# BOOK REVIEWS

## Matters of Language

**The Scientific Voice**. SCOTT L. MONTGOMERY. Guilford, New York, 1995. xvi, 459 pp., illus. $44.50; paper, $19.95. Conduct of Science.

Maurice Druon, the octogenarian novelist who bears the august title of Perpetual Secretary of the French Academy, once said that the best modern French is to be found in medical journals. It's hard to imagine anyone making a similar claim about the English found in the reports and articles in a typical issue of *Science* or the *New England Journal* (for that matter, you have to wonder when exactly Druon last dipped into the pages of *Le Quotidien du Médecin*). I don't mean to suggest that medical researchers or scientists in general write especially badly in the aggregate (aggregates being what they are), but rather that it can be hard to determine what the labels "good" or "bad" are even supposed to mean when they're applied to a form so relentlessly functional as the modern scientific article. It's like asking how well somebody drives to work in the morning.

Indeed, as Scott Montgomery points out in this thoughtful collection of essays, the very constitution of the modern scientific voice militates against any serious efforts at writing well: "Any point at which there emerges something resembling a truly personal or literary style in a technical article is commonly considered to be a point of failure, when required standards are transgressed and 'scientific' discourse begins to break down. Among the scientific community, the personal excites a degree of suspicion, even discomfort or disdain."

The depersonalization of scientific discourse makes itself known in just about every feature of the scientific article: in the sedulous descriptiveness of the title, in the notorious predilection for passives and impersonal constructions, in the bleached locutions that scientists deploy when they want to take exception to one another's work. As Montgomery notes, echoing Peter Medawar and others, the research article functions to conceal the true nature of scientific labor, with its rivalries and triumphs, its frustrations and unexpected pleasures. A reader who didn't know any better could be forgiven for concluding that scientific research is an unrelieved bore.

Must it be so? In the past, certainly, science has spoken with other, more engaging voices, as Montgomery reminds us in one of the most useful essays in this book. When you read the rich and highly personal styles of writers like Lyell or Davy or Darwin—and writers they certainly were—you can't help wondering why the inexorable march of progress demanded that the "I" be reduced to a sandy ash, as Montgomery puts it. Would they have been better scientists for writing the way we do?

But scientists don't often read their distant predecessors, and when they do it is only out of antiquarian interest. As William Whewell—he who gave us the word *scientist*—observed 150 years ago, it's in the nature of science to absorb the discoveries of earlier generations into the language itself, rather than preserving them as texts. (The picture is implicit in the famous epigram that we see as far as we do by standing on the shoulders of giants, with its unspoken premise that we never need to look down.) And with those earlier voices out of earshot, there is a strong tendency to naturalize the dreary instrumentality of modern scientific prose, as if it followed from the nature of the enterprise itself—as if somehow you would compromise the objectivity of your work on photopolymerization or Late Permian mass extinction if you tried to couch your results in the active voice.

But as Montgomery notes, what divides us linguistically from our predecessors is not simply a style but an ideology: modern scientists have "a distrust and even fear of language," whose ambiguities and evocations seem to threaten the object of clear and dispassionate expression—an attitude often accompanied, Montgomery observes, by a disquieting anti-intellectualism. (This is the mentality that often emerges, I think, when scientists take after philosophers, sociologists, and others who live by language for their "jargon," "babble," and the like, in the bluff assurance that there is nothing *those* people have to deal with that will not yield to plain-spoken common sense.)

In the end, though, the endemic suspicion of language has its most serious consequences when it obscures just how highly rhetoricized and language-dependent the discourse of modern science actually is. In one essay, for example, Montgomery traces the metaphors used in biomedical discourse—first the military images implicit in talk of "killer cells," "ion mobilization," "target cells," and the like, popularized by scientists like Pasteur and Koch in the late 19th century, and then the more recent informational metaphors of "codes," "transcriptions," and the like. We can talk about a disease, that is, as either an assault or a miscommunication, and the difference has obvious implications for the way we think about its treatment.

The other essays in the book develop these themes in terms of an impressively broad range of topics: the history of naming of lunar features, the history and political significance of scientific translation in Japan, the literary style of Sigmund Freud. To be sure, no one can cast his net so widely without letting some fish get away. At one point, for example, Montgomery says that there are "barely a handful of studies" that deal with technical translation, when in fact there is sizable literature on the problem, as you might expect given the amounts of money that have been poured into efforts to automate the process. (The difficulty of producing machine translations of technical texts, by the way, is a good indication of just how ambiguous and language-dependent even the most straightforward scientific writing turns out to be).

It is a sign of how polarized the intellectual climate has become that any writer who suggests that scientific understanding depends on language runs the risk of being accused of holding that scientific facts and laws are mere social constructions. For the record, then, let it be said that Montgomery, himself a geologist, dismisses this view as "drawing room silliness." Montgomery's lesson here is something else again: if language doesn't make the world, it may nonetheless shape the ways we apprehend it. Or, as Auden put it, "One notices, if one will trust one's eyes,/The shadow cast by language upon truth."

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## Biochemistry Extended

**Blondes in Venetian Paintings, the Nine-Banded Armadillo, and Other Essays in Biochemistry**. KONRAD BLOCH. Yale University Press, New Haven, CT, 1995. xiv, 261 pp., illus. $30 or £17.95.

