



**University of
Zurich**^{UZH}

**Zurich Open Repository and
Archive**

University of Zurich
Main Library
Strickhofstrasse 39
CH-8057 Zurich
www.zora.uzh.ch

Year: 2014

**A verified spider bite and a review of the literature confirm Indian
ornamental tree spiders (*Poecilotheria* species) as underestimated
theraphosids of medical importance**

Fuchs, Joan; von Dechend, Margot; Mordasini, Raffaella; Ceschi, Alessandro; Nentwig, Wolfgang

Abstract: Literature on bird spider or tarantula bites (Theraphosidae) is rare. This is astonishing as they are coveted pets and interaction with their keepers (feeding, cleaning the terrarium or taking them out to hold) might increase the possibility for bites. Yet, this seems to be a rare event and might be why most theraphosids are considered to be harmless, even though the urticating hairs of many American species can cause disagreeable allergic reactions. We are describing a case of a verified bite by an Indian ornamental tree spider (*Poecilotheria regalis*), where the patient developed severe, long lasting muscle cramps several hours after the bite. We present a comprehensive review of the literature on bites of these beautiful spiders and conclude that a delayed onset of severe muscle cramps, lasting for days, is characteristic for *Poecilotheria* bites. We discuss *Poecilotheria* species as an exception from the general assumption that theraphosid bites are harmless to humans.

DOI: <https://doi.org/10.1016/j.toxicon.2013.10.032>

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-93458>

Accepted Version



Originally published at:

Fuchs, Joan; von Dechend, Margot; Mordasini, Raffaella; Ceschi, Alessandro; Nentwig, Wolfgang (2014). A verified spider bite and a review of the literature confirm Indian ornamental tree spiders (*Poecilotheria* species) as underestimated theraphosids of medical importance. *Toxicon*, 77:73-77.

DOI: <https://doi.org/10.1016/j.toxicon.2013.10.032>

Accepted Manuscript

A verified spider bite and a review of the literature confirm Indian ornamental tree spiders (*Poecilotheria* species) as underestimated theraphosids of medical importance

Joan Fuchs, MD Margot von Dechend, Raffaella Mordasini, Alessandro Ceschi, Wolfgang Nentwig

PII: S0041-0101(13)00418-2

DOI: [10.1016/j.toxicon.2013.10.032](https://doi.org/10.1016/j.toxicon.2013.10.032)

Reference: TOXCON 4728

To appear in: *Toxicon*

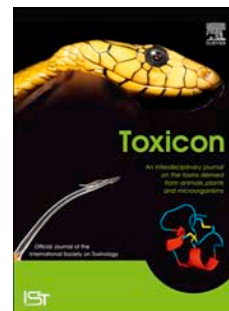
Received Date: 10 August 2013

Revised Date: 28 September 2013

Accepted Date: 31 October 2013

Please cite this article as: Fuchs, J., von Dechend, M., Mordasini, R., Ceschi, A., Nentwig, W., A verified spider bite and a review of the literature confirm Indian ornamental tree spiders (*Poecilotheria* species) as underestimated theraphosids of medical importance, *Toxicon* (2013), doi: 10.1016/j.toxicon.2013.10.032.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



1 A verified spider bite and a review of the literature confirm Indian ornamental
2 tree spiders (*Poecilotheria* species) as underestimated theraphosids of medical
3 importance

4
5 Joan Fuchs^a, Margot von Dechend^a, Raffaella Mordasini^b, Alessandro Ceschi^{a,c}, Wolfgang
6 Nentwig^d

7
8 ^aSwiss Toxicological Information Centre, Associated Institute of the University of Zurich,
9 Zurich, Switzerland

10 ^bHospital Aarberg, 3270 Aarberg, Switzerland

11 ^cDepartment of Clinical Pharmacology and Toxicology, University Hospital Zurich, Zurich,
12 Switzerland

13 ^dInstitute of Ecology and Evolution, University of Bern, Baltzerstrasse 6, CH 3012 Bern,
14 Switzerland

