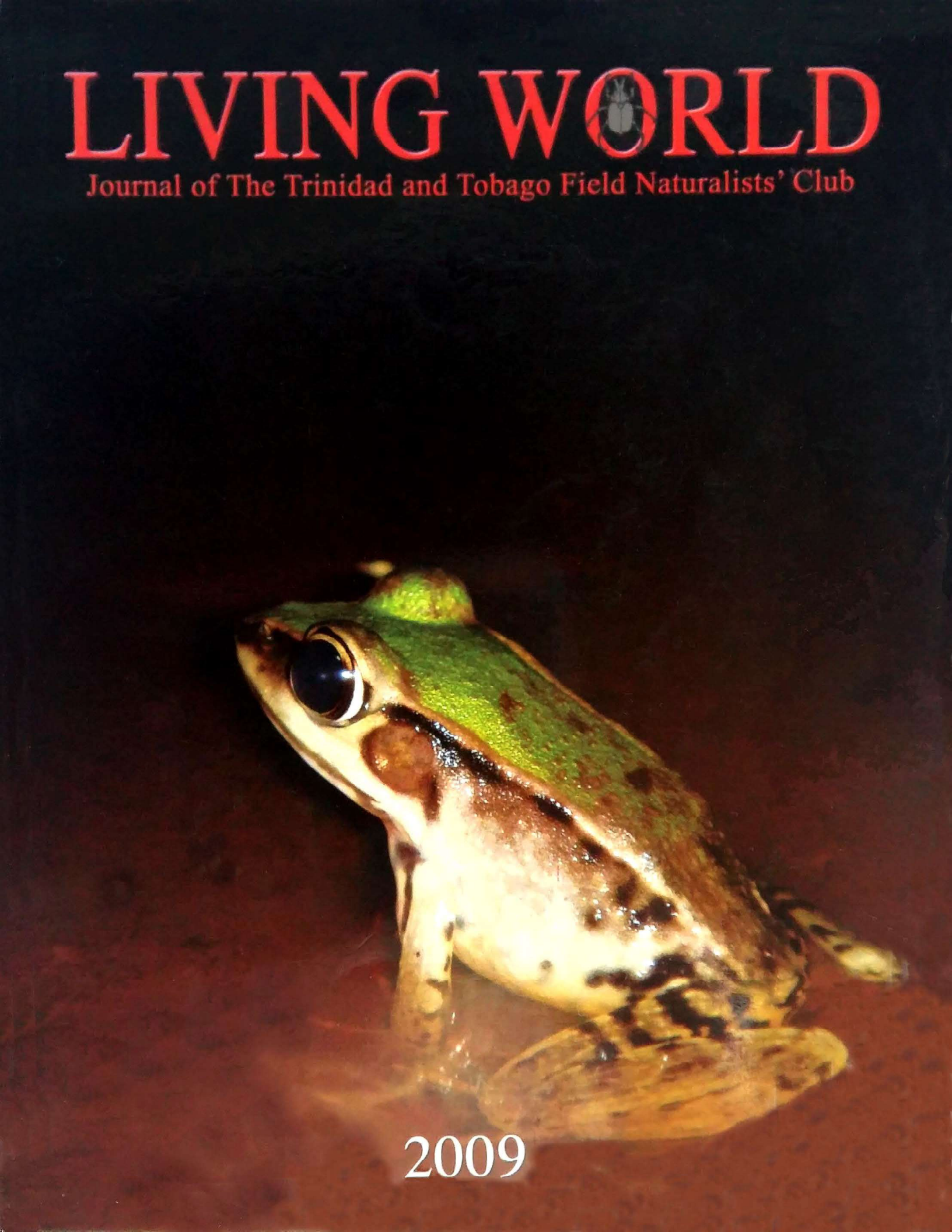
LIVING WORLD

Journal of The Trinidad and Tobago Field Naturalists' Club



2009

THE TRINIDAD AND TOBAGO FIELD NATURALISTS' CLUB

The Trinidad and Tobago Field Naturalists' Club was founded on 10 July, 1891. Its name was incorporated by an Act of Parliament (Act 17 of 1991). The objects of the Club are to bring together persons interested in the study of natural history, the diffusion of knowledge thereof and the conservation of nature.
Monthly meetings are held at St. Mary's College on the second Thursday of every month except December.
Membership is open to all persons of at least fifteen years of age who subscribe to the objects of the Club.

Mission Statement
To foster education and knowledge of natural history and to encourage and promote activities that lead to the appreciation, preservation and conservation of our natural heritage.

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The Honorary Secretary
P.O. Box 642, Port of Spain
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E-mail: *admin@ttfnc.org*
Website: *www.ttfnc.org*

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Editorial

In this issue we continue to report on the series of studies by Matthew Cock on the skipper butterflies of Trinidad and on the freshwater macroinvertebrates in the Caribbean islands by David Bass. Matthew Cock's, so far, 16 part series concentrates on the Hesperiinae, Group J, *Vettius-Naevolus.* In this group, he gives the taxonomy, history and biology of the genera *Vettius, Turesis, Eutychide, Onophas* and *Naevolus.* He also writes on the two species of *Pseudautomeris* which occur in Trinidad and notes that *P. lata* is a new record for Trinidad.

