Longevity in the European free-tailed bat (*Tadavida teniotir*)

C. Ibáñez and J. L. Pérez-Jordá¹

Estación Biológica de Doñana (CSIC), Apartado 1056, 41080 Sevilla, Spain

¹ Present address: Department of Zoology, University of Aberdeen, Aberdeen, AB9 2TN, Scotland

Numerous studies have documented that bats are unusually long-lived for small mammals (Tuttle & Stevenson, 1982; Jürgens & Prothero, 1987 and references therein). In the absence of data on overall population dynamics, longevity can be an important demographic parameter for interspecific comparisons (Tuttle & Stevenson, 1982). Here, we present the first data on the longevity of a small population of *Tadavida teniotir*.

This study started in March 1983, when some of the *T. teniotir* that roost in expansion joints of a bridge at Villarrasa, Huelva, Spain were ringed. The bats used this shelter most of the year although, the maximum numbers of individuals were observed during spring (50–60) and autumn (80), and the minima in summer (10) and winter (0–20). Most of the roost locations were inaccessible to observers. Consequently, only a small portion of the bats were marked, and the exact status of this colony as a whole remains unclear. Although some of the captured females were pregnant, we observed neither lactating females nor young. This suggests that this roost is mostly used as a regular transitional refuge in spring and autumn.

Table 1. Yearly number of *Tadavida teniotir* ringed and, between brackets, total number of captures (i.e. ringed plus recaptured individuals) from 1983 to 1995

	Males		Females		Total	
1983	21	(23)	10	(11)	31	(34)
1984	25	(45)	10	(11)	35	(56)
1985	2	(6)	0	(0)	2	(6)
1986	0	(0)	0	(0)	0	(0)
1987	2	(2)	0	(0)	2	(2)
1988	3	(7)	4	(4)	7	(11)
1989	13	(23)	7	(7)	20	(30)
1990	3	(5)	5	(5)	8	(10)
1991	6	(10)	1	(1)	7	(11)
1992	0	(0)	0	(0)	0	(0)
1993	11	(12)	9	(10)	20	(22)
1994	2	(6)	3	(4)	5	(10)
1995	7	(25)	14	(18)	21	(43)
Total	95	(164)	63	(71)	158	(235)

Table 2. Number of ringed individuals recaptured in subsequent years

	Years after marking								Total
	1	2	3	4	5	6	8	12	
Males	7	8	1	1	2	1	1	1	22
Females	2		1						3
Total	9	8	2	1	2	1	1	1	25

Over 13 years (1983–95), a total of 235 captures (164 males and 71 females) involving 158 individuals (95 males and 63 females) were made. Because capture attempts were not performed on a regular and systematic basis, the frequency of bat catches fluctuated from year-to-year (Table 1). For instance, no bats were caught in 1986 and 1992, in contrast to six field seasons in which more than 20 animals were captured (1983, 1984, 1989, 1993 and 1995).

Twenty-five individuals (22 males and 3 females) were recaptured one or more times after initial marking. The proportion of recaptured females was significantly lower than proportion of recaptured males (5% vs. 23%, respectively; Fisher's exact test, $P = 0.007$). Five individuals, all males, were recaptured after periods of five years or more (Table 2).

The longest longevity record concerned a male that was first captured on 19 August 1983. This male was subsequently recaptured on four occasions, the last time on 26 September 1995. At the time of its initial capture, this bat exhibited no apparent tooth wear. This individual also appeared the heaviest (35 g) of all 116 males captured between January and August over the study years. This suggests that this bat was born earlier than 1983 and, therefore, had reached at least 13 years at the time of its last capture. Upon each subsequent recapture, we noted progressively increased tooth wear, and at the time of the last capture the animal's teeth were quite worn. This record currently represents the longest documented life span within the family Molossidae.

One classical explanation of exceptional longevity among insectivorous bats is related to the fact that these heterothermic mammals make extensive use of torpor at some times during their annual life cycle, at least in the temperate zones (Sacher, 1977). *T. teniotir* is similar in this respect to its North American relative *Tadavida bvarilienrir*, as it is not a strictly hibernating species, and it only enters torpor during short periods of time under adverse weather conditions (unpubl. data). This difference in physiology could account for a shorter longevity in Molossidae as compared to other temperate bat families such as Vespertilionidae and Rhinolophidae. It should be noted, however, that long life spans have also been observed in typically homeothermic bat species inhabiting the tropics (Jürgens & Prothero, 1987).

Interestingly, a relatively shorter maximum life span has been found in *T. bvarilienrir* (7.2 years with 160,000 ringed bats and thousands of recoveries; Cockrum, 1973) in comparison with *T. teniotir* (this study). *T. bvarilienrir* migrates over great distances, whereas *T.*

teniotir is a non-migratory species, even at the northern border of its distribution range in the Swiss Alps (Arlettaz, 1990). *T. bvarilienrir* could, therefore, be subject to greater hazards during its seasonal migrations, resulting in lower survival rates (Paradiso & Greenhall, 1967). This view would be inconsistent, however, with the longevity records reported for *Miniopterus schreibervii*, another migratory species. Extensive ringing in Switzerland (Aellen, 1978) and South Africa (16,900 ringed bats and 24 years of monitoring; van der Merwe, 1989) have indicated maximum life spans of 15.5 and 13 years, respectively, for *M. schreibervii*.

Acknowledgement

We are grateful to all the people who have helped us during the field work, especially to R. Laffitte, C. Ruiz, A. Guillén and L. Gamallo. We are particularly grateful to R. Arlettaz, W. Lancaster and J. Speakman for their comments on the manuscript. We also thank W. Lancaster who improved the English of this manuscript. This study was supported in part by DGICYT project number PB90-0143.

REFERENCE

- Aellen, V. (1978). Les chauves-souris du canton de Neuchâtel Suisse (Mammalia, Chiroptera). *Bull. toc. Neuchâtel sci. Nat.* 101: 5–26.
- Arlettaz, R. (1990). Contribution à l'éco-éthologie du *Molossus de Cestoni, Tadarida teniotir* (Chiroptera) dans les Alpes valaisannes (sud-ouest de la Suisse). *Z. für Tierökologie* 55: 28–42.
- Cockrum, E. L. (1973). Additional longevity records for American bats. *J. Aviz. Acad. sci.* 8: 108–110.
- Jürgens, L. D. & Prothero, J. (1987). Scaling of maximal lifespan in bats. *Comp. Biochem. Physiol. A* 88: 361–367.
- Paradiso, J. L. & Greenhall, A. M. (1967). Longevity records for American bats. *Am. Midl. Nat.* 78: 251–252.
- Sacher, G. A. (1977). Life table modification and life prolongation. In *Handbook of the biology of aging*: 582–638. Finch, C. E. & Hayflick, L. (Eds). New York: Von Nostrand.
- Tuttle, M. D. & Stevenson, D. (1982). Growth and survival of bats. In *Ecology of bats*: 105–139. Lunz, T. H. (Ed.). New York: Plenum Press.
- van der Merwe, M. (1989). Longevity in Schreibers' long-fingered bat. *t. Afv. J. Wildl. Res.* 19: 87–89.