

*Chiroxiphia linearis* (Saltanix  
Colilargo, Toledo, Long-tailed  
Manakin)

M. S. Foster

This highly dimorphic, lek-breeding species extends down the Pacific side of Central America from southern Mexico (Oaxaca and Chiapas) to central Costa Rica. In Costa Rica it is most common in the dry northwestern part of the country but spreads in decreasing numbers through the Meseta Central east to Juan Viñas and south into the Dota region. It occupies both tropical dry forest and tropical and subtropical moist forest, frequenting thickets and open vine tangles as well as middle-level trees. These birds are almost exclusively frugivorous, and one can usually find them feeding commonly on fruits of such species as *Ardisia revoluta*, *Cecropia peltata*, *Cocoloba caracasana*, *Muntingia calabura*, *Psychotria* spp., *Trema micrantha*, and *Trichilia cuneata*, to name a few.

Adult males are very brightly colored, their crimson red crowns, light blue backs and shoulders, and orange legs and feet contrasting sharply with the rest of the body, which is uniform black. Their exotic appearance is enhanced by the two elongated central rectrices (tail feathers) that extend beyond the rest of the tail for a distance about twice the length of the body. Compared with males, the females are rather dull (fig. 10.22a), being olive green above and slightly paler green below, though they too have orange legs and feet. The central rectrices are only slightly elongated in the female, and some individuals have a limited red crown. Young males resemble females initially, acquiring the adult male pattern over a period of 3–4 years. With each successive molt, they look more like adult males and less like females, exhibiting a mixture of blue, red, black, and green feathers.

Males of this species engage in communal reproductive displays, that is, displays requiring the participation of more than one individual (Foster 1977). These displays are performed on an exploded lek or arena that consists of a number of courts, each owned, but not actively defended, by a pair of adult males (rarely three). The courts are not contiguous, and male couples maintain auditory, rather than visual, contact. The communal displays include the frequently repeated *toledo* vocalization given synchronously by two males of a pair. This call apparently advertises the presence of the males at the display area and attracts females. When a female arrives, the birds move to one of several low display perches in their court. These perches, defended from use by other males, usually consist of a horizontal vine with associated accessory perches. Here the males jointly perform a coordinated jump display. Most commonly it takes one of

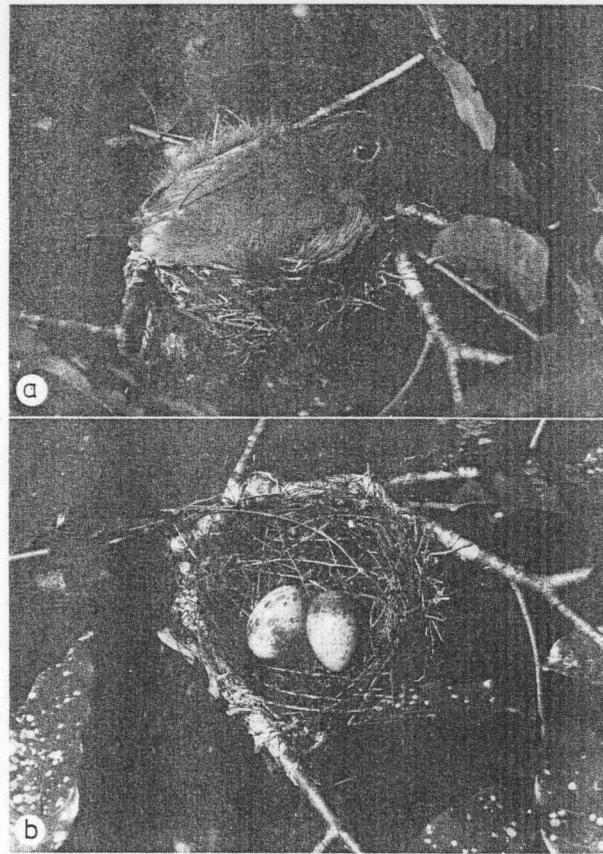


FIGURE 10.22. *Chiroxiphia linearis*. a, Adult female on nest at night. b, Nest after female has flown off. June 1980, Santa Rosa National Park, Guanacaste Province, Costa Rica (photos, D. H. Janzen).

two forms. In the up-down variant, the males are perpendicular to the display perch, facing a female on an adjacent perch. In a coordinated fashion they alternately jump into the air. In the cartwheel variant the males are parallel to the display perch, facing the female perched at one end. Their coordinated alternate jumps now describe a vertical circle with the anterior bird moving backward to the spot originally occupied by the other male while the latter individual moves forward to assume the position originally occupied by the first. Both the female and the males become visibly excited during these sequences, which vary in length but may include as many as one hundred jumps. Each jump in the display is accompanied by a wheezy *buzzee* call. The birds are very sensitive to any type of disturbance, and displays are continually interrupted and reinitiated. Finally, when the display is finished—this is signaled with a single high-pitched note given by the dominant male (see below)—one male executes a solo precopulatory display for the female, who is usually on the display perch at this time. He changes perches, describing a horizontal circle (to several meters in diameter) around her, going from perch to perch to

perch with a very slow kind of floating flight that Slud has (1957) correctly likened to the flight of the blue morpho butterfly (*Morpho* sp.). If this display is successful, copulation ensues, and the female leaves to rear the young by herself.

