DYSPLASTIC GROWTH DIFFERENTIALS IN PATIENTS WITH PSYCHIATRIC DISORDERS STUDIES ON THE MORPHOLOGY OF MATURITY

BY

J. W. LOVETT DOUST

*From the Department of Psychiatry, University of London
Institute of Psychiatry, Maudsley Hospital*

This paper is concerned with some aspects of the morphology of man, as they present in relationship to the occurrence of psychiatric disorder. Kallmann in the U.S.A. and Slater in England, among others, have initiated fundamental work, summarized recently by Slater (1950), dealing with the genetic linkages involved in the causation of mental illness, while the sociological, clinical, psychiatric, and especially psycho-analytic literature provides an overwhelming if diffuse body of evidence pointing to the importance of environmental factors. It is not a function of this paper to review this literature; it is necessary only to mention its existence for orientation purposes since the studies which follow will necessarily have to be interpreted in terms of the relative importance of these two fundamental aetiological influences.

The present investigation resulted from two assumptions based on the clinical observation of mentally ill patients in a psychiatric hospital. These were firstly, that there is something about the physical appearance of such patients which reflects their relative incapacity to remain emotionally stable under stress, and secondly, that, if this clinical impression be true, then over the length of the patient's life the separate features of his physical appearance on which the impression is based must have resulted from dysplastic or imperfect development at some definite phase of his growth, since such features cannot be assumed to appear suddenly out of the blue. Some of the differentials contributing to the clinical "hunch" have been measured and analysed by Draper and his co-workers (1944) at Columbia University with respect to physical illnesses such as cholecystitis, peptic ulceration, rheumatoid arthritis, rheumatic fever, and migraine. Features of significance in Draper's data are convincing, not only because of the comprehensive nature of his morphological observations, but also because of their ontogenetic basis. This point will be referred to later, but it is worth remarking here that, in the field of psychiatry, the scientific

strictures of the developmental hypothesis in biology have been largely neglected. Somatotypology has been widely employed by Kretschmer (1936) and other authors to reveal constitutional dysplasias in psychiatric patients but these studies remain largely descriptive, and therefore sterile, in so far as they do not lead to an increase in understanding of causation and later of rational therapy in mental disorders. The studies of Sheldon and others (1941, 1942) suffer from the same purely descriptive faults but do at least add one set of useful data to those of Kretschmer, *i.e.*, an analysis of the predominating germ-layer involved in the resulting dysplasia. Both workers, moreover, have pointed to the concordance of emotional, temperamental, and other psychological features of the personality with the constitutional somatotype of the individual examined, each agreeing that the extreme dysplasias in any orientation of their classifications tend to be associated with overt mental illness of a particular type (Kline and Tenney, 1950).

EXPERIMENTAL PROCEDURE

The objects of the investigation were to discover if any tendencies towards particular morphological configuration exist between patients suffering from a variety of psychiatric disorders and a healthy control group—such physical features being chosen for investigation which represent either fixations or deviations from the processes of normal growth and development. Many of the anthroposcopic observations and measurements reported here are those employed by Draper and his associates (1944) at the Constitution Clinic of Columbia Medical Centre, New York. They provided rewarding indices of differential dysplasia in their series of physically ill patients, and it seemed desirable to test their applicability to the psychiatrically disturbed patient. Other observations have been taken from the descriptions of Kretschmer (1936) of "infantile", "hypoplastic", and other dysplastic constitutional types. In speaking of infantile

characteristics, Kretschmer defines them (p. 81) to include those in which the shapes and modelling of the "minor proportions in the total body complex" are "typically childish".

Measurements were undertaken whenever possible, other assessments being made qualitatively on a rating scale basis. The actual items and traits used will be listed here, together with the means used for assessing them and the justification for their inclusion at the ontogenetic level.

A. ANTHROPOSCOPIC QUALITATIVE OBSERVATIONS

(1) *Characteristics relating to Hair and Pigmentation*.—It is a common observation that, after loss of the lanugo, far more babies born in Great Britain acquire hair which is fair in colour, and, at birth, nearly all have blue eyes. Rapidly or slowly, these pigmentations (or lack of them) change, and the distribution of fair hair and blue eyes becomes fairly evenly distributed with dark hair and brown eyes in the adult population. Such in any event is the impression gained from the observation of infants as compared with adults in general. It seemed worth while to include these features separately in our analysis and to observe both what the actual adult incidence of these traits was and also whether it was displaced in a psychiatric population. The rating scale method was used, the subjects being assessed clinically as to the colour of their hair and that of their eyes. A similar impression relates to the incidence of irregular pigmentation of the skin and the presence or absence of freckling of the face and upper arms was noted. Finally the length of the eyelashes was estimated, the long, curving lashes of infancy having been found normally to grow shorter with increasing age (Draper and others, 1944, p. 190).

