unately seen, this makes it easy for the Government to drive in wedges between one professional group and another when its purpose is suited. Surely something should be done to make the profession one composite whole so that it can face its employer, the State, with all the strength that the combined wisdom of its *élite* can give it in maintaining "the honour and interests of the medical profession."

Charles Hastings, our founder, used the words "medical profession," be it noted: not members of the B.M.A. Could not the Council of the B.M.A., by only slight modifications of its constitution, be made a real "council of the medical profession" by ensuring that of right the Royal Colleges and Corporations are adequately represented on it just as are the medical branches of the armed Forces and other autonomous bodies?

Such a council would by its very comprehensiveness carry enormous weight, for a denial of its advice or opinion would be to take almost impossible risks with the nation's well-being.

A Wider Outlook

Or, finally, should we widen the vista of possibilities still further and consider an idea that has been mooted before but has perhaps not received the attention it deserves—that of an independent corporation? It is only too easy to envisage the difficulties of such an administration; but difficulties exist only to be overcome, and there exists ample precedent in the shape, for example, of the Arts Council, the University Grants Committee, the British Broadcasting Corporation—and now the Post Office.

What such a scheme implies in essence is the disbursement and application of public moneys by an independent body without the intervention of departmental machinery, and without the need for a Minister to be answerable to Parliament for the day-to-day conduct of a service. Given the right representation in the governing board of such a corporation—and in medicine this would, of necessity, mean at least equal partnership of the profession—there should be possible a flexibility of policy much more in keeping with the human objects and ideals of medicine. Even more important, it would lift medicine out of the realm of party politics—an influence which has bedevilled the National Health Service from before its inception.

It may be said that the monetary sums involved are vast—too big to be handled by an independent body. Surely the very opposite is the case, and a small group of competent and responsible individuals are much more likely to have an intelligent grasp of the values of health and of the problems of disease, and so to spend money sensibly in the promotion of the one and the cure and prevention of the other.

Where are commerce and industry, agriculture, labour, or defence without efficient health services? And yet, look at the status of the Ministry of Health in the departmental hierarchy to-day. The departmental mind is restrictive and festooned with regulations: medicine needs a creative mind to guide it along its path. And more deep-rooted and essential than all this is fear of the already obvious trend of the Department to control the profession—so far perhaps only administratively, though there be some who would query even that. Let us remember that, within recent living memory, a government in another country took over control, both

administrative and clinical, of its profession and provided the greatest blot on the escutcheon of medicine in the history of the world. Professional integrity and professional freedom are, for the sake of both doctor and patient, to be preserved, literally and metaphorically, at all cost.

Conclusion

This twentieth century of ours has been a weird and bizarre mixture of primitive horror and almost incredible progress in whatever direction one looks. The acceleration of this progress has been almost frightening. Even the problems of the 1950's will need a "new look" in the 1960's. We move on rapidly into the unknown; that many new vistas are opening and will open up is inevitable; it will not be easy for us either to measure or to measure up to these advances spiritually, physically, or economically. One essential necessity will be the maintenance of that unquenchable desire for freedom which is such a fundamental characteristic of our nation and our profession. Let us hope that, in this new civilization, the art and science of medicine will fulfil its destiny as one of the most important developing forces—that the *common health* may be welded into the *common wealth* to the advantage of all its peoples. And to this fervent hope let there be added potent action.

THE MENTALLY DEFECTIVE TWIN

BY

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The purpose of this survey is to ascertain the incidence of members of a twin pair among mental defectives, and to examine reasons for any discrepancy between this incidence and that in the general population.

For various reasons it might be anticipated that twins would be more liable to be affected by mental deficiency than single-born children. In the first place, twinning in humans is somewhat unusual and, particularly in monozygotic pairs, suggests a tendency on the part of the zygote to behave in an unorthodox manner. It might therefore not be surprising to find an excess of developmental abnormalities in such cases. A second, and perhaps more cogent, reason is that twin pregnancy may impose an additional burden on the mother, so that any marginal defects in her capacity to nourish the embryo would be exaggerated. A third consideration is the greater risk of injury at birth in multiple pregnancies. Lastly, twin babies tend to be small and therefore exposed to the same risks as premature ones; included among these is a greater liability to brain damage by way of conditions like neonatal jaundice.

Some indication of the greater risk for the products of multiple pregnancy is afforded by the stillbirth rate of 53 per 1,000, for multiple births, compared with 23 per 1,000 for all births (Registrar-General, 1956), and by the much higher neonatal mortality in twins (Yerushalmy and Sheerar, 1940).

