Short Note

The introduced Madeiran lizard, *Lacerta (Teira) dugesii* in Lisbon

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The endemic lizard *Lacerta (Teira) dugesii* Milne-Edwards 1829 is widespread in the Madeiran Archipelago (Richter, 1986), where it inhabits beaches, open lands and woodland, ranging from the sea level to the top of the mountains (Sadek, 1981). It is particularly abundant around houses, refuge tips and picnic areas (Cook, 1983). The species is also found on the Selvagens islands (Bischoff et al., 1989), where it was probably introduced. It also appears on several islands of the archipelago of the Azores, where it has also been introduced (Ulstrand, 1961; Malkmus, 1984).

The presence of the Maderian lizard was detected at the Alcântara quarter near the port area of Lisbon, living on the ground under bushes near the railway fence along a belt area extending some 1.15 meters on 17th July 1992. The species had been introduced there some years previously, probably in cargoes of bananas from Funchal (Madeira). *L. (T.) dugesii* seems to be restricted to this small area of colonisation, which it shares with the native Iberian wall lizard *Podarcis hispanica* Steindachner 1870. The Iberan wall lizard is widespread in the Iberian Peninsula, where it is very common in a multitude of habitats, but in the Lisbon region it often lives on the soil, grass and walls in open and built areas.

To evaluate the situation with regard to the introduced Madeiran lizard, several lizard counts were made along the strip of colonisation. Based on Bibby et al. (1992), a fixed belt transect (width approximately 1.5 m) was chosen as the most appropriate census method to apply to the study area, which is a narrow strip along a railway. However, the detectability of lizards might have been influenced by several factors, such as observer performance, meteorological conditions, habitat heterogeneity, differences in activity of species and anthropogenic damages (digging up bushes, removing soils, pavement works, etc.) related to the building of a new road. To reduce bias, the counts

were made only on days with periods of sunshine (at mid morning) and the observer was always the same. The speed of walk was maintained approximately constant (30-35 m per min) for a whole count. The study area was divided into six fixed sectors along the railway (L1, L2, L3 on the left side; R1, R2, R3 on the right side) for better inclusion of the habitat heterogeneity observed (different distribution of bushes and built areas).

The abundance data reported in table 1 may be seen as a baseline for monitoring future changes. All classes of Madeiran lizards, were found seasonally and individuals were always most abundant in sector L3. In contrast *P. hispanica* was more homogeneously distributed among sectors, except in two sectors (L3, L2) where it scarcely occurred. Although the two species of lizards could be found in the same sector, they were never seen together side by side.

The Mann-Whitney U test was used by sectors to test the abundance data of both species among counts, and showed that the abundance of *L. (T.) dugessi* was significantly greater than the abundance of *P. hispanica* in sectors L2 ($p<0.001$), L3 ($p<<0.001$— and R3 ($p<0.05$), but in contrast *P. hispanica* was significantly more abundant in sectors L1 ($p<0.005$) and R1 ($p<<0.05$) where the exotic species is not very abundant. The abundances of the two species did not differ significantly in sector R2. The Spearman rank correlation coefficient was used to test the correlation between abundances of both species along the sectors. However, to estimate the global abundances and to take into account the different length of the sectors involved, the data were expressed using a formula of weighted abundance, AB = int [(x + d)/L], where x is the mean of all abundance counts available in each sector, d is its standard deviation, L is the length of the sector, and "int" means that the result was rounded up to the nearest integer. The coefficient obtained with AB values was -1.000, $p<<0.01$, and thus the abundances of both species are negatively and signifiicantly correlated along the six sectors.

The data in table 1 suggest that the small introduced population of Madeiran lizards is reproductively active, because all age classes were found. The results of Mann-Whitney U test suggest that the differences between abundance of both species are maintained throughout the seasonal period of activity and are probably related to concrete demographic features rather than being random distributions. The result of Spearman test provides circumstantial evidence that the native *P. hispanica* is supplanted by the exotic *L. (T.) dugesii* in sectors (e.g. L3, L2) where the exotic species is clearly abundant. In fact, adults of both species were never seen together.

No animals were found beyond the study area; no drastic changes in populations appear to have occurred. Several examples of lacertid introductions show similar features. The best example is seen in the Italian wall lizard *Podarcis sicula*, wich has been introduced to several localities: in five counties of Southern France (Knoepffler, 1961) and in the port of Toulon (Orsini, 1984); in Switzerland, one population is known along a railway embankment at Basel (Hofer and Dusej, 1993); in Spain it appears in the gardens of the port of Almeria (Mertens and Wermuth, 1960) and at the Nola coast near Santander (Mejide, 1981); and it has also been introduced to the distant port of Philadelphia, Pennsylvania, USA (Conant, 1959). There are other examples; the most

Table 1. Abundance data for both lizard species (*Lacerta (Teira) dugesii* and *Podarcis hispanica*) shown by dates, sectors (L1, L2, etc.) and age/sex classes (M - males, F - females, A - indetermined adults, S - subadults and J - juveniles). x - data not available.

