Europa.

First International Congress on Diseases of Occupat — Int. Exhibition at Milan. 1907? 1908

(Br. Med. J. 22 Aug 1908, p. 494)

Permanent International Comm. chosen incl. Oliver & Dr. Legge (Eglnd)
quarterly review of articles on occ. disease published in diff. periodicals
International Office of Bibliography
Intimacy with head office in Milan

Industrial Health – International Congress on Diseases of Occupation – 2nd. 1910

(Bri. Med. Journal 24 Sept. 1910, p. 887)

at Brussels in Sep.

State Control & Industrial Hygeie.

Comp. for Industrial diseases.

Prevention of Ankylostomiasis – Thomas Oliver.

(1 Oct p. 980) Miners Nystagmus.

Industrial Poisoning

Industrial Diseases - 3rd. International Congress of Occupational Diseases - Vienna — 1914.

(British Medical Journal; July 26, 1913; p. 208).

UNIVERSITIES & COLLEGES

THE third International Congress of Occupational Diseases will take place at Vienna on September 14th, 1914. Those who intend to present communications are asked to send them typewritten. They should reach the general secretary in February, 1914, at latest. The following is the programme of discussions: (1) Fatigue—physiology and pathology, especially in relation to professional work; action of such work on the nervous system; nightwork. (2) Work in hot and moist air. (3) Workmen's anthrax. (4) Pneumoconioses. (5) Hurtful effects of electricity in industrial labour. (6) Professional intoxications, especially aniline, mercury, and lead. (7) Hurtful effects of occupational work on the hearing. (8) Reports. A large number of communications on these subjects has already been promised. For further particulars application should be made to the General Secretary, Docent Dr. Ludwig Teleky, Vienna IX, Turkenstrasse 23. The Presidents are Dr. Francis de Haberler, chief of the sanitary administration of Austria, and Dr. A. Schattenfroh, Professor of Hygiene and Director of the Institute of Hygiene in the University of Vienna. In connexion with the congress there will be an exposition, in which will be represented as fully as possible everything relating to the origin, preventive measures, and clinical symptoms of occupational diseases, as also the whole influence of professional work on the organism in general, except the danger of accidents and the means of preventing them.

(883)

INTERNATIONAL CONGRESS OF OCCUPATIONAL DISEASES.

In the BRITISH MEDICAL JOURNAL of July 26th, 1913 (p. 208), there appeared an announcement of the third International Congress of Occupational Diseases, which is

to be held at Vienna in September (21st to 26th). The programme of discussions was there given; it includes the following subjects: (1) Fatigue—physiology and pathology, especially in relation to professional work; action of such work on the nervous system; nightwork. (2) Work in hot and moist air. (3) Workmen's anthrax. (4) Pneumoconioses. (5) Hurtful effects of electricity in industrial labour. (6) Occupational intoxications, especially aniline, mercury, and lead. (7) Hurtful effects of occupational work on the hearing. (8) Reports. The presidents are Dr. Francis de Haberter, chief of the sanitary administration of Austria, and Dr. A. Schattenfroh, professor of hygiene and director of the Institute of Hygiene in the University of Vienna. A committee has been formed in this country to promote the objects of the Congress. The Home Secretary, Mr. McKenna, is Honorary President; Sir Thomas Oliver, President; and the members are Sir John Collie, Sir Thomas Flitcroft, Professors John Glaister of Glasgow, Sheridan Delépine of Manchester, and Eurich of Sheffield; Drs. H. Langley Browne, Hedley, Pratt, W. Hamilton, F. Shufflebotham, Herbert Jones, C. H. Milburn, T. D. Lister, and Edginton. Dr. T. M. Legge is chairman of an executive committee, of which Dr. W. F. Dearden is honorary secretary. The Home Office will be represented by Dr. Legge, and various medical associations have intimated their intention to send delegates. Papers will be printed in the language in which they are written, with abstracts in German and French, and a report of the general proceedings will be published in these two languages. Those who intend to present communications are requested to send their matter typewritten, together with an abstract. Papers should be sent to the General Secretary, Docent Dr. Ludwig Teleky, Turkenstrasse 23, Vienna IX, on or before May 1st. In connexion with the Congress there will be an exhibition illustrating the origin, symptomatology, and means of preventing occupational disease and the influence of professional work on the organism in general. Membership is not confined to medical men; any person or association interested in the subject can attend or subscribe for the proceedings. The subscription is £1. Those who wish to send papers, attend the meetings (which will be held in the House of Parliament), or take advantage of arrangements for combined travel and accommodation at reduced rates, should communicate at an early date with Dr. Dearden, 168, Trafford Road, Salford, Manchester.