David Bass reports on the freshwater macroinvertebrates of the Cayman Islands where he collected 72 species, many being reported for the first time for the islands.

Jo-Anne Sewlal also reports on her preliminary study on the collection of spiders from Grenada where she noted 22 species were present, representing ten families.

There are seven Nature Notes in this issue of the Journal: three are by Stevland Charles on reptiles, one by G. White and S. Ali on the status of *Lithobates palmipes* in south-eastern Trinidad where they found it not rare as previously noted by other authors. Jo-Anne Sewlal added two families of spiders known to exist on Trinidad. Two historical notes complete the series of Nature Notes, one by John and Margaret Cooper on *Pseudosphinx tetrio,* while Reginald Potter contributes a note on a toad eating a chicken, the report being extracted from his grandfather's diary of 1889.

Martyn Kenefick gives the 2008 report from the Trinidad and Tobago Rare Birds Committee, while Ian Lambie and Vishnu Debie report on the population of Oilbirds which were counted at the Dunstan Cave, Asa Wright Nature Centre during the annual Christmas bird counts for the period 1969 to 2008.

Jerry Dave Hardy first visited Tobago in the early 1960s and became enchanted with the island and its fauna. C. K. Starr and J. N. Sewlal tell the story of this man and his work on the island.

There are four book reviews in this issue. Two books by Julian Kenny, *The Biological Diversity of Trinidad and Tobago* and *Orchids of Trinidad and Tobago,* are reviewed by Julian Duncan while Christopher Starr reviews Richard ffrench's book on *A Naturalists' Year*. A review of the *Catalogue of the Hostplants of the Neotropical Butterflies* by Beccaloni *et al.* is reviewed by Matthew Cock.

Two young Trinidadian biologists, Floyd Lucas and Karl Ramjohn, died in a tragic boating accident in January, 2009 while carrying out a marine biological survey in the south coast of Trinidad and Kevin Mahabir pays tribute to them in a short article.

On Editorial matters, I welcome Graham White as Assistant Editor of the Journal. Since we do not provide reprints to authors, we have instead provided pdfs of the articles to each author and we will continue to do so in the future.

In the first paragraph of the Editorial of the 2008 issue of the Journal, reference was made to the year 2008 when in fact the year should have been given as 2007. I apologise for the oversight.

EST

Cover Photograph

Lithobates palmipes (Spix), previously named *Rana palmipes*, is rarely seen in Trinidad. This specimen was photographed by Saiyaad Ali at a pond near Austin South Road, west of Chatham, on 28 July, 2007.

(See Nature Note on Page 44)

Guest Editorial: Rehabilitating Our Forests

The forests of Trinidad and Tobago form part of the tropical rainforest belt that straddles the equator. A significant part of these forests have been degraded by quarrying and oil and gas exploration. Companies operating in the oil and gas sector bear a special responsibility for the rehabilitation of these forests because of their carbon sinking potential. The companies, all big players in the international oil and gas sector, can contribute substantially to slowing down global warming by engaging in reforestation activities right here in Trinidad and Tobago.

Why Trinidad and Tobago for energy-based company reforestation? The short answer is that the companies are here! They are fully established in this country, lured by the very substantial hydrocarbon reserves, government stability, intelligent managerial and labour resources, a good investment climate and, of course, the potential for handsome profits in oil and gas exploration, production and marketing.

Again, why Trinidad and Tobago, a small oil and gas producer when compared with the likes of Iraq, Iran, Kuwait, Saudi Arabia, Nigeria and Venezuela? Another short but rather startling answer! Because at 16.8 thousand metric tons of CO_2 per 1000 population in 2000, this country was in the top ten of CO_2 emitters in the world, ranking 7th after the likes of Qatar, United Arab Emirates, Kuwait, Bahrain, U.S.A. and Luxembourg.

And why a small island developing state like Trinidad and Tobago with its limited land mass? The answer is not short, because it has to do not so much with size, but with the country's location between the Tropics of Cancer and Capricorn and the complex relationship between tropical forest biodiversity and carbon sequestration.

Everyone knows that there is a tendency for the numbers of species of organisms to increase as one travels either from the north or the south towards the equator. The richest forests in North America, those of the southern Appalachians or the Gulf Coast support at most 50 to 60 species, whereas any respectable tropical forest contains that many in a single hectare. But not everyone dares to offer a precise scientific explanation for this phenomenon. Suffice it to be said that, nurtured for eons in a spacious and physically benign environment, tropical life has evolved an exuberant variety of species.

