is that most cases of sciatica call for and yield to massage, always providing that it is skilfully given—a very important proviso.

OTHER SITUATIONS

These are too numerous for detailed analysis; peri-arthritis cases are common, and it is this type which improves so wonderfully with massage. The pain, particularly in the lower limbs, is so often described as a searing or burning pain; but careful exploration of the site will result in the characteristic pain on pressure of the periarticular and aponeurotic structures. "Fibrositic heel," which can be a very refractory condition, deserves recognition; a corresponding condition may be met with at the point of the elbow.

Nodular Cases

Much confusion appears to have resulted from the use of the term "nodular," in that it has led observers to expect sharply defined, very obvious, and possibly visible nodules (they sometimes are). As a matter of fact, fibrous tissue when affected in this way always tends to thicken; but the thickening, as I have already said, may be slight and in such guise—as strands, tracts, or sheaths—as to escape tactual recognition. Then again, fingers are so different, and skilled finger education is not too common, and is certainly receiving less and less emphasis in the teaching of these days. The nodules are occasionally obvious and visible, but such cases are the exception. For those who desire a fuller description I would refer to Dr. Stockman's most valuable book, and also to a paper of my own² with a description of a very marked case, the publication of which seemed to have been largely responsible for "great expectations" in regard to these nodules. Occurring as fibro-muscular thickenings, their perception is often subtle, and it may need a vaselining of the surface and much delicacy to appreciate them. They are, however, objective and demonstrable, although still in the minds of many they are only accessible to the finger of faith.

Treatment

First there is the discovery of the causal factor, particularly whether that be direct trauma or its postural or strain variety, or any toxic or infective condition: I have already mentioned some of these, but it is important not to forget dental sepsis, more particularly perhaps the pyorrhoeic cases and abscessed roots. More frequent resort should be had to x-ray examination of the teeth rather than to the wholesale clearing of the mouth, comparable to the light-hearted way that "fibrositic" appendicectomies are performed. Preliminary rest is called for in certain types of case, as to which general experience and common sense is a sufficient guide. This is very marked in post-influenzal and some of the gonorrhoeal cases. The juvenile rheumatics also demand rest, because their fibrositic pain is so often coeval with an insidious cardiac damage. On the other hand, rest is not indicated in headache or in many of the chest cases, particularly in the "pseudo-cardiac" examples; and but seldom in abdominal cases when diagnostic certainty has been arrived at. Many lumbagos and sciaticas also receive a far greater amount of rest than the nature of their case merits.

Drug treatment is only palliative to relieve exacerbations of pain, but is often called for. Outstanding is aspirin, which in many cases is given in far too small doses. While it is a wise procedure to test a patient's reaction to aspirin for the first time the drug is exhibited—though it is seldom that any medical man to-day has this opportunity—it is equally certain that once a patient's tolerance is known there is too much timidity

about the dosage. The value, and safety, of a 20-grain dose (repeated in half an hour if necessary, which it very seldom is) has to be known from experience to be appreciated.

Before the war massage and movement as a form of treatment for fibrositis, apart from the purely traumatic varieties connected with the obvious injuries, such as fractures, dislocations, etc., was very little used. The English schools (of massage) originally seemed to avoid any massage that directly touched and exacerbated the painful spot, with the result, naturally, of little or no benefit. In supposed fibrositis, and if the massage does not relieve, either the diagnosis or the technique of treatment is wrong; and even to-day this most important form of treatment is, in my opinion, not adequately expounded and demonstrated in the English training schools. It is the only curative treatment, and demands much more extensive use than it is even yet receiving. The massage clinics of hospitals are encountering an ever-expanding need in this direction; for in inveterate and widespread cases effective treatment is tedious, long-continued, and relatively costly. This latter factor is of great importance to the less wealthy middle-class patients, who do not resort to hospitals. Masseurs now abound, and competition reduces charges; but high-grade skill (and experience) in the fibrositic cases is still not too easily come by. Therefore a poor result does not necessarily invalidate the diagnosis.

