THE IMPULSIVE PSYCHOPATH: A CLINICAL AND ELECTRO-PHYSIOLOGICAL STUDY.

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THIS paper should be considered a preliminary communication, tentative and suggestive. It is based on a psychiatric and electro-physiological study of 70 cases (children, adolescents and adults) referred for anti-social and/or criminal behaviour, and is an attempt to suggest more defined criteria for the assessment of a particular syndrome.

Discussion of the psychopathic personality has been hampered by lack of clear definition of the condition. Curran and Mallinson (1944) list a dozen attempts at definition and a dozen attempts at classification based on the study of conduct. Some agreement is found between four authors that the psychopath is liable to episodic impulsive acts, and is moreover unable to profit by experience.

Research into aetiology reveals a consensus of opinion in favour of a constitutional origin, and Slater (1938 and 1943) states that " with few exceptions, however, the psychopathic personality is the result of the combination of hereditarily determined tendencies." Electro-encephalographic studies by Lennox, Gibbs and Gibbs (1940), Williams (1941), Gallagher, Gibbs and Gibbs (1942), and Hill and Watterson (1942) offer contributory evidence of the constitutional origin of the psychopathic personality, while Hill and Watterson find that 68 per cent. of the group described as aggressive psychopaths show an abnormal EEG.

Brill and Seidemann (1941) found a diminishing incidence of slow rhythms with advancing adolescence. Secunda and Finley (1942) found abnormal EEGs more common amongst " problem " than amongst normal children; but the cases of behaviour disorder showed abnormal EEGs with diminishing frequency as they grew older. In the 4 to 9 years group the frequency of abnormal EEGs was 74 per cent., and of the 16 to 18 year group 34 per cent. Grey Walter and Dovey (1943) in a group of 1,000 unselected mixed cases found (except in cases of cerebral tumour) " a smooth decline in percentage abnormality with increasing age," and confirmed that very slow rhythms (at 0·5 to 4 c.p.s.) begin to fade at the 4 to 7 years age group, and the dominant rhythm is at 4 to 7 c.p.s. from the temporo-parietal cortex.

This rhythm, called by Grey Walter the " theta " rhythm, tends to mask the 8 to 12 c.p.s. " alpha " rhythm, but the latter is always present in appropriate physiological and psychological surroundings; and as with advancing years the 4 to 7 c.p.s. fades, the alpha rhythm is left clearly dominant.

It is found that theta (4 to 7 c.p.s. rhythm) appears in cases of thalamic tumour when the cortex is cut off from the basal ganglia, in cases of children exhibiting aggressive behaviour (e.g. temper tantrums and the like), and in cases of aggressive psychopathic state.

It is perhaps pertinent to consider for a moment the psychological implication of the word " aggression." It is used here in the sense of " drive " derived from instinctive levels, which may be directed outwards against the external environment, or inwards against the self. Hence it is non-specific in its application except in so far as the magnitude of the intensity and directional factors render it pathological in any given person.

In this connection one observes that Henderson (1944), writing in *English Studies in Criminal Science*, vol. ii, considers only the " predominantly aggressive " and " predominantly passive " or " inadequate " psychopath, and instances murder

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and suicide as a logical extension of activity of the respective groups. He makes the statement that " the object is different but the underlying principle the same ; murder and suicide are similar twins."

Before going further with this attempt to relate the neurological and psychiatric implications of this study, it is perhaps pertinent to consider other observations which may indicate neuronic dysfunction. Silverman (1943), in a study of 75 criminal psychopaths, in which he merely groups the electro-encephalographic findings into " normal," " border-line abnormal " and " abnormal," finds evidence of a cerebral lesion in the histories of 27 cases, and observed neurologic signs in 21. The highest pathological factors in the histories were dystocia, birth-trauma and head injury, and in the neurological signs, inequality of deep reflexes, questionable pathological reflexes (Hoffmann, Babinski, etc.), and severe tremor.

