THE PRESENT STATUS OF KNOWLEDGE ABOUT THE JACHYMOV DISEASE (CANCER OF THE LUNGS IN THE MINERS OF THE RADIUM MINES)

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When the program committee of this Congress kindly invited me, to give an address on the so called Miners' Disease of Jáchymov (Joachimstal) in Czechoslovakia, I was very hesitant about it. The reason for this was the fact, that my work on that subject was completely stopped, when, in 1938, after the treaty of Munich, the part of my country, in which Jáchymov lies, had been separated.

After the war I was too busy with putting my department into order after its being to a greater part occupied by the Germans, as well as with teaching duties which increased immensely because of the six years' gap caused by the closing of the University by the Germans. So it was not until I got the previously mentioned invitation that I tried to resume contact with the Jáchymov Mines. But at first I was dissuaded to do so by a semiofficial information, that the mines were in the hands of the Russians. This, however, turned out to be a false rumour. As a matter of fact, the Mines have since the reoccupation of the so called Sudetenland been controled by a purely Czechoslovak Society, but it of course took some time before work could be reorganized. This Society, however, is very favourably disposed towards scientific research on the Miners' Disease, and with its support a special laboratory for this purpose has recently been founded at Jáchymov, with which I am expected to work in closest collaboration, as far as my teaching and other duties in Prague allow. But it is only natural, that no spectacular results could be achieved in the few weeks of its existence.

No information has been available as to whether the Germans did any research on these lines during the time they were controlling the Mines, at least no paper on this subject has come to my knowledge.

In these circumstances I must apologise for hardly being able to say anything beyond what I published in my latest paper on this subject, which appeared in the « Presse Médicale » in April 1938.

I may assume that the preliminaries are well known. A short summarizing, however, may be of value.

It was at Schneeberg, a small mining place in Saxony, where the Miners' Disease was first studied. Here it had been noticed long before that the miners were dying in the prime of life of a puzzling disease affecting the lungs, and ROSTOCKI, SAUPE and SCHMORL in their well known paper quoted several old chronicles, going as far back as 1500, in which this disease had been recorded. It was, however, as late as 1879, when HERTING and HESSE performed the first post-mortems on the deceased miners and recognized that the disease was due to a malignant growth of the lungs. This was first considered lymphosarcoma, but in 1911 ARNSTEIN showed that it actually was carcinoma. The same was definitely established by the thorough research of ROSTOCKI, SAUPE and SCHMORL.

At that time, however, mining at Schneeberg had already been greatly in decline, and it seems that soon afterwards it was stopped altogether.

Schneeberg lies on the northern slopes of the Erz-Mountains, a ridge averaging 3000 feet in height, which separates Saxony from Bohemia. On the southern slopes of the same mountains, in Bohemia, there is another mining place called

Jáchymov, but generally referred to by its German name Joachimstal. Its history also is very old, as it is known that in 1516 rich veins of silver were discovered there. The further development of the mining is described in some detail in the paper published by PIRCHAN and myself in 1932. Here I would only mention that in the second half of the last century the uranium ore pitchblende was worked, and it was just this mineral, from which radium was discovered by Mme CURIE in 1902. Since that time extraction of this rare element has become the main object of these mines and the associated factory, the prewar annual production of radium-chloride amounting to 2 gm.

TABLE I.

Carcinoma of the lungs	19
Sarcoma of the lungs	1
Malignant tumorous elsewhere	2
Silicosis	6
Silicotuberculosis	11
Tuberculosis	6
Suicide	2
Accident	2
Miscellaneous	3
Total	52