3rd. International Conference on Industrial Diseases - Programme.
(British Medical Journal, April 18, 1914; p. 883-884).
Sept. 1914

International Congress on Industrial Diseases will held Rome, May 1909.

(B M J 28 July 1908, p. 164)

Clinical Institute for the Study of Diseases of Occupation, Milan – 1st One in World — April 1910
(B.M.J, 30 April 1910, p. 1062).
on March 20th.

4th Italian congress of Occupational Diseases – Rome – June 1913

(Br. Med. J. 3 May 1913, p. 948)

Ankylostomiasis
diseases of the blood of professional origin
infant mortality in occupations & soc. conditions of parents
forms of dermatitis of professional origin
Professional pathology of sex. employees.

Kolar mines — Pneumonia & chills — Reduction — Oliver by 1907

Oliver, 1908, p. 294.

course than in others and pave the way more readily for tuberculous infection. Although miners' phthisis on the Kolar goldfield is remarkable rather for its absence than its presence, it is not so with other forms of lung disease. Dr. Bremridge finds that a large percentage of the miners die from pneumonia, due not so much to dust as to the fact that the men, after having worked hard for eight hours, are obliged to climb ladders to the height of 2,000 feet in a state of fatigue and when perspiring, and thus become chilled. The proof that this has had much to do with the prevalence of pneumonia has been demonstrated by the fact that since a skip, whereby coolies can ride to the surface, has been introduced into one of the mines from which the largest number of cases of pneumonia came, the number of cases of acute lung disease has considerably diminished.

India.

India – Kolar Hive Goldfield — absence of M.P. — Dr. Bremridge — 1907.
Oliver, 1908, pp. 293–294

it is another question as to whether there may not be something specific in the dust of the Transvaal rock to explain the prevalence of Rand miners phthisis. On this point the experience of Dr. R. H. Bremridge, who is on the medical staff of the Kolar goldfield in India, is extremely valuable. In the Kolar goldmines there are 40,000 coolies employed; the rock is hard. Dr. Bremridge went to India expecting to meet with cases of miners' phthisis, but he failed to find evidence of the disease except in men who had come from the Transvaal. Although no precautions are taken in the Kolar mines to throw water on the surface to diminish the dust after the use of explosives, and the men work hard, yet Dr. Bremridge finds that the miners, native and white men, keep good health. He attributes the freedom from miners' phthisis partly to the fact that in India the men work eight-hour shifts, take more leisure, and are not so eager to make a fortune as the miners in the Transvaal. There is plenty of dust in the Kolar mines; it is a hard quartz rock that is blasted, and without such precautions as the spraying of water. It would seem, therefore, as if there might be something in the character of the dust itself to explain, on the one hand, the prevalence of miners' phthisis in the Transvaal and, on the other, its marked absence in India, where no special precautions are taken to allay dust. Hard and angular as are the particles of all forms of quartz rock-dust, it would appear as if in the development of the malady there is something over and above mere mechanical irritation of the lung tissue to explain why chronic inflammatory changes once induced run in some instances a more rapid

Compare Marvin, Otters and Pave the way more readily for T.B. infection.

South Africa &
General. World.