Incidence of Twins in the General Population

Of the total of 667,811 live births in England and Wales in 1955, 15,989 were twins, an incidence of 1 in

41.7 (2.4%) (Registrar-General, 1957). The number of twin maternities registered was 8,437 against a total of all maternities of 675,026, or 1 in 80. The slightly lower incidence of live-born twins below the 1 in 40.5 expected represents the excess of twin stillbirths over single pregnancy stillbirths.

Sandon (1957) studied the data available on excess mortality in twins and estimated that, over the first 10 years of life, 85% of individual twins survive compared with 95% of all children born, the major part of this difference being attributable to the neonatal period. On the basis of the Registrar-General's (1957) figures quoted above, an excess mortality of individual twins of this order would reduce the incidence of twins from 2.4% at birth to 2.1% by the age of 10 years.

The frequency of twinning increases with maternal age up to 37 years and thereafter falls (Lotze, 1937). The variation seems to be entirely attributable to dizygotic pregnancies, monozygotic ones remaining constant at different maternal ages. In European populations, nearly 30% of all twins born are monozygotic (McArthur, 1949, quoted by Smith and Penrose, 1955).

The incidence of twins also varies in different countries. For example, compared with England, it is said to be lower in Japan and higher in Chile (Gedda, 1951). In the case of Japan the low incidence seems to be due to shortage of dizygotic pairs (Komai and Fukuoka, 1936).

Incidence of Twins Among Mental Defectives

Source of Data

The present survey concerns patients in the Fountain Hospital, London, and the Ellen Terry Home, Reigate. Both admit children with severe mental defect (idiocy or imbecility), an occasional patient proving to have an intelligence level close to, or in, the educationally subnormal range.

The Ellen Terry Home admits only blind mentally defective children from all parts of England and Wales, whereas the Fountain Hospital admits all varieties of severe mental defectives (including some blind children, but with no bias in that direction), mainly from London and Surrey. The population from which patients at the Fountain Hospital are drawn is somewhat more cosmopolitan than that of England and Wales as a whole.

Both the Fountain Hospital and the Ellen Terry Home usually admit patients at the age of 4-5 years. By this age the excess mortality of twins, as a result of the differential stillbirth and neonatal death rates noted above in the general population, is likely also to have operated in mental defectives to reduce the incidence of twins.

In view of the possibility that social factors influencing admission to a mental deficiency institution might affect the proportion of twins admitted, the incidence of twinning in a representative group of mental defectives living at home in London was also determined.

Method and Results

As a preliminary survey, a random collection of 230 social histories, based on interviews of parents by one social worker, of patients at that time (January, 1958) in the Fountain Hospital was studied to determine twinning.

This was followed by an examination for twinning of 200 consecutive admissions to the Fountain Hospital covering the period January 1, 1955, to November 21, 1957. This period was chosen as it provided the most complete case records available at the time of the study. Because of the difference in incidence of twinning between the preliminary survey and the 200 consecutive admissions (see Table I), a further 200 consecutive admissions to the Fountain Hospital covering the period February 5, 1953, to December 31, 1954, were similarly studied.

At the same time, 121 consecutive admissions to the Ellen Terry Home, covering the period September 10, 1948, to August 5, 1958, were scrutinized, since it was thought that blindness might have some special relationship to the problem.

In all the consecutive admissions, three main sources of information were used to determine twinning—namely, the pre-admission history prepared by the local authority, which includes a list of siblings; the social history prepared by the social workers attached to the Fountain Hospital; and the questionnaire sent to parents at the time of admission which includes the specific question "Was the patient a twin?"

Further, the London County Council records of all mentally defective persons living at home under statutory supervision on September 29, 1959, in the London boroughs of Lewisham, Southwark, and Camberwell were examined for twinning. These boroughs probably contain a representative cross-section of the population of London. The records included subjects with ranges of mental defect from idiot up to educationally subnormal level. About two-thirds were over 16 years old. A total of 659 records were studied, from which 20 were excluded because the required information was not available.

The results are shown in Table I.

TABLE I.—Incidence of Twins in Fountain Hospital and Ellen Terry Home and in Mental Defectives Living at Home

	No. of Twins	%	$\chi^2_{(1)}$	P
<i>Preliminary survey:</i> 230 patients in Fountain Hospital (January, 1958)	14	6.1	7.30	<0.01
<i>Survey of consecutive admissions:</i> To Fountain Hospital: { (a) 200 patients (1955-57) (b) 200 patients (1953-54)*	8 11	4.0 5.5	4.8	<0.05
To Ellen Terry Home: 121 patients (1948-58)†	10	8.3	10.71	<0.01
<i>Survey of non-institutionalized mental defectives:</i> 659 subjects living at home in London (September, 1959); ..	32	5.0	7.26	<0.01
<i>Expectation in general population:</i> At birth In later childhood		2.4% 2.1%		

* This series also contained 1 triplet, bringing the incidence of multiple births to 12 (6.0%).