15
16
17 **Correspondence**

18 Joan Fuchs, MD

19 Swiss Toxicological Information Centre

20 Freiestrasse 16

21 CH 8032 Zurich

22 Phone +41 44 634 1020

23 Fax +41 44 252 8833

24 Email: joan.fuchs@usz.ch

25
26
27 **Abstract**

28 Literature on bird spider or tarantula bites (Theraphosidae) is rare. This is astonishing as they
29 are coveted pets and interaction with their keepers (feeding, cleaning the terrarium or taking
30 them out to hold) might increase the possibility for bites. Yet, this seems to be a rare event
31 and might be why most theraphosids are considered to be harmless, even though the urticating
32 hairs of many American species can cause disagreeable allergic reactions. We are describing a
33 case of a verified bite by an Indian ornamental tree spider (*Poecilotheria regalis*), where the
34 patient developed severe, long lasting muscle cramps several hours after the bite. We present

35 a comprehensive review of the literature on bites of these beautiful spiders and conclude that a
36 delayed onset of severe muscle cramps, lasting for days, is characteristic for *Poecilotheria*
37 bites. We discuss *Poecilotheria* species as an exception from the general assumption that
38 theraphosid bites are harmless to humans.

39

40 *Keywords: Poecilotheria regalis, tarantula, Theraphosidae, muscle cramps*

41

42 **1. Introduction**

43 Bird spiders (Theraphosidae), also called tarantulas, are coveted pets due to their size, easy
44 keeping or beautiful colouring. They are considered to be harmless, although the hairs of
45 many species can cause highly disagreeable allergic reactions and irritation of skin, eyes and
46 respiratory tract (Blaikie et al. 1997; Watts et al. 2000; Choi et al. 2003; Spraul et al. 2003).
47 Literature on theraphosid bites is rare (Schmidt 1989; De Haro & Jouglard 1998; Takaoka et
48 al. 2001; Isbister et al. 2003; Ahmed et al. 2009). It is legal in Switzerland to own pet spiders
49 and their owners are not obligated to inform the county of their existence, unlike the
50 compulsory registration for snakes or other reptiles. So there is no information as to what
51 species can be found in the terrariums throughout the country. There might even be highly
52 toxic *Atrax*, *Hadronyche*, *Phoneutria* or *Latrodectus* species, which caused fatal issues in the
53 past (Nentwig & Kuhn-Nentwig 2013), in some of the terrariums as well as many different
54 species of theraphosids. While bites by theraphosids in general are considered to be rather
55 harmless (Lucas et al. 1994; Isbister et al. 2003), the Swiss Toxicological Information Centre
56 (STIC) has received 10 calls about bites by *Poecilotheria* sp. since 1995, a frequently kept
57 theraphosid genus of colourful spiders, with two written feedbacks, both concerning *P.*
58 *ornata*, with detailed information about the clinical course by the treating physicians, apart
59 from the case presented here.

60

61 Most of the 16 *Poecilotheria* species currently listed for this genus (Platnick 2013) are
62 common pet spiders. They are tree-inhabiting species, restricted to India and Sri Lanka. *P.*
63 *regalis* has a body length of about 6-8 cm and the leg span measures up to 16 cm from one tip
64 of a leg to the other; the cheliceral fang length is 10 mm in adult females. It is beautifully
65 coloured in blue, yellow, white and brown, with a distinctive leaf-like mark on the
66 opisthosoma. In captivity female *Poecilotheria* spiders can live up to 8-12 years, while male
67 spiders only live for about 2-4 years (Molur et al. 2008).

68

69 We are reporting a rare bite by an Indian ornamental tree spider (*Poecilotheria regalis*), also
70 called regal parachute spider, which caused delayed appearance of severe and diffuse muscle
71 cramps, lasting for three weeks. While searching the literature, we found that such symptoms
72 are more the rule than the exception after *Poecilotheria* bites and conclude that they are of
73 medical importance to humans, even if hardly reported. A comprehensive literature search
74 revealed that the risk of *Poecilotheria* bites is strongly underestimated and therefore we
75 combine this case study with a literature review on *Poecilotheria* bites.

