

The linear stem egg-sac of a *Cocalus* C. L. Koch 1846 (Araneae: Salticidae: Spartaeini) in Karnataka, India

Naveen Iyer¹ and David E. Hill²

¹ email naveen.iyer55@gmail.com, instagram @naveen_iyer

² 213 Wild Horse Creek Drive, Simpsonville SC 29680, USA, email platycryptus@yahoo.com

Abstract. The linear arrangement of eggs in an egg-sac constructed by a female *Cocalus* along the length of a plant stem in Karnataka is described.

Key words. Bengaluru, *Chromolaena odorata*, Turahalli forest

The spartaeine genus *Cocalus* C. L. Koch 1846 includes six described species, most known from 1-2 specimens collected at a limited number of isolated localities (Figures 1-3; WSC 2020).

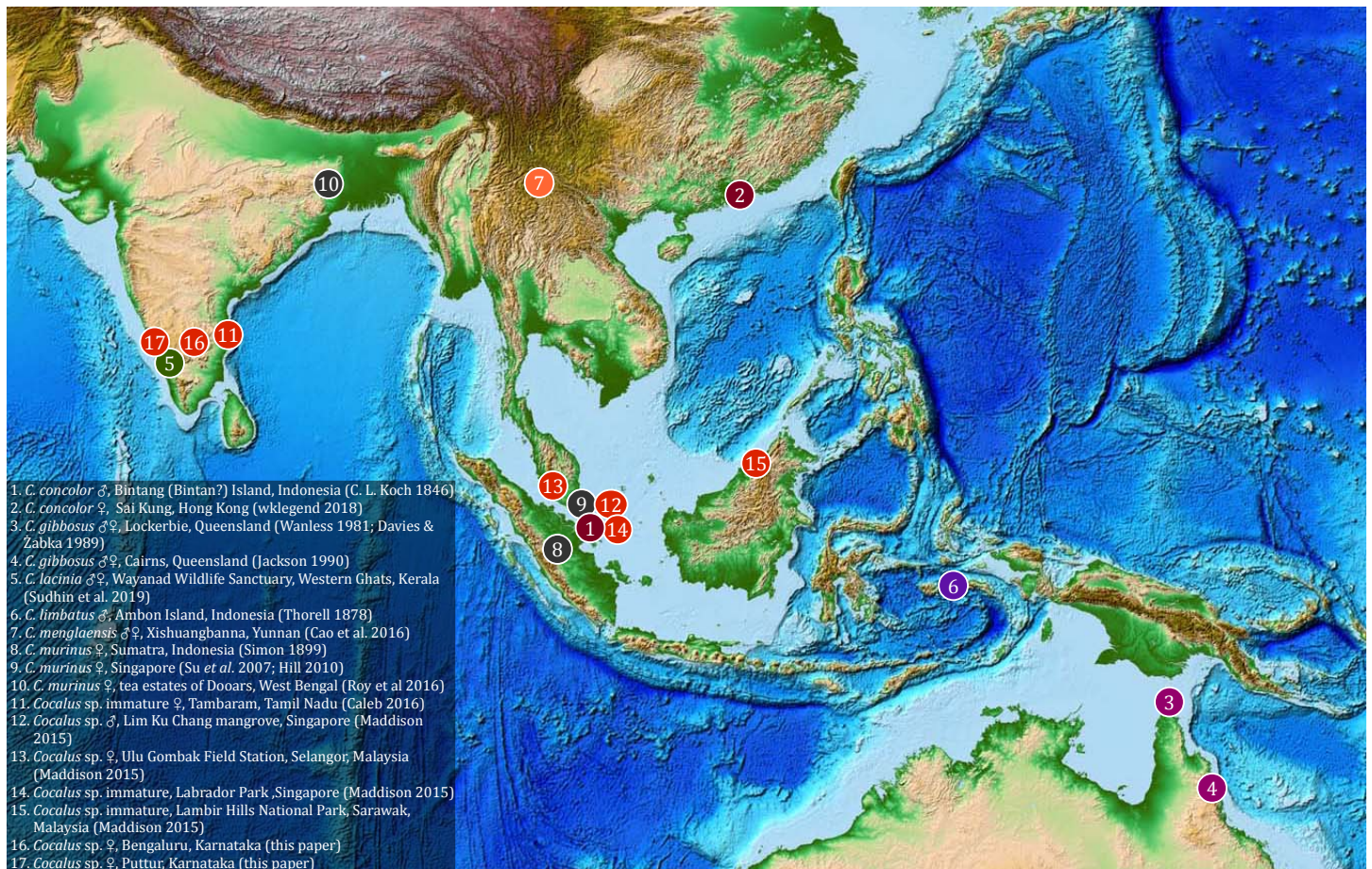


Figure 1. Known records for *Cocalus* species in south and southeast Asia and northern Queensland. This represents an update to the *Cocalus* distribution reported previously by Caleb (2016). Many of these records (11-17) are not identified to species.



Figure 2. *Cocalus* sp. from Singapore and Malaysia. **1-4**, Adult male from Lim Chu Kang mangrove, Singapore (1.44N 103.70E, SGM05-3088, record 12 in Figure 1). **5-6**, Adult female from Ulu Gombak Field Station, Selangor, Malaysia (3.325N 101.753E, SGM05-4675, record 13 in Figure 1). All photos (1-6) copyright © Wayne P. Maddison (Maddison 2015), used under a [CC-BY 3.0](https://creativecommons.org/licenses/by/3.0/) license.



Figure 3. Adult female *Cocalus concolor* Sai Kung, Hong Kong, 16 JUL 2018. This corresponds to record 2 in Figure 1. Photos copyright © wklegend (wklegend 2018), used under a [CC-BY-NC 4.0](https://creativecommons.org/licenses/by-nc/4.0/) license.

