

**A CONTRIBUTION TO THE KNOWLEDGE OF
THE WATER BEETLE FAUNA OF
PULAU TIOMAN, PENINSULAR MALAYSIA
(COLEOPTERA: NOTERIDAE, DYTISCIDAE, HYDROPHILIDAE,
HYDRAENIDAE, SCIRTIDAE, LIMNICHIDAE)**

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ABSTRACT. - A recent survey of the water beetle fauna of Pulau Tioman revealed 11 species of the families Noteridae, Dytiscidae, Hydrophilidae, Hydraenidae, Scirtidae and Limnichidae. All identified species (*Canthydrus flammulatus*, *Lacconectus krikkeni*, *Lacconectus corayi*, *Sternolophus rufipes*, *Helochares fuliginosus*, *Oocyclus sumatrensis tiomanensis* and *Amphiops coomani*) are widespread in the Indo-Malayan region. The small size of the island, presence of few lentic habitats, the steep and fast flowing streams are responsible for the lack of a rich aquatic beetle fauna. The distributional range and ecology are discussed for each species.

KEY WORDS. - Aquatic beetles, Pulau Tioman, Peninsular Malaysia, distribution, faunistics, ecology.

INTRODUCTION

Pulau (= Island) Tioman is part of the administrative district Rompin in the State of Pahang. The island is 48 km off the coast of Pahang between longitude 104°7' to 104°15' E and latitude 2°44' to 2°54' N. Extending about 38 km from the north to south and 19 km from east to west, it covers 70 sq km and is the largest island off the east coast of Peninsular Malaysia. The island's profile rises steeply from the shore to inland with narrow flat areas on its east and west coast. The southern part of the island rises about 1000 m at Gunung Kajang and about 900 m to the twin peaks of Nenek-Si-Mukut. The wet season is during the north-east monsoon period from November to March (Bullock & Medway, 1966). Although

supporting both old settlements and a developing tourist industry, most of Tioman's primary forest still remains. Owing to its isolation from the mainland it has developed several subspecies of plants and animals, in fact much of the plant life is thought to be unique to the island (Cranbrook, 1988; Day & Mowbray, 1990; Kirton, 1991).

With the exception of Bullock (1966), who recorded only "small Dytiscidae" and "Helodidae" (now Scirtidae), nothing has been published about the aquatic beetle fauna of Pulau Tioman. The first author visited the island for ten days in September 1995 and collected mainly near

