



Arie Leegwater

A Brief Excursion in Chemistry: "God-Talk" in Chemistry?

Recently, I wrote a review of two collections of philosophical essays by Eric Scerri for a British journal. The books were devoted to philosophy of chemistry and issues of chemical pedagogy. As I composed the review, I began thinking, "Would such reviews be of interest and value to readers of *PSCF*?" On the face of it, the books contained no references to God, to humans' calling in the world, or to the science/religion relationship—not a single whiff of a theology of science. So, should we simply not care and rule such reflection beyond the pale? Must, in fact, all we do be directly related to "God-talk"? A better approach to take, I would argue, is to ascertain which philosophical, metaphysical, and religious starting points radiate through a scientist's presentation and formulations. For some of us, an inviting option could be to return to an earlier time when "God-talk" was in the air, before the secularization of science took hold. But clearly, it will not do to become nostalgic about a historical "golden age" when persons such as Jan Luyken (Amsterdam, 1694) could describe chemists as "scheiders" [as practitioners of the art of separation or "*scheikunde*"], able to divide even body and soul.

Classical philosophy of science has centered on theory validation: the weighing of theories and the validity of scientific knowledge. A more recent focus has been on considering science as process and practice: "What are the historical conditions under which, and the means with which, things are made into objects of knowledge?" (Hans-Jörg Rheinberger). This contextualization of science has gone hand-in-hand with a growing awareness of the vital role that religious beliefs and commitments have played in the shaping and elaboration of scientific worldviews and pictures. These beliefs are no longer regarded as embarrassing for the reputation of a great scientist, nor are they summarily dismissed as irrelevant to scientific practice. Furthermore, they

are no longer treated only as external factors that, in particular circumstances, may have retarded or advanced the internal development of valid scientific conclusions. Religious beliefs are taken seriously in the task of understanding not only the context, but also the content of scientific practice.

By careful examination, one can often find a person in his or her scientific work by noting the problems chosen, how they are formulated, the experimental evidence marshaled, and the perception of the range and scope of a theory. Take the case of Wilhelm Ostwald, a Nobel Prize winner in chemistry (1909). Ostwald wanted to develop a general chemistry (an "*allgemeine Chemie*") which would undergird all the subspecialties of chemistry. Ostwald's desire was to reconstruct and reformulate the principles of chemistry along more general and intuitive lines. Energy and its transformations were to be the cornerstone for Ostwald's science of energetics. He considered matter to be nothing but a complex of energy factors. Energy has a right (in addition to space and time) to be a central concept in science since "everything that happens is in the final instance nothing but a change of energy." Atomic models or atoms are nothing but "graven images" as he described them in his famous 1895 Lübeck address, "Overcoming Scientific Materialism."

The strength of Ostwald's energeticist position in chemistry is also its major weakness. He wanted to stress the fundamental importance of dynamics (reaction velocities) initially, and subsequently energy transformations at the expense of more structural questions. The relatively abstract mathematical description of energy and its exchange requires the intentional isolation, either theoretically or experimentally, of a physical system, and a conscious neglect of its typical properties and structure. This neglect—or better yet, reduction—of subsuming

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typical properties as instantiations of a general law, ran counter to the major thrust of nineteenth-century chemistry. Ostwald employed a broad range of arguments: scientific, methodological, philosophical, and religious. The latter is manifest in Ostwald's commitment that the energy principle be an explanatory principle of cosmic proportions: it would be an energetics complete with a theory of happiness, an encyclopedia of the sciences, a theory of spirituality, an energetic understanding of consciousness, an argument for Esperanto, and numerous Sunday sermons (fifty-two in all), many of which exhorted his listeners to conserve energy.

Similar fine-grained considerations can be employed to examine the work of chemists such as Linus Pauling (1901–1994) and Charles A. Coulson (1910–1974). Coulson, for example, described the contributions of wave mechanics to chemistry in these words:

You must surely have been struck by the way in which, all along, modern wave mechanics has taken up ideas of the past, and refurbished them. How astonishingly fruitful have been those semi-formulated concepts of the classical chemists: and how necessary, in a sense, it has been for wave mechanics to give flesh and blood to the spirit which it has inherited ... At every turn we have seen how wave mechanics has taken their work and has added to it the quality of a deeper understanding.¹

On the face of it, Coulson describes the development of wave mechanics in chemistry, but yet on closer examination, the statement, particularly the phrase, "give flesh and blood to the spirit which it [wave mechanics] has inherited," reveals a whole new horizon of interpretation. Is it a mere metaphorical turn, for example, as we find expressed in such titles as *Science Incarnate: Historical Embodiments of Natural Knowledge*, edited by Christopher Lawrence and Steven Shapin? Or does it rather reflect a different reading or narrative of the world? In this case, it is a Christian incarnational one: nature not read first of all as mechanism, but as God's incarnational involvement with the earth.

But back to the question at hand: Does the practice of science necessarily require "God-talk," that is, must it involve a form of theism? If we think it must, we will miss the religious dynamic operative in a scientist such as Ostwald. For Ostwald, we see

a concerted effort to eradicate religion from science by a substitute religion based on energy. By contrast, in Coulson, we can admire a valiant effort to be a Christian in his scientific practice, his vocabulary and phraseology giving evidence of that effort. Clearly, to demarcate religion and science is more subtle than we often assume.

Note

¹Charles A. Coulson, "The Contributions of Wave Mechanics to Chemistry," The 1951 Tilden Lecture, *Journal of the Chemical Society* (1955): 2084.

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In This Issue

Several of the articles in this issue reflect long-lasting and intense discussions in the Christian community. Historian Mark Noll (University of Notre Dame) leads off with an article that specifies fifteen attitudes, assumptions, and convictions that have shaped evangelical reflection on the interaction of Christianity and science. Two biologists, Harry Cook and Hank Bestman (King's University College), provide a study of the emerging discipline of biological complexity, as it teases out the nuanced interactions of a cell's cytoplasm and nucleus. This article is followed by a long-awaited author exchange between Stephen Meyer (Discovery Institute) and Dennis Venema (Trinity Western University) centered on Venema's essay book review (*PSCF* 62, no. 4 [2010]: 276–83) of Meyer's recent book, *Signature in the Cell: DNA and the Evidence for Intelligent Design*. Next is an essay book review by Daniel Brannan (Abilene Christian University) of *Reconciling the Bible and Science: A Primer on the Two Books of God*, written by two members of the Church of Christ faith community, attempting to "fully integrate evolutionary thought into theology."

The book review section and two letters to the editor, written in response to previously published articles, complete the issue.

A last reminder: The deadline for submitting papers for the forthcoming special issue of *PSCF* on "Responsible Technology and Issues of Faith" is September 30, 2011 (see p. 182 for details).