S.A. Experience — Investigations elsewhere prompted —

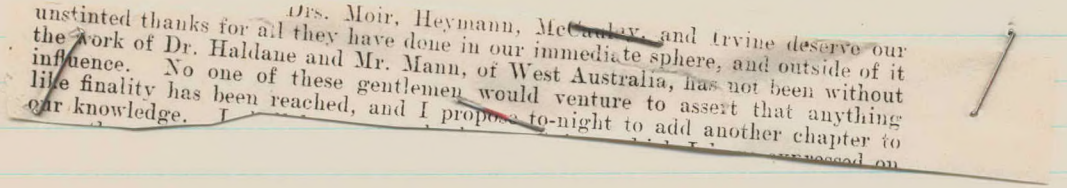
Crawford, p. 6.

In other gold-mining countries, such as New Zealand, Australia, and America, MP was little known until the facts concerning the ravages of the disease on the Rand stimulated closer ~~enq~~ investigation. This revealed the existence of the disease in Western Australia, Bendigo, and other mining centres, but to an extent which pales into insignificance when compared with the Rand.

1906.

South Africa not working in Isolation — Information from Colonies & Gt. Br. integrated by all concerned.

J. of CHM. Society Nov. 1906 'The Gases' William Cullen, p. 144.



unstinted thanks for all they have done in our immediate sphere, and outside of it the work of Dr. Haldane and Mr. Mann, of West Australia, has not been without influence. No one of these gentlemen would venture to assert that anything like finality has been reached, and I propose to-night to add another chapter to our knowledge.

Same: 1905 1907. Summons.

Results of all Commissions: Milner, Haldane, W. Australia (Kalgoolie) Victoria; Bendigo; Summons.

Final Report of the M.R.C^n. 1910, evidence L.G. Irvine, p. 239.

In several of the mining communities of the British Empire the high mortality of underground workers in certain metalliferous mines has of recent years attracted attention, and has been the subject of official investigation. The investigation of the Transvaal "Miners' Phthisis Commission" of 1902-3 was followed by a similar enquiry, in 1904, into the "Health of Cornish Miners," by Dr. Haldane and his colleagues, in 1905 by a "Report on the Ventilation and Sanitation of Mines in Western Australia," and, in 1907, we have had from Victoria a "Report on Miners' Phthisis at Bendigo" by Dr. Summons. It is obvious, therefore, that the dangers to health incident to certain classes of metalliferous mining are not a feature peculiar to the mines of the Witwatersrand. So far, however, as our information goes regarding Australian gold and other metalliferous mines, it is only in Victoria and in certain mines outside Kalgoorlie, in Western Australia, that the question of miners' phthisis holds a significance warranting investigation by Government authorities, or special notice in official reports. On the Kalgoorlie field, which employs about 6,000 men, miners' phthisis appears to be of comparatively small significance, although machine drills are extensively used. Differences in the physical character of the ore appear to be the explanation of these different health conditions. Similarly, in England, it is only amongst the Cornish tin miners that an excessive mortality is found. English ironstone miners are a very healthy class.

It is of the highest interest to note that these investigations have everywhere led to practically the same conclusions, which may be summarised as follows:—

(1) That the high mortality amongst these miners has been due to lung disease, and particularly to the disease known as "miners' phthisis," and that, with regard to diseases other than those of the respiratory organs, the mortality of miners as a class compares quite favourably with that of the general male population.

(2) That this mortality has been very greatly increased in each locality since the general introduction of rock drills into mining practice, and falls much the most heavily upon rock drill miners. General miners also suffer, but to a decidedly less extent.

S.A. influence on Broken Hill mines in New South Wales 1917-20 shown by Kennedy.

Kennedy, a Tale, pp. 65. 70 passim - learned from S.A. experience.

Oliver devotes nearly ½ of his chapter on mining & occupational diseases to S.A. and at least 50% of this portion to miners' Phthisis.

Oliver, 1908, pp. 287 – 311.

S.A. sets example - No dry drilling - Shd be all over world - 1927.

