ODONATA COLLECTED FROM GUANACASTE NATIONAL PARK, COSTA RICA, JULY 1988

S.J. BROOKS

Department of Entomology, British Museum (Natural History), Cromwell Road, London, SW7 5BD, United Kingdom

Abstract — 86 spp. were collected during July 1988 in Guanacaste National Park, north-west Costa Rica. *Argia cuprea* Hagen, *A. eliptica* Selys, *Philogenia peacocki* Brooks, *Palaemnema baltodanoi* Brooks, *Epigomphus echeverrii* Brooks and *Phyllogomphoides burgosi* Brooks had not previously been recorded from Costa Rica. The distributions of the Odonata species within the Park are briefly discussed.

Introduction

The Odonata fauna of Costa Rica is probably the best known in Central America. It was the subject of intensive study by Calvert in the first thirty years of this century (e.g. CALVERT, 1901-1908) and subsequent workers have built on this. About 250 species are now known from the country (PAULSON, 1982). Most of these occur throughout Central America but there are also several endemic species.

The species of dragonflies listed below were all collected during a visit to Guanacaste National Park, north-west Costa Rica, in July 1988. The Park covers about 700 km^2 and stretches from the Pacific Coast to the Cordillera de Guanacaste in the east. The section of the Park to the west of the Pan-American Highway comprises regenerating tropical dry forest. To the east of the Highway the ground rises towards two volcanoes, Volcan Orosi and Volcan Cacao, which form the northern limit to the range of mountains running most of the length of Costa Rica. On the slopes of these volcanoes the dry forest is replaced by rain

forest and, towards the summit of Volcan Cacao, by cloud forest.

There is no permanent water in the dry forest but by July, when the rains have usually been underway for about two months, many temporary pools form and the streams and rivers are flowing with a few feet of water. On the volcanoes there are many permanent rivers and streams and in cleared pasture at the edge of the forest several temporary pools are present. The Park, therefore, provides a wide range of biotopes suitable for Odonata which gives rise to a very rich fauna. The field stations on the volcanoes were only opened in 1986 and this represents the first major collection of Odonata from these localities.

Localities

Estacion Pitilla, N side of Volcan Orosi, 680 m:

(1) Fast-flowing forest streams in semi-shade
(2) Slow-flowing forest streams in deep shade
(3) Slow-flowing marshy seepage in shaded forest
(4) In forest away from water
(5) Unshaded marshy seepages in cleared pasture at edge of forest
(6) Unshaded temporary pools in cleared pasture at edge of forest

Estacion Maritza, W side of Volcan Orosi, 600 m:

(7) Fast-flowing, semi-shaded forest rivers (including Rio Tempesquito)
(8) Slow-flowing, shaded forest streams
(9) In forest away from water
(10) Fast-flowing, unshaded stream in cleared pasture at edge of forest

Estacion Mengo, W side of Volcan Cacao, 1100 m:

(11) Small, fast-flowing forest streams in deep shade
(12) Fast-flowing forest streams in semi-shade
(13) Marshy seepage in deep shade

Estacion Santa Rosa, 300 m (dry forest):

(14) Temporary unshaded pools
(15) Temporary, semi-shaded streams (including Quebrada Costa Rica)
(16) Large, unshaded temporary river with shallow riffle and deep pooled area (Rio Poza Salada).

In order to build up as complete a picture as possible of the habitats of each species I collected a sample of every species present at each locality visited.

Species

Polythoridae *Cora marina* Sel.: 1, 9, 7; — *C. chirripa* Calv.: 11, 12.

Calopterygidae — *Hetaerina capitalis* Sel.: 1, 5, 7, 9, 10; — *H. cruentata* (Ramb.): 1, 5, 9, 10, 12; *H. majuscula* Sel.: 11, 12; *H. miniata* Sel.: 1, 4.

Lestidae — *Archilestes grandis* (Ramb.): 15; — *Lestes henshawi* Calv.: 6, 14; — *L. sigma* Calv.: 14.

Perilestidae — *Perissolestes remotus* Will. & Will.: 9.

Megapodagrionidae — *Heteragrion albifrons* Ris: 1, 2, 8, 12; — *H.erythrogastrum* Sel.: 1, 6, 9; — *H. majus* Sel.: 12; — *Philogenia carrillica* Calv.: 1, 3, 4, 12, 13; *Philogenia peacocki* Brooks: 11.

Pseudostigmatidae — *Mecistogaster modesta* Sel.: 4; — *M. ornata* Ramb.: 9; — *Megaloprepus caerulatus* (Dru.): 4, 5.

Platystictidae *P. baltodanoi* Brooks: 11; — *Palaemnema gigantula* Calv.: 3; *P. melanota* Ris: 1.