But how is this biodiversity related to carbon sequestration? Theoretical brainstorming led to a speculation that better regulation of planetary CO_2 could be achieved by species-rich tropical rainforest as opposed to its more homogeneous temperate counterpart. Could biodiversity increase an ecosystem's ability to absorb CO_2? A positive answer to this question came in 2001 as a result of research at the U.S. Department of Energy Brookhaven National Laboratory. According to plant physiologist David Ellsworth, "The key implication of the research is that, in response to elevated levels of CO_2 and N, ecosystems with high biodiversity will take up and sequester more carbon and nitrogen than do ecosystems with reduced biodiversity."

And then in June 2007, after 40 years of study, the U.S. Center for Atmospheric Research determined that forests in the northern latitudes were less effective than tropical forests in reducing global warming.

The implications for these findings are enormous. The tropical forests can be considered to be a special planetary organ designed to regulate CO_2 levels in the atmosphere. In conservation terms, it means that protecting the tropical rainforest worldwide will safeguard their capacity to capture a larger fraction of additional carbon entering our environment. In terms of attacking global warming through the creation of carbon offset plantations, it points to a concentration of this effort in the tropics, in places like Trinidad and Tobago.

Forest rehabilitation projects are already being undertaken by energy-based companies in this country, such as NGC, Alutrint, BGTT and BHP Billiton. But these projects have been driven by conditionalities contained in Certificates of Environmental Clearance (CECs) from the Environmental Management Authority (EMA). But the companies can go beyond the call of duty in their reforestation activities and invest in carbon offset forests here. All the conditions for success exist, primarily, the availability of funding from oil and gas rents and the demonstrated willingness of the Ministry with responsibility for the environment to enter into partnerships with the energy-based companies for reforestation projects.

This editorial ends with a call to all energy-based companies in Trinidad and Tobago to enter into a joint project to rehabilitate degraded forest lands through reforestation in a well-defined area in Trinidad and Tobago. The Morne L'Enfer Forest Reserve is an excellent candidate for such rehabilitation. It has suffered and continues to suffer from oil and gas exploration. Crude oil has polluted some of the major streams in the reserve and die-back of trees has occurred. This reserve which covers an area of 3,837 ha has been seriously depleted of timber. Due to overexploitation, the reserve was closed in 1998 to all timber sales for a period of at least ten years to allow the forest to regenerate itself. An opportunity now exists to bolster this natural regeneration with enrichment planting in a unique carbon offset reforestation project.

Eden Shand
eashand@fiberline.tt

A Comparison of Macroinvertebrate Communities and Their Freshwater Habitats in the Cayman Islands

David Bass
Biology Department, University of Central Oklahoma, Edmond, Oklahoma, USA 73034.
dbass@uco.edu

ABSTRACT
A survey of macroinvertebrates inhabiting freshwater habitats of Grand Cayman, Cayman Brac, and Little Cayman was conducted between 1997 and 2008. Freshwater habitats in these islands include natural ponds, ornamental ponds, temporary pools, and natural wells. A total of 72 species was collected from the three islands with most of these being reported for the first time from the Caymans. Generally, the freshwater macroinvertebrate fauna in the Cayman Islands is sparse, most likely due to their oceanic origin, their small sizes, limited freshwater habitats, natural and human disturbances, and challenges colonizing such habitats.

Key words: Freshwater invertebrates, Cayman Islands, West Indies.

INTRODUCTION

The Cayman Islands are composed of Grand Cayman, Cayman Brac, and Little Cayman. These three small islands are located in the northwestern Caribbean Sea. The islands were formed by calcareous marine deposits uplifted from the ocean floor along the northern margin of the Cayman Trough, emerging approximately 10-30 million years ago. Maximum elevations for these low-lying islands reach approximately 17 m, 13 m, and 43 m on Grand Cayman, Little Cayman, and Cayman Brac, respectively. Grand Cayman has the largest surface area of 197 km^2 while Cayman Brac has only 38 km^2 and Little Cayman covers only 28 km^2 (Davies and Brunt 1994).

A limited amount of information regarding the freshwater invertebrates of small Caribbean islands is available (Davies and Brunt 1994). Biodiversity surveys of aquatic macroinvertebrates and related ecological studies have been conducted on some islands including Barbados (Bass 2003a), St. Vincent (Harrison and Rankin 1975, 1976), St. Lucia (McKillop and Harrison 1980), Dominica (Flint 1968, 1970; Chace and Hobbs 1969; Stone 1969; Donnelly 1970; Baumgardner *et al*. 2003; Bass 2004a, 2007), Antigua (Bass 2005), Grenada (Flint and Sykora 1993; Baumgardner *et al*. 2003; Bass 2004b), Guanaja (Bass 1993), St. Kitts (Bass 2006), Nevis (Bass 2000, 2006), Montserrat (Baumgardner *et al*. 2003), Saba (Cobben 1960; Bass 2008), Tobago (Hart 1980; Nieser and Alkins-Koo 1991; Botosaneanu and Alkins-Koo 1993; Flint 1996; Baumgardner *et al*. 2003; Bass 2003b), and Trinidad (Hynes 1971; Alkins *et al*. 1981; Alkins-Koo 1990; Nieser and Alkins-Koo 1991; Botosaneanu and Alkins-Koo 1993; Flint 1996; Turner *et al*. 2008).