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TUBERCULOSIS IN HOME-CONTACTS

A NOTE ON INCIDENCE AND THE ROLE OF HUMAN CONTAGION*

BY

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Incidence of Tuberculosis in Home-contacts

Investigations of tuberculous infection in home-contacts have been carried out by comparing the frequency of positive tuberculin tests in home-contacts and in non-contacts, or children having no history of exposure to tuberculosis. A critical summary of these investigations has been made by Hart (1932). Among the more important recent workers in this connexion must be mentioned Bernard and Debré (1920), Parisot and Saleur (1925), Opie and McPhedran (1926), Schlesinger and Hart (1930), and Dow and Lloyd (1931). Consideration of their researches leads to the following conclusions.

The incidence of tuberculous infection is much greater in home-contacts than in non-contacts, the younger the child the more marked the difference. The great variation found in the figures of different investigators may be accounted for by several factors: the environment in which the investigation was carried out—for example, town or country, hospital, dispensary, or school; the care with which controls are chosen as regards excluding contact with tuberculosis in the history and cases of clinical tuberculosis in the non-contacts, and whether children who are attending hospitals and dispensaries or only healthy school children are employed; the hygienic conditions of the households (Bennighof, 1925; Dow and Lloyd, 1931); and the number of children investigated, which may be too small.

* An extract from a report, "The Prevention of Tuberculosis in Childhood, with Special Reference to Methods of Separation." Work done during the tenure of a Dorothy Temple Cross Research Fellowship in Tuberculosis, 1933-5, awarded by the Medical Research Council.

TABLE I.—*Reported General and Tuberculosis Mortality among Home-contacts*

Country	Author and Date	Contact with	Degree of Illness of Tuberculous Individual	Age of Home-contacts	Number Investigated	General Mortality	Tuberculosis Mortality
France ¹	Armand-Delille (1912)	Household (? parents)	"Tuberculous"	?	175 (Households)	per cent.	per cent.
"	Bernard and Dchré (1920)	Mother	"	Infants ²	58	20.0	? Ditto
"	Calmette (1926)	"	"Tuberculous"; supervised by dispensaries	0 to 1 year	1,364		Provinces: 24.0 ³ Paris: 32.6 ³
"	Office National d'Hygiène Sociale, Paris (1928) [quoted by Lissant Cox et al. (1929)]	"	"Tuberculous"	1 month to 4 years	1,989	24.2	18.0
"		Tuberculous environment (excluding above)	"	"	2,865	18.0	13.9
Germany	Braeuning and Neumann (1929) ⁴	Mother, father, sibling, or grandparent	"Open" cases; sputum positive, or fatal	0 to 1 year 1 to 5 years	246 569	13.0 14.5 1.9	6.1 7.6 ⁵ 1.4
"	Peiser (1929)	Household	"Open" pulmonary tuberculosis	0 to 1 year 1 to 2 years		5.1 3.4	
"	Deutsch-Lederer (1929)	"	"Open" pulmonary tuberculosis (sputum positive)	0 to 1 year	196	7.1	6.6
"	Frantz (1930)	"	"	"	119	22.6	16.8 ⁶
Denmark	Kjer-Petersen and Ostfeld (1928)	Mother or both parents	"Open" tuberculosis	"	245	7.7	4.9
"		Father	"	"	101		3.9
"		"	"	"	116		6.9
"	Heckscher (1928)	Mother	Active pulmonary tuberculosis	"	204	24.0	5.4
"		"	Quiescent or arrested pulmonary tuberculosis	"	164	16.8	1.8
Holland	Heynsius van den Berg (1929)	Household	Sputum positive	0 to 2 years			12.3
"		"	"	0 to 1 year	123		20.4 7.2
"		(already known to dispensary before birth)	"	"			
"		Mother	"	0 to 2 years			12.3
"		"	"	0 to 1 year	78		11.1
"		"	"	0 to 2 years	59		23.3
America	Asserson (1927)	"Family"	Tuberculosis	"	149	56.0	47.0
"		Mother	"	"	77		35.0
"		Father	"	"	32		62.0
"		Other members of family	"	"	30		56.0
England	Dickinson (1925)	Mother	Tuberculous	0 to 1 year	49	32.6	
"		Father	"	"	118	15.2	
"	Cummins (1928)	Family	"	0 to 5 years			Not more than 4.5
"	Lissant Cox et al. (1929)	Household	Sputum positive	0 to 1 year 1 to 2 years 2 to 5 years	1,023 876 501	8.3 4.7 4.5	1.7 2.6 1.8
"		"	Sputum negative	0 to 1 year 1 to 2 years 2 to 5 years	428 368 211	5.6 2.9 2.8	0.7 0.8 0.9
"		Mother	Sputum positive	0 to 1 year	244	2.8	1.8
"		Father	"	"	588	11.4 7.99	3.2 1.3
"	Turner (1920)	Household	Sputum positive, ending fatally	1 to 2 years 2 to 5 years	76 76 110	21.0 13.1 5.4	5.2 3.9 3.6
"	Dow and Lloyd (1930)	Mother	Sputum positive	0 to 1 year 1 to 5 years 0 to 5 years	159 105 264	4.4 1.9 3.4	1.88 0 1.1
"		Father	"	0 to 1 year 1 to 5 years 0 to 5 years	169 114 283	7.6 6.1 7.0	1.7 1.7 1.7
"		Parent	"	0 to 1 year 1 to 5 years 0 to 5 years	328 219 547	6.0 4.1 5.3	1.8 0.9 1.4
"		"	Sputum negative	0 to 1 year 1 to 5 years 0 to 5 years	210 138 348	5.2 3.6 4.5	0.4 0.7 0.5
"	Tattersall (1934)	Household	Sputum positive	0 to 1 year	240	11.2	2.9
"		"	Sputum negative	"	866	5.4	0.4
"		"	Sputum positive	0 to 5 years	223	14.3	5.8
"		"	Sputum negative	"	687	14.3	2.3
"		Father	Sputum positive	"	111	9.9	4.5
"		"	Sputum negative	"	261	13.7	3.8
"		Mother	Sputum positive	"	84	21.4	9.5
"		"	Sputum negative	"	198	13.1	1.0

