response subsides, the catelectrotonic surround decays passively." The initial assumptions of, the explanations offered by, and the possible tests of this hypothesis are discussed.

A. C. HOFFMAN (Psychol. Abstr.).

Some Bioelectric Manifestations of the Human Cerebral Cortex during Voluntary Movements and Under the Influence of Sensory Stimulation. Kornmüller, A. E. [*Z. Sinnesphysiol.*, **68**, 117-50 (1940).]

Monopolar recording of the EEG was used. During voluntary movement of the limbs or the fingers, there was a reduction of potential in the central region but no occipital change. During movement or cutaneous or auditory stimulation, the tracings of corresponding bilateral points were in synchrony. Voluntary ocular movements increased occipital potentials, as did intermittent visual stimulation (with bilateral synchronization). With less frequent visual stimulation, there appeared waves lacking the sinusoidal character of the alpha. With intermittent visual stimulation ranging from 7 to 26 per second, the occipital potential sometimes showed a corresponding frequency, persisting for several seconds after termination of the flickering light.

(Psychol. Abstr.).

Conditioned Excitators and Human Sense Organs. Kekcheyev, K. [*Nature, Lond.*, 156, 573-4 (1945).]

Russian experiments are briefly reviewed in which the sensitivity of human sense organs was modified by extramodal or extraneous conditioning stimuli. A phrase or sentence was read aloud while the face was rubbed with a cold, wet towel; after conditioning, the reading of the phrase was accompanied by increased scotopic sensitivity. The idea of the bright light of automobile headlights was accompanied by increased auditory sensitivity; emotionally pleasant ideas, by increased sensitivity of all the sense organs. The idea of weak or of strong excitors produced the same effect respectively as the weak or strong excitors themselves. "We now find that the idea of red or yellow light increases the sensitivity of the eye to its complement (green or yellow light), but that the idea of the latter does not have the same effect."

A. C. HOFFMAN (Psychol. Abstr.).

Spinal Conditioning in Dogs. Kellogg, W. N., et al. [*Science*, 103, 49-50 (1946).]

Chronic spinal dogs were given 1,000 trials each in a conditioning experiment in which the conditioned stimulus was a shock to the left rear foot, the unconditioned stimulus a shock to the right rear foot, and the response to be conditioned the moving or flexion of the entire right hind limb. Muscle twitches of small amplitude and very short latency in response to the conditioned stimulus were obtained; it is assumed that this response is the same as the spinal conditioned response observed by Shurrager and Culler in the acute spinal preparation. However, the authors obtained not only the twitching or flexion response, but also an extension was frequently observed, this extension being of longer duration than the flexion twitch. With respect to the course of these two antagonistic responses, nothing like a typical learning curve was obtained, and no evidence of retention between experimental sessions was apparent. The authors conclude that they have not been able to establish spinal conditioning in chronic preparations; instead, the fluctuations of the response appear to be more adequately described as changes in reflex behavior.

F. A. MORE (Psychol. Abstr.).

Racial Group Differences in Mentality. Porteus, S. D. [*Tabul. biol., Haag*, 18, 66-75 (1939).]

Several studies of race differences in intelligence employing a variety of tests are reviewed. In studies comparing Chinese, Japanese, and Hawaiian children living in Hawaii, the test results tend to indicate that, on the Binet type test and on test of auditory memory span, the Chinese excel the Japanese. In all performance tests the Japanese excel the Chinese. The predominantly Hawaiian and part Hawaiian groups are inferior to both the oriental groups. On the basis of these studies and other studies reported in which the intelligence of Australian, African, and Asiatic primitive groups are compared, the following general conclusions seem warranted: Real differences in mentality exist in the various racial groups, but no single race has any claim to absolute superiority for two reasons. In the first place there is such great variability in intelligence among the various divisions of each race that the differences among the divisions may be greater than the differences among races. Secondly, the development in mentality is not even. Race groups that excel on one type of test may be inferior on another type. Finally, these differences in intelligence are not to be ascribed entirely to environmental influences.

G. A. KIMBLE (Psychol. Abstr.).

Acoustic Control in the Flight of Bats. Ewer, D. W. [*Nature, Lond.*, 156, 692 (1945).]

Ewer elaborates briefly on Hartridge's comparison of the bat's localizing technique to radar.

