Invited Editorial

Occupational Hygiene Education and Status:
Global Trends and A Global Future

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INTRODUCTION

Alice Hamilton is considered as the mother of ‘occupational hygiene’ (at least in the USA) since she introduced at Harvard University the bases of this science, which detects, evaluates and controls hazards arising in and from the workplace (Rose, 2003). After that time (the forties) the discipline, called Industrial Hygiene, evolved and developed very well up to the late nineties. What are the prospects as we settle into the 21st Century?

Relevant milestones of the international development of the discipline are the founding in 1987 of the International Occupational Hygiene Association (IOHA) (http://www.ioha.net) and the support of the International Labor Organization (ILO) and of the World Health Organization (WHO) through publications promoting Occupational Hygiene (OH) (ILO, 1981; WHO, 1988). In 1992, the WHO published a booklet entitled ‘Occupational Hygiene in Europe—The Development of the Profession’ (WHO, 1992), which described the specificity of this discipline, its utility and the basic curriculum for its education and training. This was mainly based on American and British experience. In some countries (for instance in Switzerland), this publication boosted the development of OH, its official recognition and its teaching at a postgraduate level (University of Lausanne, Swiss Federal Institute of Technology, Zurich, 2006). A few years later, a survey of the certification schemes related to this field was carried out by Burdorf (1995) for the IOHA, which confirmed that the profession was well recognized and considered in different countries.

In the USA, the US News & World Report predicted in 1991 that OH would become one of the ‘top 20 professions’ in this country (Burton, 2004). This prediction unfortunately has not been confirmed, and the present situation is not as promising, even in countries with a long-term tradition in this field.

A comprehensive survey on the situation of OH and its education and training throughout the world has not been carried out, so it is not possible to give a clear and unbiased picture of this problem. However an informal collection of information from a network of teachers and colleagues in this field from several countries has been carried out as well as a survey including every member of the IOHA Board of Directors, completed by a literature search.

OH education and training reflects the need and perception of our society for this field. This is why more emphasis has been given here to the recognition of OH in the world rather than to the specific educational and training programs offered in different countries.

I aim here to present a synthesis of the information collected about the situation and the trends of OH in different countries throughout the world as well as to discuss a few ideas and perspectives for the future of this profession.

STATUS AND VISIBILITY OF OH

Countries may be divided into three arbitrary categories: (i) long tradition and strong commitment...
of professional associations; (ii) OH is ‘recognized’ but not culturally integrated; (iii) OH is not ‘recognized’

Such a categorization necessarily biases and oversimplifies the reality (overlapping exists in some countries), but it helps to understand the differences in the way OH is established and taught in the different countries throughout the world.

In countries belonging to the first category (North America, Australia, UK, etc.) the core competence of OH is needed in the field and is provided by in house hygienists in the large companies or by external consultants, as observed in a recent survey (Brosseau et al., 2005). It is interesting to note that, in the same survey, relevant topics such as environmental issues and exposure modelling were not considered by employers as essential competence for industrial hygienists. Those countries and especially the USA, which is a pioneer in OH, defend the traditional roots of our profession and the sustainability of OH even if the environmental issues are becoming a more important part of the field than before, as illustrated by the fact that titles of several professional journals have added ‘environment’ to their specific field (such as occupational medicine or OH). Certification is part of the culture in these countries and registration may be required by law in some of them (Burdorf, 1995). The certification scheme of the American Industrial Hygiene Association (AIHA) is promoted at an international level by the International Affairs Committee of AIHA through its education initiative.

For research and education, J.H. Vincent recently emphasized the ‘undisputed continuing need for occupational graduates at advanced level’. The National Institute for Occupational Safety and Health (NIOSH) in the United States sponsors a network of Educational Research Centers as well as graduate education in OH where emphasis is put on the necessary linkages between all disciplines belonging to the Occupational Health field (Vincent, 2005).

However, a decline in research has been stressed by P. Hewitt in 2004: ‘It is a matter of concern that research in occupational hygiene in many universities has not flourished as well as it could have’ (personal communication of his lecture: An international perspective of occupational hygiene education. Presented at the Annual Conference of the Australian Institute of Occupational Hygienists, in Fremantle, Australia, 2004).

In the eighties, a change of name was discussed in the USA among the members of both American Associations (Toca, 1990) but the fear of losing the identity of industrial hygiene, which had been gained over the years, was strong enough to stop the process (Sheriff, 1991).

