Chapter 10. Hygiene struggles to find its place

Hygiene struggles to find its place

These chapters are a look at topics in the history of occupational hygiene in Britain, not the history of the British Occupational Hygiene Society, but from BOHS's start in 1953 developments in Britain except for legislation were usually tied up with or reported through BOHS. From that start, BOHS was strong on the underlying science, which had propelled improvements like those in coal mining, but there were few professional occupational hygienists who could apply their skills in a wide range of industries. The object of the Society in the 1953 constitution was "to promote the science of occupational hygiene". Looking back in 1968, David Hickish described BOHS as having been founded as a forum in which different disciplines could meet together for discussion.[1] As mentioned in Chapter 9, in his presidential address at the inaugural conference, Tom Bedford talked about the physicist, engineer, medical scientist, physician and psychologist working together, a coalition of experts, and did not mention the individual professional hygienist with sufficient practical knowledge to apply all these field. In his 1962 presidential address, Peter Isaac, one of the four Harvard graduates, said that although BOHS had reached 220 members after nine years, he doubted if the number of professionally-trained hygienists had yet reached double figures. There was a full-time, one-year post-graduate course at the London School of Hygiene and Tropical Medicine, but he had run a similar course for 12 years, and that experience "gives me no reason to believe that such a course would be well-filled by Britons".[2] (Isaac's was a course at Newcastle on Public Health Engineering, which attracted a dozen students a year, but for the previous four years none of them had been British, because British students could not get financial support.[3])

Looking at papers from a BOHS conference on *Training in Occupational Hygiene* in 1961, one can see why. ICI Ltd was in those days at the centre of the British Chemical industry, and the General Chemicals Division was at the centre of ICI's chemical interests. The Division Medical Officer explained that they manufactured hydrochloric, sulphuric, formic, oxalic, and chlorosulphonic acids, and produced chorine, which they liquefied and sold, but also used it to chlorinate "a host of organic compounds". They manufactured metallic sodium and organic mercury and phosphorus compounds, and handled "large quantities" of hydrocyanic acid. In his talk, the Divisional Medical Officer said he was the "key man", consulted on precautions, and design of new plant and lay-out of sites. He concluded that "there is little need for the employment of an industrial hygienist in a large well organised industry" although he could see that smaller industries might need one.[4] ICI did have central Industrial Hygiene Research Laboratories, but their purpose was to supply toxicological information to the Medical Officers.

The Chief Medical Officer of Esso Petroleum Ltd was not so negative. They had 14,000 employees, two refineries, and 29 sea-going tankers, with many chemicals, including caustics, and carcinogens, and radiation, noise, heating, and lighting hazards. They had employed an occupational hygienist since 1958, who was a chemist with process engineering experience, and who had undergone training at Esso in the USA. "He works directly under the Chief Medical Officer… all his reports are countersigned by one of the doctors before going out." [5]

Fig.10.1. Esso refinery and Fawley marine terminal, 1958. This was the year in which Esso appointed its first occupational hygienist in the UK. In later years Esso hygienists made important contributions to occupational hygiene nationally. Photo courtesy of EssoMobil

The Esso example illustrates that in the early days hygienists in industry sometimes faced a struggle to get out from under medical departments, where they were being in danger of being regarded as sampling technicians. There were medical officers who knew from experience the professional value of hygienists and played an important part in BOHS, such as John Rogan (President, 1955), Bob Murray (1968), and Graham Jones (1974)[6], but some of their colleagues did not. In 1974, a senior hygienist and ex-President of BOHS walked out of Esso Europe because a reorganisation placed him under a Medical Director he knew. About the same time, Henry Walton, another ex-President, who headed the Institute of Occupational Medicine's highly-successful Environmental Branch and had an array of other qualifications, was told that he could not be considered for becoming Director, because this must be someone who was medically qualified. (In due course this rule was abandoned because of the need to pick the best person for the job!) Early papers from BOHS were published in the *British Journal of Industrial Medicine*, and one of the aims of establishing its own journal, then *The Annals of Occupational Hygiene*, was to demonstrate occupational hygiene as a distinct field, with medical papers being kept below 25% of the content.[7]

