

1 case had tuberculo-silicotic areas in the lungs and all groups of glands falling within the tuberculo-silicotic zone but no apparent pure tuberculous lesion.

1 case had tuberculo-silicotic nodules in the lungs and in the tracheo-bronchial glands, the latter being calcified. There were no pure tuberculous lesions.

1 case was similar to the foregoing but with the additional presence of a subpleural calcified scar.

Of the 6 cases associated with silicosis, therefore, it may be noted that calcification in hilus glands was a prominent feature in 4. Only 2 cases showed lesions in the lungs that could be interpreted as primary affects.

This absence of subpleural primary affects in silicotic cases is commented upon further in connexion with the next group of cases.

Group C. Tuberculosis the Cause of Death. The Tuberculosis associated with Silicosis (22 cases).—Of these 22 cases, 6 showed no calcified lesions in either lungs or tracheo-bronchial glands.

In the other 16 calcification was present in all in one or more (usually in several) of the tracheo-bronchial glands, and in 8 there were also subpleural calcified foci. In 4 of these 8, however, the calcification was in areas which had the characters of ordinary tuberculo-silicotic foci, only 4 being in apparently simple primary tuberculous affects.

The only inference that it seems possible to draw from this group of cases and from the preceding sub-group of 6 is that in the presence of silicosis the development of tuberculosis is modified and that the formation of typical primary affects does not take place. Or, alternatively, that they only form in the tracheo-bronchial glands and are not recognizable in the general tuberculo-silicotic process.

This inference is not affected by the presence of a few subpleural affects because it is only to be expected that silicosis and tuberculo-silicosis should develop in some cases with already-present primary affects. We have not been able to detect any difference in type between such cases and the others.

Group D. Tuberculosis the Cause of Death. The Tuberculosis uncomplicated by Silicosis (35 cases):—

No Calcified Foci in either Lungs or Glands	16 cases
Calcified Foci in both	7 "
Calcified Foci Subpleurally but not in Glands	9 "
Calcified Foci in Glands but not Subpleurally	3 "
	—
	35
	—

Bone was found in 2 cases ; once in a subpleural area (there was also another calcified subpleural scar), the corresponding lymph node showing no calcification or bone formation ; and once in a tracheo-bronchial gland. In the latter case there was no corresponding subpleural lesion, but as there was a large cavity in the upper lobe it is possible that it may have disappeared in the formation of the cavity.

Leaving aside the question of bone formation, it may be said, therefore, that one-fifth of the cases showed full primary affects, *i.e.*, both subpleural and glandular lesions; one-third primary affects in either lung or gland, but not in both; and almost one-half no primary affects at all.

That half of the cases should show no evidence of primary affects is rather remarkable. Two possible explanations occur to us—

(1) That the cases ran such a rapid course—primary infection not healing but passing directly on to the stage of generalization—that the calcification stage was never reached.

That this is probably a true explanation for the majority of the cases is suggested by the fact that in 13 of the 16 cases showing no calcified foci in either lungs or glands the picture presented was largely one of a widespread involvement of lymphatic glands, more or less of the whole chain from the cervical to the lower retro-peritoneal being implicated. Commonly, also, there was much involvement of the spleen, liver and peritoneum, but usually comparatively little in the lungs, although in several cases there was direct spread outwards from a caseous hilus gland which had burst its bounds. These features are in keeping with the description given by Aschoff of the cases of primary infection which do not heal but pass directly on to the generalization stage.

Whether or not the fully developed primary affects are to be found in such cases, he does not say, but on the face of it, it would appear to be reasonable to expect that they might not.

(2) Another possible explanation, which is not exclusive of the former, but might come into play along with it, at any rate in so far as the glands are concerned, would come under the heading of a racial differentiation. Whilst we quite agree that an important reason for the difference between the tuberculosis of African Natives and of ordinary European communities may be the presence or absence of immunization in youth, we are not entirely satisfied that a partial explanation may not be found in a difference in structure of their lymphatic system.

Our attempt to correlate the inability of the Native of South Africa to localize tuberculosis with a specific anatomical factor is based partly on direct observation and partly on several other converging lines of evidence.

In the course of studying our series of cases, we have made numerous microscopical examinations of their lymphatic glands and have formed the opinion that the typical lymph node of the European is the exception in the Bantu. In these subjects the lymph node as usually met with is neither a "lymph gland" nor a "haemo-lymph gland" but a "mixed gland." The detail we wish to emphasize is that these nodes, without being typical haemo-lymph glands, are far more highly vascularized than are the nodes of the European. This more intimate association with the blood-vascular system may be related to the apparently deficient filtering power of the lymph-nodes of the Bantu. The

realization of the different character of the lymph nodes in the Bantu has only been gradually forced upon us during the course of this investigation.

