

**A COLLECTION OF DRAGONFLIES (ODONATA) MADE IN THE  
PERIYAR NATIONAL PARK, KERALA, SOUTH INDIA,  
IN JANUARY, 1988**

**by**

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**avec un**

**AVANT-PROPOS**

**par**

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*Dedicated to the memory of  
Professor S. KRISHNASWAMY*

## AVANT-PROPOS

*Les organisateurs du 9e Symposium International d'Odonatologie qui s'est tenu à Madurai avaient inscrit à notre programme une excursion post-symposium, comme à la S.I.O. il est de coutume à l'issue des réunions scientifiques et administratives.*

*C'est ainsi que nous avons passé deux jours enchanteurs (les 22 et 23 janvier 1988) dans le Parc National de Periyar où nous avons joui de l'environnement d'une nature restée dans son état originel, mis à part le lac de barrage aménagé dans les collines des Cardomomes à la limite des provinces de Tamil Nadu et de Kérala. Un autre agrément, non négligeable, a été le séjour dans un hôtel des plus confortables à proximité immédiate du lac.*

*L'attrait essentiel a été cependant la découverte, pour la plupart d'entre nous, d'une faune odonatologique particulièrement abondante et variée en cette saison. Inutile de dire que la collecte des libellules s'est avérée très fructueuse, car elle a fourni un matériel qui a permis d'allonger considérablement la liste des espèces reconnues en octobre 1987 par les organisateurs. Que ces derniers soient remerciés pour tous les efforts qu'ils ont déployés pour rendre le Symposium de Madurai et le post-symposium tour aussi agréables et intéressants que possible.*

*Le présent fascicule doit rester un témoignage de reconnaissance envers nos amis indiens.*

*François SCHALLER  
Président de la Société Internationale  
d'Odonatologie (S.I.O.)*

## INTRODUCTION

The report has been compiled on the basis of information contributed by the following who attended the post-symposium tour on 22 and 23 January, 1988, after the Ninth International Symposium of Odonatology held at Madurai Kamaraj University, southern India: P.S. Corbet (PSC), B. & M. Kiauta (B & MK), N. Michiels (NM), P.L. Miller (PLM), J. Ott (JO), G. Rehfeld (GR), G. & V. Rüppell (G & VR), W. Schneider (WS), J. & R.I. Silsby (J & RS) and C. Utzeri (CU).

## THE PERIYAR NATIONAL PARK

The Periyar National Park is situated in the eastern part of Kerala, close to the border with Tamilnadu, in southern India (ca 9° 35' N; 77° 10' E). It lies among the Cardamom Hills on the eastern side and towards the South end of the Western Ghats mountain range. This is a region of high rainfall which was once densely forested and supported a rich variety of wildlife. Now, however, much of the natural forest has disappeared as a result of heavy population and agricultural pressure, except within the Park.

The River Periyar originally flowed North-West to reach the Kerala coast near Cochin, but in 1895 a dam was constructed across the river which created a large lake by inundating several jungle-filled valleys. The river was made to flow northwards and then eastwards to join the River Vaigai and so it now eventually reaches the Indian Ocean. The dam was originally built to help irrigate the parched rice-growing regions of Tamilnadu. It now also allows the re-routed river to generate hydro-electric power where it descends the steep eastern escarpment, flowing through large 2 km-long pipes between Kumily and Kurumuti.

In 1935 an animal sanctuary was proclaimed round the lake by the Maharajah of Travancore who owned the whole region. He appointed a game warden to supervise conservation, and he built a small palace on an island in the lake, the palace now being the Lake Palace Hotel.

To this day the Park provides a fascinating mixture of semi-natural habitats including the lake, dense valley jungle and open grasslands with

many hills. The Park is famous not only for its elephants (800-1000) and tigers (over 40), but also for gaur (Indian bison), sambar (deer), wild boar, Nilgiri langurs and lion-tailed macaques. At present the region is under threat from the rapidly expanding human population and there is encroachment into the Park from grazing and cultivation, and from the planting of eucalyptus trees. Poaching is rife and only a few of the male elephants now bear tusks.