At Jáchymov the same kind of disease has been observed in miners, who themselves called it Bergkrankheit or Bergsucht. It is astounding, however, that the true nature of the condition was established as late as 1926 although the analogy with the Schneeberg disease offered itself and was pointed out by my late chief prof. HLAVA. It is also interesting to note that the first patient in whom the correct clinical diagnosis was made clinically by Dr. PIRCHAN, was not exactly a miner but a worker in the radium factory. Later several suspicious cases came under observation of the same physician. Unfortunately no postmortems of deceased miners could be performed in those early days owing to lack of legal basis as well as to complete absence of interest on the side of the Health Authorities. The only exceptions were such cases in which the patient had been admitted to a clinic, and this was just what happened with the patient first observed by Dr. PIRCHAN. The man had been treated and died at the medical clinic of the German University in Prague and the postmortem was therefore carried out at the German Pathological Institute. This case along with another similar one was the subject of LÖWY's paper of 1929. As a result of LÖWY's communication public attention was aroused, especially after the daily press and political authorities had intervened, had only then a systematic clinical examination of the miners as well as performing post-mortems were made possible.

The findings at the post-mortems made in 1929 and 1930 were rather amazing. Of the 19 miners dying in this period 13 could be examined at a post-mortem, and among these not less than 9 cancers of the lungs (including one pleural form) were disclosed. At that time about 320 miners were employed, in addition to which there were approximately one hundred retired ones ; among the latter the toll taken by the disease was the heaviest. It was only after these figures had been disclosed that the high incidence of cancer of the lungs among the miners was realized. The whole material up to the end of 1930 was fully described in the paper of Pirchan and myself in 1932.

In 1931, however, new difficulties arose owing to the opposition of the miners agains the postmortems. The main reason for this was the fact that the existing law did not provide indemnity for those who were victims of the Miners' Disease but a political background was also in operation as the miners were for the most part Sudeto-Germans. This difficulty had not been settled before 1933, when a new law, expressively recognizing the cancer of the lungs in miners as an occupational disease subjected to indemnity, was passed. There was a passus in the law saying that in case of death of a miner suspected of this disease the diagnosis was to be confirmed at post-mortem.

On this basis the post-mortems could be resumed at the beginning of 1933 and were consistently performed until the day of Munich in 1938. Most of them were carried out by myself or my assistants, apart from a small number of miners who died in a hospital. But even of these the lungs were handed over to my Department except one. Thus this my series is fairly complete.

There were in this series 53 deaths in 52 of which I could revise the lungs. Among these, not less than 19 carcinomas and 1 sarcoma of the lungs were found. The other causes of death were : malignant tumour elsewhere than in the lungs (2), silicosis (6), silicotuberculosis (11), tuberculosis of the lungs (6), suicide (2), accident (2), miscellaneous (3).

Thus in this series the proportion of deaths due to a malignant growth of the lungs was somewhat lower than in the first one being 37,7 % as compared with 47,4 %. This difference, however, is hardly significant. The combined figure of both series is 40,8 %, but if we subtract the 6 violent deaths (3 suicides and 3 accidents), it rises to 44,6 %. This shows, that almost every second natural death was due to malignancy of the lungs.

The prevalence of lung cancer, however, appears in particularly sharp light, if we realise, that this concerned a rather limited group of about 400 individuals ; of these 29 died of lung cancer in less than 8 years, that is 3,6 per year on the average. This corresponds to a mortality rate for lung cancer of roughly 1 %, which is unusually high.

The age of miners dying of cancer varied in the second series from 36 to 62, the average being 47,6. With addition of the earlier published group the respective figures are 36, 67, and 48,5.

The repartition of age classes in the second series (excluding the 4 violent deaths) was as follows :

TABLE II.

Age class	Cancer of lungs	Silicosis Tubercul.	Miscell.
20 - 29	—	1	—
30-39	2	9	3
40 - 49	11	12	2
50 - 59	5	—	—
60	2	1	—
Total	20	23	5
Average age	47,6	40,8	

Thus the majority of cases of lung cancer falls into the fifth decade. This is in keeping with the experience concerning lung cancers in general.

Little is to be said about the morphology of the tumours, since this showed the same variation as is generally seen in lung cancers. Nor did the microscopical character of the tumours noticeably differ from the usual findings, as there in both series altogether were 16 oat-celled, and 12 epidermoid carcinomas.

Three cases only require a special comment. Two of these were fully described in my paper of 1932, thus I dont think it necessary to go into any detail here.