¹ In considering general and tuberculosis death statistics in France the following two points should be remembered: (a) tuberculosis is not notifiable; (b) the difficulties as regards death certification seem to be considerable. Thus Hazemann (1933) states that the causes of death are often "vague and uncertain." In 1929, of 739 000 deaths, in 90,000 (or 12 per cent.) the cause was not specified or remained ill-defined ("in six counties one ignores the cause of one-third of the deaths"); in addition, 12 per cent. are put down to "senility" and as many more as "other illnesses"—that is, about one-third of the deaths do not permit of scientific tabulation. He also states that in 1927, while 71,117 deaths were certified as due to tuberculosis, 17 per cent. of the deaths that year were not certified by a medical man.

² These include infants who were separated from mother for varying periods.

³ These figures represent infants dying of affections "presumably tuberculous." Moreover, they are often quoted in France as representing the tuberculous mortality of infants born in tuberculous households.

⁴ An extensive and very careful investigation at Stettin. Their original paper should be consulted for many interesting findings.

⁵ Period 1920-6 only, when accurate figures obtained with greater certainty.

⁶ Correction required for two children who died of tuberculosis at beginning of second year.

TUBERCULOSIS MORTALITY AND GENERAL MORTALITY

In Table I are summarized the figures given by various authors in different countries for the tuberculosis and the general mortality in home-contacts. The degree of contact, the age of the children, and the number investigated are indicated where available. The following conclusions can be formulated.

1. The tuberculosis mortality in home-contacts is much greater than in non-contacts, being high in the first year of life and very much lower afterwards. But the difference is more marked as the child is older, according to some inquiries (Lissant Cox *et al.*, 1929; Turner, 1930); and less, according to others (Braeuning and Neumann, 1929). Braeuning and Neumann (1929) point out that a large proportion of the tuberculosis deaths in the age group 2 to 5 years is due to children exposed in infancy.

