

the trials made of shorter intervals will tend to produce a gradual change in that direction. It will be seen in the evidence, that at Tresavean (p. 824, 1. 46), at Trethellan (p. 821, 1. 11), and (Mr. Henwood's letter, Appendix A) at Wheal Mary, the distance of ten inches has been adopted with very important effect in facilitating the climbing: so that one-fourth of the labour is estimated to be saved; and even men who had been obliged to relinquish work in the lower levels have been able to resume it.

39. The staves are most usually of wood; iron is in many instances preferred; in others it is said to become both slippery and jagged from the corrosive action of water impregnated with salts of other metals, chiefly copper.

40. Each ladder usually terminates on a platform (sollar), an opening (man-hole) in which leads to the ladder below. This is generally so situated that the ladders are parallel to each other. In a few instances there is, in addition to this platform, a penthouse placed between the back of the ladder and the walls of the shaft, so that it covers the passage to the ladder below, and prevents the risk of the descending miner falling more than a few feet, supposing the ladder to be from four to five fathoms in length,— and the much greater risk of the falling of anything from above upon those who are below (Evidence, p. 851, 1. 63). A contrivance of similar intention is adopted in some mines—that of placing trap-doors over the manholes, and making it a rule for the last man of a party to close them (Return for Boscean Mine). It is clear that more is here trusted to the carefulness of the miner than in the former method; the closing of these trap-doors must also, it is conceived, cause a serious obstruction to ventilation.

41. The principal tools used by the miners are *picks* for working the rock, and *borers* and *mallets* for making the holes for blasting. These are often sent up and down in the bucket (kibble) in which the ore or rubbish is drawn to the surface; but the miner very commonly carries with him from 10 to 20 pounds weight of tools. There is a constant necessity for hardening and sharpening them, which is done at the smith's shop. In one mine only (Wheal Vor) a forge has been established under ground, in imitation of the practice in some parts in Ireland,* for the performance of work of this description. It is said to be very advantageous in an economical view, the weight of coal sent down being only one-fortieth of that of the tools formerly sent up, and time being likewise saved; but its most beneficial effect is the saving of the miner's labour, and the avoidance of the risk of accidents. (Evidence, p. 842, 1. 28).

42. A brief consideration may now be given to the adults by whom the underground operations in these mines are carried on. The miner of the West of England is a man of moderate stature, spare and muscular, with a chest and upper limbs rather more developed than the lower, and having the shoulders slightly inclined forwards. The complexion is sallow, and rather soddened. A miner of very large frame is seldom seen; a very fat miner could be hardly met with. The following table will exhibit the weights of miners in different districts:

Table 1. Weights of Miners working under ground in the several Mining Districts of the West of England.

District.	Mine.	Principal Produce.	Depth in Fathoms.	Number of Men employed.	Number weighed.	Age of those weighed.	Average weight.	Greatest weight.	Least weight.	Remarks.
Western Cornwall	Levant	Copper	260	300	30	20 to 30, average 25	144½	165	124	These men were taken as they followed each other up from under ground. The circumstances under which these men were weighed are not stated, neither are the greatest and least weights.
Ditto	Balleswidden	Tin	85	535	30	20 to 30	158½	..	..
Central Cornwall	Wheal Vor	Tin	250	..	8	..	169½	..	..	These men were weighed when they were about to go under ground, at 6 p.m. They were taken indiscriminately.
Ditto	N. Roskear	Copper	194	320	45	20 to 30, average 24½	156	166½	146	These men were taken indiscriminately from the whole body assembled on the pay-day. Three picked men, whose average age was 28½, averaged 188 lbs.; and three, whose average age was 49, averaged 163 lbs. They were weighed by threes; the greatest and least weights therefore represent the averages of three each.

*In the Allihies Mines, County Cork, two underground forges have been worked for several years advantageously.

TABLE 1.—Weights of Miners working under ground, &c., *continued*.