1) In case 3 of the first series two obviously primary tumours with different microscopical structure were found in the lungs, each with metastases of its own. Similar findings were recorded by SCHMORL in several cases from Schneeberg. In my second series there was one case rather suspect in this respect with a large cancer of the right middle lobe, and a quite small nodule in the left lower one. As, however, both tumours had a very similar microscopical structure, and there were widespread haematogenous metastases, the primary character of the second growth could not be prooved beyond doubt.

2) Case 4 of my first series concerned an apparently primary cancer of the pleura with a rather polymorphous structure and unusually long clinical course.

3) The third case in Nr. 8 of the second series, and was observed in 1934. It concerned a miner of 62 — by chance the oldest of this whole series —, who had sarcoma of the right upper lobe. This was a bulky tumour the size of a childs head, rather sharply delimited, of fleshy consistency, causing much usuration of several ribs in the cranial and ventral part of the thorax. Small metastatic nodules were scattered through the remaining lung tissue, but the lymph nodes were not involved. The microscopical structure was that of a polymorphocellular sarcoma, mostly composed of very large, highly irregular cells suggestive of myoblasts. Although no stripping could be demonstrated, it seemed to be myoblastic sarcoma. The late prof. EWING, to whom I had sent a slide, concurred with this diagnosis.

This case is very remarkable, as true primary sarcomas of the lung are very rare, and no such finding is known among the cases of Schneeberg.

As to the two cases of malignancy in other organs than the lungs, viz. carcinoma of the mouth, and sarcoma of the lower extremity, it is a matter of conjuncture whether these tumours should be or rather considered as a casual coincidence ascribed to the same causal factor as productive of the growths in the lungs. The same is true of the case of carcinoma of the larynx in the first series, in which, however, a post-mortem could not be made. The respective ages of the three patients were 44, 49 and 36 years. The relatively low age in both cases of carcinoma is rather suggestive of a particular causal factor.

As to the other causes of death it is not surprizing in miners to find that nearly a half died of either silicosis, or tuberculosis, or a combination of both. From this it is evident that what is called the Miners Disease at Jáchymov is actually in roughly equal parts due to lung cancer on one side and silicosis and tuberculosis on the other side.

There were in the second series several very typical instances of pure silicosis, but most cases were suspect of tuberculous infection being at least partly responsible for the fibrosis. Nevertheless, I feel it necessary to correct expressively the statement made in the paper of 1932, that silicosis was absent in the Jáchymov miners. This mistake was obviously due to the relatively low number of post-mortems as well as to the fact, that in that period not all deaths were submitted to a post-mortem, but were to some extent selected.

The high incidente of tuberculosis is easily understood in view of the low status of living of the miners.

Another question, however, arose, I mean as to whether there was any causal connection between cancer and silicosis. The gross impression was not in favour of any such connection. Some degree of fibrosis suggestive of silicotic origin could of course be seen in the lungs carrying a cancer, and there were single cases of outspoken silicosis combined with cancer ; but on the whole silicosis was not a prominent feature in cases of cancer, and on the other hand, the lungs most heavily affected with silicofibrosis were generally free from malignant growth. No need to say that the lungs of miners dying of silicosis or other non cancerous conditions were thoroughly examined for initial stages of carcinoma, which might throw some light on the pathogenesis of the cancers, but I was not lucky enough to find anything of that kind. This was also true of the two cases of suicide, in both of which a considerable degree of silicosis was found. To arrive at a more accurate conclusion as to silicosis, I had the lungs of 22 cases examined chemically ; half of them were cases of cancer, the other half were selected at random from the rest. As I reported on these examinations at the third International Cancer Congress in Brussels and the few additional findings did not substantially alter the conclusions then reached at I do not go any further into this matter. I would only say that the chemical findings were not much at variance with the gross estimate, that is the average content of silica was considerably lower in the cases of cancer than in the other group, and in single cases hardly exceeded normal findings.

TABLE III.

Year	1933	1934	1935	1936	1937	1938*	Total
Total deaths	6	9	9	7	6	15	52
Cancer of the lungs	2	3	5	3	2	5	20

* Until September 28th.