"Wisdom has to be wrested from the Sage for the benefit of posterity" says Bertold Brecht in his poem on the origin of Lao

Tze's *Tao Te Ching*. Thus the reader of this delightful book feels obliged not only to its author but to Ernst Mayr, Harvard's venerable philosopher of science and "Mister Evolution," whom Bloch thanks for encouraging him to write it. Fascination with evolution shines through in many chapters, especially "Evolutionary perfection of a small molecule," which is about cholesterol, a vital building stone for membranes. The multistep biosynthesis of cholesterol, for the elucidation of which Bloch received a Nobel Prize in 1964, is discussed in the context of the evolution of the Earth's atmosphere from an anaerobic to an aerobic state. The sequential removal of three "extra" methyl groups from the intermediate lanosterol, H. Wieland's "kryptosterol," is evaluated in Darwinian terms of fitness for living cells, affecting membrane fluidity or viscosity and cell growth. As an evolutionary scenario at the molecular level the biosynthesis of cholesterol has bearings on the beginning of life on Earth and leaves some challenging questions: what are the oxygen tensions required for the appropriate oxygenases, the enzymes that catalyze the incorporation of molecular oxygen into suitable substrates?

A masterly chapter deals with how aerobic organisms acquired evolutionary advantages over anaerobes, the porphyrins and hemoglobin belonging to the former and vitamin $B_{12}$ to the latter. The postulated "RNA world" that preceded our DNA world rests on ribonucleotide reductase, which in *Escherichia coli* can function in both anaerobic and aerobic atmospheres. The theme is carried further with respect to control mechanisms in respiration and fermentation, inborn errors of metabolism, and oxygen toxicity and the detoxifying defensive enzymes.

Just as in Bloch's hands research becomes an art, conversely art offers him a new challenge for research. In the essay that gives the volume its title he explores a phenomenon he has noted in the work of Venetian Renaissance painters such as Veronese, Tintoretto, and Botticelli. The blonde hair of the dark-eyed beauties they depicted was suggestive to Bloch of a chemical process, and indeed "acqua bionda" and exposure to the southern sun were the usual methods of acquiring the desired "biondezza." The list of plant extracts in vogue at the time includes madder root (alizarin), goosefoot (ascaridol), and coriander and cardamom (α-terpinene), all capable of yielding hydrogen peroxide via endoperoxides of the ascaridole type. Tongue in cheek, Bloch concludes this chapter with the regret that "Better Living through Chemistry" is no longer a popular slogan.

When Bloch was writing his autobiographical vignette "Summing Up" (*Annual Review of Biochemistry*, 1987), he was struck by a passage from Thomas Mann's *Magic Mountain* (1925) that predicted the existence of "the body's own opiates," the endorphins and enkephalins. Their discovery 60 years later is reviewed in a chapter on receptors. Here Bloch credits Paul Ehrlich (hailing from Strehlen, Silesia, not far from his own birthplace), and not John Newport Langley, with the formulation of the receptor concept. However, what Ehrlich postulated in 1901 as "receptive side chains" were meant to explain the binding of toxins to the cell and the formation of antitoxins (antibodies). His extension of this immunoreceptor function to chemoreceptors and drug action followed later (1907). That a damaged or missing receptor could lead to disease is another of Ehrlich's ingenious predictions not commonly remembered.

In "The importance of being contaminated" Bloch deals with impurities that came to play key roles in biochemistry, such as (aut)oxidation products in the homeostasis of cholesterol, the hyperglycemic hormone glucagon accompanying commercially produced insulin, or what Bloch calls "Trojan horse substrates," which in his laboratory produced the first acetylenic-allenic "enzyme suicide." In other episodes three contaminants of adenosine triphosphate—metallic vanadium, cytidine triphosphate, and guanosine triphosphate—became *causes célèbres*, the last one leading to a Nobel Prize (Martin Rodbell, 1995). The Trojan horse principle has applications to the rational design of new therapeutics.

The author, as *magister ludi*, approaches the ultimate step in evolutionary perfection in the gradation from *Homo sapiens* to *Homo ludens*. "To write an autobiography did not appeal to me," he confesses in the preface. But by letting us share his thoughts on this diversity of topics—which also include the nutritional lifestyles of animals, animal and microbial experimental models, and the history of pellagra research—he reveals more of his encyclopedic erudition and personality than a conventional autobiography might have conveyed.

It is not the object of life to simplify. Bloch keeps science alive by treating nature with a degree of reductionism that leaves room for reverence and wonderment.

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## Vignettes: Thanks to Newton

When science reached Newton, science came up against that extraordinary Englishman. . . . As an Englishman he postulated a rectilinear universe because the English always used the word "square" to denote honesty, truthfulness: in short, rectitude. Newton knew that the universe consisted of heavenly bodies that were in motion and that none of them moved in straight lines, nor ever could. Mere fact will never stop an Englishman. Newton invented a straight line, and that was the law of gravitation, and when he had invented this he had created a universe which is wonderful in itself, a complete British universe, and established it as a religion which was devoutly believed for 300 years.

—*George Bernard Shaw*, 1930, as quoted by Denis Brian in *Einstein: A Life* (Wiley)

As I look up at Venus shining low in the sky, I am reminded of how ignorant we humans were only a few years ago. I don't know about you, but I am very grateful to Sir Isaac Newton for describing the natural laws of gravity and motion that oblige Venus to move in an orderly fashion around our sun instead of falling into Chapman Lake while I'm trying to catch a bass. I'm also grateful that I don't have to strain my eyes to see the angel that, for centuries and centuries, people believed pushed Venus across the night sky. An angel, after all, could get called away on a new assignment, and then where would we be? The world must have been a scary place for fishermen before the basic laws of gravity got worked out and you could really begin to count on things like planets to stay in their orbits.

—*Paul Quinnett*, in *Darwin's Bass: The Evolutionary Psychology of Fishing Man* (Keokee)