

whether the subject reacts more markedly to situations of novelty—as do the immature and excitable types—or to those involving intellectual difficulty—which sometimes completely disorganize the behaviour of apparently phlegmatic people. We can see whether such reactions as there may be take the form of excitement or of inhibition. We note that some people lower their scores through carelessness, others through over-caution; that some fail because they are afraid to try, and others because they do not realize the futility of their effort.

The purely cognitive evidence is reinforced by that from the psychomotor field. The essential importance of motor evidence has been amply proved by the work of Luria in Russia, and of Bills and others in America: the contributions of Kretschmer and of Enke are also highly important; yet this qualitative observation of performance test behaviour is at present the only clinically practicable method of assessing this essential factor.

It is obviously impossible in a brief paper to discuss the exact differential diagnostic significance of the various findings. But it is quite certain that the components of behaviour in the individual personality under test are presented for inspection in the test situation. There is the degree and directedness of the subject's striving; there is his excitability or its opposite; his reaction to his success or failure; and his preferred mode of approach. I agree that these tests do not give an accurate measure of the "g" factor or of the power of educing relationships or of abstract thinking, or of any other succinctly definable scientific abstraction. For the matter of that clinical mental testing does not give a really accurate *measure* of anything—a fact which is raised as an objection to such a mode of approach. But it does give an adequate picture of the behavioural component, it does allow a trained examiner to analyse intellectual process, and it does show the place occupied by intelligence within the personality. Most important of all it does allow of an adequate prediction of behaviour.

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Heredity in the Psychoneuroses (*Summary*)

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THE part played by heredity in the development of the psychoneuroses is one of the fundamental unsolved problems of psychiatry. Psychotherapy entails so much consideration of the environmental situations that it is easy to ignore the possible hereditary aspect of the problem one is dealing with. But the chief difficulty is to define the condition the heredity of which one is attempting to trace. A psychiatric diagnosis for a psychoneurosis can still only be made on symptoms, rather than on aetiology. This introduces the same difficulties as if one were to try to investigate the heredity of a symptom such as cough. There is no neat blood test, as in hæmophilia, or well-established syndrome as in Huntington's chorea, to help in the diagnosis of a psychoneurosis. There is by no means as valid a series of diagnostic criteria as in manic-depressive psychosis. The psychoneuroses are inefficient and escapist reactions of qualities which are inherent in human nature, and which, when not exaggerated, are biologically useful.

For the present purposes the psychoneuroses were considered in three groups, which were defined as follows:

Anxiety states.—Psychoneuroses characterized by some of the somatic symptoms of palpitations, shaky feelings, giddiness, indigestion, tight feelings in the chest, with the mental symptoms of an affect of anxiety, without a preponderance of depression, and various phobias such as fear of diseases, fear of closed places, open spaces, &c.

Hysteria.—A psychoneurosis characterized by definite physical conversion symptoms such as paralysis, anaesthesia, fits, vomiting, blindness, aphonia, and certain mental symptoms such as an affect of indifference and periods of amnesia. This reaction is biologically akin to the possum reaction of a captured weasel or young lapwing.

Obsessional state.—A psychoneurosis characterized by ritualistic acts and thoughts, which the patient recognizes as absurd, and which are not associated with a preponderant affect of depression. This is related to habit formation in childhood and to mankind's primeval desire for ritual and sympathetic magic.

These definitions do not of course ensure that one is dealing with homogeneous material. One may be investigating the heredity of several different conditions under each of these headings.

The other great difficulty is that of separating the part played by heredity from that of environment. A series of statistics might be produced, complete with mean deviations,

which would only show that children are capable of imitating their nervous parents. This difficulty cannot be escaped except by extensive twin investigation, or by study of children who have been brought up away from their parents. As this latter situation does, however, in itself provide a great environmental stress, this method also is invalid.

SELECTION OF CASES

A small group of cases has been taken and investigated thoroughly, concentrating on reliability of data rather than on numbers. 104 cases have been taken comprising 63 anxiety states, 21 hysterics and 20 obsessional. The age and sex distribution is shown in Table I. These cases have not been selected in any way. They were taken entirely at random from the out-patients satisfying the diagnostic criteria at the Maudsley

TABLE I.—AGE AND SEX CHART OF PROPOSITI AND CONTROLS.