Within the Park the altitude varies from 900-1830 m. Mean maximum temperatures in December are 24-30° C, and in May they are 26-32° C. The region receives plenty of rain during the S.W. monsoon between June and September and some also from the N.W. monsoon between September and November.

### TERRESTRIAL HABITATS

The total area of the Park is 770 sq km, with an inner core reserve of about 350 sq km to which the public is not normally admitted. The main terrestrial habitats can be divided as follows:

- (1) Open grasslands studded with fire-resistant vegetation on the numerous small steep hills.
- (2) Deciduous forest dominated by *Terminalia* and *Tectona grandis* (teak).
- (3) Semi-evergreen forest along wet streams.
- (4) Climax forest, the sholas or evergreen forest of the valleys, with many huge trees.

### AQUATIC HABITATS

#### The lake

The lake covers an area of about 55 sq km and stretches 11 km from North to South. It is complex in shape being formed from a number of interconnected drowned valleys. The vegetation is cut back by some tens of metres around most parts of the lakeshore, creating an open grassy area, attractive to adult Odonata.

The large fluctuations of lake level (ca 10 m or more) reduce the amount of permanent fringing aquatic vegetation. Also the lake margin shelves steeply in many parts so the zone of shallow water is narrow. Plenty of fish life is to be seen in the shallows in some regions where there is abundant submerged aquatic vegetation. The dead trunks of drowned trees stand above the water in several regions providing perches for kingfishers, cormorants and, no doubt, dragonflies. The lake level drops considerably in March and April, but it is high in the winter months following the monsoon.

#### Canal

A swiftly flowing canal with steep stony banks leaves the lake and passes northwards towards Kumily and the hydroelectric power station.

## Ponds

At the North end of the lake, small arms or culs-de-sac of water are cut off when the level falls and they remain as ponds providing habitats with a rich aquatic flora where several dragonfly species breed.

## Streams

The rivers Mullavar and Periyar run from the South to enter the East end of the lake. They are joined by a number of smaller densely shaded forest streams which form swampy areas in some places.

## DRAGONFLY SURVEY

### Areas explored

- (A) The lakeshore around Thekkadi and the end of the peninsula towards the Boat Landing and Aranya Nivas Hotel.
- (B) The region northwards towards Kumily along the canal where there are several ponds varying in size from 5 m to 50 m.
- (C) More deeply into the forest where several streams were encountered, and in particular a stream about 2 km east of the Aranya Nivas Hotel (GR).

### Species List

All specimens observed and collected were adults unless otherwise stated. The number of specimens collected is given first, with the initials of the collector in brackets. Brief field notes are then added for some species, together with a note from FRASER's (1933-1936) account. The classification of DAVIES & TOBIN (1985) is followed.

### CALOPTERYGIDAE

#### *Neurobasis chinensis* (Linnaeus)

1 ♂ at forest stream (WS).

Occurs throughout India breeding in montane and submontane streams (FRASER, 1934).

### CHLOROCYPHIDAE

#### *Rhinocypha bisignata* Selys

1 ♂ at stream (NM and WS); - 20 ♂, 5 ♀ along 300 m of stream (GR).

Males perched in sunspots on twigs above water; territorial flights and interactions with intruders were common. During courtship, males hovered in front of females showing white tibiae and flickering red spots on wings. Receptive females flew to bankside vegetation where copu-

lation occurred, lasting 32-34 sec. Females then oviposited into drift wood (GR).

This species is the only representative of its genus in S. India – a submontane and montane insect, widely distributed and common in the Palani and Nilgiri hills, breeding between 1000 and 2000 m (FRASER, 1934).

#### LESTIDAE

##### *Lestes elatus* Hagen

1 ♂ near lake (WS).