It is, however, to be stressed, that the question of silicosis being at least a contributory factor in the causation of cancer, of the lungs, is by no means settled. I would particularly mention the remarkable paper by ANDERSON and DIBLE of 1938, which authors incline to answer this question in the affirmative. In their cases, however, no common etiologic factor of cancer could be suspected as is the case with Jáchymov.

As silicosis generally requires a much shorter occupational exposure than cancer, it is possible that in miners dying of silicosis no sufficient time had been left to develop cancer. This question, however, am not able to answer for reasons I shall presently mention. The respective age incidence, to be sure, is somewhat lower in silicosis and tuberculosis than in cancer, as was seen from the preceding slide, but the difference is not very significant. However, it must be kept in mind that the miners had intered the dangerous occupation at various age levels and, moreover, repeated alternating of overground and

underground work as well as of the special kind of the latter was very common with them. All this would require a meticulous analysis of the history of every case, which, unfortunately, I am not able to give. Shortly before Munich I intended to collect the necessary data, in which respect, however, I entirely depended upon the Mining and Health authorities, and these showed no particular readiness to help. Thus before I could achieve my task, political intrications had interfered making the whole work appear useless. Later all the official dossers concerning Jáchymov had to be delivered to the Germans and have probably been lost. Thus my work remained unfinished, and there is little hope for bringing it to completion now.

Owing to these deplorable circumstances no statement can be made with regard to the second series of my cases as to the time spent in the mines before the cancers developed, nor can exact data be given concerning the kind of work, done by those, who later succumbed to cancer. In my first series the average duration of work was 17 years, and the shortest time sufficient to produce cancer was 13 years.

As to the clinical course of the disease, I am in the same awkward position. Very few cases could be observed clinically, as the diseased miners were difficult to persuade to seek admittance, to hospitals, being averse to leaving the places where they had lived all their life. They were aware that there was no hope for them, and preferred to die at home. It is significant, that only four of the whole series died at a hospital, although several of them were treated temporarily at various clinics.

There were, to be sure, periodical examinations of the miners by panel doctors, but the respective records, too, have not been available to me. In 1933 Dr. Borovanský published an article on a series of the miners' blood-counts, showing a prevalence of relative lymphocytosis. It is evident that these meagre data hardly allow any conclusions, and so I think I had better leave this topic.

Let me only insert here a short remark concerning the suicides. Three cases of suicide among 72 deaths (one in the first series, two in the second) certainly represent a very high incidence. Although no particular inquiry into the motives was made, it is not difficult to guess, that awarness of the imminent Miner's Disease may have played a decisive role. Actually the two miners of the second series, on whom a post-mortem was made, had a considerable degree of silicosis.

As to the real cause responsible for the tumours I could not reach any further conclusions than in 1932. Several potentially cancerogenetic elements were found in the dust of the pits, particularly, arsenic and cobalt. However, these were present in very small quantities only, and in the ashes of the lungs and bones, so far examined, at most traces of them were demonstrable. Moreover, these elements may be found in many mines, in which a particularly high incidence of cancer has not been noticed.

The only particularity, by which the Schneeberg and Jáchymov mines stand out, is the radioactivity of the ore as well as of the air in the pits. Thus the conclusion seems rather sound that this factor is essential in the production of cancer.

The relative inaccessibility of newer medical literature in my country as well as shortness of time allotted to compiling this report, have prevented me from a thorough study of the question, as to whether in others of the world's radium mines any prevalence of lung cancer had been established. Anyway, all of these mines are of relatively recent origin, and in view of the long time required for development of cancer negative data would be of little value.

Whether a direct inhalation of radioactive dust or the infestation of the air with radon is to be blamed, I cannot tell. If the first possibility were true, one might expect the radioactive material to be deposited in the body. As was already reported in Brussels, measurements of radioactivity in the ashes of the lungs were made in a series of cases, and in several of them also the bones were examined in the same way. These measurements were carried out by Professor Behounek and Dr. Sandholzer, both physicists particularly experienced in the matters of radioactivity. The results, however, were negative, inasmuch as the radioactivity established did not noticeably exceed that of normal organs. But may be the instruments then available were not sufficiently sensitive to show such very low variations in radioactivity. In this respect the newly founded research laboratory at Jáchymov is much better off being equipped with modern instruments which allow far more accurate measurements, and work on these lines will be resumed without delay.

