Wilson Bull., 104(1), 1992, pp. 55–64

CYPSELOIDES STORERI, A NEW SPECIES OF SWIFT FROM MEXICO

ADOLFO G. NAVARRO S.,[1] A. TOWNSEND PETERSON,[2]
B. PATRICIA ESCALANTE P.,[3] AND HESIQUIO BENÍTEZ D.[1]

ABSTRACT.—A new species of swift (*Cypseloides storeri*) is described and given the English name White-fronted Swift. It apparently is most closely related to *C. cryptus* of Central America and northern South America. It is known from four specimens obtained in Michoacán and Guerrero in southwestern Mexico. *Received 6 June 1991, accepted 1 Sept. 1991.*

RESUMEN.—Se describe una especie nueva de vencejo (*Cypseloides storeri*), a la cual se le da el nombre común de Vencejo de Frente Blanca. Aparentemente, se encuentra muy cercanamente relacionado a *C. cryptus* de Centro y Sudamérica. Se conoce por cuatro especímenes recolectados en los estados de Michoacán y Guerrero en el suroeste de México.

Swifts are among the most poorly known families of birds. Several species new to science have been described relatively recently (e.g., Eisenmann and Lehmann 1962, Collins 1972), and many species are known from relatively few specimens. Here, we describe a new species of swift from the mountains of southwestern Mexico.

During the course of seven years of field work in the Sierra Madre del Sur of Guerrero by the Museo de Zoología (MZFC), one specimen of a medium-sized, dark swift was collected at Puerto del Gallo, a small ranch on the coastal slope of the Sierra de Atoyac of southern Guerrero. The bird was found clinging to a towel in camp late on a foggy night. Although it was initially identified as a Black Swift (*Cypseloides niger*), our examination of the specimen and comparisons with specimens of other swifts led us to conclude that the bird represents a new taxon. Study of other museum collections in Mexico revealed three additional specimens of the new form in the collection of the Escuela de Biología, Univ. Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán (UMSNH), all identified as Black Swifts by A. R. Phillips. Although species limits in the family as a whole, and especially in the genus *Cypseloides,* are notoriously difficult to define, our comparisons convince us that these four specimens are sufficiently distinct that they represent an undescribed species. We propose to call it:

[1] Museo de Zoología "Alfonso L. Herrera," Departamento de Biología, Facultad de Ciencias, Univ. Nacional Autónoma de México, Apartado Postal 70-399, México D.F. 04510 México.
[2] Museum of Natural Science, 119 Foster Hall, Louisiana State Univ., Baton Rouge, Louisiana 70803; (Present address: Div. of Birds, Field Museum of Natural History, Roosevelt Road at Lake Shore Dr., Chicago, Illinois 60605.)
[3] Dept. of Ornithology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024.

Cypseloides storeri, sp. nov.

WHITE-FRONTED SWIFT, VENCEJO DE CARA BLANCA

HOLOTYPE.—Museo de Zoología "Alfonso L. Herrera," Facultad de Ciencias, Univ. Nacional Autónoma de México (MZFC) 3535; male (left testis 3.1 × 1.5 mm) from Puerto del Gallo, Tlacotepec, Guerrero, Mexico, elevation 2500 m; collected by Julio Juárez on 2 September 1983, prepared by Adolfo G. Navarro S., field number AGNS 165.

DIAGNOSIS.—A medium-sized swift, sooty brown all over, with broad white frosting on the forehead, lores, and chin (Fig. 1). It is placed in *Cypseloides* and distinguished from swifts of other genera by the following criteria: from *Chaetura* by overall larger size, from *Streptoprocne* by smaller size and slender body form, and from *Aeronautes* and *Panyptila* by absence of large patches of white coloration on the body. It is distinguished from the Black Swift (*Cypseloides niger*) and the Sooty Swift (*C. "fumigatus"*) by the combination of relatively short wings (mean 136.6 mm ± 3.8 SE vs 151.5 ± 1.2 mm for *C. "fumigatus"* and 160.7 ± 1.5 mm for Mexican *C. niger*) and long tarsi (16.56 ± 0.91 mm vs 13.18 ± 0.21 mm for *C. fumigatus* and 12.67 ± 0.25 mm for Mexican *C. niger*), and from the Chestnut-collared Swift (*C. rutilus*) by absence of rusty brown coloration in the male and overall greater size (wing 136.6 ± 3.8 mm vs 124.2 ± 1.0 mm for *C. rutilus*). Although very similar in morphometric characters, it differs from *C. cryptus* most obviously in having a broad white frosting on the forehead, lores, and chin; in having whitish (as opposed to sooty) postorbital feathers; and in the gradually tapering (as opposed to more abrupt) shape of the face. *C. cryptus* has a restricted white chin patch, and occasionally white frosting on the lores, but never white on the center of the forehead. Sexual dichromatism appears negligible in the two male and one female specimens examined.

