ENDOCRINOPATHIES AND PSYCHOSES.*

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THE problem of the relationship of the endocrine system to personality and its disorders has long been an intriguing one. The literature abounds with the views of the psychiatrist, physiologist, pathologist and endocrinologist, and still there remains a multitude of challenging questions unanswered. The ætiology of personality disorders, that of the psychoses, and the true function of the endocrines and their working mechanism have never been satisfactorily determined. To establish scientifically any ætiological factor in medicine one must make a definite diagnosis of the entity, identify the ætiological factor, the specific pathological picture, and the influence of specific therapy.

The diagnosis of the various psychotic states is a difficult problem. Anyone with experience readily realizes the pitfalls that await one when called upon to differentiate between atypical cases of schizophrenia, manic-depressive and involutional psychoses, and the numerous states that lie somewhere between the so-called normal and the psychotic. With the diagnosis of endocrinopathies the difficulties multiply, because here we deal with a system of functioning glandular structures which may be hyperactive, hypo-active or in a state of dysfunction. These various states may exist simultaneously in different glands, i.e., we often see such syndromes as deficient growth hormone accompanied by excess of sex hormone. Each produces its own definite stigma on the organism, but how this may demonstrate itself depends considerably upon the time of life in which the dyscrasia occurs, how long it persists, the influence on other glands, on the nervous system, etc. Probably the chief factor is the quality of the inherent soma of the organism. Consider, for example, the growth hormone of the pituitary gland. If there is an over-functioning during childhood, the end-result is gigantism, but if the over-function occurs after maturity the result is acromegaly. We need not mention the other phenomena which also express the influence of this

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single abnormal condition upon the nervous tissue, the psyche, etc. Consider also the hypo-functioning thyroid gland, which causes cretinism in early life and myxœdema after maturity.

Only recently Karnosh and Stout (19) have discussed the relationship of psychoses and myxœdema. They believe that hypothyroidism exerts a marked influence upon the physiology of the body, but that no specific type of psychic reaction is predictable, because this depends upon the constitutional, hereditary and environmental background of the individual, and in older people may produce a syndrome of organic nature. Often these psychic changes cannot be influenced by therapy, in spite of the fact that the metabolic error is corrected. Dunlap and Moersch (10), studying the syndrome of hyperthyroidism and its psychic manifestations, found no direct causal relationship, but reported the increased frequency of toxic-exhaustive states, acute delirium, and manic-depressive psychoses associated with specifically pathological thyroid glands.

Pathological studies reported to date present views of both extremes, some finding almost constant association between abnormal psychic function and pathological gland structure and others reporting none.

Pende (27) makes the observation that it is not always possible, as with the brain, to tell the functional efficiency of a structure merely by studying its size, shape and form, but that the seat of the pathology may be in the minute histochemical changes. Carlson (6) expresses himself as follows: " There is nothing in the experimental, clinical or pathological fields to justify any conclusions that endocrine glands may be the primary cause of mental disturbances." However, he feels that they may constitute contributory causes and suggests further research, as does also Hoskins (17), who believes that " hormones contribute importantly to the determination of the personality ".

When we discuss therapy and its efficacy as an index of this relationship we need only quote Hoskins's and Sleeper's (17) conclusions that " before we can render an adverse decision it must be shown that the gland substance selected was the one indicated in the individual case, that a potent preparation was used, that the dosage was adequate and the treatment was continued for a sufficiently long period ". This expresses thoroughly the difficulties that face any conclusion drawn from a therapeutic approach if we add the oft-made claim of " coincidence ", whereby positive results may be questioned.

The incidence of endocrinopathies in the psychoses appears to be quite frequent. An astute observer, well versed in the endocrinopathic manifestations in its various forms, cannot but be impressed with the evidences of endocrine dysfunction in the abnormally functioning population of a mental hospital. No statistical comparisons with " normally " functioning groups have been made, for the obvious reason that a study of the frequency of such dysfunctions in the general population would be almost impossible to obtain. Rowe and Pollock (28), in examining a large series of cases (a rather selected group of 4,000), found the incidence of endocrinopathy greater in the non-psychotic group, but the association of a psychosis was much more frequent in the endocrine dysfunctioning group than in the non-endocrine, in spite of the fact that in the latter there were numerous patients with conditions conceded to be ætiologically important in producing a psychosis.

