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Chemistry in Theatre. Insufficiency, Phallacy or Both.

Carl Djerassi

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This book deals with the question of what role a play, or the theatre, can fulfill as an educational or pedagogic tool in the broad scope of science learning and education. The book contains the texts of two of the author's recent plays, viz. *Insufficiency* and *Phallacy*.

Carl Djerassi is a writer and an emeritus professor of chemistry at Stanford University. He has published short stories, poetry, some novels and several "science-in-theatre" plays.

Almost one fifth of this slim booklet is occupied by Djerassi's preface that is, in its own right, a most useful essay worth reading by any student of the exact sciences. Djerassi's point is that most of the modern science plays have a didactic component, and aim to illustrate – through the medium of theatre – what science or scientists are all about. To make such plays available to a broad audience, he advocates the production of readable books written in play format. The strong point of such plays is the dialogue format – as was already very well known by forerunners like Galileo Galilei with his *Dialogue Concerning the Two Chief World Systems*, published in 1632. Djerassi does not tell *what* his characters do, but he emphasises *how* and *why* they do some specific thing.

Insufficiency is about the chemistry of champagne bubbles (coined *bubbleology*, i.e., the science of champagne or beer bubbles), in a scientific academic context dealing with tenure and fashion. The story clearly shows how the life of a young tenure-seeking scientist develops under the strong interlock of forced – but also of voluntary – overwork that leads to tenure (in turn accompanied by an increase in material security). But it also mentions the self-imposed and seemingly unescapable treadmill of success and scientific achievement that comes with tenure. The play also deals with fashion in science via the simplistically coined term *bubbleology*, and the author shows that the actual implications of this "science" actually even reach to cosmology. The dialogues in this play also point to the problem of untenured lecturers that are tough graders in a culture of student grade inflation and anonymous student evaluations. The discussion also reflects on the system of peer reviewers and referees on evaluation committees.

Phallacy deals with the similarities and differences between science and art, and connects both. The play poses the question that comes up after the discovery that a bronze statue that was considered since long to be a Roman original, suddenly is demonstrated to be a Renaissance cast: does that discovery change the value of the artwork? The play furthermore illustrates how scientists fall in love with their own pet theories, and defend their favourite hypotheses against new evidence. The essay has very good and sharp dialogues about citing and not citing each other, and about the problem of the perception of discussion and counterarguments as personal affronts. The play vividly touches on the concept of scientific "truth" and illustrates this in a playful way, along with concepts as the scientist's life-work, fraud, proof, and credit, and even the question for priority and credit via the unwritten rules about the order of author names on a paper.

The science plays in this book are intended for reading rather than for performance on the stage. The booklet is very enjoyable reading, and offers pleasant plots that lead to unexpected outcomes – although not of the "happy end" type. The book deals with how scientists work, with the excitement and drama of scientific discovery, with the tribal nature of scientist's behaviour in the typical atmosphere of a run-of-the-mill laboratory or university department, and even includes aspects of scientific writing. The underlying morale is that first-class science and crookedness by some of its practitioners are not necessary incompatible. The short digressions about quality of a scientific work (i.e., something inherent to the work itself), the value of a scientific work and of a scientist (that refers to how the research and the researcher are evaluated, and how the result of this assessment is perceived by the society) and on scientific truth (i.e., coherence in facts, ideas and theories, knowledge that passed the test of verification and, last but not least, truth in the communication of results), are a substantial bonus to the reader.

I vividly recommend this book to all students of the exact sciences, but also to their supervisors, who can use these fictional characters and research activities to discuss the moral principles that underlie the lifelong job of scientist. The paperback version of this work is quite affordable, the e-book price is exuberant.

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