76
77

78 **2. Case Report**

79 A 45-year-old male presented to the emergency room (around 3 PM) after having been bitten
80 in the right index finger the night before (at 9 PM) by his pet *Poecilotheria regalis* (Figures 1
81 and 2), a six year old, 6 cm long female, while feeding her. He owns nine theraphosid spiders
82 belonging to the genera of *Nhandu*, *Poecilotheria*, *Brachypelma*, and *Lasiadora*, and had been
83 bitten 2 years previously by an *Acanthoscurria geniculata* (Brazilian giant white knee
84 tarantula), describing the sensation to be comparable to a bee sting. He had also once been
85 bombarded with the urticating hairs from a *Grammostola* species, which left a burning
86 sensation comparable to nettle stings (*Urtica* sp.). There were no visible bite marks after this
87 *Poecilotheria* bite, except for a slight erythema; and there was only a slight initial swelling,
88 and no local pain. He suffered from intense hot flushes within 2 hours of the bite and was
89 sweating profusely. Those symptoms resolved completely after a short time. 15 hours after the
90 bite he developed severe muscle cramps, starting in the hands and feet, then spreading to the
91 arms and legs, which is why the patient presented to the emergency room. The symptoms
92 were turning into generalized muscle cramps, and he also complained of chest pain, which he
93 described like a stabbing pain and a “contracting heart”. Creatine kinase was slightly
94 increased at 370U/L (reference range 0-200U/L). ECG was normal. The patient was treated
95 with oral lorazepam (dosage was not specified) and 2 mg intravenous midazolam, which
96 decreased the symptoms sufficiently, with resolution of chest pain and decreased muscle
97 cramps in the legs, that after five hours he insisted on leaving the hospital to go home. Yet, he
98 took magnesium twice daily for three more weeks until the remaining muscle cramps in his
99 hands resolved completely. Also, the spider was not injured, although it unexpectedly died 2
100 months after the incident.

101
102

103 3. Literature review

104 An intensive literature search revealed publications of eight bites of *Poecilotheria* species
105 (Schmidt 1989; De Haro & Jouglard 1998; Gabriel 2002; Breitschwerdt 2005; Lieske 2005;
106 Ahmed et al. 2009) and further communications of 18 bite reports in blogs of the
107 arachnological community (Arachnoboards 2013; Bighairyspiders 2013; Poecilotheria 2013;
108 Reptilesworld 2013). Spider keepers usually know the scientific names of their spiders
109 correctly, even though some confusion cannot be excluded, as they usually know the spider
110 by the name under which it was sold to them, which may be wrong. Yet, especially breeders
111 are very reliable, and therefore we regard all these reports as "verified spider bites" (sensu
112 Gnädinger et al. 2013 and Nentwig et al. 2013). These 26 bite reports refer to *P. regalis* (13
113 cases), *P. fasciata* (4), *P. pederseni* (2), *P. rufilata* (1), *P. subfusca* (1), *P. striata* (1), *P.*
114 *ornata* (1), in two cases no species name was given. In 17 cases males were bitten, in 2 cases
115 females (in 7 cases no indication of sex) and the persons were 22 – 55 years old (in some
116 cases age was not reported). In all cases bites occurred due to handling mistakes while feeding
117 the spider, cleaning the terrarium, making photos, or in situations where the pet keeper
118 expected a different behaviour. Usually, the spider moved faster than expected or the pet
119 keeper did not expect a bite from his/her pet. Bites occurred in 13 cases into a finger, in 7
120 cases into hand or arm, also once in cheek, thigh, shoulder each (three times not mentioned).
121 All bites caused symptoms but no fatalities were reported.

122
123 Bites can easily be separated into two groups: without muscle cramps and with muscle
124 cramps. 42 % of all bites did not cause muscle cramps. Symptoms were local swelling (50 %),
125 erythema (50 %), and moderate pain (73 %) with an average severity of 1.1 (scale 1-3).
126 Further symptoms were itching or burning sensations, nausea, sweating, stiff knees, fingers,
127 neck, or shoulders, and tight chest or heavy breathing (one mention each). After 1 - 4 hours (1
128 patient after 1 day) the patients were asymptomatic.