In addition to radioactivity, however, there are some facts which must be taken into

Nr.	Date	Name	Age	Site of tumour	Metastases	Microsc. type	Complications	Accessory findings	Si O_2 % in lungs wett	dry	Annotation
1	Aug. 18 1933	N. D.	50	R low. 1	Hilar lymph-nodes, pleura	Epidermoid	———	Struma	0,12	——	———
2	Oct. 20 1933	J. Ö.	51	L. low. 1	Hilar lymph-nodes, R. Kidney	Epidermoid	L. suppur. pleurisy	Struma	0,63		———
3	Jan. 10 1934	J. H.	41	L. low. 1	Next hilar l.-n. Widespred in bones	Oat-cell	———	Struma moder. silicosis	0,57	——	Ingrowth into pulm. veins
4	Jan. 17 1934	N. R.	49	L. upp. 1	Hilar lymph-nodes	Oat-cell	———	———	——	——	X-ray treatm. Tumour almost disappeared
5	Mar. 10 1934	F. P.	62	R. upp. 1	Pleura, contralat. lung	Polymorph. sarcoma	Usuration of ribs	Struma	0,12		———
6	May 2 1935	J. Ö.	46	L. low. 1	Hilar lymph-n. Periost. vert. col. Liver	Epidermoid	———	Struma moder. silicosis	0,406	2,28	———
7	May 12 1935	J. S.	46	L. low. 1	Lymph-nodes Kidney, adrenal, Thyroid	Epidermoid	Reactiv. tbc. of lungs	Struma	0,105	0,618	———
8	May 31 1935	J. B.	38	L. hilus	Gener. l.-nodes Liver. Periost. ribs, vert.	Oat-cell	———	———	0,049	0,325	———
9	Jul. 8 1935	F. S.	53	L. upp. 1	Lymph-nodes R. lung	Epidermoid	———	Struma fibrous apic. tubercul.	——	——	———
10	Nov. 26 1935	E. M.	43	R. hilus	Lymph-nodes Adrenals. Liver	Oat-cell	———	Slight struma	——	——	———
11	Jul. 25 1936	L. Z.	46	R. hilus	Lymph-nodes gen. Myocard., thyroid, Liver, Kidney, Adrenal	Oat-cell	Pleura much involved	———	——	——	———

Nr.	Date	Name	Age	Site of tumour	Metastases	Microsc. type	Complications	Accessory findings	Si O_2 in lungs wett	Si O_2 in lungs dry	Annotation
12	Oct. 28 1936	H. F.	36	L. hilus	Lymph-nodes gen. Liver	Oat-cell	Much. infiltr. of pleura and mediastinum. Compr. of oesophagus	Moder. silicosis	0,460	2,86	Inanition atrophy
13	Dec. 30 1936	G. M.	48	L. upp. 1	Hilar lymph-nodes	Oat-cell		Struma Coronary scler.	0,048	0,298	Death due to chronic heart-failure
14	Feb. 4 1937	R. S.	43	L. apex.	Vertebr. column Liver, Kidney	Epidermoid	Compressive myelitis. Urosepsis, Thrombosis l. Subsclav. vein	———	0,303	1,74	Pancoast type tumour, infiltrating extra pulmonary structures
15	Nov. 8 1937	J. W.	48	L. upp. 1	Mediastinal lymph-nodes	Epidermoid	Extensive gangrene of left lung	———	0,045	0,329	Cancer growing into mediastinum and pericardium
16	Febr. 10 1938	A. H.	41	R. mid. 1	Multiple in bones	Epidermoid	Metastatic calcinosis	Struma	——	——	Possibly a small second primary carcinoma in left lower lobe. Microscopically no difference
17	Febr. 22 1938	J. P.	50	L. low. 1	Mediastin. lymph-nodes, pleura, liver	Oat-cell	Bleeding from a liver metastasis	Slight struma	——	——	———
18	Apr. 25 1938	J. H.	48	R. hilus	Brain, thyroid Kidney, adrenal	Oat-cell	———	Silicosis struma	——	——	———
19	June 14 1938	J. W.	51	L. low. 1	Mediastinal lymph-nodes pericardium	Oat-cell	Colliquative tubercul. of hilar lymph-nodes. Bronchooesophageal fistula	Struma	——	——	———
20	Aug. 19 1938	A. F.	61	R. upp. 1	Ribs	Epidermoid	Direct ingrowth into upper hollow vein	Struma	——	——	———

