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EDITORIAL 13

One very gratifying aspect of this issue is that it visits three of the major themes of the journal;

1. Philosophy of chemistry written by philosophers of science.
2. Philosophical reflections on chemistry by practicing chemists.
3. The interplay of philosophy of chemistry and chemical education.

The first article is by Rein Vihalemm, one of the leading philosophers of science in Eastern Europe who has had a deep interest in philosophy of chemistry from the early days of the field's development. In this issue Vihalemm challenges the frequently expressed view that the periodic law is in some sense inexact when compared to the fundamental laws of physics.

By drawing partly on the articles of Kedrov, the acknowledged expert on Mendeleev's work, Vihalemm argues that there is an important sense in which Mendeleev's periodic law may be considered to be just as exact as any law of physics. He also argues that Mendeleev "constructed" the concept of an idealized element from the concept of the periodic law. As Vihalemm himself points out, this position appears to be problematical given that one usually considers the development to have taken place in the opposite order. It is usually assumed that the concept of an element preceded the establishment of the periodic law that seeks a way of classifying these elements. Nevertheless Vihalemm believes that the opposite causal sequence can be sustained and it remains to be seen if this is the case. But given that the article contains various criticisms of other authors in philosophy of chemistry one can only assume that some debate of this paper will follow.

The second paper in this issue is altogether different since it consists of some philosophizing by a practicing theoretical chemist. This is a welcome addition to the kind of material usually published in this journal. I hope that an increasing number of chemists might



begin to take up the opportunity to discuss foundational issues in chemistry in the same way that physicists have been doing for many years in our sister Kluwer journal of Foundations of Physics.

The article by Markus Reiher represents an ambitious attempt to apply Bernalffy's systems theory to the field of chemistry, something that has not been previously carried out. Reiher's meta-theoretical approach aims to classify the many different approaches currently used in chemistry by highlighting aspects that usually remain latent. The author claims that his approach will "allow us in turn to study the limits of quantum chemistry and to transcend them."

Part of the account is based on Everett's reformulation of quantum mechanics, which as Reiher reminds us is rather general and goes beyond its applications to issues in the foundation of quantum mechanics and the collapse, or otherwise, of the wavefunction. When applied to quantum chemistry Everett's approach can be used to emphasize the limitations of standard methods like Hartree-Fock and Configuration Interaction. Contrary to what is usually assumed, the state function of any chemical system is not independent of the surrounding molecules, although making such an approximation is often useful in practice. If one does need to take the surroundings into account the formalism for doing so is already available in the form of Everett's decomposition of the state of the whole system as a product of the assumed isolated system and the environment. Of course the fruitfulness or otherwise of such a meta-theory can only be judged in terms of illustrative examples, a subject that Reiher will address in the second part of his article that will appear in the next issue.

In recent years science education researchers, including those interested in chemical education, have been probing the kinds of misconceptions that students commonly develop regarding scientific concepts. Such research often tends to be identified with the notion of constructivism. Many authors in chemical education make the mistake, to my mind, of conflating such pedagogical constructivism with constructivism regarding the nature of scientific knowledge, of the kind that began to develop following the work of Kuhn and other authors of the HPS era (Scerri, 2003).

The article in the present issue is by Keith Taber who has published widely on chemical education. Although he too appears to be a constructivist of sorts, he does not seem to fall into this trap. In addition Taber's work is characterized by a close reference to substantive chemical issues rather than the kind of "busy-work" that is unfortunately all too common in the contemporary chemical education scene. Taber examines the theme of atomic models, claiming that chemical education currently employs what he terms "an incoherent hybrid of historical models". By appealing to the work of French philosopher Gaston Bachelard, Taber suggests that such archaic scientific ideas act as epistemological obstacles to learning. For example Taber draws attention to what he believes to be the mistaken notion that atoms are granted ontological priority in the molecular model of matter. It will be interesting to see what philosophers of chemistry might make of this contribution, as well as the increasing number of educational articles that are beginning to appear in this journal. I might also just mention that the recent rapprochement between philosophy of chemistry and chemical education has been given a healthy boost by Pedro Bernal. This author has given a number of cogent arguments for why chemical educators should concern themselves with the Foundations of Chemistry, both in the general sense of the phrase and in the sense of the journal that bears this name (Bernal, 2002).