129
130 58 % of all bites caused muscle cramps. In this group, symptoms were local swelling (60 %),
131 erythema (53 %), severe pain (87 %) with an average severity of 2.3 (scale 1-3). Further
132 symptoms were burning sensations, heat, fever, flu-like myalgia, heavy breathing, increased
133 heart rate, and short loss of consciousness. Cramps began on average 10 h after the bite (range
134 0 - 24 h, additionally two records of 6 and 7 days). They ended on average 7.6 days after the
135 bite (range 1 to 14 days, additionally one record of 4 weeks). Muscle cramps were generalized
136 (5 cases) or major parts of the body (4 cases), and arms or feet (4 cases).

137

138 A variety of measures were taken and drugs were administered to counteract the symptoms of
139 the spider bites. Bitten persons squeezed the bite location or the whole finger to “press out as
140 much venom (and blood) as possible”. Keeping the bitten body part cold with ice water to
141 “reduce pain” or warm with hot patches to “destroy the venom” did not bring any alleviation.
142 Patients were treated with analgesics (Hydromorphone, Ibuprofen, Acetaminophen, and
143 acetylsalicylic acid), antihistamines (Diphenhydramine and Cetirizine), corticosteroids
144 (Prednisolone and Cortisone), and antibiotics. Also high doses of magnesium were frequently
145 administered in different applications.

146

147

148 **4. Discussion**

149 Since 1995, the Swiss Toxicological Information Centre (STIC) has been contacted 10 times
150 about *Poecilotheria* sp. bites, with two written feedbacks, both concerning *P. ornata*, with
151 detailed information about the clinical course by the treating physicians, apart from the case
152 reported here. In both of these cases the patients developed severe muscle cramps with
153 delayed onset, which resolved after administration of calcium and magnesium and/or high
154 doses of benzodiazepines. Elevation of creatine kinase was not reported. The symptoms lasted
155 for up to 2 days. These cases are in line with the case report described here and also with the
156 majority of cases detected in our literature review. 58 % of *Poecilotheria* bites are
157 characterized by a delayed onset of severe muscle cramps, affecting the legs or (most often)
158 the whole body, lasting for days and often only disappearing after weeks. In 42 % of cases,
159 symptoms were mild and typical for theraphosid bites (Vetter & Visscher 1998; Isbister et al.
160 2003). This can best be explained by a “dry bite”, i.e. the spider did not inject venom.

161

162 Bitten patients had been treated symptomatically with analgesics, antihistamines and
163 antibiotics in addition to benzodiazepines and magnesium and/or calcium, but available
164 evidence for the efficacy of one treatment instead of another is insufficient, and therefore no
165 conclusive recommendations regarding the optimal treatment can be made

166

167 Delayed and long-lasting muscle cramps, accompanied by severe pain, can be regarded as
168 typical for most *Poecilotheria* bites.. While most symptoms after *Poecilotheria* bites are
169 within the range of “typical spider bite symptoms” (Nentwig & Kuhn-Nentwig 2013) or
170 within the range of theraphosid bites (Herzig & King 2013), delayed onset and long-lasting

171 muscle cramps are not. What toxins are responsible for these strong effects, which make
172 *Poecilotheria* medically relevant? To the best of our knowledge, there is no information on
173 toxic compounds of *Poecilotheria* venom available. A web-based database on spider toxins
174 (available at ArachnoServer 2.0) containing 916 toxins (201 from theraphosids) and a review
175 on spider venom compounds (Kuhn-Nentwig et al. 2011) with 1618 records (275 referring to
176 theraphosids) contain no information on *Poecilotheria*. Another explanation could derive
177 from the venom quantity injected. *Poecilotheria* spiders are rather large and should therefore
178 inject larger quantities than an average theraphosid. This is confirmed by Herzig (2010): He
179 compares the milked venom quantities of many theraphosid species and shows that an average
180 *Poecilotheria* species yields about 12 µl venom more than the average yield of other larger
181 theraphosids.

