

[REDACTED]

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*Abstract.* In most animals, especially those that must swallow food items, the ability to

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formed fruits (Leck 1971; Diamond 1980)

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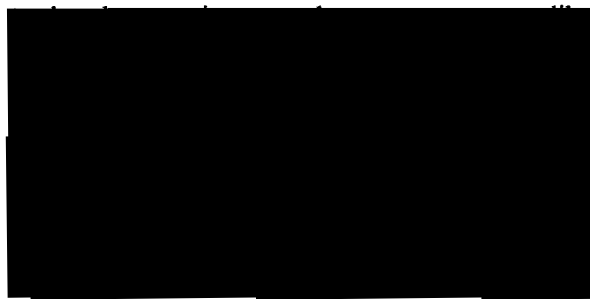
<sup>1</sup> Manuscript received 25 July 1983; revised 24 May 1984.

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TABLE 1. Fruit diameters, observation times, number of censuses, and bird species recorded at 15 tree species, each observed for at least 4 h at Monteverde, Costa Rica.

Tree species*	Fruit diameter (cm)	Observation time (h)	Number of tree censuses	Number of bird species observed during		
				First 4 h of observation	Total observation time	Total observation time plus censuses
	2.2	26.5	204	3	3	4
	2.3	5.8	316	2	2	5
	1.7	14.0	344	3	3	7
	1.2	6.8	204	3	3	8
	1.8	18.5	848	4	4	5
	1.9	26.0	876	1	3	5
		6.0	4984	0	0	4
		37.8		4	8	18
		17.0		4	4	5
		7.0			2	4
		4.6			3	5
		4.0		6	6	8
		23.1		5	6	9
		6.0		5	5	14
		7.0		6	7	13

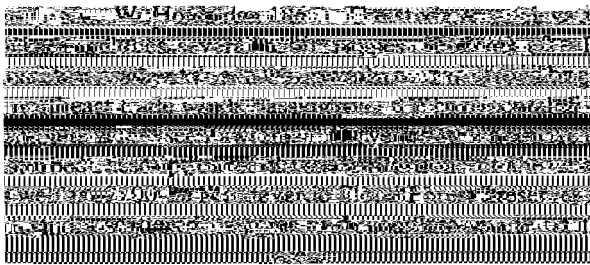
\*Species of the Lauraceae plus *Miconia laourticarpa* and *Uromyza* (Palaceae).