The association of the paired males persists from one to several years (Foster 1977) and is in every way analogous to a male-female pair bond except for the absence of copulation. Partners usually display only with each other. Normally they occupy a single court for an entire reproductive season or from year to year, though the association represents a real attachment of the males to each other rather than common attachment to a given site. One male is dominant throughout the association and performs all copulations with any females attracted to the court. The males do not appear to be kin related or altruistic. Rather, the system seems to be maintained by selection operating at the level of the individual. The subordinate member of a pair presumably is far more likely to assume dominance on a court after the loss of his partner and thus to eventually be reproductively successful than is a solitary male (Foster 1977).

The reproductive season lasts from about March through September in Costa Rica (Foster 1976). The nests, built only by the female and placed without regard to the court where copulation occurred, are shallow cups suspended from forks in small trees (fig. 10.22*b*) Clutch size is one or two, and the beige tan eggs are heavily marked with medium to dark brown spots. The young are fed at least partly on fruit.

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Foster, M. S. 1976. Nesting biology of the long-tailed manakin. *Wilson Bull.* 88:400-420.

———. 1977. Odd couples in manakins: A study of social organization and cooperative breeding in *Chiroxiphia linearis*. *Am. Nat.* 111:845-53.

Slud, P. 1957. The song and dance of the long-tailed manakin, *Chiroxiphia linearis*. *Auk* 74:333-39.

### *Chloroceryle americana* (Martín Pescador Verde, Green Kingfisher)

J. V. Remsen, Jr.

The green kingfisher (fig. 10.23) inhabits wooded shorelines of streams and lakes from southern Texas to central Argentina. Within this range, this 7-in kingfisher may be found in a wide variety of climates and habitats, from sea level to 2,500 m and from rain forests to deserts. In Costa Rica the species is common in the lowlands on both slopes but rarely occurs higher than the Central Plateau. The essential components of suitable habitat seem to be rather simple: slow-moving or nonmoving permanent

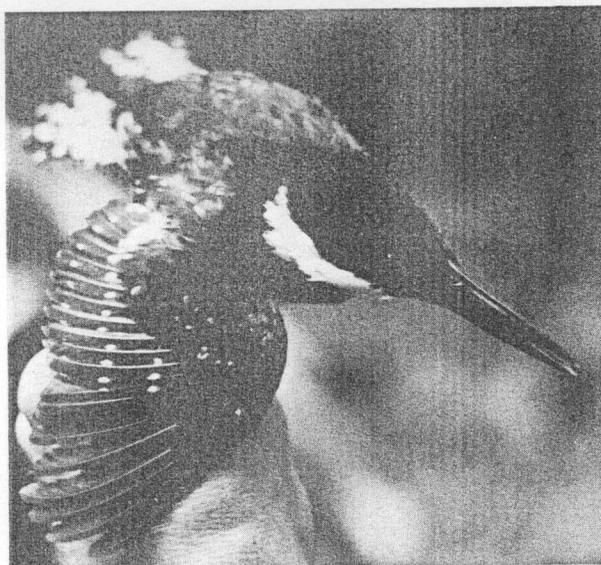


FIGURE 10.23. *Chloroceryle americana*, adult. Hacienda Palo Verde, Guanacaste Province, Costa Rica (photo, F. G. Stiles).

fresh water bordered by low, bushy growth for hunting perches. In small streams in humid lowland tropical forests where the canopy closes overhead, shading the water most of the time, the green kingfisher is replaced by a smaller congener, the pygmy, or least kingfisher (*C. aenea*) or by a larger congener, the green-and-rufous kingfisher (*C. inda*), or both. Open, sunny shorelines are usually shared with larger congeners, the amazon kingfisher (*C. amazona*) and the ringed kingfisher (*Ceryle torquata*), one of the largest kingfishers in the world.

Prey items, exclusively small fishes and aquatic invertebrates, are obtained by plunging headfirst into the water and capturing them between the mandibles on impact. Most prey is captured within a few centimeters of the water surface; no underwater pursuit is involved. Hunting perches range in height from 1 to 5 m (mean about 1.5 m) and are seldom more than a meter back from the waterline. Prey length is slightly but significantly correlated with the height of the hunting perch from which the prey was captured. Occasionally a green kingfisher may hover briefly above the water before plunging. The angle of the dive (angle between average flight path from perch to entry point and water) ranges from 90° down to 15°, but smaller angles are never observed. Apparently reflection and refraction distort target images too severely for successful strikes at angles lower than 15°. Within this range of dive angles, there is no significant relationship between angle and success rate. Prey items range from 8 to 80 mm in length, but populations studied where all four other Neotropical kingfishers were present showed a much narrower range and