Scandinavian group. Infections associated with Eire '55 and Dutch '56 viruses occurred, but were much less prevalent. Influenza virus B strains isolated during the 1954-5 epidemic differed antigenically from earlier strains of this group.

The frequency with which respiratory illnesses associated with influenza A and B infections were detected between epidemics in the period studied appears compatible with the hypothesis that both diseases are endemic in this country. Evidence of actual and potential importation of infection from abroad was also found.

This report was made possible by the work of many people—medical officers of health, laboratory workers, Service medical officers, and especially those general practitioners who took part in the influenza-spotting scheme. We should like to acknowledge in particular the help given to the Public Health Laboratory Service by the university laboratories in Aberdeen, Bristol, Edinburgh, and Glasgow, and by the Central Laboratory, Belfast. We are indebted to the Medical Research Council for a grant towards expenses of the special influenza vaccine trial spotting scheme.

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INCIDENCE OF TUBERCULOSIS AMONG WORKERS IN MEDICAL LABORATORIES

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Although the hazards of handling certain types of infectious material in the medical laboratory are well documented in the literature, the presence of an unduly high risk of contracting tuberculosis while employed in hospital or public health laboratories has never been firmly established. There is, however, evidence which suggests that tuberculous infections, quite apart from obvious skin lesions, may result from exposure to laboratory conditions. Lurie (1930), for example, has noted the presumed airborne spread of tuberculosis among animals caged separately in the same animal-room. Meade (1948) reported a decrease in tuberculin skin-test conversion rates and in the incidence of tuberculosis among medical students after they were forbidden to handle fresh post-mortem material from tuberculous patients. An excessive incidence of tuberculosis among medical students, particularly during the course in pathology, has been remarked upon by both Hedvall (1940) in Sweden and Morris (1946) in the United States.

In Düsseldorf, Koch (1951) reported that the frequency of tuberculosis among pathologists was five times higher than among physicians; four times higher than among oto-rhino-laryngologists, bacteriologists, and public health workers; and twice as high as among the

staff of infectious diseases units; there were no cases among surgeons. Despite other evidence of a similar nature, Gruber (1949) found it difficult to convince authorities in Germany that a real hazard existed: and it is certainly true that neither of the German studies takes any detailed account of the numbers and characteristics of those exposed to risk. Similar difficulties were encountered in the survey of all types of laboratory infections by Sulkin and Pike (1951), who had doubts about the completeness of case-reporting. In this country, Stewart Smith (1953) was unable to find convincing evidence that the necropsy room presented a health hazard so far as tuberculosis was concerned; and this doubt is commonly expressed by many pathologists.

The difficulties of measuring the incidence of tuberculous laboratory infections are obvious. Although laboratory experiments such as those of Sloan (1942) may indicate the possibility of aerial dissemination of bacilli from incised pathological material, complete conviction can come only from a demonstration of an appreciably higher incidence of clinically evident tuberculosis among laboratory staffs employed on tasks exposing them to infection than among the working population as a whole. Unlike infections such as psittacosis or Q fever, tuberculosis is endemic in our population and its appearance in a laboratory worker is in no way remarkable. On the other hand, the attack rate is so low that a laboratory staff of 20 people could well go on for more than a generation without a naturally occurring case arising among them. To obtain an experience large enough a wide-scale survey is clearly required.

Preliminary Observations

Under the provisions of the Industrial Diseases and Injuries Act, laboratory workers of all grades can apply for the increased rates of sickness benefit awarded to those whose disability might be attributable to their occupation. The Minister of National Insurance encourages all who are members of the Health Service to make application, although acceptance of attributability by no means necessarily follows. Reports on these claims for the period 1953-5 inclusive were made available, and "claim" rates, which are minimum estimates of the incidence of disabling tuberculosis, were calculated by relating these claims to the number of individuals in the corresponding Health Service occupational group given in returns to the Ministry of Health. Table I shows that pathologists, like chest physicians and surgeons, had much higher claim rates than did men in other specialties. Similarly, laboratory technicians had higher claim rates than other medical auxiliaries working in hospital.

