SOME OBSERVATIONS ON ENDOCRINES IN THE EMOTIONAL PSYCHOSES.*

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It has long been recognized that disturbances of the thyroid, such as cretinism, myxœdema and some cases of Graves's disease, can give rise to mental symptoms. Of recent years, however, other endocrinopathies have been investigated from the psychological standpoint, and in nearly all cases evidence of some abnormality has been found. For example, Werner (1) examined 53 castrates, 48 cases of involutional melancholia, and 96 women of menopausal age, and found marked similarity between the mental symptoms occurring at the menopause and those in involutional melancholia, and presumed that they were both due to the same cause—ovarian dysfunction.

McCartney (2) examined 20 Chinese eunuchs and 3 Skoptsi (members of a Russian religious sect practising castration in the first decade of life), and found that they showed typical schizoid symptoms, such as apathy, emotional dullness, loss of initiative and undue tendency to introspection, without any intellectual impairment. He also found evidence of gonadal dysfunction on examination of a large number of male and female schizophrenics. Engelbach (3) found evidence of hypersexuality in the early stages of many of his cases of hyperpituitarism and suprarenalism, which is later replaced by loss of libido. Power (4) has emphasized Cannon's findings on the part played by the suprarenals in the emotions of fear and rage, and suggests that probably all the other emotions are similarly implemented by endocrine secretions, and that the latter may therefore be assumed to play a large part in the purely emotional psychoses, i.e., manic-depressive insanity and schizophrenia.

Finally there is the classical work of Mott (5) on the regressive changes occurring in the testes and ovaries in schizophrenia.

Endocrinology.

The only really definite proof of existing endocrine dysfunction would be the demonstration of an excess or diminution of the particular hormones in the blood, but at present, with the exception of the Ascheim-Zondek reaction as a test for the presence of the gonadotropic principles of the anterior pituitary in the urine and blood in pregnancy, this is not yet possible. In the meantime diagnosis must be

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made by the consideration of morphological deviations of the body and the laboratory investigation of metabolic changes. Unfortunately the findings resulting from the latter are too variable to serve as diagnostic features by themselves, with the possible exception of the estimation of the basal metabolism in thyroid disorders, so that at present one must fall back on morphology as the most useful indication of endocrine functioning. In the case of the gonads a history of disordered function is helpful, but it is possible for states of definite hypogonadism to exist which are not severe enough to interfere with reproductive functions. No doubt when completely reliable and standardized extracts of the various glands are available it will be possible to confirm any diagnosis of endocrine disorder by noting the response to treatment, just as many authorities now consider that a beneficial response to iodine therapy substantiates a diagnosis of hyperthyroidism.

The endocrines are among the most important regulators of both the pre- and post-natal development of the human form, and therefore abnormalities of the latter are significant of endocrinopathy, provided those features are selected which are known to be solely due to endocrine influence. These morphological deviations can be ascertained by two methods of approach—inspection and anthropometry. By inspection one can note the amount and relative distribution of the body-fat and hair, the texture of the skin, and the degree of muscular development, and by anthropometry one can determine the proportionate degrees of skeletal development. In this connection it may not be out of place to remind the reader of some of the functions of the endocrines as so far ascertained.

The anterior lobe of the pituitary elaborates hormones which promote body growth and the maturation of the sex-glands, also controlling fat metabolism and the activities of the thyroid, parathyroids, pancreas and adrenal cortex. The posterior lobe is thought to elaborate pressor and oxytocic principles. Of all these, the effect of the growth hormone on the development of the bones is the most definite and reliable indication of pituitary hyper- or hypo-function. Hyperpituitarism occurring before puberty produces overgrowth of both long and flat bones, the increase in the case of the former being both in length and breadth. Should the onset occur after the age of epiphysial union, the enlargement is confined to the flat bones and to increase in the width of the long bones; i.e., the changes found in acromegaly. Hypoactivity of the growth hormone is only apparent in cases in which the onset occurs in infancy, resulting in a dwarf with child-like proportions, i.e., the Lorain-Levi syndrome. Hyperactivity of the gonadotropic hormone is not easy to distinguish owing to the uncertainty, at present, as to how far the symptoms may be attributed to the pituitary or to the suprarenals. Hypoactivity of this hormone produces the well-known Fröhlich's syndrome, in which genital hypoplasia is associated with marked obesity, involving mainly the regions of the breasts, mons, pelvic and shoulder girdles (Figs. 1 and 2). This condition, which is most common in adolescence, may also arise in adult life, and then the genital symptoms accompanying the obesity are purely functional and without anatomical change. Disorders of the remaining pituitary hormones do not produce any easily recognized morphological signs and were not investigated.