S	SECTORS	L1 = 0.425 km						L2 = 0.275 km						L3 = 0.450 km						R1 = 0.425 km						R2 = 0.275 km						R3 = 0.450 km					
P	DATES	n	M	F	A	S	J	n	M	F	A	S	J	n	M	F	A	S	J	n	M	F	A	S	J	n	M	F	A	S	J	n	M	F	A	S	J
	18-Jun-92	0	0	0	0	0	0	3	1	2	0	0	0	29	10	9	0	10	6	1	0	1	0	0	0	1	0	1	0	0	0	8	1	4	0	3	5
L.	20-Aug-92	0	0	0	0	0	0	5	2	3	0	0	0	64	25	17	0	22	22	3	1	2	0	0	0	1	0	0	0	1	0	11	4	1	0	6	4
(T.)	31-Aug-92	0	0	0	0	0	0	0	0	0	0	0	0	10	2	4	0	4	3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	09-Sep-92	0	0	0	0	0	0	2	0	2	0	0	0	27	7	11	1	8	12	1	0	1	0	0	0	0	0	0	0	0	0	3	2	0	0	1	0
D	02-Nov-92	9	3	5	0	1	1	28	7	16	0	5	3	103	32	57	0	14	12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
U	22-Feb-93	3	2	1	0	0	0	5	2	3	0	0	0	12	3	5	0	4	4	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
G	09-Mar-93	4	1	3	0	0	1	3	1	2	0	0	0	26	4	16	0	6	10	9	4	3	1	1	0	8	4	2	1	1	0	28	11	11	0	6	7
E	26-Mar-93	4	0	4	0	0	0	4	3	1	0	0	0	45	18	22	0	5	3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
S	19-May-93	0	0	0	0	0	0	5	1	3	0	1	0	41	19	19	1	2	5	3	1	0	2	0	0	6	2	4	0	0	1	0	0	0	0	0	0
I	15-Jun-93	1	0	1	0	0	0	3	2	1	0	0	0	23	7	10	2	4	2	2	1	1	0	0	0	3	1	0	1	1	0	13	2	8	0	3	3
I	23-Jul-93	4	2	2	0	0	0	0	0	0	0	0	0	17	5	8	1	3	4	1	1	0	0	0	0	0	0	0	0	0	0	4	1	3	0	0	1
	02-Aug-93	0	0	0	0	0	0	6	4	2	0	0	0	39	16	13	1	9	5	1	0	0	1	0	0	3	2	1	0	0	1	9	4	4	0	1	0
	AB	12						46						138						13						19						38					
	18-Jun-92	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	4	2	0	1	0	2	1	0	0	1	0	1	1	0	0	0	0
P.	20-Aug-92	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2	2	0	4	0	1	0	1	0	0	0	5	3	2	0	0	0
	31-Aug-92	11	6	3	2	0	7	1	1	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
H	09-Sep-92	6	3	2	0	1	9	0	0	0	0	0	0	0	0	0	0	0	0	3	2	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
I	02-Nov-92	17	6	6	0	5	1	0	0	0	0	0	0	1	1	0	0	0	0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
S	22-Feb-93	15	6	9	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	09-Mar-93	24	11	9	0	4	1	1	1	0	0	0	0	0	0	0	0	0	0	19	8	8	0	3	1	0	0	0	0	0	0	2	1	1	0	0	0
A	26-Mar-93	5	2	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
N	19-May-93	2	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	12	4	6	0	2	0	7	3	4	0	0	0	0	0	0	0	0	0
I	15-Jun-93	6	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	3	0	0	0	4	2	1	1	0	0	1	1	0	0	0	0
C	23-Jul-93	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	11	7	4	0	0	0	2	1	1	0	0	0	1	0	0	1	0	0
A	02-Aug-93	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	6	4	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
	AB	36						4						1						33						15						6					

important feature is that at all of these localities, as far as is known, the introduced populations of *P. sicula* has never become widespread. In contrast, in large parts of the north of Corsica, *P. sicula* has settled to the detriment of the endemic *P. tiliguerta* (Delaugerre and Cheylan, 1992). In Menorca, the introduction of *P. sicula* caused the fragmentation of the distribution of an earlier introduced species living there, the little Moroccan Rock lizard *L. (T.) perspicillata.* (Riviera and Arribas, 1993). In view of this divergence we intent to continue to follow the exotic population of the Madeiran lizard at Alcântara for monitoring any further change over the next years.

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