

## John Pemberton and the flax industry in Northern Ireland

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*The following is based on a paper given at a meeting to celebrate the 90th birthday of John Pemberton in The London School of Hygiene and Tropical Medicine, London, on 22nd November 2002. John Pemberton was Professor of Social and Preventive Medicine in Queen's University 1958-1976 and the author had been Stuart Friar Fellow in his Department from 1960-1963.*

Byssinosis is a syndrome of chest tightness and breathlessness which occurs in textile workers. Symptoms commence a few hours after returning to work after a week-end break away from the industry. The symptoms gradually ease during the day, but as the condition advances the symptoms become more severe and last for longer, sometimes for several days each week.

Ramazinni, in 1705,<sup>1</sup> was probably the first to record a description of the condition, though the term 'byssinosis', from the Greek for flax or linen, was not applied to it until 1908.<sup>2</sup> It was Richard Schilling, however, who, in two papers in 1956,<sup>1</sup> established the importance of byssinosis as a common disabling condition within the cotton industry,<sup>3</sup> and his work led to the inclusion of the condition under the Industrial Injuries Acts.

In this legislation, byssinosis was defined as occurring in cotton workers. Workers handling flax were not included either in this Act, which covered England, Scotland and Wales, or in the corresponding Act in Northern Ireland (National Insurance (Industrial Injuries) Act (Northern Ireland) 1946. In 1960, the Ministry of Labour and National Insurance (NI) asked Professor Pemberton of the Department of Social and Preventive Medicine in Queen's University, to conduct a survey of workers in the flax preparing industry to establish whether or not a 'counterpart to byssinosis amongst cotton workers' existed in workers in the flax industry in Northern Ireland.

In fact, towards the end of the survey undertaken in Northern Ireland, the Ministry in London asked



John to extend his survey to England and Scotland to give a basis for an extension of the relevant English Act to include flax workers in the definition of byssinosis. One flax mill in Halifax, one in Glasgow and one in Aberdeen were

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therefore visited by the team and a few workers examined in each – sufficient to identify a few workers with byssinosis!

The work was organised, and visits to the mills arranged by John. The field team consisted of Yvonne Dugeon, receptionist; Geoffrey Carey who performed respiratory spirometry on each man; Ian McAulay who made detailed dust measurements at randomly selected points within every flax preparing room and Peter Elwood, who interviewed each worker, completed the MRC Questionnaire on Respiratory Symptoms and recorded height, weight and an industrial history.

Twenty three of the 24 flax preparing mills in the Province were visited. Permission was not however given for the team to visit a mill which was owned by the then Minister of Commerce in the Government of Northern Ireland. In all, 2,528 workers over 35 years of age were examined, representing 83% of the total workforce of those ages in the 23 mills.

Statistical analyses were overseen by Eric Cheeseman, the first professor of medical statistics in the UK, and Desmond Merrett. The data were entered on Hollerith sorting cards by Mrs Jean McCabe and her staff. The questionnaire data were analysed on a Marchant electro-mechanical calculator and the lung function data on a DUCE computer, the first computer in the University. All these items are now museum pieces!

Overall, 17% of the workers reported respiratory symptoms which were identical to byssinosis as it had been defined in cotton workers. In the early flax-preparing stages the prevalence of the characteristic symptoms was 48%, while in the later stages, which were very much less dusty, the prevalence was low, and the symptoms were totally absent in spinning rooms in which the fibres were handled wet and dust was totally suppressed.

A report stating this, and giving evidence that the condition was clinically identical to cotton workers' byssinosis, was submitted to the Minister of Labour and National Insurance in the Government of Northern Ireland in November 1963.<sup>4</sup> This gave a basis for the enactment of legislation to provide benefits for flax workers. The results of the tiny surveys conducted in England and Scotland made possible the inclusion of flax workers in the relevant English Act.

John had however set aims for the survey which were additional to the one required to satisfy the Minister. These included the ascertainment of the prevalence of a range of respiratory symptoms in the workers, the determination of the distribution of lung function and the relationship of this, and of byssinosis, to the concentrations of airborne flax dust within the various departments in the mills.

A most important finding was that smoking powerfully potentiates the effect of flax dust and was a major factor in the development of all respiratory symptoms. In fact, byssinosis was rare in non-smokers,<sup>5</sup> and this finding was strongly supported by the data on lung function.<sup>6</sup> Published literature at that time however made no mention of this association. Once allowance had been made for the effect of smoking, there was evidence of a significant association between dust level and byssinosis, but not with chronic bronchitis.<sup>7</sup>

A problem became apparent as the survey progressed. This was, whether or not byssinosis is entirely an acute response to exposure to textile dusts, or whether exposure to the dust causes permanent respiratory changes, leading to continuing disablement of workers after they left the industry. It was clear that this was a most important question, fundamental to the understanding of byssinosis, and of direct relevance to the legislation and to claims for compensation by ex-workers who believed they had been disabled by having worked in the industry.

This issue could not be answered by a prevalence survey. Ten years after the initial survey all the workers who had been seen in the prevalence survey were therefore followed up in order to identify deaths. The analysis of these gave no convincing evidence that exposure to flax dust affects survival. Workers who had reported symptoms of byssinosis did show a very small excess mortality, their mortality rate, relative to the rate in all employed men of the same ages (the SMR) being 103 for deaths from all causes. Deaths from respiratory diseases in the flax workers were however raised (SMR 125) but there was no evidence of any gradient in mortality with increasing severity of byssinosis as reported during the survey. The numbers of deaths amongst workers with byssinosis were however small and it was not possible to take adequate account of cigarette smoking in these analyses.<sup>8</sup>

These data on mortality were presented at a number of conferences, and they led to a considerable controversy with Professor Schilling and others. Not surprisingly however, few colleagues found the evidence they provided convincing, and the general belief continued to be that byssinosis does cause permanent respiratory damage. This belief was fuelling a rapidly increasing number of claims by ex-textile workers against factory owners for compensation on the grounds of continuing disability.