The internal secretion of the testis is responsible for the development of the secondary sex characteristics and for the epiphysial union of the long bones.

Deficiency of this secretion causes slightly different symptoms according to whether the time of onset is before or after adolescence. If before, the lack of normal stimulus to epiphysial union results in the long bones continuing to grow beyond their normal time, ultimately producing arms and legs which are out of all proportion to the total stature. This can be seen in Fig. 3, which shows two males of equal height, and each with the anterior superior iliac spines marked with ink, in order to show the comparative length of the legs. It is obvious that the man on the left is equal in height to that on the right, merely because of greater length of leg. Actually the measurements from the upper margin of the symphysis pubis to the soles of the feet should be almost equal to that from the vertex to the upper margin of the symphysis pubis, as it is in the man on the right, where epiphysial union had occurred at the correct time in response to endocrine stimulus

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from the testes. The first man, or youth, was a case of moral imbecility without intellectual impairment. He presented the physical signs of delayed puberty, viz., overgrowth of arms and legs, a childish and narrow face, and although seventeen years of age still had a treble voice and had never had to shave.

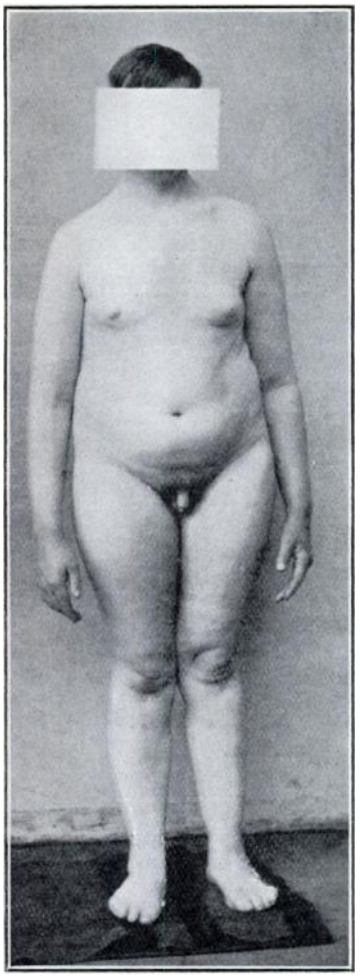


FIG. 1.

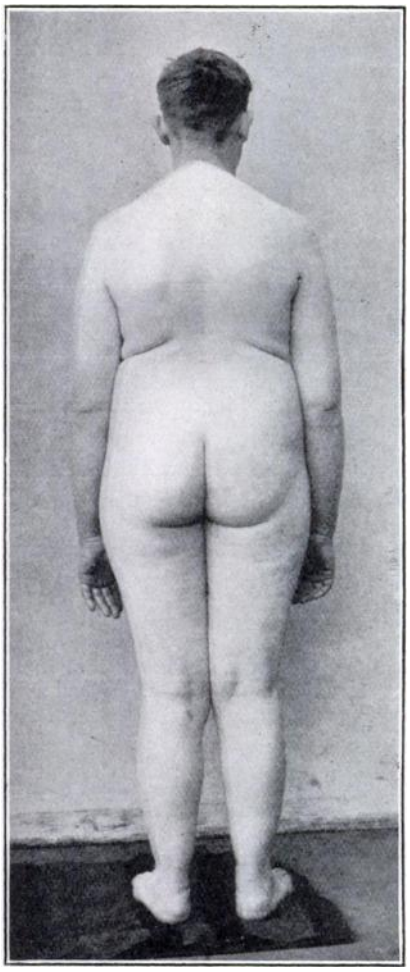


FIG. 2.

Typical obesity in hypopituitarism.

There was no axillary hair and the pubic growth was very scanty. The genitalia were those of a boy of about twelve years of age.