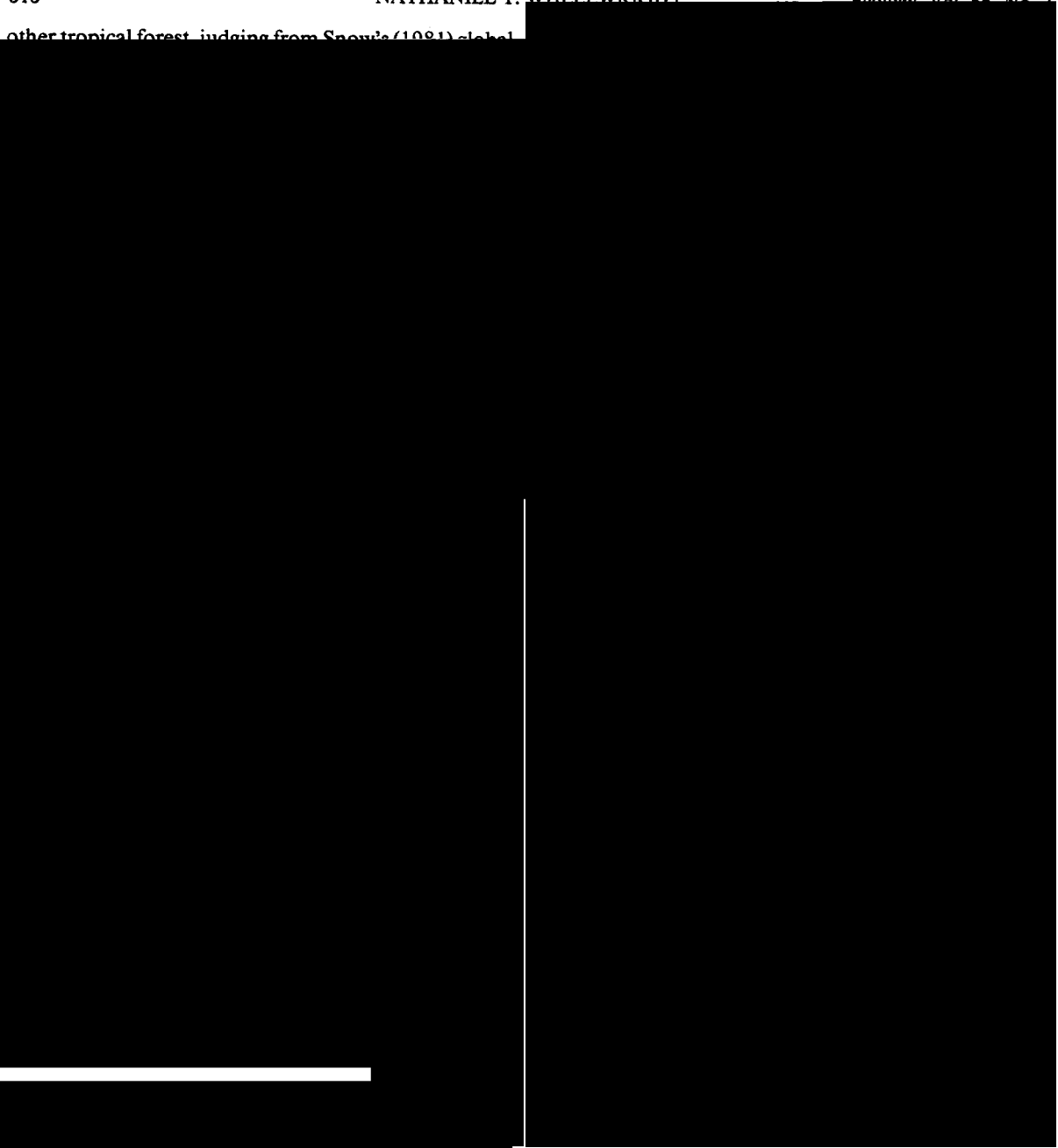
STUDY SITE AND METHODS

*Study area*

For 21 mo between June 1979 and February 1984, I studied fruit-eating birds and fruiting patterns in bird-dispersed plants in the lower montane wet and rain

