Behavior Study Of Mating and Caring Young in Scorpions *Androctonus crassicauda* (Scorpiones:Buthidae)

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***Abstract*—**This study aims to clarifying some of the aspects of reproduction that are important for understanding the reproductive ecology and other aspects: mating, birth care in scorpions our data in the laboratory show that adult females normally feed upon adult males in the breeding season. The time of courtship about 2h and the male pulling a female with chelicerae to rapidly accomplish the sperm uptake was observed and involves the male stinging by the female and additionally characterized by marked changes in the behavior and ecology of mature males which decrease male survivorship and increase the probability that these males will be cannibalized. The young generally resemble their female, Pregnancy times in scorpions depended the species and the female family in Buthidae family between 10-12 months compared to the other families newborn scorpions stay on the back of the mother for a week almost until she goes through the first molts then she will be able to live almost independently of the mother growth the exoskeleton scorpion's developmental and require between 4-7 molts to reach maturity.

***Keywords*—** Buthidae , Cannibalism, Mate ,Molting.

I. Introduction

Scorpions have many characteristics like birth behavior in all scorpions are truly viviparous[11], some scorpion species may be live for 20 to 25 years, but the typical life span is 3 to 8 years the female undergoes a gesta¬tion period ranging from 5 months to more than 1 year, females usually give birth to 15 to 50 young the imma¬ture scorpions molt 3 to 7 days after birth and remain on the mother[16], the young are born alive in sacs as soon as the young scorpions free them¬selves from these sacs then climb onto their mother's back these young carried with the female until the young have undergone at least one molt[1,2,3]. Before the first molt the young scorpions cannot survive naturally without the mother care they depend on her for protection and to regulate their moisture levels molting commences with a split in the old exoskeleton below the edge of the carapace then emerges from this split the pedipalps and legs are first removed from the old exoskeleton followed by the metasoma new exoskeleton is soft and must constantly stretch while the new exoskeleton hardens to ensure that it can move when the hardening is complete the young scorpi¬ons leave the mother after about 2 weeks and begin to fend for themselves scorpions reach maturity in a year or so depending on the availability of food[4,5,6]

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II. Methods

The scorpions *Androctonus crassicauda* were collected at night during 2018-2019 in the mating season this specimens were collected from provinces Baghdad, Karbala , Salahuddin and Wasit the scorpions were found under objects wood, stone, trees ,specimens were put in Iron box and transferred to laboratory for study the genus and the species are identified in the laboratory according to the keys of Kovarik [7] the females mating in May should undergo considerable development before the onset of winter relative to the amount of development in the embryos of females mating in late summer[13], two mature females were put in class containers 50 x 50 cm provided with layer of moist potting soil,a piece of cork and flat rocks as the containers of females would also serve as mating arenas the addition of flat rocks provided a surface structure for spermatophore by males, and six adult males were kept in 20 x 20 cm class containers, with moist potting soil and a single piece of cork all specimens were maintained at temperatures from 28 to 35°C during the day mature females were provided a 24hour acclimation period before mating trials were initiated and randomly selected mature male all observed courtship and mating behaviors were recorded[8,9], once sperm transfer was completed indicating termination of the mating sequence males were removed from arenas and returned to individual containers and sometimes adult females normally feed upon adult males[10.11] This specimens was examined under dissecting microscope(20x) and compound microscope(10x) ,photographed using camera with resolution of 10 pixel.

III. Results and Discussion

In laboratory results the courtships behaviors were complete between female and male (plate 1, 2, 3, 4) and they are divided to four groups: behaviors in early courtship, throughout courtship, late courtship and behaviors associated with spermatophore position [13, 14], scorpion males locate females by pectines over the ground to detect pheromones given off by females and they are ready to mate, then male hold of the female's pedipalpal claws and dance around