Moss, p. 82.

as soon as they are sufficiently deep to hold water, the dust formed during the greater part of the drilling is not produced in dangerous quantities. Machine drills also produce large quantities of dust when starting a hole, unless special precautions are taken. Dry drilling is strictly prohibited by law in South Africa, and it would be to the advantage of the mining community if dry-drilling in rock were prohibited throughout the world. A drill-hole has to be cleaned out when the drilling is finished, and, for this purpose, a water jet must be used. It is a most reprehensible practice to blow out the hole with compressed air.

New Zealand.

miners' phthisis is included) was a disease, in contracting which a miner was entitled to compensation under the Workers' Compensation Act, not a single claim was made for compensation in respect of the disease.

The preventive measures considered by the Commission, and which have been generally recommended by other Royal Commissions elsewhere, are as follows:—

1. The compulsory use of dust-preventing appliances, such as sprays, water blasts, and atomizers.
2. Improved ventilation of mines.
3. Use of bath and change houses at the mines.
4. Prevention of indiscriminate spitting, and the destruction of tuberculous sputum.
5. Definite treatment of those affected with tuberculosis of the lungs in an advanced form.
6. Improved housing conditions and disinfection of work places and living quarters.
7. The exclusion from work underground of all persons infected with tuberculosis of the lungs.

The use of dust-preventing appliances is provided for under Section 19 (*m*) of the Mining Act Amendment Act, 1910, viz.:—

'There shall at all times be used in and about the battery or place where such crushing or drilling is done an adequate jet or spray of water, or such other appliances as in the opinion of the inspector will effectually keep the air pure and prevent dust circulating in the place where such operations are being carried out, and for this purpose an adequate supply of water shall be provided,'

In addition to which it would be advisable that an approved water blast be used immediately after blasting in mines, a provision made compulsory in the Transvaal, for the purpose of allaying the noxious gases, smoke, and dust, caused by blasting in close ends. The use of a water blast of the James type is recommended by the Transvaal Royal Commission, and is thus described in Doctor Haldane's 'Report on the Health of Cornish Miners':—

'At the mouth of the level a piece of 6 in. iron pipe *c*, Fig. 1, or a small cylinder, provided with a side tap *d* is let into the ordinary 2 in. iron pipe *a* for carrying the compressed air for the drill. Before the blast this is filled with water through the side tap from a cistern after the compressed air has been

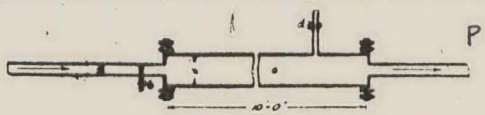


FIG. 1.—JAMES WATER BLAST.

turned off. Immediately after the blast the compressed air is suddenly turned full on. The water is thus driven along the pipe *e* with great velocity, and a mixture of finely divided water and air is discharged from the open end, which is directed toward the face which has just been blasted. By this means the dust is entirely cleared from the last 30 ft. or 40 ft. back from the blast, the air leaving quite clear immediately after. If a ventilating pipe as shown in Fig. 2 is carried forward about as far as the compressed air pipe, any dust which has been driven out beyond the reach of the jet can be rapidly carried off. This plan has the great merit that it implies scarcely any trouble, and no extra apparatus except the piece of 6 in. pipe and tap for filling it. The rock blasted is also thoroughly wetted, so that no dust is produced in shovelling it. The water partly washes out from the air any nitrous fumes which may be present, but, of course, no carbonic oxide,

p. 231.

PREVENTION OF MINERS' PHTHISIS.—"The Royal Commission of New Zealand, in its report, states that, from the evidence taken by it, it is apparent that tuberculosis has not in New Zealand assumed such proportions as indicated by the returns from Cornwall, Bendigo, Queensland, West Australia, and the Transvaal. In proof to the same effect it should be stated that during the period between October 10, 1908, and December 24, 1909, when pneumoconiosis (a term which formerly was used to classify a group of diseases all similar in character, amongst which

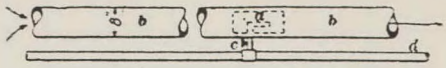
J. of the C.M.M. Society Nov. 1912, pp. 231 - 232.