Notkin (26) found only 8 cases of gross endocrinopathies in a hospital population of six thousand, and concluded that the relationship of endocrine dysfunction to the psychoses has been over-rated, and that the fundamental cause of the major psychoses is still unknown. We agree with the latter inference, but from our own experience and that of others we feel that the incidence is much greater than that noted by him, if one considers all degrees. We have many examples—which cannot be related here because of lack of space—of endocrine disturbance, such as abnormal hirsutism, the shape and size of hands, variations in stature, in fat distribution, and in the relationship of morphological measurements.

Kraepelin, in 1891, expressed a suspicion that the endocrines might constitute an ætiological factor in the psychoses. That this was not based entirely on speculation is indicated by the frequent occurrence of psychoses and personality disorders at puberty and involutional periods; psychic disturbances during menstrual periods; the disturbance of menstrual cycle in many psychotic patients, and the anomalies of sex function in psychotics.

Curschman (7) suggests that homosexuality is explainable as a dysfunction of the sex hormones and that close investigation in these cases reveals other heterosexual stigmata, such as tendency toward female type of pelvis in the male, the scanty beard, the pubic hair distribution characteristic of the opposite sex.

Allen (1), in studying the physiology of the œstrogenic principle, concludes that the sex-mating instinct partly depends on the sex hormone, and that in experimental animals activity is influenced by the presence or absence of this hormone.

Gibbs (14), in studying sex development in male schizophrenics, concluded that there is an unevenness in the physical sexual development, that the marriage rate was less in these patients, and that heterosexual relations showed a high percentage of inadequate expression. He believes that adequate functional activity of the pituitary, thyroid and suprarenal is necessary for sex growth and function. McCartney (24) found that the personality make-up of twenty eunuchs closely approached that so often observed in the simple dementia præcox syndrome, such as lack of affect, apathy, introspection and purposeless existence. In studying autopsy material of dementia præcox cases he found a high percentage of pathological gonads and adrenal glands, and in the female patients no normal ovaries. He inferred that dementia præcox is primarily a disorder of the endocrine system, especially the gonads, and suspects that some toxic factor may be the primary cause of the damage to the genital glands. This is by no means a new hypothesis, for gonadal inadequacy has often been suspected of being a causative factor in dementia præcox.

Variation of pulse-rate and blood-pressure readings in psychotic patients seems also to be connected with endocrine imbalance. Hoskins (17) reported 10% lower blood-pressure readings in dementia præcox than in normals.

Recent basal metabolism studies indicate a decreased rate in many psychoses. This cannot be considered as positive evidence, since it is well known that not only do the endocrines influence these results, but psychic states as well, though, of course, it is quite possible that the psyche acts through the endocrine system. The relationship of the thyroid gland and body metabolism is well known, but recent experimental evidence reveals the important role of the pituitary and adrenals in oxygen assimilation and carbohydrate metabolism. Hoskins (17) has reported a tendency for the blood-sugar level to remain high considerably longer in schizophrenia than in the normal individual. McRobert (25) suggests a relationship between emotional tension and sugar tolerance.

Blood chemistry studies may indicate endocrine pathology. Many observers have reported the calcium-phosphorus balance disturbed in the depressive states, although we could not corroborate these findings, as reported by one of us (D. L. S.) (29). Hypercholesteræmia is a frequent occurrence in involutional melancholic states, while Sevringhaus (31) notes a frequency of melancholic states in diabetic patients. Abnormal hirsutism is frequently observed in the psychotic patient, and is no doubt a frank expression of endocrine imbalance.

Circulatory changes, such as cyanosis, sialorrhœa, hyperidrosis, lymphocytosis, dermographism, alimentary glycosuria, and decreased sensitiveness to adrenalin, all become more significant since the recent work in Ranson's (12) laboratory on diabetes insipidus indicates a definite relationship between the vegetative nervous and endocrine systems. A presumptive theory at this time would be that one dysfunctioning gland throws the entire endocrine system into a state of imbalance through close association with the nervous system—for example, the neural structure of the post-pituitary gland and medulla of the adrenal: it may influence the neural mechanism so as to produce a change of personality. This no doubt does not explain the entire picture, and therefore we must agree with Pende (27),

Hoskins (17), McRoberts (25), Dolja (8), Langfeldt (21), and Rowe and Pollock (28), that other factors are involved; thus the endocrine may be one, heredity another, and psyche still a third. All acting together may produce a change in the personality, but, as Rowe points out, "in such a conception there is no inevitability. All the factors may be present, but become productive only if the summation of their several indices exceeds a critical boundary". This we believe is quite in keeping with the accepted theory of threshold barriers used at the present time to explain such phenomena as hyperglycæmia without glycosuria. Frank (13) applies this theory in his expression of sub-threshold blood cycles of pituitary and œstrogenic hormones in certain types of amenorrhœa. We recognize that all this is speculative and therefore dangerous, and that possibly much will be discarded when more exact knowledge is available.