He suggests that one function of the complex intra-aural muscle reflex in the bat may be to make use of the trailing edge of the echo in such a way that the reflected note does not seem to be continuous with the emitted one. He also suggests that the great development of the pinnae of the bat's ears may enable the bat to eliminate signals reflected from the ground and so increase the maximum range at which objects may be detected.

A. C. HOFFMAN (Psychol. Abstr.).

Acoustic Control in the Flight of Bats. Hartridge, H. [*Nature, Lond.*, 156, 490-4 (1945).]

The author discusses the details of the localizing mechanism used by bats in flight. Bats produce four different sounds: Supersonic tones accompanied by a buzz and a click, and a signalling or communicating tone of about 7,000 cycles per second. The supersonic tones usually lie between 40,000 and 55,000 cycles, a frequency range regarded as optimal for localization considering the vocal apparatus required, the attenuation of sound during transmission, and the aural resolving power required. The tone may be interrupted (probably intentionally) and the rate of these interruptions may vary. The larynx of the bat contains at least two (one for the buzz, the other for the supersonic and signalling tones) and possibly three vibrating structures (one for each of the three sounds). The possible structure of each larynx and of the mechanism producing the click is discussed. It is the conclusion of the author that the bat breathes and phonates (during both inspiration and expiration) via the nose rather than the mouth. It is suggested that during the time the supersonic tone is being produced, the ear is rendered quiescent by "the intra-aural muscle reflex" (possibly by synchronization of the muscle systems involved). How the reflected sounds are used to localize is not known at present.

A. C. HOFFMAN (Psychol. Abstr.).

2. Pharmacology and Treatment.

Toxicity of Sulfanilamide on Higher Nervous Activity. Gantt, W. H., and Marshall, E. K., jun. [*Johns Hopk. Hosp. Bull.*, 77, 104-15 (1945).]

Two dogs with salivary conditioned reflexes and two others with cerebellar motor conditioned reflexes were given sulfanilamide by mouth in doses ranging from 0.5 to 1.2 gm. per kgm. body weight. Their external behavior was unchanged with small doses; moderate ataxia occurred with larger, and marked ataxia with the largest doses. In large doses, sulfanilamide abolished weak CRs and decreased auditory and especially visual CRs, and cerebellar CRs to auditory stimuli. Unlike alcohol, it does not change the relations between the values of excitatory and inhibitory CRs but depresses all CRs. The maximum effect was usually reached within an hour after administration, and by the next day the CRs had returned to normal. Sulfanilamide does not impair cortical reflexes until the therapeutic dose has been considerably exceeded. Overdosing in humans produces ataxia and mental confusion roughly similar to that in dogs.

M. E. MORSE (Psychol. Abstr.).

Quantitative Studies on Alcohol Tolerance in Man. Influence of Ethyl Alcohol on the Sensory, Motor and Psychological Functions in Relation to the Blood Alcohol in Normal and Habituated Persons. Goldman, L. [*Acta physiol. scand.*, 5, Suppl. 16, 7-128 (1943). (Abstracted Review; original not seen.)]

Experiments on 11 total abstainers, 24 moderate and 14 heavy drinkers show a linear relation for each individual between symptoms and blood alcohol content. Symptoms of intoxication appear at a blood alcoholic level of 0.036 per cent. and 0.075 per cent., the results showing individual differences in blood alcoholic level and toxic effect. Disappearance of symptoms occurs at the same blood alcoholic levels, whether food is taken or not. With the same consumption, the abstainers show the strongest effects. Alcoholic habituation is a matter of increased tolerance due to a rise in the blood alcoholic threshold of symptoms.

W. L. WILKINS (Psychol. Abstr.).

Permeability of the Hemato-encephalic Barrier in Massive Arsenotherapy. Krichevskaya, E. I., and Lass, D. I. (Dept. Syphilology, Central Dermatol. Venereal Inst., Narkomzdrav, Moscow, U.S.S.R.). [*Am. Rev. Soviet Med.*, 3, No. 1, 38-40 (1945).]

