Chronic bronchitis was diagnosed in a man who had been gassed in the war and treated in hospital for four or five weeks. He had had several attacks of chest trouble since that time. In a few others slight adventitious sounds were found, with no other departure from normal.

In the last column of Table I the conclusions arrived at on interpretation of the clinical and radiological data are indicated for each age group by the letters A, B, C, and D, which have the following significance:

A.—Nothing found in the clinical or radiological examinations which suggests any changes in the lungs: thirty cases.

B.—Changes in the lungs found clinically and radiologically: five cases, in which the diagnoses were:

- (1) consistent with history of previous pneumonia;
- (2) asthma; (3) catarrh; (4) chronic bronchitis; (5) slight fibrosis or senile changes.

C.—Changes in the lungs found clinically only: one case showed slight signs of bronchial catarrh.

D.—Changes in the lungs found radiologically only: fourteen cases. The changes in two were doubtful and in all the others they were of slight degree. Classification of the changes and the clinical findings are as follows:

- (a) Slightly increased striation, or more fibrosis than usual, three cases—(1) occasional adventitious sounds; (2) normal; (3) flat chest.
- (b) Evidence of old pleurisy, three cases—all normal.
- (c) Evidence of slight emphysema, four cases—(1) very muscular; (2), (3), and (4) normal.
- (d) Calcified glands, two cases—both big men, in both occasional rhonchi were found.
- (e) Slight catarrh—normal.
- (f) Catarrh: ? old pulmonary tuberculosis, right apex—normal.

TABLE I

Age Group	No. of Men Examined	Years of Work in Furnace Room	Classification on Basis of Past History and Clinical and Radiological Examinations			
			A	B	C	D
20-29	6	5-12	3	—	—	3
30-39	12	6-18	7	—	1	4
40-49	10	11-25	5	3	—	2
50-59	14	14-24	9	1	—	4
60-69	8	12-39	6	1	—	1
Total	50	5-39	30	5	1	14

Conclusions

After considering the results of the clinical and radiological examinations and the report on sickness rates the committee was unable to find, within the limits of the material included in this investigation, any evidence that the inhalation of alumina dust had caused fibrosis of the lungs.

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Sickness among Workers in Alumina

APPENDIX BY DR. A. BRADFORD HILL

In addition to the clinical and x-ray examinations an attempt was made to measure the amount of sickness experienced by the workers in the two factories. The list of workers, which was obtained as a preliminary to the investigation, included particulars of the approved societies to which the operatives belonged under the National Health Insurance Acts. It was found that the number of societies represented by members at these works was very nearly fifty, but a large number of societies had only one or two members there. In fact, the sickness experience of over 80 per cent. of the operatives could be obtained from only nine societies. It was decided to confine the inquiry to this number. With the assistance of the Department of Health for Scotland the nine societies were approached and kindly provided the sickness histories of the men belonging to them over the five years 1931 to 1935 inclusive. These operatives were divided into two groups: (1) men employed for at least five years previous to the inquiry in the reduction works; and (2) men employed for at least five years previous to the inquiry in the other parts of the factory—namely, the workshops, refinery, and power house. The object of investigation was to see whether the former group, exposed presumably to a higher concentration of dust in the atmosphere, showed any pronounced differences in its sickness rates from the rate experienced by workers in the other parts of the factory. The histories related to 107 men in the reduction works and to 129 in other parts of the factory. As sickness rates vary with age, a preliminary comparison of the two groups was made with regard to that factor. Table II shows that in the reduction works compared with the rest of the factory there were proportionately rather more workers at ages over 40 years and less at under 30 years. As sickness rates usually increase with age this difference may tell slightly against the operatives in the reduction works.

TABLE II

Age Last Birthday on January 1st, 1931 *	Number of Men in	
	Reduction Works	Other Parts of the Factory
Under 20	5 (4.7%)	10 (7.8%)
20-30	27 (25.2%)	46 (35.7%)
30-40	31 (29.0%)	33 (25.6%)
40-50	31 (29.0%)	26 (20.1%)
50-60	13 (12.1%)	14 (10.8%)
Total	107 (100.0%)	129 (100.0%)

* Six men in the reduction works and five in other parts of the factory entered their societies during 1931-5. They have been allocated to the age groups according to their age last birthday on January 1st of the year in which they entered.

Excluding the eleven entries referred to in the footnote to Table II there were 101 men in the reduction works and 124 in other parts of the factory whose sickness history was available for the complete five years. Thirty-six of the former, or 35.6 per cent., and fifty-four of the latter, or 43.5 per cent., had no sickness at all during the five years. The difference between these percentages is small and not more than might easily arise by chance with such small numbers. The total number of claims made over the five years (including cases of workmen's compensation) was 135 in each group. From this figure calculation of a claim rate can be made: taking the rate as the number of claims made per 100 persons per annum, it is 25.2 in the reduction works and 20.9 in the other parts of the factory (for simplification the few entries have been counted as if they were present for the whole five years; more accurate treatment makes no material

difference to the results). If the comparison be limited to illness—that is, if injuries, compensated or otherwise, be excluded—the two rates become 19.4 and 17.4. The rate is slightly higher in the reduction works.

A second rate to be utilized is the number of days of sickness per person. The total number of days of incapacity in the reduction works was 4,027, and in the other parts of the factory 2,885; this appears to be a large difference, but the former total includes 700 days of absence of one man due to an injury (a Workmen's Compensation Act case). If all injuries be excluded from both groups the total days lost due to illness are 2,039 and 2,050; the number of days per person per annum is then 3.8 in the reduction works and 3.2 in the other parts of the factory, while the average duration of a claim is 19.6 days in the former and 18.3 days in the latter.