This disproportion between the upper and lower measurements is also dependent on normal functioning of the pituitary growth hormone, and if the latter is deficient it will not occur, the individual remaining a dwarf of more or less symmetrical proportions. But as the stimulus for the maturation of the testes comes from the

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pituitary, any marked increase of the lower measurement over the upper always indicates hypogonadism, no matter whether its origin is primarily in the gonads themselves or in the pituitary. Hypogonadism arising after the period of active growth is over will not produce any modification of the skeleton.

Precocious development of the testicular hormone leads to premature closure

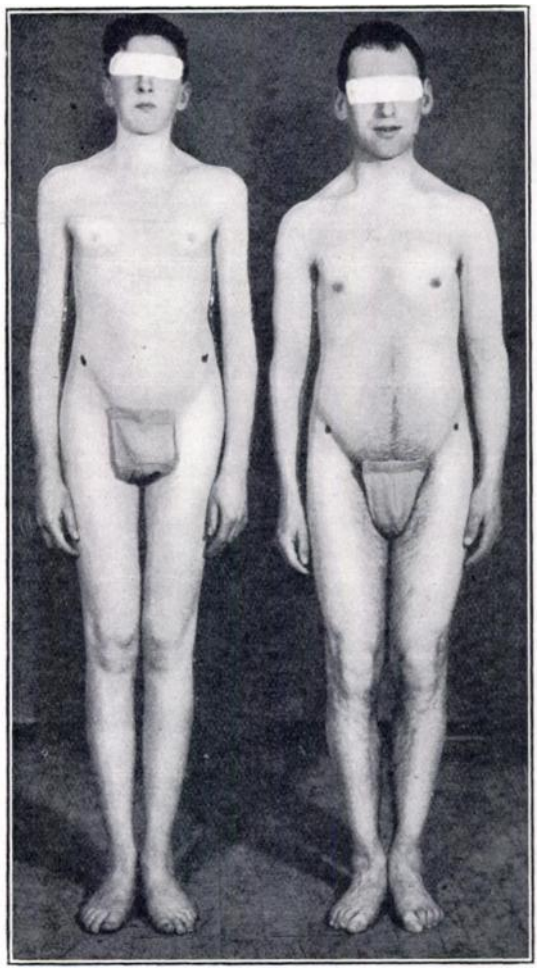


FIG. 3.

of the long bone epiphysis, so that hypergonadism occurring during the growth period produces the opposite effect, the upper measurement exceeding the lower, provided the pituitary growth hormone is unimpaired. The gonads also influence the development of the hair, fat, skin and muscle. Engelbach (3) describes the typical hypogonad as having well-developed primary hair (scalp and eyebrows), but poorly developed secondary hair (face, axilla, pubis, body, limbs), poor musculature,

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smooth-textured skin, narrowness of the lower part of the face, and a tendency to leanness, except during the later decades, when there may be a terminal obesity.

Hypergonadism, whether arising primarily, or as a result of suprarenal or pituitary abnormality, is associated with the opposite characteristics, viz., excessive development of the secondary hair and body musculature. This condition, which usually does not call for treatment unless occurring in females or children, is not necessarily entirely due to the gonads, but may be caused by some dysfunction of either the suprarenal cortex or the pituitary, or both combined. The function of the suprarenal cortex is thought to be that of a stimulant to the gonads, largely because of the association of suprarenal tumours with hirsutism and virilism in women, but the recent discovery that in some cases these changes can be caused by pituitary lesions has rather complicated the theory. Therefore any cases in the present investigation showing symptoms which are the direct opposite of hypogonadism have been labelled "hypergonadism", and no attempt made to implicate any particular gland.

The effects produced by the hormones of the thyroid and the suprarenal medulla are too well known to require reiteration.

Examination of Manic-depressives and Schizophrenics.

Two hundred male patients resident in the South Yorkshire Mental Hospital were examined, 100 of each of the two psychotic groups. The investigation was confined to males, because physiological alterations of endocrine balance do not occur so frequently in this sex as in women. The methods of examination used were: (1) inspection, (2) anthropometry.