(2) *Facial Modelling*.—Combining the observations of Kretschmer (pp. 82–83) with those of Draper (p. 65) of the hypoplastic face, ratings were made on the presence or absence of the following features:

Eyes, deep-set.

Nose, lateral deviation, saddle or "snub"-shaped nasal root, deep-set nasal root, "retroussé"-shaped of uneven contour, the uncommon type of hypoplastic described by Kretschmer (p. 83) as long and "pulled down" with a pointed tip.

Lips, special attention was given to the size and shape; the small, scanty, shallow upper lip "strained in the middle as if the skin was too short" (Kretschmer) was watched for as was the pouting and full, or conversely, thin protruberance of the lip mucosa; the lower lip was also observed regarding the possible absence of the usual concavity between the mid-point of the mandibular ramus and the mucocutaneous margin.

Mandible, either receding or prognathic (Bolk, 1924).
Supra-Orbital Ridge, prominent.

Ears, rated for presence of Darwin's tubercle and existence of a separate lobule, the alternative to this being a dysplastic pinna extending directly on to the neck without lobulation.

Skin of Face, assessed for immaturity if it felt baby-soft to the touch on palpation.

(3) *Dental Pattern*.—Note was taken of the complete eruption of all the third molar ("wisdom") teeth and of a variety of irregularities of the dental pattern such as the presence of retained deciduous teeth, of absent, small, or twisted upper lateral incisors, of large "buck" canines, and of a wide space between the two central incisors of either jaw; the relative incidence of caries was also rated from inspection of the visible dental hygiene and of the number of fillings (Smyth and Young, 1932).

(4) *Epicanthic Fold*.—Draper has emphasized the universality of this morphological trait among human infants of all races. Although the complete fold is seldom seen in adult white populations, some of its components (inner canthus lower than outer canthus, skin fold around inner canthus, upper lid margin downwards and inwards) tend to persist, and these remnants have been rated for their occurrence.

(5) *Size of Feet*.—Since a feature of the infantile constitution is stated to be smallness in actual size as well as of one part in relation to other parts of the body, it was thought desirable to check the incidence of this in our groups. A satisfactory method appeared to be to make an indirect estimate of the foot size from a knowledge of the subject's shoe size. These facts were elicited by questioning.

B. ANTHROPOMETRIC QUANTITATIVE OBSERVATIONS

With the aid of a Walther's rule and its paired visors, a series of seven measurements were taken of various features of the subject's face and hands. The former included:

(i) *Actual depth of midline of upper lip* from nasolabial junction to mucocutaneous margin. This measurement provided an objective check on the reliability of the anthroposcopic observations of this feature.

(ii) *Interpupillary distance* measured and compared with

(iii) *Breadth of face* at the meatal level.

From (ii) and (iii) was computed:

(iv) *Interpupillary index (I.P.I.*—interpupillary space/facial breadth, Draper, p. 193).

Other measurements were:

(v) *Length of nose* from nasion to tip.

(vi) *Width of bridge of nose*.

(vii) *Depth of nasal root* in region of bridge.

The *rationale* for these observations lies in the importance of the progressive development and differentiation of the nasal bridge in relation to the position of the eyes, the latter coming together from their early foetal situation at the sides of the head as the bridge of the nose gradually pushes itself forwards. The final feature investigated was:

- (viii) *Relative laxity of ligaments* about metacarpo-phalangeal joints. Hyperextensibility of the metacarpo-phalangeal joints, which is as universal a characteristic of infancy as the epicanthic fold, sometimes persists into adulthood ("double-jointedness"). More commonly, however, this trait is largely lost in adolescence. The assessment carried out on this feature was a simple one; the metacarpo-phalangeal joints of the thumbs were put into extension; if extension was possible beyond 180°, the subject was rated as having hyperextensibility of his joints. Both hands were examined so that a comparison could be made between them.

EXPERIMENTAL POPULATIONS STUDIED

These consisted of 648 subjects (491 males, 157 females). Ages ranged from 15–64 years with a representation roughly equivalent in the various groups included. All subjects were British and of United Kingdom stock.

