ERIC R. SCERRI

EDITORIAL 10

A large part of this issue is taken up by a detailed and highly textured article by the historian of science Klaus Hentschel. The subject matter is the work of John William Draper, especially his foundational work in photochemistry. The interdisciplinary nature of Draper's research makes him an ideal subject for discussion in *Foundations of Chemistry*, as does Hentschel's own interdisciplinary approach to the issues that are examined.

While relying largely on a historical approach, Hentschel places the work in the context of philosophical thinking on natural kinds. As is well known, Kuhn's emphasis on incommensurability has been countered by appeal to Putnam and Kripke, who claimed that scientific entities such as the electron, for example, should be regarded as having a causally continuous history starting from the initial dubbing of the term. The common scientist's belief that Thomson's electron is the same as Rutherford's electron, Bohr's electron or Dirac's electron is thereby restored. More recently Putnam's and Kripke's philosophical views have come under criticism from other philosophers who favor a more naturalistic approach by contrast to an analytical examination of the problem of sense and reference and natural kinds.[1] Hentschel proposes that we take the naturalistic approach even further and succeeds in showing the subtleties involved in attempts to establish the reality of a new scientific entity and more specifically Draper's tithonic rays. As it turned out these rays were part of the electromagnetic spectrum and so not in fact a natural kind.

To return to Draper, I would like to mention a few additional aspects of his life and work at the risk of repeating parts of Hentschel's article. Draper attended University College, London where he studied chemistry under Edward Turner. It was Turner who first interested him in the chemical effects of light, a theme

Foundations of Chemistry **4:** 1–4, 2002.

which was to occupy a large part of Draper's scientific life. After emigrating to Virginia in 1832 to join a newly founded Weslyan community, Draper eventually became professor of chemistry at New York University. At about this time the American Chemical Society was founded, beginning with a meeting attended by just 36 chemists.[2] Draper was invited to be the society's first president, an honor he accepted after he was assured that "we will see to it that you are not burdened with time-consuming details and will make it very pleasant for you".[3] Draper achieved considerable celebrity for his work in photography, most notably as the first person to obtain a portrait photograph, which he did in December of 1839. A photograph of his sister taken in July of the following year remains as the oldest surviving photographic portrait anywhere in the world. After moving on to photograph the moon and the sun, Draper was led to a deeper study of the chemical effects of radiant energy in general, which forms the subject of Hentschel's study in this issue.[4]

In the second article, the chemist Robert Kerber raises an interesting pedagogical issue surrounding the beloved Markovnikov rule and suggests that this might serve as an example of the way we should regard other named rules in organic chemistry. The Markovnikov rule, as originally stated, shows many exceptions and provides no real understanding of why a particular portion of a hydrogen halide, for example, attaches itself to one particular carbon atom in what is initially a double bond. The modern understanding of such reactions has led certain authors to rewrite the original Markovnikov rule to refer to the relative stability of carbonium ions rather than the degree of hydrogenation of the two candidate carbon atoms as did Markovnikov's original version. Kerber believes this practice to be mistaken and harmful pedagogically.

Of course such a practice is common even outside of organic chemistry. I will give one example based on a rather bitter teaching experience of my own.[5] Le Châtelier originally stated his principle by saying that when a system in equilibrium is subjected to a constraint, the reaction proceeds in such a way as to "oppose" the effect of the constraint.[6] However when it comes to the effect of temperature and pressure increases one can easily make the wrong prediction by sticking to this talk of "opposing" the constraint. Many modern textbook authors seem to rescue the original Le Châtelier

rule while surrepticiously changing the wording from "oppose" to "yield" or "accommodate" the constraint. What these authors do not seem to realize is that such word changes have the paradoxical effect of rendering Le Châtelier's principle completely incorrect[7] rather than affecting the intended rescue.

Two book reviews appear in this issue. The first, written by historian Mary Jo Nye, concerns the excellent compilation of articles on Philosophy of Chemistry, with the appropriate title "Of Minds and Molecules" that was edited by Nalini Bhushan and her late husband Stuart Rosenfeld.[8] The second review, written by chemical educator Harry Pence, is on an edited collection entitled Communicating Chemistry and concerns the development of chemistry textbooks in various European counties.

Finally I would like to draw the attention of readers to two calls for papers which complete this first issue in our fourth volume. One of these is for a forthcoming special issue on Green Chemistry and the other for the sixth meeting of the International Society for the Philosophy of Chemistry to be held at Georgetown University in Washington D.C. These meetings have served as the focal point of world-wide activities in the new philosophy of chemistry and the sixth gathering, being organized by Professor Joseph Earley, promises to be the most ambitious yet.

NOTES

1. The Putnam-Kripke view is already more naturalistic than the older nominalist approach in that natural kinds are determined scientifically. Gold is whatever has atomic number 79 and water is what has the structure of H_2O.
2. Today the American Chemical Society boasts a membership of 136,000.
3. S. Morrissey, Chemical & Engineering News, December 10, 2001, 59–60.
4. I acknowledge the use of the entry for Draper in the Dictionary of Scientific Biography.
5. The first chemistry class I ever gave was on Le Châtelier's principle. Without realizing what I was letting myself in for I tried to predict the effect of increasing the pressure and temperature on a particular reaction such as the Haber process. I predicted that an increase in pressure would lead to a volume increase and that an increase in temperature would favor the exothermic direction. I was incorrect in both cases. I later realized that this is a rather excusable mistake and that one should not consider a literal opposition to the constraint but actually a yielding to or accommodation of it. The fact that "yielding" is

the diametric opposite of "opposing" makes me think that this is a far worse case of what Kerber is getting at in his article.

6. This is not meant to be a literal translation of Le Châtelier's original statement but is meant to convey the spirit of the principle.
7. I mean completely incorrect in the sense of making precisely the opposite prediction.
8. Stuart Rosenfeld died tragically a few months before the publication of the book. A memorial conference was held in his honor at Smith College in November 2001. The talks given at this meeting will appear in a special issue of Foundations of Chemistry to be edited by Nalini Bhushan.

Department of Chemistry & Biochemistry
University of California at Los Angeles
Los Angeles, CA 90095-1569
USA