Marked variations in the incidence of occupational skin cancer have occurred. Cancer of the scrotum of chimney sweeps only occurred in Great Britain, attributed to the unique system of cleaning chimneys, the type of coal in use and the preference for open fires instead of stoves, and perhaps the wearing of protective clothing. The occurrence of cancer of the scrotum in the mule spinning of cotton was almost entirely a British phenomenon and was completely restricted there to the mule spinning of raw cotton. No cases occurred in the use of waste cotton-linters, although the machines and the oil used were identical in both processes. The difference was the requirement in the former that the temperature in the workplace be above 80°F (26.7°C) and a somewhat slower spindle speed in the latter. The absence of cases in the rest of the world, except in British immigrants, could have been due to slower spindle speeds, lower temperatures and different oils. An increased incidence in the engineering industry was noted in the Birmingham region in Great Britain (Cruickshank and Squire, Br. J. indust. Med., 1950, 7, 1).

A study of variations in incidence of cancer of the scrotum has been made. Waterhouse (Ann. occup. Hyyg., 1971, 14, 161) showed that the incidence of cancer of the scrotum was 4 times as high in the Birmingham region as the South West Metropolitan region and that in Birmingham 97% of the cases were occupational and 85% due to oil. Geographically an increased incidence has occurred only in the Birmingham region and in the valley of the Avre in the Haute Savoie. The highest incidence has been among automatic machine operators and in workers using neat cutting oils. In the Birmingham region there have been marked variations in incidence according to the place of work. For example, in one workshop employing 85, 16 cases of carcinoma of the scrotum as well as of skin carcinoma occurred. Owing to labour turnover each year it is not possible to estimate the true incidence over the years, but there was undoubtedly a high incidence. In a similar neighbouring factory in the same firm no cases have occurred over the same period and a similar pattern of incidence occurred in other workplaces. No relationship was found between high incidence and lack of cleanliness.

The increased incidence of oil cancer in the Birmingham region and the Savoy Alps may have occurred to some extent because they are centres for machine tools but they are not unique centres in either Great Britain or France and similar work without an increased incidence is carried out in all industrial countries. The excess of oil cancer in auto-setters occurs because their groins may be continually contaminated by neat cutting oil. A comparison of work places, similar in all respects for the incidence of oil cancer, failed to find any causative factor. At the present time the major factors in the marked variations in incidence have not been identified.

**THE CARCINOGENICITY OF OIL MIST.** H. A. WALDRON, Department of Social Medicine, The Medical School, Birmingham.

There is no doubt that exposure to mineral oil may induce skin tumours in susceptible individuals but there is some controversy regarding the carcinogenicity of oil mist (Lancet, 1970 ii, 967). A preliminary study of a series of men with a first primary tumour of the scrotum revealed an excess of subsequent primary tumours, notably of the bronchus and digestive tract. (Holmes, Kipling and Waterhouse, Lancet, 1970, ii, 214; Waterhouse, Ann. occup. Hyyg., 1971, 14, 161; Waterhouse, Ann. occup. Hyyg., 1972, 15, 43). The present study has extended these findings, particularly as they relate to exposure to oil mist.

A total of 288 cases of scrotal cancer was registered at the Birmingham Regional Cancer Registry (BRCR) between 1936 and 1971 and in this group of men, 42 subsequent primary tumours were registered between 1936 and 1972 (allowing for at least a one year follow-up period). The expected number of second primary tumours was 17.11 ($P < 0.001$). Analysis of the sites of the second primary tumours showed a significant excess in the larynx, bronchus, lip, stomach and skin. An examination was made of the occupations of the cases and these were divided into 4 sub-groups, those with exposure to oil (162) those with exposure to pitch and tar (36), those in whom exposure to known carcinogens was uncertain (73) and those whose occupation was unknown (17). With 2 exceptions, the excess of second primary tumours was confined to the group with oil exposure (see Table I). The exceptions were that an excess of skin tumours was
found in the men with exposure to pitch and tar (3 observed, 0.05 expected, $P < 0.001$) and an excess of tumours of the stomach was noted in the men whose exposure was uncertain (3 observed, 0.59 expected, $P < 0.05$). The first excess is to be anticipated on a priori grounds, but no explanation can be offered for the excess of stomach tumours in the absence of knowledge of exposure to possible carcinogens.

The finding of an excess number of second primary tumours of the larynx and bronchus in the oil exposed group is consistent with the notion that oil mist is acting as a carcinogen. To test this hypothesis, the occupations of all the male cases of carcinoma of the bronchus and larynx registered at the BCR between 1967 and 1969 were categorized according to the Registrar General's classification of occupation. The proportion of men in each of the occupational orders was compared with the number of men in each order as a proportion of the total work force in the region during the same years, the assumption being that if tumours of these sites were related to oil exposure, then a significant excess should be observed in those orders which included men in oily jobs (order V and VII). An overall excess of bronchial tumours was noted in order V ($P < 0.001$) but not in order VII. Neither order showed an excess of laryngeal tumours. The excess of bronchial tumours in order V was due to an excess in 2 categories of workers, metal furnace men, and smiths and forgemen.

The 2 occupations which between them contributed over half the cases of second primary tumours in the index series were the toolmakers and machine operators. In the regional analysis, machine operators were represented according to expectation, but the toolmakers showed a significant deficit of both bronchial and laryngeal tumours ($P < 0.001$ and $< 0.05$ respectively).

Thus, if oil mist is carcinogenic, this effect appears to be exerted on only a sub-set of the exposed population composed, presumably, of persons having an enhanced susceptibility, the basis of which is unclear.

**INDUSTRIAL BLADDER CANCER—THEN AND NOW. H. G. PARKES, British Rubber Manufacturers’ Association, Birmingham.**

The first cases of bladder cancer which were recognized as being of industrial origin made their appearance at the end of the last century. In the years that followed, the casual association with occupational exposure to aromatic amines was gradually understood and explored until it was possible, by 1950, not only to identify the principal carcinogens (e.g. β-naphthylamine benzidine and 4-aminodiphenyl) but also to make some quantitative evaluation of their relative potency. Thereafter, use of these chemical carcinogens was generally discontinued in favour of other and safer compounds. Industrial bladder tumour was recognized as a prescribed industrial disease in 1953 and regulatory control of the principal carcinogens was introduced with the Carcinogenic Substances Regulations in 1967.

Despite all this, it remains true to say that new cases of industrial bladder cancer are still making their appearance today—some 80 years after they were first reported. This observation does not appear to evoke the response of concern and profound shock which it would seem to merit.

Due to the long latency of these industrial cancers a very large population remains at risk today and only a small proportion (some 20,000 in Britain) have any form of routine surveillance or screening available to them. Many more deaths will yet take place among the victims of this industrial disease before the hazard can be said to have been eliminated.

To what extent are steps being taken to ensure that there is no repetition of this tragedy? Is it not possible that even today there are within industry chemicals not yet recognized for their carcinogenic potential which could be putting yet another industrial population at risk? The means of detecting such a threat and of preventing the long-term consequences are only now beginning to be understood and to be implemented. There

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**Table I**

| Site      | Expected number | Observed number | $P$  |
|-----------|-----------------|-----------------|------|
| All sites | 8.24            | 28              | $< 0.001$ |
| Larynx    | 0.13            | 2               | $< 0.05$  |
| Bronchus  | 2.64            | 11              | $< 0.001$ |
| Skin      | 0.77            | 11              | $< 0.001$ |
| Remainder | 4.70            | 4               | n.s.  |

Expected and observed number of subsequent primary tumours in men with oil exposure.