Clearly, there are major difficulties in the interpretation of such data. Quite apart from the possibility that claims are not equally often pressed by individuals suffering from tuberculosis in different occupational

TABLE I.—Crude Tuberculosis Claim Rates for Hospital Staff (M.N.I. 1953-5 Inclusive)

	Cases	Man-years Exposure	Rate per 1,000 p.a.
Pathologists	12	2,193	5.47
Chest physicians and surgeons ..	10	2,489	4.02
Other medical staff	13	19,830	0.66
Laboratory technicians	33	11,593	2.85
Other auxiliary staff	34	32,152	1.06

groups, the age-and-sex structure of these groups may vary widely. Again, laboratory staffs may have better facilities for prompt recognition of tuberculous infection. Finally, occupational self-selection may result from men and women of poorer physique or with a family history of tuberculosis preferring the physically less arduous life of the laboratory to the rigours of general practice or other specialties. To try to meet these difficulties surveys of morbidity among clinical laboratory workers in general and mortality of pathologists in particular were carried out.

The Morbidity Survey

With the help of Sir Samuel Bedson, Chairman of the Central Pathological Committee of the Ministry of Health, and Dr. G. S. Wilson, Director of the Public Health Laboratory Service, directors of all official pathological and bacteriological laboratories were asked to provide information both about the work and the routine practices of health care in their laboratories and about the occupation and health history of every individual who had worked in each laboratory during the period 1949-53 inclusive.

The first questionnaire dealt with the laboratory conditions. The size of staff in relation to the number of rooms was taken as a guide to the crowding of the working space and risk of human contacts at work. The main function of the laboratory—for example, blood transfusion or public health bacteriology—gave some indication of the nature of any infective hazards; while the frequency of x-ray examination and tuberculin skin-testing at entry or at regular intervals thereafter was elicited to determine the standards of health care in different laboratories.

A personal record was also required for every individual who had worked in the particular laboratory for any time during the period 1949-53. Names were excluded to make this report completely confidential: references in later correspondence were made by code numbers or initials. The data requested included age, sex, occupational status in laboratory—for example, chief technician or student—the nature of the duties undertaken—for example, medium preparation or animal care—and possible contacts with tuberculous material, such as sputum or infected animals, in the preceding 12 months. Questions were also included about the results of pre-employment tuberculin skin-tests and chest x-ray examinations and any history of being offered and accepting B.C.G. vaccination. In general, the information on health care could be given accurately only for present members of staff, and analysis of these data has been restricted to those from that group.

A history was also obtained of tuberculous infection arising at any time between January 1, 1949, and December 31, 1953, during the period of employment in the reporting laboratory. For these cases the type, pulmonary or other, and date of onset of first absence from work were to be given. Comments on known human contacts, at work or at home, were also included.

Of the 368 heads of laboratories approached 345, or 94%, gave all the information they could obtain. Considering the impersonal nature of postal inquiry and the emotions which the subject can engender, this was a most gratifying response. Follow-up questions on doubtful points were answered equally effectively.

Method of Analysis

In the analysis of the data, the number of cases of tuberculosis reported in any particular group of laboratory workers compared with the number to be expected in a group of the same age and sex structure had they experienced the contemporary age-sex-specific tuberculosis attack rates prevailing in a standard population. This method depends for its accuracy on (1) the completeness of case-reporting, (2) the propriety of the standard rates used, and (3) the complete and accurate reporting of the numbers and charac-

teristics of the populations exposed to risk in each subdivision of the laboratory staffs.

To take the last first, the adequacy of the description of the population derived from the survey was tested by comparing the numbers and age distribution of pathologists at the end of 1953 and the total numbers of laboratory technicians estimated from the survey with data from official sources. In both instances there was satisfactory agreement with the Ministry of Health return for that year. The checks on the two other aspects of the method are considered incidentally in the discussion of the results.