sometimes with their tails and the male lowers its mesosoma until its genital aperture touches the ground spermatophore is then ejaculates on the ground and pulls the female so her sex organ touches the sperm in the last half hour [19, 20], the courtship scorpion eggs hatch in their mother's pouch and the young crawl out and climb on her back (plate5,6), scorpion young are soft and very small spend two weeks on their mother's back and eat the own mates scorpions stay with their mother through the first molt is begin after two day the young are absorb stored nutrient reserves then the second molt after two weeks and developed to survive under severe condition when they would most likely starve [12,15,16], characteristics of type Androctonus crassicauda are one day: The body color is generally light yellow with some black areas around the middle eyes pedipalpes are immature and weak movable and fixed fingers were thin and long, legs are not fully developed and weak, the shield was well-developed middle eyes complete, the pectin teeth number in the right comb is 13 teeth, while in the left comb is 11 teeth sternum semi-triangular, after three molt walking legs were strong and clawed the third and fourth pair of legs spur the mesosoma region is strong the dorsal plates clear with granules, the metasoma region are well developed strong with granules the vesicle and aculues are present with tiny hair trichobothria arrangement was clear and well-developed and arrangement are beta-trichobothria (plate6,7,8,9) [12,17,18]. The data show that cannibalism of mature males by mature females during the breeding season, mate cannibalism is common among scorpions and occurs within almost all other orders of arachnids and there is little information on the time of mating scorpions during the breeding season.

TABLE I:
BODY MEASUREMENTS OF *ANDROCTONUS CRASSICAUDA* ARE ONE DAY (MM)

Part of body	Length/mm	Width/ mm
Carapace	3.82	6.96
Mesasoma segments	6.92	–
Metasoma segments and telson	8.51	–
Pedpalpe		
Femur	4.73	2.93
Patella	4.96	2.91
Chela	7.39	2.35
Finger movable	10.18	–
Total body	19.25	–
Pectin teeth		
Right number	13	
Lift number	11	

Plate 1: Dorsal view of adult female of *Androctonus crassicauda*

Plate 2: Dorsal view of adult male of *Androctonus crassicauda*

Plate 3: Ventral view of adult female of *Androctonus crassicauda*

Plate 4: Ventral view of adult male of *Androctonus crassicauda*

Plate 5: Female during the young birth of *Androctonus crassicauda*

Plate 6: Female with the young on her back of *Androctonus crassicauda*

Plate 7: Pectines teeth in young of *Androctonus crassicauda* (200x)

Plate 8: Carapace in young of *Androctonus crassicauda* (200x)

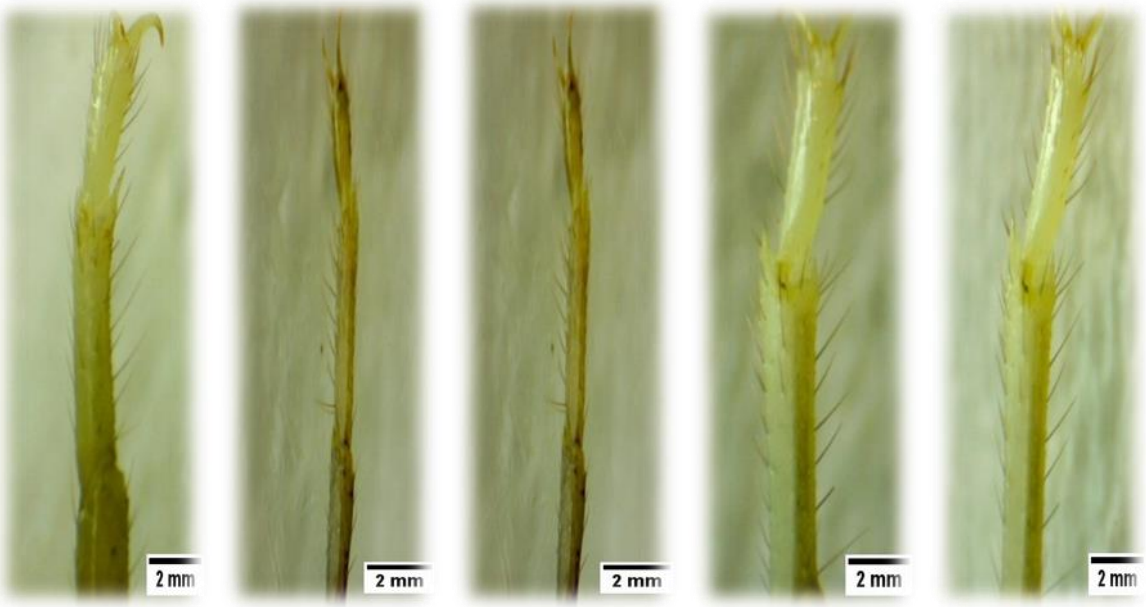

Plate 9: Fourth legs in young of *Androctonus crassicauda* (100x)

REFERENCES

[1] Alexander, A . J . 1957 . The courtship and mating of the scorpion, *Opisthophthalmus latimanus*. Proc .Zool. Soc . London, 128 : 529-544 https://doi.org/10.1111/j.1096-3642.1957.tb00274.x.