Two principal groups were differentiated; one of *healthy "normal" controls* and one of *patients*. The patients comprised mainly cases of various forms of *psychiatric disturbance*, but also included a small group of twelve otherwise healthy subjects who had sought out-patient treatment for *migraine* at a neurological hospital* and another group of eighteen *high-grade mental defectives*.† The migrainous patients included four males and eight females; all the defectives were males.

(1) *Healthy Controls*.—These were drawn from two sources. Their total number was 261 (246 males and fifteen females). The larger source was a neighbouring Army Depot‡ which supplied 226 soldiers (N.C.O.s and other ranks) who were detailed to attend at the Institute of Psychiatry in batches of eight per week. The ages of the soldiers ranged from 17–44 years; the first 107 were subjected to the complete battery of tests, and the remaining 119 to only a small number of them. The actual numbers used in each separate investigation are detailed in the Tables. To counterbalance these Army controls, a smaller and more varied group of 35 civilians (twenty males and fifteen females) was examined.

The age range of this civilian group was wider, from 15–65 years, and the subjects included physicians, nurses, technical workers, clerks, and housewives. The civilian group as a whole displayed less cultural homogeneity than the Army group, and, partly because of this and partly on account of its numerical disparity, was not employed when the influence of certain factors (*e.g.*, age) was computed.

(2) *Psychiatrically Abnormal Group*.—This contained 357 patients (111 + 112 males and 134 females) and was also drawn from two main sources.

One sub-group was drawn from the wards and out-patient department of the Maudsley Hospital. It consisted of 245 patients, of whom 111 were males and 134 females. The age range was from 16–63 years and the diagnostic categories represented included:

- 27 *psychoneurosis*
- 35 *psychopathic personality*
- 71 *affective disorder—depression*
- 95 *schizophrenia*
- 17 *idiopathic epilepsy*.

Where these diagnostic categories have been split into the different sub-categories of mental disorder, the proportions have been indicated in the Tables, but such sub-grouping was only carried out when the numerical incidence appeared sensibly to justify it.

The second sub-group which was drawn from the Army* comprised only cases of *psychoneurosis*, of which 112 were examined. These subjects were all "other ranks", who had broken down during their military service and had been referred to Army psychiatrists for diagnosis and possible invaliding out. The first 56 of these cases were extensively investigated, and the remainder took only a small selection of tests. Mean ages and standard deviations for the different groups have not been computed, but the relative loadings for the various age ranges and diagnostic categories may be assessed from Table VIII, in which the influence of chronological age is derived. Broadly, the mean ages of the two principal subdivisions of the healthy and abnormal groups showed sensible correspondence, though no effort was made to "match" the groups with regard to the age and sex variables.

The Tables show discrepancies in the numbers of subjects examined, especially with regard to the quantitative assessments. One reason for this has already been stated; another was that circumstances made it impossible to administer the complete battery of tests to all individuals. The tabulated

* Investigated through the courtesy of Dr. Anne Bolton.

† For the opportunity of investigation of whom we are indebted to Dr. J. K. Collier Laing, Medical Superintendent of Darenth Park Hospital.

‡ Through the kindness of Col. L. Bootle-Wilbraham, D.S.O., M.C.

* The patients (all males) were made available for testing through the courtesy of Lt. Col. H. Pozner, R.A.M.C.

results only refer to such clinical material as it was possible to investigate in sufficient numbers to allow of statistical evaluation. Examinations carried out in small numbers of subjects, and assessments whose actual and "expected" incidence was too low for tests of significance, are referred to briefly in the next section.

RESULTS

Those results which are of statistical significance may be seen in detail in Tables I to VIII. Eleven rating-scale assessments (χ^2 method) and two sets of measurements (analyses of variance) on morphological characteristics empirically assumed to represent ontogenetic dysplasia proved either to be statistically insignificant or to show too low an expected frequency for evaluation. The traits falling into these categories were the following:

- Size of feet (by shoe size)
- Presence of receding jaw
- Prognathos
- Prominence of supra-orbital ridge

- Long pulled-down nose with pointed tip
- Darwin's tubercle of the pinna
- Freckling of face and arms
- Excessive dental caries
- Difference in hyperextensibility beyond 180° of metacarpo-phalangeal joints between right and left thumbs
- Absence of concavity of lower lip
- Length of nose
- Breadth of nasal bridge.