The age-sex-specific notification rates for pulmonary tuberculosis for the United Kingdom during the years 1949-53 have been used as a standard. The total "exposure to risk" was obtained by adding the number of months each person spent in each laboratory during the course of the survey period to obtain the total number of person-months in each age, sex, and occupational or other group.

Results of Morbidity Survey

Among the average number of persons working in the laboratories (4,824) during the five years, 151 cases of tuberculous infection were reported. Of these, 55 were excluded from the analysis for the following reasons: 16 had non-pulmonary lesions; 10 had minimal pulmonary lesions not severe enough to cause absence from work; 1 attempted suicide by intravenous inoculation; and 28 had recurrent or continuing infections where the date of first onset of absence from work was before the beginning of the survey in 1949 or where the absence, although reported by one laboratory, had begun in another and was thus included already. The remaining 96 cases formed the basis of the subsequent analysis.

Table II shows the detailed comparison of observation and expectation at the national notification rates in the two sexes, at all ages and in each grade within the laboratory staffs. Small though the numbers in any one group are, the trend of the results is clear. Among male workers, pathologists, junior and student technicians, and post-mortem attendants appear to contract disabling pulmonary tuber-

TABLE II.—Comparison of Observed Frequency of Tuberculosis With Numbers Expected at National Notification Rates

Job	Age Group								Total		Ratio
	15-24		25-34		35-44		45-64				
	O.	E.	O.	E.	O.	E.	O.	E.	O.	E.	
Males											
Pathologists	0	0.1	2	1.5	9	1.2	1	0.9	12	3.7	3.2
Scientists	0	0.1	0	0.2	0	0.1	0	0.1	0	0.5	0.0
Chief or senior technicians	1	0.2	2	1.2	0	1.0	3	0.8	6	3.2	1.9
Technicians	4	1.9	4	1.9	1	0.5	1	0.3	10	4.6	2.2
Junior technicians	13	3.0	1	0.3	0	0.0	0	0.0	14	3.3	4.2
Student technicians	10	2.0	1	0.2	0	0.0	0	0.0	11	2.2	5.0
Post-mortem attendants	0	0.0	0	0.1	3	0.3	7	0.7	10	1.1	9.1
Animal-house attendants	0	0.0	1	0.1	0	0.0	0	0.2	1	0.3	3.3
Others	0	0.1	0	0.2	0	0.1	0	0.3	0	0.7	0.0
Total	28	7.4	11	5.7	13	3.2	12	3.3	64	19.6	
Ratio	3.8		1.9		4.1		3.6		3.3		
Females											
Pathologists	0	0.0	2	0.3	1	0.1	1	0.1	4	0.5	8.0
Scientists	0	0.2	1	0.2	0	0.0	0	0.0	1	0.4	2.5
Chief or senior technicians	0	0.1	0	0.1	0	0.0	0	0.0	0	0.2	0.0
Technicians	1	1.9	0	0.5	0	0.1	1	0.0	2	2.5	0.8
Junior technicians	4	4.5	1	0.3	0	0.0	0	0.0	5	4.8	1.0
Student technicians	11	3.5	1	0.2	0	0.0	0	0.0	12	3.7	3.2
Clerks	4	2.6	0	1.0	0	0.2	1	0.0	5	3.8	1.3
Cleaners	1	0.2	1	0.3	1	0.2	0	0.2	3	0.9	3.3
Total	21	13.0	6	2.9	2	0.6	3	0.3	32	16.8	
Ratio	1.6		2.1		3.3		10.0		1.9		

O. = Observed. E. = Expected.

culosis far more frequently than might have been expected at national age-sex-specific notification rates. Similarly, women pathologists, student technicians, and cleaners appear to fare badly compared with women in the country as a whole.