[2] Benton, T. G. 1990: The behavior and ecology of scorpions. UnpublishedPhD thesis, University of Cambridge.

[3] Benton, T. G. 199la. Reproduction and parental care in the scorpion *Euscorpius flavicaudis*. Behaviour 117: 20-27. https://doi.org/10.1163/156853991X00102

[4] Benton, T. 2001. Reproductive ecology. Chapter 11. In Brownell P. and Polis G. (eds): Scorpion Biology and Research.Oxford University Press, New York, pp. 278–301.

[5] Cloudsley-Thompson, J. L. 1990: Scorpions in mythology, folklore and history. In G. A. Polis (ed.), *The biology of scorpions*:462-485. Stanford Univ. Press, Stanford, California.

[6] Fet, V. and Soleglad,M.E. 2005. Contributions to scorpion systematic on recent changes in high-level taxonomy. Euscorpius 31:1–13. https://doi.org/10.18590/euscorpius.2005.vol2005.iss23.1

[7] Kovařík,F. 2009.IIlustrated Catalog of Scorpions Part 1, Introduction Remarks, Keys to families, genera and species .Prague. Clavion .Prod .170.

[8] Lourenco,W.R. 2000. Reproduction in scorpions, with special reference to parthenogenesis. In S. Toft; N.Scharff (eds.). European Arachnology. Aarhus University Press. pp. 71–85.

[9] Mahsberg, D. 2001. Brood care and social behavior. In Brownell,P. and Polis G. (eds): Scorpion Biology and Research. OxfordUniversity Press, New York, pp. 259–277.

[10] Makioka, T. 1992: Reproductive biology of the viviparous scorpion,*Liocheles australasiae* (Fabricius) (Arachnida, Scorpiones,Ischnuridae). II. Repeated pregnancies in virgins. Int. J.Invert. Reprod. Dev. 21: 161–166. https://doi.org/10.1080/07924259.1992.9672232

[11] Morris, D. 1970 . Patterns of Reproductive Behavior . McGraw-Hill, New York, 528 pp .

[12] Outeda-Jorge, S., Mello, T. and Pinto-DA-Rocha, R. 2009: Litter size, effects of maternal body size, and date of birth in South American scorpions (Arachnida: Scorpiones). *Zoologia* 26:43–53. https://doi.org/10.1590/S1984-46702009000100008

[13] Polis, G.A. 1990. The Biology of Scorpions. Stanford UniversityPress, Palo Alto, California.

[14] Polis, G. A. and Farley, R. D. 1979: Behavior and ecology of mating in the cannibalistic scorpion, *Paruroctonus mesaensis* Stahnke (Scorpionida: Vaejovidae). *J.Arachnol*. 7: 33-46.

[15] Polis,G.A. and Mohnac M. 1990: Mating by female scorpions while still carrying young. J. Arachnol. 18: 364–365.

[16] Polis, G. A. and Sissom, W. D. 1990: Life history. In Polis,G.A. (ed.),The biology of scorpions: 161-223.

[17] Prendini, L.and Wheeler, W.C. 2005. Scorpion higher phylogeny and classification, taxonomic anarchy, and standards for peer review in online publishing. Cladistics 21:446–494 https://doi.org/10.1111/j.1096-0031.2005.00073.x

[18] Ross, L.K. 2007. Development and care of early-instar Pandinusimperator (Scorpiones: Scorpionidae). Forum Mag. Am.Tarantula Soc. 16: 24–28.

[19] Warburg, M.R. 2010. The scorpion female's reproductive system a partial review. Anat. Rec. 293: 1738–1754. https://doi.org/10.1002/ar.21219

[20] Warburg, M. R. 2012. Pre-and post-parturial aspects of scorpion reproduction: a review. European Journal of Entomology. 109 (2): 139–46. https://doi.org/10.14411/eje.2012.018