THE POOR CLIMBING BOYS.

A HUMANE British Parliament passed an Act several years ago, known as Lord Shaftesbury's "CLIMBING BOYS' ACT," whereby the barbarous employment of poor children for sweeping chimneys was prohibited, and the use of machines enforced. So far as London is concerned, this Act is, we believe, faithfully enforced,—but in the provinces there are at the present time upwards of 3000 of these poor creatures still suffering the wrongs of British slavery.

As the bulk of the climbing boys come from the families of working-men, who by accident, or the premature death of their parents, are thrown into Union Houses—we appeal to our readers to do what they can to *enforce* the faithful carrying out of the Act of Parliament. Mr. Wm. Wood, of Bowden, Manchester, or Mr. James Glass, of 24, Barrington Crescent, Brixton, will gladly correspond with any parties who desire to aid in preventing the use of climbing boys in districts where they are at present employed.

"PITY THE POOR CLIMBING BOYS!"

Cancer at work

Although there has been progress in the treatment of cancer by radiation, surgery, chemotherapy and immunotherapy, it is probable that efforts to prevent the disease have been more rewarding and effective than those made to improve treatment. Some occupational cancers can be prevented when the cause is identified. It is, however, often difficult to find the causes and sometimes even more difficult to remove them when they are known. Two hundred years after Percival Pott made the connection between cancer and the working environment, Professor E. Boyland reviews subsequent work on occupational cancers.

PERCIVAL POTT, FRS, was a surgeon at St Bartholomew's Hospital; his "Chirurgical observations relative to the cataract, the polypus of the nose, the cancer of the scrotum, the different kinds of ruptures and the modification of the toes and feet" was published by Hawes and Collins in Pater-noster Row in 1775. The paper entitled "cancer scroti" describes "a disease as peculiar to a certain set of people which has not, at least to my knowledge, been publicly noticed; I mean the chimney-sweepers' cancer". "The trade call it soot-wart. The disease, in these people, seems to derive its origin from the lodgement of soot in the rugae of the scrotum". He had identified a cause of cancer—a carcinogen active in man. The observations and identification did not stop the exposure of the child chimney sweeps, and Charles Kingsley, who was an active member of the Christian Socialist movement led by Frederick Denison Maurice, described the plights of these child workers in *Waterbabies* almost a century later.

Pott pointed out that "the subjects are young, in general in good health, at least at first, the disease brought on them by their occupation—all this makes it (at first) a very different case from cancer which appears in an elderly man, whose fluids become acrimonious from time, as well as other causes; or from the same kind of complaint in women who have ceased to menstruate. But be all this as it may, the scrotum is no vital organ, nor can the loss of a part of it ever be attended with . . . the smallest degree of inconvenience". He must have perceived the process which is chemical carcinogenesis.

Percival Pott was a modest scholar; as his son-in-law, Sir James Earle, wrote "he often said he began to teach when he had much to learn; and that he was not actuated by that opinionative wisdom which sometimes attends advanced life, after all his study and experience he confessed that he still retained a long list of inquirenda". Samuel Johnson was one of his patients and his portrait painted by Joshua Reynolds hangs in St Bartholomew's Hospital. His epitaph reads "The labours of the ancients were familiar to him; he scorned to teach a science of which he had not traced the growth."

The Romans had chimneys in connection with their hot air heating systems, but in northern Europe chimneys were developed slowly. In mediaeval times hearths in the centre of the living room and vents in the roof were usual. When coal became available as a domestic fuel Count Rumford established the forms and proper relationships of the parts of the chimney. The chimneys which required children to clean them were an English development and the associated disease was more common in England than in continental Europe. It seems probable that chimney sweeps in Germany had some form of protective clothing.

Before Percival Pott, Ramazzini in the *de morbis artificum*, published in 1700, considered occupational diseases such as the colic due to lead to which painters, glaziers and plumbers were exposed. Ramazzini had noticed the high incidence of breast cancer in nuns and indicated that this was caused by their occupation.

Following the work of Pott many clinicians reported on the condition. Bell in 1794 described other cases and said it appears obviously to be produced by soot, for it is found that besides chimney sweeps those who are employed in manufacture in which soot enters are occasionally seized by it. James Earle in 1808 recorded a case of a gardener with epithelioma of the left hand on which he had previously hung a pot containing soot used to kill slugs. He saw that skin cancer elsewhere than in the scrotum could be caused by soot. In the edition of the works of Percival Pott, revised by James Earle in 1808, reference was made to an eight-year-old apprentice with scrotal cancer. Often, however, there was a long latent period. Curling in 1856 described a case of a sailor who developed scrotal cancer in the fifth decade of life but who had been brought up as a sweep. In the nineteenth century the disease remained but it was recognised that not all children employed as sweeps developed scrotal cancer.

With the expansion of the Industrial Revolution increasing amounts of oils were used for the lubrication of machines. Before 1850 the oils were mainly of animal origin but later mineral oils were used in much larger quantities. Volkmann in 1875 described occupational skin cancer by tar, paraffin and soot in Germany and in the following year (1876) Bell of Edinburgh described cases of "paraffin cancer" in workers in the Scottish shale oil industry.

