Asian J. Exp. Sci., Vol. 35, No. 1, 2021; 31-37

Online available on : www.ajesjournal.com, ISSSN : 0971-5444

A Report on Pseudoscorpion Sp. (Pseudoscorpionide, Haekel) From Reclaimed Coal Mine Spoils of Kathara, Jharkhand, India

Amita Hembrom[1] & Braj Kishore Sinha[2]

[1]Research Associate, [2]Soil Ecology laboratory, Deptt of Zoology, S S M College, Ranchi University, Ranchi

Email: brajkishore58ranchi@gmail.com

Received: November 26, 2020; Revised: December 22, 2020; Accepted: December 28, 2020

Abstract : Present paper reports on the pseudoscorpion collected from the reclaimed coal mine spoils (RCMS) of Kathara coalfield area of Jharkhand, India. The reported Pseudoscorpion is a by-product of the soil samples collected from more than 40 years old RCMS, subjected to modified Berlese Tullgren funnel. The samples were collected randomly from 1mX1m quadrates, and we were able to separate three mature specimens – two females and one male with two immature specimens from the trash and slides were prepared for taxonomic categorization. Biometric measurement of the Holotype specimen is of the female followed by Paratypes measurement of male and another female specimen.

Key Words: Pseudoscorpion, reclaimed coal mine spoils, RCMS, Holotype, Partatype, Tullgren.

Introduction

Pseudoscorpions are lesser-known arachnids, commonly called as false scorpion as they resemble scorpion but lack tail (metasoma) and sting. They are considered to be closer to kin of sun-spiders (Solifugae). There are two sub-orders – Epiocheriata and Iocheriata. The sub-order Iocheriata is characterized by possession of venom gland in within one or both of their cherial fingers.

There have been very few scientific descriptions of pseudoscorpions till the dawn of 20th (Dalman, 1826 and Laterielle, 1837) century. The research geared up with studies of Banks (1904 &1909), Beier (1932; 1953; 1971 &1973), Chamberlin (1923; 1931; & 1932), Hoff (1956), and other's contributors, which added significantly in understanding the pseudoscorpion's biology. Haack and Wilkinson (1987), Harvey (1990), Buddle (2005), Hoff (1949), Muchmore (1973), Weygoldt (1969), Zeh and Zeh (1994) contributions have further strengthen the understanding of pseudoscorpion and their role in the ecological functions and services. There has been a report on morphological features of a pseudoscorpion species *Strobilochelifer spinipalpi*- from Saudi Arabia (Alsaqabi, 2018).

There are fewer species (3385) of pseudoscorpions reported worldwide (Harvey 2009), but their natural history and behaviour (Weygoldt 1969; Zeh and Zeh 1994 &Tizo-Pedroso and Del-Claro 2005) has showed high degree of variability in size and form. They are found in leaf-litter, under the rocks, under the banks and within decaying of wood, in caves and in bird nests. A few species have been found to be in bird nest as parasites (Haack and Wilkinson 1987). *Chelifercancroides* (L), is cosmopolitan in nature and found in human made structures (Buddle 2010).

Pseudoscorpions have been reported from Czech Republic (Krajcovicova *et al.*, 2013); Turkish (Sezek & Ozkan 2005); Madagascar and Colombia (Judson 2010); Canada (Buddle 2010); USA, New York (Shear *et al.,* 1989). From Indian subcontinent, it has been reported from Sri Lanka (Batuwita & Benjamin, 2014) and South India (Murthy and Anathakrishnan 1977; Sivaraman1979, 1980 & 1981). Bhattacharyya (1990) reported pseudoscorpions from West Bengal. A note on status of scientific study on pseudoscorpion in India has been presented in the table 1. Present paper is a maiden report from Jharkhand on pseudoscorpions.

Materials and Methods

The pseudoscorpions were obtained as by-products of soil samples subjected to modified Berlese tullgren funnel and were collected from more than 40 years old reclaimed mine spoils (RCMS) of Kathara coalfield area (Fig. 1). The experiment was a part of research project leading Ph.D. degree and samples were collected randomly from 1mX1m quadrates of RCMS of different chronosequences. The pseudoscorpions were preserved in 70 per cent ethanol and were mounted on micro-slides in DPX. MM02 Microscope with built in objective magnification of 45X was used for identification and photograph of the specimen. We used Eye piece 5X, 10X and 15X as per requirement for identification of the specimens. Camera Lucida (prism type) sketches were drawn with the magnification of 10Xx10X.