Age-group	Anxiety state			Hysteria			Obsessional state			All psychoneurotics			Controls			
	♂	♀	Both sexes	♂	♀	Both sexes	♂	♀	Both sexes	♂	♀	Both sexes	♂	♀	Both sexes	
10-14																
15-19	2	1	3		1	1	1	1	2	3	3	6		2	2	
20-24	7	8	15		6	6	3	3	10	14	24	1	5	6		
25-29	2	7	9	2	4	6	2	1	3	6	12	18	5	2	7	
30-34	10	5	15	1	4	5	1	1	2	12	10	22	4	2	6	
35-39	10	6	16	1	1	1	4	2	6	15	8	23	3	1	4	
40-44	2	1	3	1	1	1	3	3	3	6	1	7	4			
45-49																
50-60	1	1	2		1	1	1		1	2	2	4	2		2	
Totals	34	29	63	5	16	21	15	5	20	54	50	104	19	12	31	

Out-patient Department, Guy's Hospital, and the Cassel Hospital, so that the cases are not confined to one social class. I knew nothing of the patient's family history before investigating a case. I may add, before starting this work I had a prejudice against the significance of heredity in the psychoneuroses. With the exception of the cases at the Cassel, I was myself responsible for the psychotherapy of the patients. Not only was the detailed family history often helpful in the treatment of the patient, but also the fact that I was treating the patient helped me to obtain excellent co-operation from the patients and their relatives. I did not have the services of a social worker, and all the interviewing of relatives was done by myself. Though much time was thus taken up, the advantage was that the human factor was simplified, the human error being my own, not my own and that of a social worker. In all about 500 relatives were interviewed, and information obtained concerning 2,288 relatives of the patients. In each case a diagnostic summary of the patient's case was prepared, then a family history from at least one other relative as well as the patient. Details were requested for each first and second degree relative, but needless to say a full account was not always available for each relative. Having obtained the case-histories the next step was to classify all the relatives seen and those about whom accounts were taken, according to their psychiatric abnormalities (Table II).

TABLE II.—KEY TO ABBREVIATIONS IN CLASSIFICATION OF RELATIVES.

N	Psychiatrically normal.
An	Definite anxiety state, amounting to social or work incapacity at some time.
Hy	Definite hysteria, paralyses, amnesic fugues, hysterical fits, with social or work incapacity at some time.
O	Definite obsessional psychoneurosis, with ritualistic acts or thoughts, causing some incapacity.
D	Manic-depressive psychosis, with suicides, mental hospital admissions, depressive stupor, &c. with incapacity for work at some time. This includes involuntional depressive states and puerperal depressions.
S	Schizophrenic psychosis.
P	Psychosis of unspecified nature, including general paralysis, senile dementia, and various cases not able to be accurately diagnosed from the data.
AP	Anxious personality, including timid apprehensive personality, excessive worrying, phobias not amounting to definite psychoneurosis; obsessional personality, with <i>folie de doute</i> , excessive worry over details; depressive personality with well-marked mood swings. In well-marked cases it is possible to distinguish between these groups, but usually these personality traits blend into one another, and often all are present in the same relative.
Alc	Alcoholism.
Ep	Epilepsy.
PP	Psychopathic personality, including odd, eccentric people, paranoid psychopaths, impulsive and quarrelsome people, wanderers unable to settle to any job with any success, unstable psychopaths.
MD	Mentally defective.

CONTROLS

A series of controls was taken of roughly the same age-groups as the psychoneurotic patients. The controls were selected among the medical patients in the wards at Guy's. They were selected only by accessibility of relatives and information, and by the fact

of their not being desperately ill. Only 31 controls were taken, but even these are sufficient for some purposes. It was not as easy to investigate the controls as the psychoneurotics for several reasons: (1) I was not the patient's physician and the same contact was not always able to be made. (2) For some curious reason these patients and their immediate relatives knew and cared less about their remoter relatives than the psychoneurotics. (3) These patients and the other informants seemed to have less insight into personality traits than the psychoneurotics and could not give as good a history of other relatives. In some cases, however, I happened to pick on the one normal member of a psychiatrically very abnormal family, and usually here a good history was obtained. This may of course mean that if a lot is known about a family, psychiatric abnormalities will always be found, but my impression is that psychoneurotics and their relatives give a better account of personalities than the normals. These controls cannot of course be regarded as typical of the general population, because they were all ill, but it was hoped that in respect to psychoneurotic incidence they could be regarded as at least something with which to compare my results. The illnesses from which these patients were suffering were conditions such as tuberculosis, heart failure, &c. in which there is considered to be no neurotic trait. An interesting point emerges not directly concerned with the present subject. This is the part played by psychobiological situations in determining the onset of a physical disease. Many of the patients gave histories of difficulties which they had encountered similar to those with which we are familiar in taking histories of psychiatric cases. However, instead of reacting by a psychoneurosis, they fell victims to a physical disease or their rheumatic heart became decompensated. This is far from the same as saying that these diseases are psychological in origin, but is merely a way of stating the platitude that the chain breaks at its weakest link.