Fig. 10.2. GOPOH members at a meeting at Pilkington's Glass Works, St Helens, in 1968. L to R, (with dates in which they became BOHS president): Jerry Sherwood (1966), David Hickish (1967), Cliff Warner (1956), John Adams, Geoff Hedgecock (1978), Gwyn Davies (1993), Michael Molyneux (1979), Ted King, Jim Sanderson (1982), Derek Turner (1973), Ken Bishop, Ray Higgins, Dermot Doran (1984), Don Murphy. Absent: Stan Roach, Bob Rowlands, Stan Silk, John Steel , Gerry Lee, Stuart Luxon. In addition to their presidencies, many held other posts in BOHS, and later in IOH.

Towards an established profession

In Chapter 9, I described the Slough Industrial Health Service, and the work of its hygienist, Jerry Sherwood, one of the four who trained at Harvard.[8] In 1953, the team there described occupational hygiene as "the measurement and control of the working environment with the object of safeguarding the health of people at work" [9]. By 1961 this had spawned a Slough Occupational Hygiene Service, directed by David Hickish, another of the Harvard four. He gave a paper at the same conference on training as the ICI and Esso papers quoted above, but his paper is quite a contrast.[10] He described the hygienist's function as recognition, evaluation, and recommendation of controls (reflecting the definition adopted by the American Industrial Hygienists Association[11]), and he gave examples of the application of these functions. He said that recommendations are likely to appear as criticism and meet resistance, so the hygienist must have adequate training and experience. Training should include: "physiology, some elementary industrial medicine and toxicology", air sampling and analysis, dust, radiation, noise, heating and ventilation and air-conditioning, lighting, and statistical methods. The training must include practical work and field surveys.

In view of the struggle some hygienists had with medical colleagues, it is interesting that Hickish says that he does not see how the hygienist can function without medical advice, and needs "the advice and assistance and full co-operation of the Industrial Medical Officer".

However, the Slough unit did not last. In 1965, Hickish presented another paper at a BOHS conference, but this time on lessons from the closure of the unit the previous year.[12] These were fundamentally that the demand for such a service from industry was insufficient to support it – its finances had always depended on a grant from the Nuffield Foundation which decreased annually. An editorial in the same issue of *Annals of Occupational Hygiene* said that in the previous ten years only five firms had appointed occupational hygienists[13]; there were occupational hygiene services based in Newcastle and Manchester, but they depended on Nuffield grants, and, according to Hickish, on the lower overheads provided by association with universities. By the time of his paper, David Hickish was working as a hygienist for Ford Motors, where he stayed for the rest of his career, while contributing massively to the development of BOHS.