The objectives of this investigation include to: 1) describe the freshwater habitats existing on the Cayman Islands; 2) determine the species of aquatic macroinvertebrates inhabiting freshwaters of the Cayman Islands; 3) note the microhabitat preferences of each species; 4) determine the relative abundance of each species; 5) compare the macroinvertebrate fauna between Grand Cayman, Cayman Brac, and Little Cayman; and 6) compare the Caymanian freshwater macroinvertebrate fauna to other such fauna on other small Caribbean islands.

MATERIALS AND METHODS

Sixty-eight collections were made from various freshwater habitats across the Cayman Islands between 1997 and 2008 (Figure 1). Forty of these collections were taken on Grand Cayman, eight came from Cayman Brac, and the remaining 20 were collected from Little Cayman. Water temperature was usually recorded from each site at the time of collection.

Several methods of collecting were employed to ensure as many species as possible were captured. Submerged debris, such as stones, leaves, and wood, were carefully examined and inhabitants were picked from the substrate using forceps. A dip net (mesh = 0.1mm) was swept through aquatic vegetation and the water column to capture macroinvertebrates occupying those microhabitats. The microhabitat from which each specimen was collected was noted. Collecting efforts continued at each site until no additional species were encountered. These collecting methods were similar to those used on other islands (Bass 1993, 2003a, 2003b, 2003c, 2004b, 2005, 2006, 2007, 2008) so comparisons of the results could be made.

Specimens were preserved in 70% ethanol and returned to the laboratory for further identification. Taxa that could not be identified to the species level were separated into morphospecies for subsequent analysis. Sorenson's index of similarity (1948) was used to compare these collections in the three Cayman Islands with each other and with similar endeavors on other small Caribbean islands.

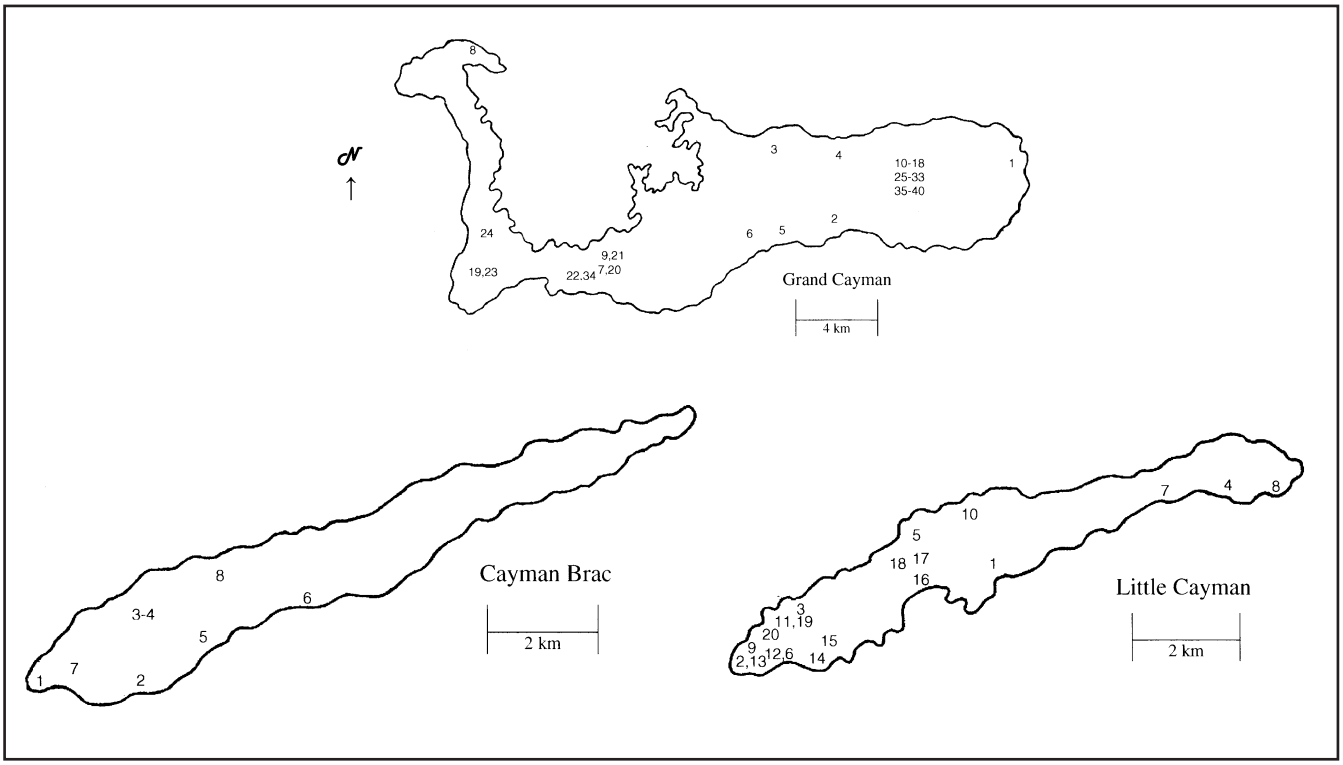

Fig. 1. Map indicating location of collecting sites in the Cayman Islands. Collection number, location, and collection date are listed in legend of Table 1.

