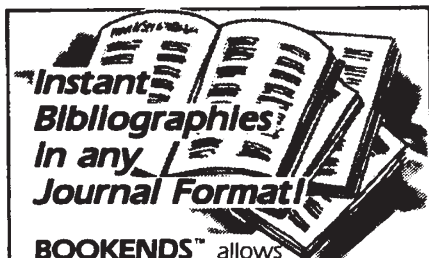


what is already thought about evolution. It is a modest contribution, but a real one. He, however, would see it otherwise. Like his fellow authors he is resolved on revolution. He believes that his work exemplifies a new "generative paradigm" for biology, which ought to replace the philosophically less satisfactory evolutionary "paradigm" that biologists persist in deceiving themselves with. Now, I do not think biology even has "a" paradigm; but I do not want to argue about that: what I do deny is that Goodwin's work demands any deep changes in the theory of evolution.

In general, these volumes completely fail to show that natural selection should be relegated to the explanation of "last resort". Not all the ideas discussed are wrong, or unimportant: but those that are probably correct are already incorporated in the Darwinian theory, or can be added to it without conceptual difficulty; and those that are not, have for that reason already been rejected. Darwinism is not as vacant, nor as silly, as these authors portray it. I too hope to spend my declining years thinking about evolution. But I still expect to make frequent resort to Mr Darwin's theory, which has survived over a century of criticism: to his theory of natural selection. After all, what else do we have? □

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## Shadows on the wall

P. W. Atkins

### In Search of Schrödinger's Cat: Quantum Physics and Reality.

By John Gribbin.

Wildwood House/Corgi/Bantam: 1984.

Pp.302. Hbk £12.50; pbk £2.95, \$8.95.

### Quantum Questions: Mystical Writings of the World's Great Physicists.

Edited by Ken Wilber.

Shambhala, PO Box 271, Boulder,

Colorado/Routledge & Kegan Paul,

London: 1984. Pp.208. Pbk \$8.95, £8.95.

THESE books confront us with two totally different yet intellectually entwined approaches to that most extraordinary of this century's revelations. Gribbin's popularization of quantum theory I approached with sympathy; Wilber's collection of essays with something akin to scorn.

*In Search of Schrödinger's Cat* is the more straightforward book. It is one of a small number, none of them particularly successful, which attempt to convey the content of quantum theory to a lay audience. That audience is generally presumed to expect bewilderment, the folk-appreciation of quantum theory, and generally it gets it. Popularizations begin with the precept that quantum theory has overthrown our most fundamental expectations of the world, and has replaced them by deep perplexities. Gribbin shares with his readers his astonishment and delight that so much oddness may be taking place around us, and successfully conveys his opinion that deep down the world is mysterious beyond our dreams. All this he does with an admirable desire to convey insight and wonder. However, the execution is uncontrolled, and for many pages he wanders off into the mechanisms of lasers and semiconductors. These excursions are intrusive, and the book would have had more impact without them.

Be that as it may, I must confess that I do not approve of the impact the book might have had. Gribbin favours awe. That certainly makes for better journalism, but in the later stages of his book, after we have been saturated with astonishment, he unfurls his true colours and flies the flag of many worlds. This minority interpretation of quantum theory is plainly a science fiction writer's joy machine: it is the opium of the physicist, and being so outlandishly profligate (resembling the hypothesis of God) its acceptance seems to me to abnegate the scientist's duty to seek truth in simplicity.

Gribbin's book is a child of the public wonderment of the discoverers of quantum theory, and his awe is fuelled by theirs; for since the founders of the subject were bewildered it is hardly surprising that their interpreters convey a sense of stupefaction. I, however, prefer to think of the quantum fathers as being so steeped in their classical

expectations that they could never loosen their minds to accept the greater simplicity their discoveries implied. Even Heisenberg, who is represented in Wilber's collection of essays, seems to me to have misunderstood the uncertainty principle by interpreting it as limiting our ability to know the present, rather than appreciating that it constrains the meaning of "complete description", and not our ability to know it. Classical physics, quantum theory shows, is *overcomplete*, and attempts to impose descriptions that are too complete for reality to bear; quantum weirdness stems from our insistence on answers to classically conditioned, meaningless questions.

But *Quantum Questions* goes beyond the misconceptions that plagued the founding fathers. It is a collection of their essays in which they reflect on mysticism, technically interpreted to mean the direct discernment of reality beyond the image, and in particular the experience of the reality beneath the mathematics. There is, of course, a narrow line between hallucinations, in which the divine is purportedly directly experienced, and the kind of comprehension being groped for by the quantum physicists as recorded in these informal essays. They could dimly see that the homomorphism of mathematics and the world, the fact that mathematics works and is our key to the exploration of the workings and structure of the world, must entail something much deeper than at first might appear. They variously muse and strive in these essays to identify the substance beyond the mathematical shadows on the wall. For what it is worth, I am sure they are right, and that the hand-in-glove fit of mathematics and "reality" must be more than a coincidence. I personally suspect that it reveals a consonance of the logical structure of mathematics and the structure of spacetime, and that one is in some sense in resonance with the other.

I emerged from Wilber's collection, and his charmingly seductive introduction, in some sympathy with these night-thoughts. Of course, there is no resolution of the central question, and there is a great deal of foggy twaddle peddled by the pessimistic: Schrödinger views science as silent on the world near the heart; Heisenberg remarks that one cannot think about ethical problems rationally, and de Broglie seems unduly contaminated by the deep pessimism of Bergson, who was dangerously influential yet failed to appreciate, as some still do, the extraordinary and probably limitless power of science. Yet, among the twaddle there are thoughts worth thinking. Those with a mind attuned to the deeper problems of the world will find little satisfaction from this volume, but they should take pleasure from much, and generally wholesome, provocation. □

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