

Sexual Selection's Strangest Inventions

Remote reaches of Australo-Papua host a spectacular array of avian kinfolk that embody one of Charles Darwin's most important theories



Courtesy American Museum of Natural History (Photo: E.T. Gilliard)



Gerald Borgia



Male greater bird of paradise (*Paradisaea apoda*) in display (top), male Australian regent bowerbird (*Sericulus chrysocephalus*) (bottom) and male satin bowerbird (*Ptilonorhynchus violaceus*) with his bower (left).

By LAURA TANGLEY

First of two articles

Take a trip to the wilds of Australia and New Guinea and you will see not just unusual mammals like kangaroos and koalas, but birds that have taken a bizarre evolutionary path as well. High in the dense foliage of a rain forest tree in southwest New Guinea, for example, you may spy up to 20 fluffs of brilliant yellow feathers, flinging themselves from branch to branch and shrieking raucously. Closer inspection reveals that each bird's body, dark maroon with a touch of bright green, is much smaller than the fan of yellow feathers it loudly displays.

To the northwest at the rugged Vogelkop peninsula, a sharp eye may spot a four-foot-tall hut, made of tightly woven twigs and grasses, along the edge of a steep mountain path. The carefully tended yard outside the front door is decorated with mushrooms, blueberries, black beetle shells and flowers, all arranged in neat piles according to color. With time and patience, one would see the hut's owner—

a chunky olive-brown bird — show up to rearrange his decorations and replace all of yesterday's wilted flowers with bright new ones.

Surprisingly, these odd creatures, the former a male greater bird of paradise (*Paradisaea apoda*) and the latter a male Vogelkop gardener bowerbird (*Amblyornis inornatus*), are considered relatives. Some ornithologists once classified all 42 bird of paradise species and 18 bowerbird species as one family, but the more modern view is that they split into two families, Paradisaeidae and Ptilonorhynchidae, thousands of years ago. "They are still assumed to be quite closely related, however," says Mary LeCroy, an American Museum of Natural History ornithologist who has studied birds of paradise for 10 years.

Although birds in general tend to be more colorful than most animals (they also see color, while many mammals do not), male birds of paradise are "probably the most highly decorated of all birds," wrote Charles Darwin in 1871. Adults are brilliantly colored and decorated with a variety of lacy plumes, capes, false wings

and wires growing from the head, back or tail. These ornaments are used in complicated, often noisy, arboreal displays that include jumping, charging, zig-zagging through the air and hanging upside down.

In contrast, while several have bright colors and a few wear a small crest, most male bowerbirds are more like their female counterparts — stocky and unadorned. What they lack in fancy plumage is more than made up for, however, by their bowers — grass or stick structures constructed by males and used for courtship rituals and mating. Bower designs range from complex huts and walled avenues to towers up to eight feet tall. They are decorated with colorful natural objects such as fruit, flowers, shells, shiny insect skeletons and, occasionally, articles "stolen" from human neighbors — plastic clothespins, coins, glasses and keys, for example. Color preferences vary with the species. Many birds paint their bowers, using colored vegetation mixed with saliva as paint and their beaks as paintbrushes. Bowens are "the most elaborate structures built by birds," says Jared Diamond, a physiologist and ecologist



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Male Count Raggi's bird of paradise (*Paradisaea raggiana*) displaying (above), male red bird of paradise (*Paradisaea rubra*) (right) and male and female Vogelkop gardener bowerbirds (*Amblyornis inornatus*) with bower in background (below).



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with the University of California at Los Angeles, who studies bowerbird behavior.

But bowers, and fancy plumage of male birds of paradise, have nothing to do with these animals' survival. They are used only for mating rituals and displays. How could such strange characteristics evolve through natural selection? Darwin, the author of that theory, thought they could not, and he introduced another theory, called sexual selection, in order to explain these kinds of traits. Sexual selection, wrote Darwin, "depends on the advantage which certain individuals have over other individuals of the same sex and species, in exclusive relation to reproduction." He devoted over half of *The Descent of Man* to explaining his new idea, giving this classic the subtitle *Selection in Relation to Sex*.

He divided features that had evolved through sexual selection into two kinds: those "by which the male conquers other males" (horns, antlers and other "weapons") and those "by which he allures or excites the female" (bright colors, fancy plumes and decorations).

In a recent lecture commemorating the centennial of Darwin's death, Diamond

talked about birds of paradise, bowerbirds and sexual selection. Although Darwin's theory has been accepted, for the most part, by evolutionary biologists, "to this day his interpretations, and indeed the significance of sexual selection itself, remain controversial," he said. One interesting area of debate is the relative importance of the two kinds of sexual selection Darwin described. Another is why females seem to be drawn to sometimes strange physical structures and behaviors. Such unresolved questions about sexual selection, says Diamond, "are the problems that bowerbirds and birds of paradise pose in the extreme."

Because they live in remote, rugged forests of Australia, New Guinea and nearby islands, birds of paradise and bowerbirds were nearly a total mystery until recently. When one European explorer first saw the bower of the Vogelkop gardener bowerbird in 1872, for example, he thought it had been constructed by local natives. Until the mid-1800s birds of paradise were known in Europe only by their skins and plumes, delivered to museums and milliners by Moluccan

feather merchants who kept the birds' location a secret. In fact, until 1824 when the first European reported seeing a live bird of paradise, it was even a popular belief that the birds remained in the air all of their lives. This legend, and the name "bird of paradise," arose to explain the fact that skins imported for hundreds of years had always arrived with their feet cut off. The greater bird of paradise's Latin name, *Paradisaea apoda*, means literally "of paradise, without feet."

It is not surprising that bowerbirds and birds of paradise remained elusive for so long, says Diamond, because "it's difficult and sometimes dangerous to get to places where you can study them." Just last year he rediscovered one species, the yellow-fronted gardener bowerbird (*Amblyornis flavifrons*), that had been known only by three skins sold to Lord Rothschild of the Tring Museum in 1895 (SN: 11/21/81, p. 326). Today, although they remain among the most mysterious of bird families, much more is known about these unusual animals than before. □

Next: Solving the mysteries