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Discovery of the Masked Saltator in Colombia, with notes on its ecology and behavior.— The Masked Saltator (*Saltator cinctus*) was described by Zimmer (1943), based on a specimen collected on the Cordillera de Cutucú, near Macas, Ecuador. Later, the species was collected in northern and central Peru, in the departments of Cajamarca, Amazonas, and Huánuco (O'Neill and Schulenberg 1979) and was observed again at the type locality (Robbins et al. 1987). Recently, it was observed by P. Greenfield et al. in Podocarpus National Park in southern Ecuador (Ridgely and Tudor 1989). It was seen in 1989 at two additional Ecuadorian localities, on the Cordillera de Huacamayos at ca 2000 m, south of Baeza along the road to Tena in western Napo and on the Cordillera de Sabanilla at 3000 m, south of Vilcabamba in Loja (Ridgely, in litt). The overall scarcity of observations suggests a patchy distribution from central Peru north to eastern Ecuador (Fig. 1).

I report here the discovery of the Masked Saltator in two Colombian localities (Fig. 1). Most observations have been made in the Reserva del Alto Quindío Acaime (4°37′N, 75°28′W), Municipality of Salento, Department of Quindío, on the western slope of the Cordillera Central. The first sightings took place on 3 and 4 December 1986. On 5 June 1989, I observed the species at the second site, located in the watershed of the Rio Blanco (5°04′N, 75°32′W) near the city of Manizales, Department of Caldas, 45 km north of the first site (Fig. 1).

Study area and methods.—The topography of the Alto Quindío is rugged and mountainous. The slopes between 2500 and 3650 m are covered with large remnants of primary forest interspersed with broad areas of secondary forest in different sucessional stages, tracts reforested with native species, and smaller areas of pastures and potato plantations. Above 3650 m, forest is replaced by páramo, and below 2500 m, the landscape is dominated by cattle pastures and small forest fragments. The forested area has been classified as "Lower Montane Moist Forest and Montane Wet Forest" (sensu Holdridge) (IGAC 1977). Rainfall