New Zealand - Com'n - Prevention Methods (Water & water blast); Money refund; Rec. Exclusion TD. Improved housing; change house; Ventilation Reg's.

and for this reason, if no other, a ventilating pipe is desirable in cases were the level or rise has been driven more than a few fathoms beyond the air current.

The ventilating apparatus shown in Fig. 2 consists of a pipe *b*, in which is inserted a reversible nozzle *a* connected at the valve *c* to the compressed air pipe *d*. By adjusting the nozzle *a* and admitting compressed air, a current may be induced in either direction through the ventilating pipe *b*.

p. 232.



FIG, 2.—VENTILATING APPARATUS.

The more adequate ventilation of all mines to a standard of quality, quantity, and fixed temperature, is dealt with under the heading of 'Ventilation.'

The use of bath and change houses is also recommended.

The prevention of indiscriminate spitting appears to be a matter requiring urgent attention by local bodies and by the Government. The dissemination of directions regarding the destruction of tuberculous sputum is very necessary.

Improved housing conditions for the miners and the definite treatment of tuberculous persons are matters which are being strongly advocated by many medical practitioners of New Zealand.

The exclusion from work underground of persons infected with tuberculosis of the lungs is a matter insisted upon by all authorities.

The Commission therefore makes the following recommendations :—

Preventive Measures.—Every working place where rock drills are in use shall be furnished with an approved water blast or suitable appliance for laying the dust, smoke, and gases after a blast; and no man shall return to an end, rise, winze, or other close place, until the air is free from dust, smoke, and fumes, caused by blasting.

Measures of Relief.—That miners suffering, or suspected to be suffering, from fibrosis or superimposed tuberculosis of the lungs shall have free medical advice from the Government, such advice to be given by a medical expert appointed for the purpose.

That in addition to the homes and sanatoria already established, adequate relief be provided from the Gold Miners Relief Fund for those suffering from miners' phthisis, which for that purpose shall be subsidised £1 for £1 by the Government.

The qualifications for the above measures of relief to be 5 yr. residence in New Zealand immediately prior to the application for relief, 2½ yr. of which shall have been occupied in mining underground or working at a crushing mill in New Zealand."—NEW ZEALAND ROYAL COMMISSION, *Mines and Minerals*, July, 1912, p. 745. (A. McA. J.)

New Zealand - Gt. precautions taken - water jet — at goldmine Waihi - largest one re Dr. Purdy.

Conditions as near perfection as the industry will allow.

Brought down figure enormously.

1.6 phthisis gen. popn.

1.87 pneumoconiosis.

Cd. 487-7478, 1914, p.64. qq. 20869 — 20879, ev. E.B. Collis.

Coal Mining

Coal Mining Mechanisation

Review of literature — Technology — Explosives & mechanical drilling.

Certainly increases amount of dust.
Means more exposure & quicker accumulation of dust.
earlier age incidence.
Doesn't affect prevalence of disease & incidence at later age.

Coal mining technology appears later.

dynamite — 1905 67% explosives still gunpowder Boulton, ~~p.256~~. ~~Haddock~~, p 243. v.2

coal cutting machines introduced ~~on a coal scale~~ only coming in 1910, p. 256. v.2.

↳ then only young men ed. use them — too much agility for rather older men to do so.
Haddock, p.181.

(1)

1.2°/o ~~mine~~ on surface.

Coal Mining Industry 882, 354 coal miners GB. 709, 339 o/g. — Oliver. 1908.

Oliver, p. 268. 1908.

Coal miners' phthisis, anthracosis — 50 yrs. ago — now remarkably diminished in G.B. — ventilation & legislⁿ. 1908.