Protoneuridae — *Neoneura amelia* Calv.: 16; — *N. esthera* Will.: 16; — *Protoneura amatoria* Calv.: 16; — *Psaironeura remissa* (Calv.): 1, 2, 3.

Coenagrionidae — *Acanthagrion trilobatum* Leon.: 14, 15, 16; — *Anomalagrion hastatum* (Say): 14, 16; — *Argia chelata* Calv.: 12, 13; — *A. cupraurea* Calv.: 7, 13, 16; — *A. cuprea* Hag.: 1; — *A. eliptica* Sel.: 5; — *A. indicatrix* Calv.: 5; — *A. johanella* Calv.: 5; — *A. oculata* Sel.: 4; — *Argia* sp. nr *oculata* Sel.: 15; — *A. popoluca* Calv.: 3; — *A. pulla* Hag.: 14, 16; — *A. rogersi* Calv.: 12; — *A. tezpi* Calv.: 14, 15, 16; — *A. translata* Hag.: 15; — *A. ulmeca* Calv.: 1, 8, 12; — *A. variabilis* Sel.: 12, 13; — *Enallagma civile* (Hag.): 6, 14; — *Ischnura capreola* (Hag.): 14, 16; — *I. ramburi credula* (Hag.): 14; — *Leptobasis vacillans* Selys var. *atrodorsum* Calv.: 14; — *Telebasis salva* (Hag.): 6.

Aeshnidae — *Aeshna psilus* Calv.: 6; — *Anax amazili* (Burm.): 6, 7, 14; — *Coryphaeschna perrensi* McL.: 6; — *Gynacantha nervosa* Ramb.: 14, 15; — *Triacanthagyna*

carribea Will.: 15.

Gomphidae — *Epigomphus armatus* Ris: 2, 3, 4; — *E. echeverrii* Brooks: 7, 12; — *E. subobtusus* Sel.: 12; — *E. tumefactus* Calv.: 1, 5, 8, 9; — *Erpetogomphus tristani* Calv.: 7; — *Perigomphus pallidistylus* (Belle): 1, 7, 9; — *Phyllogomphoides bifasciatus* (Sel.): 15; — *P. burgosi* Brooks: 2.

Corduliidae — *Neocordulia batesi longipollex* Calv.: 9.

Libellulidae — *Brechmorhoga praecox* (Hag.): 1, 7, 9, 10, 16; — *B. rapax* Calv.: 1, 4, 7, 9, 11, 12; — *B. vivax* Calv.: 1, 9; — *Cannaphila insularis funerea* (Charp.) 2, 4, 5; — *Dythemis multipunctata* Kirby: 15; — *D. sterilis* Hag.: 14, 15, 16; — *Erythrodiplax castanea* (Burm.): 5; — *E. funerea* (Hag.): 6, 14, 15; — *E. fusca* (Ramb.): 5, 6, 14; — *E. umbrata* (L.): 14; — *Lepthemis vesiculosa* (Fabr.): 14; — *Libellula croceipennis* Sel.: 10; — *L. herculea* Karsch: 4, 5, 8; — *Macrothemis inequiunguis* Calv.: 1; — *M. musiva* Calv.: 5; — *M. pseudimitans* Calv.: 15; — *Micrathyria atra* (Martin): 6, 14; — *M. ocellata* Martin: 14; — *Orthemis ferruginea* (Fabr.): 5, 6, 10, 14; — *O. levis* Calv.: 14, 15; — *Pantala flavescens* (Fabr.): 1, 6, 10, 14; — *Perithemis domitia* (Ramb.): 6, 14; — *Tauriphila australis* (Hag.): 1; — *Tramea abdominalis* Ramb.: 6, 14; — *T. claverti* Mutt.: 6, 14.

Discussion

In the present collection six species were previously unknown from Costa Rica but only two of these (*Argia cuprea* Hagen and *A. eliptica* Selys) had previously been described, the other four (*Philogenia peacocki* Brooks, *Palaemnema baltodanoi* Brooks, *Epigomphus echeverrii* Brooks and *Phyllogomphoides burgosi* Brooks) were new to science and have subsequently been described (BROOKS, 1989). This suggests that most of the wide-ranging Central American species that occur in Costa Rica have already been recorded. However, it is also apparent that there must be many endemic species present, some of which have a very restricted distribution within the country, particularly those in the genera *Palaemnema, Philogenia* and *Epigomphus*. More of such species may be discovered by collecting in other upland areas that have seldom been visited by odonatologists. In addition, several of the species, such as *Erpetogomphus tristani, Perigomphus pallidistylus, Neocordulia batesi longipollex, Palaemnema gigantula* and *Argia rogersi*, have rarely been collected before, further indicating the importance of the Park as a refuge for Odonata with restricted distributions.