When the laboratory population is grouped according to the nature of the possible contacts with tuberculous infection the results obtained appear as in Table III. Although one man may do several tasks and no clear-cut comparisons are

TABLE III.—Comparison of Observed Frequency of Tuberculosis With Numbers Expected at National Notification Rates

Contact History*	Males			Females		
	Obs.	Exp.	Ratio	Obs.	Exp.	Ratio
Handling P.M. material ..	35	8.9	3.9	6	3.2	1.9
.. infected animals ..	22	5.6	3.9	5	2.5	2.0
Culture work ..	27	8.2	3.3	8	4.8	1.7
Handling infected sputum ..	37	11.4	3.2	21	7.4	2.8
Sensitivity tests ..	14	4.6	3.0	2	2.2	0.9
Handling other discharges ..	36	12.6	2.9	19	8.2	2.3
No contact ..	2	2.4	0.8	6	6.8	0.9

* Individuals may have more than one type of exposure.

possible, the general ranking of risks in males does suggest that the handling of post-mortem material, from either human or animal sources, is associated with a higher relative incidence of pulmonary tuberculosis. Among women, on the other hand, bacteriological work ranks above contacts with necropsy material as a possible hazard. Of particular importance from the viewpoint of method, however, is the close agreement between the numbers of cases expected among laboratory staff with no contact with infective material (9) and the number actually reported (8). The comparative immunity of women doing sensitivity tests, based though it is on small numbers, is not readily explicable. When the attack rates according to duration of employment in medical laboratories are plotted as in Fig. 1 a peak incidence appears about two years after beginning laboratory work. This peak, which is more marked among males than among females, cannot be entirely explained by the exposure of young susceptibles to the increased number of infective contacts usual when a youth begins work. Some of the cases in the peak period were male post-mortem attendants who had taken up laboratory work in middle life. Again, although there is some appearance of excessive morbidity from tuberculosis among young Service men shortly after joining the Army (Rosenbaum, personal communication), this is almost entirely the result of the routine initial medical examination, and there is no rise in incidence in the next two years of Army service.

Suggestive though this evidence is, it should not be too readily accepted. As already noted, the standard rates may not be appropriate to an urban group of the same social class as laboratory workers. Some pathologists have suggested that overcrowding in laboratories may increase the

FIG. 1.—Incidence by length of employment.

risk of effective transmission of infection in the normal contacts of daily life, particularly if pathological laboratory work has attracted an unduly high proportion of individuals who have had active disease. Others may go into the laboratory because of poor physique or a family history of tuberculosis. A preoccupation with infection and unusual opportunities for bacteriological and radiological diagnosis may increase the likelihood of the detection and reporting of pulmonary lesions which might otherwise have been unrecognized.

The appropriateness of the general method adopted was tested by applying the standard national notification rates to civil servants coming from much the same social background as the main grades of laboratory workers and also employed mainly in towns throughout the country during the same period 1949–53. Male professional engineers and scientific officers in the General Post Office are roughly comparable in education and social background to pathologists; and male and female clerical officers, like laboratory technicians, are largely drawn from the grammar schools. The rate of routine mass miniature x-ray examinations is similar in the two groups. The relatively low ratios, seen in Fig. 2, obtained by applying the standard rates to the group of professional engineers (0.7), are quite consistent with the indications given by the low standardized mortality ratio (64%) for Social Class I in 1951 (Registrar-General, 1954).

Similarly, the ratio of observed to expected cases among clerical officers of both sexes (0.9) suggests that these standard rates are appropriate to a group, such as civil servants, where all absences from work due to pulmonary tuberculosis are routinely reported. Since these were the criteria and methods of reporting and standardization used in the survey, the excessive morbidity reported among pathologists and technicians becomes more significant.

The low tuberculosis incidence rates for secretarial and other staff not exposed by their jobs to much infection make it less likely that overcrowding in the laboratories may explain some of the excessive morbidity among the rest of the staff. Nevertheless, this possibility was further investigated by comparing the experience of laboratories where the total number of the staff, and presumably the risk of work contact with a human carrier, was much the same but the number of rooms in the laboratory was either above or below the average. There was no suggestion in these data that the more crowded laboratories have in fact a consistently higher attack rate. It proved difficult to obtain complete histories of human contact either at home or at work for the 96 cases; but of the total, a known work contact was reported for 15 to 16%, and home or other contacts with an infectious case for 12 to 13%. These proportions are difficult to interpret because of the many unknown sources of infection, but they do not suggest that increased risk of contact with a human source at work is unusually common in clinical laboratories.