RESULTS AND DISCUSSION

Freshwater Habitats

Very few natural freshwater habitats exist across the Cayman Islands. These habitats include natural ponds, sinkholes, and ornamental ponds. Water temperatures ranged from 26-42° C in these habitats. Due to the porosity of the substrate, there are no streams or rivers on these islands.

Permanent bodies of standing water may be found in low-lying areas across the Cayman Islands. These vary in size, but most are relatively shallow, rarely exceeding a few meters in depth. Salinity of these habitats varies, but usually coastal ponds have higher salinities than those found further inland. In the ponds where salinity was measured, values ranged from 0-44 parts per thousand. It should be noted that this research focused on freshwater invertebrates so the majority of biological samples were collected from habitats having little or no salinity. The bottom substrate of these ponds is primarily silt and mud.

Temporary pools may result following heavy rainfall, particularly in forested areas during the rainy season of May through November. The most persistent of these habitats are located in the Queen Elizabeth II Botanical Park. Most of these are small, usually having a surface area of less than 3 m^2 and a depth of no more than 0.8 m. The basin of these pools is generally composed of limestone with a small amount of decomposing leaves and sediment on the bottom.

Sinkholes are very common throughout the Cayman Islands. Some of these have been explored by divers and they have found channels that lead to the open sea, but whether this occurs with the majority of sinkholes is unknown. Because ocean salt is carried inland by the wind, these bodies of water contain various amounts of salt. Subsequent rains wash the salt to the greater depths of the sinkhole, resulting in a freshwater habitat at the surface. However, some sinkholes have become plugged with sediments so the salt remains suspended in the surface water and that environment becomes saline, potentially supporting a different invertebrate community.

Small ornamental ponds began to be constructed on Grand Cayman during the 1990's and these are especially common within the Queen Elizabeth II Botanical Park. These artificial habitats are usually composed of rock and often contain imported aquatic vascular plants. Most of these ponds have surface areas of less than 25 m^2 and depths of no more than 1 m. It is likely that some freshwater invertebrates associated with the imported plants were introduced to Grand Cayman inadvertently.

Aquatic invertebrate communities inhabiting water-filled bracts of *Heliconia* (wild plantain) inflorescences have been reported from several other small Caribbean islands, including Puerto Rico (Richardson and Hull 2000) and Saba (Bass and Bass 2008). *Heliconia* has been introduced into several locations within the Queen Elizabeth II Botanical Park and water may be held in the bracts for

Table 1. List of freshwater macroinvertebrates, including collecting sites, life cycle stages present, relative occurrence, and microhabitats in Cayman Islands (Grand Cayman = GC, Cayman Brac = CB, Little Cayman = LC) during June 1997 through May 2008. Life cycle: A, adult; J, juvenile; L, larva; N, nymph. Occurrence: *** abundant, ** common, * rare.

Taxa / Collection Site	Collections	Life Cycle	Occurrence	Microhabitat	Trophic Relationship[1]
Oligochaeta					
Pristina sp.	GC23	A	*	Detritus	Detritivore
Gastropoda					
Biophalaria schrammi	GC10, GC12, GC13, GC14, GC15, GC16, GC18, GC25, GC26, GC28, GC30, GC36, GC40	J, A	***	Detritus	Detritivore
Bithynia tentaculata	GC10, GC11, GC19, GC20, GC32, GC33, GC34, GC37, CB4, CB7	J, A	***	Detritus	Detritivore
Cerithdea costata	LC13, LC14	A	*	Detritus	Detritivore
Melanoides tuberculata	GC10, GC19, GC22, GC23, GC24, GC27, GC34, GC35	J, A	***	Detritus	Herbivore
Physella cubensis	GC10, GC12, GC40	J, A	*	Detritus	Detritivore
Pyrgophorus parvulus	LC13, LC14, LC16	A	*	Detritus	Detritivore
Bivalvia					
Eupera cubensis	GC29	A	*	Detritus	Collector
Ostracoda					
Unidentified Ostracoda	GC10, GC18, GC26	A	**	Detritus	Detritivore
Amphipoda					
Hyalella azteca	GC10, GC14, GC18, GC26, GC31, GC33, GC36, GC40	J, A	***	Detritus	Detritivore
Decapoda					
Barbouria cubensis	CB6	A	*	Under Rocks	Detritivore
Hydrachnida					
Unidentified Hydrachnida	GC2, GC9				
Ephemeroptera					
Callibaetis sp.	GC26, LC11, LC16, LC20	N	**	Detritus	Collector
Odonata					
Anax junius	GC9, GC14, GC19, GC29	N	**	Detritus	Predator
Brachymesia furcata	GC23, GC34, CB4, CB7, LC15	N	**	Detritus	Predator
Dythemis rufinervis	GC19	N	*	Detritus	Predator
Enallagma sp.	GC2, GC5, GC9, GC14, GC18, GC19, LC4	N	***	Detritus	Predator
Erythemis vesiculosa	GC10	N	*	Detritus	Predator
Erythrodiplax sp.	GC2, GC4, GC5, GC8, GC10, CB2, LC2, LC6, LC9, LC11	N	***	Detritus	Predator
Ischnura ramburi	GC21, GC23, GC28, GC33, GC34, GC40	N	***	Detritus	Predator
Orthemis ferruginea	GC37	N	*	Detritus	Predator
Pachydiplax longipennis	GC14, GC18	N	*	Detritus	Predator
Pantella flavescens	GC34	N	*	Detritus	Predator
Somatochlora sp.	GC34	N	*	Detritus	Predator