DISTRIBUTION.—Known from the mountains of southwestern Mexico, in the states of Michoacán (Tacámbaro) and Guerrero (Sierra de Atoyac), at elevations of 1500 and 2500 m, respectively.

DESCRIPTION OF HOLOTYPE.—General coloration is sepia (closest to color 119 of Smithe 1975), lighter on the underparts, and more blackish on the shoulders and the outer webs of the remiges and greater wing coverts. Feathers of forehead, lores, chin, and upper throat are tipped with white or whitish-buff with dark shaft-streaks, giving the appearance of a whitish face. The feathers immediately behind the eye are similarly frosted with white. The rostrum is tapered and somewhat elongated. The iris in life is dark brown, and the tarsi, toes, and bill are blackish sepia (in the preserved specimens).

MEASUREMENTS OF THE HOLOTYPE.—Bill length (anterior edge of nostril to tip) 4.8 mm, total exposed culmen 5.8 mm, wing chord 135 mm, tarsus 17.3 mm, tail 42.6 mm, and mass 39.5 g.

ETYMOLOGY.—We take pleasure in naming this species for Dr. Robert W. Storer in recognition of his many contributions to the knowledge of the birds of Guerrero and Michoacán.

SPECIMENS EXAMINED.—*Cypseloides storeri*: (MZFC holotype male) from type locality in Guerrero; Mexico: Michoacán, Salto de Santa Paula, 1–1.5 km NNE Tacámbaro (Univ. Michoacana San Nicolás de Hidalgo UMSNH 1 male, 1 female, 1 unsexed). The following specimens were compared with the holotype or all four specimens of *C. storeri*. *C. cherriei*: Venezuela: Aragua, Rancho Grande (American Museum of Natural History AMNH 1 female). *C. cryptus*: Belize: Manatee Lagoon (Univ. of Michigan Museum of Zoology UMMZ 2 males, 2 females); Nicaragua: Zelaya, El Recreo (University of California at Los Angeles Museum of Zoology UCLA 1 unsexed); Costa Rica: San Pedro (AMNH 1 female); Panama: Puerto Obaldía (Field Museum of Natural History FMNH 1 male); Pan-