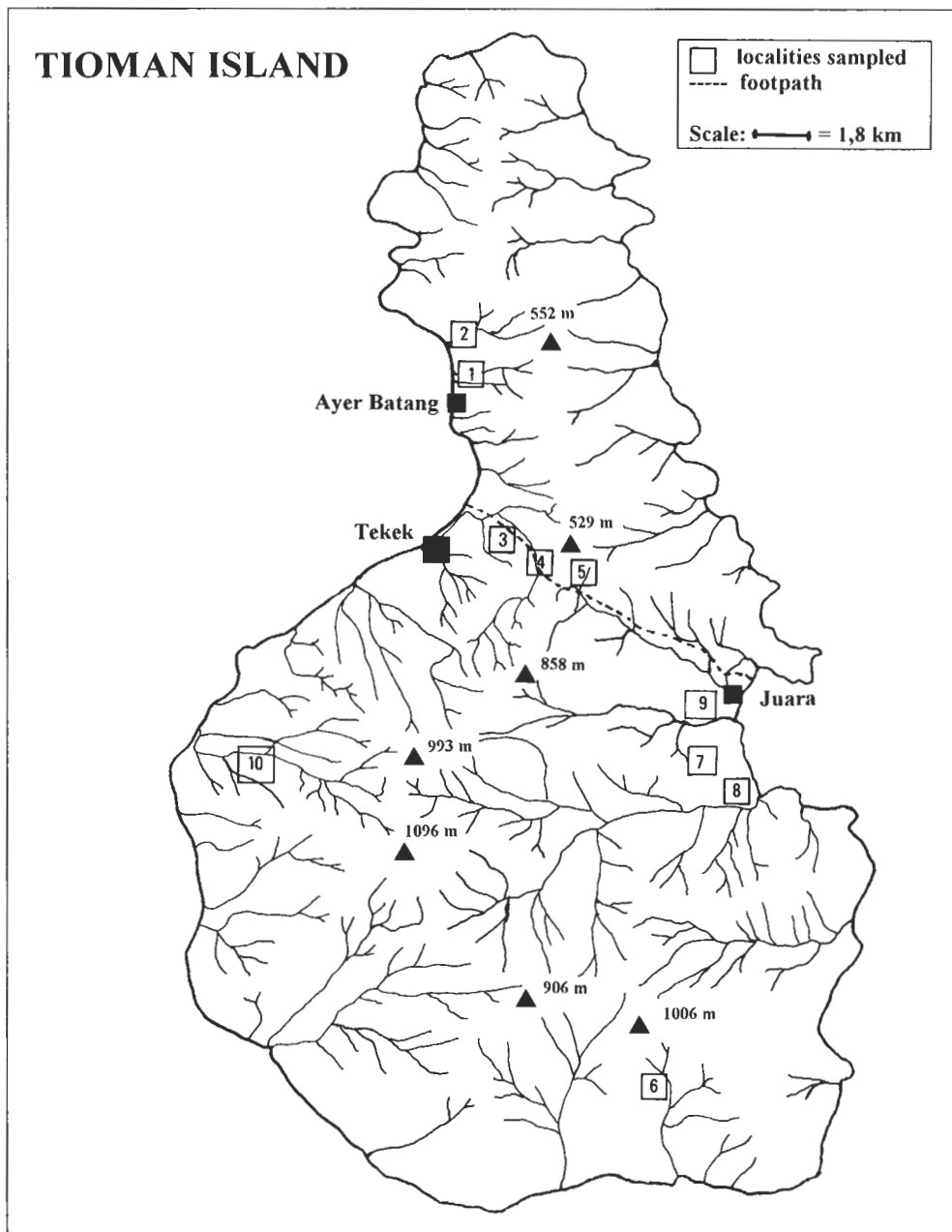


Fig. 1. Map of Pulau Tioman, showing study localities.

Kampung Ayer Batang and Kampung Tekek, and along the jungle track from Tekek to Juara up to an altitude of 330 m. In addition the second author surveyed the island with a team of biologists from the National University of Singapore for six days in June 1996. Miss H.K. Lua (ZRC) visited the island for six days in June 1997. The three field trips were carried out in particular to promote knowledge of the water beetle fauna of Peninsular Malaysia which is still relatively unexplored (Hendrich, 1995).

The purpose of this paper is to give a review of all water beetle species known from Tioman. Descriptions and photographs of the localities sampled by the authors are provided. For each species the distribution range and ecology are discussed. Due to lack of suitable taxonomic works for the Hydraenidae, Scirtidae, and the genus *Helochaeres*, only the genus names are given.

MATERIAL & METHODS

The Dytiscidae, some of the Hydrophilidae and the *Prionocyphon* larvae have been collected by using a small aquatic dip net with a triangular frame and various small metal kitchen sieves. *Lacconectus* fly away immediately when taken out of the water. It is necessary to use an aspirator for collecting larger series of these dytiscids. Most of the Hydrophilidae and Hydraenidae are picked up with forceps directly from the substratum of the samples.

About 600 water beetles have been collected for this study from the following localities (Fig. 1).

Loc. 1: Sungei Ayer Batang, small stream close to the beach, surrounded by secondary vegetation, 12 & 14 Sept. 1995, leg. L. Hendrich. All beetles were taken from muddy ground among rotten leaves and roots on small, shallow and semi-shaded rock pools. Surface: 20-40 sq cm, depth: 2-4 cm.

Loc. 2: Panuba near Monkey Beach, 12 & 14 Sep. 1995, leg. L. Hendrich. Small shallow and sandy stream, shaded by a dense forest predominated by *Pandanus* trees. All beetles were collected among floating roots and rotten *Pandanus* leaves.

Loc. 3 (Fig. 2): Jungle track from Tekek to Juara, primary forest, Sungei Ayer Besar, 200-270 m, 10-12 Sep. 1995, leg. L. Hendrich; idem, pothole, 25 June 1996, leg. H. K. Lua. Small, shallow and shaded rock pools and potholes, tributary along Sungei Ayer Besar. All pools had a muddy substrate covered with rotten leaves. Surface: 0.5-1.0 sq m, depth: 2-5 cm.