2. The great variation in the figures of tuberculosis mortality reported by different authors may be accounted for by the following factors. (a) Conditions peculiar to the country under investigation—for example, the general infantile mortality is higher in France than in England and Wales (83.3 and 70 respectively in 1927). (b) The hygienic conditions under which the population studied lives: thus Calmette's figures (1926) were obtained among children living in bad home conditions. (Lissant Cox *et al.*, 1929, when considering separately tuberculous households with good and bad hygiene, found the tuberculosis death rates to be 1.45 per cent. and 1.71 per cent. respectively, and the mortality from all causes 7.05 per cent. and 9.22 per cent.) (c) Attention must be paid to the possibility of a number of children having been separated from the tuberculous person in the household for a varying period, however short, as the result of the patient's being away for treatment, or of the child's being sent to stay with relations; especially as this will probably occur during the period of greatest contagiousness. This factor may partly account for the low figures obtained in Lancashire (Lissant Cox *et al.*, 1929), a county known for its very efficient tuberculosis organization.

3. The figures for mortality from causes other than tuberculosis also differ. The low general mortality figures in home-contacts obtained by Lissant Cox *et al.* (1929), Deutsch-Lederer (1929), and Braeuning and Neumann (1929) are probably due to the fact that (1) infants in tuberculous households are likely to be better looked after as the result of supervision by tuberculosis and child welfare organizations; and (2) the more debilitated children are more likely to die from tuberculosis. It is also probable that figures, both as regards the tuberculosis and the general mortality, will depend on the proportion of tuberculous mothers and fathers in these investigations, as infants of sick mothers are not likely to receive as much general care in the home. Thus in the Lancashire inquiry the proportion of tuberculous fathers in the households was very high.

EFFECT OF FAMILY RELATIONSHIP

The importance of the relationship of the home-contacts to the tuberculous person in the household is obvious, as a greater incidence of tuberculosis in home-contacts of tuberculous parents may be brought forward as evidence in support of the inheritance of tuberculosis (especially if it is found to be greater when the mother is tuberculous than when the father). On the other hand, as will be seen later, such a fact can easily be explained on the assumption of intimacy of contact increasing the dose of contagion. The work of Schram (1922), Dickinson (1925), Klostermann (1926), Opie and McPhedran (1926), Kjer-Petersen and Ostenfeld (1927), Asserson (1927), Lissant Cox *et al.* (1929), Heynsius van den Berg (1929), and Dow and Lloyd (1930, 1931) indicates that the incidence of both tuberculous infection and mortality is greater when there is contact with a parent than with a more distant relative, with the mother than with the father, this only holding true if no separation is effected (see also Table I).

The value of investigations into the incidence of tuberculous disease in contacts is doubtful, owing to the different criteria adopted by various authors as to what con-

stitutes tuberculous disease. The work of Opie and McPhedran (1926), Chadwick (1927), Barclay (1932), and Armand-Delille (1933) may be mentioned.

As a final reflection in this section, attention should be drawn to the fact that in view of the remarkably wide differences in the tuberculosis morbidity, lethality, and mortality in home-contacts reported by various authors, it is clear that, before any reliable conclusions can be drawn with regard to any prophylactic measure in these children, uniform criteria upon which such investigations are to be based must be determined. It is suggested that this matter could best be dealt with by the Health Organization of the League of Nations.

The Role of Human Contagion

The fact that human contagion can cause tuberculous disease rests on a definite experimental basis. Its role in the tuberculosis of home-contacts can best be considered by discussing the effect of various factors associated with contagion.