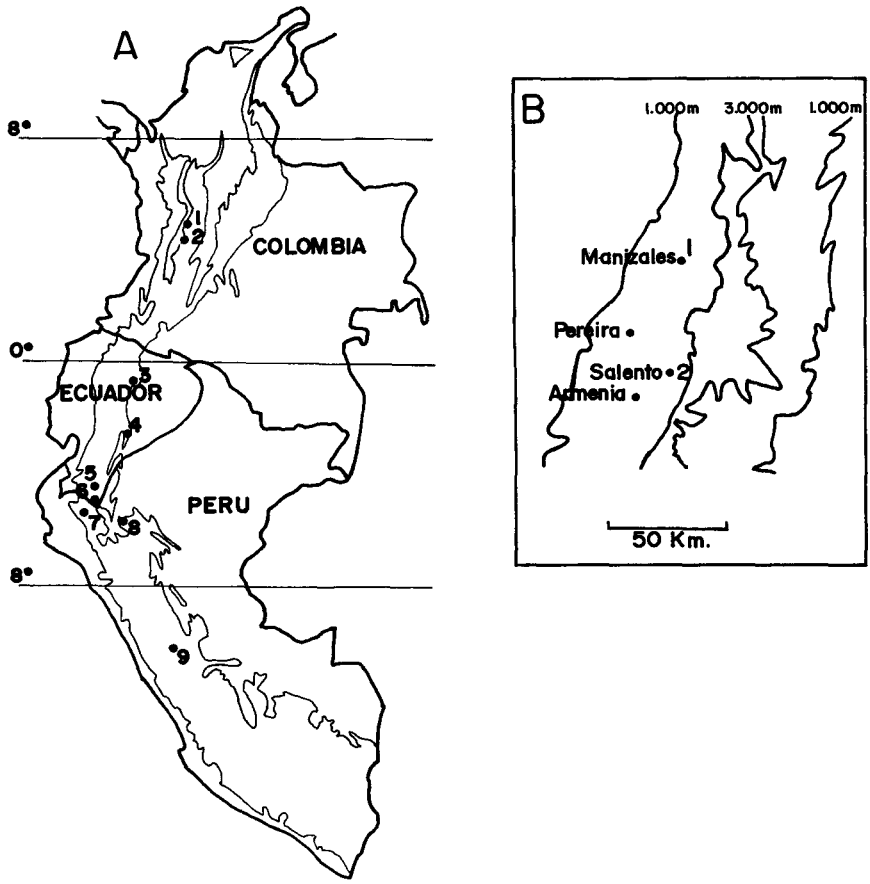

FIG. 1. A. Localities at which *Saltator cinctus* has been reported in the Colombian, Ecuadorian, and Peruvian Andes (the 1000 m contour is indicated): (1) Río Blanco, (2) Alto Quindío, (3) Cordillera de Huacamayos, (4) Cordillera de Cututucú, (5) Podocarpus N.P., (6) Cordillera de Sabanilla, (7) Cerro Chinguela, (8) Cordillera Colán, (9) Carpish. B. Central part of the Cordillera Central shown in detail.

is bimodal, with rainy seasons in April–May and October–November and dry periods in January–February and July–August (Pérez 1983).

From June 1989 through July 1990, I made four censuses each month, along each of four transects (total length 8.8 km) in the Alto Quindío. These transects included various types of primary and secondary forests, gaps, and the forest-páramo ecotone. To estimate the density of birds I divided the number of birds seen during all transects by twice the mean perpendicular distance from the transect for all individual sightings multiplied by the sum of the lengths of all transects (for further details, see Strahl and Silva, in press). An adult male was collected on 30 April 1991 and deposited in the bird collection of the Institute de Ciencias Naturales, Univ. Nacional.

TABLE 1
NUMBERS OF RECORDS OF THE MASKED SALTATOR IN DIFFERENT HABITATS AND STRATA IN ALTO QUINDÍO, COLOMBIA

Habitat	Strata			Total
	Understory	Middle	Canopy	
Primary forest				
Without *P. oleifolius*	0	0	6	6
With *P. oleifolius*	1	9	62	71
Edges and gaps				
Without *Chusquea*	6	1	1	8
With *Chusquea*	2	3	4	9
Secondary forest	5	0	8	13

Results.—The Masked Saltator is a distinctive bird (see Zimmer 1943, Ridgely and Tudor 1989). All the individuals seen in the Alto Quindío differ from descriptions in Zimmer (1943), O'Neill and Schulenberg (1979) and Ridgely and Tudor (1989) by having the bill wholly red, the belly creamy white instead of pure white like the chest, and a narrow pale gray streak behind the black mask. By these differences, the Colombian population may represent a different subspecies from those populations of Peru and Ecuador.

The Masked Saltator was observed a total of 108 times in the Salento area, between 2500 and 3080 m. It was found regularly in primary forest with *Podocarpus oleifolius* and *Prumnopytis montanus* (Podocarpaceae). These tree species are not uniformly distributed inside primary forest, but generally form patches on ridges and steep slopes. The birds were found year-round in the same places, suggesting that they maintain permanent territories. In the remaining habitats, I observed the species only sporadically (Table 1).

During the 1989–1990 censuses, I found an average of 17.2 individuals/10 km of trail in primary forest with *P. oleifolius* and of 1.2 individuals/10 km in the remaining habitats. The densities estimated were 82.6 birds/km and 5.9 birds/km in primary forest with *P. oleifolius* and in other habitats.

Since the forest with *P. oleifolius* comprises a very small proportion of total primary forest area (less than 10%), the Masked Saltator has a surprisingly low population density for a small frugivorous bird if this is compared with the densities reported for very large frugivores like cracids. Densities of 2.5–14.8 individuals/10 km of trail, and 1.8–19.8 individuals/km, were found for several cracid species in Venezuela (Strahl and Silva, in press) and Peru (Torres, in press).