District.	Mine.	Principal Produce.	Depth in Fathoms.	Number of Men employed.	Number weighed.	Age of those weighed.	Average weight.	Greatest weight.	Least weight.	Remarks.
Central Cornwall	Consols .	Copper	360	954	20	20 to 30, aver. age 24½	lbs. 157½	lbs. 161½	lbs. 156½	These men were weighed before they went down, four at a time. Twelve others, who had just come up from under ground, averaged 146 lbs. each: their average age was 24. Eight men, whose mean age was 40, averaged 145 lbs.
Eastern Cornwall	Fowey	Ditto .	230	1030	52	..	163½	192	..	The men in this party were weighed in the weighing-machine. Only three were weighed separately: the "greatest weight" given is that of one of these. These men were weighed separately on the patent scales. The ages are not stated.
	Consols				27	..	156½	183	136	
Devon .	Wl. Friendship.	Ditto .	180	340	30	20 to 30, average 23½	153½	178	130	The circumstances under which these men were weighed are not stated.
Total	..	..	..	3479	242	..	157½	192	124	The Returns for Levant, Fowey Consols, and Wheal Friendship, are signed by the Managers, Mr. Rowe, Captain Davis, R.M., and Mr. Matthews respectively. The weighing at Wheal Vor, N. Roskear, and Consols, was conducted by myself.

43. Much attention has been given within the last few years, and chiefly under the auspices of the Royal Polytechnic Society of Cornwall, to the determination of the average duration of the miner's life, and of the causes by which it is shortened. For the elucidation of the former point, researches were instituted (by Mr. Robert Blee), and some of the most important results are embodied in the following tables:—

TABLE 2.—Showing the Number and Proportion of Male Deaths, at certain intervals of Age, in several Mining and Non-Mining Parishes in Cornwall.

	Parish.	Description of Population.	Male Census 1831.	Of the Total Number of Males dying in Ten Years, there died per cent. between the Ages of										Total Male Deaths in Ten Years.	Decennial per centage of Male Deaths.	Remarks.
				0—10	10—20	20—30	30—40	40—50	50—60	60—70	70—80	80—100				
Non-Mining.	Probus . . .	Rural .	673	29.7	3.	9.9	4.5	6.5	9.1	6.8	18.3	11.4	131	19.4	An almost exclusively agricultural parish; well cultivated; population generally located on elevated sites.	
	Mabe . . .	Ditto .	248	43.7	12.5	3.1	3.1	—	9.3	3.1	15.6	9.3	32	12.2	Exclusively rural; cold, and inhospitable; soil not rich. No miners.	
	St. Clement's .	Rural and Urban.	1311	42.7	4.7	7.	7.5	5.4	6.4	11.3	6.4	8.7	185	14.1	The majority of its population reside in the town of Truro.	
	Mylor . . .	Ditto .	1116	38.3	5.4	6.9	4.4	4.9	6.4	15.8	10.9	6.4	201	18	The majority of its population reside in the town of Penryn.	
	St. Mary's, Truro	Urban .	1280	39.4	5.2	7.6	5.5	4.1	5.2	9.	13.8	7.6	287	22.4	Exclusively resident in the town of Truro; but this is cleanly in this part.	
	Penzance town .	Ditto .	2845	45.7	4.2	5.8	6.6	5.5	7.6	7.8	10.7	5.7	560	19.6	Exclusively urban; well ventilated.	
	Falmouth town and parish.	Ditto .	2849	44.	4.3	7.1	7.7	7.5	7.6	8.1	8.8	4.2	821	28.8	Town population crowded. In many parts dirty courts, &c.; waterscarce.	
Mining.	Illogan . . .	Rural .	2906	35.8	8.6	12.4	8.8	7.9	9.6	8.1	5.6	2.8	602	20.7	Similar to Probus and Mabe, except in having the majority of its population engaged in mining.	
	Gwennap . . .	Ditto .	4087	41.5	7.6	8.	7.5	10.	11.	6.2	5.1	2.6	804	19.6	Has one large village, otherwise like Illogan. Mines in still larger proportion.	
	Redruth . . .	Rural and Urban.	3876	49.1	4.9	5.7	7.2	10.3	8.5	6.3	4.2	2.8	887	22.8	A large and dirty town, in which there reside a great number of miners.	