In the writer's series of 70 psychopaths, 50 cases were studied for neurological signs, and 38 (i.e. 76 per cent.) were found to show a sign which in its full implications will be the subject of a further communication. Briefly it consists in a " flickering " movement of the fingers, observed when the arms and hands are extended and the eyes closed. It appears to be more commonly lateralized to the left side, is commonly accompanied by an equivocal plantar response on the same side and is increased by hyperpnoea, following which the " flicker " may appear in the digits of both hands. The movement of the fingers is non-phasic, not athetoid, or choreiform, and is probably best described as a " digital asynergia." The question of " sidedness " has been discussed by Fleischhacker (1943), and he makes the tentative suggestion that " one begins to wonder whether the right hemisphere in " right-handed " people may not play a more important role in the production of some " psychotic " symptoms than is generally thought." In a control group of 52 persons, age range 8 to 65 years, five only (i.e. 9·59 per cent.) showed this sign. Before leaving the subject of cerebral pathology in relation to psychopathic states it should be mentioned that several workers (reported in Curran and Mallinson's review) discussed cerebral changes, and it is perhaps noteworthy that Prof. R. J. A. Berry, addressing the Royal Society of Edinburgh, appears to favour the conception of establishment of engraphic patterns based on the theory of neuronic cerebration. He points out that " between birth and the age of six years the brain approximately quintuples in size and weight, and between birth and maturity it adds to its weight by roughly 1,000 gm. Most, if not all, of this increment is due to the myelinization of the cerebral axones of the white medullary centres." Prof. Berry found that " the smallest averages within normal range were shown by the shiftless and thriftless, criminals and reformatory boys."

Mention above of hyperpnoea leads on to discussion of the effect on the psychopath of biochemical stress, as estimated psychiatrically and by electro-encephalography. Hill and Watterson state that three factors are known to influence rhythms : biochemical changes in the blood, cerebral trauma and constitutional defects. Examples of biochemical stresses which have been applied to such cases are the lowering of blood sugar by fasting and/or the injection of insulin and hydration. If either of these are done to a psychopath, hyperpnoea then augments the 4 to 7 c.p.s. theta rhythms, and slower delta-type rhythms appear at a much earlier point than in the normal. Hill and Sargant (1943) reported a case of the first-mentioned of these, in a youth charged with the murder of his mother. Here the EEG became abnormal when the blood sugar fell below 100 mgm. per cent., and the appearance of slow rhythms was accompanied by some degree of impairment of judgment and clouding of consciousness (quoted by Curran and Mallinson).

In the writer's series two cases have been investigated in this manner. In May, 1943, Miss A—, aged 17 years 8 months, was charged with " grievous bodily wounding." It was stated that at about 2 a.m. she rose from bed, took down a horse-shoe (which apparently formed some part of her bedroom furniture) from the wall, descended to the floor below, and inflicted severe head injuries on a woman asleep there. During the subsequent three weeks, in spite of thorough investigation by the C.I.D., she denied all knowledge of the crime, and amongst her usual daily activities, sat for, and passed, a minor examination. Her early history suggested the presence of an epileptic inheritance, and showed that she had previously reacted to frustration with episodes of sullen aggression.

On examination after arrest she showed a bland indifference, with marked block of affect, both to the social significance of her act and its consequences. Her intelligence estimation put her in the dull and backward group ; and psychological tests (e.g. Rorschach) confirmed the view of emotional and intellectual dissociation.

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EEG records were taken, using a 4-channel machine, with standard and bi-polar leads, and Grey Walter's frequency analyser.

Resting records showed a peak at 7 c.p.s.; fasting records with a blood sugar of 84 mgm. per cent. showed increased energy in the 7 c.p.s. band, with bursts of lower frequencies.

Hyper-ventilation elicited a regular bifrontal 2 to 3 c.p.s. rhythm.

Repetition of records 20 minutes after the ingestion of 50 gm. of glucose showed the same features.

Conditions under which the accused had lived during the 24 hours prior to committing the crime were imitated as closely as possible, and blood-sugar estimations were taken approximately hourly through that time. At 2 a.m. the blood sugar had fallen to 69 mgm. per cent. On this it was considered a reasonable inference that the EEG, abnormal at 84 mgm. per cent. blood sugar, would be at least as abnormal, if not more so, at 69 mgm. per cent.

This evidence was accepted by the learned Judge, who bound over the accused with a condition of residence, and weekly attendance at a Mental Treatment Clinic.

