

***Crozetia* Davies (Diptera: Simuliidae): redescription of *Cr. crozetensis*, *Cr. seguyi*, number of larval instars, phylogenetic relationships and historical biogeography**

DOUGLAS A. CRAIG¹, DOUGLAS C. CURRIE² & PHILIPPE VERNON³

1. Biological Sciences, University of Alberta, Edmonton, Canada, T6G 2E9; d.craig@ualberta.ca

2. Centre for Biodiversity and Conservation Biology, Royal Ontario Museum, Toronto, Ontario, Canada, M5S 2C6; dougc@rom.on.ca

3. Université de Rennes 1, UMR 6553 CNRS, Station Biologique, 35380 Paimpont, France; philippe.vernon@univ-rennes1.fr

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Abstract

The taxonomy of the genus *Crozetia* Davies (Diptera: Simuliidae) is reviewed. Apart from the eggs, all stages of *Crozetia crozetensis* (Womersley) and *Cr. seguyi* Beaucournu-Saguez and Vernon, are fully redescribed with only claws and genitalia detailed for the female of *Cr. crozetensis*. A phylogenetic analysis of the Simuliidae indicates that *Crozetia* is the sister group of all other members of the extant Simuliini, in agreement with current molecular evidence. Palaeogeological evidence on

the age of the Crozet Islands is equivocal, but a very late Cretaceous to early Eocene age (79-54 Mya) is most likely, hence the presence of simuliids on this archipelago is not the result of vicariance from Gondwanaland. Method of dispersal to the Crozet Archipelago may have been via wind or possibly vectored by birds from Africa, as suggested by presence of a basal tooth on the adult female claw. Morphometric analysis of larvae of *Cr. seguyi* indicates seven instars which is typical for the Simuliidae.

Key words: Simuliidae, *Crozetia*, taxonomy, larval instars, phylogenetic relationships, biogeography

Introduction

The Simuliidae are found on many isolated volcanic islands that possess suitable running water habitats, attesting to great dispersal ability of the adults. Most such islands possess only a few species each, but in French Polynesia, there have been major species radiations on some islands (Craig et al. 2001). In the Pacific, south of New Zealand, the southernmost islands there that possess simuliids (*Austrosimulium*) are Campbell Island (52.55°S 169.18° W) and Auckland Islands (50.68°S 166.15°E). Both sets of islands each possess a single endemic species. Navarino Island (Chile), at 55.10°S 67.65°W, is ostensibly the most southern island in the world to possess simuliids (*Pauraustrosimulium*), but is not far distant from the South American continent.

Southeast of South Africa (Fig. 1), in the southern Indian Ocean, the Crozet Islands (46.40° S 51.78° E) possess two species in the endemic genus *Crozetia*. These islands (Fig. 2) are the most isolated from any other land mass that possesses Simuliidae. The Kerguelen Islands ~1,500 km further to the east, although with suitable habitats, lack simuliids. Both archipelagoes have a severe climate, befitting their latitude, and now lack trees, although each is well covered with tussock grasses (Fig. 3).

Crozetia has been of interest to students of black flies because the larvae are highly aberrant (Dumbleton 1962, Davies 1965, 1974, Currie and Craig 1987). In particular the labral fan rays are markedly modified and apparently do not serve in filter feeding. Rather, these rake-like fans are used to browse the substrate. The pupae and adults also exhibit peculiarities.

The first simuliid material from the Crozet Islands was collected by T. H. Johnston and J. W. Marr (Johnston 1937) during a British, Australian and New Zealand Antarctic Research Expedition (BANZARE) in 1929. Womersley (1937) described the material (two males and some dozen larvae) as *Simulium* (*Cnephia*) *crozetense*. He illustrated the wing, leg, antenna and genitalia of the male, and hypostoma, antenna, palpus and mandible of the larva. As Dumbleton (1962) noted, Womersley misidentified certain larval structures. A further eight adults (male and female) were collected by R. Jeannel during an expedition in 1939 to the French Austral Islands (Prince Edward, Crozet and Kerguelen Islands). These were described by Séguy (1940) and assigned to the genus *Cnephia* Enderlein.