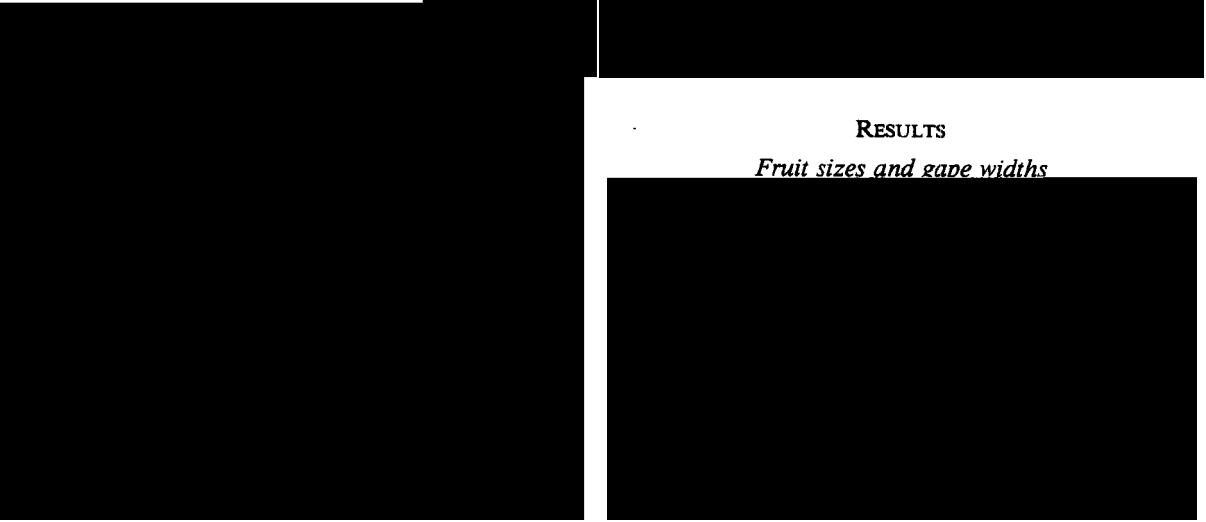


other tropical forest, judging from Snow's (1981) global



**RESULTS**

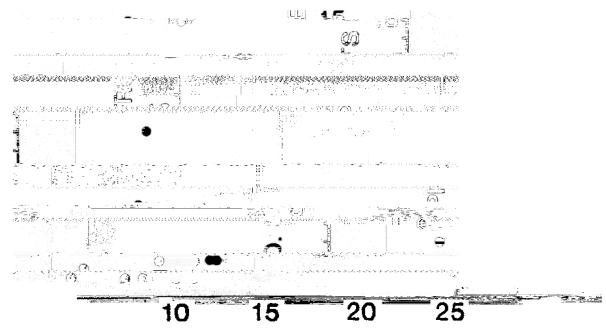
*Fruit sizes and gape widths*





gitated seeds did not exceed 20 mm in diameter for bellbirds or 23 mm for quetzals, as compared to a

20



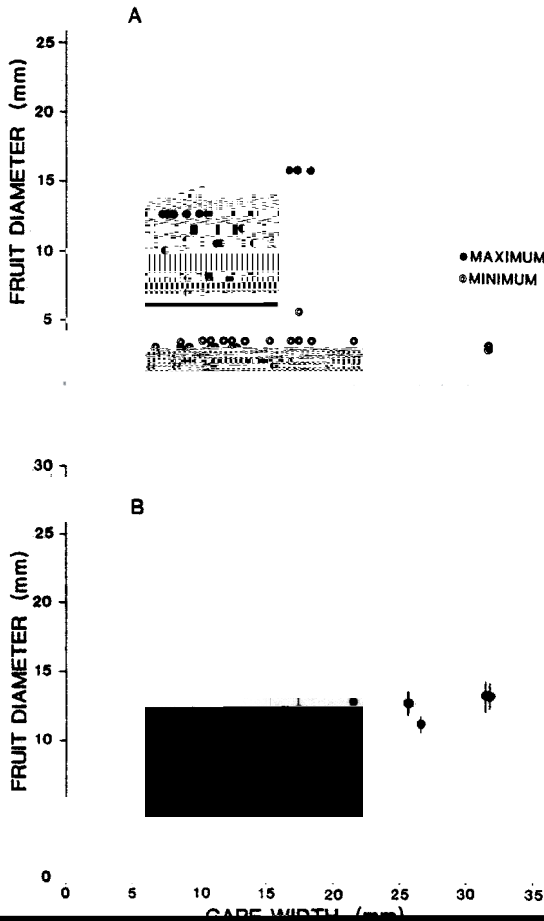
GAPE WIDTH (mm)

FIG. 3. Gape widths of birds vs. number of species of lauraceous fruits eaten ( $r = 0.64$ ,  $n = 17$  bird species,  $P < 0.001$ ).