As the incidence of chimney sweeps' cancer decreased in the nineteenth century the incidences of scrotal cancer increased among the spinners of the Lancashire cotton industry, the first cases being described in 1887. This "mule spinners' cancer" has decreased in the present century because (1) the cotton industry employs fewer workers, (2) ring spinning machines have replaced the old mule spinners, (3) less carcinogenic oils controlled by specifications are used, and (4) there has been a general improvement in hygiene. Although less common, scrotal cancer

still occurs in industry in conditions in which men are exposed to lubricating oils.

Although the first synthetic dyestuffs were made in England by Perkin, the German chemical industry was the first to exploit the discoveries and manufacture dyestuffs on a large scale. It was in Germany that the first cases of bladder cancer due to exposure to aromatic amines were reported by Rehn in 1895. The development of dyestuffs industries in other countries was associated with widespread increases in the incidence of bladder cancer. Cases of bladder cancer in men who had manufactured dyestuffs intermediates including 2-naphthylamine and benzidine in England were reported by Wignall in 1929. Another aromatic amine, 4-aminobiphenyl, had been manufactured and used in the United States for many years. The intelligent anticipation and laboratory work of Williams and his colleagues (1952), showing that it was carcinogenic to animals, prevented the manufacture of this compound in Britain and other countries. In 1955 evidence was presented showing that this compound had caused cancer in men occupied with its manufacture.

In addition to their use in dyestuff manufacture, aromatic amines were used in the rubber industry. Case and Hosker in 1954 found an increased incidence of bladder cancer in rubber workers in one region of England. It is probable that carcinogenic aromatic amines have not been used in the rubber industry since 1950 and because of the possible hazard special facilities for early diagnosis have been available for 20 years. Cancer of the bladder has been a prescribed disease in Britain since 1953.

Pott by Reynolds (courtesy Bart's Hospital)

Early in the present century Japanese workers demonstrated that the application of coal tar to the ears of rabbits or the skin of mice induced tumours some of which were malignant. This provides a bioassay of carcinogenic activity which Kennaway and his colleagues used to identify the hydrocarbon 1, 2.5, 6-dibenzanthracene as the first known compound to induce cancer and then for the isolation and characterisation of 3, 4-benzopyrene from coal tar. Carcinogenic aromatic amines and polycyclic hydrocarbons were known 40 years ago, but in spite of much research the mechanisms by which they exert their carcinogenic actions are still not exactly known.

The knowledge of the chemical nature of the carcinogens, which must have been present in the soot that caused cancer in the young chimney sweeps described by Percival Pott, has in some cases helped with the problems of reducing the hazard of environmental carcinogens. Many other extrinsic cancer-producing agents have been discovered. As most cancers in man are probably caused by extrinsic factors, many still remain to be identified. The discovery of these and the removal or reduction of them in the environment will decrease the incidence of cancer in the way started by the English surgeon two hundred years ago. □

Career medicine

THE young scientist who wants to venture into medical research now faces an acute problem in finding a satisfactory career structure. It used to be that workers in this field had some form of tenure, either through their contract or through a moral obligation readily acknowledged by the employer. But the trend in recent years has been to offer only temporary appointments lasting, at most, five years. This poses severe problems.

The really outstanding person will always find help elsewhere if the support runs out, of course. My concern is more for the capable and well qualified scientist. Three to five years of medical research may actually prove to be a handicap when competing for teaching or research posts with candidates who have pursued a more academic path.

The Medical Research Council have recently recognised the problem in their own establishments by ensuring that tenure will be granted to staff no later than in their mid-30s—other institutions will probably fall into line. But this only accounts for 20–30 people annually. Numerous first-rate scientists better equipped for work in applied medical research are still unhelped by this scheme.

In the UK, experience has shown that the best way to effect the transition from research activity to clinical trials is through a team of medical and scientific staff who can meet regularly on an equal footing. (Contrast this with the United States where young doctors may undergo a long training in basic science and later become competent to direct highly advanced work in a hospital laboratory.) Such teams at present exist in advanced institutes and in them the scientist (who often makes the early running) has learnt to communicate successfully with the clinician. Might not such teams be introduced more widely in medical schools and general hospitals? They could be a highly efficient means of speeding the acceptance by clinicians of the most recent advances in laboratory methods. And might not this be a solution to the career problem for medical scientists?

Such a scheme could best start in specialised centres or medical schools where there already is a tradition of regular clinical conferences. Young medical staff would rapidly recognise the advantages of team work with scientists; it is all but impossible to keep pace with advanced laboratory methods as well as advanced medicine.

Recruitment of scientists to such a service could take place in two ways. Firstly, at the graduate level, for which the Universities might set up an M.Sc. course in Bio-Medical Science as a recognised qualification. Secondly, scientists who have already spent three to five years in medical research might be required to take a diploma in Bio-Medical Science. These courses would provide a general clinical background to the problems in which the hospital laboratories play a major role a large proportion of the lectures being given by medical staff. This would be far less expensive for the country than the training of medical graduates in advanced laboratory methods, in addition to their medical training. Such a scheme could provide a career structure for those scientists at present in medical research who have a most uncertain future.—*E. J. Ambrose.*