

explain the Victorian fascination with whatever deviated from neat definitions and distinctions, including “monstrous” human anomalies (missing limbs, Siamese twins, dwarfs), hybrids (mules, children of mixed races), and imaginary creatures (mermaids, sea monsters).

Ritvo draws a staggering amount of anecdotal detail into *The Platypus and the Mermaid*, enough to convince any reader of the Victorian era’s compulsion for classification. It’s a virtuoso display, but the book doesn’t offer much of an argument. Ritvo’s goal is simply and topically “to represent the range of these taxonomic practices.” One can, of course, draw one’s own conclusions from this taxonomy of the taxonomists, but further ruminations from the author, who has led readers to anticipate learning “as much about the classifiers as about the classified,” would have been welcome.

—Toby Lester

**THE SYMBOLIC SPECIES:  
*The Co-evolution of Language  
and the Brain.***

By Terrence W. Deacon.  
Norton. 527 pp. \$29.95

Long ago, my English professor sneered that biological “reductionism thinks that it explains weeping as ‘paroxysmal lachrymosis.’” But he had it backward. It is *holism* to “explain” weeping as paroxysmal lachrymosis, or, for that matter, laughter as an explosive release of tension. Reductionism, by contrast, traces both weeping and laughter to origins deep in the brain, those origins to the movements of cations (positively charged ions) across the membranes of neurons, and those ion flows to an evolutionary divergence of primate brains from their common roots. Today, such reductionist explanations are becoming more and more numerous. Nowhere is the growth of knowledge about behavior, “animal” and human, better exemplified yet more obscure than in the study of language.

Humans are unique in having language—the capability of manipulating symbols for our apprehension of, response to, and communications about the external world and our internal milieu. No other animal is a symbolic species. The linguist Noam Chomsky was right in insisting upon something special in the human brain, something preformed, that enables children to learn

language. But even Chomsky and his followers in effect denied the relevance of evolution, and therefore that of biology, to the provenance of the “language organ.”

How does the human brain differ from the brains of animals without language, and how did it get that way? An answer begins to appear in half a dozen different disciplines: linguistics, neurology, physical anthropology, developmental biology, molecular genetics, evolution. Few people can manage them all; even fewer can make the findings accessible. Deacon, a Boston University researcher in neuroscience and evolutionary anthropology, does both without ever losing clear sight of the whole. *The Symbolic Species* brings the language organ securely within the purview of the life sciences.

The language-competent brain does differ from those of other species, but not in absolute size. A recently understood subtlety of embryo development determines not only a brain’s gross size but also its size relative to the rest of the body and the relative sizes of the constituent parts of the brain. The relative sizes of the brain’s parts in turn determine, in a remarkable Darwinian process of selective cell death, how densely each part is connected to the others. As Deacon shows, the new language-biology suggests that symbol manipulation ultimately results from the manner in which nerves disseminate throughout the embryonic brain and its periphery. The capacity for language must have offered early humans a selective advantage in their environment, for only in our species did the brain develop in this fashion. Development of our language organ thus cannot be understood apart from evolution.

Deacon attempts what seems impossible: a book rich in scientific insights, in a demanding multidiscipline, that nevertheless reaches and informs nonspecialists. To a large extent he succeeds. Authoritative insights are there in profusion, and so assembled, they are a revelation. General readers will miss implications buried in technicalities and glosses, but that is a small price to pay for a mind-expanding tour of the emerging science of language. *The Symbolic Species* is a must-read for scientists and lay readers alike who want to know where we stand in the quest to define—rigorously and in physical reality—the psychobiological distinction we name “humanity.”

—Paul R. Gross