consideration at least as possible contributory factors. The original population of Jáchymov and the surrounding villages, from which most of the miners were recruited, was, before the war, a typical one of the mountainous parts of the country. Medium grade enlargement of the thyroid, mostly with adenomatous nodes in it, was a common finding at the post-mortems. Furthermore, those narrow valleys rather cut off from the outside world are generally inhabited by the kinsfolk of a few families, and intermarriages are very common. No accurate genealogic studies have been made, but the fact was conspicuous, that the same surnames appeared repeatedly in the autopsy records, some of them as many as six times.

As these people had been living there for centuries, a certain degree of imbreeding may be assumed, and the possibility cannot be dissmissed of increased suspectibility to a given cancerogenic agent in such a population. In how far the existing rather low standard of nutrition may have contributed to this, is of course difficult to evaluate.

In our paper of 1932 PIRCHAN and I accepted a rather optimistic view as to the anticipated effectiveness of the newly installed protective measures, consisting chiefly of improved ventilation of the pits and the use of respirators. The actual development, however, was much short of the expectation. As may be gathered from this table the general mortality showed no significant decrease, nor did the incidence of lung cancer. In fact, the year 1938, though the figures take in only three quarters of it, was remarkable for a particularly high mortality, as there were 14 deaths (plus one accident), with not less than 5 cases of lung cancer. Such conspicuous variations in mortality from Miners' Disease have for a long time been known to occur.

Before closing, I should like to give a short sketch of the possibilities for further research on Miners' Disease. Since the defeat of Germany, a greater part of the inhabitants of the Jáchymov district have been transferred to Germany as belonging to the Sudetogermans. However, about 200 of the original miners have been left, while the rest were replaced partly by workmen from other mining districts, partly by people new to the job. Although the first ones may already have some degree of damage to the lungs from previous mining, the special environmental factors acting for generations in the old stock of miners do not affect them, thus they may well serve for comparison. As, however, actual development of cancers in them can be at the worst anticipated as late as in the second decade of their employment at Jáchymov, the 200 remaining original miners are all that have been left for immediate study of the disease.

It is intended to keep the miners under a steady medical supervision, in carrying out periodical blood counts, x-ray examinations of the lungs and measurements of radioactivity of their bodies. Further post-mortem studies with chemical and radiological examination of the organs are of course considered essential. How far this may lead to a more accurate establishing of the actual cause of the cancers, remains to be seen.