Taxa / Collection Site	Collections	Life Cycle	Occurrence	Microhabitat	Trophic Relationship[1]
Hemiptera					
Belostoma minor	GC1, GC3, GC5, GC14, GC19, GC20, GC21, GC22, GC23, GC26, GC31, GC32, GC34, GC37, GC38, CB3, LC7, LC20	N, A	***	Detritus	Predator
Buenoa sp.	GC17, GC28, GC36, GC40, LC16, LC18	N, A	***	Neuston	Predator
Hydrometra sp.	GC14	N	*	Aquatic Plants	Predator
Limnogonus sp.	GC26, GC36	N, A	*	Neuston	Predator
Merragata sp.	GC22	A	*	Neuston	Predator
Mesovelia sp.	GC14, GC16, GC18, GC22, GC26, GC27, GC28, GC38, GC40	N, A	***	Neuston	Predator
Microvelia sp.	GC17, CB5, CB6, LC11, LC16, LC17, LC18, LC19, LC20	A	***	Neuston	Predator
Notonecta sp.	GC27	A	*	Neuston	Predator
Paraplea sp.	GC28	A	*	Detritus	Predator
Rheumabates sp.	CB4, CB6	N	*	Neuston	Predator
Trepobates sp.	GC23	N	*	Neuston	Predator
Trichocorixa verticalis	GC1, GC6, GC7, GC8, GC21, CB1, LC3, LC5, LC6, LC8, LC9, LC10, LC12, LC14	A	***	Detritus	Predator
Trichoptera					
Chimarra sp.	GC18	L	*	Detritus	Collector
Lepidoptera					
Ancentria sp.	GC3	L	*	Detritus	Collector
Coleoptera	GC3, GC8, GC11, GC20, GC21, GC29, CB1, LC5, LC6, LC7	A	***	Detritus	Collector
Berosus sp.					
Celina sp.	GC18, GC19	A	*	Detritus	Predator
Copelatus sp.	GC37, CB7	A	*	Detritus	Predator
Cybister sp.	GC18, GC40	A	*	Detritus	Predator
Cymbiodyta sp.	GC37	L, A	*	Detritus	Collector
Derallus sp.	GC20, GC31	A	*	Detritus	Collector
Dytiscus sp.	GC12	L	*	Detritus	Predator
Hydacticus sp.	GC28, GC29, GC32, GC36	L, A	**	Detritus	Predator
Hydrochus sp.	GC30, GC31, GC32, GC40	A	**	Detritus	Shredder
Hydrobiomorpha phallica	GC16	A	*	Detritus	Collector
Hydrophilus insularis	GC12, GC14, GC18, GC35, GC38, GC39, GC40, LC16	A	***	Detritus	Collector
Laccobius sp.	GC29, GC34, GC37	A	*	Detritus	Piercer
Laccophilus sp.	GC18, LC10	A	*	Detritus	Predator
Paracymus confusus	GC10, GC18	A	*	Detritus	Collector
Pelonomus sp.	GC20	A	*	Detritus	Collector
Peltodytes sp.	GC40	A	*	Detritus	
Rhanthus sp.	CB5, CB7	A	*	Detritus	