For instance, when in a run-down state after three self-induced abortions in five years and when she was trying to get a divorce from her husband who had deserted her, a 28-year-old woman developed rheumatic arthritis. A pot shopkeeper with a pancreatic cyst developed diabetes after a period of worry and insomnia following the opening of Woolworth's next door, although he had had the cyst for some years previously.

STATISTICAL RESULTS

Owing to space limitation it is practicable here to show only some of the tables of results.

Influence of position in family.—The positions of psychoneurotics in the sibships of the propositi were charted, so that the number of first children, only children, youngest children, &c. could be investigated. It was seen that the psychoneurotics occur apparently scattered at random in any position in the family. There were but 4 only children among the propositi. Dr. Lewis Fanning has kindly confirmed the random occurrence of these cases statistically. Thus according to the series of cases here examined, the position in family is of no significance in determining whether or not a person will develop a psychoneurosis (the full proof of this cannot be published here).

Incidence of abnormalities in the parents of patients and controls.—This is shown in Table III. It will be seen that 46.8% of the parents of anxiety states are normal,

TABLE III.—INCIDENCE OF PSYCHIATRIC ABNORMALITIES IN PARENTS OF PSYCHONEUROTIC PATIENTS AND CONTROLS.

	Anxiety states				Hysteria				Obsessional state				Controls	
	No.	%	Diff.	S.E.	No.	%	Diff.	S.E.	No.	%	Diff.	S.E.	No.	%
N	59	46.8	33.8	± 7.7*	17	40.5	40.1	± 9.6*	20	50.0	30.6	± 9.4*	50	80.6
An	27	21.4	21.4	± 5.4*	4	9.5			3	7.5	7.5	± 3.4*		
Hy	2	1.6			8	19.0	17.4	± 5.6*	3	7.5	7.5	± 3.4*	1	1.6
O														
D	7	5.6												
S	1	0.8												
P	1	0.8												
AP	22	17.5	4.6	± 5.7	6	14.3	1.4	± 6.8	13	32.5	19.6	± 8.2*	1	1.6
Alc	2	1.6			3	7.1							8	12.9
Ep	2	1.6											1	1.6
PP	3	2.4			4	9.5			1	2.5			1	1.6
Totals	126	100.1			42	99.9			40	100.0			62	99.9

* = statistically significant figure.

significantly different from the control figure of 80.6%. The 21.4% of parents suffering from anxiety state is also significant.

Significant figures for hysteria are 40.5% normal parents, and 19% hysteric parents.

The obsessional show 50% normal, and 7.5% obsessional parents. This is a much lower figure than Lewis obtained, in whose series, in 1936, 37% were obsessionals. This difference is probably due to many cases being counted as obsessionals in his series which would

be included in the present series as obsessional personalities (AP). There are 7.5% of manic depressives in the parents of obsessionals, a significant figure.

Thus in all the three psychoneuroses, there seems to be some evidence of breeding true some connexion between obsessional state and manic-depressive psychosis, and less between anxiety state and depression. There proved to be no significant difference in incidence between mothers and fathers (table not shown here).

Abnormalities in sibs over 15.—These are shown in Table IV. The same tendency appears. In the anxiety states and obsessionals, the proportion of normals is significantly

TABLE IV.—PSYCHIATRIC ABNORMALITIES IN SIBLINGS OVER 15 OF PSYCHONEUROTIC PATIENTS AND CONTROLS.

	Anxiety states				Hysteria				Obsessional state				Controls	
	No.	%	Diff.	S.E.	No.	%	Diff.	S.E.	No.	%	Diff.	S.E.	No.	%
N	140	61.4	28	± 5.07*	52	80	9.4	± 5.3	36	64.3	25.1	± 6.2*	110	89.4
An	28	12.3	12.3	± 3.03*	3	4.6			3	5.4				
Hy	5	2.2			4	6.2	5.4	± 2.5*	4	7.1	7.1	± 2.4*	1	0.8
O	2	0.9							1	1.8				
D	2	0.9												
S	1	0.4			1	1.5								
AP	38	16.7	7.8	± 3.88*	4	6.2			11	19.6	10.7	± 5.3	11	8.9
Alc	2	0.9												
Ep	1	0.4											1	0.8
PP	8	3.5			1	1.5								
MD	1	0.4							1	1.8				
Totals	228	100.0			65	100.0			56	100.0			123	99.9

lower, 61.4% and 64.3%, as compared with 89.4% in the controls. The 12.3% of anxiety states in sibs of anxiety states, and 7.1% of obsessionals in sibs of obsessionals is also significant. The AP group is also significant in the sibs of anxiety states.