Under normal conditions As does not pass from the blood into the cerebrospinal fluid. After the injection of various arsphenamine preparations, As may appear in the cerebrospinal fluid after 5 minutes. The highest concentration of As in

the fluid is reached in 2-72 hours. Inflammatory processes in the membranes facilitate the passage of As into the cerebrospinal fluid. The character of neurosyphilis and the kind of preparation determine the passage of As into the fluid. Intravenous injections of a concentrated solution facilitated the penetration of the barrier. The content of As in the blood after ordinary arsphenamine therapy, the passage of As into the cerebrospinal fluid, the time of the appearance, the permeability of the meninges and the concentration of As in the cerebrospinal fluid were studied on 43 patients (tabes, progressive paralysis, syphilis of the brain, syphilitic meningitis, syphilitic pachymeningitis, syphilitic myelitis, latent syphilis, epidemic chronic encephalitis, epilepsy, and Friedrich-Marie disease). Some As was detected within 30 minutes to 5 hours after injection of neoarsphenamine. After 24 hours As was not found in any case. In all the cases in which there were inflammatory changes of the membranes, As penetrated into the cerebrospinal fluid. In dogs the size of the dose and the condition of the membranes influence the passage of the barrier. Arsenic penetrated into the cerebrospinal fluid in 37 of 49 patients who received massive arsenotherapy and who developed a temperature reaction. It appears, therefore, that in four-fifths of the patients, the temperature was a factor that facilitated the penetration of the barrier. W. R. HENN (Chem. Abstr.).

Toxicological Microanalysis of Hypnotics. Hanson, Arne. (State Lab. Forensic Chemistry, Stockholm). [Svensk Kem. Tid., 56, 290-4 (1944) (in English).]

Micro methods are applied to the identification of barbiturates in tissues. Urine, after treatment with Pb (OAc)₂, and cerebrospinal fluid are acidified and extracted with peroxide-free ether. Blood is extracted after addition of 1 volume H₂O and 6 volumes of pH 3.5 buffer. Stomach contents and viscera are treated by the Stas-Otto process and extracted. The ether extracts are dried with CaCl₂ or Na₂SO₄, treated with 0.1 gm. animal charcoal and 0.2 gm. CaCO₃, filtered through a layer of Na₂SO₄ held between layers of asbestos, and evaporated. If the barbituric acid contains saturated groups, it is boiled 3-5 minutes with dilute KMnO₄ containing H₂SO₄, re-extracted, and sublimed. The p-nitrobenzyl derivative (Lyons and Dox, C. A., 23, 821) is prepared and m.ps. are determined. Sublimation temperatures and m.ps. of 17 barbituric acids and their p-nitrobenzyl derivatives are tabulated. H. L. MASON (Chem. Abstr.).

Chronic Ethyl Alcohol Intoxication in Dogs. Widmark, Erik M. P. (Medico-Chemical Inst., Lund, Sweden). [Acta Path. Microbiol. Scand. Suppl., 54, 401-12 (1944) (in English).]

One dog received 65 kgm. EtOH during 3½ years (71 per cent. of lifetime) and another received 100 kgm. in 6 years 4 months and 10 days (81 per cent. of lifetime). Both died suddenly with cardiac collapse and pulmonary edema. No other pathological conditions were observed except some fatty infiltration of the liver and abnormally high values for volatile reducing substances in the blood.

H. L. WILLIAMS (Chem. Abstr.).

Experimental Investigations on Animals Showing Capillary Damage and Hemorrhage into the Brain during Insulin, Cardiazole, and Electric Shocks. Bjerner, Bo., Broman, Tore, and Swensson, Ake (Karolinska Inst., Stockholm, Sweden). [Acta Psychiat. Neurol., 19, 431-52 (1944) (in German).]

Rabbits showed localized changes in permeability and punctiform hemorrhages after shock, the changes being most marked after insulin shock and least after electric shock.

H. L. WILLIAMS (Chem. Abstr.).

The Action of Narcosis on Blood-sugar Modifications. Robuschi, Luigi. [Biochim. terap. sper., 28, 153-71 (1941).]

The hyperglucemia induced by injections of metrazole is completely inhibited by the administration of chloral or chloralose. G. A. BRAVO (Chem. Abstr.).

Action of Diphenylhydantoin and Phenobarbital on Subcortical Epilepsy. Gley, P., Fournier, P., and Touchard, T. [Compt. rend. soc. biol., 139, 298 (1945).]

Slight differences in the effects of the above antiepileptics on convulsions produced by electric shock in decerebrate pigeons are discussed.

