Henslow's

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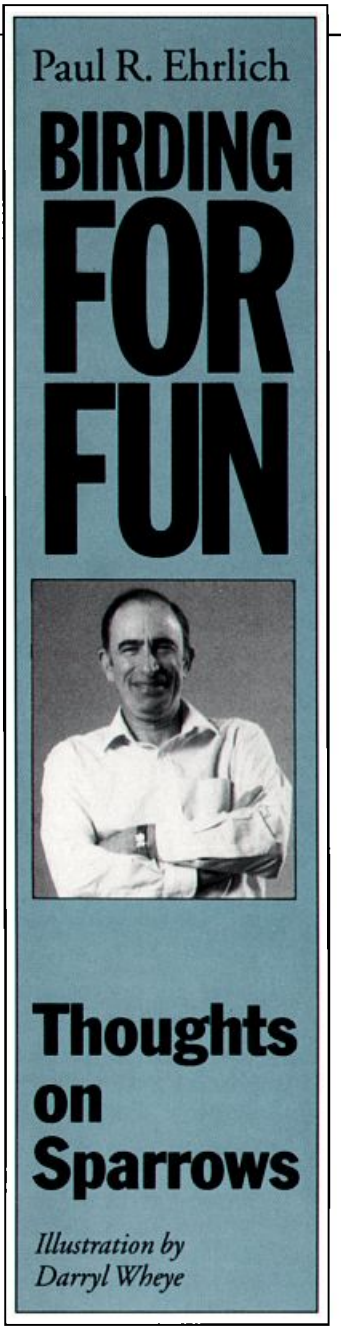

It had been a pretty depressing trip back East for Anne and me when we fetched up in Chicago to attend a meeting. We'd been struggling, in support of the United Nations Fund for Population Activities, to find ways of changing the Administration's wildly pronatalist population policies—with little luck. The Chicago meeting didn't get off to an auspicious start either. Jared and Marie Diamond were there (Jared, you may recall, is the brilliant ecologist who got me back into birding and thus is indirectly responsible for these columns.). Jared and Marie, however, were deeply worried because they'd left their twin sons at home in Los Angeles, and it was the weekend that LA was burning.

Then I ran into Murray Gell-Mann. Murray is a polymath with a Nobel prize in physics and a deep commitment to saving the Earth's environment. But his real claim to fame is that he is a demon birder. In fact, he's memorized the latinized names of most of the world's birds. "Paul, I'm going out tomorrow morning to try to find Henslow's Sparrow—would you like to come along?" Does a bear live in the woods? I agreed to rise well before dawn to seek (as Murray would say) *Ammodramus henslowii.* At 0455 the next morning we piled into a rental car and headed for Goose Lake Prairie, a little more than an hour southwest, where a guide to birds of the Chicago area said a population of Henslow's still existed.

Soon we were tramping through a weedy field exactly where the book, almost a decade earlier, said the critters existed. Murray had brought along a tape, and we played the short Henslow's song repeatedly, to the entertainment of many Field and Song sparrows, most of which skittered over the surface of the field and disappeared into the vegetation. It was quite windy, and we were beginning to think that the local Henslow's population had died out when suddenly our tape was answered by a handsome male singing a few yards away on a dried stalk. All of the distinguishing characters were visible. I even believed I could see the olive on the head, despite my color-blindness. Murray assured me the olive was there. The song, produced many times, was unmistakable. It was a "lifer" for both of us.

Henslow's Sparrow is an excellent symbol of the state of the North American avifauna today. It has responded to the enormous changes wrought by *Homo sapiens* on our continent. Although its range increased in response to early deforestation which created additional suitable habitat, drainage of lowlands and cultivation of fields has subsequently greatly reduced its breeding habitat and exterminated populations in many areas. The species is officially listed as "threatened" in Canada. Seeing Henslow's Sparrow reminded me that, be they thriving

garbage birds like starlings, disappearing rarities like the Red-cockaded Woodpecker, or species first favored but then clobbered by human action such as Henslow's Sparrow, the fate of our birds lies entirely in human hands.

Our impromptu excursion also reminded me of some fascinating evolutionary puzzles. Murray and I saw a lot of sparrows on that morning—besides the Henslow's, Fields, and Songs, there were also Chippings, White-throateds, White-crowneds, Larks, and Swamps. Their abundance raised the question of why there are so many kinds of sparrows. Why, indeed, are more than half of the some 9000 species of birds, passerines? Or, more generally, why are some groups of organisms much more rich in species than others?

Sparrows seen on a spring morning near Chicago. Center: Henslow's Sparrow; Clockwise from top right: Song Sparrow, Chipping Sparrow, White-throated Sparrow, White-crowned Sparrow, Lark Sparrow, Swamp Sparrow, and Field Sparrow.