The few available photographic records for this genus are usually not identified to species (e.g. Maddison 2015; Caleb 2016). In addition, the behavior of *Cocalus* species is little-known, with the exception of a single paper on the predatory and nesting behaviour of *C. gibbosus* in Australia (Jackson 1990). *Cocalus* have previously been found on the bark of a fallen tree in Tamil Nadu (Caleb 2016), and on the tree bark of *Tectona grandis* (Lamiaceae) in Kerala (Sudhin et al. 2019). *Cocalus* is one of the few tropical Afroeurasian spartaeine genera that have crossed Wallacea and now have a limited representation in Australasia (Hill 2010).

Here we report the stem egg-sac of an unidentified *Cocalus*, found by the lead author (NI) on the upper, dry stem of a Siam Weed (Communist Plant, Pacha, Asteraceae: Eupatorieae: *Chromolaena odorata*) in an extension of the Turahalli forest area, within city limits in southwestern Bengaluru (Figures 4-5, record 16 in Figure 1). *Chromolaena odorata* is native to the American tropics, but is now widespread in tropical Afroeurasia, where it has been viewed as *one of the world's worst weeds* (Vaisakh & Pandey 2012).

Eggs of this *Cocalus* were deposited in two long rows along the length of the stem (most evident in Figure 4: 6) and tightly bound with silk to form a linear egg-sac, without an enclosing nest. The female rested in the open, lengthwise on top of this nest/egg case. Jackson (1990) similarly described the construction of exposed egg sacs on tree trunks by *Cocalus gibbosus* in Australia, but the sacs of that species were round and flattened against the bark.

Photographs of a similar female *Cocalus* attending to a stem egg-sac with emergent (second instar) spiderlings were taken by Ms. Vasanthi Sametadka in Puttur, Karnataka, India (Figure 6, record 17 in Figure 1). These indicate that, like the nesting female, the emergent young of this *Cocalus* also remain exposed on top of the egg case prior to their dispersal, lacking the protection of a surrounding nest.