The Masked Saltator is usually found in the canopy inside primary forest, and to a lesser extent in gaps and at lower heights along forest borders (Table 1). In Peru and Ecuador, *S. cinctus* was observed in thick stands of *Chusquea,* a common bamboo species of all localities where the bird was collected (O'Neill and Schulenberg 1979; Ridgely, in. litt.) and broadly distributed in the Andean cloud forest. I have also found Masked Saltators in *Chusquea* thickets, but those events appear to be occasional instead of reflecting an association with this bamboo *per se.* Indeed, the bird seemed, if anything, to avoid *Chusquea,* as it tended to descend to the understory along gaps and edges much more when bamboo was absent than when it was present (Table 1). Moreover, I never saw the birds foraging in the *Chusquea,* even when the stands were in seed. At Rio Blanco (the second locality), a pair was seen in

an area reforested with *Alnus acuminata* (Betulaceae), a native species which grows naturally in pure stands.

The Masked Saltator is inconspicuous, and few of my records were made before I learned its vocalization. The call can be described as a "tzip" (Vuilleumier 1970 and pers. obs.) or a "tseeyk" (Robbin et al. 1987), which is very similar to the foraging call of the Golden-fronted Redstart (*Myioborus ornatus*), but is more liquid (pers. obs.). This low-intensity call is repeated at irregular intervals when the bird is inactive or foraging, but as activity increases, the "tzip" is followed by a lower and softer "tiu-tiu." Robbins et al. (1987) found another vocalization that they described as a "chu" repeated at ca 3–5 sec intervals. I never heard this vocalization.

S. cinctus was usually observed singly (35% of sightings) or in pairs (61% of sightings). Only three times did I observe small groups, twice in December, 1986, and once in October 1989.

The Masked Saltator is an attendant species of mixed flocks (11% of sightings). The more frequent species in those flocks are Golden-fronted Redstart, Capped Conebill (*Conirostrum albifrons*), Pearled Treerunner (*Margarornis squamiger*), Spotted-crowned Woodcreeper (*Lepidocolaptes affinis*), White-throated Tyrannulet (*Mecocerculus leucophrys*), Sooty Brush-Finch (*Atlapetes schistaceus*), and Lacrimose Mountain-Tanager (*Anisognathus lacrymosus*). Vuilleumier (1970) once saw a Masked Saltator in a mixed flock.

Fruits and seeds are the most frequent items in the diet. I observed fruit consumption 36 times: 31 cases involved the fruit of *P. oleifolius,* two were arillate seeds of *Clusia multiflora,* two were unripe fruits of *Cissampelos* sp. (Menispermaceae), and one of an unidentified vine. I have also seen individuals foraging among fruiting *Siparuna echinata* shrubs, although I have not seen them consuming the arillate seeds. On one occasion a bird ate an unidentified young leaf.

Consumption of *P. oleifolius* fruits was seen essentially year round, both in wet and in dry seasons. This implies that the bird ate seeds at different stages of development. Moreover, the part of the fruit that normally attracts birds, the fleshy, red, sweet-tasting peduncle, was never consumed, but rather discarded, by *S. cinctus.* These observations, taken together, suggest that Masked Saltator is a predator, rather than a disperser, of seeds of *P. oleifolius.*

Breeding.—In the second half of April, 1991, I saw a pair of Masked Saltators very active and unusually low in a sector with very dense shrubs and *Chusquea* bamboo, near a stand of *P. oleifolius.* I assumed there was an active nest. On 29 April an adult flew out of these shrubs followed by a juvenile. The latter was duller than the adult, had a shorter tail, a small black mask and a pale yellow bill instead of red. It vocalized like an adult. Nearby, on a ridge with an open and stunted forest of *P. oleifolius* and *Clusia* sp., in a dense understory of Ericaceae, I saw another pair of Masked Saltators active at low levels. One of them was carrying nest materials. On 13 April 1990, I saw a saltator in an impenetrable tangle of ferns, possibly attending a nest. All those records have two elements in common: (1) the immediate proximity of *P. oleifolius,* and (2) saltators unusually active at low levels in very dense understory thus allowing the observer to approach them closely.

