

## ASPECTS OF MATERNAL CARE AND SOCIAL BEHAVIOUR IN SCORPIONS; *TITYUS (ATREUS) NEBLINA* LOURENÇO (SCORPIONES, BUTHIDAE)

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**Abstract:** Both related and unrelated specimens of *Tityus (Atreus) neblina* show certain particular traits in their behaviour which could be assimilated both to the intermediate sub-social stage of development (family route) and to the quasisocial stage (parasocial route). Females with broods were kept together in a terrarium with other non-gravid females. On several occasions, second instar juveniles moved from their mother's back to the backs of other, non-gravid, females. This behaviour, which is undoubtedly connected with social behaviour has been observed in buthid scorpions for the first time.

**Key words:** Scorpiones, Buthidae, *Tityus (Atreus) neblina*, maternal care, social behaviour.

**Aspectos de los cuidados maternales y el comportamiento social de los escorpiones; *Tityus (Atreus) neblina* Lourenço (Scorpiones, Buthidae)**

**Resumen:** Tanto ejemplares relacionados como no relacionados de *Tityus (Atreus) neblina* muestran ciertos rasgos peculiares de comportamiento que podrían asimilarse igualmente a la fase de desarrollo subsocial intermedia (ruta familiar) o a la fase cuasisocial (ruta parasocial). Se mantuvieron en un terrario hembras con crías junto a hembras no grávidas. En diversas ocasiones, juveniles de segunda etapa se pasaron de la espalda de su madre a las de hembras no grávidas. Es la primera vez que se observa en escorpiones bútidos esta conducta, que está indudablemente relacionada con un comportamiento social.

**Palabras clave:** Scorpiones, Buthidae, *Tityus (Atreus) neblina*, cuidados maternales, comportamiento social.

### Introduction

Maternal behaviour and care has, for a considerable time, been known to occur in scorpions (Vannini *et al.*, 1978; Lourenço, 1979). Newborn scorpions of all species stay with their mothers until just after the first moult. This period, which usually lasts from one week to almost one month, represents a subsocial stage along the family route (Polis & Lourenço, 1986). Some species retain their young for even longer periods.

Cooperation is known to exist between mother and offspring in some non-buthid scorpions. In such cases, mother and offspring may forage together, capture and drag prey into their burrows and may also feed communally. Adults have been seen to share with their young the prey that they capture. Such active cooperation between mother and offspring characterizes the intermediate subsocial stage of sociality along the family route. There is no evidence, however, that any scorpion species show more advanced stages of sociality (Polis & Lourenço, 1986).

For non-buthid scorpions, in particular those showing embryonic development with diverticula (Lourenço, 2002), some examples of species living in the field in mixed groups of related and possibly unrelated individuals are known (Polis & Lourenço, 1986). In such cases the degree of cooperative behaviour may correspond either to the intermediate subsocial stage (family route) or to the quasisocial stage (parasocial route) of development.

In a recent study of the life cycle of the species *Chaerilus philippinus* Lourenço & Ythier (Lourenço *et al.*, 2008) several individuals were raised together in a common terra-

rium. These unrelated and subsequently related specimens showed certain particular traits in their behaviour which could be assimilated both in the intermediate sub-social stage (family route) and in the quasisocial stage (parasocial route). No case of cannibalism was ever observed among them. A more peculiar type of behaviour was noted when distinct females had their offspring in the same period. These females with broods stayed together in the terrarium when other females and males were also present. On several occasions it was possible to observe that first instar pre-juveniles would move from their mother's back to the back of another female with or without a brood, and even to the backs of males. These exchanges could last for some minutes or even some hours. Just before the stages of the first moult, however, first instar pre-juveniles invariably returned to the backs of their own mothers (Lourenço *et al.*, 2008).

### New results

Several specimens of *Tityus (Atreus) neblina* Lourenço, were kept together for more than 8 years. The entire biological cycle of this species was observed and described, including a new case of parthenogenesis in scorpions (Lourenço & Cloudsley-Thompson, 2010).

Population densities of *T. (A.) neblina* seem to be especially high in their native region of the 'Cerro de la Neblina', between Brazil and Venezuela. The diel behaviour of *T. neblina*, both in the field and in the laboratory, is characteristic of a species dwelling in forests (Cloudsley-

Thompson, 1981). These scorpions move slowly and only leave their retreats at night. Their predatory technique is of the sit-and-wait type. They remain motionless with the pedipalp fingers opened. Cannibalism appears to be uncommon in natural conditions, and was never observed among specimens raised in the laboratory-even when several individuals were maintained together in numbers varying from 5 to 10.

During the study of the life cycle of *T. (A.) neblina*, several females reproduced by parthenogenesis. After the birth of their offspring, these females with broods were placed together in the terrarium with other (non-gravid) females. After an average of 5 days, the first moult of the young scorpions took place. Juveniles began to disperse from their mother's back between 7 and 14 days after their birth. In several cases the second instar juveniles moved from their mother's back to the back of another non-gravid female and were accepted over a period of several hours without stimulating any aggressive reaction from the non-gravid female. This behaviour is somewhat similar to that previously observed in *C. philippinus* (Lourenço *et al.*, 2008), but it represents the first example ever observed amongst buthid scorpions.

As in the case of *C. philippinus*, we do not have a precise explanation of this behaviour.

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**Fig. 1.** Female of *Tityus (A.) neblina* with first instar (pre-juveniles). Reproduction by parthenogenesis. **Fig. 2.** On the left, the same female as in figure 1 shortly after the first moult (remnants of exuvia can still be observed). On the right, a non-gravid female with a juvenile on its back from the brood of left female. Some juveniles are also resting beneath the females.