The other lines of evidence pointing to a difference between the lymphatic system of the Bantu and that of the European are as follows :—

(1) In Appendix 7 there is described what has been termed the tuberculo-silicotic zone. While this condition is met with also in the European miner, it is developed far more rapidly in the Native and is of more constant and comprehensive occurrence. This suggests greater freedom of lymphatic circulation.

(2) In this Section (p. 169) we discuss a group of 264 cases aged 40 years and over. Tuberculo-silicosis was found in 176 and simple tuberculosis in 88. Of the 176 cases of tuberculo-silicosis, in 100 (57 per cent.) the disease was localized, and in 76 (43 per cent.) it was generalized. Of the 88 cases of simple tuberculosis, in 8 (9 per cent.) the disease was localized, and in 80 (91 per cent.) it was generalized. The limiting factor seems to be related to silicosis rather than to age, and we are disposed to associate it with the lymphatic obstruction characteristic of silicosis.

(3) The frequency and grossness of involvement of the spleen is a characteristic of the tuberculosis of the Native. Owing to their similarity with the lesions associated with experimental tuberculosis in the monkey, Dr. Watkins-Pitchford used to call these spleens "monkey-spleens," a term which we have adopted, although we cannot say whether our former chief is its authentic parent, as used in this context. Accessory spleens are very common in our subjects and when there is abdominal tuberculosis these accessory spleens are always involved. This suggests that the spleen-haemolymph circulation in the Bantu is more intimately associated with the lymphatic circulation than is the case in the adult European.

(4) In the section of the Report dealing with tuberculin reactions (p. 92) it is stated that tuberculosis in the series studied ran the same course whether a tuberculin reaction determined previous to the recognition of clinical tuberculosis had been positive or negative. In the Bantu a previous invasion with the virus of tuberculosis does not appear to be associated with any appreciable gain in ability to localize an after-coming clinical tuberculosis.

Fishberg⁴⁵ writes: "In children infection with tubercle bacilli, if it causes active disease at all, is usually followed by a generalized morbid process with implication of the lymphatic glands." The above passage (and similar passages could be quoted from almost any standard work on tuberculosis), applies to our series of Bantu subjects throughout their lives. Whereas in the early adult period of the western European tuberculosis usually turns over from being a general disease to being a local disease, we have found no evidence of a turn over on a corre-

sponding scale in the Bantu. This seems to us very strong evidence of a racial difference, and it is possible that the free vascularization of their lymph-nodes plays some part in their lack of ability to control a "lymphatic spread."

For illustrations of radiographic examination of lungs, see Figs. 14-19, Plates XI-XVI.

SECTION F.—CLASSIFICATION OF CLINICAL TYPES OF TUBERCULOSIS MET WITH IN NATIVE MINERS ON THE RAND.

(1) An investigation was made by Professor Lyle Cummins and Dr. L. G. Irvine of the clinical and radiographic records filed at the Medical Bureau in respect of 512 cases of "simple tuberculosis" and 250 cases of "tuberculosis with silicosis," with the object of obtaining information as to the clinical types of tuberculosis present amongst mine Natives (see Appendix 8).

(2) The data were entered on special cards showing (i) the number of years worked underground by the Natives concerned; (ii) whether the cases were sputum-positive or sputum-negative; (iii) the extent of the lesions as shown by the radiograph, classified as "minimal," "moderate" or "maximal"; (iv) the amount of systemic disturbance, classified as S1, S2 or S3, and (v) the temperature, whether normal or a mild (T+), moderate (T++), or severe (T+++) pyrexia.

(3) In the cases of simple tuberculosis the general results were as follows:—

(i) The sputum-positive cases numbered 392, or 76.6 per cent., and sputum-negative cases 120, or 23 per cent.

It was noted that the number of cases in the sputum-negative group fell with each year of service, suggesting that the lung lesions tend to be more "open" in the mine Natives who have worked longest on the Rand.

(ii) As regards *extent of disease*, there was a higher percentage (42) of cases of "maximal" extent amongst the sputum-positive group than amongst the sputum-negative group (27), the difference being greatest in the "first-year" cases. In the sputum-positive group the average percentages of cases of "minimal," "moderate" and "maximal" extent were respectively 17, 41 and 42, and the percentages showed no significant differences at different durations of service.