† This series also contained 2 unrelated triplets, bringing the incidence of multiple births to 12 (9.9%).

‡ This series also contained 2 unrelated triplets, bringing the incidence of multiple births to 34 (5.3%).

§ Based on data quoted in text.

|| χ^2 based on expectation of twins at birth in general population (2.4%). Yates's correction was used.

Comments

Clearly, the population of the Fountain Hospital and the Ellen Terry Home contains a proportion of twins significantly in excess of that in the general population, even if the figure for the latter at birth (2.4%) is used for comparison. That this excess of twins among mental

defectives is not confined to institutionalized populations is shown by the similarly raised incidence among defectives living at home. Studies in other countries, with only one exception so far as we are aware, have revealed a like pattern.

Thus, in Norway, Looft (1931) noted 4.6% of twins among 278 mental defectives compared with an incidence of twins at birth of 1.35% in the general population. More extensive later studies confirmed this trend. Juda (1939) found 2.41% of twins among 20,212 subjects in special schools, containing 80% mental defectives, in Bavaria, Baden, and Württemberg. This compared with an expectation of twins of 1.65% in the general population. Allen and Kallmann (1955) reported a 3.1% incidence of twins among institutionalized mental defectives in New York State as opposed to a 2% expectation in the general population. The excess of twins among the defectives was observed in all major diagnostic categories. Smith's (1930) finding was the exception; he noted 122 children of multiple births among 6,700 "mental defectives" in Denmark (1.82%), a figure not significantly higher than in the general population. However, Smith's material included subjects with intelligence quotients up to 90, and details of the method of collecting data are not given.

Most of the research on the intelligence of twins has been devoted to a comparison of like and unlike pairs with a view to assessing the relative importance of heredity and environment. Relatively little attention has been paid to the abilities of twins as such. Findings in such studies, however, have been complementary to those in our own and other series of an excess of twins among mental defectives. Thus, Mehrotra and Maxwell (1949), analysing data obtained by the Scottish Council for Research in Education (1949) (which contains information about 11-year-old children and includes data on twinning), found that the average intelligence-test score gave an intelligence quotient 5 points lower in twins than in non-twins. The difference could not be explained by differences in family size. The correlation between members of twin pairs on test scores was of the order of $r=0.7$.

Some relevant observations have also been made by Sandon (1957), who, in his capacity as chief examiner to two local education authorities, investigated the abilities of twins. Basing his study on candidates for the "eleven-plus" examination, he found that twins did markedly less well than ordinary children, having examination marks averaging some half to two-thirds of the standard deviation of the mark distribution less than those of ordinary children. He noted a significant shortage of twins in grammar schools.

A further contribution was made by Drillien (1959), whose material included 100 pairs of twins. She found that, on average, as tested on the Gesell scale, twins had consistently lower scores than other children. Her observations extended only up to the age of 2 years.

These findings, taken together, strongly suggest that twins tend to suffer from reduced potentialities for mental development. It is difficult to obtain adequate controlled data showing in what way, if any, the causes of mental retardation in twins differ from those in non-twins. An attempt will, however, be made to examine certain aspects of the problem.

Birth Weight

Table II shows that two-thirds (8 of 12) of the multiple-born patients in the Ellen Terry Home series

TABLE II.—121 Consecutive Admissions of Blind Mental Defectives to Ellen Terry Home (1948-58)

	Without	With	Total
	Retrolental	Fibroplasia	
No. of singletons ..	87	22	109
" " twins ..	3	7	10
" " triplets ..	1	1	2
Total ..	91	30	121

had retrolental fibroplasia, as opposed to one-fifth (22 of 109) of the singletons ($P<0.002$). If all cases of retrolental fibroplasia are excluded, then the incidence of multiple births in this group of blind mental defectives falls from 9.9% (12 of 121) to 4.4% (4 of 91).

Retrolental fibroplasia is associated with mental deficiency (Williams, 1958; Parmelee *et al.*, 1958) and almost invariably related to prematurity. It may be that the high incidence of twins in the group with retrolental fibroplasia is due to their low birth weights and their consequent liability to be submitted to oxygen therapy. However, as Williams (1958) points out, the same factors that damage the eyes may possibly be also responsible for brain damage.