Oliver 1908, p. 267.

no longer predisposition to pulmonary tuberculosis.
ventilation largely is remarkably free and the air supplied pure & abundant.
↑ improvement in housing etc. p. 268 — newer mining villages.
better food, good wages, pure drinking water.

• But p. 269 as a class miners enjoy considerable immunity from pulmonary consumption yet it prevails — eg. West Riding of Yorkshire & Monmouthshire.

• Also mortality from respiratory disease exceeds std. by 21% — i.e. non tuberculous respiratory disease i.e. non-tuberculous lung diseases increased.

Coal mining areas.
- Durham & Northumberland
- Lancashire
- West Riding
- Derby & Notts
- Staffordshire

~~also~~ - Monmouth & Wales.

also p. 272 - improved health & comparative freedom from TB ← better ventilation gets rid of bacteria too.

Coal.

Mining — Hereditary Occupation — Esp. Coal mining Oliver. 1908.

Oliver, 1908, p. 267.

Of all occupations in this country [Br.], none is more hereditary than that of coal mining. A lad goes into the mine because his father is working there and his grandfather did so before him.

(5) Coal Mining — Beneficial legislation — Safety of. —

Coal mining, which has its own special risks from explosions, fires, subsidences, etc., the disasters in which are often on a scale which compels attention on account of their magnitude, has already been the object of much beneficial legislation, with the result that what was once a most dangerous and unhealthy occupation is now a healthy and comparatively safe one. But metalliferous mining, here and in other countries, has not been regarded as necessitating any special measures for the safeguarding of life and health, notwithstanding that, under present conditions, it carries with it greater risk than coal mining.

Oliver 1905 An Addresses
P. 920

Explosives — Gunpowder — gives off Carbon Monoxide.

(Kerr)

p 102

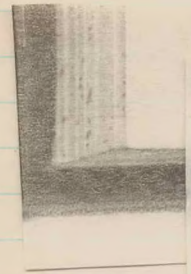
Gunpowder is largely used. It is cheap, comparatively slow in action, and therefore suitable for coal and soft rocks, and less dangerous than some of the nitro-compounds. On the other hand, it is very dangerous in the presence of fire-damp and coal-dust, and its use is now prohibited in certain collieries by order of the Home Secretary.*

Gunpowder, if exploded in large quantities, is also dangerous to life, especially in badly ventilated workings, owing to the large percentage of carbon monoxide it gives off, and no explosives which give rise to this gas ought to be used for extensive blasting in mines, because of the risk of injury to health, and also because even small traces of carbon monoxide have been proved to render mixtures of coal-dust and air highly explosive, a point frequently overlooked in experiments with explosives. On firing 1¼ lbs. of blasting powder, over 3 cub. ft. of combustible gas, consisting chiefly of carbon monoxide, would be produced, and this, when mixed with pure air, would give over 10 cub. ft. of an explosive, or, at least, a rapidly burning mixture. The approximate composition of ordinary gunpowder is: Nitrate of potassium (saltpetre), 75 per cent.; carbon, 15 per cent.; sulphur, 10 per cent., along with small percentages of potassium sulphate and water.

Coal Cutters only coming into vogue - driven by compressed air — 1905.

Oliver, an address, 1905, p. 919.

Coal Miners – Health of – 1905.



Compare these death-rates with those of coal miners of this country. It is the boast of Northern coal-mining districts that they can show many old men whose health above 60 and 70 years of age remains good. The British coal mines are extremely well ventilated, the shifts are short, and the coal dust, although it often contains particles of stone, is yet soft when compared with the quartzite of the South African mines. I quite agree with Dr. Trotter, of Bedlington, when he says in his very interesting paper that it is not coal as coal that causes miners' phthisis, but the stone particles to which the carbon is adherent, and that probably the main causes of phthisis as affecting mining populations are to be found not in the occupation followed by the men but in the homes. Between the ages of 25 and 35 3·9 per cent. of the deaths of tin miners are due to lung disease, while in coal miners it is 2·1 per cent.; between the ages of 35 and 45 the percentages are for the Cornwall miner [illegible] for the coal miner [illegible] In certain districts the percentages are still even more favourable for the coal miner.