(iii) As regards *systemic disturbance and pyrexia*, the Natives in the first year of service showed a higher percentage of cases with severe systemic disturbance and a higher proportion of markedly pyrexial cases than the Natives with longer periods of service. This result appears both in the sputum-positive and in the sputum-negative groups. In the same way, the proportion of cases with normal temperature increases in both groups with increase in years of service. This increased power of holding in check the more severe types of pyrexia and of limiting the tendency to loss of flesh and general health suggests that the older mine Natives have acquired, in the course of

some years' exposure to contact with tuberculosis on the Rand, some degree of resistance, sufficient, if not to bring the disease to a standstill, at least to ameliorate its worst manifestations.

(4) It was considered desirable to treat cases of *tuberculosis with silicosis* as statistically distinct. The following points were noted regarding the 250 cases investigated :—

(i) These cases fall almost exclusively into the "five years" and "over five years" service groups.

(ii) Practically 85 per cent. were sputum-positive.

(iii) In this group the same tendency to keep the temperature within normal limits was evident in the long-service Natives, especially in the sputum-negative cases, amongst whom the chance of secondary infection is less than in the open cases.

(5) In attempting to draw conclusions from these records, it must be remembered that they include only cases in which a radiograph had been taken; the more severe cases of simple tuberculosis who had died in the mine hospitals or at the W.N.L.A. hospital, and in respect of whom no radiograph could be taken, were necessarily excluded. Had these cases been added, it might have been expected that they would have still further accentuated the evidence of lack of resistance manifested by the "first-year" Natives as compared with cases contracting tuberculosis after a longer acclimatization to mining conditions.

The investigation, so far as it goes, serves to show that the "new" mine Natives tend towards a very acute and severe type of disease, whereas the "long-service" Natives learn to tolerate tuberculosis to a greater extent. In this respect, these clinical observations fall into line with the pathological findings as well as with the statistical studies.

The same point is brought out by an enquiry made into the length of service in cases found fit for repatriation, as compared with the length of service of those dying on the mines, the findings being summarized in Table 37.

In this series of 500 cases of each of the two categories, all being cases of tuberculosis uncomplicated by silicosis, the average length of service in the cases fit for repatriation was found to be 3 years and 10 months as compared with 2 years and 6 months in those dying on the mines.

This indicates an enhanced power in the longer-service cases to control their symptoms and to retain a certain measure of good health in spite of clinically evident tuberculosis.

It is also clear from this Table that the East Coast Native comes out better than the B.S.A. Native; the average length of service amongst the former being about one and a half times that of the latter in the case of the repatriates, and about two and a half times in the fatal cases. That this apparent superiority of the East Coast Native is, however, mainly due to greater duration of service, has already been shown on pp. 137 and 138.

TABLE 37.

INVESTIGATIONS INTO SERVICE AND ORIGIN OF MINE NATIVE LABOURERS CERTIFIED TO BE SUFFERING FROM PULMONARY TUBERCULOSIS.

DECEASED.							REPATRIATED.						
Year.	District of Origin.	No. of Cases.	Total Service.		Average Service.		Year.	District of Origin.	No. of Cases.	Total Service		Average Service	
			Yrs.	Ms.	Yrs.	Ms.				Yrs.	Ms.	Yrs.	Ms.
1926	B.S.A. ...	81	154	2	1	10							
	East Coast ...	69	286	8	4	1							
	Total ...	150	440	10	2	11							
1927	B.S.A. ...	100	173	1	1	8	1927 (last month of year)	B.S.A. ...	32	90	10	2	10
	East Coast ...	51	198	8	3	10		East Coast ...	33	126	3	3	9
	Total ...	151	371	9	2	5		Total ...	65	217	1	3	4
1928	B.S.A. ...	86	119	3	1	4	1928	B.S.A. ...	172	519	7	3	—
	East Coast ...	72	250	3	3	5		East Coast ...	233	1,084	8	4	7
	Total ...	158	369	6	2	4		Total ...	405	1,604	3	3	11
1929 (first 4 months of year)	B.S.A. ...	24	34	10	1	5	1929 (first month of year)	B.S.A. ...	15	39	10	2	7
	East Coast ...	17	53	3	3	1		East Coast ...	15	60	2	4	—
	Total ...	41	88	1	2	1		Total ...	30	100	—	3	4
Grand Total	B.S.A. ...	291	481	4	1	7	Grand Total	B.S.A. ...	219	650	3	2	11
	East Coast ...	209	788	10	3	9		East Coast ...	281	1,271	1	4	6
		500	1,270	2	2	6			500	1,921	4	3	10

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