Time charts of the dates of onset of absence because of tuberculosis in the laboratories showed that, although there were 20 instances when two or more cases appeared in the same laboratory during the survey, only 8, or 8%, of the 96 cases recorded followed a previous case in the same

FIG. 2.—Tuberculosis in laboratory and G.P.O. staffs (1949–53). (Compared with U.K. notification rates.)

laboratory within between two and twelve months. Even if these were all true secondary infections, they would not suggest an unusual risk of human case-to-case transmission.

To avoid any risk of anxiety or resentment among laboratory staffs no questions were asked about previous personal histories of tuberculous infections: only illnesses arising for the first time during service in the reporting laboratory at some time between 1949 and 1953 were included. Thus no data on the relative frequency of previous clinically evident infection are available. Some indication of the frequency of previous contact with infection can be obtained, however, from the percentage of positive Mantoux test results among young entrants to the laboratory service. Table IV shows rates which are quite compatible with rates of 60–75% for 18-year-olds in towns of more than 50,000 population found during the Medical Research Council's National Tuberculin Survey in 1949–50 (M.R.C., 1952). It should be emphasized, however, that only 40% of the entrants were skin-tested on recruitment and that many individuals with a clear previous personal history of tuberculosis might not have been examined for this reason. But for the remainder, these figures do not support the view that the younger recruits accepted for service in laboratories have had more contact, familial or other, with tuberculosis than have other urban children of the same age.

TABLE IV.—*Tuberculin Skin-Sensitivity-Test Results for Laboratory Recruits (1949–53)*

Age	Male		Female	
	No.	Obs. % Positive	No.	Obs. % Positive
< 16 ..	41	70.7	65	49.2
17–18 ..	78	66.7	169	68.0
19–20 ..	9	88.9	39	56.4

Note.—At age 18, rates in both sexes in M.R.C. 1949–50 National Tuberculin Survey ranged from 60 to 75% for towns of more than 50,000 population.

As for the relevance of diagnostic facilities to high reported incidence rates, three comments are pertinent. Firstly, one might assume that diagnostic standards would apply equally to all members of the laboratory staff; yet there is a clear rise in infection rates with increasing contact with infected material. Secondly, all minimal lesions have been excluded and all cases reported and used in this analysis have been obvious and severe enough to require absence from work. Finally, pre-employment x-ray examination and regular examinations thereafter formed a routine practice in only 60%, and skin-testing in 40%, of the laboratories at the time of the survey.

Two questions remain. Has the suggested occupational hazard been a constant feature of pathological or bacteriological work in this century? Is there any evidence that pathologists as a group are selected in any way on grounds of physique? To try to answer these questions a survey was made of the mortality experience in this century of a group of doctors concerned in some way with pathology and its allied subjects.

The Mortality Study

Data and Analysis

The honorary officers of both the Pathological Society of Great Britain and Ireland and the Association of Clinical Pathologists gave access to the records of their membership since their foundation in 1906 and 1927 respectively. It was assumed that membership of these learned societies implied a decided interest in this branch of medicine although not necessarily an intention to practise clinical pathology and bacteriology. The number of years lived by each of these society members until his death or his survival until January 1, 1955, was then totalled and the numbers of man-years lived in each age group in each ten-year period from 1906 to 1954 were tabulated. Particulars of the date of death and the certified cause were obtained from the files of the General Medical Council, to whom the Registrars-General are statutorily obliged to furnish a copy of the death certificate of all registered medical practitioners dying in this country or in Eire. By tracing each member through successive *Medical*

Directories it was possible to limit those included to men who had lived here all their working lives.