On inspection note was made of the extent of muscular development, the general texture of the skin, the primary and secondary hair development, and the degree and distribution of the body-fat. Degrees of muscular development were grouped as (*a*) poor, (*b*) average, (*c*) increased; types of hair development as (*a*) good primary, but poor secondary hair, (*b*) average primary and secondary hair, (*c*) increased secondary hair; types of skin as (*a*) smooth, (*b*) average. These standards were arbitrary ones, formed after the examination of a large number of individuals, but since all cases were inspected by the same observer, the results are comparable. It was found that fat distribution did not lend itself very well to classification into groups, as this feature varies so much according to the state of the psychosis at the time of examination, so that only those cases were noted where the amount was very excessive and not to be accounted for by nutritional causes. The measurements taken were (1) stature (standing), (2) distance from the upper margin of the symphysis pubis to the soles of the feet (standing), (3) bizygomatic width (maximum width between the zygomatic arches), (4) bigonial width (distance between the angles of the mandible). No. 2 will, in future, be referred to as the lower measurement, from which the upper measurement may be obtained by subtracting it from the total stature. By dividing (4) by (3) and multiplying by 100 a figure, the bigonial index, is obtained, and is useful for representing statistically the shape of the face in a large number of people. Ordinary standard anthropometric apparatus was used for this part of the work. The results obtained were treated by

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standard statistical methods, i.e., by the use of "means" to express the characteristic measurements of each group, the standard error as a test of significance, and the χ^2 distribution as a means of testing the agreement between observation and hypothesis (6).

Results.

TABLE I.—*Measurements.*

	Means and standard deviations. Manic depressives.	Means and standard deviations. Schizophrenics.	Difference between means.	Standard errors.
Stature	167·8 cm. σ 7·0	167·5 cm. σ 6·9	0·3 cm.	±0·97
Lower measurement minus upper	+2·0 ,, σ 5	+3·4 ,, σ 4·5	1·4 ,,	±0·69
Bigonial index	17·28 ,, σ 0·89	16·98 ,, σ 0·89	0·3 ,,	±0·12

It will be seen from the above table that although there is no significant difference between the mean statures of the two groups, there are small differences between the mean bigonial indices and between the means of the figures obtained by subtracting the upper from the lower measurement in each group. Since in each of these two latter cases the differences are twice the value of their respective standard errors, they may be considered to be significant. It was found, therefore, that the schizophrenics, as a class, had longer legs in proportion to their stature, and a more "inverted-egg-shaped" face, than the manic-depressives, both of which factors suggest a relative hypogonadism.

TABLE II.—*Muscular Development.*

	Poor.	Average.	Increased.		
Manic-depressives	20	57	23	=	100
Schizophrenics	34	41	25	=	100

$\chi^2 = 14{\cdot}6 \quad P. = 0{\cdot}01$

It will be seen from Table II that the two psychotic groups are dissimilarly distributed in respect to muscular development, and since the value of P. is below 0·05 this dissimilarity is not due to chance selection, but to the fact that they represent different anatomical groups. The greatest differences are between those of poor and average muscular development, the schizophrenics having a larger number of the former and a lesser number of the latter, from which one may conclude that schizophrenics as a class are poorer in muscular development than manic-depressives.

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TABLE III.—*Hair Development.*

	Primary good, secondary poor.	Average primary and secondary.	Increased secondary.	
Manic-depressives	9	20	71	= 100
Schizophrenics	21	25	54	= 100

$\chi^2 = 21{\cdot}3$ P. = 0·01

It will be noticed that there is a difference in the distribution of types of hair distribution, and again this is not to be explained by chance selection, the value of P. being below 0·05 in this table also. The two groups deviate in opposite directions, the schizophrenics tending to have good primary but poor secondary hair, whereas the manic-depressives tend to excessive secondary hair development.

TABLE IV.—*Texture of Skin.*

	Smooth.	Average.	
Manic-depressives	17	83	= 100
Schizophrenics	25	75	= 100

$\chi^2 = 4{\cdot}5$ P. = 0·03

This table shows that the distribution of the skin types also differs in the two classes (although the degree of difference is not so marked as in the case of the muscular and hair types), the soft-textured skin, typical of hypogonadism, being more frequently found amongst schizophrenics than manic-depressives.