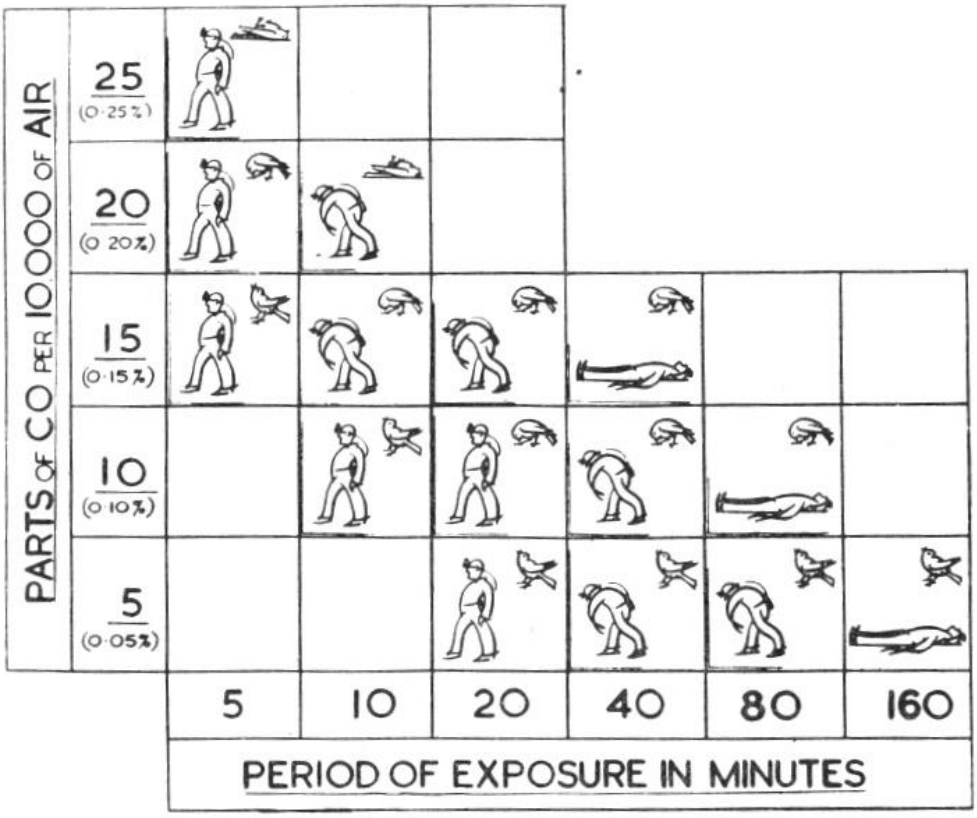

Fig 10.3. A 1962 BOHS conference on carbon monoxide gave National Coal Board staff a chance to present research on hazards other than dust. This is from a paper by TD Spencer on the effectiveness and limitations of canaries in warning of the risk of the gas to miners. 500 ppm may cause collapse in the working miner and leave his canary unaffected. 2500 ppm may kill the miner, but his canary will succumb first and warn him. In Britain today the WEL is 30 ppm and the STEL is 200 ppm. © BOHS (*Ann Occ Hyg* 5:231-234 (1962))

The situation would not be permanently changed until the Health and Safety at Work Act in 1974, but the number of hygienists slowly increased, and they began to meet together as a Group of Practising Occupational Hygienists (GOPOH) (Fig 10.2). Their position was strengthened in 1967, when BOHS established a British Examining Board in Occupational Hygiene (BEBOH) which initiated two qualifications: a Diploma, for which a candidate must have a first or second class honours degree or equivalent, and five years of responsible experience; and a Certificate, requiring 2 science

subjects at A-level or equivalent, plus three years experience. These were awarded following written and oral examinations, and the standard was regarded as high. A Diplomate could then be expected to practise comprehensive occupational hygiene without professional supervision. In 1975, an array of Preliminary Certificates was introduced, eventually thirteen of them, in specialist fields.[14] [15]

BOHS and science

However, it would be a mistake to see BOHS as divided between practising hygienists and scientists. There was a spectrum of interests. BOHS's first and longest lasting international scientific venture began with the Inhaled particles and Vapours symposium in Oxford, which became a series - the most recent was Inhaled Particles XII in 2017. The organising committee of the first of these included three of the Harvard-trained hygienists. In another important innovation reported in the Society's journal, Jerry Sherwood, one of the Harvard four, had adapted a small pump so that it could be worn, and made personal sampling possible, revolutionising exposure assessment.[16] Ray Higgins, another GOPOH member, was co-designer of the Higgins-Dewell cyclone, the basis of many still in use for sampling respirable dust[17], which was published in Inhaled Particles II. In its first ten years, David Hickish himself had eight papers in BOHS's scientific journal, *Annals of Occupational Hygiene*.

Fig. 10.4. CN Davies (centre), the first editor of *Annals of Occupational Hygiene* (1958-68), at an aerosol conference in Germany in 1981. On the left is Trevor Ogden, who became the sixth editor (1997-2012).

