# BOVINE TUBERCULOSIS; THE ETIOLOGICAL SUPPORT OF FAMILY HISTORY.

By

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THE work contained in the following paper demonstrates that valuable evidence of the relative incidence of bovine and human tuberculosis may probably be obtained by a careful record of the chances of contact infection in each case.

The material dealt with was derived from a central clinic in a large industrial County Borough (Newport, Mon.) and from a series of smaller clinics. Two of the latter were in industrial (coal and iron) districts and three in small country towns containing semi-urban and rural populations. The total population of the area exceeds 200,000. The cases analysed were drawn from records of 4000 individuals personally examined by one of us. Approximately 50 per cent. of these were diagnosed as suffering from tuberculosis in one or other of its various forms, and about 10 per cent., or 400 persons, showed evidences of non-pulmonary tuberculosis. In order that the statistics concerning the latter class might be made as accurate as possible the following precautions were taken:

Doubtful cases and cases of micropoly-adenitis in children, and all cases in which the predominant lesion was pulmonary, and the non-pulmonary forms which were secondary to pulmonary infection, were excluded. Cases presenting lesions which proved on serological or histological investigation to be due to other conditions, *e.g.* syphilis, Hodgkins' disease or lymphosarcoma, have been omitted. Every effort was made to secure that the cases analysed were genuine cases of non-pulmonary tuberculosis requiring treatment.

As a comparison, 250 unselected cases of pulmonary disease, in all of which tubercle bacilli had been found in the sputum, have been analysed.

Table I contains the records of 382 cases of non-pulmonary tuberculosis. Fifty-one of these were cases of tracheo-bronchial adenitis and they have been placed in a separate class from the rest. There remain 331 cases of non-pulmonary tuberculosis. Of these 170 were males and 161 were females. In

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every case, as a routine measure, the family history was carefully inquired into at the time of the first examination of the patient. It is probable that the history of the presence of tuberculosis in the family is under-estimated in these statistics, but as all the cases were investigated under similar conditions and without any view to the present publication this error can be assumed to be a constant, and, therefore, although the absolute figures of tuberculous family histories are probably too low, the relative percentages in each class of case are not affected.

Table I.

| Lesion | Total | M. | F. | F.H.$_0$ | F.H.$_1$ | F.H.$_2$ | Percentages F.H.$_0$ | Percentages F.H.$_1$ | Percentages F.H.$_2$ | Age Periods 0–5 | 5–10 | 10–15 | 15–20 | 20–25 | 25–30 | Over 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | % | % | % | | | | | | | |
| GLANDS: external groups—chiefly cervical | 132 | 67 | 65 | 87 | 32 | 13 | 65·9 | 24·2 | 9·9 | 21 | 34 | 29 | 19 | 15 | 6 | 6 |
| JOINTS: | | | | | | | | | | | | | | | | |
| Ankle and elbow | 13 | 6 | 7 | 10 | 3 | 0 | | | | 1 | 6 | 2 | 1 | 3 | — | — |
| Hip | 33 | 17 | 16 | 17 | 13 | 3 | 66·2 | 24·3 | 9·4 | 3 | 10 | 13 | 5 | 1 | 1 | — |
| Knee | 28 | 11 | 17 | 22 | 2 | 4 | | | | 1 | 5 | 6 | 8 | 3 | 3 | 2 |
| Spine | 37 | 17 | 20 | 24 | 12 | 1 | 64·8 | 32·4 | 2·7 | 8 | 8 | 5 | 4 | 8 | 2 | 2 |
| Other bones | 34 | 24 | 10 | 25 | 8 | 1 | 73·5 | 23·5 | 2·9 | 4 | 6 | 12 | 4 | 2 | 2 | 4 |
| | | | | | | | 67·5 | 26·7 | 6·3 | | | | | | | |
| Tuberc. Peritonitis | 29 | 19 | 10 | 18 | 6 | 5 | 61·8 | 20·6 | 17·6 | 6 | 11 | 9 | 3 | — | — | — |
| Skin | 17 | 7 | 10 | 10 | 7 | 0 | 58·9 | 41·1 | 0 | 1 | 1 | 3 | 4 | 1 | 4 | 3 |
| Miliary tuberculosis | 8 | 2 | 6 | 4 | 3 | 1 | 50 | 37·5 | 12·5 | 8 | — | — | — | — | — | — |
| Total | 331 | 170 | 161 | 217 | 86 | 28 | 65·5 | 25·9 | 8·4 | 53 | 81 | 79 | 48 | 33 | 18 | 17 |
| Tracheo-bronchial GLANDS; hilum tuberculosis | 51 | 35 | 16 | 19 | 25 | 7 | 37·3 | 49 | 13·7 | 2 | 36 | 13 | — | — | — | — |
| Pulmonary T.B. sputum | 250 | 135 | 115 | 126 | 105 | 19 | 50·4 | 42 | 7·6 | — | 1 | 9 | 36 | 47 | 35 | 122 |