Birth weights in various groups are shown in Table III.

TABLE III.—Birth Weights in Various Groups

Group	Total No. of Cases	Birth Weight (in lb.)					Mean Birth Wt.	Premature*	
		1½-	3½-	5½-	7½-	9½-		lb. oz.	No. %
General population of England and Wales (Ellis, 1947)							7 4		
Birmingham singletons (McKeown and Record, 1952)	22,454						7 7		
Birmingham twins (McKeown and Record, 1952)	650						5 4		
Birmingham single live births (Crosse, 1957)	87,203								6.1
Birmingham multiple live births (Crosse, 1957)	2,431								55.3
Singletons in F.H. (1953-7)	342	12	52	182	91	5	6 12	64	19
Twins in F.H. (1941-58)	44	10	24	10			4 11	34	77
Singletons in E.T.H. (1948-58)	79	18	12	33	16		5 12	30	38
Twins in E.T.H. (1948-58)	10	6	2	2			4 1	8	80
Singletons in E.T.H. without R.L.F. (1948-58)	62	4	10	33	15		6 6	14	23
Twins in E.T.H. without R.L.F. (1948-58)	3	1		2			5 7	1	33
Singletons in E.T.H. with R.L.F. (1948-58)	17	14	2		1		3 4	16	94
Twins in E.T.H. with R.L.F. (1948-58)	7	5	2				3 8	7	100

* Criterion for prematurity = birth weight of 5½ lb. or less.
F.H. = Fountain Hospital. E.T.H. = Ellen Terry Home. R.L.F. = Retrolental fibroplasia. For conversion to metric weights, 1 lb. = 454 g.

The birth weights quoted in Table III for the various groups in the Fountain Hospital and the Ellen Terry Home, with the exception of twins in the Fountain Hospital, are derived from all the relevant available birth weights of the 400 consecutive admissions to the Fountain Hospital (1953-7) and the 121 consecutive admissions to the Ellen Terry Home (1948-58) (see Table I). In order to obtain adequate data for twins in the Fountain Hospital, the available birth weights of all twins admitted to this hospital from 1941 to 1958 inclusive were considered.

It would appear that twinning is commoner among blind mental defectives than among those who are not blind (Table I), that the most important factor in this is retrolental fibroplasia (Table II), and that retrolental fibroplasia, both in singleton and in twin defectives, is associated with a lower birth weight than in twins generally and in sighted mentally defective twins (Table III). Our cases of retrolental fibroplasia show little difference between the mean birth weights of singletons (3 lb. 4 oz.; 1,474 g.) and twins (3 lb. 8 oz.; 1,587 g.). Forrester's (1955) findings were almost identical. In his series of cases of retrolental fibroplasia the average birth weight of the 28 single births was 3 lb. 2 oz. (1,417 g.) and of the 12 multiple births 3 lb. 4 oz. (1,474 g.). Both our figures and those of Forrester suggest that the critical birth weight below which retrolental fibroplasia is likely to occur tends to be slightly higher in multiple than in single births. If this is real it may be due to a greater tendency to nurse multiple-born than single-born children in an oxygen atmosphere.

Table III also shows that the mean birth weight of patients admitted to the Fountain Hospital—that is, gross mental defectives—is lower than that in general populations. In the case of twins there is a combination of this tendency with that for twins to be of low birth weight. The combined effect is that mentally defective twins have lower birth weights than either normal twins or single-born mental defectives. The incidence of prematurity (as judged on a birth weight of $5\frac{1}{2}$ lb. (2,484 g.) or less) in singleton and twin mental defectives is also much higher than in single and multiple live births, respectively, drawn from the general community.

Vignes (1925) pointed out that the reduction in the birth weight of twins as against that of single births appeared to become greater with the lengthening of pregnancy; from which he concluded that the mothers had increasing difficulty in coping with the nutritional requirements of the twin fetuses. Douglas (1956) and Drillien (1958, 1959) have shown that children with low birth weights are, as a group, somewhat handicapped in regard to mental development. Further, Drillien and Richmond (1956) have shown that the incidence of low birth weight is related to social class. It would be interesting and informative to study twins in these contexts to see whether "upper class" twins are less liable to low birth weight and mental retardation than "lower class" ones.