182

183 The Swiss Toxicological Information Centre received information on 10 bites in 18 years and
184 we extracted further 26 cases from the literature and blogs (Schmidt 1989; De Haro &
185 Jouglard 1998; Breitschwerdt 2005; Lieske 2005; Ahmed et al. 2009, Arachnoboards 2013;
186 Bighairyspiders 2013; Poecilotheria 2013; Reptilesworld 2013), covering 24 years, leading to
187 an annual frequency of less than 2 reported bites. *Poecilotheria* species are frequently kept as
188 pet spiders and a recent census records 6000 specimens belonging to 15 *Poecilotheria* species
189 (Märklin & Kroes 2009) kept in Central Europe. One would expect frequent bites and
190 accidents but this seems not to be the case. On the other hand, there is certainly some
191 reporting bias or underreporting. Only three publications (Schmidt 1989; De Haro & Jouglard
192 1998; Ahmed et al. 2009) are regular publications in medical journals while all others were
193 communicated in blogs of the arachnological pet community. *Poecilotheria* species are
194 usually very shy and hide away. When they feel threatened, they display a remarkable
195 threatening posture with elevated forelegs, thus showing their aposematic yellow stripes on
196 black background of the ventral leg sides. In contrast, the dorsal colour pattern of
197 *Poecilotheria* species corresponds to bark camouflage patterns. Even if bites are not frequent,
198 ornamental tree spiders run very fast and their speed can be confounded with aggressiveness
199 (Klaas 2007).

200

201 It is unknown why the venom of *Poecilotheria* (and perhaps of a few other theraphosid
202 genera? Ahmed et al. 2009) is much more toxic to humans than an average theraphosid
203 venom. It has been argued that arboreal theraphosids should have more potent venom,
204 correlating with the necessity to rapidly paralyze large, struggling prey in an aerial

205 environment, without using immobilizing devices such as sticky webs (Escoubas & Rash
206 2004). Also, theraphosid spiders from the Americas should be less venomous than species
207 from Asia and Africa (Escoubas & Rash 2004). While it is true that the toxicity of theraphosid
208 spiders varies widely (Escoubas & Rash 2004; Mourão et al. 2013), it remains unclear if such
209 conclusions can be drawn from a study where the venom of 55 theraphosid species was
210 compared by intracerebroventricular injection into mice, no control was included, and all
211 mice died at different times after injection. Also the number of Asian species (5 out of 55) is
212 rather low (Escoubas & Rash 2004).

213

214 In general, most theraphosid spiders are regarded as harmless and their bites cause only minor
215 problems, which is confirmed by reviews on theraphosid bites in Australia (Isbister et al.
216 2003) and Brazil (Lucas et al. 1994). Many American theraphosid spiders like *Brachypelma*
217 sp. are even more feared as “bombarding” spiders that use their urticating hairs covering their
218 opisthosoma in case of danger by brushing them with the hind legs into the direction of the
219 perceived attack, so defensive bites are rarely necessary. It is advisable to stay outside the
220 shooting range because these urticating hairs can cause dermatitis, keratoconjunctivitis and
221 asthma-like bronchitis (Blaikie et al. 1997; Watts et al. 2000; Choi et al. 2003; Spraul et al.
222 2003). Also, there is a report of pharyngeal irritation after ingestion of fried spiders, which, in
223 some countries of Asia and South America, are considered to be a delicacy (Traub et al.
224 2001), although only the American species are likely to have this effect. Allergic reactions
225 and sensitization have been described. All these symptoms can persist for quite a long time
226 (weeks). There is no antidote available and treatment is symptomatic and supportive.

227

228 We were confronted with several limitations going through the available literature and mainly
229 the bite reports from the blogs of different arachnological societies, the most important one
230 being the retrospective character of our data collection. Also, there is most probably an
231 underreporting bias, especially of dry bites.

232

233

234 **5. Conclusion**

235 Theraphosid spider bites are rare and generally mild with the exception of *Poecilotheria*
236 species. The reason for a specific toxicity of their venom remains unclear. We are describing a
237 case of a *Poecilotheria regalis* bite and the delayed onset of severe and diffuse muscle cramps
238 that resolved completely with the use of benzodiazepines and magnesium.