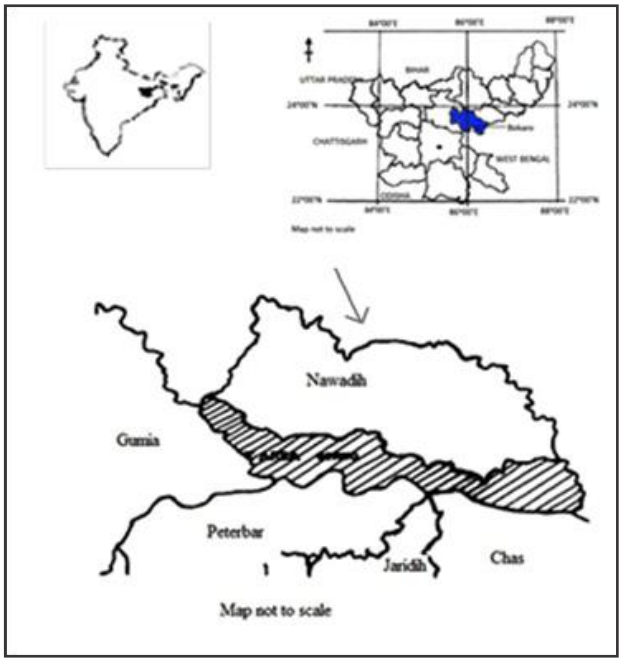


Fig. 1. Map of the study area.

The collected pseudoscorpions were identified up to genus while following the keys of Batuwita and Benjamin (2014). Total five specimens were collected out of which three specimens were mature (one male and two female) and two specimens were immature. All animals are preserved and are stored in the Soil Ecology Laboratory of Zoology department of S S M College, Ranchi University, Ranchi Jharkhand. Female (Holotype – Slide No 71) slide submitted to the Soil Ecology Laboratory, Department of Zoology, S S Memorial College, Kanke Road, Ranchi, Jharkhand.

Results

Diagnostic characters of the collected specimen

The animal was yellow in colour with well-developed venom apparatus present only in movable chelal finger, articulation of Femur and patella of leg I is oblique, spermathecae present, pedipalp femur is without tactile setae, Carapace rectangular – three times longer than broader, last few abdominal segments clothing is poorly seen as the specimen was dissolved. Eyes were poorly developed and situated near the anterior margin of carapace. Movable cheliceral finger with 2 sub-apical teeth were present.

Biometry of the specimens

The total body length of the animalmeasured from pedipalp to the last abdominal segment is about 1.93mm;at abdominalareathe maximum width is 0.4mm;the width at cephalothorax is 0.22mm (Fig: 2).

Palp: Right chela with hand measures about 0.4mm; the length of the movable finger is 0.18mm; whereas the length of immovable finger is 0.25mm; Left chela with hand measure to 0.35mm; the length of movable finger is 0.11mm, while the length of immovable finger is 0.13. The tibia measures to 0.17mm and the femur measures to 0.24mm.

Chelicer (Rt): Movable finger is 0.03mm; immovable finger is 0.03mm, chelicer (Lt): Movablefinger measures about 0.03mm; whereas immovable finger measures about 0.03mm.

First leg: Coxa is 0.04mm; Trochantoris 0.1mm; Femur is 0.06mm; Tibia is 0.08mm; Tarsus is 0.02mm.

Chaetotaxy: Rt Sternal chaetae 3+4+3+3+12 on movable hand. The Rt chela has 3+1 bothriotricha.

Male (Paratype)

Total body length of the male specimen is about 1.26mm. Width at abdomen is 0.84mm, width at cephalothorax is 0.24mm, width of the body through testis is 0.29mm. A pair of eyes were present in male specimen .