Langfeldt (21) concludes that the occurrence of dementia præcox depends upon a specific inferior endocrine formula, and that this in itself is an expression of heredity. Through this dysfunctioning endocrine system there results a special constitutional type, such as has been described often as hyperthyroid, hypogenital and hypopituitary constitution, etc., which "results in an inferior development of the brain, and when this already inferior system is further damaged by toxin and disease, acute disturbances occur".

The endocrine system is closely linked with the nervous system. Ranson's (12) work has already been mentioned. Lewis (23) observes that the following conditions with neurological aspects have been associated with the ovaries: puerility, amenorrhœa, vagotonic crises, precocious puberty and vasomotor instability of the climacteric. Migraine has recently been supposed to be due to disturbance of the female sex hormone. Tetany often occurs in pregnancy when there is a parathyroid deficiency. Bowman (4) worked with parathyroid therapy in schizophrenia and concluded that no relationship was demonstrated, but suggested that further investigation was necessary before this could be definitely settled.

The recent theory that essential hypertension is the result of endocrine disturbance is not entirely new. Dolja (8) divided the endocrines into two groups of vasodilators and vasoconstrictors with the thyroid acting as the co-ordinator. We now know that the maintenance of blood-pressure level is closely connected with the endocrine activity; for example, the influence of the adrenal hormone; but this, in itself, does not seem sufficient to maintain this level, and it is suspected that both the anterior and posterior lobes of the pituitary are intimately associated in this function. Recent therapy with X-ray exposure of the pituitary and adrenal is probably based on the above conception—a work now being checked at this hospital.

Lewis (23) concludes that "there is a definite relationship between endocrine disorders, whether that of causality, association, or merely coincidence, with nervous and mental disorders", and stresses the need for further co-operative research. Bassoe (2) offers four problem cases in differential diagnosis where the ætiological factors of trauma, infection and endocrine imbalance are considered, and also suggests further investigation of this relationship.

There is considerable presumptive evidence for suspecting a close relationship between endocrine dysfunction and certain mental and nervous disorders. Pende (27), in his studies of constitutional inadequacies, relates the constitution to the primordial tissue-cells. The influence of the endocrino-sympathetic system is determined by the tissues upon which the hormones must act. He believes that the complex of dyshormonic personalities due to constitutional anomalies, involving several or all of the glands at the same time, the ones most frequently met with in practice, although the functional anomaly of a single gland may predominate. Stockard (32) states: "The entire personality of the normal individual may be promptly altered in significant ways by the changes in functional co-ordination among the organs of the body. The glands of internal secretion respond most delicately to all modifications in organic balance, and thus they superficially appear to be the most important elements in determining personality. The initial cause for the personality change need not necessarily

be in the glands of internal secretion themselves—but disease and the gland act as a means through which personality change is expressed." This is in keeping with Sevringhaus' (31) idea of hormones being merely catalytic agents which influence the metabolic processes, but do not initiate anything: "The nature of the glandular reaction truly determines the particular kind of personality change. Different causes may produce one and the same effect by initiating the same secretory reaction." An example of this is the similarity of the physical reaction to injection of adrenaline and the fear or rage reaction.

Many believe that failures following suitable endocrine therapy are attributable to structural changes that cannot be corrected. We believe that this is a very plausible explanation of these failures. We know that nervous tissue is markedly susceptible to trauma and toxins, and it is quite conceivable that changes produced by endocrine dysfunction acting on the nervous tissue go on to such a pathological state that reversibility is impossible.

Downs (9) observes: "The majority of endocrine dystrophies present marked and definite psychic symptoms peculiar to their class. It seems probable that both somatic and psychic symptom-complexes are the result of endocrine disturbances, acting upon the entire organism, including also other glands of internal secretion." He cites the fact that mental defectives often show endocrinopathic stigmata. He also mentions the low I.Q. associated with cretinism and mongolism, and the rather high I.Q. found in individuals with delayed sex-gland development. These observations again corroborate the theory that pathological states may be reached when the reaction is irreversible, for no amount of thyroxin fed to a matured cretin will influence his I.Q. to any great extent.

Hoskins (17), in a thorough study of 80 cases of dementia præcox, concluded: "Endocrine deficiency plays a significant role in dementia præcox, and in properly selected cases specific endocrine therapy is of value in the treatment of this disorder."