Biologists have many ideas on these issues, but as yet no definitive conclusions. In the mid-1980s for instance, the question of the comparative species richness of the passerines was the subject of an interesting debate. The discussion started with the publication of a provocative article by Robert Raikow of the the University of Pittsburgh (*Systematic Zoology* 35:255–259, 1986). He asked whether there was some "key adaptation" that makes the passerines more evolutionarily "successful" than the non-passerines. Do they jointly possess some attribute that make them form new species especially rapidly? Or have dicky-birds evolved a trick that makes them relatively extinction-proof? Evolutionists speculate that some other speciose (meaning species-rich) groups have such key adaptations. Bats, for instance, are thought to be successful because they "learned" to navigate and hunt at night using sonar rather than sight. Cichlid fishes have a novel jaw apparatus that allows them to consume very diverse foods. Butterflies are moths that have mostly become distasteful to predators and are thus able to seek nourishment for themselves and select plants on which to lay their eggs in the daytime.

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Passerines are small and particularly able to exploit three very abundant food sources: insects, fruits, and seeds. But, according to Raikow, there seems to be no particular morphological feature of the passerines as a whole that has permitted them to consume these foods. He also discussed the specialized syringes (voice boxes) and song-learning ability of the vast majority of passerines as possible key innovations. Passerine vocalizations are central in species recognition and courtship, and often even vary from one population to another. This could expedite the process of differentiation of populations, the process that generates new species. But as Raikow points out, correlation does not necessarily indicate causation. Among Americans there is a high correlation between length of head hair and wearing of dresses, but long hair does not cause

the wearing of dresses and dresses do not cause long hair. Raikow ends up concluding, rather weakly in my view, that the diversity of the passerines is an artifact of taxonomists having lumped them all together into one oversized unit, the order Passeriformes.

Other evolutionists disagree with Raikow's conclusion (see replies to him in *Systematic Zoology* 37:71–79, 1988). John Fitzpatrick of the Field Museum of Natural History, has pointed out, among other things, that an entire suite of characteristics including vocal learning, general behavioral plasticity, high metabolic rate, relatively large brains, and short generation time may have primed the passerines for "rapid evolutionary radiation" (diversifying quickly, in geological terms, into many genera and species). He also noted that it is passerine colonists that, upon reaching archipelagos, quickly differentiate into arrays of closely related species. For example, of 22 endemic landbird species restricted to the Galapagos islands, 18 are descendents of three independent colonizations by a mockingbird, finch, and flycatcher. Rails, stilts, geese, ducks, and hawks all reached the Hawaiian islands, but only the arrival of a finch has left a complex radiation: 16 genera and 28 species of honeycreepers (*Drepanididae*).

John Kochmer of Yale and Richard Wagner of Oxford emphasized the role of small body size in passerine success. Small organisms presumably have more ecological niches (essentially lifestyles) available to them. Little insectivorous birds can specialize their foraging techniques to search for prey in different places and manners—preying up bark, gleaning the top sides or undersides of leaves, hunting near the trunks of trees or near the branch tips, probing in turf, hawking flying bugs in mid-air, and so on. Eagles have a much narrower array of evolutionary options.

Geerat Vermeij of the University of Maryland contributed a broad-brush overview of the problems of deciding why one group of organisms is more successful than another. The basic answer, of course, must be that either the potential for speciation or the resistance to extinction (or a combination of the two) is greater in one group than in the other. But when dealing with historical phenomena, a more detailed resolution of the question is difficult. Two things are required, as Vermeij points out, to make it plausible that a particular factor was significant in the success of a group. First, underlying theory should suggest a causal connection (*e.g.*, song dialects can be barriers to interbreeding and thus promote speciation). Second, the factor involved must be correlated with success (*e.g.*, most of the speciose passerines have song dialects; most of the relatively species-poor non-passerines do not).

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I've only been able to give a small flavor of the controversy here, and I should add that the exchange of views was a fine example of scientific discourse—carried on by the participants with mutual respect, not rancor. I don't know what the resolution of the passerine success mystery will be. For my money, both size (and related access to more lifestyles) and sounds are major candidates for explaining the species richness of passerines—with, doubtless, other factors thrown in also. But maybe Raikow is right, and the predispositions of taxonomists have at least biased my view. Right or wrong, Raikow has made a positive contribution by generating a careful review of both the particular issue and of some of the pitfalls of evolutionary explanation.

That hypotheses to explain historical phenomena are often difficult to frame and more difficult to test should not diminish either the intrinsic interest of the phenomena or the importance of investigating them to the development of a comprehensive theory of evolution. Birds, indeed all groups of organisms, present us with a wealth of questions that are only too rarely considered. After all, the sparrows raise many other issues. Why, for example, do they (or sandpipers for that matter) tend to have longitudinal streaks on their breasts rather than crosswise stripes? Why do *Zonotrichia* adults tend to lack streaks altogether? Why do so many sparrows have plain, light throats? What is the significance of the "whisker" that is so often present on the side of the throat?

The next time you're looking at a bunch of birds see what questions you can frame about their characteristics, and then see if you can propose reasonable answers to them. If you're like me, it will help occupy your mind while you await the equivalent of a Henslow's Sparrow to pop out of the grass.

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