It is perhaps interesting that after a year of this regime Miss A— voluntarily entered a mental hospital, where she has remained and is apparently content to do so.

Mr. B—, aged 18 years 8 months, was examined in February, 1943, charged with breaking, entering and larceny. There was again a family history of epilepsy, and a personal history of recurrent outbursts of rage and violence, with previous convictions for house-breaking and larceny or which he had been sent to a Nautical School (from which he had absconded on several occasions). He also showed a bland indifference to his state.

His records showed a peak of energy in the 7 c.p.s. band, which became dominant after hyperpnoea.

As the Court desired a recommendation as to disposal, they were urged to make the detention maximal. He was committed to Borstal, and released after 10 months. In July, 1944, he was arrested for murder, and this time was examined by Dr. Denis Hill, who reported the presence of asymmetry of cortical rhythm, the presence of diffuse theta rhythm, instability to overbreathing which was not inhibited by raising the blood sugar above 150 mgm. per cent., and undue instability to lowering of blood sugar.

The sentence was 15 years' imprisonment.

On the same day in 1943 another case was examined, remanded on a similar charge, who showed a similar record. His future activities may be awaited with some interest.

Three other cases in this group: Private C—, aged 19, was examined while awaiting trial for a peculiarly unpleasant murder, apparently unpremeditated. His records showed an intermittent low potential 4 to 7 c.p.s. rhythm, at times dominant from the temporal area, and at times in short bursts from first one and then the other frontal lobe. There was a definite asymmetry of the alpha rhythm; hyperpnoea had no appreciable effect on these rhythms, nor had the ingestion of glucose.

This man's autonomic activity was studied with the aid of the electro-pathometer, which makes use of the psycho-galvanometric reflex by a modification, designed by Grey Walter, which permits of a constant current input and (D.C.) amplification of the voltage drop across the patient, which is proportional to his resistance.

No objective signs of emotion relating to the crime could be obtained; and there appeared to be a dissociation of affect amounting to abulia.

Fifteen previous convictions for assault and/or assault with robbery had been recorded against this man, his first conviction being recorded at the age of 12 years.

Mr. D—, aged 16, showed a similar record. While on remand for larceny he committed an unprovoked assault on another boy, which was fortunate not to have produced more than a transient concussion.

Examined with the electro-pathometer there was found an almost complete absence of affective change; though, as in the previous case, the subject freely discussed anti-social activities in the past, many of which had not figured on any charge-sheet.

This electro-pathometric study is being continued.

Mr. E—, aged 22, had a history of head injury at the age of about 11 years, and in 1938, and a minor injury again in 1940 while on active service. About 10 days later he had an explosion of temper which was repeated on several occasions, and earned him various periods of detention. He then began stealing bicycles, motor-cycles and cars, receiving in all nine sentences, civil or military, in 17 months. At an earlier examination than that performed in March, 1943, he was reported to have shown diminished deep reflexes on the right side, and an equivocal right plantar response.

In March, 1944, he was referred for examination; the electro-encephalogram showed marked asymmetry of the two post-central hemispheres; on the left side analysis showed peaks at 3, 5, 7, 8, 10 and 12 c.p.s., the rhythms at 10 and 12 c.p.s. presumably being the alpha rhythm, as they were partly blocked by physical and mental stimuli. On the right side the dominant rhythm was at 8 c.p.s. with irregular modulations. The alpha rhythm appeared to be absent on this side. Overbreathing greatly augmented the energies in the slow band, producing some activity at 2 to 3 c.p.s. and 5 to 7 c.p.s. from the right post-central hemisphere.

It was considered that this record suggested some degree of cortical atrophy in that area rather than an essential condition.

A Rorschach examination, by Dr. Hutton, showed extreme restriction of interest, and of

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normal emotional reactions. Air-studies by Mr. Phillip Ryan, F.R.C.S., suggested a filling defect in the left parietal area. A trephine disc was removed from the left parietal area, and an Adson dura separator passed between dura and brain resulted in the escape of clear fluid in some quantity, and the lessening of tension.

The patient made an uninterrupted recovery; he has remained at work for the past ten months, and there have been no further anti-social episodes.