The above presents only a brief review of some of the interesting literature concerning this problem. Many others have discussed the specific association of one particular gland with various typical psychotic states. The review of these would only add more confusion to a situation that is already chaotic and is, therefore, omitted. Our own purpose in offering even this much of the literature is to emphasize the increasing importance of the endocrines in the field of mental medicine, and to forge a definite link with our own report that follows.

In 1931 a concerted effort was started at Elgin to study the endocrine system as a possible clue to personality disorders. In 1933 a preliminary report (18) was made, reviewing some 172 cases, and the working mechanism of this study was set forth at that time. Because of lack of funds this has not changed materially. We still have to depend largely upon the interest of manufacturers to supply us with endocrine products. In the case of well-established hormones the patients' relatives are asked to defray the cost. Because of such lack of funds much laboratory check-up has had to be curtailed.

This present report reviews the entire study up to October, 1934, and includes a total series of 314 patients. The work is continuing, and many of the findings presented now may be considerably modified when the study is completed.

This series of cases represents a selected group, but not all the patients in the institution showing endocrine stigmata are included. Many have had to be excluded for obvious reasons, such as unco-operativeness, especially where

basal metabolism determinations were considered essential. Some patients refused to co-operate for medication when given orally and were excluded on this score. Still others were excluded if the psychosis had been present more than five years prior to reference to the endocrine clinic.

The group studied represents patients referred to the clinic by various members of the medical staff as possible endocrinopathies. The patients were then seen by the endocrinologist, who recommended various laboratory procedures. When these had been completed the cases were again seen at the clinic, and after consideration of all the factors, such as physical symptoms, laboratory results and psychiatric picture, a conclusion was arrived at which placed the individual in one of three groups: (1) a definite endocrinopathic diagnosis was made, either uni- or pluri-glandular, (2) showing doubtful endocrine dyscrasia, or (3) exhibiting no endocrine disturbance.

It is evident that in so large a series of cases as this a review or summary of individual cases would be too cumbersome and in fact undesirable. We have therefore worked out various tables which we hope will clearly present our findings.

TABLE I.—*Analysis of Total Group* (314 *Cases*). *Psychiatric States and Sex Distribution.*

Diagnosis.	Male.	Female.	Total number.	Percentage.
Dementia præcox . .	51	131	182	58·0
Manic-depressive . .	4	22	26	8·3
Involutional melancholia	0	20	20	6·4
Psychoneuroses . .	0	8	8	2·5
Miscellaneous . .	17	61	78	24·8
	72	242	314	100·0

Table I presents a tabulation of the entire group as to distribution of sex and psychiatric diagnosis. It shows a surprising preponderance of female patients to male. 77% of the patients are females. The explanation for this probably lies in the fact that ovarian disturbances are more obvious than those of the male sex glands.

When we look at the distribution according to psychiatric diagnosis, our attention is arrested by a preponderance of dementia præcox cases as compared with any of the other psychoses. This may be accounted for partially by the fact that 60% of the population of any state institution consists of dementia præcox cases. The high proportion in this selected group is still indicative of the fact that in many dementia præcox cases there were findings suggestive of endocrine disturbance. The following tables show this.

TABLE II.—*Analysis of 314 Cases as to Endocrine Evidence, Endocrine Diagnosis and Distribution of Definite Diagnoses among the Various Psychotic States.*

IIA.—*Endocrine Evidence.*

	Number.	Percentage.
Positive	222	70·7
Negative	55	17·5
Doubtful	37	11·8
	314	100·0

IIB.—*Endocrine Diagnosis.*

	Number.	Percentage.
Definite	176	56·1
Not definite	114	36·3
Doubtful	24	7·6
	314	100·0

IIC.—*Psychiatric Diagnosis of those with Definite Endocrinopathy.*

	Number.	Male.	Female.	Percentage.
Dementia præcox	104	23	81	59·0
Manic-depressive	20	2	18	11·4
Involutional melancholia	10	0	10	5·7
Psychoneurosis	6	0	6	3·4
Miscellaneous	36	5	31	20·5
	176	30	146	100·0

Table II is divided into three sub-tables, dealing with the analysis of the endocrine evidence for establishing a definite endocrinopathic diagnosis. In sub-table IIA we see that 70·7% of cases presented sufficient positive evidence to justify their inclusion in the group showing definite endocrine dyscrasia. This compares closely with Rowe and Pollock (28), who, working with a group of 250 psychotic patients, found positive evidence in 76% of cases. 11·8% showed doubtful evidence, and after complete review of the findings, 17·5% were thought to show no endocrinopathic evidence.