For countries belonging to the second category (those represented in IOHA and not belonging to the first category) OH responsibilities are frequently mixed with other ones such as safety, environmental protection, ergonomics or even quality. Therefore, the curricula of the educational programmes of these countries were not specific for OH. Companies may prefer to hire safety technicians rather than occupational hygienists for financial reasons even in countries where OH is legally recognized. Occupational medicine remains the core of Occupational Health Services and other members of the team have, frequently, a less visible identity. T.W. Tsin, the current IOHA President, has nicely described this trend in a paper presented with E. Kau in 2004 (Personal communication of their presentation: The changing role of occupational hygienists. Presented at the Annual Conference of the Australian Institute of Occupational Hygienists, in Fremantle, Australia, 2004). Certification of OH is usually not required in these countries with a few exceptions (Burdorf, 1995), but the body of knowledge and experience is defined as well as the competence of the educational institutions. OH is looking for a ‘niche’ in such multidisciplinary teams. Figure 1 illustrates how occupational hygienists are educated in Switzerland together with occupational physicians and ergonomists. Such an education system with three blocks of teaching, which is common for these three types of experts, is a good way to learn the ‘team work’ that is necessary in occupational health services.

In countries belonging to the third category (most of those are not represented in IOHA) OH is simply not recognized and therefore there are no specific education and training programs within this field. Large companies may have their own experts educated elsewhere. In Australia, for instance, Deakin University (2006) offers a Diploma in OH through a 2 years distance learning course which is quite convenient for people from countries of this category. In developing countries, especially in Africa, the influence of former colonial powers has an impact on their approaches to occupational safety and health issues. Countries, which were under the influence of

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**Fig. 1.** The new ‘Master of Advanced Studies’ in Occupational Health in Switzerland. Each block represents 5–8 modules. Each module represents 2–5 days of teaching including practice in the lab or in the field.

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France for instance, have developed occupational medicine according to the French model. They have not developed OH and show great demand for competencies in this field.

TRENDS AND OPPORTUNITIES

The global trend in our society for occupational health during the last century has been a shift from an effort to reduce the number of victims in hard jobs (mines, tunnels, foundries, etc.) to a development of working conditions, which optimize comfort and well-being. In other words the initial collective concern of the industrial society has been transformed into an individual concern for a better life (Fig. 2). In many developed countries the incidence of occupational diseases and accidents is decreasing and the effects of psycho-social stressors are increasing (Paoli and Merllie, 2001).

Some people argue that these emerging problems (stress, burnout, harassment, etc.) should now be treated as a priority in occupational health, notably because the 'traditional issues' (those belonging to the core knowledge of the OH profession) are more and more under control. This vision is biased by the fact that, apparently, the 'old' problems (lead, silica, solvents, etc.) are better managed, but we all know that a lot of 'traditional' topics are not yet under appropriate control (multiple chemical sensitivity for instance) (Labarge and McCaffrey, 2000). Even silicosis has not yet been eradicated in developed countries (Fedotov, 2005).

To be honest, it can be said that OH is not progressing or even, is losing its visibility almost everywhere. A lot of facts could be given to illustrate this obvious trend. Only a few relevant ones will be given here.

Statistics of the IOHA secretariat (Spee, 2005, personal communication) show a decrease in the number of members of OH societies in North America, which represents by far the most important continent compared to the others. Elsewhere, the number of members is so low that a trend can hardly be detected with one exception: Asia, where a clear upward trend is visible (Spee, 2006), probably due to the rapid development of many countries of this continent and to the globalization process which tends to export the manufacture of many goods in those countries for obvious financial and regulatory reasons. Beside this positive development in Asia, the global decrease is illustrated by a decrease of education and training programs at a graduate level even in countries with a long-term tradition in this field, as has already been mentioned. In Denmark, the Danish Occupational Hygiene Society was dismantled due to an insufficient number of members (Schneider, 2005, personal communication). Most of the persons consulted during the preparation of this paper confirmed this global negative trend.

Paradoxically, in parallel to this downward trend of OH, several new issues have been emerging, which fit perfectly with the core competencies of OH.

Let us consider four examples.

(i) Nanoparticles. How does the exposure to these particles have to be evaluated? What are the appropriate metrics? Is it possible to develop biomarkers? Once the exposure is assessed, what does it mean in terms of health risk? What types of control are really efficient? All these questions belong closely to the OH field (UK Government, 2005).

(ii) In Europe, the new regulation for the control of chemicals, called REACH (Registration, Evaluation and Authorization of Chemicals) offers a privileged opportunity for OH to show its utility since the requirements of this law concern the core competencies of this profession: exposure scenarios, exposure assessment, risk assessment (with reference values) and control (Luotamo and de Bruijn, 2005).

(iii) Bioaerosols and biosafety are becoming very important issues, both at occupational and public health levels. The communicable diseases such as SARS and maybe the avian flu, can be best prevented if the behaviour of bioaerosols is well understood and if the personal protective devices are appropriate. The long experience of occupational hygienists in the workers' protection against airborne hazardous agents cannot be neglected in this context.

(iv) The development of simple tools to control efficiently hazards at the workplace is becoming more and more popular. COSHH Essentials developed by the Health and Safety Executive in the UK (Health and Safety Executive, 2006), as well as the toolkit of the ILO (2005) cannot be developed and validated without a strong knowledge of OH.