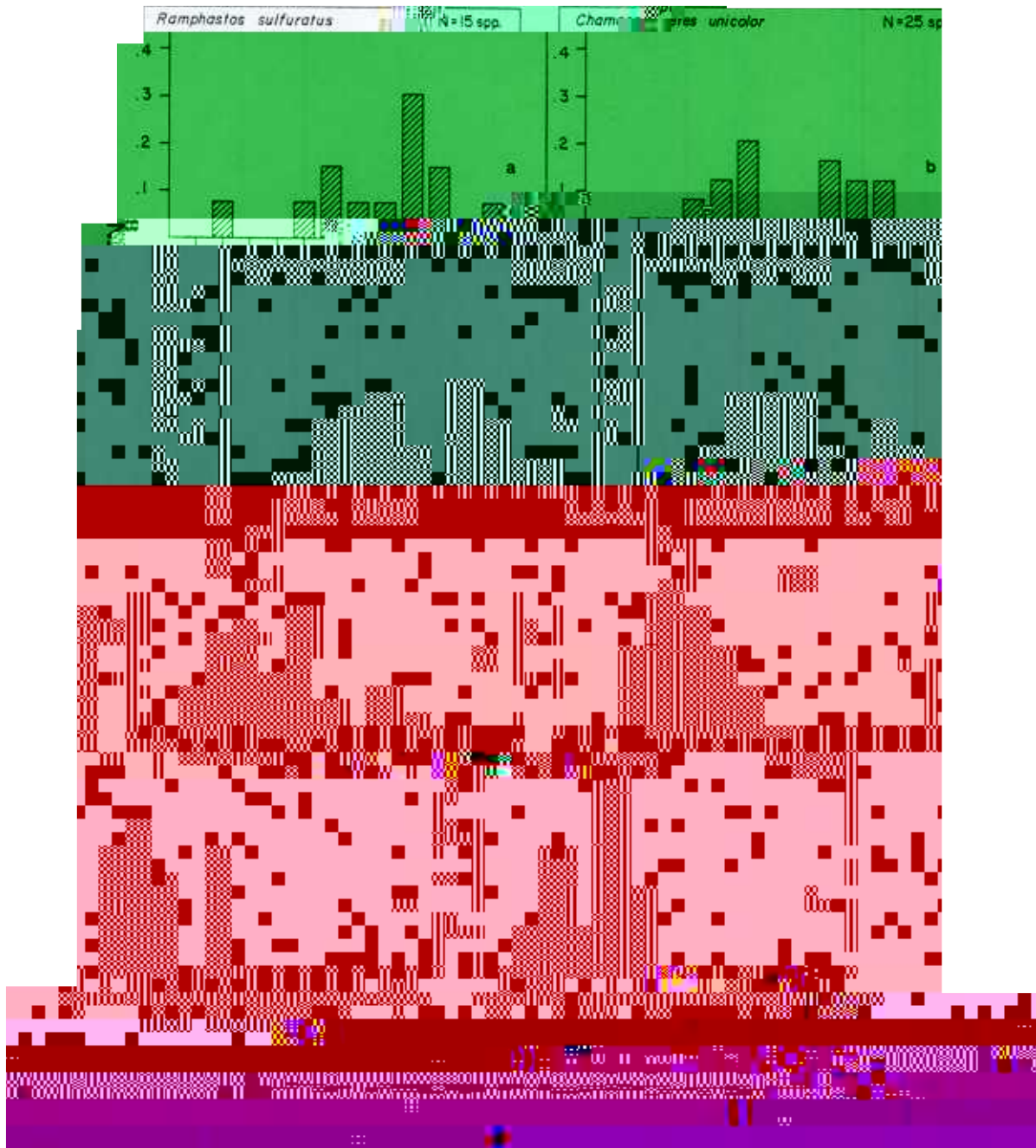
mm to 24.8 mm in 23 bird-dispersed species. Wheelwright & Calder (1987) found that the gape width of a bird is related to the size of the seeds it disperses.