Sub-table IIB is constructed as follows: After reviewing all the evidence of endocrine disturbance, it is still often quite a difficult task to make a definite endocrine diagnosis for, as previously pointed out, the gland that is the ætiological factor may not be the one that produces the gross symptomatology that we now know to expect. For example, amenorrhœa may be assumed as a symptom of endocrine dysfunction, but often even after a thorough investigation one cannot say whether a primary pituitary failure or ovarian failure or a combination of the two is the determining cause. Many resistive cases of hyperglycæmia are now thought to be due to a dysfunctioning adrenal gland. We therefore believe that we are justified in leaving a little over one-third of our cases in a group where no definite endocrine diagnosis was established, since this group includes the 55 cases that showed no endocrine evidence. In a small number a doubtful diagnosis was ventured. In 176, or 56·10%, a definite endocrine diagnosis could be established. It is quite possible that in

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the light of future investigation these diagnoses may prove incomplete or even quite wrong.

In sub-table IIc we deal only with the 176 patients whom we were able to label definitely as endocrinopathic. Here we present the distribution according to psychiatric diagnosis, and we find that 104 (59·0%) of this group are cases of dementia præcox. This percentage is somewhat higher than that found by Rowe, who found 42·8% of dementia præcox cases showing endocrine dysfunction, and Hoskins, who had 39% of a group of 80. These indeed are high percentages, and although they do not definitely indicate a direct causal relationship, they do call for consideration of an association which appears to be more than mere coincidence. The other relationships are not striking, and no definite conclusion can be drawn at this time.

TABLE III.—*Distribution of Endocrine Diagnoses.*

		D.P.	M.D.	I.M.	P.N.	Misc.
Pituitary deficiency	64	35	8	3	2	16
,, -thyroid	28	21	2	0	0	5
,, -ovarian	18	12	1	3	2	0
Ovarian-thyroid	16	9	1	2	0	4
,,	14	8	3	2	0	1
Thyroid	10	5	1	0	2	2
Hypogonadism	9	8	0	0	0	1
Pit.-ov.-thyr. def.	3	1	2	0	0	0
Miscellaneous	14	5	2	0	0	7
	176	104	20	10	6	36

Table III deals with the incidence of the various endocrinopathic syndromes. Here the pituitary syndrome alone far outnumbers any of the others. The percentage of these is 36·3, comparing rather closely with the percentage of 40·8, reported by Rowe in a study of 250 cases.

We then arranged the various endocrine dysfunctions against the frequency of the various psychiatric entities, and found that of the total of 182 cases of dementia præcox, 104 showed definite endocrine imbalance in recognizable form, and of this group of 104, 35, or 36·6%, were associated with purely pituitary gland disturbance—somewhat less than Rowe's analogous findings of 40·8%. If, however, in our series we include the pituitary-thyroid, pituitary-ovarian, and pituitary-ovarian and thyroid groups as well, we have a total of 69 cases of dementia præcox, or 66·3% of all the cases of dementia præcox in one definitely diagnosed endocrine group who showed definite pituitary disturbance. In the remainder of the table the preponderance of pituitary disturbance as compared to any of the other glands is significant.

This result merely indicates an association between psychoses and pituitary disturbances, while some other factor may predispose to the especial type of psychotic behaviour.

TABLE IV.—*Therapy: Methodology. Last 142 Cases (2nd Series)**.

A. *Laboratory Work.*

	Requested.			Carried out.			
	Yes.	No.	Total.	Adequate.	Partial.	Omitted.	Total.
Endocrine diagnosis	59	14	73	41	14	4	59
No endocrine diagnosis	26	28	54	18	8	0	26
Doubtful	11	4	15	6	1	4	11
	96	46	142	65	23	8	96

B. *Treatment.*

	Recommended.			Given.			
	Yes.	No.	Total.	Adequate.	Partial.	Omitted.	Total.
Endocrine diagnosis	64	9	73	43	13	8	64
No endocrine diagnosis	26	28	54	12	4	10	26
Doubtful	10	5	15	8	0	2	10
	100	42	142	63	17	20	100

Table IVA presents merely an analysis of the latter 142 cases of our series as to laboratory work requested, and the number of cases where it was possible to carry this out adequately, partially, or not at all. In IVB the number of cases where treatment was recommended is stated, together with the number that received treatment adequately, partially, or not at all.