Finally the type of sickness suffered by the two groups has been compared by means of the diagnoses recorded. This comparison is made in broad groups in Table III.

The operatives in the reduction works appear to have a rather low incidence of respiratory complaints, but taking the small numbers into account there is in general no very distinct difference in the proportional incidence of the various groups of complaints (or in the absolute incidence, as can be shown by calculation of the claim rates for each cause).

It appears from this admittedly limited material that the operatives in the reduction works experienced slightly

TABLE III

Diagnosis	Number of Sicknesses Recorded under Given Diagnosis	
	Reduction Works	Other Parts of the Factory
Diseases of respiratory system	42 (31.1 %)	59 (43.7 %)
" digestive system ...	8 (5.9 %)	12 (8.9 %)
Rheumatism, etc. ...	13 (9.6 %)	6 (4.4 %)
Infectious diseases ...	5 (3.7 %)	1 (0.7 %)
Injuries (under W.C.A. and otherwise)	31 (23.0 %)	23 (17.0 %)
Skin (including septic) conditions	7 (5.2 %)	7 (5.2 %)
Other causes ...	15 (11.1 %)	16 (11.9 %)
No diagnosis ...	14 (10.4 %)	11 (8.2 %)
Total ...	135 (100.0 %)	135 (100.0 %)

higher sickness rates than the men in the other parts of the factory, but that no really substantial differences are revealed in the kinds of illness suffered by the two groups; the difference in sickness incidence does not appear to be due only to the older age distribution of the men in the reduction works, for a slight excess is apparent among comparable age groups.

Nova et Vetera

JOHN MILTON'S BLINDNESS

A SUGGESTED DIAGNOSIS

Speculation continues to be rife as to the nature of Milton's blindness. It has been suggested that it may have been due to albinism (Mutschmann¹), congenital lues (Saurat and Cabannes²), detachment of the retina (Sorsby³), and glaucoma (Stern⁴). In his account of the medical aspects of the lives of certain historical characters (of which a notice appeared in the *Journal* of June 27th), Mr. James Kemble⁵ includes a chapter on John Milton and his blindness, and reviews what we know of the clinical features of the case and the diagnoses which have been made. Milton began to lose his vision at the age of 36, and by the time he was 44 he was totally blind. We know that between the writing of *L'Allegro* and the appearance of *Paradise Lost* he ceased writing poetry and produced pamphlets and books written with a wild invective quite foreign to that beauty, charm, and dignity which characterized his other work, so that Pattison wrote: "The awful majesty of Milton descends from the empyrean throne of contemplation to use the language of the gutter and the fish-market." This period of scurrilous writing took place during the eight years in which he was losing his vision. There was no change in the appearance of his eyes. Milton himself wrote of them, "Eyes; yet to all outward appearance so sound, so clear, and free from the least spot, as theirs who see furthest." He also wrote, "A mist formed on the left side of my left eye, and prevented me from seeing anything on that side," and "My forehead and temples seem to be the seat of chronic vapours, which constantly oppress and weigh down my eyes."

After reviewing the various causes which have been suggested and to which we have already referred, Kemble favours a diagnosis of glaucoma, but admits that the age of 36 to 44 is rather early for the development of this disease, and that it is a little difficult to interpret precisely Milton's statement that "a mist formed on the left side of my left eye." He points out that it seems to mean that there was a defect on the temporal side of the visual field and that in glaucoma there is peripheral contraction of the field, but this, at least in most early cases, is more pronounced on the nasal side.

It is possible, however, that there may be a different solution altogether and one which would more easily

account for all the recorded facts, and suggest that the blindness may have been due to an intracranial tumour exerting pressure on the optic chiasm. We might go further and postulate the nature of the tumour, for it must obviously have been of very slow growth and ultimately have become a "dead tumour," otherwise it would have wrecked Milton's life as well as his visual pathways. Such a tumour might well have been a cyst, possibly one arising from remnants of Rathke's pouch. We have records of a case in which such a tumour, the size of a golf ball, was removed from a man aged 41. For four years he had been steadily losing his vision, and a diagnosis of primary optic atrophy had been made. The pituitary fossa was normal and there were no signs of pituitary disease other than some headache and a minor degree of polydipsia and polyuria. At the time of operation there was a large defect in the temporal field of his right eye; his left eye was blind. The tumour was an old cyst containing cholesterol crystals. In the three years that have elapsed since its removal his right temporal field has expanded slightly but his left eye remains blind. It is very probable that had the chiasm not been explored in this case and the cyst removed this patient would by now have been quite blind, while his general condition might have altered little, if at all, as there was not at any time any increase in his intracranial tension and papilloedema had never been observed. In Milton's case the temporal field defect, with the slowly progressive loss of vision proceeding to complete blindness and the oppressive feelings in the forehead and temples and of a weighing down of the eyes, strongly suggest that he was suffering from pressure on his optic chiasm, and that this was due to a tumour such as that to which we have alluded. Hence we conclude that Milton's blindness was probably due to a suprachiasmatic cystic tumour, which died but destroyed his optic nerve fibres in doing so. While it was most active the great mind forsook the beauty of the fairest of the Muses for vitriolic diatribes; but when the tumour died the intolerant aggressive outlook fortunately died with it, the Muse returned, and *Paradise Lost* came forth. So far as we know this explanation of Milton's blindness has not hitherto been suggested.

L. R.

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