The commonest species of the genus, confined to peninsular India and found throughout the year in the South, hiding in jungle scrub during dry seasons (FRASER, 1933).

#### COENAGRIONIDAE

##### *Agriocnemis pygmaea* (Rambur)

3 ♂, 2 ♀ at ponds (WS); – 1 ♀ at lake (B & MK).

Very abundant.

This species has a wide distribution and is found throughout India. It is one of the smallest Indian damselflies (FRASER, 1933).

##### *Ischnura aurora* Brauer

4 ♂ at ponds (WS); – 1 ♂ at lake (B & MK); – 1 photo (J & RS).

Very abundant at ponds where many males were seen mating with teneral females, some of which were hardly able to fly, as reported by ROWE (1978).

Very widely distributed (FRASER, 1933).

##### *Ischnura senegalensis* (Rambur)

4 ♂ at ponds (WS); – 1 ♂ at lake (B & MK).

Found throughout India from sea level to > 2000 m, but not common (FRASER, 1933).

##### *Pseudagrion decorum* (Rambur)

5 ♂, 2 ♀ at ponds and lake (WS); – 7 ♂, 2 ♀ at lake (B & MK).

Common at Periyar.

Widely distributed throughout India, an insect of the plains with few records from montane regions. FRASER (1933) found a few specimens at Coorg at > 1000 m.

*Pseudagrion malabaricum* Fraser

7 ♂, 1 ♀ at ponds and lake (WS); – 2 ♂ (CU); – 1 ♂ (PSC); – 12 ♂, 3 ♀ at lake (B & MK).

Common at Periyar.

Found throughout the Western Ghats in submontane and montane areas. Locally common. FRASER (1933) found it to be common and abundant in Coorg.

*Pseudagrion rubriceps* Selys

1 ♂ by lake (CU).

Common at Periyar. Wing displays observed in perched males when approached by conspecifics (CU).

Widely distributed in the plains and submontane regions (FRASER, 1933).

## PLATYCNEMIDIDAE

*Copera vittata* (Selys)

1 ♂ at forest stream (WS).

Widely distributed in S. Asia (FRASER, 1933).

## GOMPHIDAE

*Paragomphus lineatus* (Selys)

1 ♂ on canal (CU).

A few were taken near the canal, and many on the Kurumati river at the foot of the hills (B & MK).

Found throughout India, breeding in both still and running waters (FRASER, 1934).

## LIBELLULIDAE

*Acisoma panorpoides* Rambur

1 ♂ at stream (GR).

A few were seen perching low on vegetation near the lake margin.

Widely distributed in western India, never far from water (FRASER, 1933).

*Brachythemis contaminata* (Fabricius)

1 ♂, 1 ♀ near lake (WS); – 1 ♂ (PSC); – 4 ♂, 2 ♀ near lake (B & MK); – 1 photo (J & RS).

Many seen at lake, ponds and most commonly along the canal. Much

reproductive activity was seen around the ponds and along the canal. Males competing for territories sometimes flew in parallel with rivals, facing same way and gradually approaching each other. Hovering females oviposited onto emergent vegetation at water level while guarding males hovered close to them. Active until after sunset.

This species occurs throughout the plains of India being very common and found everywhere along borders of streams and rivers (FRASER, 1936).

### *Crocothemis s. servilia* (Drury)

2 ♂, 2 ♀ near lake (WS); – 4 ♂, 1 ♀ near lake (B & MK); – photos (J & RS).

Several males at stream (GR). It was common with many being seen along the shores of the lake. Yellow immature individuals commonly perched among mature red males close to water edge.

A very widespread species (FRASER, 1936).

### *Diplacodes trivialis* (Rambur)

1 ♂, 1 ♀ near lake (WS); – 4 ♂, 4 ♀ near lake (B & MK).

Several males at the stream (GR). Very abundant on lake margins and typically seen perching on ground or low on vegetation, or flying very close to the ground. Exaggerated 'obelisk' position observed in some individuals perched on ground, with abdomen being held 'beyond the vertical' (i.e. with dorsal surface of abdomen towards ground) (CU).