It is obvious that in dealing with tuberculosis in home-contacts contact with a tuberculous person is *ipso facto* present. The role of human contagion can, however, best be appreciated by investigating the possibility of contact in children with tuberculous infection and disease not specially brought up because of a history of exposure. The figures obtained by various authors differ considerably (see Bernard and Debré, 1923; Lemaire, 1925; Debré and Cordey, 1925; Bernard, 1927; Chown and Medovy, 1933; and Bentley, 1933). It seems that the younger the child the more likely is home contagion to be found. This is easily understood, for the infant lives strictly within the family, while the older child spends a great deal of his time out of doors or at school, and may pick up contagion where it cannot be traced. That a history of contact is also more common in children with tuberculous disease than merely with infection is also easily explained by the fact that home-contacts are more liable to receive a large dose of contagion, which is more likely to develop into disease. To a certain extent results will depend on the thoroughness of investigations undertaken in the search for contact; whether merely the word of relatives is taken or all members of the household are actually examined. They may also depend on the amount of human tuberculosis of bovine origin in the country under review: the more bovine tuberculosis the smaller the percentage of human contact found. The latter factor will not play such an important part in investigations of children with pulmonary tuberculosis (where the bovine type is rather rare*) as in those with surgical tuberculosis or merely a positive tuberculin test.

That contact does not always lead to infection is evident from the fact that not all home-contacts are tuberculin-positive (see Hart, 1932). The following investigations in particular—some demonstrating that children even after prolonged or intimate contact may remain tuberculin-negative—must be mentioned: Köffler (1921), Barchetti (1921), Bernard and Debré (1923), Wahl and Gerstenberger (1923), Petschek (1924), Zimmermann (1925), Myers and Kernkamp (1930), Park, Kereszturi and Mishulow (1933). It is obvious that in these investigations account must be taken of other factors. These will now be discussed.

AGE WHEN CONTACT OCCURS

Cases of tuberculous disease presumably due to post-natal contact have been described at a very early age. Habitz (1927) reports a fatal case at the age of 4 months. Couvelaire and Lacomme's (1931) second case died at the age of 15 weeks. Blacklock (1932), in carrying out

* Recent investigations in Denmark have shown that pulmonary tuberculosis of bovine origin is by no means uncommon (Jensen, 1934).

post-mortem examinations, found tuberculous lesions in six infants under 3 months of age. Bernard and Debré (1923) conclude that the younger the infant at the time of contact the graver the prognosis. Lemaire (1925) found that if contagion arose before 1 year the mortality was 57 per cent.; if between 1 year and 2½ years, 1.66 per cent. Nassau and Zweig (1925) found that of twenty infants infected during the first three months all died; of sixteen infected during the second three months 18.75 per cent. died; and of thirteen infected during the second half of the first year only 3.8 per cent. died. Asserson (1927) states that of those infected under 12 months 15 per cent. die of tuberculous disease, and 2.6 per cent. of those infected between 1 year and 2 years of age.

Braeuning and Neumann (1929) discovered that the tuberculosis mortality varied according to the age at which contact took place (all contacts of open sputum-positive cases).

TABLE II

Age when Contact Began	Number of Cases	Tuberculosis Mortality	
		Within One Year	At end of Five Years of Contact
0-1 year	246	6.1 per cent.	8.1 per cent.
1-5 years	539	1.4 "	1.4 "
6-10 "	618	0.49 "	1.4 "
11-15 "	617	Nil	1.0 "

Heynsius van den Berg (1929) observed that when there was contact in the first three months of life 71.8 per cent. of the children became Pirquet-positive before one year, and the tuberculosis morbidity and mortality were 32.1 and 18.3 per cent. respectively. If contact took place between the fourth and twelfth months the corresponding percentages were 52.2, 8.3, and 2.1. At the end of two years the percentages for tuberculous infection, morbidity, and mortality were 80.5, 45.6, and 30.5 if contact had occurred in the first three months of life, and 80.9, 31.5, and 11 respectively if contact first began at a later age. Ribadeau-Dumas (1933) gives the mortality after infection in the first three months as 92 per cent., in the first year as 50 per cent., and in the second year as 10 per cent.