ZUSAMMENFASSUNG

Alte Chroniken (zurückgehend bis 1500) berichten von einer derartigen Krankheit unter den Bergarbeitern des nördlichen Teiles des Erzgebirges in Schneeberg (Sachsen). Auch in Joachimsthal (Böhmen, am südlichen Teil des Erzgebirges) war die Krankheit gut bekannt; merkwürdigerweise wurde die wahre Natur derselben in Böhmen erst anlässlich einer Sektion im Jahre 1926 festgestellt. Nach der Untersuchung von Pirchen und Sikl scheint die Sterblichkeit an Lungenkrebs unter den Bergarbeitern ziemlich hoch zu sein (44,6 %), fast die Hälfte der natürlichen Todesfälle, was einer Sterblichkeitsrate unter der Bevölkerung von etwa 1 % pro Jahr entspricht. Silikose kommt ebenso häufig wie Krebs vor; eine Beziehung zwischen diesen beiden Leiden konnte vom Verf. aber nicht gefunden werden. Unter die anderen möglichen Krankheitsursachen sind das Arsen und das Kobalt zu rechnen; der die ausschlaggebende Rolle spielende gemeinsame Faktor scheint die Radioaktivität zu sein. Ferner ist noch bei den Sektionen häufig eine Struma beobachtet worden. Auch Vererbung scheint hierbei eine Rolle zu spielen; Inzucht ist seit Jahrhunderten ziemlich häufig unter der armen Bevölkerung dieser tiefen Täler. Infolge des niedrigen Lebensstandards der Bergarbeiter ist die Ernährung derselben ziemlich schlecht. Häufig scheinen Selbstmorde zu sein (infolge Bekanntwerden der Krankheit der Bergarbeiter ?) Die durchschnittliche Arbeitszeit im Bergwerk vor Ausbruch der Krankheit beträgt 13-17 Jahre. Nach der Niederlage Deutschlands sind nur noch 200 Bergarbeiter zurückgeblieben, da ein grosser Teil derselben. die Sudetendeutschen, nach Deutschland ausgewiesen wurden. Es ist äusserst interessant, diese beiden Gruppen vom wissenschaftlichen Standpunkt aus weiterhin zu beobachten und miteinander zu vergleichen.

SUMMARY

Old chronicles (as far back as 1500) are mentioning such a desease between the miners of the northern slopes of the Erzmountains in Schneeberg (Saxony) In Jachymov (Bohemia, southern slopes) thé desease was well known also but curiously enough the true nature of this condition in Bohemia was only established by a post mortem in 1926. Through the work of Dr. Pirchan and Sikl it appears the mortality by lung cancers among the miners is very high (44,6 %) almost 50 %, of the natural deaths, corresponding to a mortality rate among the population of roughly 1 % per year. Silicosis is as frequent as cancer. but the author has been unable to establish any relationship between the two deseases. Among other possible factors involved in the causation of the desease are arsenic and cobalt, but the common factor which seems to play the outstanding role seems to radioactivity. It is to be noticed also the goitre was a common finding in the post-mortem. Moreover heredity may have played a role, intermarriages since centuries are very frequent among the scanty inhabitants of those deep valey. The low standard of living of the miners makes their nutrition very poor. Suicides seems to frequent (awarness of the miner's desease ?) The average time spent in the mines before the development of the desease is 13 to 17 years. Since the defeat of Germany a great part of the miners being sudetogermans have been displaced in Germany, 200 only of the original miners remaining at work. It would be utmost interesting to be able to follow them in the future and compare both groups at a scientific point of vue.

RESUMEN

Documentos antiguos que datan hasta del año 1500 mencionan esta enfermedad entre los mineros de la vertiente norte de la sierra de Erz en Schneeberg (Sajonia). Tambien la enfermedad era bien conocida en la vertiente meridional de Bohemia (Jachymow) pero aquí se dió el hecho curioso de que la verdadera naturaleza de la afección no fuése conocida hasta 1926 como resultado de un examen necrópsico. Según los trabajos de Pirchan y Sikl la mortalidad por cáncer pulmonar entre los mineros es muy elevada (46,6 %) casi el 50 % de las muertes naturales que corresponden a una mortalidad media de la población de un 1 % anual aproximadamente. La silicosis es tan frecuente como el cáncer pero el autor no ha logrado establecer una relación entre una y otra afección. Entre otros posibles factores favorecedores de la enfermedad estan el arsénico y el cobalto, pero el que generalmente representa el papel primordial parece ser la radioactividad. Tambien debe señalarse el hecho de que el bocio se observó frecuentemente en las autopsias. Por otra parte la herencia pueda haber intervenido debido a que desde hace siglos se vienen uniendo latre sí las familias escasas de estos profundos val'es. Las precarias condiciones de vida de estos mineros hacen que su alimentación sea muy deficiente. Los suicidios parecen ser frecuentes (reconocimiento por el enfermo de que padece la « enfermedad de los mineros »). El tiempo medio transcurrido en las minas antes de la aparición de la enfermedad es de 13 a 17 años. Despues de la derrota de Alemania una gran parte de los mineros (Sudetes alemanes) se ha desperdigado por Alemania y solamente 200 de ellos siguen trabajando. Sería interesante seguir a ambos grupos en el futuro para compararlos.