TABLE 3.—The same particulars respecting Females.

	Parish.	Female Census 1831.	Of the Total Number of Females dying in Ten Years, there died per cent. between the Ages of										Total Female Deaths in Ten Years.	Decennial per cent. of Female Deaths.
			0—10	10—20	20—30	30—40	40—50	50—60	60—70	70—80	80—100			
Non-Mining.	Mabe . . .	264	33·3	11·1	5·5	8·3	8·3	2·7	5·5	13·8	11·1	36	13·6	
	Mylor . . .	1531	30·4	6·8	6·8	8·1	9·	5·5	8·5	13·3	11·1	233	15·2	
	St. Mary's . .	1645	35·6	7·	6·	5·7	5·7	5·	11·7	11·4	11·4	314	19·	
	Penzance . .	3720	35·5	4·3	7·7	6·5	5·5	7·2	10·3	11·6	10·4	577	15·5	
Mining.	Illogan . . .	3166	36·7	8·4	9·3	6·2	5·	7·2	6·6	10·3	9·7	511	16·7	
	Gwennap . .	4452	44·6	6·6	7·7	5·3	4·	6·1	7·2	10·	9·8	650	14·6	
	Redruth . .	4315	45·	4·6	6·9	4·8	4·5	4·8	8·4	10·8	9·7	777	18·	

44. These tables were drawn up about three years ago. Since that time the new Registration of Deaths has furnished materials for a comparison between the miners and other labourers living in the same parishes. The results obtained by Mr. Blee from this comparison, as instituted by him, are given in this table :—

TABLE 4.—Showing the Average Ages of Persons Dying above 30, and Registered, in Three Years in the Parish of Camborne, in Two Years in Gwennap, and in One Year in Illogan.

Parish.	Males.		Females.	Proportion per Cent. of Miners' Deaths by Mine Accidents.	
	Miners.	Not Miners.			
Gwennap . . .	46	60	64	16	} Mean per centage of the three parishes, 17.
Illogan* . . .	49	68	64	32	
Camborne . . .	54	60	53	5	

Mr. Lanyon has also brought together the results, for the first year of the new registration, for the mining parishes of St. Just, St. Austle, St. Ives, Gwennap, Stithians, Redruth, Illogan, Camborne, Gwinear, Gwithian, Breage, and Phillack. They are here exhibited :—

TABLE 5.

Class.	Number of Deaths.	Average Age.
Miners . . . .	. . . 213 . .	50 years 7 months.
Labourers, &c. . .	. . . 196 . .	56 years 7 months.

In the following table are given the results of my own examination of the registers of St. Agnes and Perranzabuloe, Kenwyn and Kea parishes, for the period from July 1st, 1837, to February, 1840, for the former two parishes, and to December, 1840, for the two latter :—

TABLE 6.—Showing the Particulars stated with respect to Miners and other Males above the Age of 15, distinctively.

Parishes.	Population, Census 1831.	Class.	Total Deaths.	Causes of Death.			Average Age.				Remarks.
				Con- sumption	Acci- dents.	Other Causes.	Con- sumption	Acci- dents.	Other Causes.	All Causes.	
St. Agnes and Perranzabuloe	9,435	Miners. .	87	52	6	29	41·5	21·16	57·	49·8	1294 labourers 20 years old are returned (by the census 1831) as employed in mines in these parishes.
		Not Miners	44	10	1	33	31·9	30·0	60·9	53·6	
Kenwyn and Kea	12,388	Miners. .	59	25	7	27	41·4	41·8	50·7	45·6	One of the accidental deaths of miners in the former parishes, and one in these happened to an engineer.
		Not Miners	90	23	3	64	31·0	41·0	51·4	45·9	

* Mr. Blee has since examined the Illogan burial-register for two additional years, and the results have been :—Average age above 30—miners, 51; not miners, 64; per centage of miners dying violent deaths, 18·4.

45. Among the *causes of death* assigned in the registers, those which affect miners to a greater extent than other labourers are consumption and accidents. With respect to the former. it will be seen from the above table (6) that of 146 miners, 77 (or more than one-half) died of consumption, whilst of the males of other classes, only 33 out of 134 (or less than one-quarter) died of this disease.