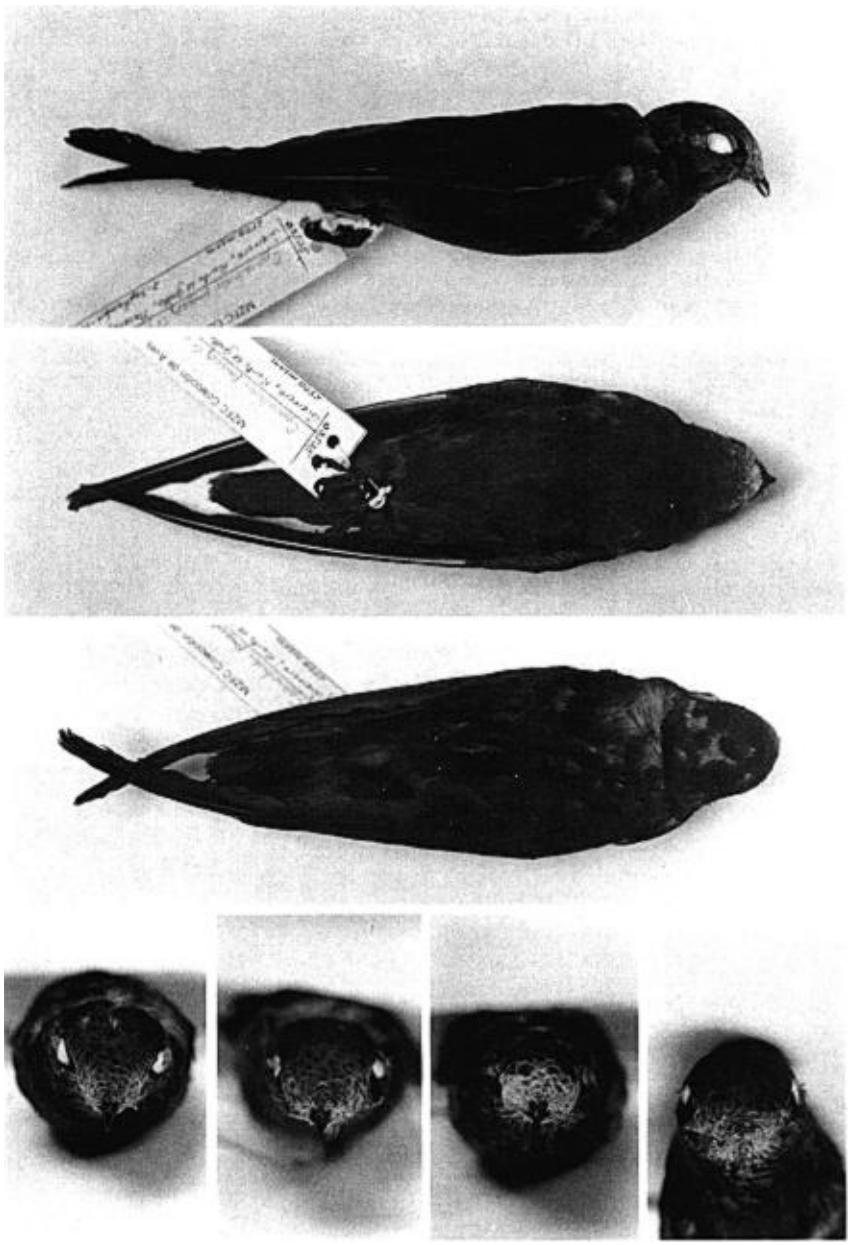

FIG. 1. Photographs of the holotype and three other specimens of *Cypseloides storeri*: holotype in side, ventral, and dorsal views (top-to-bottom), and head-on views of the holotype MZFC 3535, and UMSNH 1265, 1267, and 1266 (left-to-right).

ama: Hermosa Bay, Isla Coíba (Los Angeles County Museum of Natural History LACM 1 female); Peru: Puno, Abra de Maruncuca, 10 km SW San Juan del Oro (Louisiana State Univ. Museum of Natural Science LSUMZ 1 female). *C. senex*: Brasil: Pará, Serra do Cachimbo (LSUMZ 1 female). *C. major*: Argentina: Tucumán, Tapia (LSUMZ 1 male). *C. niger*: Mexico: Oaxaca, El Tule (Instituto de Biología, U.N.A.M. IBUNAM 1 male); Mexico: Oaxaca, Cerro San Felipe (AMNH 1 female); Mexico: Oaxaca, Colyotepec (IBUNAM 1 female); Mexico: Oaxaca, 4 mi E Matatlán (LSUMZ 1 male); Mexico: Morelos, Alpuyeca (AMNH 1 male); Mexico: Tlaxcala, 4 mi W Tlaxcala (Moore Laboratory of Zoology MLZ 1 male); Mexico? (IBUNAM 1 male); United States: Washington, Whitcom Co. (UCLA 1 female); Canada: British Columbia, Okanagan (UCLA 1 male); Cuba: Oriente, Tiguaba (UMMZ 1 male); Cuba: Guantanamo, San Carlos (UMMZ 1 male); Dominican Republic: Santo Domingo, La Vega (UMMZ 1 male). *C. rutilus*: Mexico: Oaxaca, Putla (IBUNAM 1 male); Mexico: Oaxaca, 1 mi E Putla (LSUMZ 2 males, 2 females); Mexico: Oaxaca, 1 mi SW Valle Nacional (LSUMZ 1 female); Mexico: Distrito Federal, Xochimilco (IBUNAM 1 male?); Mexico: Guerrero, Omiltemi (MZFC 1 female); Guatemala: Sierra de las Minas, 1 mi N Usumatlán (UMMZ 1 female); Guatemala: Tulumaje, Zecopa (LACM 1 female); Costa Rica: Hacienda El Pelón (UCLA 1 male, 1 female); Costa Rica: Irazú (FMNH 1 female); Peru: Puno, Sagrario (FMNH 2 females); Peru: Madre de Dios, Hacienda Amazonia (FMNH 3 females).

