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SHORT NOTE

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DIET OF THE PYGMY PALM-SWIFT (*TACHORNIS FURCATA*)

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ABSTRACT We studied the diet of the Pygmy Palm-Swift (*Tachornis furcata*) based on stomach contents of four individuals collected in Venezuela. The diet consisted of insects from 6 orders and 22 families and of three spiders. Hymenoptera, particularly fig wasps and their parasitoids, made up 71.32% of 750 prey items. Flies (Diptera) and aphids (Homoptera) were important prey items as well. Body length of 39 intact prey items ranged from 1.1 to 4.2 mm, with a mean of 2.03 mm. These prey sizes are consistent with that of other small swift species.

RESUMEN · Dieta del Vencejo Enano (*Tachornis furcata*)
Estudiamos la dieta del Vencejo Enano (*Tachornis furcata*) en base a contenidos estomacales de 4 individuos coleccionados en Venezuela. La dieta estaba compuesta por insectos pertenecientes a seis órdenes y 22 familias y por tres arañas. Hymenoptera, en particular avispas del higo y sus parasitoides, formaron el 71.3% de 750 presas identificadas. Moscas (Diptera) y áfidos (Homoptera) también fueron ítems presa importantes. El tamaño de 39 ítems presa intactos medidos varió entre 1.1 y 4.2 mm con una media de 2.03 mm. Estos tamaños de presa son similares a los de otras especies de vencejos pequeños.

KEY WORDS Apodidae · Diet · Pygmy Palm-Swift · Stomach contents · *Tachornis* · Venezuela

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INTRODUCTION

Swifts are consummate aerial foragers gathering all of their arthropod food in flight (Lack & Owen 1955). Their prey, mostly insects along with a small proportion of ballooning spiders, is exceedingly diverse, with 17 orders and over 120 families represented in the diet of various swifts (Lack & Owen 1955, Tarburton 1993, Garcia-del-Rey et al. 2010; Collins et al. 2009, 2010a; Collins 2010). There is also great variation in the type of insect prey taken from year to year (Lack & Owen 1955, Collins 2010), season to season (Hespenheide, 1975, Langham 1980, Cucco et al. 1993), and even day to day within a single breeding season (Lack & Owen 1955, Hails & Amirruden 1981, Garcia-del-Rey et al. 2010). Weather conditions also influence prey availability and foraging sites (Lack & Owen 1955, Cucco et al. 1993). Ephemeral abundances of such prey as mayflies, alate ants, termites are readily utilized (Collins 1968, Kopij 2000, Rudalevige et al. 2003). Despite this great variability in the kind of prey swifts take, there is a general pattern of the size of the prey being related to the body size of the swift, i.e., larger swifts take on average larger prey than smaller swifts (Collins et al. 2009, Collins 2015, Collins & Francis in prep.). This has also been proven for aerial-foraging swallows and other foraging guilds of birds (Hespenheide 1971). Information on the prey size of swifts at both the very small and at the large ends of the body size continuum (< 6 g to > 200 g) would be a valuable addition to our understanding of the foraging ecology of these birds. We present here data on the food of the Pygmy Palm-Swift (*Tachornis furcata*), which is endemic to the Maracaibo basin of Venezuela and Colombia (Collins et al. 2002) and the smallest Neotropical swift species.

METHODS

The food composition data we present here are derived from the stomach contents of four adult specimens (1 male, 3 females) of the Pygmy Palm-Swift collected by shooting on 12 January 1995, 6.4 km north of Los Naranjos (8°47’56.53”N, 71°39’28.23”W, 60 m a.s.l.) on the road to Puerto Chama, Estado Zulia, Venezuela (Collins et al. 2010b). Stomachs were removed from specimens being prepared as skeletons; stomachs were not available from a specimen prepared as a study skin and two that were preserved in fluid for anatomical study. The four stomachs were stored in 70% ethanol and later opened and the contents flushed out and examined under a dissecting microscope. Much of the material consisted of disassociated head capsules and other body parts which generally could not be identified below ordinal level or only tentatively allocated to a family (Table 1). Identifications were assisted by direct comparisons to a personal reference collection (HAH). Destruction of delicate wings made sub-ordinal identification of flies (Diptera) impossible. The size (= body length) of 39 intact specimens was measured with an ocular micrometer to the nearest 0.05 mm from the tip of the head to the tip of the abdomen excluding antennae or any caudal appendages.

RESULTS

The prey remains contained parts or whole specimens of 750 individuals allocated to 6 orders and 22 families of insects and three spiders (Table 1). Hymenoptera made up 71.32% of all prey items identified (Table 1). Fig wasps (Agaonidae) and their parasitoids (Torymidae) were the most numerous individuals consumed; flies (Diptera) and aphids (Homoptera) were also important prey items. The body size of 39 intact prey items from a variety of taxa (Table 1) ranged from 1.1 to 4.2 mm (mean ± SD = 2.03 ± 0.903).