The following table conveys the results of an examination of the burial-register of St. Just by Mr. Seymour Tremenheere :—

Table 7.

Parish.	Miners' Deaths entered.	Cause of Death entered.				Average Age of those who died by Accidents.
		Consumption.	Accidents.	Various Disorders.	Old Age.	
St. Just, in Penwith	67	29	16	13	9	21·25

The proportion of the deaths by consumption is here more than two-fifths; that among other classes of labourers is not stated.

46. It may be seen from the above tables that the ratio of the deaths by accident to the total deaths of miners has been in Gwennap, Illogan, and Camborne 17 (Table 4), in St. Agnes and Perranzabuloe, Kenwyn and Kea (Table 6), 8·9, and in St. Just (Table 7) 23·8.

The returns made to the queries under the present inquiry give a total of 75 deaths by accident during the last two years, and of these about 70 happened to adults. Those returns embrace altogether an adult male mining population of 12,409. Hence it would appear that the annual proportion of deaths of this description is 1 in 354 of the men employed.*

47. The disease designated *consumption* in the registers embraces two principal varieties. One of these is a form of tubercular phthisis, not distinguishable from that disease as occurring in other classes; the other has apparently nothing to do with the tubercular diathesis, and is distinctively the miners' consumption. In many cases it has been preceded by pneumonia and bronchitis, perhaps often repeated; but in many others, and these are the most characteristic, a degree of shortness of breath is the first symptom complained of, and it is long, whilst itself gradually increasing, unaccompanied by any other. The digestive powers are unimpaired; the miner says "his heart is good;" and when seated feels as if his health were perfect. After a time, however, he begins to lose flesh, and his general strength slowly fails. Pain is not felt until late, and it is then for the most part fugitive. At length cough and expectoration, moderate in extent, come on, and hectic fever is at last established, with the usual concomitants; though the progress of each stage of decline is still slow, and marked by no urgency of symptoms. The duration of this form of disease varies from two to ten years or more; and it is this which chiefly cuts off the miner between the ages of 35 and 50. The chronic character of this *consumption*, and its independence of a strumous origin, are also illustrated by a comparison of the average ages of miners and of other labourers registered as having died of *consumption*. It has been shown (Table 6), that in four parishes, whilst the average age of death by consumption was for miners 41·5 (nearly), it was for other classes less than 31·5.

48. The consumption occurring under 25, which is analogous to the disease so called among other classes, manifests itself, by cough and expectoration (often of dark-coloured sputa), at an early period, and in my own experience has been often associated with hemoptysis. (Evidence, p. 835, 1. 45.) But though deriving some of its characters from the occupation of the sufferer, it is commonly attended by the usual symptoms of tubercular phthisis, and its connexion with a strumous diathesis is often evidenced by the appearance of similar disease among the female members of the family who may be even quite unconnected with the mines.†

49. The description already given of the nature of the places under ground in which the miner works, and of his labour, will furnish a sufficient list of causes of disease.

* The average age of the 29 miners stated in Tables 6 and 7 to have died from accidents is 26·2. These are the only instances in which, as far as we are aware, the age has been extracted from the register. To conclude that the period at which life has been terminated in this way is so early on the general average would be hasty; but the result in these cases is worthy to be borne in mind, in its relation to this inquiry.

† Thus Mr. Lanyon says—"A man presented himself labouring under phthisis: he informed me that he had lost 3 sisters by the same complaint, 1 at 21, another at 36, and a third at 42 years of age ; also 2 brothers. like himself miners, 1 at 54, the other at 59, whilst he himself is 53; so that the brothers exceeded the ages of the sisters by many years." (See also Evidence, p. 840, 1. 24.)