Oliver, an Address, 1905 >p. 920.
BMJ. 14 Oct. 1905.

Coal workers pneumoconiosis 4 + b.

Coal dust may produce small amounts of fibrous tissue. In that event 'simple pneumonoconiosis' may result . . .

A more serious condition may develop known as progressive massive fibrosis which is thought to be due to some infection superimposed on the simple pneumoconiosis. It has long been recognised that victims of silicosis are very prone to tuberculosis infection and it may be that a similar association exists with pneumoconiosis.

— anthracosis from early times — T.B. — difficulty in detection.

Coal Mining ↓ T.B. — little early age —

Association of TB. with anthracosis or coal workers' pneumoconiosis from earliest times - Even Oliver concedes this — gt. difficulty in detection secondary infection Oliver, 1903, p. 571

But little fatal ability from miners — incidence of mortality at early age low. Great improvement in health — ventilation & mining precautions.

But machinery only introduced later to produce dust in great quantities, esp in hard anthracite coal mining and especially Wales, a feature of mid early 20 (20s) and mid 20 + later.

Gray

footnotes p317

Newcastle District 25,000 men 9,000,000 tons alone 1905.

Oliver, an address, p. 919, 1905.

predisposes.

S. Wales – Coal Workers' Pneumonconiosis & T.B. anthracite

Information supplied by Dr. Ian Webster.
not bituminous soft coal in midlands
but hard anthracitic coal different composition.

(Heppleston)

p 573

Thus we may distinguish a specific type of simple pneumokoniosis, namely silicosis, due to a specific chemical substance, and a non-specific type due to a mixture of different substances in which there is usually much less free silica.

Coal mining — Collis — no anthracosis — Mavrogordato - why — 1915.

Mavrogordato 1922, p. 111

The air-borne dust in a coal-mine may contain up to 12% of free silica; little precaution is taken to lay this dust, and the absolute quantity of free silica blown out of such a mine in 24 hours is probably about as great as that blown out of a Rand mine of similar size in the same time. The collier was not always free from chest trouble; "Anthracosis" was as well established as Silicosis; Colliers' Asthma was a by-word, and old-established pathological museums have specimens of colliers' lungs showing fibrosis. Professor Collis[7] says that these diseases have disappeared. The only new influence is the vastly improved ventilation, to which circumstance I attribute this happy result. The collier escapes because—

1. The dust concentration is diluted;
2. The dust is blown away from where the men work.

It is quite likely that the coal helps them to deal with the small amount of stone dust that they actually do inhale.

If there be dust in a coal-mine it is where there are a few passing workers, in a Rand mine it is where men are gathered together at work.

Coal Miners' Pneumoconiosis — 1948.

(Heppleston)

p 571

The magnitude of the problem of pneumokoniosis as it exists to-day can be judged from the following facts. In South Wales approximately 18,000 coal workers have been disabled by pneumokoniosis during the past 17 years (Jenkins, 1948),

Coal workers pneumoconiosis — not nec. silica content — dust accumulation

(Heppleston)

pp 574 - 575

Thus, whilst silicosis may well arise as a consequence of a chemical or physico-chemical reaction between the lung tissue and the silica dust, the non-specific disease of Welsh coal workers is more readily explicable as the result of simple overloading of the lungs with dust irrespective of its nature rather than as a modified silica effect. It cannot be denied that free silica may play some part in the genesis of the disease in coal workers, but its contribution appears to be of much less importance than that of the other components of the coal dust. In these men it appears that as more dust is deposited than can be removed it collects into small aggregates which then undergo a very mild form of fibrosis, thereby preventing further dispersal of the dust. As a consequence of the aggregation and fibrosis focal emphysema develops (Heppleston, 1947). Policard (1947) also believes that pneumokoniosis may arise from the mechanical presence of large amounts of inert foreign material.