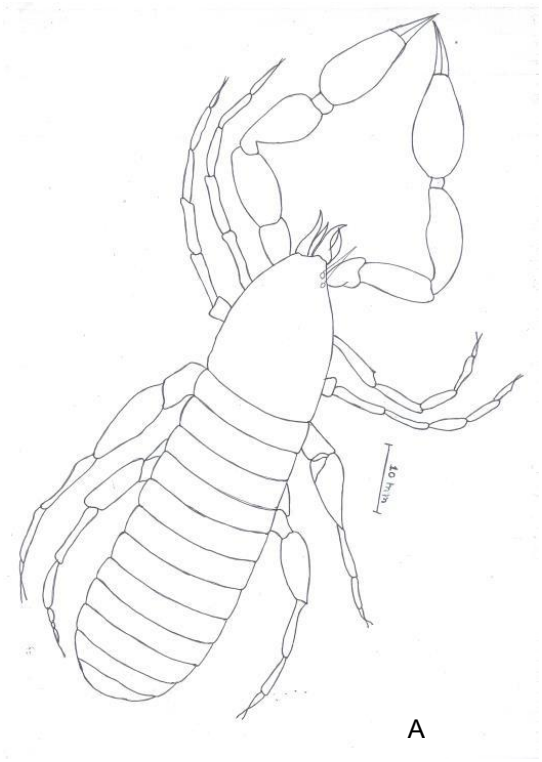
Palp: Right Chela with hand measures to 0.22mm; Movable finger is 0.24mm; immovable finger measure to 0.38mm. Left Chela with hand is about 0.22mm; the Movable finger is 0.25mm; while the immovable finger measures to 0.38mm. Tibia is 0.09mm in length and femur is 0.25mm in length.

Chelicer (Rt): Movable finger is 0.08mm; immovable finger is 0.01mm. Chelicer (Lt): Movable finger is 0.06mm; immovable finger is 0.09mm.

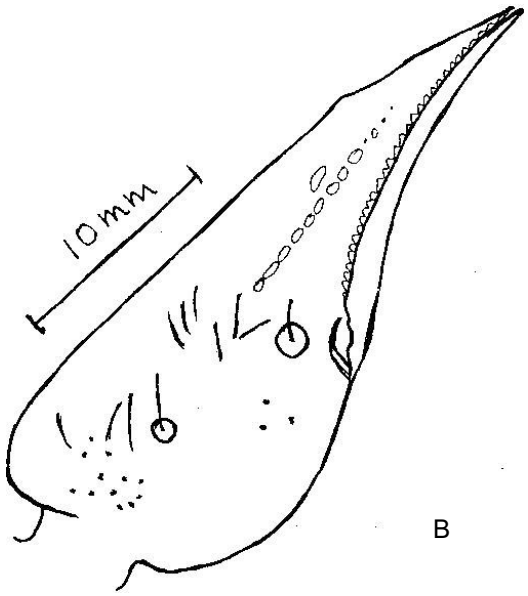
First leg: Coxa is 0.03mm; Trochantor is 0.03mm; Femur is 0.08mm; Tibia is 0.09mm; whereas the Tarsus is 0.02mm.

Discussion

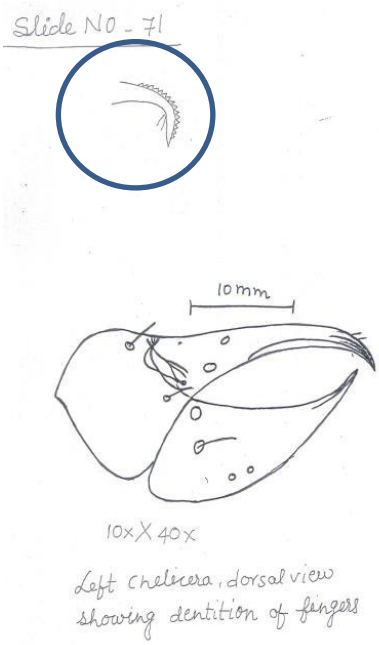
The holotype description of the pseudoscorpion in the biometry of the present specimen presented in table-2. The authors are of the opinion that the holotype specimen differs from the other reported Indian species of Pseudoscorpions (table-1). Bhattacharyya (1990) reported species from the nests of *Paaserdomesticus,* which is a commensal species while the present specimen has been collected from the reclaimed mine spoil, is a free-living form and is not a commensal. Further, these specimens have adaptations for living in the reclaimed mine spoils, which is in an initial stage of secondary succession (Sinha *et al.,* 2009).