REMARKS

Within-population variation.—On inspection of the four specimens of *C. storeri,* we became concerned that variation in size might be too extensive for individuals of a single species. To test whether this seemingly elevated variation (Table 1) might indicate that the measurements were not drawn from populations of a single species, we compared it with levels of variation in a similar, closely related species. We used a series of 108 adult *C. rutilus* from Costa Rica (an area roughly equivalent to the known range of *C. storeri*) for which measurements of wing chord, tail, and tarsus were kindly provided by M. Marín (pers. comm.). (Restricting the data set to adults removes age-related variation from the *C. rutilus* but not from the *C. storeri* data, making the test conservative.) For each measurement, we bootstrapped estimates of the coefficient of variation (SD/mean) by selecting at random with replacement 1000 quartets of individuals from the *C. rutilus* data (selecting two males, one female, and one from both males and females, to replicate the sex ratio in the *C. storeri* sample), and calculating the coefficient of variation for each (Efron 1979). We then compared the coefficients of variation observed in *C. storeri* with the 95th percentile of the distribution of bootstrapped values for *C. rutilus.*

Coefficients of variation for *C. storeri* (N = 4) are 0.055, 0.061, and 0.028, for tarsus, tail, and wing chord, respectively. The bootstrapped distributions have their modes at 0.030, 0.038, and 0.024, and 95% limits (one-tailed test) at 0.076, 0.065, and 0.043. Hence, to the extent that variation in *C. rutilus* is representative of variation within other species of the genus, we have no grounds to reject the null hypothesis that four

TABLE 1

MEASUREMENTS (MM) OF THE FOUR SPECIMENS OF *CYPSELOIDES STORERI* AND OTHER *CYPSELOIDES* SWIFTS. SEXES ARE COMBINED IN THE CALCULATIONS OF MEANS. *C. "FUMIGATUS"* INCLUDES THE FORMS *MAJOR, ROTHSCHILDI,* AND *FUMIGATUS*

Taxon or specimen	N	Tarsus length	Tail length	Wing chord
Cypseloides storeri	4			
UMSNH 1265 (male)		15.25	47.0	140.0
UMSNH 1266 (unsexed)		16.65	48.5	139.5
UMSNH 1267 (female)		17.05	45.0	132.0
MZFC 3535 (male)		17.29	42.6	135.0
Mean ± SE		16.56 ± 0.91	45.8 ± 2.6	136.6 ± 3.8
C. cherriei	2	11.99 ± 0.58	43.4 ± 0.6	119.6 ± 1.6
C. senex	2	20.47 ± 0.05	46.0 ± 1.5	160.5 ± 2.5
C. cryptus	13	15.97 ± 0.31	46.9 ± 1.0	134.4 ± 1.3
C. niger USA	2	12.72	53.5 ± 1.5	160.0 ± 3.0
Mexico	7	12.67 ± 0.25	60.6 ± 2.4	160.7 ± 1.5
Costa Rica	3	11.83 ± 0.78	61.0 ± 2.5	151.0 ± 1.5
C. rutilus	18	11.96 ± 0.21	44.2 ± 0.7	124.2 ± 1.0
C. "fumigatus"	10	13.18 ± 0.21	51.5 ± 1.1	151.5 ± 1.2

measurements so different could be drawn from populations of a single species of *Cypseloides* swift.

Morphometric variation among species.—To understand morphometric variation in the *Cypseloides* swifts, we plotted measurements of tarsus, wing chord, and tail (Table 1; bill length not included because of low repeatability of measurements). The scatter of points (Fig. 2) reveals the distinctiveness of four groups of species in morphometric space: *C. niger* and *C. "fumigatus"* (including the forms *fumigatus, rothschildi,* and *major*) overlap somewhat, characterized by long wings and short tarsi; *C. senex* is distinctive in its overall large size; *C. rutilus* and *C. cherriei* group together because of their relatively small size in all characters; and finally *C. cryptus* and *C. storeri* are distinctive in their moderate size combined with relatively large tarsi. Further investigation omitting extreme taxa (e.g., *C. niger* and *C. senex*) and using principal components analysis failed to provide any additional resolution. Hence, on morphometric grounds, the closest relative of *C. storeri* appears to be *C. cryptus.*