What is here to be observed is the difference of their effects on different individuals. In the younger subjects, acute inflammation or hemoptysis may be induced by some of these causes; whilst in others, the inhalation of carbonaceous, and mineral particles especially, may excite either free secretion of mucus merely, in which the foreign matters are expelled, or it may give rise to a chronic inflammatory condition of the membranes, or, in those who are predisposed, it may occasion the deposition of tubercles, which will be followed by consumption more or less rapid in its course. But in men whose constitutions have been robust up to the age of 35 or 40, the membrane, long habituated to the contact of these foreign substances, retains comparatively little irritability, and the secretion from its surface, in which those substances are involved and rejected, is much less readily produced; the consequence is that they are retained to some extent in the minuter bronchial ramifications, and assist in causing, when they have become more compactly aggregated, the train of symptoms described above, which are similar to, only less acute than those which occur in persons exposed to the inhalation of mechanically irritant particles in other occupations, particularly in the grinding of stone and steel. The characters of the sputa, even at a late period of disease, not infrequently indicate the long-continued retention of such particles; and examinations after death (though very few such have been made) have exhibited deposits resembling melanosis, not unconnected, I believe, with such retention. The partial occlusion of the more minute bronchial tubes, and of the air-cells, both directly by the aggregation of these particles by means of viscid mucus, and indirectly by the gradual thickening of the membrane induced by their contact, will contribute, by increasing the effort of respiration, to the dilatation of the larger tubes, and to the pulmonary emphysema found in other cases; though these effects may be more directly produced by the lodgment in one of the larger pipes of a quantity of this compacted substance.

50. Diseases of the heart and great vessels might, *a priori*, be expected to be of frequent occurrence under the above circumstances. My own experience leads me to believe that they are rare, if we except such degrees of hypertrophy and dilatation as are usually found in those who have followed laborious occupations during a long series of years. Valvular disease is very uncommon. The unplethoric condition of the miner, and the very free perspiration maintained during his labour, will serve to account for his not being the subject of disease of the great organs of circulation to the extent which might have been anticipated.

51. It will have been seen from the foregoing Table (No. 6.) that the deaths caused by other diseases are less in proportion among the miners than among other classes in their neighbourhood. The relative numbers living at the same ages not being known for the several employments respectively, it is probable that some corrections may be necessary for the establishment of a just comparative estimate; but it is believed that these would not materially affect the inferences here deduced.

52. Data are wanting for the ascertaining with accuracy the amount of sickness among the adult miners, short of that which terminates fatally. Pay from the sick-club is usually limited to cases of external injury, and no record of the time lost by sickness has been kept. On the whole there is reason to believe that dyspeptic affections are frequent among miners until about the age of 25, that they generally enjoy something approaching to immunity from disease from that period until 40, and that afterwards the pulmonary affections most fatal to the class begin to show themselves, and proceed with more or less speed in after years. This is nearly the opinion given by Mr. Lanyon with respect to the large body of miners in the midst of whom he has practised, and there is reason to believe that it is very generally applicable (Evidence, p. 835, 1. 20).

53. Notice has been already taken of the amount of *fatal accidents*. A great number of others inflicting injury, not incompatible with the preservation of life, occur in almost every mine. From the United Mines, for a period of two years, in which only one accident attended with loss of life occurred, a return has been made of 77 names of those who received pay from the club in consequence of injuries which detained them from work.* The nature of the injuries has not been recorded; but they are stated by the agent making the return (Mr. Francis) to have been in nearly all cases slight. The only mine in which I have discovered a record of the injury, as well as of the time during which pay was received, is East Wheal Crofty. The agent (Mr. Tredinnick) has favoured me with a copy of it, and the results are given in the following table:

* The number of men employed is 626.

Table 8.—Showing the Number of Accidents which occurred in East Wheal Crofty Mine during the several months of the year 1840, with the loss of time occasioned by them to the men.