An EEG record taken last week, i.e. January, 1945, showed a normal record.

Of the 70 subjects examined for this study, 29 (i.e. 41·42 per cent.) showed a persistent theta (4 to 7 c.p.s.) rhythm; an additional 5 showed a resting delta (0·5 to 4 c.p.s.) rhythm (i.e. 48·57 per cent.); and a further 20 showed, with a normal resting record, delta rhythms developing after hyperpnoea. In the case of 7 of the 10 subjects showing normal records there is a possible explanation. One was a postman, previously of good character, committed for larceny of registered letters; another was a furrier on a first charge of larceny of a fur coat left in his care for repairs. It is possible that the aggressive episodes in both these cases were reactions to police arrest.

The third was a girl, charged with larceny, who appeared for examination with an hysterical palsy of the left arm. It is possible that her so-called fits of aggression were hysterical (or to quote R. D. Gillespie, "histrionic") in nature.

The fourth proved to be an hallucinated schizophrene with a paranoid overlay. Examined in 1943, he was treated with electro-convulsion therapy, and, at the time of writing, remains well and in regular employment.

The fifth was a small boy with an I.Q. of 140, who was being educated in a village school. His aggressive episodes, when closely investigated, proved to be the reasonable reaction of an intelligent child to a dull and repressive external environment.

The sixth proved to be a mental defective with a schizophrenic overlay, and the last was an infanticide who reacted vigorously to arrest. Her previous record had been good.

It is possible that these cases cannot be called true psychopathic personalities.

Lest it be thought that the interpretation of records is a simple matter this idea should be dispelled forthwith. Two records exemplify this point, and perhaps emphasize Dr. Denis Hill's criticism that the time has arrived for an exhaustive study of the individual record, rather than repeated statistical surveys of many records.

The first is the case of Private C—, whose history has already been given; the second was that of an intelligent schoolmaster, undergoing considerable emotional stress due to conflict, whose basis was the old story of "the eternal triangle." An acute near-schizophrenic episode occurred lasting four days, with disorientation in time and space, and some paranoid features. During this time his records showed alpha frequencies, appearing irregularly in either and both pre-central hemispheres. A month later, when he had solved his conflict by direct action, the record was normal and has remained so.

What can be the possible interpretation of the findings set forth above?

Alpers (1940), quoted by Curran and Mallinson, reports that, in cases of hypothalamic destruction or dysfunction, due to tumour, customary personality trends are disordered, with, amongst others, obvious anti-social tendencies and partial or complete loss of insight into these changes. Grey Walter (1945) considers that the appearance of theta rhythms indicates disturbance of thalamic-hypothalamic function.

Masserman (*Behaviour and Neurosis*, University of Chicago Press) points out that Alpers in conclusion specifically states, "the hypothalamus may be regarded as an area concerned with the expression of emotional reactions which are ordinarily sifted and weighed by the cerebral cortex," and himself suggests that "an emotion is a highly integrated conative, cognitive and affective-somatic reaction, in which not only the central nervous system but the entire organism functions as a psychobiologic whole."

It is here suggested that we are observing a condition where the normal establishment of cortico-thalamic association patterns is arrested at the age in childhood corresponding to the end of the latency and the beginning of homosexual periods. If this be so, how might the process be effected? Darrow and his co-workers (1944) in a study of parasympathetic regulation of the EEG suggest that a neural

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mechanism is indicated by which emotionally induced autonomic changes may produce " functional " effects on brain.

If the foregoing suggestions be valid, some indications for the treatment of this condition may be afforded. Taking the long-term view treatment must surely be preventive, and attention might well be directed to the maturational period mentioned above. Hence another burden falls on the shoulders of the child psychiatrist.

Taking the short-term view, it might be advisable to advocate the introduction of an indeterminate detention sentence, discharge to be dependent upon the establishment of satisfactory social and ethical patterns. This view has been advanced by Prof. D. K. Henderson, and might go some way to dispel the popular idea that the psychiatrist invariably appears in Court to offer evidence in mitigation.

Finally, one suggests that the hitherto loose conception of psychopathic personality is beginning to take shape, and that a more precise understanding of the condition is emerging.

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