Another striking aspect of the data is the low number of species that occur in the vicinity of more than one of the field stations. Only 13 species (15%) were found both at Santa Rosa, in the dry forest sites, and in the wet forest on the volcanoes. These tended to be widespread species which inhabit exposed, temporary pools such as *P. flavescens, Tramea* spp. and *E. civile*.

Altogether, 24 species were found exclusively at Santa Rosa (64% of the Santa Rosa total) and most of these were common Central American taxa. However, there were two distinct dry forest faunas. One was typified by many of the libellulids and *Ischnura* spp. which were to be found flying over, and breeding in, the temporary pools (locality 12), some of which were quite large but others no more than water-filled tyre-tracks. Many of these species are migrants and presumably they fly into the Park after the rains have arrived. A second suite of species occurred only at the temporary streams and rivers (localities 13 and 14). The streams were shallow, with gravelly substrate, often with tree-shade and generally amounted to a series of pools linked by a trickling runnel. Here there were *Argia* spp., *Archilestes grandis, Neoneura* spp. and *Phyllogomphoides bifasciatus*. Few, if any, of these species have been recorded as migrants and it is unlikely that they travelled far to get to the streams. The biologies of such species are poorly known and it is uncertain how they pass the dry season. The fact that they were not found further upstream on the volcanoes suggests that they do not spend the dry season in the rain forest as sphingids have been shown to do in the Park (JANZEN, 1984).

Similarly, much of the odonate fauna on the volcanoes appeared to be sedentary. Of the 49 species which were collected exclusively from the volcanoes only 12 species (24%) were found at more than one of the three field stations. The fauna at Pitilla and Maritza was fairly similar, as might be expected, since both sites were situated on the same volcano at a similar altitude. Pitilla supported a richer fauna than Maritza

but the biotopes were also more varied at Pitilla. Of the species which were collected at Pitilla, 23 (51%) were found nowhere else and at Maritza 5 species (21%) were restricted to that site. Although Mengo supported the fewest species (only 15 were collected at this field station), 9 species (60%) were found only there. This included three species which were previously undescribed. Apart from its higher altitude and the fact that it is on a different volcano, Mengo also differed from Pitilla and Maritza in having much smaller, more heavily shaded streams. All these factors, and the lack of species favouring open temporary pools, probably contributed to its markedly different suite of species.

As at Santa Rosa, many of the volcano species were restricted to a particular kind of biotope. At Pitilla, for example, the open, marshy seepages and temporary pools (localities 4 and 5) at the forest edge supported such species as *Argia johanella, Telebasis salva* and *Erythrodiplax castanea* which did not occur in the forest. Other species, such as *Cannaphila insularis funerea* breed in such biotopes but females and immatures were frequently encountered in the forest away from water. Typical of the shady, slow-flowing forest streams were *Psaironeura remissa* and *Heteragrion albifrons* and at the head waters of the forest streams, where shallow water trickled through deep leaf-litter, *Philogenia* spp. could be encountered. Typical forest stream species, particularly where patches of sunlight penetrated the canopy, were *Hetaerina* spp., *Epigomphus* spp., and *Cora* spp.

Several species were encountered in the forest at Pitilla and Maritza away from water. Of these, the Pseudostigmatidae and possibly *Perissolestes remotus*, are tree-hole breeders and were only found in this biotope. Only two males and one female of *Argia oculata* were collected and all three were found on separate occasions in different parts of the forest away from water, leading one to speculate whether this too is a tree-hole breeder.

Three very closely related species of *Argia* (*A. oculata, A. eliptica*, and a third species referred to as "min-blue" [Garrison, in litt.] which have sometimes been treated as synonymous were all present in the Park. It is of interest to note that each taxon occupied a different biotope, although occurring practically sympatrically, suggesting that they might be valid species. The female specimen listed as *Coryphaeschna perrensi* differed from the descriptions of that species in having a uniformly green thorax, instead of the usual red/brown, was smaller with a shorter pterostigma, had predominantly black wing venation instead of brown, and lacked the black markings on the dorsum of the abdomen. It may, therefore, represent an undescribed species. The specimens listed under *Argia cupraurea* may also be a complex of two species since those from Maritza differed from Santa Rosa specimens in details of the male appendages and the extent of blue on the male abdomen.

From this note it is apparent that Guanacaste National Park supports a very rich odonate fauna since 34% of the species occurring in Costa Rica were collected in the Park during one month. With more collecting throughout the year it is possible that this total could reach 50%. Two factors probably contribute to this diversity. One is the wide range of biotopes suitable for Odonata provided in the Park, and the second is due to the narrow habitat requirements of many of the odonate species.

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