239

240 **Acknowledgement**

241 We thank the patient for the detailed description of his symptoms, Astrid Klose for providing
242 the photos and last, but not least the reviewers for their valuable comments.

243

244

245 **Conflict of interest**

246 The authors declare that there is no conflict of interest

247

248

249

250 **References**

251

- 252 1. Ahmed, N., Pinkham, M., Warrell, D.A., 2009. Symptom in search of a toxin: muscle
253 spasms following bites by Old World tarantula spiders (*Lampropelma nigerrimum*,
254 *Pterinochilus murinus*, *Poecilotheria regalis*) with review. QJM. 102(12):851-7.
- 255 2. Arachnoboards (2013) www.arachnoboards.com. Accessed 28.07.2013.
- 256 3. Bighairyspiders (2013) Tarantula bites. <http://www.bighairyspiders.com/bites.shtml>.
257 Accessed 28.07.2013.
- 258 4. Blaikie, A.J., Ellis, J., Sanders, R., MacEwen, C.J., 1997. Eye disease associated with
259 handling pet tarantulas: three case reports. BMJ. 314(7093):1524-5.
- 260 5. Breitschwerdt, M., 2005. Folgen und Behandlung eines Bissunfalls mit *Poecilotheria*
261 *ornata* POCOCK 1899. Arachne 10: 26-28.
- 262 6. Choi, J.T., Rauf, A., 2003. Ophthalmia nodosa secondary to tarantula hairs. Eye (Lond).
263 17(3):433-4.
- 264 7. de Haro, L., Jouglard, J., 1998. The dangers of pet tarantulas: experience of the Marseilles
265 Poison Centre. J. Toxicol. Clin. Toxicol. 36(1-2):51-3.
- 266 8. Escoubas, P., Rash, L., 2004. Tarantulas: eight-legged pharmacists and combinatorial
267 chemists. Toxicon. 43(5):555-74.
- 268 9. Gabriel, R., 2002. "Notes and observations regarding the bite of *Poecilotheria pedersenii*".
269 British Tarantula Society Journal 17 (2): 61–64.
- 270 10. Gnädinger, M., Nentwig, W., Fuchs, J., Ceschi, A., 2013. Swiss prospective study on
271 spider bites. Swiss Med Wkly. 143:w13877.

- 272 11. Herzig, V., Wood, D.L., Newell, F., Chaumeil, P.A., Kaas, Q., Binford, G.J., Nicholson,
273 G.M., Gorse, D., King, G.F., 2001. ArachnoServer 2.0, an updated online resource for
274 spider toxin sequences and structures. *Nucleic. Acids. Res.* 39 (Database issue):D653-7.
- 275 12. Herzig, V., 2010. Update zum DeArGe-Spinnengiftprojekt, *Arachne* 15(4), pp. 26-31
- 276 13. Herzig, V., King, G.F., 2013. The neurotoxic mode of action of venoms from the spider
277 family Theraphosidae. In: Nentwig W (ed.) *Spider ecophysiology*. Springer, Berlin.
- 278 14. Isbister, G.K., Seymour, J.E., Gray, M.R., Raven, R.J., 2003. Bites by spiders of the
279 family Theraphosidae in humans and canines. *Toxicon*. 41(4):519-24.
- 280 15. Klaas, P., 2007. *Vogelspinnen – Herkunft-Arten-Pflege*, Datz Terrarienbücher, Eugen
281 Ulmer KG Stuttgart.
- 282 16. Kuhn-Nentwig, L., Stöcklin, R., Nentwig, W., 2011. Venom composition and strategies in
283 spiders: Is everything possible? *Adv. Ins. Physiol.* 40: 1-86.
- 284 17. Lieske, H., 2005. Ein Erfahrungsbericht über den folgenreichen Biss einer *Poecilotheria*
285 *fasciata* (LATREILLE, 1804). *Arachne* 10: 29-32.
- 286 18. Lucas, S.M., Da Silva Júnior, P.I., Bertani, R., Cardoso, J.L., 1994. Mygalomorph spider
287 bites: a report on 91 cases in the state of São Paulo, Brazil. *Toxicon*. 32(10):1211-5.
- 288 19. Märklin, T., Kroes, T., 2009 Umfrage Poecilotheria, Stichtag 31.03.2009. *Poecilotheria*
289 *Newsletter* 8: 1-18 (www.poecilotheria.com).
- 290 20. Molur, S., Daniel, B.A., Siliwal, M. 2008. *Poecilotheria regalis*. In: IUCN 2013. IUCN
291 *Red List of Threatened Species*. Version 2013.1. <www.iucnredlist.org>. Downloaded on
292 31 July 2013.
- 293 21. Mourão, C.B., Oliveira, F.N., e Carvalho, A.C., Arenas, C.J., Duque, H.M., Gonçalves,
294 J.C., Macêdo, J.K., Galante, P., Schwartz, C.A., Mortari, M.R., Almeida Santos Mde, F.,
295 Schwartz, E.F., 2013. Venomic and pharmacological activity of *Acanthoscurria paulensis*
296 (Theraphosidae) spider venom. *Toxicon*. 61:129-38.
- 297 22. Nentwig, W., Kuhn-Nentwig, L., 2013. Spider venoms potentially lethal to humans. In:
298 Nentwig W (ed.) *Spider ecophysiology*. Springer, Berlin.
- 299 23. Nentwig, W., Gnädinger, M., Fuchs, J., Ceschi, A., 2013. A two year study of verified
300 spider bites in Switzerland and a review of the European spider bite literature. *Toxicon*.
301 73:104–110
- 302 24. Platnick, N.I., 2013. The world spider catalog, Version 14.0. Available at:
303 <http://research.amnh.org/entomology/spiders/catalog/index.html>.
- 304 25. Poecilotheria (2013) www.poecilotheria.com. Accessed 28.07.2013.