Ten years after the study of mortality in the industry, that is, twenty years after the initial prevalence survey in the flax mills, opportunity arose for the situation to be examined further. A team based in John's old department in Queen's University, under the direction of Professor Harold Elwood, conducted a survey of subjects resident in towns in Northern Ireland in which flax processing had been a major source of employment. Random samples of the population were drawn from electoral registers, the MRC Questionnaire on respiratory symptoms applied, lung function measured and an occupational history recorded.

A prediction which had been made when planning this survey, namely that about half the older residents in the selected towns would have worked in the flax preparing industry, was confirmed. It was therefore possible to compare the respiratory symptoms and respiratory function of ex-flax workers with symptoms and function in subjects who had never handled flax. There was very little evidence that the ex-flax workers had any excess respiratory symptoms, or any impairment of respiratory function.<sup>9</sup>

The opportunity was taken at the same time to conduct identical surveys in Bolton and Oldham, in which cotton processing had been a major source of employment. Again, as with flax, very little evidence was found that former cotton workers had any excess respiratory symptoms, or any impairment of respiratory function.<sup>10</sup>

The three phases of this work therefore yielded evidence from which it seemed reasonable to conclude that byssinosis does occur in flax workers with a prevalence and severity similar to the condition in cotton workers, and that cigarette smoking is a powerful potentiating factor in the development of byssinosis. By far the most important conclusion was however that while workers can be disabled by byssinosis while

exposed to textile dusts, once they leave the industry the symptoms disappear and there is no permanent disability attributable to the dust.

Following discussions with a number of people, including industrialists in the flax and linen industry and medical colleagues, a commentary on changes in the flax industry, with predictions of the likely future for the industry was submitted and published in the *Lancet*. In this it was stated that 'the future of the (flax) industry, perhaps even its very survival, probably depends more on medico-legal developments than on all the technical and other issues combined'.<sup>11</sup>

It has not been possible to obtain continuous data on claims for byssinosis. The condition had been included in the National Insurance (Industrial Injuries) Act (Northern Ireland) in 1966 and the total number of applications up to 1980 appear to have been well over 700. In the five years to the end of 1970, 35 claims were allowed. In the next five years 22, and in the five years 1976 to 1980, 168 claims were allowed. Although no further figures were available, it was stated that there had been no claims after about 1983. Strangely however, six patients were admitted to hospital in the 1990s, with a diagnosis of byssinosis.

Nor has it been possible to obtain details of common law claims. One of the managing directors of a mill was most helpful, and according to him the mills had been able to survive the claims for byssinosis because flax was then a highly profitable business, and insurance cover had been adequate. At the same time, the situation with byssinosis appears to have fuelled the 'blame culture' and this is now posing problems for the industry greater than byssinosis had ever been.

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Epidemiologists are always interested in long-term outcomes, and so in order to get some details about the present state of flax growing and flax processing in Northern Ireland a number of medical colleagues and managers and others in the industry were contacted in 2002. It was also hoped to get information about claims for disablement by byssinosis under the Industrial Injuries legislation, and under common law on the grounds of negligence by mill owners.

It seems that no flax at all is now grown in Northern Ireland. Research on new methods of flax cultivation is going on in the Department of



Agriculture in Queen's University but the field work is being conducted in Belarus!

Two mills still process flax, but the raw fibres are all imported. The managing director of one of the mills stated that dust control in the mill is now so good that byssinosis is 'a thing of the past'.

Weaving and the production of Irish linen is apparently thriving, though on a much reduced scale compared with the early post-war years. Covers in seats in 'first class' are made from Irish linen in a number of airlines. Double damask linen is regularly supplied to the British Royal family, the Saudi Royal family, the President of the United States, and recently, an order was received from Number 10 Downing Street. Many hotels in London and abroad are supplied with Irish table linen. The mill which had made specially designed table linen for the Titanic in 1912 reproduced items with the same design to coincide with the launch of the film 'Titanic'. Linen dress fabrics are enjoying a marked revival with leading courturiers.

Most of the old mills have been demolished, but a few remain. One is now a historical and craft centre, run by a Trust. Another is a museum and houses many of the machines, the dust from



which had been measured in the early 1960s by McAulay. The national Trust maintain the Wellbrook Beetling Mill at Wellbrook, in County Tyrone. In the Irish Linen Centre in the Lisburn Museum spinning and weaving are demonstrated. There are 'Linen Tours' in one of the former flax towns, and these include a visit to a working scutch mill, a weaving mill, but none of the processes which used to take place in the preparing mills – carding, hackling, drawing, doubling, spinning or reeling – appear to be demonstrated.

#### CODICIL

John is still active at ninety! He takes an active interest in a current follow-up of the Boyd Orr survey of the diets and health of school children in the 1930s. He and Gwen, John's wife, had been field workers in this survey.<sup>12</sup> Thirty papers arising out of this study are now listed in *Index Medicus*, many being based on a recent follow-up of the cohort by epidemiologists in the Department of Social Medicine in the University of Bristol.<sup>13, 14</sup> Recent papers have been published by John himself on the history of the Society for Social Medicine<sup>15</sup> and on a school diet in the 1920s<sup>16</sup> and he is currently working on other historical papers.

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