FRASER (1936) describes it as probably the commonest dragonfly in India, occurring from the plains to > 2000 m.

### *Neurothemis fulvia* (Drury)

2 ♂ at forest stream (WS); – 1 ♂ near lake (CU); – 1 ♂ near lake (B & MK).

Several hundred males and females perching on low vegetation in sunspots (GR). Many immature and mature individuals were seen in the vicinity of the lake and ponds.

This species occurs throughout India in wet and semi-wet areas and sometimes forms large colonies at the edges of jungle (FRASER, 1936).

### *Neurothemis t. tullia* (Drury)

1 ♂, 1 ♀ near ponds (WS); – 1 ♂ (PSC); – 1 ♂ at marshy stream close to lake (B & MK); – 2 ♂, 1 ♀ (GR); – photos (J & RS).

Abundant at ponds and lake inlets. It became reproductively active in the middle of the day when males sat prominently on vegetation near or over water. Aerial copulations were brief. Oviposition occurred among



emergent vegetation and lasted 6-7 min. with guarding male flying 10 cm behind female. The female perched several times during each oviposition bout and the guarding male perched alongside.

The species occurs throughout peninsular India in large colonies near swamps (FRASER, 1936).

*Orthetrum pruinosum neglectum* (Rambur)

1 ♂ near lake (WS); — 1 ♂ near lake (B & MK).

Common along the lake margin and at streams. Territorially active males commonly perched on rock or bare soil. After copulation, the male sometimes rammed the female several times while she perched or hovered before starting to oviposit. An ovipositing female flicked water droplets towards or onto the bank while being closely guarded by a male.

According to FRASER (1936) the species occurs throughout India, being one of the commonest dragonflies of the plains and it is met with everywhere up to 2000 m.

*Orthetrum s. sabina* (Drury)

1 ♂ near lake (WS); — 6 ♂, 3 ♀ near lake (B & MK); — photos (J & RS).

Commonly seen near the lake (GR). Copulations varied in length from 2 to 50 min.

Very widespread and common (FRASER, 1936).

*Palpopleura s. sexmaculata* (Fabricius)

1 ♂, 1 ♀ at marshy stream close to lake (B & MK); — photo (J & RS).

A few seen near small streams.

A very widely distributed and rather variable species occurring in large colonies near marshy ground and bamboo jungle where it breeds (FRASER, 1936).

*Pantala flavescens* (Fabricius)

3 ♂, 1 ♀ by lake (WS); — 1 ♂ by lake (CU); — 1 ♂, 2 ♀ by lake (B & MK); — photos (J & RS).

Numerous in the vicinity of the lake. Large feeding swarms gathered close to the lake in evening, with both mature and immature individuals represented. Occasional copulating pairs were seen but no territorial behaviour or oviposition was observed. Many perched by hanging vertically among bushes, particularly towards evening but also sometimes during the day.

FRASER (1936) describes this species as emerging in southern India at the end of September and migrating until late November.

*Potamarcha congener* Rambur

1 ♂ near lake (WS); - 1 ♂ by lake (B & MK).

Not common at Periyar, a few being seen by small streams and ponds near Thekkadi.

A widely distributed and common insect throughout India with habits, according to FRASER (1936), similar to those of *Cratilla*: large colonies are often met with in patches of jungle near tanks.

*Tholymis tillarga* (Fabricius)

6 ♂ by lake (WS); - 1 ♂, 3 ♀ [2 of which were newly emerged and perched beside exuviae] (PSC); - 1 ♂ by lake (B & MK).

Very abundant at the lake. Numerous males patrolled along the lake margins towards dusk and intense sexual activity was witnessed. One female was seen to mate 3 times in rapid succession, copulations being in the air and lasting 10-20 s (CU). Oviposition was by dipping onto horizontal floating pieces of vegetation to which egg batches stuck. Fish were seen to snap at ovipositing females, and small fish sucked up their eggs. During the day, many perched by hanging vertically among bushes in the shade, 20-50 m from the lake side, where *Pantala* also perched. Individuals were observed to feed during the day in shaded areas among trees and also over the water at sunset.