*Observations within a plant family*

Another test of the hypothesis that fruit size and gape

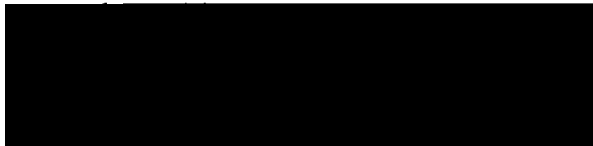


of fruits than small birds, however (Fig. 4). Maximum



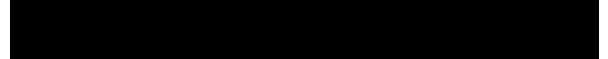
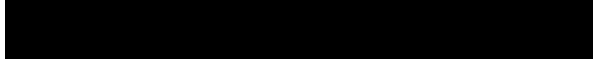
( $r_s = -0.56$ ,  $n = 43$  plant species,  $P < .001$ ). Fruit mass

indicated that birds chose among individual fruits on the basis of size. Selective feeding by birds was



DISCUSSION

as collected from seed traps below bellbird. See



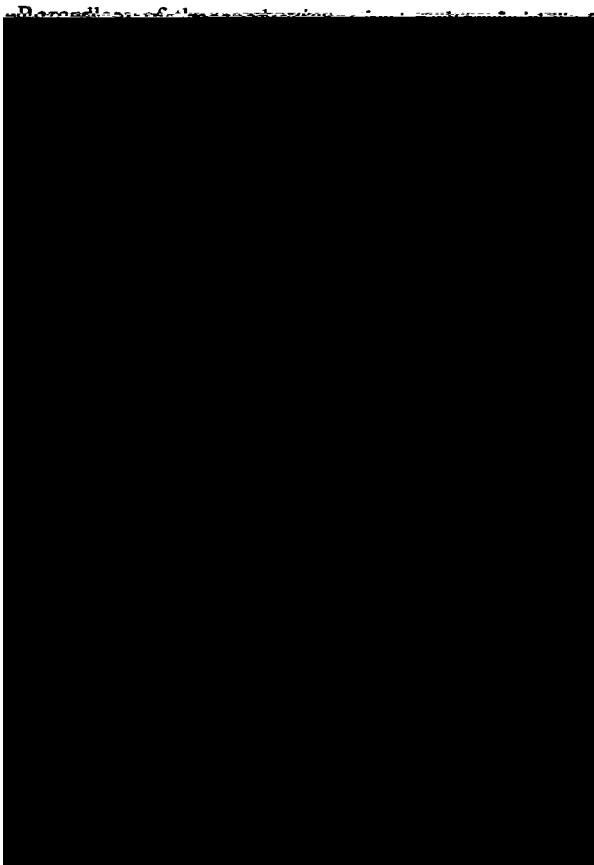
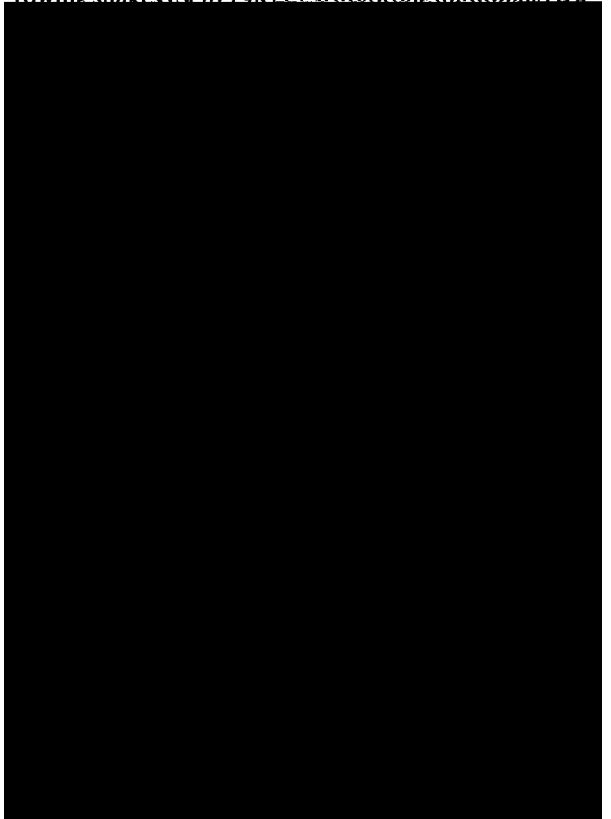
rowing snakes (Seib 1981), carnivorous mammals (De