Months.	Number of Accidents.	Average detention from work (in days).	Longest detention (in days).	Shortest detention (in days).	Remarks.
January . . .	15	10·4	23	2	Three cases of <i>broken legs</i> are entered in January, besides the accidents in the table. One of these received pay for six months; one for 14 months; and the third was still doing so at the end of 18 months, when the record closes. The accidents referred to in the table are stated to have been all trifling; but a few of the cases were attended with detention from work beyond the month. One fatal accident occurred in this mine. The accidents for the first six months of 1841 are similar in number and character. The number of men employed is 586.
February . . .	14	8·2	18	2	
March	7	7·4	17	2	
April	5	2·8	5	2	
May	3	6·3	10	4	
June	6	12·0	29	2	
July	8	10·6	21	4	
August	8	7·7	12	3	
September . .	12	11·0	25	2	
October	4	12·7	23	3	
November . . .	6	10·6	21	3	
December . . .	3	8·0	10	6	
Total	91	8·97			

There is no reason to doubt that this table presents a fair average view of the number, and severity of the casualties occurring in the greater part of these mines, though perhaps in respect of the latter point rather too favourable.

54. But besides that many of these injuries, though not immediately fatal, ultimately occasion the death of the sufferers,—a great number of individuals in the mining districts are permanently disabled by such contingencies for mining labour, and many for any mode of gaining a livelihood. Loss of sight has been one of the most frequent injuries of this kind.

55. The following table exhibits the causes of the 75* fatal accidents stated on the returns to the queries:—

Table 9.—Mine Accidents.

Mines.	Depth in fathoms.	Number employed under ground.	Surface.			Under ground.				Both.
			Ex-plosion of a boiler.	En-tangled in ma-chinery.	Other causes.	Blasting.	Falling.	Ground falling.	No cause men-tioned.	
W. Owles	150	188	..	..	..	1	..	..	..	1
Levant	260	460	..	..	..	..	2	..	..	4
Ballaswidden . .	85	535	..	1	..	..	..	1	..	2
Botallack	150	147	..	..	..	..	..	..	1	1
Bosweddan	75	90	..	..	..	..	1	..	..	1
Providence	120	116	..	..	..	..	1	1	..	2
Ding Dong	100	269	..	..	..	..	..	1	..	1
Reeth Consols . .	90	114	..	..	..	..	1	1	..	2
Godolphin	110	..	..	..	..	..	..	1	..	1
W. Julia	135	..	..	..	..	..	2	..	..	2
Carzize	120	..	..	..	..	2	..	..	..	2
W. Prosper	78	184	..	..	..	..	..	..	1	1
W. Friendship . .	100	214	..	..	..	..	..	..	4	4
W. Virgin	125	196	..	..	..	..	1	2	..	3
East W. Crofty . .	130	619	..	..	..	..	1	..	..	1
Dolcoath	190	451	..	..	..	..	..	1	..	1
Great W. Prosper .	20	28	..	..	..	..	..	2	..	2
Restormel	50	94	..	..	1	..	..	2	..	3
Trefoil	60	108	..	..	..	..	1	1	..	2
Carnsmorrey . . .	30	122	..	..	..	2	..	..	..	2
Charlestown . . .	85	430	..	..	..	..	..	3	..	3
Fowey Consols . .	230	1067	..	1	..	..	2	3	..	6
W. Betsey (Devon) .	120	119	..	..	..	..	1	1	..	2
Tamar	145	61	..	..	..	..	..	1	..	1
West W. Jewell . .	115	107	..	..	..	1	1	1	..	3
United Mines . . .	220	739	..	..	..	..	1	..	..	1
Consols	300	1003	5	..	..	..	3	..	..	8
Tresavean	290	521	..	1	..	2	4	..	..	7
W. Jewell	150	207	..	..	..	..	1	..	..	1
Grambler, &c. . . .	43	40	..	..	..	..	1	..	..	1
R. Polberrou Consols	130	152	..	..	1	..	..	..	..	1
W. Coates	75	133	..	..	..	..	..	2	..	2
Cornubian	55	100	..	..	..	..	1	..	..	1
Total . . . . .	..	..	5	3	2	8	25	26	6	75

*It appears from the *Second Report of the Registrar General* that the proportion of male deaths in Cornwall, in the year from July 1st. 1838, to June 30th, 1839, between the ages of fifteen and fifty-five. was to the males living between those ages (as deduced from the Population Returns, 1821) about one in eighty-six. If we consider the proportion to have been, among the miners employed under ground, one in eighty, we shall obtain a total mortality among those of this class to whom the returns of the number of

56. The causes of the minor accidents are often the same in kind with those now stated; others again, such as blows from the tools, are not calculated to produce very dangerous injuries.