Silicosis in Coal Workers - type of rock - [anthracite]

Rosen The history of miners' diseases p 295

The nature of this information has already been related in detail; yet a brief summary will enable us to emphasize the most significant contributions of the Scottish group as a whole. In general it may be said that these investigators presented the first clearly defined clinical and pathological pictures of silicotic disease among workers in coal mines. The pathological and nosographic observations recorded above are undoubtedly recognizable as referring to various types and stages of silicosis (anthraco-silicosis, simple silicosis, silicosis with tuberculosis).

Although the attention of physicians had originally been attracted by the pulmonary pigmentation and black expectoration found among coal miners, some of them recognized that these phenomena were probably only secondary and not pathological per se. Basing their conclusions upon empirical observation rather than theoretical speculation, a number of physicians arrived at the astute inference that the existence of pulmonary disease among certain groups of miners was due to the nature of the rock in which the mining operations were being carried on.

Coal — Bituminous.

(Haddock)

p 62

BITUMINOUS COAL

This is true coal, and gets its name from the fact that the substances in it look like bitumen or road pitch. There is no bitumen in it. It is the chief kind of British coal, and we usually distinguish between two kinds of bituminous coal, viz. LOW CARBON BITUMINOUS COAL which has between 70 and 80 per cent of carbon, and HIGH CARBON BITUMINOUS COAL, which has 80 to 90 per cent.

Coal – anthracite

(Haddock)

p 64

Anthracite

This is the product of the last stage in coal-making by Nature; that is to say, it has the greatest carbon content. It has 90 to 95 per cent of carbon, so that practically about 5 per cent is left for gases and ash. For this reason it is the best heating coal we know. It is very glossy, and does not soil the hands like other coals. It is most difficult to ignite, but once ignited is a great heat-giver. It has to be burned in special grates or stoves, where the air supply to the fire can be regulated. It is dense and hard, and shows very little trace of vegetable matter—just a few spores or seed cases. Anthracites are usually wonderfully pure and clean. By this we mean that they seldom have layers of dirt in them such as we see in other coals. Many think that when Nature increases the carbon content further we have GRAPHITE.

Anthracite is the rarest of coals. It is mined in South-West Wales, the Donetz Basin of South Russia, Pennsylvania, and other places. It is usually the deepest coal in the coalfield. By this we do not mean that we always have to sink deep shafts to get it; it may be on the surface owing to uplift, tilting of the measures, faulting, or the wearing away of the upper measures. What we mean is that it is *usually* the earliest or oldest seam to be laid down in the coalfield where we find it.

Metalliferous Mines Regulations Act - 1872.

(Result of Findings of Royal Commission 1860 [sic] Barton, essays, vol. 1., p. 55.

- no longer boys under 12 u/g.
- under 16 - max. 10 hrs. per day.
- reporting of accidents compulsory.
- no vertical or overhanging ladders.
- drying or change houses - 'naked'
- plans for mines.

∴ worst cond^ns in Cornish mining were first officially ameliorated to some extent.

Died after 35 years of age.

Stats & Mortality Farr. 1860s.

Rosen The history of miners' diseases p215

From the figures in this table it is readily apparent that the rates of mortality among miners do not differ materially from those prevailing among non-miners until after the age of thirty-five. From this age onwards a large and progressive excess of mortality among the miners becomes very evident. The inference drawn by Farr from this preliminary analysis is "that the large and progressive excess of mortality among the miners

Mortality — Coal miners less than metal — all investigators incl. Barkers

up to date.

Rosen The history of miners' diseases 224 - p 225

> ... several facts stand out quite clearly. In the first place it is evident that all miners suffered most from various pulmonary diseases. In consequence of the prevalence of these morbid conditions, the rates of mortality were generally higher among miners than among non-mining males, although an excessive divergence in the mortality rates of the two groups did not become very apparent until the fourth decade of life. Within the mining population itself the coal-miners apparently enjoyed better health and a longer duration of life than the metal miners.

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