These issues and many others should boost a new launching of this profession and represent an excellent opportunity to show how OH can fill the needs of the research necessary to improve the assessment and control of these new risks and problems, both in the occupational and the general environment.

Occupational Hygienists should remain ‘problem solvers’ and should not be limited to ‘rule followers’ as stated by A. Hale a long time ago (Hale et al., 2001).
1986). The profession will come to an end if the companies and other stakeholders need only technicians in the fields to make measurements and are not interested by well-educated hygienists at a corporate level and if universities, research centres and industry do not support research in OH.

**PERSPECTIVES AND CHALLENGES**

It is obvious that OH has to adapt to its environment to keep an ecological niche, but changes in the working world and in our society are so important and so rapid that the threat is becoming very serious and the adaptation may become in the medium term a transformation. The specificity of this field is now considered as too narrow and may be too ‘academic’ so that fewer and fewer companies can afford this type of experts. The development of simple tools to assess and control occupational risks fits the needs of small and medium enterprises (simplicity and cost) and does not require a long investment in terms of training. In other words, the approach to chronic risk, which is the core competence of our profession, is not considered any more as requiring high expertise and can be done by almost any technical person. It is good, at a global level, that prevention can be widespread and can concern as many people as possible, but there is a risk that the hygienists’ expertise be considered as no longer necessary, forgetting that simple approaches can only be done if the complex mechanisms leading to the risks and their consequences are fully understood. The challenge is here: how to increase the visibility of OH and to raise the awareness for the importance of OH among those promoting ‘simple’ tools and multidisciplinary teams. In this respect, it is clear that the ILO and WHO have a key role to play. The work-plan for 2006–2010 produced by the network of Collaborating Centers of the WHO for occupational health offers several opportunities to improve the visibility of OH (WHO, 2006). For instance, the Basic Occupational Health Services project developed in Finland, promoted by the WHO and adopted recently by the Ministry of Health in China (Rantanen, 2005, personal communication) is a perfect illustration of this challenge.

In a keynote address at the 2004 Conference of the Australian Institute of Occupational Hygienists, Peter Hewitt summarized the important landmarks and publications related to OH Education and he stressed that ‘managerial skills play an increasingly important part, as does the application of project management and communicative skills’. This statement illustrates perfectly the need for educated managers in the area of HSE (Health, Safety, Environment). The name of the profession, which has underserved its visibility and which continues to do so, should be changed into ‘Risk Managers for HSE’ as suggested by Jeffery S. Lee (1997), in his keynote lecture at the Third International Scientific Conference of IOHA in Switzerland.

Another important challenge is to find a place in the ‘Health Promotion at the Workplace’ movement which is becoming very popular in Europe (European network for Workplace Health Promotion, 2006) and probably elsewhere too. A lot of companies prefer this voluntary (non-legal) global approach to health problems related to the workplace. The opening of OH to this area, which has been initiated and developed by non-traditional actors in the HSE field, will offer unique opportunities to enlarge the scope of its field and to increase this necessary interaction with new actors. Among these are human resource managers who currently deal with the problem of sick leave (absenteeism) but also have to cope with ‘presenteeism’ (presence at work without any motivation and with very bad productivity) (Aronson and Gustafsson, 2005). The links between sick leave and working conditions have been clearly established (Nielsen et al., 2006). Economists and financial managers are also quite important partners since they are able (or should be able) to introduce economic performance indicators related to the quality of working conditions (strongly related to the quality of production) and to the workers’ health (strongly related with motivation, commitment and productivity) (White et al., 2005). Other actors may be relevant such as insurers, work organization psychologists, etc. It is a well known fact that work is good for health if the working conditions and the work organization fill a minimum set of requirements, well established by the Whitehall Study (North et al., 1996). Therefore, one of the new goals of OH should be to promote good health through adequate working conditions, while continuing to control occupational risks at an appropriate level (avoiding ill health).

**CONCLUSIONS**

Education and training in OH depend on the cultural roots of a nation, on its research capacity and policy, on its legal framework and on the perception and understanding of this field by the stakeholders.

It is time to redefine OH in the context of the new values of our society. The core competencies (anticipation, detection, evaluation and control of risks) should remain the same and be developed at a high scientific level to be able to cope with emerging risks. But, the scope of OH should be enlarged so that the new important related fields discussed above be better understood and integrated. A transdisciplinary approach is needed to develop healthy working conditions for a healthy working population in a healthy society. Transdisciplinarity does not mean that the partners of the team will lose their identity. They will gain in visibility since each of them will be
recognized by his or her competence in the so many different areas related to workers’ health.

Our future will depend on our capacity to learn from the lessons of the past to build up a new image of our core competencies. It holds in two words: COURAGE AND CREATIVITY.

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