Again it should be stated that the higher the age group the less reliable are the figures in these groups as an indication of the actual age incidence of the lesion, since after the age of 15 many of the figures of the later groups should be moved to the left. A large number of the adult cases of non-pulmonary tuberculosis had had the disease for a number of years before they presented themselves for examination at the clinic, and the ages given are those at which they were first examined at the clinic. The age incidences of the non-pulmonary types of tuberculosis do not necessarily represent the age incidence of non-pulmonary forms of tuberculosis in the population, but only the age incidences of the cases of non-pulmonary tuberculosis which attended the clinics. The pulmonary cases on the other hand represent with fair accuracy the age incidence of pulmonary tuberculosis in the population. This is probably because tuberculosis clinics are wrongly regarded as being institutions primarily intended for the treatment of pulmonary types of the disease.

An examination of Table I shows that tuberculous cervical adenitis was the predominant type of non-pulmonary lesion seen at the clinic. 132 of the 331 cases were tuberculous infection of glands of the external groups, chiefly cervical.



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Tuberculosis of the joints, spine and of the long bones account for 145 cases, various lesions of the skin for 17, tuberculous peritonitis for 29—with one exception all of the ascitic type—and miliary tuberculosis for eight cases. It is seen, therefore, that certain types of tuberculosis, *e.g.* tuberculous meningitis, were not represented at all in the practice of the clinic and it is certain that only the more severe cases of cervical adenitis were sent for treatment.

The family histories of these cases, as a measure of the opportunities of infection, reveal some striking facts. In order to study these histories they have been divided into three groups:

1. Cases in which no history of tuberculosis in the family was admitted.
2. Cases which gave a history of tuberculosis occurring in a near relation, mother or father, brother or sister, husband or wife.
3. Cases which gave a history of tuberculosis in a more remote relation, grandparents, uncles or aunts.

These three groups have been designated $F.H._0$, $F.H._1$, $F.H._2$. The detailed percentages of each variety of non-pulmonary tuberculosis are set out in the table; it will suffice here to consider the general averages. Of the 331 cases, 217 gave no history of tuberculosis in the family, 86 gave a history of tuberculosis in near relations, and 28 in relations more remote. These numbers expressed as percentages give the following figures: $F.H._0$, 65·5 per cent.; $F.H._1$, 25·9 per cent.; $F.H._2$, 8·4 per cent.

The table shows that the possibility of family contact in the two large groups of glandular and bone and joint cases are very similar, since the $F.H._1$ percentages (24·2 per cent.—26·7 per cent.) are very close together.

The numbers of cases which are included under the headings Tuberculous Peritonitis, Skin and Miliary Tuberculosis, and under the sub-headings of Diseases of the Joints are too few to justify any conclusions being drawn from the percentage figures.