Ovularity

In consecutive admissions of individual twins to the Fountain Hospital (1941–58) and the Ellen Terry Home (1948–58), the sex of the other member of the pair was known in 41 and 9 instances respectively. Detailed checking on ovularity in most of our cases was not possible. Of the nine pairs from the Ellen Terry Home series, only two were same-sex pairs, so that no more than 22% (two out of nine) of this series could have been uniovular. The 41 pairs from the Fountain Hospital series consisted of 29 same-sex and 12 opposite-sex pairs. An estimate of ovularity in these pairs can be arrived at with Weinberg's (1901) method, whereby the number of uniovular pairs is derived by deducting twice the number of opposite-sex pairs from the total number of pairs. On this basis, 17 (41 – 2 × 12) of the 41 Fountain Hospital twins would be uniovular (41%). By comparison, the usual proportion of uniovular twins in European populations is 25–28% (Gates, 1946) and in the United States is 32.5% (Yerushalmy and Sheerar, 1940).

Yerushalmy and Sheerar (1940) found that the well-recognized excess stillbirth and neonatal mortality rate in twins (three times higher than in single births) appeared to be largely attributable to the uniovular pairs, which seemed to be more delicate or, as they put it, to have a "constitutional inferiority." The percentages of monozygotic and dizygotic twins in which both members of the pair were stillborn was 6.5 and 3.0 respectively. The neonatal mortality rate per 1,000 was 122 for all twins and 138.5 for monozygotic twins. This relative disadvantage of uniovular twins at birth and in the neonatal period might be expected to manifest itself in later life also, so that an undue proportion of mentally defective twins might be uniovular. In fact, as noted above, the proportion of uniovular twins in the Fountain Hospital series is rather high (41%). However, this figure must be interpreted cautiously, being based on an estimate in a comparatively small series. Further, no more than two out of the nine cases in the Ellen Terry Home series could have been uniovular. It would be worth while exploring this question in a larger series than at present available.

Yerushalmy and Sheerar noted that prematurity was 50% commoner in uniovular than in binovular twins, apparently using assessment of duration of pregnancy rather than birth weight as the criterion of prematurity. In our series of Fountain Hospital and Ellen Terry Home twins, birth weights were available in a total of 33 mental defectives of the same sex as the other twin and 19 defectives of opposite sex. These are analysed in Table IV. Differences between the same-sex and opposite-sex twins in mean birth weights and incidence of prematurity are in the anticipated direction, the same-sex cases (some of whom are uniovular) being lighter and more often premature.

TABLE IV.—*Birth Weights of 52 Mentally Defective Members of Twin Pairs According to Sex of Other Member (No. of Cases in Parentheses)*

	F.H. Series (42)		E.T.H. Series (10)		Total (52)	
	S.S. (30)	O.S. (12)	S.S. (3)	O.S. (7)	S.S. (33)	O.S. (19)
Mean birth weight	4 lb. 9 oz.	5 lb. 0 oz.	3 lb. 6 oz.	4 lb. 6 oz.	4 lb. 7 oz.	4 lb. 13 oz.
Incidence of prematurity	80% (24)	67% (8)	100% (3)	71% (5)	82% (27)	68% (13)

S.S. = Same sex. O.S. = Opposite sex. Criterion for prematurity = birth weight of $5\frac{1}{2}$ lb. (2,484 g.) or less.

The Other Twin

In the consecutive admissions of individual twins to the Fountain Hospital and the Ellen Terry Home, referred to in the previous section, the fate of the other member of the pair was known in 40 and 9 instances respectively (Table V). The most striking finding is that none of the opposite-sex twins is mentally defective, while four of the same-sex twins are (three of imbecile level and one educationally subnormal). As any mono-

TABLE V.—*Fate of Other Member of 49 Twin Pairs Containing a Mentally Defective Member*

	F.H. Series		E.T.H. Series		Total	
	S.S.	O.S.	S.S.	O.S.	S.S.	O.S.
Deaths { Stillborn ..	3	2	0	0	3	2
Within 3 days ..	3	1	0	1	3	2
4–8 months ..	2	1	0	2	2	3
Status of survivors { Mentally defective ..	3	0	1	0	4	0
Normal ..	17	8	1	4	18	12
Total ..	28	12	2	7	30	19

S.S. = Same sex. O.S. = Opposite sex.

zygotic twins are included in the same-sex pairs, our finding is in accordance with expectation, twin studies showing a greater similarity between monozygotic siblings than between dizygotic (Böök, 1953).