Hybridization?—The species described here belongs to a most confusing genus. Because the characters of *C. storeri* are largely a mixture of characters of various swift species (e.g., white forehead as in some *C. niger,* size of *C. cryptus*), the possibility exists that these specimens actually represent hybrids between two other species, for instance, between *C.*

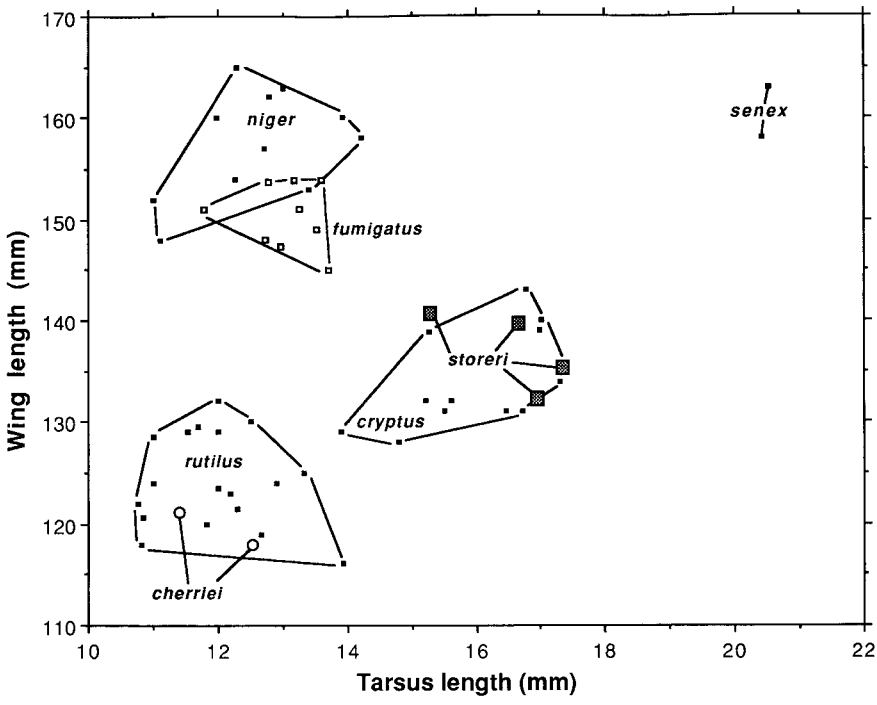

FIG. 2. Scatterplot of wing chord versus tarsus length for seven species of *Cypseloides* swifts. *C. "fumigatus"* includes the forms *major, rothschildi,* and *fumigatus.*

niger and *C. rutilus.* However, three points argue against this explanation. First, morphometric studies indicate *C. storeri* is in no way intermediate between any of the potential parental forms (Figs. 2 and 3). The measurements of *C. storeri* closely coincide with those of *C. cryptus,* and show no tendency towards any other of the species. Second, although *C. rutilus* occurs in the two localities from which *C. storeri* has been recorded, other potential parental forms are not known to breed there. *C. cryptus* is known from no closer than Belize and Honduras (the nearest breeding record is from Costa Rica; Marín and Stiles, in press); *C. niger* breeds along the western and southern mountains of Mexico, but the localities for *C. storeri* lie in an apparent distributional gap for the species (A.O.U. 1983). Finally, no example of hybridization between any species of swifts is known (C. T. Collins, pers. comm.). Hence, neither the opportunity (i.e., sympatry of parental forms), nor evidence (e.g., morphological intermediacy) for a hybrid origin exists in the present case, and we consider a hybrid origin to be unlikely.

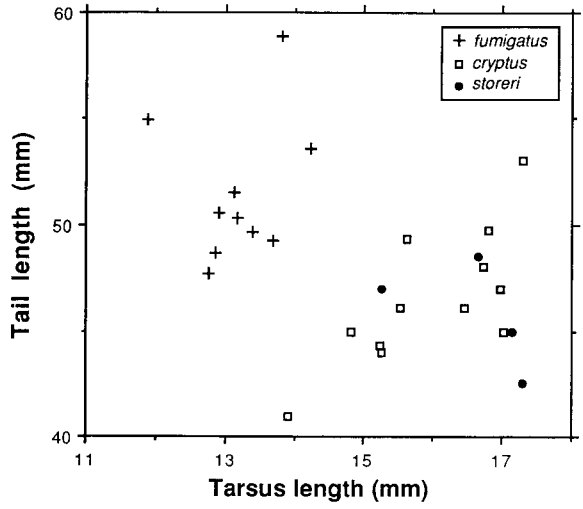

FIG. 3. Scatterplot of tail length versus tarsus length for the complex of species including *Cypseloides "fumigatus," C. cryptus,* and *C. storeri.*

