What price philosophy?

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Ludwig Boltzmann: His Later Life and Philosophy, 1900–1906. Edited by John Blackmore. Kluwer: 1995. Pp. 266. Dfl140, \$89.50, £59.

WHEN we were students, Ludwig Boltzmann was our hero, more so than, say, Einstein, because we were chemists and Boltzmann is more immediately relevant to chemistry. His distribution law and the eloquent equation $S = k \log W$ were essential for us. How could one understand chemistry without them? And they retain their lustre to this day — Boltzmann's equations remain indispensable, on subjects extending from interpretation of thermodynamic or kinetic data for biological processes to current debates about black holes and other cosmological matters.

There is also of course a well-known dark side to Boltzmann's life — his gradual abandonment of physical science for philosophy and his death by suicide, hanging himself (at the age of 62) while on a family holiday at the seaside. John Blackmore's documentary history is confined to this period, to the last years of Boltzmann's life. He has assembled a collection of documents, letters to and from and about Boltzmann, interspersed with lecture notes and anecdotal recollections, arranged in an admirable way, so that the ageing man himself emerges with rare clarity from the printed pages. (Poorly printed, we might add, for rarely have we seen a book with more gross typographical errors.) But the reader should be warned that there is nothing here about Boltzmann in his prime. For example, 17 letters between Boltzmann and Lorentz dating from 1886 to 1897 are mentioned as existing but there is no hint of their content.

As the book's title implies, there are two ways to peruse this book. One can focus on philosophy and try to assess Boltzmann's role in the field — for example, did Boltzmann influence Wittgenstein? Or one can focus on the life itself. We (the reviewers) are hardly competent for the former, and the latter is probably in any case more congenial to most readers of *Nature*. But, as it happens, the central theme in either approach must be the same, the long battle — an intimate part of scientific folklore — between 'energeticists' and 'atomists', personified by Ernst Mach and by Boltzmann respectively. The energeticists harked back to Bishop Berkeley and his denial of anything not directly evident to the senses, which in Mach's time included atoms and

molecules. The atomists, of course, were the heirs of Newton's corpuscular mechanics. In Germany and Austria (unlike the United Kingdom) the establishment was ranged against the latter and it was a lonely battle for our hero. "Boltzmann is the last great representative of the atomic theory", declared one critic, probably Wilhelm Ostwald, ironi-

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Blue Boltzmann — philosophy, he wrote, "gets on my nerves".

cally considered to be the founder of physical chemistry. Was any prediction ever so ludicrously wrong?

What emerges strongly and perhaps surprisingly from the documents is that the often heated philosophical disputation was not accompanied by any personal ill-will. The protagonists remained friends and Ostwald's advocacy was a major factor in Boltzmann's move from Vienna to the Leipzig faculty in 1900. Boltzmann himself relished the debates and his personal good nature shows forth repeatedly in his correspondence. In a letter to Franz Bretano, for example, he wrote "... nor do I wish or even consider it politeness if someone agrees with me in everything; that is quite clear. I only profit from well-grounded contradiction." His generosity of spirit is particularly apparent in his letters to Svante Arrhenius, a former student who won a Nobel prize in 1905, an honour

that Boltzmann never received despite several nominations. Boltzmann congratulated him on this occasion and, as he had done many times before, wished him success with his future work. No hint of jealousy here, no sign anywhere that lack of recognition contributed to the anguish that led to suicide. In the same vein, Boltzmann's sense of humour comes through in his own writings and in comments by those who knew him. His light-heartedness persisted to the very end, as evidenced for example by his entertaining travelogue *On the Trip of a German Professor into El Dorado*, which describes his journey as visiting professor to the University of California at Berkeley in 1904.

The sadder part of Boltzmann's life emerges in frequent references to his illnesses. He suffered from respiratory ailments, dyspepsia, laryngitis, boils and (according to his wife) urinary tract infections. He himself most often complains of 'neurasthenia', which today might be diagnosed as 'mood disorder', but even the most ardent of Freudians could hardly blame blood in the urine on manic-depressive illness. Nevertheless, he confesses in his letters to periods of depression, confusion and inability to finish work in progress. By the spring of 1906 he was so ill (mentally?) that his lectures were cancelled and colleagues were convinced that he would never return to work. His suicide in September of that year was tragic, but not wholly unexpected by those who knew him. (He had attempted suicide once before when he was unhappy, in Leipzig in 1901.)

Blackmore defines the purpose of his book as being "not to persuade, but to inform, to add new material...". He invites the reader to reach an independent conclusion about Boltzmann's true philosophical persuasion (if, indeed, he had one) and offers none himself. He hints that preoccupation with philosophy may have contributed to Boltzmann's final depression, but rejects the possibility that direct attacks on his own atomic views had anything to do with it.

Did Boltzmann himself leave any clues? Here is a sample to ponder, based on shorthand notes for a philosophy lecture in 1904: "Philosophy gets on my nerves. If we analyze the ultimate ground of everything, then everything finally falls into nothingness. But I have decided to resume my lectures again and look the Hydra of doubt straight in the eye, and it can be quite ominous if one values one's life." □

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