On the shoulders of giants: Molecular Biology in Public Health

We accepted with great pleasure the invitation by professor Walter Ricciardi, our friend and colleague, to write an editorial in order to introduce this special issue dedicated to Molecular Biology in Hygiene. We are delighted for two connected reasons. First, Carmine, as a former professor of Hygiene, has passed his concepts of Hygiene on to his family and, despite significant difficulties, keeps working on the problems of preventive medicine in the work environment and in geriatrics. Second, Gerry, raised in an environment of hygienists, has dedicated all his professional efforts to Molecular Biology. As these two distinct experiences have constantly mixed within our family over time, we appreciate the promiscuous intermingling of these two disciplines in this thematic issue. The result is a useful common effort aiming at understanding the problems of diseases in the work environment and in the human environment in general. These problems have a profound social meaning, for which it is necessary to create an essential collaboration with scientific research. This is the only way to benefit human society.

In reality, Hygiene is an applied discipline, derived from different basic disciplines, including microbiology, virology, immunology, forensic medicine as well as clinical medicine. The interaction between Hygiene and these disciplines has always been extremely tight, even though Hygiene has often been seen as a "Minor Discipline from a Lesser God" …. On the contrary, Molecular Biology is not a discipline at all, but simply a methodology, that is, pure technology. However, something rare occurred: the technological innovation has been so vast and disruptive that the new field has detached itself, creating a cultural rupture. And so, biochemistry has become proteomics, genetics has become genomics, and completely new horizons have been opened, with unexpected new perspectives. Essentially, Molecular Biology is something like a tailor workshop, where tissue (DNA, RNA) is cut (restriction enzymes), analysed (sequenced), sewed (ligated) in order to form new clothes (constructs, expression vectors), that can be mass produced in an industrial fashion (cloning vectors). That's all! Furthermore, molecular biologists have made an effort to be excluded from traditional science. In fact, unlike with "traditional" scientists, they are somehow strange and eccentric. First of all, they use a funny language: for example restriction enzymes are called Bim, Eco, Ind (Molecular Biology is called "Bim-Bum-Bam science", an old child's game). Moreover, molecular biologists are truly strange scientists; for example the inventor of PCR, whose work that lead to the Nobel Prize was rejected by Nature, while he got an astrophysics paper accepted, spent a year in a California tribunal spending a fortune on prostitutes (and also telling the world about it in seminars and meetings).

The study of nucleic acids allowed the development of new technologies for the manipulation of DNA and RNA, and permitting researchers to apply knowledge from philogenetically distant species such as viruses, bacteria, and plants, to diagnosis and therapy in man. The genome project has sequenced the entire genome of several different species, including man. Even though only at the experimental level, thousands of human genomes are currently being sequenced to identify alterations specific to diseases. In brief, the explosive innovation of Molecular Biology has induced the formulation of new questions, on which active work is in progress. Could we predict the structural conformation of proteins from their primary sequence deduced from the genome? Could we create new synthetic forms of life? Could we identify the main steps of evolution of life on earth? Could be understand the entire evolution of the species? Could we understand how genes determine

development in mammals? Will we increase our knowledge on mutations and polymorphisms that cause or favour diseases? Will we be able to prevent, diagnose and cure our diseases? Will we able to create new drugs by studying our genes? What will be the effect of understanding our genetic heredity at the individual, family and social level?

Clearly the innovation of Molecular Biology has pervaded Hygiene. This is indeed evidenced by this special issue, and also by the advanced course "Molecular Biology in Public Heath" organized by professor Walter Ricciardi at the Catholic University of the Sacred Heart. The first effect, quite obviously, is the use of PCR. Several papers are indeed dedicated to this aspect, in order to identify and quantitate trichothecene (Agodi et al.), and Salmonella (Quaranta et al.) in food, or for identification of influenza (Amicizia et al.) or Listeria (Piana et al.). Genotypic (Boccia et al.; Mammina et al.; Giammanco et al.; Villari et al.) and expression (D'Ugo et al.) studies allowed interesting conclusions in the area of preventive and predictive medicine.

We whish to congratulate this initiative of the Italian Journal of Public Health hoping to further increase the integration between new and traditional approaches, to evolve and create a modern Hygiene. New technologies allow us to see farther only if they stand "*on the shoulder of giants*", as recognized by Newton.

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