



## The identity of the frog fly *Caiusa coomani* Séguy, 1948 (Diptera, Calliphoridae)

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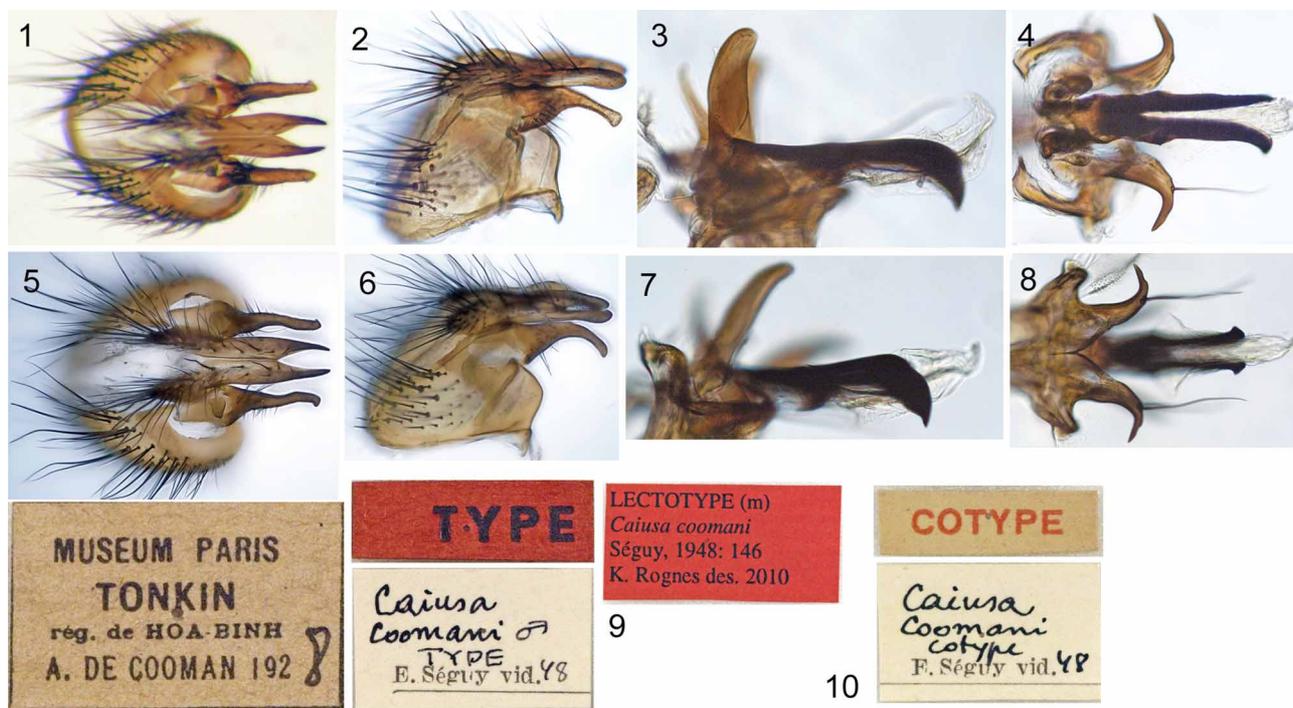
The type material of the nominal species *Caiusa coomani* Séguy, 1948 (Diptera, Calliphoridae), now placed in *Phumosia* Robineau-Desvoidy, 1830, has been examined and a lectotype designated to fix the interpretation of the name. In Hong Kong the larval stages of the species is a predator on the egg masses in foam nests of the brown tree frog *Polypedates megacephalus* Hallowell, 1861 (Anura, Rhacophoridae). *Phumosia coomani* is known from China, Japan and Vietnam. Discrepancies between the figured genitalia and the external features in Chinese reference works are pointed out.