The male collected on 30 April 1991 was in breeding condition. One of the individuals observed at Rio Blanco on 5 June 1989 had a yellow bill (H. Alvarez, pers. comm.).

Discussion.—The records of *S. cinctus* presented here constitute a range extension of about 870 km northward. O'Neill and Schulenberg (1979) suggested that the species might occur in the southern Andes of Colombia. It is probable that the species occurs on the western slope of the Cordillera Central wherever there is adequate habitat. Its presence along the eastern slope of the Cordillera Central has yet to be confirmed.

The broad geographical distribution and few records of this very distinctive species suggest that it has a truly patchy distribution, probably due to specific habitat requirements. In the

Alto Quindío, at least, it shows a strong preference for highly localized patches of *Podocarpus oleifolius* within primary forest, where observation is difficult due to the steep topography. That may explain why the bird was missed by several very productive expeditions to the same area (Chapman 1917; Hernández et al. 1985; Orejuela, unpubl. data).

The Masked Saltator is a very vulnerable species because of its association with *P. oleifolius,* a tree species with a very slow growth rate that has been overcut because of its coveted wood. The status of Masked Saltator in Colombia is of particular concern since the Cordillera Central, the only range where the species has been found to date, is also the most deforested in the country (Orejuela 1985).

If the species is found in Ecuador in association with *P. oleifolius,* as is expected, its status there might also be precarious, as most of the Andean region is affected by colonization (L. Suarez, pers. comm.). Additionally the principal forests of *Podocarpus* in Ecuador are found in Loja Province, the most deforested Andean area in the country, where the species is being strongly affected by timbering of the high quality wood, even within the borders of the Podocarpus National Park (L. Suarez, pers. comm.) where the Masked Saltator has been recently seen (Ridgely and Tudor 1989).

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Fruit harvesting by American Robins: influence of fruit size.—Size relationships between bird gape width and fruit diameter can limit the composition and breadth of avian fruit diets and the disperser assemblages of plants with vertebrate-disseminated seeds (Wheelwright 1985, Snow and Snow 1988, Lambert 1989). It is less clear, however, that birds are influenced by differences in fruit size for fruits smaller than their gape capacities. Aviary studies with tropical species suggest that birds may prefer the largest fruits they can handle (Moermond and Denslow 1983); however, results from field studies have been mixed (Wheelwright 1985, Piper 1986).

Here we examine the hypothesis that the efficiency of fruit harvest by wild American Robins (*Turdus migratorius*) in New Jersey increases with increasing fruit size. A positive relationship between feeding efficiency and fruit size would suggest a possible rationale for size preferences in fruit-eating birds. American Robins, because of their abundance, diet, and relatively large size, are among the most important consumers of fleshy fruits in eastern North America (Wheelwright 1986, White 1989).

Methods.—We examined avian fruit foraging as part of a study of the nutritional content and value of fleshy fruits for birds (White 1989). Fruit consumption by American Robins was observed September–December, 1979–1982, in old fields and mixed-aged and mature woods in central New Jersey. We recorded the plant species visited, time from robin arrival to departure from the plant in seconds, and the number of fruits eaten. Fruit widths and masses for species used by the robins were determined from plants other than those used in the observations to avoid potential biases due to selective feeding. We recorded ten or more complete foraging bouts at each of the following plant species: *Rhus copallina, Juniperus virginiana, Rosa multiflora, Vitis vulpina, Viburnum prunifolium, Lindera benzoin, Nyssa sylvatica,* and *Pyrus* sp.

Results.—Mean fruit widths ranged between 3.7–9.0 mm in diameter (mean mass: 21–518 mg); however, size limitations in feeding were not at issue because all plants had fruits 3–8 mm narrower than the mean gape width of the robin (White 1989). Significant negative correlation existed (A) between fruit width and mean number of fruits eaten in a bout and (B) between fruit width and mean bout length, while significant positive correlation existed (C) between fruit width and total fruit mass harvested per bout (Fig. 1). Results were similar