To these "exposures-to-risk" in each age group in successive decades were then applied the corresponding age-specific death rates for the social class to which all medical practitioners belong (Registrar-General, 1912, 1927, 1936, 1954).

Summary of Results

The numbers of deaths from each of the main causes expected at Social Class I rates are compared in Table V with the numbers actually observed. These results suggest

TABLE V.—*Comparison of Deaths Observed Among Members of the Pathological Society, 1906–53, With Numbers Expected at National Social Class I Rates*

	Cause of Death							Total
	Pulm. Tub.	Non-Pulm. Tub.	Suicide	Cancer	Cardio-vascular	Respiratory	Other	
Observed	17	2	18	34	120	29	80	300
Expected	15	1	5	42	108	32	79	282

that men whose leaning towards laboratory work has led to membership of one or other of the appropriate societies may share a tendency to suicide, but in other respects they are, so far as mortality is a measure, as robust as other males in the same social class.

There is, however, little if any excess mortality from tuberculosis in the groups as a whole. But the whole membership could be divided, on the basis of appointments held according to *Medical Directories* current in their lifetimes, into those obviously practising hospital pathology or diagnostic bacteriology and those, working perhaps as consulting physicians or engaged in specialized experimental work, who were less likely to be exposed to tuberculous infection. Only men between 25 and 64 working during the period 1925–53, when all but one of the cases occurred, have been included. When the experiences of these two subdivisions of the society membership are compared, as in Table VI, it is clear that, although the two are alike in respect

TABLE VI.—*Comparison of Deaths Observed Among Members of the Pathological Society, 1925–53, With Numbers Expected at National Social Class I Rates*

	Cause of Death			Total
	Pulmonary Tuberculosis	Suicide	All Other Causes	
Presumed hospital pathologists:				
Observed ..	10	6	54	70
Expected ..	6	2	66	74
Other members:				
Observed ..	4	6	42	52
Expected ..	4	2	57	63

of suicide and other causes of death, the hospital workers appear to have an excess in mortality from pulmonary tuberculosis.

An increasing degree of specialization within the profession has been a marked feature of medical practice in this century; and, even within specialties such as pathology, the nature of the work has changed very considerably. For these reasons a further subdivision of the comparative experience of hospital pathologists and others in successive decades seems justified. Despite the small numbers thus produced, there is in Table VII a suggestion, albeit a very tenuous

TABLE VII.—*Time Trends in Tuberculosis Mortality Among Members of the Pathological Society*

Decade	Presumed Hospital Pathologists			Other Members		
	Obs.	Exp.	Ratio	Obs.	Exp.	Ratio
1925–34 ..	1	1.6	0.6	0	1.5	—
1935–44 ..	4	2.6	1.5	3	1.1	2.7
1945–53 ..	5	1.9	2.6	1	0.8	1.3

one, that the adverse mortality from pulmonary tuberculosis has appeared among hospital laboratory workers largely in the last decade.

Discussion

The certain recognition of pulmonary tuberculosis as an important occupational hazard to workers in pathological and bacteriological hospital laboratories is by no means easy. There have been very suggestive incidents: two research workers in the same laboratory were found to be suffering from pulmonary tuberculosis due to the type-specific strain which they had been investigating. Dramatic though such laboratory outbreaks may appear, some of the multiple cases observed in these circumstances are quite likely to arise from the ordinary personal contacts with an infective carrier in the same occupational group. The demonstration of a general raising of the incidence of pulmonary tuberculosis above the endemic levels in the community requires the type of large-scale survey here described.

The 94% response rate achieved ensures that the results are closely representative of the national hospital or public health laboratory experience: even though there were no cases in the remaining 6% of laboratories, it would make little difference to the results obtained. These results agree surprisingly closely with the crude preliminary indications, based on claims made for compensation, of the striking divergence between the two specialties where excessive exposure to tuberculosis might be anticipated (pathologists and chest physicians and surgeons) and the remainder of the medical staff in the hospital branch of the Health Service. Even on the scale of this five-year survey, the total number of cases is quite low, but, although no one item of the evidence presented is irrefutable, there is an internal consistency in the pattern of results which makes it seem likely that a real occupational hazard exists. Cross-checks on the accuracy of the data and the appropriateness of the methods used give added confidence to the conclusions derived from the analysis.