60-  
50-  
40-  
30-  
20-  
10-  
0

N=1396 fruits

b

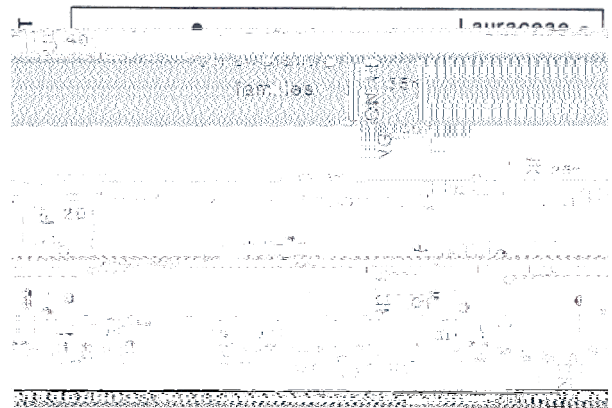
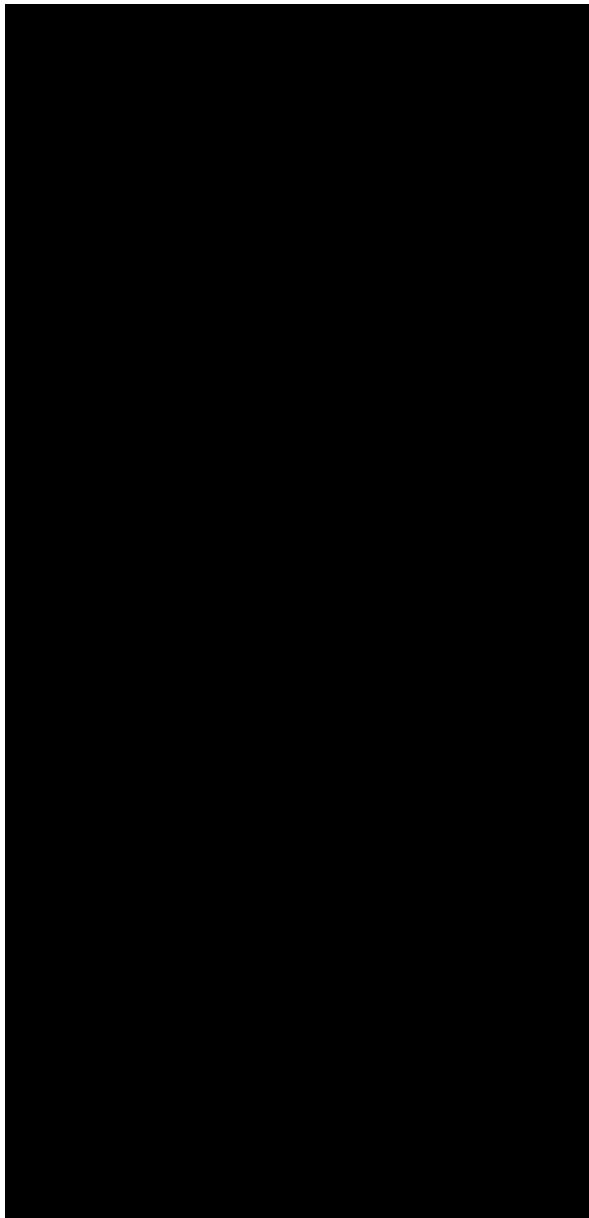