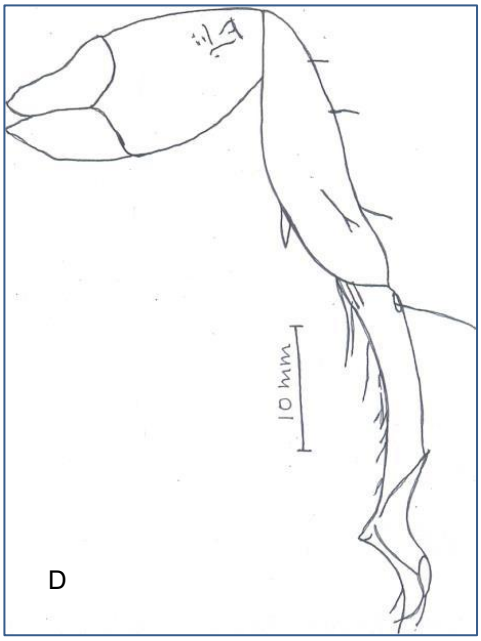
A



B



C1, 2



D

Fig. 2. A. Female. B.Chela C. Left Chelicera D. Walking Leg

Table 1. Details of reported species of pseudoscorpions from India and their authors

SN	Family	Genus species	Reported area	Paper title	Journal	Author
1	Atemnidae Kishida (1929b)/ Chamberlin (1931)	*Tullgrenius orientalis*	South India	Pseudoscorpions from South India: some new species of the family Atemnidae Chamberlin (Pseudoscorpionida : Monosphyronida)	Oriental Insects 14(3):	S. Shivraman (1980)
		Paratemnus indicus				
		P. robustus				
		Oratemnus loyolat				
		Stenatemnus asiaticus				
		S. orientalis				
		Tamenus indicus				
2	Olpiidae Banks, 1895	*Minniza loyolae*	West Bengal	A survey of pseudoscorpions in the nests of Passer domesticus (Linnaeus) in West Bengal	Environmrnt and Ecology. 8: 245-247	S. Bhattacharyya (1990)
	Chernetidae Menge, 1855	*Chernes sp.*				
	Cheliferidae Risso, 1827	*Chelifer sp*				
		Tyrannochthonius madrasensis				
		Apocheiridium indicum				
		Cheiridium museorum				
3	Olpiidae Banks, 1895	*Minniza loyolae*	South India	Two new species of pseudoscorpions from south india.	Annals and Magazines of Natural History. 13: 221-224	V A Murthy (1961)
4				Indian Chelonethi	Oriental Insects Monograph. 4: 1-210	V A Murthy & T N Ananthakrishnan (1977)
5	Sternophoridae Chamberlin, 1923	*Sternophorus montanus*	South India	Systematics of some South Indian Sternophorid Pseudoscorpions (Pseudoscorpionida,	Revue Suisse De Zoologie. 88: 313-325	S. Shivraman (1981)

Table 2. Measurements of all the specimens collected, their mean and SD values

Slide no	**51**	46	71		
Gender	**M**	**F**	**F**		
	Paratype		**Holotype**		
Measurments in	mm		mm	Mean	SD
Magnification (Obj x Eeyps)	**45Xx5X**				
Total body length	1.26	1.68	1.93	1.623	±0.3385
Abdominal Width	0.84	0.3	0.4	0.513	±0.2872
Through testis Width	0.29	0	0	0.097	±0.1674
Width at cephalothorax	0.24	0.21	0.22	0.223	±0.0152
Chelicer(with hand & finger)	0	0.11	0.09	0.067	±0.0585
Chelicer Finger	0.12	0	0	0.040	±0.0692
Immovable finger (Left)	0.09	0.08	0.03	0.067	±0.0321
Movable finger (Left)	0.06	0.06	0.03	0.050	±0.0173
Immovable finger (Right)	0.1	0.07	0.03	0.067	±0.0351
Movable finger (Right)	0.08	0.06	0.03	0.057	±0.0251
Chela					
Chela with hand (Right)	0.22	0.34	0.4	0.320	±0.0916
Chela with hand (Left)	0.22	0.35	0.35	0.307	±0.0750
Base to finger	0.39	0	0	0.130	±0.2251
Finger	0.25	0	0	0.083	±0.1443
Movable finger (Left)	0.25	0.17	0.11	0.177	±0.0702
Immovable finger (Left)	0.38	0.15	0.13	0.220	±0.1389
Movable finger (Right)	0.24	0.17	0.18	0.197	±0.0378
Immovable finger (Right)	0.38	0.15	0.25	0.260	±0.1153
Tibia	0.09	0.16	0.17	0.140	±0.0435
Femur	0.25	0.18	0.24	0.223	±0.0378
First Leg					
Coxa	0.03	0.04	0.04	0.037	±0.0057
Trochanter	0.03	0.04	0.1	0.057	±0.0378
Trochanter base	0.02	0	0.03	0.017	±0.0152
Femur	0.08	0.09	0.06	0.077	±0.01525
Tibia	0.09	0.1	0.08	0.090	±0.01
Tarsus	0.02	0.03	0.03	0.027	±0.0057