Taxonomic status.—Species limits in swifts have presented a number of challenges to ornithologists: characters are often subtle differences in shape or coloration; specimens are scarce, making analysis of variation due to sex, age, and geography difficult; and little is known about swift biology in general. The form described herein is closely similar to the mid-sized swifts *C. cryptus* of Central America and northern South America and *C. "fumigatus"* (itself a taxonomic mess) of southern South America. Although the specific distinctiveness of *C. cryptus* from *C. fumigatus* has been questioned (Marín and Stiles, in press), they are distinct in morphometric space (Fig. 3). The four specimens of what we describe as *C. storeri* represent a population of swifts most similar to *C. cryptus.* The two forms are disjunct by about 1500 km. They differ markedly in the amount of white on the face: *C. cryptus* usually shows a small white patch on the chin, and some individuals show white on the lores; all four specimens of *C. storeri* have extensive white on the chin, lores, and forehead. (The difference in facial shape mentioned above is consistent in the three specimens of *C. storeri* for which the cranium is intact in the skin, but the reliability of this character will have to be checked when skeletal series are available.) We recognize that under some taxonomic viewpoints, the new form described here might better be considered a subspecies or a member of a superspecies complex. However, in view of the large range disjunction and the non-overlapping character distribution, considering that the current tendency of the ornithological community is to split

differentiated allopatric populations (J. V. Remsen, pers. comm.), and because genetic studies increasingly support the distinctiveness of such disjunct populations (e.g., in the Scrub Jay [*Aphelocoma coerulescens*], Peterson 1990; Common Bush-Tanager [*Chlorospingus ophthalmicus*] and Chestnut-capped Brush-Finch [*Atlapetes brunneinucha*], Peterson et al., in press), we argue that *C. storeri* merits specific rank.

Ecological information.—The two localities from which *C. storeri* is known suggest that the species occurs in mountainous areas with high waterfalls and deep canyons. The Guerrero specimen probably was attracted to lights in camp, so nothing is known about the location of the breeding site; still, the locality is in montane cloud forest with deep canyons, rushing streams, and waterfalls. The Michoacán specimens were taken from an ecotone between pine-oak forest and dry, tropical deciduous forest in an area with many high waterfalls. Information on the ecological relationships of *C. storeri* with other swift species is scant; however, in both localities, White-naped Swift (*Streptoprocne semicollaris*), Chestnut-collared Swift, Vaux's Swift (*Chaetura vauxi*), White-throated Swift (*Aeronautes saxatalis*), and Great Swallow-tailed Swift (*Panyptila sanctihieronymi*) have been sighted.

No *storeri*-like swifts have been seen by us in many months of additional field work in the Sierra de Atoyac and other parts of central and southern Guerrero. However, during two days of field work in October 1990 at several high waterfalls near Tacámbaro, Michoacán, we sighted four individual swifts that appeared to be *C. storeri.* At about 18:00 h (nightfall), after large flocks of White-naped Swifts and a few Chestnut-collared Swifts had entered the canyon for the night, four swifts intermediate in size between the latter two species entered the canyon flying low along the treetops. Although the sighting was brief, and the swifts could not be located later at the waterfall roost site itself, we believe that these individuals belong to the new species.

Biogeography.—The presence of this new taxon in the mountains of western Mexico supports the idea that these mountain systems are important as centers of endemism (Escalante et al., in press). Other species endemic to the mountains of western Mexico include Pileated Flycatcher (*Xenotriccus mexicanus*), Eared Poorwill (*Nyctiphrynus mcleodii*), Guerrero Hummingbird (*Eupherusa poliocerca*), Flammulated Flycatcher (*Deltarhynchus flammulatus*), White-throated Jay (*Cyanolyca mirabilis*), and Black-throated Magpie-Jay (*Calocitta colliei*) (A.O.U. 1983). Moreover, as with the White-fronted Swift and the White-chinned Swift, many western Mexican forms are disjunct outliers with close relatives in Central America or northern South America, such as Mexican Woodnymph