Loc. 4 (Fig. 3): Jungle track from Tekek to Juara, primary forest, Sungei Ayer Besar, 270 m, waterfall area, 10-12 Sept. 1995, leg. L. Hendrich. Small, shallow and sun-exposed rock pool just above the waterfall. Beetles sat among roots, green algae and mats of floating grasses. Some specimens of the genera *Oocyclus* and *Hydraena* were captured in wet rock crevices.

Loc. 5: Jungle track from Tekek to Juara, primary forest, 330 m, spring area of Sungei Baharu, 11 & 16 Sep. 1995, leg. L. Hendrich. Small, shallow and slowly flowing helocrene just besides the footpath.



Fig. 2. Jungle track from Tekek to Juara, primary forest, Sungei Ayer Besar, 200 - 270 m. Small, shallow and shaded rock pool. The habitat of *Lacconectus corayi*, *L. krikkeni* and the larvae of Scirtidae.

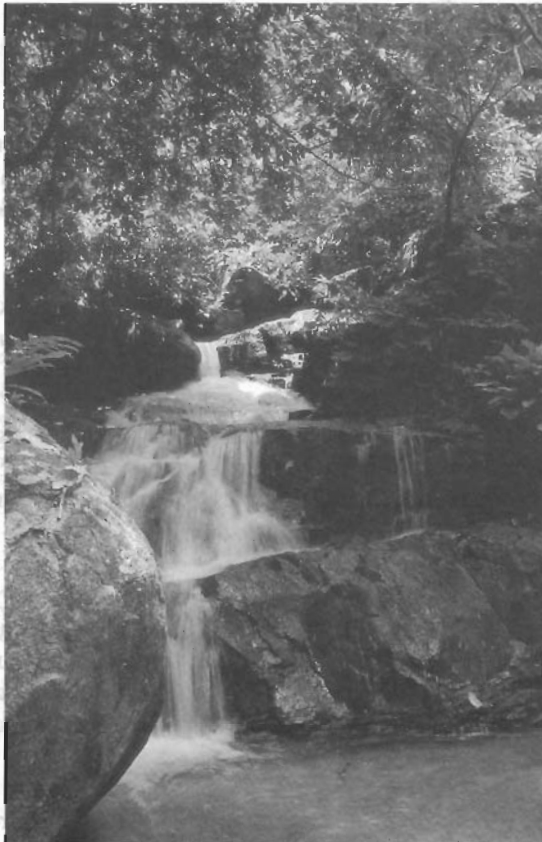


Fig. 3. Jungle track from Tekek to Juara, primary forest, Sungei Ayer Besar, 270 m, waterfall area. The habitat of *Oocycilus sumatrensis* and *Hydraena*. Beetles occur among roots, green algae and mats of floating grasses.

Loc. 6: Sungei Asah, 26 June 1996, leg. C. M. Yang & H. K. Lua. Stagnant pool with leaf litter near the Mukut waterfall.

Loc. 7: Headwater of a tributary of Sungei Keliling, 27 June 1996, leg. H.K. Lua.

Loc. 8: Sungei Mentawak, 24 June 1997, LHK 336, leg. H. K. Lua. From partially submerged grass along the river bank, water slightly brackish during high tide.

Loc. 9: Sungei Keliling, 26 June 1997, LHK 343, leg. H. K. Lua. From partially submerged grass along the river bank.

Loc. 10: Sungei Paya, 25 June 1997, LHK 348a, leg. H. K. Lua. From partially submerged grass along the river bank.

Specimens examined are deposited in the following institutions:

CB = Collection of M. Balke, Berlin, Germany; CFH = Collection of F. Hebauer, Deggendorf, Germany; CH = Collection of L. Hendrich, Berlin, Germany; CKD = Collection of B. Klausnitzer, CP = Collection of F. Pederzani, Ravenna, Italy; NHMW = Naturhistorisches Museum Wien, Austria; ZMB = Zoologisches Museum der Humboldt Universität, Berlin, Germany; ZRC = Zoological Reference Collection, Raffles Museum, National University of Singapore, Republic of Singapore.

FAUNISTICS, TAXONOMY AND ECOLOGY

Family Noteridae

Canthydrus flammulatus Sharp, 1882

Canthydrus flammulatus Sharp 1882: 278; Vazirani, 1977: 5.