It is also highly probable that some of the 18 normal same-sex survivors are monozygotic with the mentally defective member of the twin pair. Indeed, this is so in two pairs of twins in the present series, described in a separate publication (Brandon *et al.*, 1959). In these two pairs of monozygotic twins one member of each pair is microcephalic and a gross mental defective, the other being above average intelligence. In such cases birth injury can always be invoked as an explanation of the discrepancy in intelligence between the monozygotic twins, and this possibility cannot be eliminated in the two pairs of twins under consideration. However, this is not always an adequate explanation, and marked differences in intrauterine development occur, associated with factors like variations in vascular supply as discussed by Price (1950), so that by no means all monozygotic twins are concordant in regard to mental defect. If there was, in fact, identity of intrauterine environment in twins, then monozygotic twins should be truly identical at birth. Actually, fairly obvious differences are often found—for example, in birth weight (Vignes, 1925). In the above-mentioned two pairs of monozygotic twins the mentally defective member of each pair weighed 3 lb. 3 oz. (1,446 g.) and 4 lb. 10 oz. (2,098 g.) at birth, the birth weight of the normal member being 4 lb. 2 oz. (1,871 g.) and 7 lb. (3,175 g.) respectively.

Birth weights of both members (of which one was mentally defective and the other normal) were available in a total of 27 twin pairs from the Fountain Hospital and Ellen Terry Home series. These have been analysed in terms of same-sex and opposite-sex pairs in Table VI. It shows a tendency for the normal twins to have higher birth weights than the defective twins, both in the same-sex and in the opposite-sex pairs. The differences are, however, not statistically significant in this series.

Birth Order

Excluding the four instances where both members of the twin pair were mentally defective (see Table V), the order of birth of our mentally defective individual twins was known in 30 and 6 cases of the Fountain Hospital and the Ellen Terry Home series respectively. The birth order of the other members of each pair, in terms of their fate, has been analysed in Table VII. This indicates

that a total of 61% (22 of 36) of our *mentally defective twins* were second-born. Further, 57% (8 of 14) of the other members of each pair that were second-born were stillbirths or died within eight months, as opposed to 36% (8 of 22) that were first-born. To put the latter data in another way, 43% (6 of 14) of the other members of each pair that were second-born were normal survivors, compared with 64% (14 of 22) of those that were first-born. While these figures are too small to be significant, our findings are similar to those of Yerushalmy and Sheerar (1940). They noted that second-born twins were at a disadvantage and tended more often to be stillborn. They found, however, no significant difference in neonatal mortality rates between first- and second-born twins.

Aetiological Factors

In Table VIII aetiological factors for mental deficiency detected among all (46) consecutive admissions of members of a twin pair to the Fountain Hospital from 1941 to 1958 inclusive have been set out alongside similar data derived from 100 consecutive admissions

TABLE VIII.—*Aetiological Factors in Consecutive Admissions to Fountain Hospital of 46 Individual Twins (1941-58) and 100 Singletons (1956-7)*

Groups		Twin Series	Singleton Series	
Group A (associated with known cause or distinct syndrome):				
Environmental	Meningitis	Tuberculous ..	—	2
		Influenzal ..	—	1
		Pneumococcal ..	1	—
	Kernicterus	Due to rhesus-factor incompatibility ..	1	2
		Of prematurity ..	—	1
	Pertussis immunization ..	—	1	
Genetic	Phenylketonuria ..	1	—	
	Cerebral lipoidosis ..	—	2	
	Galactosaemia ..	—	1	
Uncertain	Mongolism ..	2	24	
	Sturge-Weber syndrome ..	—	1	
Group B (probably due to cause indicated):				
Environmental	Encephalitis ..	1	1	
	Septicaemia with coma ..	—	2	
	Gastro-enteritis with coma ..	—	1	
	Maternal rubella ..	—	1	
Group C (other possibly significant factors):				
Environmental: ? Cerebral trauma or anoxia at birth*		9	11	
? Genetic	{ † Family history of mental retardation ..	11	11	
		2	3	
? † " .. psychosis ..				
Group D (none of above suggested)		18	35	
Total No. of cases		46	100	

* Associated with severe cyanosis, irritation, collapse, or convulsions.

† Family = Grandparents, parents, siblings, uncles, aunts, and first cousins.