The footnote indicates similar statistical results in the initial group of 172 cases reported previously. As is readily seen, the complete study of a psychiatric patient is not a simple procedure, because co-operativeness of the subject is essential, for example, in determining the basal metabolic rate and glucose tolerance; there is, therefore, a high frequency of omissions.

Table V is merely a tabulation of the various endocrine products recommended and used. This deals only with the latter group of 142 cases. No attempt is made to report the efficacy of any particular product. Apart

* In Series I—172 cases—treatment was recommended in 90 cases, given adequately in 33, partially in 26, not at all, or very inadequately in 31.

TABLE V.—*Preparation Recommended and Used.*

	Recommended.	Given.	Not given.
Thyroid	35	26	9
Antuitrin	26	25	1
Ovarian residue	22	22	0
X-ray	15	2	13
Ampacoid ovary	12	11	1
Lugol's solution	14	8	6
Theelin	11	6	5
Pituitrin	10	8	2
Operative	5	3	2
Stanley's material (emulsion gonad)	5	3	2
Antuitrin G (growth hormone)	4	4	0
Progynon	3	2	1
Antuitrin S	3	1	2
Suprarenal extract	2	2	0
Ovarian extract	1	1	0
Corpus luteum	1	1	0
Thyrotropic	1	1	0
Prephysin (anterior pituitary follicle-stimulating hormone)	2	2	0
	172	128	44
Treatment recommended	100%	80%	20%

from some success with thyroid and anterior pituitary follicle-stimulating hormone no outstanding results can be reported. A case of hypothyroidism treated with whole thyroid responded rapidly and left the institution improved. Another two cases, one a castrate, the other a young hypogonadal individual, given injections of testicular preparation, coincidentally made marked mental improvement and left the institution. Another case showing a syndrome of hyperthyroidism and manic-depressive psychosis was subjected to thyroidectomy and made a complete mental and physical recovery.

In the following Table, VI, an analysis of the association of therapy and improvement is attempted.

Of the 314 cases referred to this clinic our records indicate that 107 patients have been discharged from the institution. This is 34·08%, and is rather high, but it should be noted that 14% is contributed by the manic-depressive group. Of these 107 patients only 54, or 17·2% of the total 314 patients

TABLE VI.—*Therapy; Efficacy; Analysis of* 107 *Discharged Cases from* 314.

Of the 314 cases referred to the clinic 107 had been discharged. Of these 107 patients, 54 had a definite endocrine diagnosis, 41 none, and 12 doubtful.

	(A.)				(B.)		
Diagnosis.	Number.	With endocrine diagnosis.	Treatment advised.		Treatment given.		
			Yes.	No.	Adequate.	Partial.	Omitted.
Dementia præcox	48	22	18	4	12	3	3
Manic-depressive	15	11	7	4	2	2	3
Involutional melancholia	9	4	4	0	3	1	0
Psychoneurosis	6	6	6	0	3	2	1
Miscellaneous	29	11	10	1	7	1	2
	107	54	45	9	27	9	9
Percentage	34·08	17·2	83·3	16·7	60	20	20

referred to the clinic had a definitely diagnosed endocrinopathy. Of this group of 54 patients, 45 were recommended for therapy; only 27, or 60%, received adequate therapy, and 20% only partial.

It can readily be seen that definite conclusions as to efficacy of therapy cannot be claimed, but this high association possibly indicates that beneficial influences are obtained in some cases. We do not feel that these very moderate results of therapy should in any way cause us to discontinue this study. It is only with a more exact knowledge of endocrine dysfunction and with the use of definitely indicated hormones, of known potency, that we can hope to arrive at a better analysis of the efficacy of glandular therapy.

SUMMARY.

To summarize, we have reviewed much of the literature of the associations of psychoses and endocrine disturbances. It reveals that there is a considerable variance of opinion, but most authors seem inclined to believe that there exists some association, even though direct causal relationship has not been demonstrated.

We then offer our own study of 314 patients in which our results seem to corroborate the suspicion that a relationship exists between certain psychotic states and endocrine dysfunction.

There seems to be a preponderance of pituitary dysfunction either alone or associated with other glands.

We can report no startling results. In a few cases where the association

was quite definite, administration of the indicated drug resulted in improvement.

A large percentage of this group (34%) left the institution, which would indicate that the psychic manifestations are at times reversible.

In all, the study indicates that further investigations are necessary before endocrine associations can be summarily discarded in considering the ætiology of psychotic states.

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