In May 2009 and 2010 I received considerable material (18 males and 24 females) of a yellow blowfly with a dark abdominal tip with a slight bluish sheen from Nancy E. Karraker (School of Biological Sciences, University of Hong Kong, Hong Kong, China) for identification. The larvae of these flies had been attacking the foam nests of a rhacophorid frog, and killing and consuming the developing embryos. The larvae were collected and reared to adults as part of an ecological study on the predation of the brown tree frog (*Polypedates megacephalus*) embryos by calliphorid larvae in Hong Kong. The flies clearly belonged to the calliphorid subfamily Phumosiinae, having long thin setae covering all the katatergite, a very elongate metathoracic spiracle with a very large anterior lid, in combination with lack of a metallic sclerite bearing setae on the suprasquamal ridge. I identified the fly as *Caiusa coomani* Séguy, 1948 using the English language key by Fan (1997: 652), the crucial external character being the sharply defined greyish vitta on the prescutum, sometimes proceeding backward beyond the suture but never reaching the scutellum. However, the dissected genitalia of eight male specimens of this fly differ in several important respects from the male genitalia of “*Caiusa coomani* Séguy” figured in the same work (p. 444, fig. 136). Neither did they fit with the figure of the cerci and surstyli in posterior view given by Fan (1965: 171, fig. 663a), repeated in Fan (1992: 460, fig. 1104n), or with the figures given by Feng *et al.* (1998: 1456, fig. 2944Mp). To identify the material with confidence it was therefore necessary to study the type material of *Caiusa coomani* Séguy, 1948, which is housed in Muséum national d’Histoire Naturelle, Paris, France (MNHN). The purpose of this paper is to designate a lectotype of *Caiusa coomani*, to describe the main features of its genitalia, to discuss features that separate it from its close relatives, to point out a possible error in important Chinese reference works on this species, and to discuss briefly its geographical distribution.

*Caiusa coomani* was described by Séguy (1948: 146) on the basis of an unspecified number of males collected from the Hoa-Binh region of “Tonkin”, now Vietnam, by A. de Cooman in 1928. Séguy did not use the word type or other expression to restrict the name-bearing type to a single specimen. In MNHN there are three male specimens under *Caiusa coomani*. They carry identical locality labels (Fig. 9, leftmost figure). One specimen bears a “TYPE” label (Fig. 9) and the two others each bear a “COTYPE” label (Fig. 10). Each specimen has a Séguy determination label (Figs. 9, 10). The determination labels of the “TYPE” and one “COTYPE” has the handwritten number “48”. All three specimens fit the original description and are accepted as forming all or part of the original type series. The specimen with the “TYPE” label has been dissected by me, and is here designated as lectotype of *Caiusa coomani* Séguy, 1948, to fix the interpretation of the name. The two other specimens are designated as paralectotypes. The specimens have been given lectotype (Fig. 9) and paralectotype labels accordingly.

The genitalia of the lectotype are shown in Figs. 1–4. Of particular significance is the shape of surstylus. It is very narrow, narrower than the tip of cerci and strongly curved in profile view. In posterior view it is almost straight, but the extreme tip is very slightly bent outwards. Other noteworthy features are the heavily sclerotised paraphallic process with the single ventrally directed point, the lack of denticles on the ventral distiphallic membrane, and the peculiar outwardly curved pregonites with 1–3 very long setae. The part of the pregonite that is outside of the long setae is moderate in length. The genitalia of a male of the Hong Kong material are shown in Figs. 5–8. Seven other males were dissected and found to have similar genitalia. There is thus no reason to doubt that the Hong Kong material consists of a single species, and that it belongs to the same taxon as the *Caiusa coomani* lectotype.