Taxa / Collection Site	Collections	Life Cycle	Occurrence	Microhabitat	Trophic Relationship[1]
Thermonectus basillaris	GC13, GC14, GC17, GC18, GC37, GC39, GC40, LC15, LC16	A	***	Detritus	Predator
Tropisternus lateralis	GC1, GC8, GC9, GC14, GC15, GC18, GC20, GC28, GC36, GC38, CB1, LC1, LC2, LC3, LC6, LC9	L, A	***	Detritus	Collector
Diptera Chironomidae					
Ablabesmyia sp.	GC4, GC5, GC9	L	*	Detritus	Predator
C*hironomus* sp.	GC2, GC4, GC5, GC8, GC10, GC15, CB3, CB4, CB7	L	***	Detritus	Collector
Dicrotendipes sp.	GC6	L	*	Detritus	Collector
Goeldochironomus sp.	GC26, LC11	L	*	Detritus	Collector
Labrundinia pilosela	GC9	L	*	Detritus	Predator
Orthocladiinae	GC29	L	*	Detritus	Collector
Tanypodinae	GC4, GC22, GC37	L	*	Detritus	Predator
Tanytarsus sp.	GC2	L	*	Detritus	Predator
Other Diptera					
Aedes sp.	GC21	L	*	Plankton	Collector
Culex sp.	LC3, LC6, LC10	L	*	Planktonic	Collector
Culicoides sp.	GC1, GC3, GC4, GC5, GC7, GC9, GC37, CB2, LC9	L	***	Detritus	Predator
Dolichopodidae	GC3	L	*	Detritus	Predator
Odontomyia sp.	GC9, LC9	L	*	Detritus	Collector
Probezzia sp.	GC9	L	*	Detritus	Predator
Stratiomys sp.	GC19, GC23	L	*	Detritus	Collector

Trophic relationship[1] – Trophic relationships of insects based on Merritt, Cummins and Berg (2008) and non-insects on Thorp and Covich (2001).

Collections: GC1) Collier's Pond, GC, 11 June 1997*; **GC2)** Betty Bay Pond, GC, 11 June 1997*; **GC3)** Point Pond, GC, 11 June 1997*; **GC4)** Malaportas Pond, GC, 11 June 1997*; **GC5)** Meagre Bay Pond, GC, 12 June 1997*; **GC6)** Pease Bay Pond, GC, 12 June 1997*; **GC7)** Governor's Pond, GC, 12 June 1997*; **GC8)** Palmetto Pond, GC, 13 June 1997*; **GC9)** Least Grebe Pond, GC*, 18 June 1997; **GC10)** Fountain Pond, Queen Elizabeth II Botanic Park, GC, 15 May 2003; **GC11)** Wetlands Lake, Queen Elizabeth II Botanic Park, GC, 15 May 2003; **GC12)** Gazebo Pond, Queen Elizabeth II Botanic Park, GC, 15 May 2003; **GC13)** Buttonwood Swamp, Queen Elizabeth II Botanic Park, GC, 15 May 2003; **GC14)** Kary's Pond, Queen Elizabeth II Botanic Park, GC, 15 May 2003; **GC15)** Crocodile Hole, Queen Elizabeth II Botanic Park, GC, 15 May 2003; **GC16)** High Spring Pond, Queen Elizabeth II Botanic Park, GC, 15 May 2003; **GC17)** Natural Well, Queen Elizabeth II Botanic Park, GC, 15 May 2003; **GC18)** Monument Pond, Queen Elizabeth II Botanic Park, GC, 15 May 2003; **GC19)** Halfway Pond, Georgetown, GC, 16 May 2003; **GC20)** Governor's Pond, GC, 21 May 2007; **GC21)** Least Grebe Pond, GC, 21 May 2007; **GC22)** Prospect Pond, GC, 21 May 2007; **GC23)** Halfway Pond, GC, 21 May 2007; **GC24)** Sherwood Drive Pond, GC, 21 May 2007; **GC25)** Fountain Pond, Queen Elizabeth II Botanic Park, GC, 25 May 2007; **GC26)** Colour Garden Pond, GC, 25 May 2007; **GC27)** Wetlands Lake, Queen Elizabeth II Botanic Park, GC, 25 May 2007; **GC28)** Gazebo Pond, Queen Elizabeth II Botanic Park, GC, 25 May 2007; **GC29)** Ground Dove Walk Temporary Ponds, GC, 25 May 2007; **GC30)** Kary's Pond, Queen Elizabeth II Botanic Park, GC, 25 May 2007; **GC31)** Crocodile Hole, Queen Elizabeth II Botanic Park, GC, 25 May 2007; **GC32)** High Spring Pond, Queen Elizabeth II Botanic Park, GC, 25 May 2007; **GC33)** Monument Pond, Queen Elizabeth II Botanic Park, GC, 25 May 2007; **GC34)** Prospect Primary Pond, GC, 19 May 2008; **GC35)** Fountain Pond, Queen Elizabeth II Botanic Park, GC, 27 May 2008; **GC36)** Colour Garden Pond, Queen Elizabeth II Botanic Park, GC, 27 May 2008; **GC37)** Buttonwood Swamp, Queen Elizabeth II Botanic Park, GC, 27 May 2008; **GC38)** High Spring Pond, Queen Elizabeth II Botanic Park, GC, 27 May 2008; **GC39)** Natural Well, Queen Elizabeth II Botanic Park, GC, 27 May 2008; **GC40)** Gazebo Pond, Queen Elizabeth II Botanic Park, GC, 28 May 2008; **CB1)** Mangrove Wreck Pond, CB, 7 June 1997*; **CB2)** Salt Pond, CB, 8 June 1997*; **CB3)** The Splits, CB, 9 June 1997*; **CB4)** The Splits, CB, 20 May 2008; **CB5)** Hayman's Pond, CB, 20 May 2008; **CB6)** Black