Material examined. - 1 ex., loc. 8 (ZRC).

Distribution. - Myanmar, Thailand, Indonesia: Sumatra, Sulawesi (Vazirani, 1977). First record for Peninsular Malaysia.

Ecology. - *Canthydrus flammulatus* is a lentic species living among wet leaf litter, mud and floating vegetation in all kinds of more permanent, exposed, shallow, stagnant or slow flowing water (e.g. swamps, ponds, drainage ditches and flooded areas along streams and rivers).

Family Dytiscidae

Subfamily Colymbetinae Erichson, 1837

Tribe Copelatini Van den Branden, 1885

Lacconectus corayi Brancucci, 1986

(Fig. 4)

Lacconectus corayi Brancucci 1986: 132-134, fig. pg.195.

Material examined. - 26 ex., loc. 3 (CH, CB); 89 ex., loc. 5 (CH, CB, ZMB, ZRC).

Distribution. - Singapore (Brancucci, 1986). First record for Peninsular Malaysia.

Ecology. - This is one of the most common *Lacconectus* species in Malaysia, where it is widespread in the lowland and lower montane rain forests (Hendrich, in prep.). It is found in small forest pools fed by small springs, pools of intermittent streams, rock pools at the edge of forest streams and in water-filled tree hollows. In general the habitat is rich in mud and rotten leaves. On Tioman *L. corayi* occurs in association with *L. krikkeni*.

***Lacconectus krikkeni* Brancucci, 1986**

Lacconectus krikkeni Brancucci 1986: 130-132, fig. pg. 194; Brancucci 1987: 93-95.

Material examined. - 86 ex., loc. 3 (CH, CB, CP), 140 ex., loc. 3 (ZRC); 74 ex., loc. 5 (CH, CB, ZMB); 14 ex., loc. 6 (ZRC).

Distribution. - Singapore, Peninsular Malaysia and Sarawak (Brancucci, 1986).

Ecology. - This is the most common *Lacconectus* in Peninsular Malaysia, and is widespread in the lowland and lower mountain rain forests. For habitat see *L. corayi*.

Family Hydrophilidae

Subfamily Hydrophilinae Ganglbauer, 1904

Tribe Oocylini Hansen 1991

***Oocyclus sumatrensis tiomanensis* Hebauer & Wang, 1998**

(Fig. 5)

Oocyclus sumatrensis tiomanensis Hebauer & Wang, 1998: 44.

Material examined. - 31 ex., loc. 3 (CH, CFH, ZRC); 5 paratypes, loc.4 (CH).

Distribution. - Peninsular Malaysia: Pulau Tioman and Pulau Langkawi (Hebauer & Wang, 1988).



Fig. 4. *Lacconectus corayi* Brancucci, 1986 (Body length, 3.6 mm).



Fig. 5. *Oocyclus sumatrensis tiomanensis* Hebauer & Wang, 1998 (Body length, 3.5 mm).

Ecology. - D'Orchymont (1932) described the typical form of *sumatrensis* from specimens collected in helocrenes in Northern Sumatra (Lake Toba area). Hansen (1995) summarizes all knowledge about the natural history of the genus *Oocyclus*: "The species....inhabit hygropetric habitats". On Tioman *O. sumatrensis tiomanensis* is part of the so-called fluiculous fauna (Vaillant, 1956; Balke et al., 1997) inhabiting rock pools near waterfalls. The beetles sit among roots and green algae, under mats of floating grasses and in wet rock crevices.

Tribe Chaetarthriini Ganglbauer, 1904

***Amphiops coomani* d'Orchymont, 1926**

Amphiops coomani d'Orchymont. 1926: 246-248; d'Orchymont 1932: 707.

Material examined. - 3 ex., loc. 3 (CH, CFH, ZRC); 1 ex., loc. 4 (CH).

Distribution. - Vietnam, Thailand, Peninsular Malaysia, Sumatra, Java (d'Orchymont, 1932).

Ecology. - This is a lentic species and occurs among wet leaf litter in small puddles and pools fed by springs or streams.

Tribe Hydrophilini Ganglbauer, 1904

***Helochares* (s.str.) *fuliginosus* d'Orchymont, 1932**

Helochares fuliginosus d'Orchymont 1932: 689-690.