Murthy and Anathakrishnan (1977) and Sivaraman (1979, 1980 & 1981) specimens have a different chaetotaxy (as described earlier) than the chaetotaxy described by other authors. Further, the morphological adaptations observed for the present specimen is also different from the rest of the species described by the earlier authors. Therefore, based on the diagnostic characters, our specimens are different from all the described specimens. Therefore, based on the above discussions our specimens can follow taxonomic status, and a species nov. is proposed as *Paracherneskatharensis*spnov.

Systematic position:

Order: Pseudoscorpionide (Haekel, 1866)

Super family Cheliferoidea

Family Chernetidae (Menge, 1885)

Subfamily Chernetinae (Menge, 1885)

Genus Parachernes (Chamberlin, 1931)

Species *Paracherneskatharensis*spnov, (Hembrom, 2011)

Acknowledgments

Both authors gratefully thank to the Principal S S Memorial College, Ranchi for providing laboratory facilities for carrying out the research. We also thank to all the authors whose paper has been referred in this article. The first author is grateful to UGC for providing RGNF for carrying out her Ph.D research.

References

Alsaqabi S. M. (2018). Morphological Features of Pseudoscorpion (Strobilochelifer spinipalpis) from Qassim Palm Farm. International Journal of Science and Research. https://doi.org/10.21275/ART20203870

Banks N. (1904). The Arachnida of Florida. Proc. Acad. Nat. Sci. Phild. 56:120-127.

Banks N. (1909). New Pseudoscorpionida. Can. Ent. 41: 303-307.

Batuwita S. & Benjamin S.P. (2014). An annotated checklist and a family key to the pseudoscorpion fauna (Arachnida: Pseudoscorpiones) of Sri Lanka. *Zootaxa*, 3814 (1), 37–67. doi: http://dx.doi.org/10.11646/zoorexa.0000.0.0

Beier M. (1932). Pseudoscorpionidea II. Subord. C. Cheliferinea. *Tierreich,* 58, i–xxi+1–294.

Beier M. (1953). Pseudoscorpioneaus El Salvador and Guatemala. Senckenbergiana. 34: 15-28.

Beier M. (1971). PseudoscorpioneunterArauacrien-Rinde in Neu-Guinea. Anul. Naturhist. Mus. Wien. 75: 367-373.

Beier M. (1973). Pseudoscorpionidea von Ceylon. *Entomol. Scand. Suppl.* 4: 39 -55.

Bhattacharya S. (1990). A survey of pseudoscorpions in the nests of Passer domesticus (Linnaeus) in West Bengal. Environment and Ecology 8, 245–247.

Buddle C. (2010). Photographic key to the Pseudoscorpions of Canada and the adjacent USA. *CJAI doi: 10:3752/cjai.2010.10*

Buddle C. M. (2005). A primer on pseudoscorpions and taxonomic status in Canada. Newsletter of the Biological Survey of Canada (Terrestrial Arthropods*)* 24: 12-16.

Chamberlin J. C. (1923). New and little know Pseudoscorpions principally from the islands and adjacent shores of the Gulf of California. Proc. Calif. Acad Sci. Ser *4*, 12: 353-387.

Chamberlin J. C. (1931). The arachnid order Chelonethida. Stanford Univ. Publs. Biol.Sc. 7:1-284.

Chamberlin J. C. (1932). On some false scorpions of Superfamily Cheiridioidea. Pan. Pacif. Ent. 8:137-144.

Dalman J.W. (1826). Om insekterinneslutne I Copal; jemtebeskrifningpanagraderiblandforekomman denyaslagtenocharter. – Kongliga Svenska Vetenskaps-AkademinesHandlingar, 1825: 375-410.

Dashdamirov S. (2004). Pseudoscorpions from the mountains of northern Pakistan (Arachnidas: Pseudoscorpiones). Arthropod selecta 13(4): 225-261.

Haack R.A. and Wilkinson R..C. (1987). Phoresy by Dendrochernes Pseudoscorpions on Cerambycidae (Coleoptera) and Aulacidae (Hymenoptera) in Florida. Am.Midl. Nat. 117:369-373.