DISCUSSION

Many of the food items taken by Pygmy Palm-Swifts, particularly fig wasps and their parasitoids (Hymenoptera), are frequently found near palm trees where these swifts both forage and nest (Collins et al. 2010b). Fig wasps and their parasitoids were also important in the diets of Band-rumped Swift (*Chaetura spinicaudus*) and Short-tailed Swift (*C. brachyura*) in Central America (Hespenheide 1975) and of the Edible-nest Swiftlet (*Aerodramus fuciphagus*) in Malaysia (Langham 1980). Diptera were also important prey of Pygmy Palm-Swifts, making up 12.7% of the items identified. By contrast, the prey brought to nestlings by the Neotropical Palm-Swift (*Tachornis squamata*) elsewhere in Venezuela (Collins & Thomas 2012), contained 52.7 % Diptera and only 10.5 % Hymenoptera. We do not consider these differences in prey type proportions to be significant in light of the great variability in prey types previously documented for most other swift species and our small sample size. However, the orders of insects represented in these diet samples were the same for both of these swifts.

The prey items taken by Pygmy Palm-Swifts were, as expected, small averaging only 2.03 mm (Table 2). This closely resembles the size of prey taken by two other small swifts, Neotropical Palm-Swift and Glossy Swiftlet (*Collocalia esculenta*) (Table 2). The maximum prey size taken by the Pygmy Palm Swift (4.1 mm) is slightly less than that reported for the other two, somewhat larger swifts (Table 2) but it is not possible to assess these slight differences when only limited food samples are available. However, the small size of the prey taken by the Pygmy Palm-Swift is in general agreement with the overall trend of smaller swifts taking smaller prey as previously documented for other larger swifts (Collins et al. 2009).

Differences in prey size and vertical zonation of foraging areas have been proposed as strategies of resource partitioning (Collins 2015). Ecological partitioning by swifts also occurs where a species is

Table 1. Prey items taken by the Pygmy Palm-Swift (*Tachornis furcata*) in the Maracaibo basin of Venezuela. Samples correspond to stomach contents of four individuals. [a]Allocation to family tentative. [b]Most appeared to be fig wasp parasitoids (Torymidae) but identification tentative.

Prey taxa	Family	Subfamily/genus	%	Samples				Total	No. measured
Order				1	2	3	4		
Araneae			0.03						
	Unidentified			0	0	2	1	3	0
Coleoptera			6.01						
	Bruchidae			0	0	1	0	1	1
	Chrysomelidae			0	0	0	1	1	1
		Alticininae		0	3	0	0	3	2
	Coccinellidae			0	1	0	0	1	1
	Curculionidae			1	1	0	0	2	2
		Apioninae		0	0	3	0	3	1
	Eucnemidae			0	0	0	1	1	1
	Platypodidae			0	0	0	1	1	1
	Scolytidae			1	2	0	0	3	2
	Staphylinidae			4	3	2	4	13	3
	Unidentified			3	3	5	3	14	6
Psocoptera			0.3						
	Psocopteridae			1	1	0	0	2	1
Hemiptera			2.8						
	Miridae (?)[a]			6	4	4	3	17	1
	Scutellaridae (?)[a]			0	1	0	0	1	1
	Tingidae			1	0	1	0	2	0
Homoptera			6.57						
	Aphididae			9	28	1	4	42	1
	Cicadellidae			1	0	0	0	1	0
	Fulgoridae			0	3	0	1	4	1
Diptera			12.7						
	Unidentified			16	40	14	21	91	0
Hymenoptera			71.32						
	Agaonidae			67	159	43	68	337	2
	Braconidae								
		Microgastrinae		6	3	3	4	16	0
	Diapriidae			0	0	0	1	1	1
	Formidicae			3	3	13	1	17	0
		Myrmicocryptus		6	3	12	2	23	2
	Torymidae			0	33	0	0	33	0
	Parasitoids[b]			37	22	25	33	117	3
Totals				**159**	**315**	**127**	**149**	**750**	**39**

strongly habitat specific and confines its foraging to a single area. The Pygmy Palm-Swift and its allopatric congener, the Neotropic Palm-Swift, are examples of habitat specialists primarily foraging in palm savannas, a habitat not regularly shared with other, potentially competing, species of swifts. The reduced body

Table 2. Body mass and prey size of three small swifts. Sources: [a]this study, [b]Collins & Thomas 2012, [c]MK Tarburton unpubl. data, [d]Collins & Francis unpubl. data.

Common name	Scientific name	Body mass (g)			Prey size (mm)		
		Mean	Range	N	Mean	Range	N
Pygmy Palm-Swift	*Tachornis furcata*	6.8[a]	6.45–7.10	7	2.03[a]	1.1–4.1	39
Neotropical Palm-Swift	*Tachornis squamata*	10.48[b]	9.0–12.4	47	2.43[b]	0.5–7.8	381
Glossy Swiftlet	*Collocalia esculenta*	6.5[c]	3.5–10	445	2.61[d]	0.9–10	1456

size and deeply forked tails of these Palm-Swifts should be viewed as adaptations making them agile and efficient predators (Collins & Thomas 2012) of the seeming abundance of small prey, particularly hymenoptera, found in palm savannas.

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