Compared with other workers in the laboratory or men and women of similar age and social status outside, laboratory workers exposed to post-mortem material or sputum from tuberculous patients suffered about a threefold increase in the incidence of disabling pulmonary tuberculosis. Attack rates reached a peak in the third year of laboratory employment. None of the likely alternative explanations for this excess proved satisfactory. Indeed, the demonstration that members of the pathological societies have no raised death rates from other physical diseases makes occupational self-selection of the less robust unlikely. The slight suggestion in the mortality experience of hospital pathologists that the excessive incidence of tuberculosis is a fairly recent phenomenon would be quite consistent with the development of specialized pathological and bacteriological techniques in the last two decades.

Strong though such circumstantial evidence is, it simply indicates that a hazard exists without determining whether air-borne dissemination or contact contamination is the only or even the more important mode of transfer of infection. There is thus a clear need for detailed bacteriological studies of technical procedures as a source of infection. In this way, more specific prophylactic measures can be added to more obvious hygienic precautions.

Summary and Conclusions

Examination of the frequency of claims for sickness benefit for pulmonary tuberculosis made under the Industrial Diseases and Injuries Act suggested that pathologists shared with chest physicians and surgeons much higher claim rates than other hospital consultants. Laboratory technicians also made relatively more claims than other types of medical auxiliary. A survey was therefore made of tuberculous morbidity experience in the laboratories of the National Health Service and the Public Health Laboratory Service during the five-year period 1949-53 inclusive. Data on the work and accom-

modation of the laboratory, methods of pre-employment examination or medical supervision, and individual records of work and exposure to tuberculous material and the incidence of tuberculosis were provided by 94% of the directors of laboratories approached. At the same time a study was made of the mortality experience, during the present century, of the membership of the two major societies for pathologists and bacteriologists.

Analysis of these data suggested that:

1. The apparent gross excess in tuberculous morbidity noted in the compensation claim rates was equally obvious in the results of the special morbidity survey.

2. This excess was greatest among individuals employed in laboratory and mortuary tasks which exposed them to the risk of contact with infected pathological material. The incidence was highest in the second and third years of such employment. For such occupational groups, the attack rate from pulmonary tuberculosis severe enough to cause absence from work was about three times above the rate for non-exposed laboratory staff.

3. Both pathologists and laboratory technicians had in general a much higher incidence of disabling tuberculosis than socially comparable groups of General Post Office professional engineers and clerical officers of the same age working in this country at the same time under regular medical supervision. For males in both grades the excess was threefold, and for female technicians twofold.

4. The analysis of the limited pre-employment examination results available suggests that young recruits to laboratory work had no unduly frequent previous contact with tuberculosis. No adequate data were available for pathologists.

5. The mortality investigation showed that members of the pathological societies were not physically self-selected in that they had in general no excessive mortality from all causes of death other than suicide. There was, however, a slight suggestion, based on very small numbers, of excessive tuberculous mortality among presumed hospital pathologists, particularly in recent years.

Consideration of various alternative explanations led to the conclusion that in laboratory work on the pathology and bacteriology of tuberculosis there was a considerable environmental hazard from pulmonary forms of the disease.

I am indebted to the National Association for the Prevention of Tuberculosis for suggesting this investigation and for a generous grant towards its cost. The honorary officers of the Pathological Society and of the Association of Clinical Pathologists, the staffs of the Ministry of Health, and the national officers of the General Medical Council helped in obtaining some of the information. Miss D. Bobby, Miss L. M. Colwell, Mrs. B. M. Hunt, and Mrs. S. King were responsible for the secretarial and computing work. I am particularly grateful to all the laboratory directors and staffs who provided the bulk of the data.

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