Notes on Egg-sacs and Spiderlings of Two Species of *Grammostola* (Araneae: Theraphosidae) From Central Argentina

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Tarantulas (theraphosid spiders) possess life-history traits that differ markedly from other spiders. For example, some species live for 15–30 years and require 5–6 years to reach reproductive maturity (Main 1978, Vincent 1993). Most species are habitat specialists and are extraordinarily sedentary (Main 1987, Vincent 1993, Coyle & Icenogle 1994). This combination of life-history characteristics such as longevity, habitat specialism with poor dispersal abilities and small geographic ranges, parallels general characteristics of taxa that are extinction prone, either at the population or species level (McKinney 1997). Moreover, a thorough understanding of theraphosid biology and ecology is necessary from a

Figure 1: Female of *Grammostola doeringi* in Bahía Blanca. Live habitus. © Ferretti.

Figure 2: Female burrow of *Grammostola doeringi*. © Ferretti.

conservation standpoint because natural populations may be threatened by habitat disturbances and captures for pet commerce (Costa & Pérez-Miles 2002).

Members of the family Theraphosidae are usually large and long-lived and in the last few decades they have become popular pets in many countries. Although several papers report different aspects of their biology (Costa & Pérez-Miles 1992, 2002; Pérez-Miles & Costa 1992; Marshall & Uetz 1993; Schillington & Verrell 1997; Huber 1998; Janowsky-Bell & Horner 1999; Locht *et al*. 1999; Punzo & Henderson 1999; Yañez *et al*. 1999; Ferretti & Pérez-Miles 2011) only one describes the spiderling emergence in detail in a *Grammostola* species (Panzera *et al*. 2009) and few described the spiderlings activity or dispersal after emergence (Reichling 2000, Shillington & McEwen 2006).

Two tarantula species inhabit south of Buenos Aires province, Argentina, *Grammostola doeringi* (Holmberg, 1881) and *Grammostola vachoni* Schiapelli & Gerschman, 1961. *Grammostola doeringi* (Fig. 1) can be easily found in nearby the locality of Bahía Blanca, where it lives in tubular burrows that are constructed in open fields (Fig. 2). The other tarantula species, *Grammostola vachoni*, inhabits burrows constructed under stones in the rocky hills (Fig. 3) of northern and central Argentina (Ferretti & Ferrero 2008). Adult females occupy soil burrows under stones and remain within, or close to, this shelter at all times. This tarantula species is common in the hilly zone in the locality of Sierra de la Ventana. Recently, distributional data analysis showed that maybe they could comprise sympatric species and studies on ethological reproductive isolation are being developed by the authors. Moreover, both species have the same reproductive period with walking males in spring in Southern Hemisphere (October – December). The aim of this study is to present preliminary notes about the development of these two *Grammostola* species.

Spiders' maintenance at the lab: Females were kept in the laboratory of Zoología de Invertebrados II, Universidad Nacional del Sur. Tarantulas were maintained individually in glass containers of 13 cm diameter or rectangular glass containers of 30x14x15 cm according to their size, with soil and water provision. All individuals were fed *ad libitum* with cockroaches (*Blattela germanica*) and *Tenebrio* sp. larvae (Coleoptera). Spiderlings were individually housed in plastic containers of 3 cm diameter x 5 cm high with a soil substrate and a wet cotton wool ball. Spiderlings were fed with termites (Isoptera). The room temperature during breeding was 26.7°±1.52°C.

Observations: We observed the construction of two egg-sacs of *Grammostola doeringi* on 19 December 2004 and 22 December 2009 (summer in southern hemisphere). Both females made their egg-sacs in the laboratory. In the laboratory, the egg-sac construction in *G. doeringi* was characterised by the complete covering of the inner walls of the glass container (13 cm diameter) by dense web (Fig. 4). Egg-sac care by the females involved maintaining it under her body (Fig. 5). Spiderlings emerged 62 days after oviposition from the first egg-sac and 76 days after oviposition from the second egg-sac. Neonates were pale yellow, but moulted immediately becoming light brown (Fig. 6). From the first egg-sac 219 spiderlings were counted and 27 spiderlings were dead. The second egg-sac contained 168 spiderlings, where 8 were dead (Fig. 7). The percentages of dead spiderlings through moults are shown in figure 8. The spiderlings from the second egg-sac are still alive.

Egg-sacs of *Grammostola vachoni* were observed in the field (Fig. 9) in December and January (summer in southern hemisphere): one on 10 December 2007 (egg-sac examined in the laboratory contained 248 eggs), one on 22 December 2011 and one on 6 January 2010. In the laboratory, the egg-sac

Figure 3: Male of *Grammostola vachoni* in a short burrow. Note that stone was removed. © Ferretti.

Figure 4: Dense web formed by a female of *Grammostola doeringi* during egg deposition. © Ferretti.