Table I lists the *positive* qualitative data obtained by clinical observation of the subjects. The modified χ^2 technique used to establish statistical significance of these measures enabled the separate contributions made by each diagnostic group to be compared with the total χ^2 for the trait in question. From a study of each separate "contribution" to the total it was possible to demonstrate which diagnostic group, if any, was principally responsible for the differences between them. For three of the ratings in Table I, *P* is obviously too great for significance; the figures have been included, however, to indicate

TABLE I

DIFFERENTIAL INCIDENCE AMONG CONTROLS AND TWO PSYCHIATRIC GROUPS (NEUROTIC AND PSYCHOTIC) OF SEVENTEEN QUALITATIVE FEATURES OF MORPHOLOGICAL ONTOGENETIC DYSPLASIA

Feature of morphological dysplasia investigated	Controls		Neurotics		Schizophrenics		Statistical significance		Principal contributor to difference	Extent of contribution to χ^2
	No.	% Incidence	No.	% Incidence	No.	% Incidence	χ^2	<i>P</i>		
EYE COLOUR: Brown	107	46.7	56	33.9	46	26.1	7.020	.05	Controls	3.235
HAIR COLOUR: Dark brown	107	64.7	56	44.6	46	45.6	6.395	.05	Controls	3.871
Fair	107	30.8	56	50.0	46	34.8	7.315	.05	Neurosis	4.849
UPPER EYE-LID: Remnants of epicanthic fold	107	47.7	56	44.6	46	65.2	5.096	.1	—	—
EYE LASHES: Long, Curved	107	29.9	56	42.9	46	58.7	11.453	.01	Schizophrenia	6.923
EYES: Deepset in face	107	15.9	56	35.7	46	28.3	8.437	.02	Neurosis	4.277
NOSE: Lateral deviation present ..	107	22.4	56	39.2	46	39.1	6.927	.05	Both	3.547
Saddle shape	107	10.3	56	16.1	46	28.6	7.858	.02	Abnormals	5.381
Uneven contour	107	31.8	56	46.4	46	52.2	8.308	.02	Schizophrenia	3.230
Root deepset	107	11.2	56	28.6	46	47.8	24.600	.001	Schizophrenia	14.500
TEETH: 3rd molars still unerupted ..	226	27.0	112	33.9	—	—	6.070	.02	Neurosis	5.493
Irregular dental pattern ..	107	38.3	56	51.8	46	52.2	3.192	.3	—	—
UPPER LIP: Scanty	107	18.7	56	41.1	46	60.8	27.232	.001	Schizophrenia	14.837
Pouting	107	44.8	56	64.3	46	58.7	6.308	.05	Neurosis	2.808
Straight and thin	107	6.5	56	12.5	46	19.6	6.876	.05	Schizophrenia	3.443
EARS: No discrete lobule ..	107	15.9	56	41.1	46	47.8	22.048	.001	Schizophrenia	7.733
SKIN: Soft, babyish	107	36.4	56	55.4	46	41.3	5.695	.1	—	—

All assessments made by same observer on rating-scale basis. 209 subjects (107 controls and 102 patients) rated for all features except one. All subjects male. No feature included in differential significance columns in which contributory expected χ^2 frequency was less than 10 and "expected" fraction of total numbers less than 0.24 (Lewis and Burke, 1949).

DYSPLASTIC GROWTH DIFFERENTIALS

173

TABLE II
LENGTH OF UPPER LIP

Sex.. .. .		Male			Female		
Diagnostic Group		No.	Mean length (mm.)	Standard deviation	No.	Mean length (mm.)	Standard deviation
Control		108	16.56	2.677	—	—	—
Anxiety State		29	16.00	2.521	—	—	—
Hysteria		25	14.36	2.564	12	13.17	2.167
Psychopathy { Inadequate		8	15.12	3.563	4	13.75	0.957
{ Aggressive		4	12.75	2.754	—	—	—
Depression		12	17.00	2.000	18	14.89	3.179
Schizophrenia		29	15.28	4.579	32	12.88	1.930
Epilepsy		2	12.50	0.707	6	12.83	1.329
Mental defect		18	12.67	2.249	—	—	—
Migraine		2	17.50	3.536	—	—	—
Totals		237	15.69	3.141	72	13.47	2.379
Analysis of Variance	(1) Diagnosis ..	DF = 236 F = 4.950	P = 0.001 $\eta^2 = .164$		DF = 71 F = 2.457	P = N.S. $\eta^2 = .128$	
	(2) Sex difference ..	DF = 308	P = 0.001		F = 30.474	$\eta^2 = .090$	

the tendencies they reveal. For all other ratings, χ^2 is significant at least to within the 5 per cent. level of confidence.