Hagen H. (1870). Synopsis Pseudoscorpionidumsynonymica – Proceedings of the Boston Society of Natural History 13: 263-272.

Harvey M.S. (1990). Catalogue of the Pseudoscorpionida (Mahnert v, ed). Manchester Univ. Press.

Harvey M.S. (2009). Pseudoscorpions of the World, version 1.2. Western Australian Museum Perth. http://www.museum.wa.gov.au/arachnids/pseudocorpions (June 2010).

Hembrom A. (2011). Impact assessment of mining on soil mesofaunal arthropods diversity of Kathara coalfield area. D. Phil. Thesis, Univ. Ranchi, Jharkhand.

Hoff C.C. (1949). The Pseudoscorpions of Illinois. Bull. Illinois Nat History Survey 24: 413-498.

Hoff C.C. (1956). Pseudoscorpions of the family Chernetidae from New Maxico. Am.Mus. Novit. 1800: 66.

Judson M.L.I (2010). Redescription of ChelifereucarpusDALMAN(Acarchnida, Chelonethi, Withiidae) and first record of pseudoscorpions in copal from Madagascar and Colombia. Paleodiversity. 3: 33-42.

Krajcovicova K., Christophoryova, J. and Krumpal, M. (2013). Pseudoscorpions (arachnida: pseudoscorpiones) of the southwestern part of českýkras protected landscape, czech republic. Mun. Ent. Zool. 8(2):714-723.

Latreille P. A. (1837). Arachnides. – In: CUVIER, G. (ed.): The Animal Kingdom [Translation, with annotations by DUFOUR L. DE SERRES M. STRAUS-DURCKHEIM H. AUDOUIN V. &

MILNE EDWARDS H.]. Vol. 3: 275–326; London (G. Henderson) [available online at http://www.biodiversitylibrary.org/item/19969].

Menge. (n.d.). Chernetidae (1855) | Field Guide and Catalogues. Retrieved from http://www.museum.wa.gov.au/catalogues/pseudoscorpions/family/chernetidae.

Muchmore W.B. (1973). Ecology of Pseudoscorpions – a review. Pp 121-127, in Proceedings of the First Soil Microcommunities Conference (Dindall DL, ed.) Syracuse NY.

Murthy V.A. & Ananthakrishnan T.N. (1977). Indian Chelonethi. Oriental Insects Monograph, 4, 1–210.

Murthy V.A. (1961). Two new species of pseudoscorpions from south India. Annals and Magazine of Natural History 13, 221–224. http://dx.doi.org/10.1080/00222936108651100

Sezek F. and Ozkan M. (2006). A new record for the Turkish pseudoscorpion fauna: *Lamprochernessavignyi* (Simon, 1881) (Arachnida, Pseudoscorpionida). Turk J Zool. 30: 255-259.

Shear W.A. Schawaller W. and Bonamo P.M. (1989). Record of Palaeozoic pseudoscorpions. Nature. 341: 527-529.

Sinha B. K., Hembrom A. Mahto M. and Pandey P. N. (2009). Pedosphere Drivers for Succession in a Derelict Ecosystem. Proc. Zool. Soc. India. Vol.8 (1).

Sivaraman S. (1979). Studies on some Indian Pseudoscorpions (cl: Arachnida) D. Phil. Thesis, Univ. Madras.

Sivaraman S. (1980). Pseudoscorpions from South India: Some new species of family AtemnidaeChamberlin (Pseudoscorpionida, Monosphronida) Oriental Insecta 14(3): 345-362.

Sivarama S. (1981). Systematics of some South Indians Strenophorid Pseudoscorpions (Pseudoscorpionida, Monosphronida) Revue Suisse De Zoologie. 88:313-325.

Tizo-Pedroso E. and Del-ClaroK. (2005). Matriphage in the neotropical pseudoscorpion Paratemnoidesnidificator (Balzan 1888) (Atemnidae). Journal of Arachnology 33: 873-877.

Weygoldt P. (1969). *The biology of pseudoscorpions*. Harvard University Press, Cambridge, Massachusetts, pp. 1–145.

Zeh D.W. and Zeh J.A. (1994). When morphology misleads – interpopulation uniformity in sexual selection masks genetic divergence in harlequin beetle-riding pseudoscorpion populations. *Evolution* 18:1168-1182.