RESUME

De vieilles chroniques remontant jusqu'à l'an 1500 parlent de cette maladie parmi les mineurs du versant nord de l'Erzgebirg à Schneeberg (Saxe). A Jachymov (Joachimstal) situé en Bohême sur le versant sud des mêmes monts la maladie était bien connue mais chose curieuse, sa véritable nature ne fut établie avec certitude en Bohême qu'en 1926 et ce, grâce à une autopsie. Suite aux travaux de Pirchan et Sikl il est établi que la mortalité par cancer du poumon parmi ces mineurs est extrêmement élevée (44 6 %) presque 50 % de toutes les morts naturelles ce qui correspond à un taux de mortalité parmi la population d'à peu près 1 % par an. La silicose est aussi fréquente que le cancer mais l'Auteur a été incapable d'établir une relation entre les deux affections. Parmi les autres facteurs qui pourraient jouer un rôle dans la production de la maladie, il faut citer l'arsenic et le cobalt, pourtant le facteur commun, la radioactivité, semble jouer le rôle essentiel. On doit également noter que le goître est une constation d'autopsie banale ; qui plus est, le rôle de l'hérédité ne doit pas être oublié car les mariages consanguins sont fréquents depuis des siècles parmi les familles de mineurs de ces vallées profondes et peu habitées. Les conditions sociales des mineurs font que leur nutrition est misérable. Les suicides sont fréquents (crainte de la maladie des mineurs ?). La durée moyenne de travail dans les mines avant l'apparition de la maladie oscille entre 13 et 17 années. Depuis la défaite des allemands, une grande partie des mineurs étant des sudètes de race germanique ils ont été déplacés et 200 anciens mineurs seulement sont restés au travail. Il serait du plus grand intérêt, au point de vue scientifique, de pouvoir connaître et comparer le devenir des deux groupes.

RIASSUNTO

Vecchie cronache (fin dal 1500) ricordano tale malattia tra i minatori delle pendici settentrionali delle Montagne dell'Erz nello Schneeberg (Sassonia). In Jachymov (Boemia) pendici meridionali) è anche ben conosciuta ma molto curiosamente la vera natura di questa forma fu stabilita in Boemia soltanto da un' autopsia fatta nel 1926. Attraverso la ricerca del Dott. Pirchan e Sikl appare che la mortalità per cancro polmonare nei minatori è molto alta (44.6 %)

quasi il 50 % delle morti naturali, corrispondenti alla percentuale di mortalità presso la popolazione di, all'ingrosso, 1 % per anno. La silicosi è frequente come il cancro ma l'A. non è riuscito a stabilire alcuna relazione tra le due malattie. Fra gli altri possibili fattori interessati nella causa della malattia vi sono l'arsenico e il cobalto ma il fattore comune che sembra giocare il ruolo principale è la radioattività. E' stato rilevato anche che il gozzo è un reperto comune nella autopsia. Inoltre un ruolo può aver giocato l'eredità, infatti i matrimoni tra consanguinei sono da secoli molto frequenti tra i pochi abitanti di questa profonda vallata. Il basso tenore di vita dei minatori rende la loro nutrizione molto povera. I suicidi sembrano frequenti (consapevolezza della malattia dei minatori ?). La media di tempo trascorsa nelle miniere prima dello sviluppo della malattia è di 13-17 anni. Dopo la sconfitta della Germania una gran parte di questi minatori essendo sudeti tedeschi sono stati trasferiti in Germania mentre soltanto 200 degli originali minatori sono rimasti al lavoro.

Sarebbe di estremo interesse poterli seguire nel futuro e comparare i due gruppi dal punto di vista scientifico.