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

Development of Tolerance and Cross-tolerance to Barbiturates in Experimental Animals. Gruber, Charles M., and Keyser, Goldie F. (Jefferson Med. Coll., Philadelphia, Pa.). [*J. Pharmacol.*, **86**, 186-96 (1946).]

If a reduction in sleeping time can be taken as a criterion of acquired tolerance to barbiturates, dogs can acquire tolerance to butisol-Na (I) and pentobarbital-Na (II); rats can acquire tolerance to (I), (II), cyclopal (III), seconal-Na (IV), and ortal-Na, and rabbits can acquire tolerance to (I), (II), (III), (IV), amytal-Na (V), and evipal-Na (VI). A tolerance to the barbiturate, as judged by the shortened sleeping time, is no protection against the LD 50. A dog, rabbit, or rat made tolerant to one barbiturate will very likely show some tolerance to all other barbiturates. Cross-tolerance was shown in rabbits for (I), (II) and (V), and in dogs and rats for (I) and (II). In developing tolerance in rabbits the time intervals can be longer between doses of long-acting barbiturates than with short-acting compounds. To develop tolerance in rabbits to (VI) the drug must be injected twice each day. Tolerance to any barbiturate is rapidly lost after cessation of administration.

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

Certain Peripheral and Central Nervous System Effects of β -diethylaminoethyl Phenyl- α -thienylglycolate Hydrochloride. Abreu, Benedict E., and Troeschler-Elam, Elizabeth (Univ. Calif. Med. School, San Francisco). [*J. Pharmacol.*, **86**, 205-12 (1946).]

The drug effectively opposes the spasmogenic action of pilocarpine on the intact colon and ileum of the anesthetized dog and of morphine on the intact colon of monkey and dog. It produces marked cardiac acceleration in the morphine-treated and untreated dog; in the monkey cardiac acceleration is slight, and is less than after administration of 0.1 the effective dose of atropine sulfate. It produces signs of central-nervous-system activity resembling delirium in dogs but not in monkeys or rabbits, when employed in spasmolytic dosage. β -Diethylaminoethyl phenyl- α -thienylacetate-HCl, diphenylacetate-HCl (trasentin), and 9-fluorene-carboxylate-HCl (pavatrine), and β -1-piperidylethyl α -methyl-*p*-xenylacetate-HCl have similar but much weaker actions.

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

Further Studies on the Depressant Actions of Barbiturates on the Terrapin Cardiac Vagus Nerve. Gruber, Charles M., and Keyser, Goldie Freedman (Jefferson Med. College, Philadelphia, Pa.). [*J. Pharmacol.*, **86**, 297-300 (1946); *cf. C. A.*, **32**, 6742¹]

In *Chrysemys marginata*, the Na salts, dissolved in Ringer solution, were placed in the pocket formed by the pericardial sac; this exposes the whole heart to the drug. The cardiac vagus nerve was then electrically stimulated. The effects of the barbiturates were temporary; recovery occurred in 5-30 minutes after washing out with Ringer solution, the time depending on the type of barbiturate used, the concentration of the solution, and the length of time the heart was exposed to it. Ortal, evipal, pentobarbital, and seconal were the most toxic. Butisal and vinbarbital (delvinal) had an extremely weak depressant action. Ortal Na was the most potent; in 0.0005 M solution it caused complete vagus block, while the other drugs in the same concentration produced only depression. *Cf.* preceding abstract.

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

Hypnotic Effect of Benzoxazolone Substitutes. Lespagnol, A., and Lefebvre, Mme. [*Bull. soc. chim.*, **12**, 386-8 (1945); *cf. C. A.*, **38**, 5587^a.]

Since benzoxazolone in its constitution is related to urethan, it seemed interesting to study some of its derivatives with regard to their hypnotic activity. 3-Methyl-, 7-allyl-, m. 82°, 3-allyl-, m. 41-3°, and 7-methyl-2(3)-benzoxazolone, m. 120°, were prepared. On testing the compounds in equal amounts (1:10,000 dilution) the hypnotic effect ensued in 5 to 10, 3, 1.5 and 0.5 minutes respectively. It is interesting to note that the allyl radical loses its hypnotic potency when it is attached to a benzene ring, while the Me group attached to the benzene ring enhances the hypnotic effect.

G. J. SCHEFF (Chem. Abstr.).