Editorial Introduction: Ethical Case Studies of Chemistry, Part II

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Like no other single discipline, chemistry is centrally important for addressing such diverse global issues as environment, health, food, energy, and material resources. If that is more than a rhetorical standard phrase to request and justify public funding for chemistry, two clauses apply. First, chemists cannot address these issues alone; they have to collaborate with other disciplines, including natural, engineering, and social sciences as well as the humanities. Such interdisciplinary work requires an understanding of the possibilities and limits of chemistry from the outside, compared to that of other disciplines, *i.e.* an *epistemological* understanding of the science of chemistry. Second, interdisciplinary teams can develop useful possible solutions only in agreement with the norms and values of society. That in turn requires an understanding of the moral possibilities and limits, *i.e.* an *ethical* understanding of chemistry. If you really believe in the central importance of chemistry, then you strongly object to the education of bench-worm chemists.

The lesson has implications for the philosophy of chemistry too. First, the foundationalist approach in epistemology that discusses the relationship between disciplines in terms of their presumed reductive hierarchy, is irrelevant. Hierarchical orders of disciplines, justified by would-be reductions, are poisonous to interdisciplinary teamwork. What matters instead is mutual understanding of each other and one's own limits, to which epistemology can provide very useful contributions. Second, such as ethics is an integral part of philosophy, so is ethics of chemistry an integral part of philosophy of chemistry. The philosophers of physics might continue their peculiar ethics-free route, unlike for instance the philosophers of biology, technology, medicine, and others. For the philosophy of chemistry, however, there is no systematic reason, let alone a lack of ethical issues, that would justify ignoring ethics. If they want to make a useful contribution to the future development of chemistry, they do both, theoretical and practical philosophy of chemistry adjusted to its societal role.

In this vein, we present the second part of our thematic issue on 'Ethical Case Studies of Chemistry'. Meant to educate chemistry students with both crucial historical episodes and ethical reasoning of their discipline, they com-

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prise the four classical issues of the debates on DDT and PVC as well as the normative approaches of Green Chemistry and REACH.

Once considered the perfect remedy against both insect borne diseases such as malaria and insect pests, DDT proved to have numerous adverse effects on human and non-human health, most prominently pointed out already in 1962 by Rachel Carson's *Silent Spring*. Tom Børsen and Søren Nors Nielsen provide a general ethical framework to evaluate both the positive and negative aspects of industrial chemicals, which they apply to DDT in order to develop a balanced view.

Another classic in its own right, PVC is one of the oldest and still most widely produced plastics, despite various health and environmental issues. Alastair Iles and coworkers investigate its full production chain, from feedstocks to consumer products such as toys. Equipped with the principles of Green Chemistry they illustrate how the historically entrenched production can be changed at various steps and by various actors to achieve a safer chemical world.

In our second paper on Green Chemistry, based on interviews with French and US researchers, Laura Maxim investigates how the field has developed since its start 20 years ago. She argues that the original ethical movement, according to which chemists would engage in toxicologically safer development, has much weakened since because of the supposed lack of influence and disciplinary barriers between chemistry and toxicology.

The final paper of this set takes REACH, the European regulation of marketing chemicals, as a case to illustrate how ethical ideas have influenced legislation. Jean-Pierre Llored demonstrates that, after curative and preventive environmental policies of the past, REACH has been informed and guided by the precautionary principle. Rather than providing a fixed set of interdictions, the regulation tries to face the uncertainty of the future with precautionary measures to be regularly revised.

With these four cases along with the seven ones from the previous issue we are trying to reach for a set of classical cases of chemistry that span the entire field of ethical issues and aspects. More is in the making, *e.g.* studies on the Bhopal disaster, poison gas in WWI, chemical climate engineering, and on the ACS code of conduct, and even more are solicited. For a systematical and complete overview of the up-to-date state of our project, visit:

http://www.hyle.org/journal/issues/special/ethical-cases.html

If you want to join this project with a case, please contact us as soon as possible. If you have tried one or more case studies in class, your feedback would be very welcome. Both authors and teachers of ethics of chemistry can contribute to a new generation of chemists engaged in shaping a better world.

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