(*Thalurania ridgwayi*) and Crowned Woodnymph (*T. colombica*) (Escalante and Peterson, in press), Short-crested Coquette (*Lophornis brachylopha*) and Rufous-crested Coquette (*L. delattrei*) (Banks 1990), White-throated Jay and Silvery-throated Jay (*C. argentigula*), Red-breasted Chat (*Granatellus venustus*) and Rose-breasted Chat (*G. pelzelni*), and northern and southern populations of Rosy Thrush-Tanager (*Rhodinocichla rosea*) and Military Macaw (*Ara militaris*). This repeated distributional and phylogenetic pattern suggests a previous biogeographic relationship between western Mexico and Central America.

ACKNOWLEDGMENTS

We are deeply grateful to the collectors of the specimens of the new species, A. Phillips, F. Méndez G., and J. Juárez. L. Villaseñor of the Colección Ornitológica of the Univ. Michoacana de San Nicolás de Hidalgo in Morelia, Mexico, generously loaned us the specimens from Michoacán that were critical to this paper. M. Marín generously provided long series of measurements for the within-species variation comparisons. The following individuals and institutions loaned specimens or permitted access to collections under their care: M. LeCroy (American Museum of Natural History), S. Lanyon and D. Willard (Field Museum of Natural History), R. Storer and J. Hinshaw (Univ. of Michigan Museum of Zoology), J. Hafner (Moore Laboratory of Zoology, Occidental College), L. Kiff (Western Foundation of Vertebrate Zoology), K. Garrett (Los Angeles County Museum of Natural History), J. Northern (Univ. of California at Los Angeles), J. V. Remsen (Louisiana State Univ. Museum of Natural Science), and E. Velarde and N. Chávez (Instituto de Biología, Univ. Nacional Autónoma de México); G. Hess and B. Webb kindly provided information on specimens under their care at the Delaware Museum of Natural History and Denver Museum of Natural History, respectively. Comments and suggestions from J. Bates, T. Chesser, C. Collins, S. Hackett, A. Kratter, L. León, J. Llorente, C. Marantz, M. Marín, T. Parker III, J. V. Remsen, T. Schulenberg, S. Sillett, and D. F. Stotz were invaluable in our attempts to understand this difficult group. A. Peterson prepared photographs for Figure 1. Support for this research was obtained from the Facultad de Ciencias, Univ. Nacional Autónoma de México, by the Dirección General de Asuntos del Personal Académico-UNAM project 201789.

LITERATURE CITED

American Ornithologists' Union. 1983. Check-list of North American birds, 6th ed. American Ornithologists' Union, Washington, D.C.

Banks, R. C. 1990. Taxonomic status of the coquette hummingbird of Guerrero, Mexico. Auk 107:191–192.

Collins, C. T. 1972. A new species of swift of the genus *Cypseloides* from northeastern South America. Contr. Sci. Nat. Hist. Mus. Los Angeles County 229:1–9.

Efron, B. 1979. Bootstrap methods: another look at the jackknife. Ann. Statist. 7:1–26.

Eisenmann, E. and C. Lehmann V. 1962. A new species of swift of the genus *Cypseloides* from Colombia. Amer. Mus. Novitates 2117:1–16.

Escalante P., B. P., A. G. Navarro S., and A. T. Peterson. A geographical, ecological and historical analysis of land bird diversity in Mexico. *in* Biological diversity of Mexico:

origins and distribution (T. P. Ramamoorthy, R. Bye, A. Lot, and J. Fa, eds.). Oxford Univ. Press, Oxford, England. (in press).

——— AND A. T. PETERSON. Geographic variation and species limits in Middle American woodnymphs (*Thalurania*). Wilson Bull. (in press).

MARÍN A., M. AND F. G. STILES. On the biology of five species of swifts (Apodidae, Cypseloidinae) in Costa Rica. Proc. West. Found. Vert. Zool. (in press).

PETERSON, A. T. 1990. Evolutionary relationships of the *Aphelocoma* jays. Ph.D. diss., Univ. of Chicago, Chicago, Illinois.

———, B. P. ESCALANTE P., AND A. G. NAVARRO S. Genetic variation and differentiation in Mexican populations of Common Bush-tanagers and Chestnut-capped Brush-finches. Condor (in press).

SMITHE, F. B. 1975. Naturalist's color guide. American Museum of Ntural History, New York, New York.