The species is widespread throughout India (FRASER, 1936).

*Tramea basilaris burmeisteri* Kirby

1 ♂, 2 ♀ near lake (B & MK); - 1 ♀ (WS); - 1 ♀ (CU).

Several seen (GR). Pairs usually oviposited in tandem with female intermittently released and re-clasped, but sometimes the male guarded without contact.

This is a common species found throughout India up to 2000 m (FRASER, 1936).

*Tramea limbata* (Desjardins)

1 ♂, 1 ♀ by lake and ponds (WS); - 1 ♂ by lake (B & MK).

Males sometimes flew low over water making dipping movements which resembled the oviposition movements of females. Oviposition as in *T. basilaris*.

Widely distributed in India (FRASER, 1936).

*Trithemis aurora* (Burmeister)

2 ♂, 1 ♀ near lake (WS); - 2 ♂ by lake (CU); - 1 ♂ (PSC); - 8 ♂, 6 ♀ near

lake (B & MK); - 1 ♂ (GR); - photo (J & RS).

Very abundant along the well vegetated parts of the lake shore. Several were newly emerged (G & VR). Much reproductive activity was observed.

This species is found throughout India up to 1500 m (FRASER, 1936).

### *Trithemis festiva* (Rambur)

1 ♂ by lake (WS); - 1 ♂ (PSC); - 1 ♂ by lake (B & MK); - 1 ♂, 1 ♀ in cop. (GR).

This species occurs commonly throughout the plains of India, breeding in still water (FRASER, 1936).

### *Trithemis pallidinervis* (Kirby)

1 ♂ by lake (WS); - 1 ♀ by lake (CU); - 1 ♂ (PSC); - 1 ♂ by lake (B & MK); - photo (J & RS).

Many newly emerged individuals seen. Males perched on exposed vegetation on lake margin, particularly on promontories, facing into the breeze. No reproductive activity observed.

A common insect throughout India except in desert areas, breeding only in stagnant waters and usually in marshy zones (FRASER, 1936).

### *Urothemis signata* Rambur

1 ♂ (GR).

It occurs throughout peninsular India (FRASER, 1936).

### *Zyxomma petiolatum* Rambur

2 ♂ patrolling over an artificial densely shaded pond ca 50 m from the lake, about 30 min before sunset (WS, JO & PLM).

It occurs throughout India but not above 1000 m. FRASER (1936) reports it from Coorg, the Nilgiris and other regions. It is well known for its crepuscular habits.

## DISCUSSION

Most of the species observed are common and widely distributed, although *Ischnura senegalensis* and *Pseudagrion decorum* are reported by FRASER (1933) not to be common in submontane areas. The paucity of observed species contrasts with the richness of what has been observed by FRASER (1933-1936) in this region of South-West India, although at unstated times of the year.

Some additional species were seen on a visit to the same region from October 25th to 29th, 1987 (PLM):

*Ictinogomphus rapax* (Rambur) — Many males were observed to perch at approx. 30-40 m intervals along the lakeshore interacting aggressively. No mating or oviposition was seen. No adult was seen in January.

*Anax guttatus* (Burmeister) — Abundant and sexually active at the ponds. None seen in January.

*Macromia* sp. — Large exuviae of one specimen found ca 5 m from lake edge. No adult seen.

*Cratilla lineatus calverti* Foerster — 1 ♀ caught among trees 30 m from lake margin. None seen in January.

*Orthetrum* sp. (*taeniolatum*?) — One seen near lake margin.

*Hydrobasileus croceus* (Brauer) — 1 ♂ caught at lake margin. A few males were seen patrolling along the lake shore, behaving like *Tramea basilaris*. None seen in January.

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