57. A marked diminution of the accidents from "blasting" has followed the introduction of safety-fuse* for firing the powder. The destruction of the eyes, noticed above, originated chiefly in accidents from this cause; and the prevention of the condition of helplessness thus induced is a benefit only less important than the saving of life.†

58. Every miner now takes some food with him when he goes under-ground an innovation on the custom 20 or 30 years, which has been justly considered most beneficial. The pasties and hoggans, the most usual articles of this kind, will be described in a future page of this Report. Extreme exhaustion during their labour is to a great extent obviated by this sustenance: it is often, however, still experienced after the fatigue of climbing at the conclusion of the hours of work. The condition of the body, if it be not then recruited, is the least adapted to throw off the noxious influences which it has been imbibing during the period of labour, and to resist the effects of the exposure to which it is about to be subjected. A short rest, and a small quantity of warm and nutritious fluid, taken at this time, may probably remedy the past and obviate the future evil, and will certainly afford most essential comfort to the miner. This benevolent provision has been only in one instance effected; but in that it has been eminently serviceable, and appears to have been preservative to an extent which could not have been anticipated. An account of the arrangements at Dolcoath for furnishing soup to the miners is given in the evidence (p. 837, l. 60: p. 838, l. 46). The cost of this bounty is not large, even though two houses and establishments for delivering it are there requisite.‡

59. Before the miner goes underground, he changes his ordinary dress for one of woollen, consisting generally of trousers, shirt, and jacket. He does not wear stockings, but puts on a pair of thick shoes, and he covers his head with a strong

fatal accidents apply (about 15,000) of 187·5, and of these, 32·5 (one-half the two-years' underground accidents in the above Table) will have been caused by these casualties, being 17·3, &c., per cent. Making due allowance for that part of the mining population respecting whom no returns have been made on this point, the total number of accidents almost immediately fatal, occurring in the mines of Cornwall and Devon during the two years, can hardly have been less than one hundred. A thousand, then, at least, have probably been cut off in this way in the last twenty years, and that generally in the prime of life.

* Safety-fuse is a species of cord, into the texture of which gunpowder is introduced, and which is afterwards covered with a coating of a bituminous nature. The process is secured by patent.

† A further security, in connexion with this operation, has been provided in a "tamping wedge", invented by Mr. R W. Fox; but it has not yet come into general use. *Polytechnic Report*, 1835.

‡ The first suggestion of this highly beneficial provision emanated from Dr. Carlyon (see Mr. Henwood's letter (Appendix A), and its execution is due to the same noble lady whose beneficence, emulous of her father's (the late Lord de Dunstanville), has ameliorated the condition of the miner, throughout a very extensive mining district, in almost every department. Mr. Petherick, the manager making the returns for Dolcoath, has assisted the inquiry by an account of the expense incurred by this provision, and of the numbers who have partaken the benefit. In the letter accompanying this account he says "As the time since the introduction of the delivery of soup in this mine is short (three years), we must not speak positively as to its effect as a preventive of consumption, but all of us have remarked that our men are not laid up with colds in the manner they were used to be, neither have we had but two cases within the last three years of miners' consumption." The number of men at Dolcoath is 404, and of boys working under ground 47. The account is as follows:

DOLCOATH MINE SOUP ACCOUNT.					
1839.	January	Half-pints delivered to the men and boys		2598	
	February	Ditto	Ditto	2837	
	March	Ditto	Ditto	2751	
				-----	8186
1840	January	Ditto	Ditto	2640	
	February	Ditto	Ditto	2245	
	March	Ditto	Ditto	2236	
				-----	7121
1841	January	Ditto	Ditto	3256	
	February	Ditto	Ditto	3579	
	March	Ditto	Ditto	4092	
				-----	10927
The average expenditure per month is £5 10s, viz Paid for the soup				£1	15 0
				Ditto for the delivery of it	£3 15 0