Table II confirms the qualitative ratings of Table I with respect to the length of the upper lip. There is a large sex difference here, but apart from this, the analysis of variance, at least in the male group (there being no female representatives among the controls), indicates significantly short upper lips in patients with most types of psychiatric disturbance (except depression) and confirms Kretschmer's description of this component of his "hypoplastic" constitutional type. The high *F* ratios representing the sex differences for mensuration of the inter-pupillary distance (Table III) might be assumed from a clinical impression of the differential

facial modelling of men and women. The relationship of the distance between the midpoints of the pupils and the breadth of the face (I.P.I. or "inter-pupillary index") might be expected to negate this. Table IV (overleaf) shows such to be the case, and also indicates that relative wide-spacing of the eyes is significantly common to cases of anxiety state, psychopathic personality, schizophrenia, and female agitated depression, while relatively narrow-spaced eyes are to be found among male hysterics, idiopathic epileptics, and cases of migraine.

The findings recorded in Tables III and IV are echoed in Table V (overleaf). If a significant correlation exists developmentally between the mid-pupillary space and the formation of the nasal bridge, then it might be expected that the results of measurement

TABLE III
INTERPUPILLARY DISTANCE

Sex.. .. .		Male			Female		
Diagnostic Group		No.	Mean length (mm.)	Standard deviation	No.	Mean length (mm.)	Standard deviation
Control		127	61.008	3.421	15	59.467	3.314
Anxiety state		38	61.525	3.126	2	57.500	0.707
Hysteria		26	61.115	2.566	17	60.588	2.740
Psychopathy { Inadequate		17	61.176	2.834	8	59.750	3.196
{ Aggressive		7	59.286	4.029	3	59.000	5.568
Depression { Neurotic		7	63.714	3.729	25	59.280	2.052
{ Psychotic		14	61.857	2.627	25	57.880	3.244
Schizophrenia { Constitutional		36	61.417	2.989	28	59.786	3.131
{ Paranoid		8	61.250	2.550	21	58.762	3.534
Epilepsy		7	59.429	2.371	9	59.000	4.873
Mental defect		18	59.333	3.333	—	—	—
Migraine		4	57.250	5.315	8	59.357	4.373
Totals		309	61.023	3.259	161	59.224	3.259
Analysis of Variance	(1) Diagnosis ..	DF = 308 F = 1.985	P = 0.05 $\eta^2 = .068$		DF = 160 F < 1	P = N.S. $\eta^2 = .059$	
	(2) Sex difference ..	DF = 469	P = 0.001		F = 32.256	$\eta^2 = .064$	

TABLE IV
DISTRIBUTION OF THE MEANS OF THE INTERPUPILLARY INDEX

Sex		Male			Female		
Diagnostic Group		No.	Mean Index	Standard deviation	No.	Mean Index	Standard deviation
Control		128	46.641	3.448	15	44.133	2.587
Anxiety state		37	42.270	3.746	2	46.500	0.707
Hysteria		26	45.962	2.645	19	45.947	2.718
Psychopathy	Inadequate	19	46.368	2.793	5	51.600	5.030
	Aggressive	8	47.125	1.727	3	46.000	3.605
Depression	Neurotic	9	46.444	3.046	16	47.000	3.812
	Psychotic	17	46.235	2.840	29	45.724	3.172
Schizophrenia	Constitutional	34	48.529	3.578	41	47.244	3.793
	Paranoid	10	46.700	5.229	10	47.200	3.765
Epilepsy		6	43.500	2.739	11	46.000	4.858
Mental defect		17	45.765	2.223	—	—	—
Migraine		3	44.000	4.359	6	45.333	3.615
Totals		314	46.701	3.403	157	46.427	3.702
Analysis of Variance	(1) Diagnosis	$DF = 313$ $P = 0.05$ $F = 2.003$ $\eta^2 = .068$			$DF = 156$ $P = 0.05$ $F = 2.197$ $\eta^2 = .131$		
	(2) Sex difference ..	$DF = 470$ $P = N.S.$			$F < 1$ $\eta^2 = .00136$		

of the depth of the nasal root should bear a relationship to the variables controlling these ocular proportions.