Figure 5: Female of *Grammostola doeringi* carrying an egg-sac between front legs. © Ferretti.

Figure 6: Spiderling of *Grammostola doeringi*. © Ferretti.

construction (10 December 2007) was similar to that of *G. doeringi*. The egg -sac measured 44 mm diameter with three openings of three millimetres approximately where spiderlings emerged. Spiderlings emerged 75 days after oviposition from the egg-sac. We counted 434 spiderlings from the egg-sac and they lived 7 months approximately. We observed two moults inside the egg-sac. The percentages of dead spiderlings through moults are shown in figure 10.

Both species studied apparently produced only one egg-sac per year, mainly during the warm period. In our study egg-sacs were observed in the field and in the laboratory mostly in the summer (temperate region). Costa & Pérez-Miles (2002) also observed egg-sacs in the field during summer in *G. anthracina* (Koch 1842) (previously named as *G. mollicoma*) and *G. iheringi* (Keyserling 1891). The period from oviposition to emergence of spiderlings was reported by Costa & Pérez-Miles (2002) in *G. anthracina* and *G. iheringi* as more than 50 days. A large number of dead spiderlings was due to abnormal moults resulting in defective neonates (Fig. 11). These anomalies were achieved during the moulting process leading to death or defective individuals. Maybe some genetic problem could be operating leading these anomalies during moults and wild caught spiders also seem to have problems during their development. The case of defective juveniles after moults was not reported in other *Grammostola* species (Costa & Pérez-Miles 2002, Panzera *et al*. 2009).

A high number of deaths of spiderlings of *G. vachoni* could be explained by the critical high sensitivity of them to humidity variations, and in the laboratory, humidity being too low is often a major cause of spiderlings dying in captivity, but an excess of water also caused the death. The observed number of spiderlings emerged was significant higher than other *Grammostola* species (Costa & Pérez-Miles 2002, Panzera *et al*. 2009).

Reproductive success in captivity in theraphosids is unusual [Ed. This may be true under laboratory conditions, but these days theraphosids are routinely and successfully captive bred by enthusiasts] and was indicated for the first time by Celerier (1981) in *Stromatopelma calceatum griseipes* (Pocock 1897) and then by

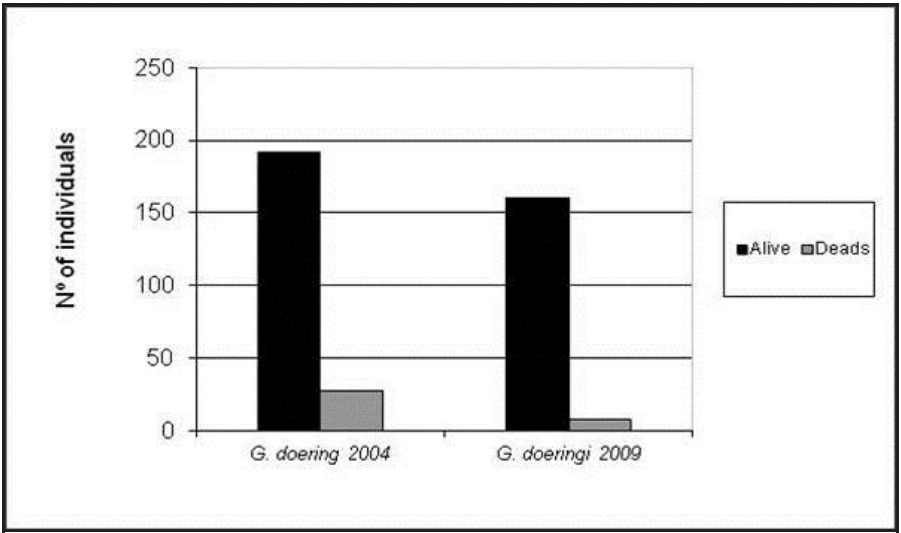

Figure 7: Number of spiderlings emerged from the egg-sacs.