TABLE VI.—*Mean Birth Weights of 27 Twin Pairs, Each Pair Containing One Defective and One Normal Member*

	Fountain Hospital Series			Ellen Terry Home Series			Combined Series		
	Defective Twin	Normal Twin	No. of Cases	Defective Twin	Normal Twin	No. of Cases	Defective Twin	Normal Twin	No. of Cases
Same-sex pairs ..	5 lb. 3 oz.	5 lb. 11 oz.	14	3 lb. 4 oz.	3 lb. 1 oz.	1	5 lb. 1 oz.	5 lb. 8 oz.	15
Opposite-sex ..	5 " 6 "	5 " 8 "	8	5 " 2 "	5 " 5 "	4	5 " 4 "	5 " 7 "	12

TABLE VII.—*Birth Order and Fate of 36 Other Members of Twin Pairs, Each of Which Contains One Mentally Defective Member*

	Totals			Stillbirths			Deaths Within 3 Days			Deaths Within 4-8 Months			Normal Survivors		
	F.H.	E.T.H.	Total	F.H.	E.T.H.	Total	F.H.	E.T.H.	Total	F.H.	E.T.H.	Total	F.H.	E.T.H.	Total
Other twin born first ..	18	4	22	3	0	3	2	1	3	1	1	2	12	2	14
" " " second ..	12	2	14	4	0	4	1	0	1	2	1	3	5	1	6
Total ..	30	6	36	7	0	7	3	1	4	3	2	5	17	3	20

of singletons to the same hospital from March 29, 1956, to November 21, 1957. Nearly all cases in both the twin and the singleton series were gross mental defectives (idiots or imbeciles), an occasional child being educationally subnormal. Owing to the small numbers, any comparison between the two groups in terms of causation of mental defect is of limited value. The most striking difference is in the percentage incidence of mongolism—six times commoner in the singleton than in the twin series. Both series reflect the difficulty of establishing causes of severe mental defect, a problem which we have discussed elsewhere (Berg and Kirman, 1959).

Clinical Findings

A comparison of clinical findings, as distinct from aetiological factors, was also made between consecutive admissions to the Fountain Hospital of 44 individual twins (1941–58) and 100 singletons (October 5, 1955, to November 21, 1957) (Table IX). In this instance, in

TABLE IX.—*Clinical Findings in Consecutive Admissions to Fountain Hospital of 44 Individual Twins (1941–58) and 100 Singletons (1955–7) (Cases of Mongolism Excluded)*

Finding	Twin Series	Singleton Series
Skull		
Microcephaly*	15 (34%)	24
Hydrocephalus	14	21
	1	3
Eyes	21 (48%)	46
Strabismus	12	40
Blindness	10	11
Optic atrophy	6	8
Retrolental fibroplasia	4	1
Nystagmus	4	17
Microphthalmia	3	0
Coloboma	1	1
Cataract	0	1
Buphthalmia	0	1
Interstitial keratitis	0	1
Epilepsy†	16 (36%)	23
Cerebral palsy	14 (32%)	41
Spastic diplegia	8	23
Hemiplegia	4	8
Athetosis	2	5
Ataxia	0	5
Other physical anomalies	6 (14%)	14
Inguinal hernia	2	1
Cleft palate	1	3
Congenital heart defect	1	1
Imperforate external auditory meatus	1	0
Prolapsed rectum	1	0
Deformed feet	0	3
Polydactyly	0	2
Congenital dislocation of hips	0	1
Recto-vulval fistula	0	1
Pyloric stenosis	0	1
Hiatus hernia	0	1
Psychotic	2 (5%)	2
None of above clinical findings	6 (14%)	20

* Defined as a head circumference of more than three standard deviations below Westropp and Barber's (1956) mean for that particular age and sex.

† Fits observed in Fountain Hospital only.

order to make the two groups more comparable in respect of physical signs, cases of mongolism were excluded because of the high incidence of these among admissions of singletons only (Table VIII).

The frequency of physical abnormalities is notable, over three-quarters of the patients in each series having one or more of the findings listed. Differences in incidence of individual clinical findings between the two groups are not statistically significant in our comparatively small series when examined, where applicable, by the χ^2 test ($P>0.1$).

Necropsy Findings

Necropsy reports were available on the brains of nine patients in the Fountain Hospital twin series who died after admission at ages ranging from 2 to 15 years.

Eight of the brains weighed 116 to 930 g. (mean, 387 g.) less than the average for the age, using the norms of Coppoletta and Wolbach (1933). The ninth weighed 149 g. more than the norm, due to terminal congestion and oedema. None showed gross malformation such as would indicate origin in embryonic life, though all nine had pathological changes. These changes were consistent with damage occurring in the latter part of pregnancy, at birth, or post-natally (ulegryria, loss of white matter with thinning of the corpus callosum, ventricular dilatation, or marbling of the striatum). It was not found possible to time the origin of the lesions more precisely on the basis of the pathology alone, though clinical evidence suggested origin at birth in two cases and post-natally in one.

Summary

Twins admitted to the Fountain Hospital and the Ellen Terry Home were studied. Both admit grossly defective children (idiots and imbeciles), the latter institution blind ones only and the former without bias in favour of blindness.