Table V shows that measurements of the nasal root depth are significantly decreased for psychotics but not for massed neurotics, the increased width found in patients with anxiety states apparently cancelling out the narrow interpupillary distance characterizing hysterical patients.

TABLE V
INFLUENCE OF DIAGNOSIS ON DISTRIBUTION OF MEANS OF DEPTH OF NASAL ROOT
Measured in mm. on 244 male subjects

Diagnostic Group	No.	Mean depth (mm.)	Standard Deviation	Analysis of Variance
Control	106	16.953	2.723	$DF = 243$
Neurosis	59	17.610	2.666	$P = 0.001$
Depression	22	15.273	2.979	$F = 12.877$
Schizophrenia	57	14.895	2.418	$\eta^2 = .139$
Total	244	16.480	2.854	

Table VI completes these quantitative assessments and reveals the tendency towards fixation at morphologically immature levels in cases of psychiatric disorders.

Table VII represents a crude attempt at constructing an "Index of Morphological Maturity". The twenty traits and measurements which best differentiated between controls and psychiatric abnormals were selected, and the incidence of each trait for the individuals of the various diagnostic sub-groups studied was totalled. There was no significant sex difference in these totals, although the differential

sex patterning showed a skewing in the expected direction. From Table VII it can be seen that, as the severity of the psychiatric diagnosis increases, so does the weight of the loading of features of morphological ontogenetic dysplasia, the greatest incidence of such features being present in "constitutional" (hebephrenic, catatonic, and simplex) schizophrenia, and in (female) epilepsy.

Table VIII has already been briefly referred to (p. 171). If these features which have been examined really do represent dysplasias of the processes of maturation, then it is logical to assume that, whatever the relative *velocity* of individual growth and development within the structure of physiological time (Du Nouy, 1936), the progress of ontogenesis should always be towards a diminution of such dysplasias. Table VIII demonstrates the significant march of that progress within the limited age ranges studies. It also shows that, with standard deviations approximately equivalent between the groups and for the 10-year periods between fifteen and 44 years, a slower drive towards maturity is inherent in the psychiatrically abnormal patients than exists in the individuals of the healthy group; the reduction in the loading of morphological dysplastic features was 1.8 in the controls and only 1.2 in the patients ($P = .05$ in each case).

DISCUSSION

The personality of Man is a mosaic, the resultant of the integration of a vast number of variables, fitting, jigsaw-fashion, into the matrix of the whole. It is no static thing, but dynamic, changing and structured in biological time. Everyone is familiar with the fact that behaviour patterns are

TABLE VI
DIFFERENTIAL INCIDENCE OF HYPEREXTENSIBLE LIGAMENTS ("DOUBLE JOINTEDNESS")
AT THUMB METACARPO-PHALANGEAL ARTICULATION

Diagnostic Group	No.	Incidence	Percentage Incidence	Contribution to χ^2	Negative or positive contribution	Statistical significance
Control	46	7	15.2	8.165	—	$DF = 3$ $P = .01$ Principal contributor to total χ^2 is Schizophrenia
Neurosis	38	16	42.1	0.757	+	
Depression	56	20	35.7	0.031	+	
Schizophrenia	41	21	51.2	4.513	+	
Total	181	Total $\chi^2 = 13.466$				

TABLE VII
MORPHOLOGY OF MATURITY INDEX

Mean incidence by diagnostic group and sex of twenty possible features of morphological ontogenetic dysplasia.

Sex		Male			Female		
Diagnostic Group		No.	Mean incidence N/20	Standard deviation	No.	Mean incidence N/20	Standard deviation
Control		124	5.532	2.661	13	4.846	2.882
Anxiety state		40	8.050	2.470	4	6.250	0.500
Hysteria		27	8.519	1.762	14	8.357	3.249
Psychopathy	Inadequate	20	8.500	2.565	3	9.000	0
	Aggressive	7	7.000	2.081	2	4.500	3.536
Depression	Neurotic	10	7.500	2.677	16	6.125	3.008
	Psychotic	13	7.615	2.534	17	7.176	2.766
Schizophrenia	Constitutional	9	9.778	3.032	12	10.000	2.796
	Paranoid	9	7.444	2.789	4	8.250	2.630
Epilepsy		5	7.000	0.707	10	10.700	2.312
Migraine		4	8.000	0.816	8	6.500	2.000
Totals		268	6.914	2.818	103	7.505	3.199
Analysis of Variance	(1) Diagnosis ..	$DF = 267$ $F = 7.909$ $P = 0.001$ $\eta^2 = .235$			$DF = 102$ $F = 4.692$ $P = 0.001$ $\eta^2 = .338$		
	(2) Sex difference ..	$DF = 370$ $F = 3.027$ $P = N.S.$ $\eta^2 = .008$					