- 305 26. Reptilesworld (2013) Vogelspinnen. <http://reptilesworld.de.tl/Vogelspinnen.htm>.
306 Accessed 28.07.2013.
- 307 27. Schmidt, G., 1989. Efficacy of bites from Asiatic and African tarantulas. Trop. Med.
308 Parasitol. 40(2):114.
- 309 28. Spraul, C.W., Wagner, P., Lang, G.E., Lang, G.K., 2003. [Ophthalmia nodosa caused by
310 the hairs of the bird spider (family Theraphosidae) or hairy megalomorph (known in the
311 US as tarantula)--case report and review of the literature]. [Article in German] Klin.
312 Monbl. Augenheilkd. 220(1-2):20-3.
- 313 29. Takaoka, M., Nakajima, S., Sakae, H., Nakamura, T., Tohma, Y., Shiono, S., Tabuse, H.,
314 2001. [Tarantulas bite: two case reports of finger bite from *Haplopelma lividum*]. [Article
315 in Japanese] Chudoku Kenkyu. 14(3):247-50.
- 316 30. Traub, S.J., Hoffman, R.S., Nelson, L.S., 2001. Pharyngeal irritation after eating cooked
317 tarantula. Int. J. Med. Toxicol. 4(5): 40.
- 318 31. Vetter, R.S., Visscher, K., 1998. Bites and stings of medically important venomous
319 arthropods. Int. J. Dermatol. 37(7):481-96.
- 320 32. Watts, P., Mcpherson, R., Hawksworth, N.R., 2000. Tarantula keratouveitis. Cornea.
321 19(3):393-4.
322

Figure 1. Female, adult *Poecilotheria regalis* (Theraphosidae) (dorsal view) (Photo ©Astrid Klose)

ACCEPTED MANUSCRIPT

Figure 2. Female, adult *Poecilotheria regalis* (Theraphosidae) (ventral (aposematic) view)
(Photo ©Astrid Klose)

ACCEPTED MANUSCRIPT





Highlights

- Theraphosid spiders are coveted pets in Switzerland and Central Europe.
- Most theraphosid spider bites seem to be harmless.
- We present a case of a bite by *Poecilotheria regalis* with severe muscle cramps.
- A comprehensive review of the literature shows that *Poecilotheria* species are medically relevant.

Ethical statement

No ethical statement was required for this article; the patient gave his written permission to use his data.

ACCEPTED MANUSCRIPT