It is instructive to compare these figures with those obtained in 250 cases of pulmonary disease all of which showed the presence of tubercle bacilli in the sputum. Beyond insuring that this was the fact (and so placing the question of diagnosis beyond dispute) no sort of selection was employed in choosing these pulmonary cases. Of the 250 pulmonary cases 126 belonged to the class $F.H._0$, 105 to the class $F.H._1$, and 19 to the class $F.H._2$. Expressed as a percentage the $F.H._1$ figures amount to 42 per cent. compared with 24·2 per cent. for glands of external groups, 26·7 per cent. for joints and 25·9 per cent. for the 331 cases of "Other Tuberculous Diseases," which are included in the table. With these may be considered 51 cases of children under 15 suffering from active tuberculosis of the tracheo-bronchial glands. Nineteen of these gave no family histories ($F.H._0$), 25 gave histories of tuberculosis in near relations ($F.H._1$) and seven in remote relations ($F.H._2$); expressed as percentages $F.H._0 = 37·3$ per cent.; $F.H._1 = 49$ per cent.; $F.H._2 = 13·7$ per cent. Ten of these cases, all falling in group $F.H._1$, were examined as contacts with cases of tuberculosis.

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The number of these (tracheo-bronchial gland) cases is small, but on the evidence it would appear that the chances of infection by family contact approach the conditions found in cases of pulmonary tuberculosis.

It is of interest to compare the figures for $F.H._1$ and $F.H._2$ with the percentages of bovine infection discovered by laboratory methods for each class of lesion.

The following table has been compiled from Cobbett's[1] valuable book which appeared shortly after this clinical material had been analysed, and from a table constructed by A. E. Stanley Griffiths[2] largely founded upon his own experimental work and that of F. Griffiths and Eastwood. The percentages and the numbers of cases upon which the laboratory conclusions for each type of lesion are founded and the percentage and number of instances of each type of lesion in our series are given in Table II. It will be noted that taking the

Table II.

| Lesion | Percentage of Bovine infection at all ages | $F.H._1$ (all ages) | $F.H._2$ (all ages) |
|---|---|---|---|
| *Pulmonary | 1·41 % (212 cases) | 42 % (250 cases) | 7·6 % |
| †Bronchial glands | 5·5 % (18 cases) | 49 % (51 cases) (or excluding 10 contacts = $F.H._1$ = 36·5 %) | 13·7 % |
| *Cervical glands | 47·05 % (102 cases) | 24·2 % (132 cases) | 9·9 % |
| *Bones and joints | 19·9 % (392 cases) | 26·7 % (145 cases) | 6·3 % |
| †Abdominal tuberculosis | 51 % (56 cases) (all ages 6 %) | 20·6 % (29 cases) (Tuberculous peritonitis) | 17·6 % |

* Source—Cobbett, *op. cit.*
† „ —A. S. Griffiths, *loc. cit.*

table as a whole there is shown an inverse proportion between the laboratory percentages for bovine infection in each lesion and our figure for $F.H._1$. This extends to the bronchial glands class, if the ten contacts previously mentioned are removed, as it seems reasonable to do, since their inclusion might seem to vitiate the haphazard choice which has been observed throughout.

The only real exception to the inverse relationship is the "Bones and Joints class." The laboratory results give 19·9 per cent. to bovine infection. $F.H._1$ for this class is 26·7 per cent. We should have expected a higher bovine percentage.

The figures given suggest that the family histories of cases of tuberculosis, if taken in sufficient number, would constitute valuable collateral evidence of the extent of bovine infection in districts. The lower the figure for $F.H._1$ the more likely are the lesions to be of bovine origin. More investigations by tuberculosis officers into the family histories of cases of tuberculosis might

[1] Cobbett, C. L. (1917). *The Causes of Tuberculosis*, Cambridge Public Health Series.
[2] Griffiths, A. Stanley (1907). *Brit. Journ. Tuberculosis*, XI, No. 4.

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prove of great value in indicating the probable extent of bovine tuberculosis in the districts with which the officers are concerned; the extent to which it may vary in one district compared with another; and the relative proportions of cases of human and bovine tuberculosis found in districts of different type, as for example in purely industrial compared with purely agricultural areas.

This paper makes it clear that contact infection is not so common in cases of "Other Tuberculous Diseases" as in pulmonary infections. There must, therefore, be some other factor at work in these cases. The discussion of that factor may be left to a second paper.

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