The letter to the editor in this issue is by Michael Akeroyd who is one of the unsung heroes of the philosophy of chemistry community. About ten years ago Michael began contacting a number of authors who were producing work in philosophy of science and who were specifically addressing chemical topics. I personally became aware of Jeff Ramsey, Dan Rothbart, Joachim Schummer, Paul Needham among others after Michael had contacted us about his idea of organizing an International Summer School of Philosophy of Chemistry. The first such meeting took place at Michael's home institution, Bradford College, in the Yorkshire town of Ilkley in 1994. As I recall it the meeting was a leisurely affair at which it was possible to attend all the talks, since there was just one main session and all talks were followed by extended discussion among participants.

In the following two years international meetings took place in Rome and Athens. In 1997 Michael organized another meeting,

once again in Ilkley. It was at this gathering that we founded the International Society for the Philosophy of Chemistry (ISPC) and that *Foundations of Chemistry*, which was about to be launched, was adopted as the official society journal. The following year Michael surpassed even his own previous feats in organizing a highly memorable meeting at Sidney Sussex College, Cambridge. As a result of growing interest in various parts of the world it was decided that we should alternate meetings between America and the rest of the world. Michael has continued to serve on the executive ISPC committee and is perhaps the only person to have attended and spoken at every single international meeting to date.

The most recent ISPC meeting, which was wonderfully organized by Joe Earley, took place in Washington D.C. and the papers given there are due to be published as part of the Proceedings of the New York Academy of Science. On this occasion we moved from the old format where everyone could attend every talk in the same room to a new format involving three parallel sessions. Of course this is the outcome of a rapidly expanding field, but one cannot help wondering whether we might be losing something in the process.

But to return to Michael Akeroyd, there can be little doubt that if it had not been for his vision, several of us might have continued to work in isolation for some time. In the present issue Michael's letter concerns the on-going debate between the relative virtues of prediction and accommodation of data by scientific theories. As I have mentioned in previous editorials, the main testing-ground for the renewed interest in this question has been the periodic system of the elements, a topic that has long interested Akeroyd. Here he raises the question of the rare earth elements and their eventual accommodation into the periodic system, an episode that has yet to be explored in any depth.

Finally the issue closes with two book reviews. In the first of these the husband and wife team of George and Laurie Kauffman consider a play entitled "An Immaculate Misconception" by nobel prize-winning chemist Carl Djerassi and in the second review Jeffry Ramsey casts a critical eye on the proceedings of an international conference on "paper tools" held in Berlin and edited by Ursula Klein.

INCOMPLETE LIST OF CONFERENCES ON  
PHILOSOPHY OF CHEMISTRY

In the early 1990s some small meetings were held in Germany, Italy and the UK, including the First International Conference on the Philosophy of Chemistry which took place in March of 1994 at the London School of Economics.

The following larger international meetings followed soon afterwards. Readers interested in a more detailed history of the field should consult van Brakel's article (van Brakel, 1999).

1st International Summer School in Philosophy of Chemistry & Biochemistry, July, 1994, Ilkley, Yorkshire, UK.

Rome meeting, summer 1995, \*

Athens meeting, summer 1996, \*

1st Meeting of International Society for the Philosophy of Chemistry (ISPC), Ilkley, Yorkshire, UK, 1997.

2nd Meeting of ISPC, Sidney Sussex College, Cambridge, UK, 1998.

3rd Meeting of ISPC, University of South Carolina, Columbia, USA, 1999. \*

4th Meeting of ISPC, University of Poznan, Poland, 2000. \*

5th Meeting of ISPC, Loughborough University, UK, 2001.

6th Meeting of ISPC, Georgetown University, Washington D.C. USA, August, 2002. \*

7th Meeting of ISPC, To be held at the University of Tartu, Estonia, August 16th–20th, 2003.

Those interested in attending the Tartu meeting should contact the organizer, Professor Rein Vihalemm, for details. Rein.Vihalemm@ut.ee. Some information is already posted at the official ISPC website, <http://www.georgetown.edu/earleyj/ISPC.html>.

8th Meeting of ISPC, to be held at the University of Durham, UK, mid-late August, 2004. Organizer: Robin Hendry, R.F.Hendry@durham.ac.uk.

Meetings marked with an asterisk denote that their proceedings have either been published or are currently in press.

Readers may also be interested to hear that the recent Philosophy of Science Association Meeting (PSA) in Milwaukee, Wisconsin featured as many as five sessions that included papers on philosophy of chemistry. Two of these sessions, organized by Michael Weisberg and Robin Hendry, were specifically on philosophy of chemistry and included a key-note lecture from Nobelist Roald Hoffman.

#### REFERENCES

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