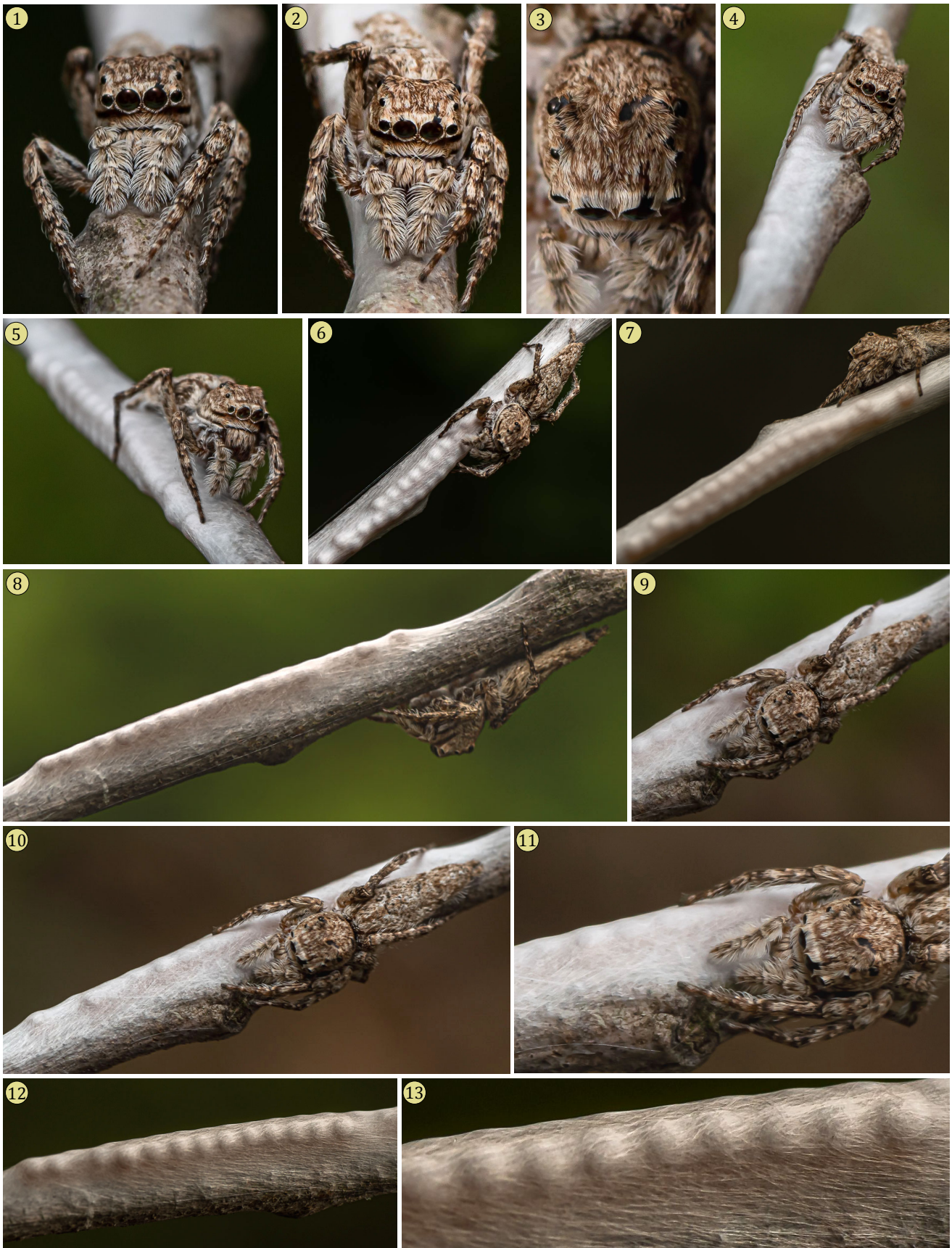


Figure 4. Adult female *Cocalus* sp. guarding her egg sac along a dry stem of *Chromolaena odorata* in Bengaluru (10:30-11:00 IST, 30 MAY 2020). **6**, The two regular rows of eggs within the sac are evident in this view. **12-13**, Detailed views showing tightly wrapped rows of eggs within this sac. Photographs copyright © Naveen Iyer.



Figure 5. Three views of the Siam Weed in the Turahalli forest of southwestern Bengaluru where this brooding *Cocalus* was found. **1**, Siam Weed identified in inset rectangle. **2-3**, Note the dry stem at the top of this plant where the egg-sac was located. Photographs copyright © Naveen Iyer.