First-degree relatives.—Table V shows the incidence in the most important abnormalities for all first-degree relatives, i.e. parents, children and siblings of psychoneurotic

TABLE V.—INCIDENCE OF CHIEF ABNORMALITIES IN FIRST-DEGREE RELATIVES.

	Anxiety states		Hysteria		Obsessional state		All psychoneurotics		Controls	
	No.	%	No.	%	No.	%	No.	%	No.	%
N	208	57.0	69	64.5	60	59.4	337	58.8	164	86.8
An	55	15.1*	7	6.5	3	3.0	65	11.3		
Hy	8	2.2	12	11.2*			20	3.5	2	1.1
O	2	0.5			7	6.9*	9	1.6		
AP	61	16.7	10	9.3	25	24.8*	96	16.8	19	10.1
D	9	2.5			4	4.0	13	2.3*		
Other conditions	22		9		2		33		4	
Totals	365		107		101		573		189	

patients. There is significant evidence of similar inheritance, of 15.1% in anxiety states, 11.2% in hysterics, and 6.9% in the obsessionals. There is also a significant incidence of anxiety states, in the relatives of hysterics and obsessionals, and of depressive psychosis in the relatives of obsessionals and anxiety states.

Second-degree relatives.—Table VI shows the incidence of the more important abnormalities in all second-degree relations, i.e. uncles, aunts, grandparents, nephews, nieces, half-

TABLE VI.—INCIDENCE OF CHIEF ABNORMALITIES IN SECOND-DEGREE RELATIVES.

	Anxiety states		Hysteria		Obsessional state		Controls	
	No.	%	No.	%	No.	%	No.	%
N	533	72.4	207	79.3	178	71.2	251	89.9
An	20	2.7	5	1.9	1	0.4	2	0.7
Hy	3	0.4	4	1.5	2	0.8	1	0.4
O					2	0.8		
AP	87	11.8*	24	9.2	42	16.8*	17	6.1
D	20	2.7*	4	1.5	11	4.4*	1	0.4
Other conditions	73		17		14		7	
Totals	736		261		250		279	

sibs, grandchildren. The data of course are not as reliable as those for first-degree relatives. The significant figures are those for depression in second-degree relatives of anxiety states (2.7%), and of obsessional states (4.4%) and for anxious personality in relatives of anxiety states (11.8%) and of obsessional states (16.8%). The high incidence of depression in second-degree relatives is probably due to the fact that they are on an average fifteen years older than the first-degree relatives who have not had time to develop their depressions.

Twins.—There were four pairs of fraternal twins among the propositi, only one member of each pair being psychoneurotic. One pair was studied in detail. Physically they resembled one another very closely, but one was an hysteric and the other a normal healthy woman. They were brought up together but their biographies showed a gradual divergence of personality. Their finger-prints show no resemblance at all, in spite of the physical resemblance. One can only conclude that they were fraternal twins closely resembling one another physically but not in temperament, although they shared approximately the same environment. This is in itself an argument for an hereditary factor in the psychoneuroses. It also suggests that this factor is not in any way linked with any physical traits; that personality and physique can vary independently. Of the other twins, one pair were of opposite sexes, the other two pairs were of the same sex but dissimilar.

Family histories of Service psychoneurotics.—Table VII shows the incidence of psychiatric abnormality in the parents and siblings of 30 consecutive cases of soldiers, sailors and

TABLE VII.—INCIDENCE OF ABNORMALITIES IN PARENTS AND SIBLINGS OF 30 CONSECUTIVE SERVICE CASES.

	Parents		Siblings	
	No.	%	No.	%
N	37	61.7	125	87.4
An	3	5.0	6	4.2
"Shell shock"	3	5.0		
D	4	6.7	1	0.7
P	1	1.7		
AP	11	18.3	9	6.3
MD			1	0.7
Alc	1	1.7	1	0.7
Totals	60	100.1	143	100.0

airmen who were failing to adjust for psychoneurotic reasons. The data were hastily collected in the course of ordinary work and among Service cases in E.M.S. hospitals. There is a relatively high incidence of abnormality in the parents, especially of depression. The siblings are not very abnormal.