40  
30  
20  
10  
% OF DIET

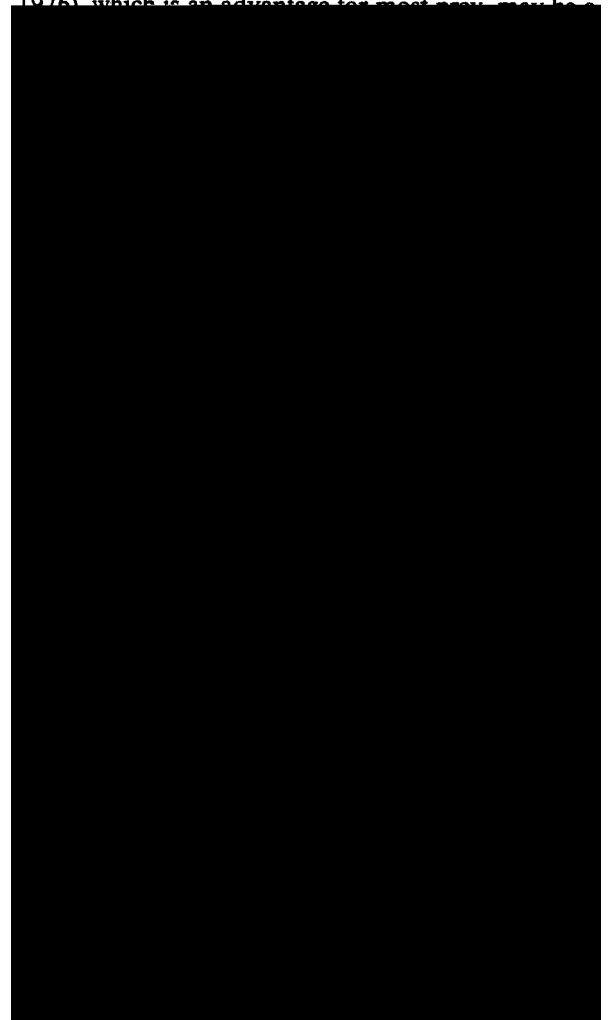
N= 844 fruits

b





1976) which is an advantage for most prey, may be



*Consequences for seed dispersal*

This study suggests that, by producing large fruits, plants are actually at a disadvantage with respect to seed dispersal (Wheelwright and Orszag 1982, Orszag and Wheelwright 1982, Orszag and Wheelwright 1983, Orszag and Wheelwright 1984, Orszag and Wheelwright 1985, Orszag and Wheelwright 1986, Orszag and Wheelwright 1987, Orszag and Wheelwright 1988, Orszag and Wheelwright 1989, Orszag and Wheelwright 1990, Orszag and Wheelwright 1991, Orszag and Wheelwright 1992, Orszag and Wheelwright 1993, Orszag and Wheelwright 1994, Orszag and Wheelwright 1995, Orszag and Wheelwright 1996, Orszag and Wheelwright 1997, Orszag and Wheelwright 1998, Orszag and Wheelwright 1999, Orszag and Wheelwright 2000, Orszag and Wheelwright 2001, Orszag and Wheelwright 2002, Orszag and Wheelwright 2003, Orszag and Wheelwright 2004, Orszag and Wheelwright 2005, Orszag and Wheelwright 2006, Orszag and Wheelwright 2007, Orszag and Wheelwright 2008, Orszag and Wheelwright 2009, Orszag and Wheelwright 2010, Orszag and Wheelwright 2011, Orszag and Wheelwright 2012, Orszag and Wheelwright 2013, Orszag and Wheelwright 2014, Orszag and Wheelwright 2015, Orszag and Wheelwright 2016, Orszag and Wheelwright 2017, Orszag and Wheelwright 2018, Orszag and Wheelwright 2019, Orszag and Wheelwright 2020, Orszag and Wheelwright 2021, Orszag and Wheelwright 2022, Orszag and Wheelwright 2023, Orszag and Wheelwright 2024, Orszag and Wheelwright 2025).



\_\_\_\_\_. 1981. Tropical frugivorous birds and their food plants: a world survey. *Biotropica* 13:1-14.  
Sorensen, A. E. 1983. Taste aversion and frugivore preferences. *Oecologia (Berlin)* 56:117-120.