All these findings, when pieced together, indicate that when schizophrenics are compared, as a class, with manic-depressives, they present morphological evidence of relative hypogonadism, being characteristically poor in muscular development and secondary hair, having a softer textured skin and a disproportionate growth of the long bones. The latter feature also indicates that the onset of the hypogonadism occurred during the active growth period. It is interesting to note how closely these features coincide with Kretschmer's leptosome type, which is said to be most frequent amongst schizophrenics.

Fig. 4 shows two selected patients, left a schizophrenic, and right a manic-depressive, each presenting graphically the characteristics of their class as found by this investigation.

As previously mentioned, fat distribution was only noted when excessive in amount, and that was in 26 manic-depressives and 6 schizophrenics. In all cases it was of the pituitary type of distribution, and in the case of the schizophrenics was associated with evidence of hypogonadism, whereas all the

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manic-depressive cases showed normal secondary sex characteristics, the obesity occurring late in life, as also did the onset of their psychoses in three-quarters of the cases. This latter fact may possibly mean that involutional

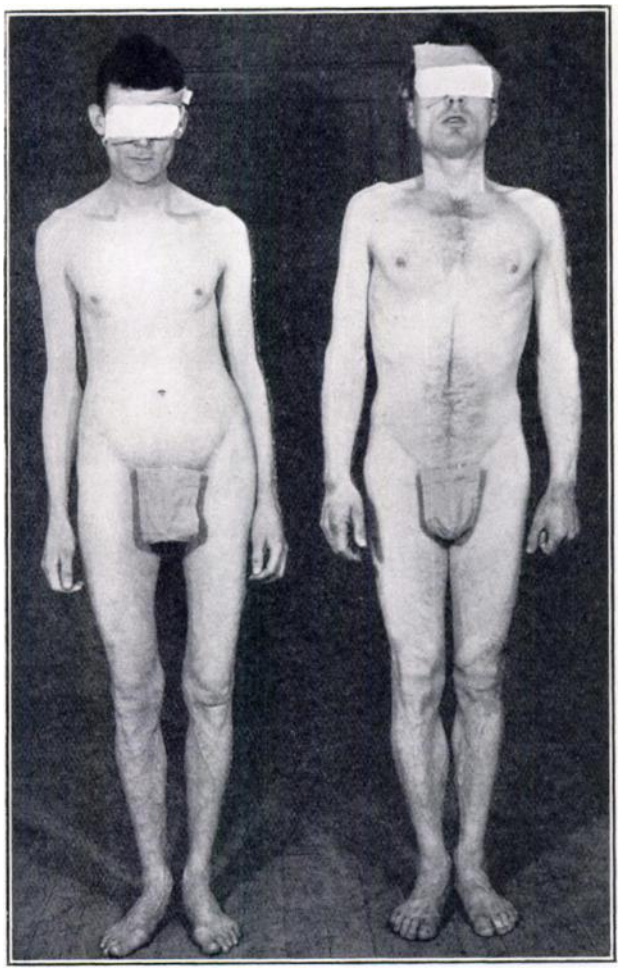


FIG. 4.

manic-depressive insanity has an endocrine basis. Here again there is some similarity between the endocrine morphology and Kretschmer's findings, the obesity bearing a strong resemblance to that described in his pyknic type.

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SUMMARY.

One hundred male cases of schizophrenia and of manic-depressive insanity were examined for morphological evidence of endocrine differences. It was found that the schizophrenics as a class showed relative hypogonadism, which had had its onset during the growth period, and that pituitary deficiency, of late onset, was frequent amongst the manic-depressives. These findings appeared to have some relationship to Kretschmer's morphological types.

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References.—(1) Werner, *Endocrin*, 1935, xix, p. 695.—(2) McCartney, J. L., *ibid.*, 1929, xiii, p. 73.—(3) Engelbach, *Endocrine Medicine*, 1932 (Baltimore: Charles T. Thomas).—(4) Power, T. D., *Journ. Ment. Sci.*, October, 1935, lxxxi, No. 335, pp. 783–798.—(5) Mott, F., *ibid.*, July, 1921, lxvii.—(6) Fisher, R. A., *Statistical Methods for Research Workers.*

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