Follow-up of cases.—A postal follow-up was done recently on all these 104 psychoneurotic patients. Of the 63 anxiety states, replies were obtained concerning 28. Of these all had returned to work, 11 were completely recovered, 12 better but with some symptoms, 3 were the same, and 2 had died, 1 of duodenal ulcer and 1 of a stroke. Four were grade 1 in the Services. Of the obsessional 11 replies were obtained. One had completely recovered, 6 better but still had symptoms, 3 were worse, and 1 had committed suicide. The 1 who recovered attributed her recovery entirely to halibut oil. Two were in the Forces graded B, 6 were at work, but in 1 case a schoolmaster had become a fire watcher, 2 were incapacitated. Of the hysterics, 14 replies were obtained, 3 were recovered, 5 much improved, 3 unchanged, and 3 were worse. One was grade A.1. in the Army, 1 had been boarded out of the Army. Six were at work and 6 were incapacitated. In none of these cases did the family history provide a reliable guide to the prognosis of the patient. Some with the worst family history had done best. All these cases had received some psychotherapy, some of them quite intensively. The cases that had done badly had attended most of the available psychiatrists, one bad obsessional had received shock therapy with no improvement. The interesting point about this follow-up is the good prognosis of the anxiety states. The degree of conversion seems to be an index of bad prognosis. It is of course impossible to generalize from such a small follow-up, especially as those who did not reply may all be in mental hospitals, but I doubt it. The obsessionals and hysterics who had done badly did not hesitate to describe their miserable state.

CONCLUSIONS

In this series, without detracting from the importance of the environmental factor or of psychotherapy, a case is made out for the significance of heredity in the development of the psychoneuroses. The random occurrence of psychoneurosis in the sibships and the cases of fraternal twins are probably the strongest arguments for heredity playing a significant part.

Assuming then that there is a hereditary factor, what is its nature? It is easier to answer this negatively than positively. It is not a recessive, only one case of consanguinity was found. Simple dominance is also excluded; the ratio of first-degree relatives affected, in the aggregate, does not suggest simple dominance, though at times individual family trees can be found where the inheritance looks simple dominant.

There is a great probability that the inheritance of many commonplace human characters is on the lines of variable dominance, where the environment also plays a large part.

With the psychoneuroses, however, we are not dealing with definite diseases, but only reaction types. The clinical classification of psychoneuroses into anxiety, hysteria, and obsessional is arbitrary, though convenient. This classification is supported by the observation that these conditions to some extent breed true, about 15% in anxiety states and about 7% in hysteria and obsessional states. These three conditions also seem to be related genetically to one another and the obsessional state, and to a less extent the anxiety state, and much less hysteria, to the manic-depressive psychosis. They also seem to be related to a more indefinite personality deviation which I have called anxious personality which is in itself not definitely abnormal, but yet which is possessed by most of our patients. To postulate a gene for anxiety state, one for hysteria and one for obsessional, even a variable dominant gene, seems much too simple to fit the facts. Another theory would be that psychoneuroses occur by a certain shuffling of the kaleidoscope of factors responsible for normal personality. The fact that psychoneuroses occur in the relatives of normals to some extent would support this. In some families it seems as though the psychoneuroses have arisen as a result of combinations of factors not in themselves pathological, though the combination proves to be. For instance, a combination of overconscientiousness with low intelligence may well predispose a patient to develop a psychoneurosis, though these qualities separately may not be beyond the range of normality. This theory, however, would not account for the observed greater incidence in the relatives of psychoneurotics, and it is probably not the whole story. I would suggest, however, that the development of, say, an obsessional state rather than an anxiety state depends more on the commonplace personality factors, which are probably themselves variable dominants, than on the specific psychoneurotic factor, if it exists. It may perhaps be that there are one or more pathological variable dominant factors, of the order of constitutional emotional sensitivity, determining whether or not a psychoneurosis can develop in a suitable environment.

The high ratio of similar inheritance obtained in some of the figures for first-degree relatives suggests in fact that the inheritance of the underlying diathesis responsible for psychoneurosis in general is not excessively complex. It may even be a simple variable dominant. If this were so, then the particular type of psychoneurosis may depend on the particular grouping of contributory personality factors, not necessarily in themselves pathological. Some such combined inheritance is most likely to fit such data as exist. It is possible to make a scheme of multi-factor inheritance to fit almost any genetic ratio, but it would be wiser at this stage to let the figures speak for themselves rather than to speculate further. The environment in which these psychoneuroses developed was the peace-time environment, and the stresses were the familiar ones of family and sexual relationships and work difficulties. Psychoneuroses developing in these conditions may be more endogenous than those arising in the acute and extraordinary stresses of war time. It is moreover probable that many of the environmental situations of these psychoneurotics arise as a result of their characters, rather than that their characters are a result of their environment. To split the influence of environment from heredity decisively is at present impossible, but nevertheless from such evidence as we have, heredity plays quite an important part as environment in the development of the psychoneuroses.

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