TABLE VIII
PROGRESSIVE DIMINUTION AS AGE ADVANCES OF LOADING OF FEATURES OF MORPHOLOGICAL IMMATURITY IN BOTH CONTROL AND PSYCHIATRICALY ABNORMAL GROUPS

Not until the *sixth* decade does the psychiatrically abnormal patient grow up to the morphological maturity reached by the control group in the *second* decade

Diagnostic Group		Controls			Psychiatric Abnormals		
Age range (years)		No.	Mean incidence N/20	Standard deviation	No.	Mean incidence N/20	Standard deviation
15 - 24		69	5.971	2.657	83	8.228	2.534
25 - 34		50	5.220	2.683	66	8.439	2.684
35 - 44		17	4.176	2.430	30	7.033	2.632
45 - 54		0	—	—	10	7.100	2.767
55 - 64		0	—	—	6	6.000	1.673
Totals		136	5.471	2.689	195	7.990	2.644
Analysis of Variance		$DF = 135$ $F = 3.507$ $P = 0.05$ $\eta^2 = .050$			$DF = 194$ $F = 2.868$ $P = 0.05$ $\eta^2 = .057$		

tolerated in infancy and early childhood which would place adults either in prison or in a mental hospital. But, just as these patterns are normally outgrown by integration with modes of behaviour progressively more in accord with the cultural standards accepted

locally as typical of those of adult reaction, so the *physical* bodily characteristics of infancy and childhood change with growth and development from those characterizing immaturity to those typifying the relative maturation of adulthood. And,

pari passu, these changes occur in parallel—emotional development proceeding in step with changes of physique, constitution, and bodily configuration. If these processes occurred with the same speed and to the same degree, both among individuals and among the innumerable components making up the *Gestalt* of each personality, then one might observe among the members of any culture or people a sameness or identity much greater than is perceptible in fact. Growth and development do indeed lead to much similarity among individuals, *e.g.* height and weight are reached to within a certain limited range, and from these measurements the calculation of a “ponderal index” provides a useful classification of groups. But the distribution of individuals for these measurements falls along a Gaussian curve and is only crudely related to factors of *differential* growth. The morphological features examined in this paper, although similar in many respects to other indices, differ from them in representing a variety of *potentials* to development which may or may not be realized in the attainment of adulthood. All babies, for example, are born with hyperextensible ligaments, but a cross-section of the healthy British population shows that only 15.2 per cent. of adults show such hyperextensibility, while the remaining 84.8 per cent. have lost it. We may therefore assume that “double-jointedness” changes with advancing chronological age, and that its retention in adulthood represents an unrealized potential to differential development. But this is not to say that these healthy adults are morphologically “immature” in any *general* sense of that term; they are only immature with respect to this one characteristic. We have seen that a number of such morphological dysplastic features are found normally distributed in a population sample such as our controls; but we have also seen that, when twenty such features are sampled and their total incidence examined, their number gradually diminishes with advancing age, and also that the fewer such characters any given individual possesses at any one time, the less likely is he to possess also the psychological characters of emotional immaturity, and the less likely is he to break down with psychiatric disorder, as the stress of his environment becomes ever more severe and out of step with the progressively intricate adjustments he has to make with the advance of his chronological age.

We have also shown that, grouping the mentally ill patients together and comparing their morphological growth index with that of the controls on an age range basis, then, for these criteria at least, not until the age of 60 does the emotionally unstable and dysplastic individual mature morphologically

to the extent reached by the healthy individual at the age of 20. The implications of this are not surprising when such findings are reviewed in terms of what we know clinically of the prognosis of psychiatric patients. The psychiatrist sees surprisingly few middle-aged neurotics or idiopathic epileptics in his clinic or mental hospital practice as compared with similar patients in younger age groups.