The nominal genus *Caiusa* was established by Surcouf (1920: 52) for a single new species, *Caiusa indica* Surcouf. He considered it close to *Phumosia* Robineau-Desvoidy, 1830, having the same general appearance, but differed by the presence of only a single anterior katepisternal seta (“... ne possédant qu’une seule soie sternopleurale antérieure au lieu de deux ...”). It was subsequently sunk as a junior synonym of *Phumosia* by Zumpt (1954), and this opinion is followed here. James (1977) failed to include the name *Caiusa coomani* in his catalogue of the Diptera of the Oriental Region. It is also lacking from the website *Systema Dipterorum* (formerly *Biosystematic Database of World Diptera*) (Pape & Thompson 2010). Kurahashi (1989) was the first to introduce the combination *Phumosia coomani*.



**FIGURES 1–10.** *Phumosia coomani* (Séguy, 1948). **1–4.** Genitalia of lectotype of *Caiusa coomani*. **1.** Cerci and surstyli, posterior view. **2.** Cerci and surstylus, left lateral view. **3.** Aedeagus, left lateral view. **4.** Pregonites and aedeagus, dorsal view. **5–8.** Genitalia of a male bred from larvae consuming egg masses of *Polypedates macrocephalus*. **5.** Cerci and surstyli, posterior view. **6.** Cerci and surstylus, left lateral view. **7.** Aedeagus, left lateral view. **8.** Pregonites and aedeagus, dorsal view. **9.** Labels on lectotype (4 labels). **10.** Labels on one of the paralectotypes (2 labels) (a locality label, identical to the one on the lectotype, and a paralectotype label are not shown).

In the Oriental Region *Phumosia coomani* belongs to a group of testaceous yellow *Phumosia* species having two exceedingly minute setulae just above the lower facial margin, 4 postsutural dorsocentral setae, 1+1 katepisternal setae, a single pair of large postsutural acrostichal setae just in front of scutellum, a pale scutellum and all hyaline (not infuscated) wings. It can usually be separated on external features from its two close relatives *P. testacea* (Senior-White, 1923) and *P. indica* (Surcouf, 1920) by the presence of a laterally well defined dark grey vitta middorsally on the prescutum just enclosing the presutural acrostichal setae. In *P. testacea* the mesonotum is all pale testaceous, whereas in *P. indica* it is largely fuscous black (Séguy 1948; Kurahashi 2003). However, two of the examined males of *P. coomani* are almost all testaceous on prescutum, lacking a distinct middorsal grey stripe, which means that safe identification can only be made by examining the male genitalia. The male genitalia of *P. testacea* and *P. indica* have been illustrated by Senior-White (1923), Senior-White *et al.* (1940), Tumrasvin *et al.* (1979) and Kurahashi (2003). The most important distinguishing feature is the shape of the surstyli, which in *P. testacea* and *P. indica* are broad and almost straight in profile view in contrast to the narrow and strongly curved surstylus of *P. coomani*. In addition the surstyli curve inwards in dorsal view and have a narrow part at about the middle.

The male genitalia as figured by Fan (1965: 171, fig. 663a), Fan (1992: 460, fig. 1104n), Fan (1997: 444, fig. 136) and Feng *et al.* (1998: 1456, fig. 2944Mp) for a species they called “*Caiusa coomani*” differ in important respects from those of the lectotype of *Caiusa coomani*, and may be based on another species misidentified as *coomani*, possibly *Phumosia testacea* or *P. indica*. It may also mean that a fourth species exists which may show a prescutum pattern similar to *P. coomani*, even if having different genitalia. The apparent contradiction between the described external features in

the English language key by Fan (1997: 652) and the figured genitalia suggests that the distribution of *Phumosia coomani* in mainland China (Fujian, Guangxi, Guizhou, Hainan, Hunan, Sichuan, Yunnan, Zhejiang) as reported by Chinese authors may not be entirely correct. The species is known with certainty to occur in China (Hong Kong) (present study), Japan (Kurahashi 1989) and Vietnam (type locality). The records from China (Taiwan) by Lue and Lin (2000) and Lin *et al.* (2000) are accepted with some doubt, even if their identifications are based on the descriptions of the external features given by Fan *et al.* (1992, cf. Lue & Lin 2000: 275) only, and apparently not on any genital studies. These authors also document predation on egg masses of rhacophorid frogs by *Phumosia coomani* (Séguy).

