the further fact that for ten years I have been medical attendant to several large collieries has given me facilities for studying it from what may be called chemical and pathological points of view. No reasons are given to explain why the subject should be carefully inquired into, as I presume they are self-evident.

Anyone who has read Dr. Smith's work will agree with me that the conditions which he found existing in mines were bad. Without entering into any details or discussion as yet into his observations I simply shall mention that, taking carbonic acid as a test and an example of the state of air found, from 339 specimens taken he got an average of 0.785 per cent. No miner at the present time would be asked to work in such an atmosphere, nor would he if asked. From fifteen to twenty years ago mine air was bad. Improved methods of ventilation were not then in general use, and the law on the subject was not so strictly enforced as now, when not only must there be ample provision for removal of the air, but measurements must be periodically made and entered into a book for the purpose, showing the volume and the velocity of the fresh air currents. The test of a candle or a lamp burning is a somewhat rough one, as it is made by the miner. When made in the manner referred to by Smith it is of more value, but the miner's method is a common one, and in fiery pits often such a fatal one that some reference to it may be interesting.

In talking with miners on the subject, they have told me that about twenty years ago sometimes the air was so bad that, if the lamp was unaided, it would not burn, but by constant attention it might be made to give out a feeble light, and it was frequently the duty of boys when too young or too small for harder work to trim the lamps, and keep them burning for their fathers or seniors.

The methods for determining the various constituents in the air of the mines, such as temperature, organic matter, carbonic acid and oxygen, are carried out by those most recent methods which generally have been found most practicable and exact in such circumstances.

The micro-organisms were determined by Hesse's apparatus which consists of a glass cylinder 18 in. long and 2 in. in diameter. At one end a piece of rubber sheeting is stretched tightly over the tube. The other with a tight-fitting plug of india-rubber through which a glass tube passes. This is connected with an aspirating apparatus. Along the bottom of the glass cylinder is 50 cc. of nutrient jelly. The whole is set up for as on a tripod. The air to a given volume is driven through the tube and over the gelatine.

As regards ventilation, experiments were made in connection with the different methods used. The following table gives some comparative results:

Table showing Relationship of Carbonic Acid, and Oxygen per 1,000,000 vols. and Microbes.

Carbonic Acid.	Oxygen per 1,000,000.	Microbes per litre.
1.397	42	214 moulds 10 bacteria
2.111	30	150 " 50 "
5.812	—	63 "
—	20	41 "
1,267	—	26 "
0.820	—	16 "
0.811	—	25 "
2.175	—	countless
2.562	—	6 bacteria
2.303	—	5 "
3.790	—	0 "
2.630	60	—
2.209	45	—
2.796	30	—
1 187	matchless	—
2.856	39	—
1.352	15	—
1.912	22	16 bacteria
5.182	40	0 "
2.628	30	28 bacteria
0.964	11	25 "
1.454	10	countless
1.675	matchless	30 moulds 30 bacteria
2.063	34	17 "

Ventilation implies two conditions: removal of impure and the substitution of pure air, and those conditions may be obtained either by, first, natural methods, such as by the action of winds, changes produced by alterations in temperature or pressure or by the diffusive tendencies of gases; secondly, artificial methods. We have such examples as the action of fires, fans, jets of steam, steam pipes, etc. The principles of these, however, are not different from natural methods. In the cases of those mines which came under my notice, the variety of artificial methods adopted was the fan method applied on the principle of propulsion. Whether the propulsion method or the vacuum method is the better I cannot decide, and this point falls more under the consideration of mining engineers. In the *Transactions of the Mining Institute of Scotland* there are interesting