DURATION OF CONTACT

Bernard and Debré (1923) and Lemaire (1927) provide figures illustrating the direct relation between duration of contact and infection. Frantz (1930) shows a similar relation between duration of contact and mortality. The importance of intimacy of contact in relation to infection and mortality has already been indicated (see also Table I), for children clearly have a more intimate contact with the mother than with the father or sibling. The greater incidence of infection and mortality as the result of contact with sputum-positive rather than negative cases, with advanced than with mild disease, is revealed in the investigations of Schram (1922), Röpke (1923), Opie and McPhedran (1926), Braeuning and Neumann (1929), Heynsius van den Berg (1929), Lissant Cox *et al.* (1929), Schlesinger and Hart (1930), and Dow and Lloyd (1930, 1931). Braeuning and Neumann (1929) observe that severity of case and intimacy (good or bad home conditions) are of little importance in the age group 1 to 4 years.

A fact of great importance in relation to the question of heredity is demonstrated by Schlesinger and Hart (1930) when they state that the percentage of tuberculin reactions among children exposed in tuberculous households to parents or siblings with non-pulmonary tuber-

culosis was no higher than among children of non-tuberculous households.

Bernard and Debré (1923) consider the ante-allergic period (that is, the time elapsing between contact and the appearance of a positive tuberculin test, a term first employed by Debré and Jacquet in 1920) to be inversely proportional to the dose of contagion. Bernard and Debré (1920) estimate that the ante-allergic period may be as long as four months. Epstein (1926, 1928) thinks this is too long, and gives three to seven weeks as the limits when the intradermal test is used. Breckoff (1924) found it to be usually fifty-two to fifty-four days. He quotes Gutowsky (sixty-two days), Schloss (seventy days), and Bratusch-Marrain (fifty-six to eighty-four days). (See also Debré, Paraf, and Dautrebande, 1921.)

PROGNOSIS OF INFECTED INFANTS

Hart (1932) summarizes the published reports on the fate of infants with positive tuberculin reactions. The tuberculin mortality in these varies from 2 to 100 per cent., but of twenty-one authors thirteen report percentages well over 50. Hart concludes that

"it is probable that the divergent results are mainly due to differences in clinical material, although variation in the length of the period of observation may play a part. Much of the work has been carried out in children brought to hospital on account of symptoms, many even being clinically tuberculous when first seen. There is fairly general agreement that even at the present time the prognosis of tuberculous infection in infants is unfavourable once it has progressed to the stage of manifest tuberculosis. . . . Where, on the other hand, the group investigated has consisted mainly or entirely of children in whom the only sign of tuberculosis is a positive reaction, a much lower mortality from this disease has been recorded."

Bernard and Debré (1923) consider the period of survival after the ceasing of contact as of importance in the prognosis. If the infant lives more than six months it escapes progressive tuberculous disease; of thirty-six infected infants who died, thirty died within one month or less after separation from the tuberculous relative, one died after two months, one after four months, and one after five months: that is, if the infant lives for one month after separation there is a good chance of his remaining alive.

SEPARATION OF INFECTED CONTACTS

The question as to what effect has separation from the tuberculous relative of an infant already infected is very important, but difficult to answer.

Bernard and Debré (1923) found at the crèche at Laennec Hospital that forty infants from tuberculous mothers were infected out of a total of fifty-eight, but only thirty infants dated from the period when the crèche was organized so that separation between infants and mothers could be effected. Of these thirty infected infants only twelve died (contact having lasted from two to thirteen months, but in one case thirteen days); the other eighteen (examined two months to two years after separation) remained quite well. They conclude that these eighteen infants were saved because of the separation. This assumption seems hardly justified, as it implies a 100 per cent. mortality for infected infants, which is by no means the rule.

Lemaire (1925), who followed up a hundred children under 2½ years with a positive tuberculin test from three months to over three years, found three deaths (4.5 per cent.) among sixty-seven children who had been separated (in two cases the tuberculosis had already been generalized when separation took place), and twenty-one deaths (63.6 per cent.) among thirty-three children who had not been separated. Separation had been effected forty-eight times by sending the child to the Oeuvre du Placement Familial des Tout-Petits* (P.F.T.P.); once by admission of the parent to

* An organization boarding out infants and children up to the age of 4 with families in the country, under medical supervision.

a sanatorium; fourteen times by the death of the tuberculous parent; and once by sending away the nurse. Ribadeau-Dumas (1925), at the same meeting at which the above results were reported, affirmed that too much importance was being attached to the size of the dose or repeated doses of contagion, but that it was the age at which contact took place that mattered: once the tubercle bacillus entered the infant's organism "anything might occur"; if infection took place in the first three months it was always fatal.