1841	Abstract of One Week's Delivery			Men	Boys
April	1.	Delivered by Elizabeth Davey, in the day, to		94	2
		Ditto James Trezona night		75	3
	2.	Ditto Elizabeth Davey day		88	6
		Ditto James Trezona night		77	3
	3.	Ditto Elizabeth Davey day		87	5
	5.	Ditto Ditto. Ditto		82	5
		Ditto James Trezona night		77	5
	6.	Ditto Elizabeth Davey day		86	6
		Ditto James Trezona night		77	2
	7.	Ditto Elizabeth Davey day		84	5
		Ditto James Trezona night		87	

felted cap, hemispherical in the crown, and broad-brimmed, about two pounds in weight. On this he usually sticks his candle, by means of a lump of clay, attaching another to a button.

60. These habiliments are, unless the miner lives very near at hand, kept at the mines, in the changing-houses, where the ordinary dress is left till he comes up from his work. In a few mines, under the benevolent auspices lately referred to, the access to them, from the shafts by which the miner ascends, is by shallow levels terminating, by means of a short footway, in the interior of these buildings, so that the miner, when he comes to the surface, issues at once into a warm air without any exposure. In the changing-houses themselves, the degree in which accommodation is furnished for drying the clothes, and enabling the miner to change his dress without running the risk of chill, is very various. Some of the most perfect are described in the evidence (p. 838, 1. 54; p. 839, 1. 39).

61. Closely associated with these arrangements is the provision of warm water for cleansing the surface before the dress is changed. The quantity of water heated in condensing the steam - the great moving power in these mines - causes a ready access to this article, so essentially beneficial when the frame is exhausted, and the skin coated with mineral dirt; but in the greater number of the mines it is allowed to escape without being collected in any reservoir where the men might effectually avail themselves of it. The excellent contrivance for this purpose at North Roskear is described in the evidence (p. 839, 1. 44).

62. The great body of the miners under-ground are employed in excavating the rock, whether for the sinking of shafts, the driving of levels, or the removing the veins of ore. These operations require, in most of these mines, the almost constant application of the explosive force of gunpowder. The greatest part of the work consequently consists in "beating the borer", that is, driving an iron cylinder terminating in a wedge-shaped point, by blows with a heavy hammer (mallet), whilst it is turned by another hand. The necessity, or advantage, of making the hole in a particular direction, often constrains the miner to assume every variety of posture in carrying on this work; at times he is even compelled to lie on his side for this purpose.

63. When the rock has been bored to a sufficient depth, the charge is introduced, and rammed down with a "tamping-iron", a particular clay being used for wadding, and a certain length of safety-fuse keeping up the communication with the powder; fire is applied to this, and the miners retire till the explosion has taken place. It is not often that the safety-fuse misses fire, but accidents now and then arise from its burning more slowly than usual, which may occur from tight ramming down; the impatience of the miner leading him to a too early examination into the cause of the delay, and the explosion taking place before he withdraws.

64. After the blasting, the "pick" comes into requisition, for the removal of the partially separated and angular pieces of rock. In soft ground the use of gunpowder is only occasionally required. A more minute account of some of the operations which are performed equally by boys and men, and of the usual hours of work, will be found in subsequent sections of this Report.

65. The work above described is done almost universally by the piece. The miner contracts to excavate the rock in a certain situation, at so much per solid fathom; this is denominated "tut-work"; or he undertakes to excavate the vein, and to fit the ore for the market, at the price of so much in the pound of the sum for which the ore is sold; this is called "tribute".

66. It will be seen that both these contracts are, to a certain extent, speculative; but while the former involves only the uncertainty of the nature of the ground, which in these strata is not ordinarily great, the latter is dependent on the character of the vein as well; on its size, and richness, which are exceedingly variable in the majority of mines. The consequence is, that while the tutworkman receives pay approaching in the regularity of amount to that of the daily labourer; the tributer is on one occasion absolutely a loser, and on another receives a sum unusually large for a person in his rank of life.*

The method by which the contracts are let, tends however to equalize, in a great measure, the average monthly earnings during periods of considerable length. At certain stated times, generally at an interval of two months, the work to be

*The tributer is in fact a co-adventurer with the owners, but one who risks nothing but his time and labour.