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## References

- Fan, Z.-d. (ed.) (1965) *Key to the common synanthropic flies in China*. Academy of Science, Peking [= Beijing], xv + 330 pp. + 40 pls. [In Chinese.]
- Fan, Z.-d. (ed.) (1992) *Key to the common flies of China*. Second edition. Academia Sinica, Shanghai, xlviii + 992 pp. + 40 pls. [In Chinese with English notes on the new taxa.]
- Fan, Z.-d. (ed.) (1997) Diptera: Calliphoridae. *Fauna Sinica, Insecta*, 6, xii + 707 pp. [In Chinese with English summary, key to subfamilies, tribes, genera and species, and summary of new taxa.]
- Feng, Y., Chen, H.-w. & Xue, W.-q. (1998) Calliphoridae. In: Xue, W.-q. & Chao, C.-m. (eds), *Flies of China*. Vol. 2. Liaoning Science and Technology Press, Shenyang [1996], pp. 1366–1517. [In Chinese, with English summaries of new species.]
- James, M.T. (1977) Family Calliphoridae. In: Delfinado, M.D. & Hardy, D.E. (eds), *A catalog of the Diptera of the Oriental Region*. Volume III Suborder Cyclorrhapha (excluding Division Aschiza). University Press of Hawaii, Honolulu, pp. 526–556.
- Kurahashi, H. (1989) New record of *Phumosia coomani* (Séguy), n. comb. (Diptera, Calliphoridae) from Japan. *Japanese Journal of Entomology*, 57, 318.
- Kurahashi, H. (2003) Blow flies from the Solomon Islands, with description of a new species (Diptera, Calliphoridae). *Japanese Journal of Systematic Entomology*, 9, 277–289.
- Lin, S.-s., Kuo, C.-h. & Lue, K.-y. (2000) Oviposition behaviour and host selection of the frog fly, *Caiusa coomani* (Diptera: Calliphoridae). *Chinese Journal of Entomology*, 20, 281–292. [In Chinese.]
- Lue, K.-y. & Lin, S.-s. (2000) Investigation of foam nests (Rhacophoridae) infested by frogflies (Diptera) in Taiwan. *Chinese Journal of Entomology*, 20, 267–280. [In Chinese.]
- Pape, T. & Thompson, F.C. (eds) (2010) *Systema Dipteriorum*. Available at <http://www.diptera.org/>; accessed on 1 December 2010.
- Séguy, E. (1948) Trois diptères nouveaux d'Asie orientale. *Notes d'Entomologie chinoise* (Musée Heude), 12 (12), 143–147.
- Senior-White, R.A. (1923) The Muscidae testaceae of the Oriental Region. (With descriptions of those found within Indian limits.) *Spolia zeylanica*, 12, 294–314 + pls. I–XI.
- Senior-White, R.A., Aubertin, D. & Smart, J. (1940) *The fauna of British India, including the remainder of the Oriental Region*. Diptera. Vol. VI. Calliphoridae. Taylor & Francis, London, xiii + 288 pp.
- Surcouf, J.M.R. [1920] Révision des Muscidae testaceae. *Nouvelles Archives du Muséum d'Histoire Naturelle de Paris*, (5) 6 ('1914', '1919'), 27–124.
- Tumrasvin, W., Kurahashi, H. & Kano, R. (1979) Studies on medically important flies in Thailand VII. Report on 42 species of calliphorid flies, including the taxonomic keys (Diptera: Calliphoridae). *The Bulletin of Tokyo Medical and Dental University*, 26, 243–272.
- Zumpt, F. (1954) *Phumosia schoutedeni* n. sp. with remarks on the status of the genus *Phumosia* R.-D. *Annales du Musée Royal du Congo Belge. Nouvelle série in 4°*, *Sciences zoologiques*, 1, 574–577.