Asserson (1927) mentions that of twenty-three infants from tuberculous mothers referred for boarding out by the New York Tuberculosis and Health Association, only nine whose tuberculin tests were negative were accepted: all were well at the end of a year. Of the fourteen with a positive tuberculin test who were refused, twelve died before the end of the year; the two who survived had been removed from their homes and placed in institutions for three or four months while their mothers received hospital care.

Bernard, Debré, and Lelong (1925) give the following figures in relation to the children accepted for boarding out by the P.F.T.P. No case of tuberculous disease is stated to have occurred in the 265 infants who had been separated at birth or before contamination had taken place. Among 171 infants and children admitted contaminated (that is, with a positive Pirquet test) there were seventeen cases of tuberculosis (of which thirteen were fatal, giving a tuberculosis mortality of 7.6 per cent.); the general mortality is not given. Of sixty-six children who did not satisfy the conditions of admission or whose separation the parents refused, fifty-four (82 per cent.) died, mostly before 1 year, the oldest at the age of 23 months. Their comparison of 82 per cent. and 7.6 per cent. as indicating the benefit of separation of children already infected is not justified, especially as the group represented by the lower percentage are cases selected because of their general good health and after observation so as to exclude tuberculous disease. But in the group of sixty-six children inquiries were made as to contact and hygiene in thirty-seven families. They found that thirteen infants would have been accepted if the parents had not refused. In five contact had ceased owing to the death of the tuberculous parent; all were alive (in three the hygiene of the environment was satisfactory, in two it was bad). In eight where contact persisted, all died (four environments satisfactory and four bad). Among twenty-four infants whose admission was refused by the P.F.T.P., in eleven contact had ceased and ten were still alive (in six the hygienic environment was good). In thirteen contact persisted and they all died (in ten the hygienic environment was good).

The evidence cited above certainly suggests that, at any rate as regards infants, separation, even after the Pirquet test becomes positive, has a beneficial effect in the prevention of the development of tuberculous disease. It might be argued that this is due not to the avoidance of repeated doses of contagion but to the improved hygienic conditions of the environment in which the infants are placed: these prevent the tuberculous infection from developing into disease. Bernard, Debré, and Lelong's figures relating to infants remaining at home when contact has ceased suggest, however, that repeated doses of contagion do play some part. Any further evidence on this question both from the P.F.T.P. and the Oeuvre Grancher cannot be taken into account owing to the practice of vaccinating the infants with B.C.G. since the time when the children discussed above were dealt with.

Conclusions

1. Post-natal contact is by no means always fatal, and does not always infect even infants, but it causes infection in a large proportion of such children.
2. The younger the infant the more likely is it to be infected, and the younger when infected the graver is the prognosis.
3. While dose (intimacy and duration) plays an important part in infecting an infant it is probable, but by no means certain, that it plays a part in the prognosis afterwards.

4. Separating an infant in contact with a tuberculous parent before infection has occurred prevents the development of tuberculous disease, at any rate up to the age of 4 years (according to the observations in the P.F.T.P.).

5. It is possible that separating an already infected infant may also prevent, in some cases, the development of tuberculous disease, but this may be due to the improved hygienic conditions rather than to the avoidance of repeated doses of contagion.

6. There is no evidence to show whether the separation of an older child with a positive tuberculin test has any effect in preventing the development of tuberculous disease, and it is to be noted that the tuberculosis mortality in children at that age is very low in any case. Hygiene may, however, also have some effect here. Nevertheless, separation is indicated in non-infected children, at any rate up to the age of 5 years, although the danger when contact first takes place in this age period is not nearly as great as in infants (Braeuning and Neumann, 1929).

I should like to express my thanks to Dr. N. Tattersall for permission to publish his mortality figures included in Table I.

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