

ESTABLISHMENT OF RESIDENT ODONATA POPULATIONS ON THE FORMERLY WATERLESS COUSINE ISLAND, SEYCHELLES: AN ISLAND BIOGEOGRAPHY THEORY (IBT) PERSPECTIVE

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In March-April 1997, *Ceriagrion glabrum*, *Diplacodes trivialis*, *Orthetrum brachiale wrighti*, *Pantala flavescens* and *Tramea continentalis* were resident on Cousine Island. Prior to December 1993, there were no perennial stands of water on the island, and within just over 2 years, these spp. had established as breeding residents, having crossed at least 2.5 km of open sea, probably via the filter route. Cousine is unlikely to support more than about 4 or 5 continuously breeding residents in relation to its size.

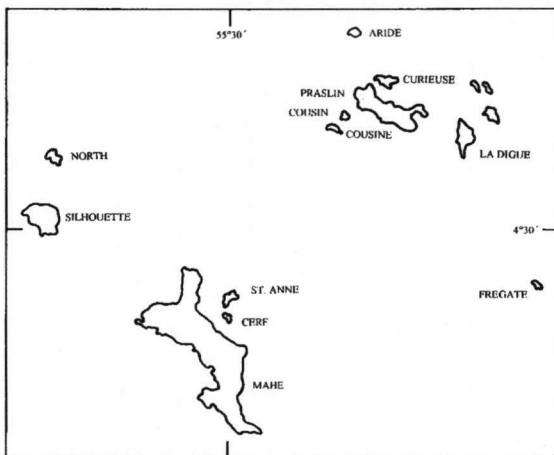


Fig. 1. The main, central group of granitic islands of the Seychelles.

INTRODUCTION

The Seychelles granitic islands (4-5°S, 55-56°E) are an isolated ancient vestige of part of the earlier supercontinent of Gondwanaland (BRAITHWAITE, 1984). They lie about 930 km N of Madagascar and 600 km E of Africa. They have an insect fauna fairly rich in local endemics (COGAN, 1984), with five of the 19 recorded Odonata species

(BLACKMAN & PINHEY, 1967) occurring only in the Seychelles.

Cousine Island (Fig. 1) is a small, naturally waterless, (26 ha, 1 km long, 400 m wide) granitic island about 5 km SW of the larger (38 km²) island of Praslin, which has stands of perennial water. In order to avoid desiccation stress on the introduced giant tortoises and on some threatened endemic bird species, small (± 1 m² to ± 12 m²) pools were created in December 1993.

From 27 March 1997 to 4 April 1997, I visited the island and assessed the residency status of the Odonata. Supplementary observations were made on the nearby Cousin Island (Fig. 1), which has an artificially-supplemented, perennial pool of ca 30 m².

FIELD EVIDENCE

CERIAGRION GLABRUM (BURMEISTER)

Six males and two females (both in tandem and ovipositing) were recorded, but no larvae were found. On Cousin Island (3-IV-1997), two adult males and an adult female were at the pool, and a larva was recorded.

DIPLACODES TRIVIALIS (RAMBUR)

About 4-6 adult males and an occasional female were present only at the larger (± 12 m²) sunlit, warm water (39-40°C) pool. Larvae were not abundant, only 4 were recovered after intense sampling. On Cousin Island (3-IV-1997), no adults or larvae were seen.

ORTHETRUM BRACHIALE WRIGHTI (SELYS)

No adults of this species were seen. However, it was recorded earlier in the season (31-I-1965) by BLACKMAN & PINHEY (1965). Early-instar larvae were abundant (> 3-4 per net scoop) in a shade-dappled ($\pm 4-5$ m²) pool. On Cousin Island (3-IV-1997), the pool was occupied by two adult males and larvae were also present.

PANTALA FLAVESCENS (FABRICIUS)

Only a few adults were seen, none of which were females. One sunlit, very small pool (± 1 m², ± 12 cm deep, 35-36°C at ± 6 h00, 2-IV-1997) was occupied by larvae solely of this species (21 individuals of all ages). They were also present in low numbers in small pools that were shaded part of the day. Interestingly, larvae (24 individuals, of all ages, recovered) were recovered from a shallow (± 25 cm deep) pool that had a bottom temperature of 39-40°C (± 16 h15, 2-IV-1997). On Cousin

Island (3-IV-1997), no individuals, larvae or adults, were recorded.

TRAMEA CONTINENTALIS (SELYS)

This species was abundant; all the open, sunlit pools were hawked by a male or a mating pair. There was frequent oviposition. Adults, based on wing-wear, appeared to be of all ages. On Cousine Island (3-IV-1997) it was present as both larva and adult.

DISCUSSION

COUSINE ISLAND SPECIES

BOURQUIN (1997) recorded an immigration swarm of *Hemianax ephippiger* (Burm.) to Cousine Island on 6 November 1996. This species has also been reported from the larger (\pm 68 ha) Aride Island, about 25 km to the N (CARTY & CARTY, 1996). Yet, during our visit, it was not found to be resident on Cousine Island.

BOURQUIN (1997) also recorded *Tholymis tillarga* (Fabr.) on Cousine Island, but no adults or larvae were found*.

In contrast to above, BOURQUIN (1997) did not record *Ceriagrion glabrum*, which appears to be a new arrival, and by its ovipositing behaviour (but no larvae found) it may in March - April 1997 be resident. It has also been recorded on Aride Island (CARTY & CARTY, 1996). *C. glabrum* has a wide range across Africa and its neighbouring islands (PINHEY, 1984)**.