Just as the differential physical characteristics of individuals provide visual confirmation of their unique personalities (the identical twin is an excellent example of this, emotional and behavioural characteristics appearing in step with practical somatic identity), so not only do the individual differences in morphological development appear associated with the uniqueness of individual personality, but also the pattern of a group of morphological dysplasias appears associated with the tendency for an individual to break down in a particular psychiatric fashion if stress becomes intolerable. Thus, such features of morphological dysplasia as blue eyes, long curved lashes, pouting lips, and a soft skin are found predominantly among neurotics; wide-spaced eyes and a shallow nasal root among depressives; and a scanty upper lip, ears without discrete lobulation, a high interpupillary index, double-jointedness, and persistent remnants of the epicanthic fold among schizophrenics. Among psychoneurotics, the case of anxiety state with his wide-spaced eyes and high interpupillary index is capable of morphological differentiation from the hysteric with his short upper lip and relatively low I.P.I. Similarly, among schizophrenics, the paraphrenic may be distinguished from the hebephrenic, catatonic, and dementia praecox simplex by the total of dysplastic features in the index of morphological maturity being less, though still heavy by comparison with other diagnostic groups studied. It should be emphasized that these predictive conclusions do not refer to the presence of isolated morphological characteristics but only to the pattern of their distribution in a total loading of dysplastic features in excess of that found in a normal healthy population.

We all grow up unevenly and differentially to varying degrees and at varying velocities. This unevenness is reflected in our emotions, intelligence, and constitution; in our immunity to disease and somatic configuration; in the functioning of our bodily processes and the speed and pattern of our homeostatic responses to the stresses of living. It is just this unevenness which makes us unique personalities, distinct one from another as well as culturally, racially, and anthropologically. One

of the purposes of this paper is to suggest that, at least for the morphological variables of the processes of growth, a surfeit of such dysplasia, too uneven a loading of immature characteristics, bodes ill for the integrity of psychological functioning and contributes manifestly to the causation of mental disease.

SUMMARY

- (1) Anthroposcopic observations of 28, and anthropometric measurement of seven features of morphological growth dysplasia were made on 261 healthy adult subjects, 302 psychiatric patients, twelve patients with migraine, and eighteen mental defectives.
- (2) Qualitatively and quantitatively, the patients revealed a persistence of characteristics of morphological immaturity significantly greater than that in the controls.
- (3) The loadings of immature and dysplastic features showed a differential sex distribution and a progressive decline with age. The totals were significantly higher for the patients than for the controls.
- (4) The differential distribution of the 31 separate morphological traits formed relatively distinct patterns for each of the psychiatrically abnormal groups; this enabled gross diagnostic predictions to be made on ontogenetic grounds.
- (5) The implications of the findings are discussed, especially from the point of view of personality development.

I am greatly indebted to all my colleagues who have assisted in this investigation by making available clinical material for evaluation, to those mentioned in the text of this paper as well as to those on the staff of the Maudsley Hospital. I am grateful for the facilities granted for the work by Professor Aubrey Lewis, Head of the Department of Psychiatry at this Institute, and by Captain H. A. Dilley of the War Office, and for the statistical advice and computational assistance freely given by Mr. A. Lubin and Mr. G. K. McArthur. Lastly I gladly acknowledge the financial assistance made available to me, since part of this work was done during the tenure of a Fellowship in Medicine of the Nuffield Foundation.

REFERENCES

- Bolk, L. (1924). *Verh. Akad. Wet., Amst.*, 27, 329.
- Draper, G., Dupertuis, C. W., and Caughey, J. L., Jr. (1944). "Human Constitution in Clinical Medicine". Hoeber, New York.
- Du Nouy, P. Lecomte (1936). "Biological Time". Methuen, London.
- Kline, N. S., and Tenney, A. M. (1950). *Amer. J. Psychiat.*, 197, 434.
- Kretschmer, E. (1936). "Physique and Character", trans. W. J. H. Sprott, 2nd ed. Kegan Paul, London.
- Lewis, D., and Burke, C. J. (1949). *Psychol. Bull.*, 46, 433.
- Sheldon, W. H., and Stevens, S. S. (1942). "The Varieties of Temperament". Harper, New York.
- and Tucker, W. B. (1940). "The Varieties of Human Physique". Harper, New York.
- Slater, E. T. O. (1951). In "Recent Progress in Psychiatry", vol. 2, chap. 1. Churchill, London.
- Smyth, C., and Young, M. (1932). *Spec. Rep. Ser. med. Res. Coun.*, No. 171. H.M.S.O., London.