Hygiene standards

Measurement implies standards, because the hygienist needs some guide as to what results are acceptable. As described in Chapter 5, a Factory Inspector, G Elmhirst Duckering, devised measurement methods in the early 1900s, and proposed that a limit for dust concentration might be a better way of regulating factories than just mandating specific control measures, and in 1912 Thomas Legge used Duckering's measurements and his own health observations to propose a limit for lead.[18] The Factory Inspectorate's big 1923 report on grinding and cleaning of castings did not

specify a limit in so many words, but did have a table comparing concentrations in clean and dusty environments.[19] In the late 1930s, K Goodall of the Factory Inspectorate was taking measurements in asbestos factories which were being compared with a "dust datum" equivalent to about 20 f/ml by modern methods.[20] As mentioned in Chapter 9, in 1950 ICI issued a list of exposure limits,[21] and in 1953 the Slough Industrial Health Unit was using the US ACGIH TLV list.[22]

However, in the 1960s, hygienists in Britain were using methods for quartz and asbestos which were different from the US methods, so there were no ACGIH values which could be applied. The Hexhlet static size-selective sampler[23] was being used to measure respirable quartz according to the BMRC definition (see Chapter 8), and after a look at a limited amount of health information the hygienists in GOPOH decided that they would work to a standard of 0.1 mg/m^3 respirable quartz.[24]

The need for standards and the GOPOH initiative led BOHS to establish a Standards Committee, which in 1968 published a standard for chrysotile asbestos.[25] This standard recommended use of the membrane filter method, and proposed a sampling strategy which was ambitious and ahead of its time, and required measurements to be taken over three months to ensure that the upper 90% confidence limit of the average exposure was <2 fibres/ml. This sophisticated strategy was rapidly forgotten: the membrane filter method was adopted, but the standard was applied by the Factory Inspectorate in guidance as 2 f/ml averaged over 4 hours. Other organisations applied it over 8 hours, and in this form 2 f/ml became widely-used.

The Committee's intention was that the chrysotile standard would prevent the first signs of asbestosis occurring after 50 years exposure. In principle this was a strict standard, but the epidemiological analysis was flawed,[26] and when the whole asbestos problem became more political the Committee was accused of being hoodwinked by the industry.[27] Also, while recognizing the risk of cancer, the committee said the state of knowledge did not permit specifying a safe level. This important reservation, that the standard did not claim to protect against cancer and that the committee could not recognise a safe level, did not appear in the summary, which on the contrary said that "it should be realised that exposure up to certain limits can be tolerated for a lifetime without incurring undue risks". I reviewed the standard more fully in the *Annals* in 2003.[28]

The subsequent history of the asbestos exposure limits is too long and complicated to detail, but an important principle was established by the Advisory Committee on Asbestos set up by the government in 1976. In 1979 they proposed a standard of 1 fibre/ml for chrysotile, but the number is less important than their method, because they rejected the approach of defining acceptable risk and deriving corresponding exposure. They proposed instead that a concentration should be identified 'at which further expenditure of effort to lower that level is out of all proportion to the reductions thereby achieved'; that this test should be applied where reduction is most difficult; that the resulting fibre/ml level should be compared with the risk estimates to ensure that the corresponding risk was not unacceptably high; that this number should be applied to all processes as a 'control limit'; and that for all processes there should be an overriding regulatory requirement to reduce exposure below this limit to the minimum that is reasonably practicable. Thus the risk estimates were given very much a secondary role in determining what the limit should be.[29] This approach became influential in later standard-setting for substances where a ban was deemed unjustified, but no clear safe level could be identified.

BOHS Standards Committee proposed several other standards, but the most influential was one for wide-band noise in 1971, which for the first time applied the concept that noise exposures containing equal amounts of acoustic energy would cause equal damage, and so could propose a standard of 90 dB(A) averaged over 8 hours.[30 31] The same approach and standard was promulgated by the Department of Employment the following year, without acknowledging the BOHS standard.[32]

Despite these examples of BOHS's influence, the days in which independent groups could propose standards were coming to an end. The establishment of the Health and Safety Commission (HSC) and the Health and Safety Executive (HSE) in 1974 put involvement of employers and trades unions in the centre of health and safety policy. The dramatic effects of this will be illustrated in the next chapter.

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