Figure 6. Four views of emergent (second instar) *Cocalus* spiderlings resting on the surface of a stem egg-sac, attended by the female (visible beneath stem in 2), in Puttur, Karnataka. Photographs copyright © Ms. Vasanthi Sametadka, used with permission.

Acknowledgements

We thank Abhijith A. P. C., Mr. Jithesh Pai and Ms. Vasanthi Sametadka for supplying us with additional photographic documentation of *Cocalus* nesting. We also thank Wayne P. Maddison and *wklegend* for allowing us to use their photographs.

References

- Caleb, J. T. D. 2016.** First record of the genus *Cocalus* C. L. Koch, 1846 (Araneae: Salticidae) from India. *Peckhamia* 135.1: 1-4.
- Cao, Q., S. Q. Li and M. Žabka. 2016.** The jumping spiders from Xishuangbanna, Yunnan, China (Araneae, Salticidae). *ZooKeys* 630: 43-104.
- Davies, V. T. and M. Žabka. 1989.** Illustrated keys to the genera of jumping spiders (Araneae: Salticidae) in Australia. *Memoirs of the Queensland Museum* 27: 189-266.
- Hill, D. E. 2010.** Sunda to Sahul: Trans-Wallacean distribution of recent salticid genera (Araneae: Salticidae). *Peckhamia* 80.1: 1-60.
- Jackson, R. R. 1990.** Predatory and nesting behaviour of *Cocalus gibbosus*, a spartaeine jumping spider (Araneae: Salticidae) from Queensland. *New Zealand Journal of Zoology* 17 (4): 483-490.
- Roy, T. K., S. Saha and D. Raychaudhuri. 2016.** A treatise on the jumping spiders (Araneae: Salticidae) of tea ecosystem of Dooars, West Bengal, India. *World Scientific News* 53 (1): 1-66.
- Maddison, W. P. 2015.** Photographs of *Cocalus* sp. *posted online at* [http://salticidae.org/salticidImages/pages/asia/images\[6-11\].html](http://salticidae.org/salticidImages/pages/asia/images[6-11].html)
- Koch, C. L. 1846.** Die Arachniden. J. L. Lotzbeck, Nürnberg, Dreizehnter Band: 1-234, plates 433-468, figures 1078-1271.
- Simon, E. 1899.** Contribution à la faune de Sumatra. Arachnides recueillis par M. J. L. Weyers, à Sumatra. (Deuxième mémoire). *Annales de la Société Entomologique de Belgique* 43: 78-125.
- Su, K. F., R. Meier, R. R. Jackson, D. P. Harland and D. Li. 2007.** Convergent evolution of eye ultrastructure and divergent evolution of vision-mediated predatory behavior in jumping spiders. *Journal of Evolutionary Biology* 20 (4):1478-1479.
- Sudin, P. P., A. V. Sudhikumar and K. S. Nafin. 2019.** A new spider species of the genus *Cocalus* C.L. Koch, 1846 (Araneae: Salticidae: Spartaeinae) from Western Ghats of India. *Arthropoda Selecta* 28 (1): 125-130.
- Thorell, T. 1878.** Studi sui ragni Malesi e Papuani. II. Ragni di Amboina raccolti Prof. O. Beccari. *Annali del Museo Civico di Storia Naturale di Genova* 13: 1-317.
- Vaisakh, M. N. and A. Pandey. 2012.** The invasive weed with healing properties: a review on *Chromolaena odorata*. *International Journal of Pharmaceutical Sciences and Research* 3 (1): 80-83.
- Wanless, F. R. 1981.** A revision of the spider genus *Cocalus* (Araneae: Salticidae). *Bulletin of the British Museum of Natural History (Zool.)* 41: 253-261.
- wklegend. 2018.** Photographs of a female *Cocalus concolor* from Sai Kung, Hong Kong *posted online at:* <https://www.inaturalist.org/taxa/733258-Cocalus-concolor>
- WSC. 2020.** World Spider Catalog. Natural History Museum Bern, online at: <http://wsc.nmbe.ch>, version 21.0 (accessed on 16 June 2020).