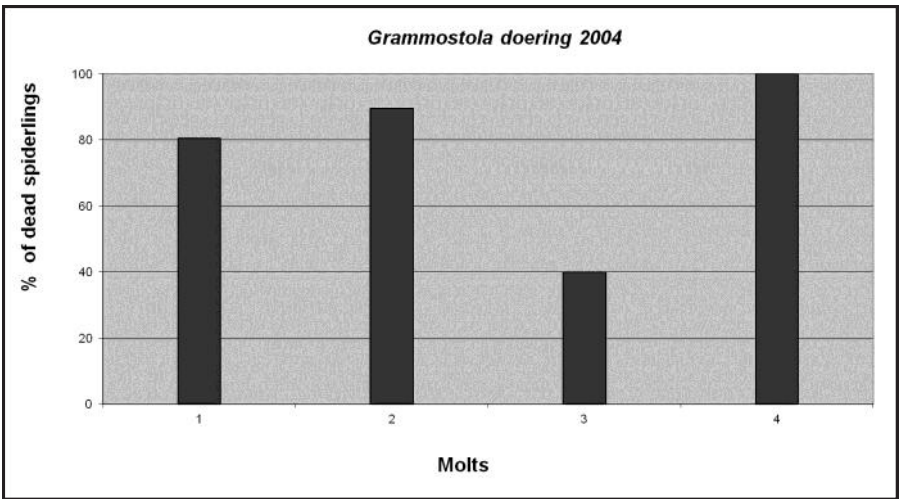

Figure 8a: Percentages of dead spiderlings from the egg-sacs of *G. doeringi*. Egg-sac from 2004.

Costa & Pérez-Miles (1992) for *Plesiopelma longisternale* (Schiapelli & Gerschman 1942). Usually in theraphosids egg-sacs made in the laboratory are eaten or abandoned (Costa & Pérez-Miles 2002).

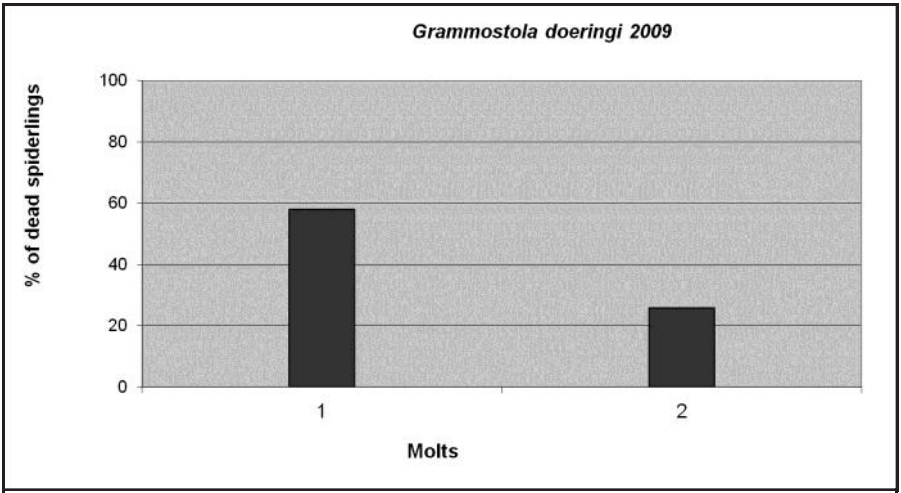

Figure 8b: Percentages of dead spiderlings from the egg-sacs of *G. doeringi*. Egg-sac from 2009.

Acknowledgments

We thank the British Tarantula Society for a grant and Stuart Longhorn for his valuable comments on the article. Authors thanks to Adriana Ferrero and Laboratorio de Zoología de Invertebrados II for providing captive facilities. Thanks to Leonela Schwerdt for her help on field work. Nelson Ferretti and Gabriel Pompozzi thanks to CONICET for their PhD. fellowships.

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Figure 9: Female of *Grammostola vachoni* holding an egg-sac. © Ferretti.

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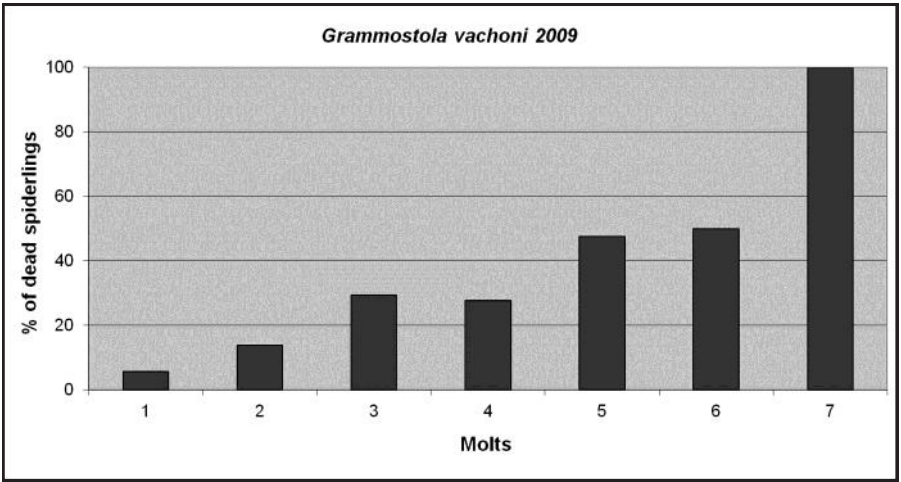

Figure 10: Percentages of dead spiderlings from the egg-sac of *G. vachoni*.

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Figure 11: Defective spiderlings after moulting. © Ferretti.