Of the species recorded in this study, *Tramea continentalis* and *Pantala flavescens* are well-known travellers and/or migrants in neighbouring Africa (PINHEY, 1985; SAMWAYS & CALDWELL, 1989). Both species were breeding on Cousine Island, late March - early April 1997. Interestingly, *T. burmeisteri* Kirby, so often seen flying with *T. continentalis* in South Africa, was not recorded here, nor elsewhere in the Seychelles (BLACKMAN & PINHEY, 1976). The rapid appearance and firm establishment of *T. continentalis* on Cousine Island suggests that it readily crosses the sea.

Pantala flavescens was recorded both as an adult and as an abundant larva. It was not seen on Cousine Island on 3 April 1997, nor has it been recorded from Aride Island.

Diplacodes trivialis, like *P. flavescens* and *C. glabrum*, has a wide geographical distribution, occurring across the Oriental and Australasian regions, but not in Af-

* Note added in proof: *T. tillarga* was present and ovipositing on Cousine Island 12 January - 6 February 1998.

** Note added in proof: *C. glabrum* was absent from Cousine Island 12 January - 6 February 1998.

rica (WATSON, et al., 1991). Strangely, it was sighted on Cousine Island but not on Cousin Island. It has not been recorded on Aride Island either (CARTY & CARTY, 1996), but it does occur elsewhere in the Seychelles (BLACKMAN & PINHEY, 1967). It appears to be a quick island colonizer and was one of the first dragonflies to colonize Krakatau (THORNTON, 1996).

The only Seychelles endemic dragonfly breeding on Cousine Island is *Orthetrum brachiale wrighti*, recorded earlier from Aride Island (CARTY & CARTY, 1996) and occurring also on Cousin Island. It too, like *T. continentalis*, *P. flavescens*, *C. glabrum* and *D. trivialis*, appears to readily cross from some Seychelles islands to others. Interestingly, it was recorded on Cousine Island by BLACKMAN & PINHEY (1967) in January 1965, suggesting that it may fairly regularly cross the sea or that it can breed in semi-permanent pools such as tree-holes or rock concavities.

FILTER ROUTE DISPERSAL

In just over two years, the artificial pools of Cousine Island have attracted four resident species (*Pantala flavescens*, *Tramea continentalis*, *Diplacodes trivialis*, *Orthetrum brachiale wrighti*), and three possibly occasional breeders (*Tholymis tillarga*, *Ceragrion glabrum* and *Hemianax ephippiger*). This is a relatively high number (Fig. 2) given the size of the island and its isolation. It is certainly partly accounted for by the different pools being dominated by different species, depending on pool size, shade/sunlight ratio and temperature, as has been shown on main-

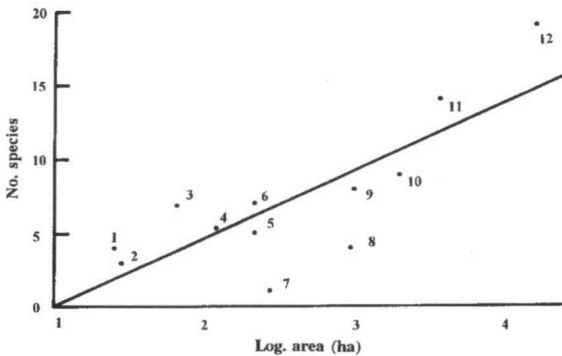


Fig. 2. A log. island area: Odonata species richness regression line ($y = -4.84 + 4.66x$, $r^2 = 0.63$) for the granitic islands of the Seychelles, based on records of BLACKMAN & PINHEY, 1967; CARTY & CARTY, 1996 and the data in this study. - [1 = Cousine, 2 = Cousin, 3 = Aride, 4 = Cerf, 5 = Frégate, 6 = St. Anne, 7 = Curieuse, 8 = Coetivy, 9 = La Digue, 10 = Silhouette, 11 = Praslin, 12 = Mahé. N.B. The figure for species richness on Cousine is conservative, being the known resident species. A total of 7 spp. has been recorded from the island.]

land Africa (STEYTLER & SAMWAYS, 1995; OSBORN & SAMWAYS, 1996).

The dragonflies on Cousine Island may either have reached the island via the smaller neighbouring island of Cousin, or the larger increasingly distant islands of Praslin and Mahé. If dispersal was, for example, Praslin-Cousin-Cousine, this would be a filter route (COX & MOORE, 1993). If it was a question of chance arrivals (as the *H. ephippiger* arrival may have been), then this would have been

a sweepstakes route (COX & MOORE, 1993). As colonization by this relatively large number of species was so rapid, and they occur throughout most of the Seychelles (BLACKMAN & PINHEY, 1967), it appears that they are highly vagile, and follow a filter route.

SPECIES RICHNESS EQUILIBRIUM

It is interesting to speculate how many Odonata species Cousine Island is likely to hold. Evidence so far points to the equilibrium level (MacARTHUR & WILSON, 1967) of about 4-5 species, with pools dominated by *Pantala flavescens*, *Tramea continentalis*, *Diplacodes trivialis*, or *Orthetrum brachiale wrighti* or *Tholymis tillarga*, and *Ceriagrion glabrum* being a subdominant to *D. trivialis* in particular. There is however, clearly a dynamic equilibrium between these species on Cousine Island.

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Note added in proof: Dr O. Bourquin captured two female specimens of *Anax guttatus* (Burm.) on Cousine Island, January 1998. There is no evidence yet however, that this species is breeding there. This brings the total number of species recorded on the island, but not necessarily breeding, to eight.