Material examined. - 10 ex., loc. 1 (CH, NHMW); 2 ex., loc. 2 (CH, NHMW); 1 ex., loc. 10 (ZRC).

Distribution. - Indonesia: Northern Sumatra, West Java (d'Orchymont, 1932). Malaysia: Tioman Island. First record for Peninsular Malaysia.

Ecology. - A lentic species. D'Orchymont (1932) described the species from specimens collected at the edge of small streams, waterfall areas and spring fed swamps in West Java (Botanical Garden of Bogor) and Northern Sumatra (Lake Toba area). The Tioman specimens were found in very small sun-exposed, rock pools and in the shallow water at the edge of slow flowing streams, among floating roots, grasses and rotten leaves.

***Helochares* (*Hydrobaticus*) sp.**

Material examined. - 1 ex., loc. 9 (ZRC).

Ecology. - The specimen was collected from partially submerged grass at the edge of a slow flowing stream.

***Sternolophus rufipes* (Fabricius, 1792)**

Hydrophilus rufipes Fabricius, 1792: 97
Sternolophus rufipes d'Orchymont, 1932: 707.

Material examined. - 1 ex., loc. 7 (ZRC).

Distribution. - India, Myanmar, Thailand, Vietnam, Peninsular Malaysia, Indonesia: Sumatra, Java, Bali; China, Japan, Philippines (d'Orchymont, 1932).

Ecology. - This is the most common species of the genus in Southeast Asia. *Sternolophus rufipes* is a lentic species living among wet leaf litter, floating vegetation and roots in all kinds of shallow, stagnant or slow flowing water.

FAMILY HYDRAENIDAE
Tribe Hydraenini Ganglbauer, 1904

***Hydraena* sp.**

Material examined. - 12 ex., loc. 4 (CH, NHMW).

Ecology. - Hygropetric species found in wet leaf litter in small rock pools fed by helocrenes.

Remarks. - These specimens may consist of one or more new species.

FAMILY SCIRTIDAE

***Prionocyphon* spp**

Material examined. - 10 ex., third instar larvae, loc. 3 (CKD).

Ecology. - Larvae of Malaysian Scirtidae are often found in large numbers in small forest pools, rock pools beside forest streams and water-filled tree hollows. The habitat must be rich in mud and rotten leaves. On Tioman the larvae of *Prionocyphon* occur in association with the dytiscids *Lacconectus corayi* and *L. krikkeni*. *Prionocyphon* larvae are possibly part of the diet of *Lacconectus*.

FAMILY LIMNICHIDAE

Material examined. - 1 ex., loc. 8 (ZRC); 81 ex., loc. 9 (ZRC).

Ecology. - In Malaysia and New Guinea the adults of Limnichidae have been collected along the margins of streams on wet sand or loam. On Pulau Tioman all adults are collected from partially submerged grass along river banks, slightly brackish water habitats during high tide.

Remarks. - The Tioman specimens may consist of one or more new species.

DISCUSSION

The present survey of water beetles on Pulau Tioman reveals eleven species of the families Noteridae, Dytiscidae, Hydrophilidae, Hydraenidae, Scirtidae and Limnichidae. Together with two undescribed species of the family Psephenidae (Jäch, in litt.) a total of thirteen species are known from the island so far. The Limnichidae, *Hydraena* and some specimens of *Helochares* have not yet been identified to species level and may belong to new species (Jäch and Schödl, pers. com.).

Canthydrus flammulatus, *Lacconectus krikkeni*, *Lacconectus corayi*, *Amphiops coomani*, *Sternolophus rufipes*, *Helochares fuliginosus* and *Helochares* and the larvae of *Prionocyphon* are restricted to lentic habitats. The *Hydraena* inhabits the edge of small and slow flowing helocrenes. *Oocyclus sumatrensis tiomanensis* is part of the fluiculous fauna and is recorded for the first time in Malaysia. None of the identified species recorded in this study is endemic to Pulau Tioman. With the exception of *O. sumatrensis tiomanensis*, all species are widespread in the Indo-Malayan region. The small size of the island, very few available lentic habitats and the steep and fast flowing streams with large boulders are responsible for the lack of a rich aquatic beetle fauna. We expect more species to be found on the island if more intensive collecting in other sites, especially in the area of Sungei Tioman. Sungei Mentawak and other streams and stagnant pools, is carried out for a longer period.

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