Incidence.—The proportion of twins among both institutionalized mental defectives and those living at home exceeded significantly that in the general population. The greater incidence of twins in the Ellen Terry Home, as opposed to that in the Fountain Hospital, was directly related to the comparative frequency of retrolental fibroplasia in the former institution.

Birth Weight.—The mean birth weight of gross mental defectives was lower than that in general populations. In twins this tendency was combined with that for twins to have low birth weights. The combined effect was that mentally defective twins had lower birth weights than either normal twins or single-born mental defectives. Prematurity, judged on a birth weight of 5½ lb. (2,484 g.) or less, in singleton and twin defectives was commoner than in single and multiple live births, respectively, drawn from the general community. Retrolental fibroplasia, both in singleton and in twin defectives, was associated with a lower birth weight than in twins generally and in sighted defective twins. The mean birth weight of the cases with retrolental fibroplasia in the Ellen Terry Home series was slightly lower in singletons than in twins.

Ovularity.—An estimated 41% (17 of 41) of defective twins admitted to the Fountain Hospital were uniovular. No more than 22% (2 of 9) admitted to the Ellen Terry Home could have been uniovular. Defective twins of the same sex as the other member of the pair had a lower mean birth weight and higher incidence of prematurity (5½ lb.—2,484 g.—or less at birth) than defective twins of opposite sex to the other member.

The Other Twin.—In a total of four twin pairs concordant for mental defect, all four were same-sex pairs. In another two twin pairs in whom monozygosity was established, one of each pair was a gross defective, the other being above average intelligence. In twin pairs containing one normal and one defective member, the former tended to have higher birth weights both in same-sex and in opposite-sex pairs.

Birth Order.—Second-born twins tended to be at a disadvantage in regard to the chances of both mental defect and early death. 61% (22 of 36) of our defective twins were second-born. 57% (8 of 14) of the other members of the pairs that were second-born were still-

births or died in early infancy, compared with 36% (8 of 22) who were first-born.

Aetiological Factors.—In consecutive admissions to the Fountain Hospital of 46 individual twins and 100 singletons, the most striking difference was in the percentage incidence of mongolism—six times commoner in the singleton than in the twin series.

Clinical Findings.—In consecutive admissions to the Fountain Hospital of 44 individual twins and 100 singletons (mongolism excluded) over three-quarters of the patients in each series had physical abnormalities. Differences in incidence of individual clinical findings between the two groups were not statistically significant.

Necropsy Findings.—In nine of the Fountain Hospital twin series who had died since admission, none of the brains showed gross malformation suggesting origin in embryonic life, though all nine had pathological changes. The origin of these changes could not be timed precisely, though all were consistent with damage late in pregnancy, at birth, or post-natally.

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A STUDY OF THE AETIOLOGY OF RESPIRATORY DISEASE IN A GENERAL HOSPITAL

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The main objects of this investigation were to determine (1) the prevalence of viral and bacterial infections in all patients admitted to hospital suffering from a respiratory illness, their clinical picture, and the effect of admission to hospital on the course of the illness; and (2) the number and cause of acute respiratory illnesses arising in patients already in hospital suffering from some other disease.

Materials and Methods

The survey covered the period September 29, 1958, to March 31, 1959, and comprised 117 children and 179 adults. The following were included: (1) All patients with symptoms of respiratory disease admitted to all the adult medical wards of St. Thomas's Hospital; (2) all children with symptoms of respiratory disease admitted to the medical children's ward at St. Thomas's Hospital and the children's ward of the Royal Waterloo Hospital; (3) patients developing symptoms of respiratory disease while in these wards. These were ascertained by daily visits to each ward by one of us.

All patients were seen and examined by one of us within 24 hours of admission. The history and results of physical examination were recorded on a standard form, which also included the results of x-ray examination. Patients were re-examined at intervals, usually of two to three days, throughout their stay in hospital. Serological results were regarded as significant only when there was a fourfold or greater rise between suitably paired specimens. Results are expressed as statistically significant only when $P < 0.05$.

Specimens Examined.—At the first examination 5–10 ml. of venous blood was taken from all patients. A further specimen was obtained 10 to 28 days later from as many patients as possible. Serum was separated immediately from all samples and stored at -20°C . Throat swabs for virus isolation were taken from all children at the first examination, and from adults with symptoms of less than five days' duration before admission. Swabs were broken off into bijou bottles containing 2 ml. of Hanks's solution with 0.5% lactalbumin hydrolysate and placed immediately in a vacuum flask

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