Shrimp Hole, CB, 20 May 2008; **CB7)** Turtle Crawl Pond, CB, 20 May 2008; **CB8)** Wallace's Well, CB, 20 May 2008; **LC1)** Tarpon Lake, LC, 3 June 1997*; **LC2)** Bittern Pond (West End Pond), LC, 3 June 1997*; **LC3)** McCoy's Pond, LC, 4 June 1997*; **LC4)** Pond 14B, LC, 4 June 1997*; **LC5)** Jackson Pond, LC, 4 June 1997*; **LC6)** Bulldozer Pond, LC, 4 June 1997*; **LC7)** Pond 14A, LC, 5 June 1997*; **LC8)** Sandy Point Pond, LC, 5 June 1997*; **LC9)** Lighthouse Pond, LC, 5 June 1997*; **LC10)** Grape Tree Pond, LC, 5 June 1997*; **LC11)** Salt Rock Well, LC, 6 June 1997*; **LC12)** Roadside Ditch, LC, 26 May 1998; **LC13)** West End Pond, LC, 29 May 1998; **LC14)** Pirates Point Pond, LC, 29 May 1998; **LC15)** Airstrip Well, LC, 29 May 1998; **LC16)** Power Plant Well, LC, 30 May 1998; **LC17)** Evelyn's Well, LC, 30 May 1998; **LC18)** Sonny's Well, LC, 30 May 1998; **LC19)** Salt Rocks Well, LC, 30 May 1998; **LC20)** Pirates Well, LC, 31 May 1998.
* indicates collection by Richard Heard during June 1997.

about 60-90 days. Their bracts were examined in 2007 and 2008, but no aquatic invertebrates were observed living in these ephemeral microhabitats. However, it is possible they may be colonized by invertebrates in the future.

Freshwater Macroinvertebrates

A total of at least 72 species representing 14 major groups was collected from the freshwater habitats of the Cayman Islands. Grand Cayman supported the highest number of species, 66, while Cayman Brac and Little Cayman contained 14 and 18 species, respectively (Table 1).

Oligochaeta

Only one species of freshwater oligochaete, *Pristina* sp., was collected and this was found in the sediment of a large pond on Grand Cayman (Table 1). *Pristina breviseta* has been reported from a similar habitat in Barbados (Bass 2003a), but the species of the Cayman specimen is undetermined.

Gastropoda

Six species of snail were collected from a variety of standing waters (Table 1) and several interesting distributions were observed. *Biophalaria schrammi* was the most frequently encountered snail, occurring in many aquatic habitats on Grand Cayman. *Bithynia tentaculata* was the only gastropod found on more than one of the Caymans, occurring on both Grand Cayman and Cayman Brac. The eurytolerant pond snail, *Physella*, is widespread in ponds throughout the Caribbean basin, but *P. cubensis* appears to have a limited distribution in the Caymans, occurring in only two ornamental ponds in the Queen Elizabeth II Botanical Park. The introduced snail, *Melanoides tuberculata*, was also found only on Grand Cayman. *Cerithdea costata* and *Pyrgophorus parvulus* existed only on Little Cayman, although empty shells of *C. costata* were observed on all three islands.

Bivalvia

Eupera cubensis was the only bivalve collected and it was found in a temporary pool on Grand Cayman (Table 1). This species has been previously reported from temporary ponds on other small Caribbean islands (Bass 2005) and is common in southeastern North America (Thorp and Covich 2001). Because this clam is tolerant of only low salinity, it is probably transported in damp feathers of migrating waterfowl.

Ostracoda

A single species of ostracod was collected from three artificial ponds in the Queen Elizabeth II Botanical Park (Table 1). Specimens were found in different years indicating this species is thriving on Grand Cayman.

Amphipoda

The amphipod, *Hyalella azteca*, was found in abundance at numerous sites and during different times across Grand Cayman (Table 1). Although this species is widespread throughout the Caribbean basin (Bass 2003c), it was not encountered on Cayman Brac or Little Cayman. These amphipods commonly live among the plant detritus upon which they feed.

Decapoda

Barbouria cubensis, commonly known as the Cuban cave shrimp or black shrimp, was observed in a sinkhole on Cayman Brac (Table 1). Because this species is listed as critically endangered (IUCN 2008) and has been collected from the Caymans previously, no specimens were taken. Cuban cave shrimp are restricted to anchialine caves and pools in the Bahamas, Bermuda, Caicos Islands, Cayman Islands, Cuba, and Jamaica (Iliffe 2007).

Hydrachnida

Unidentified hydrachnids were collected from two sites on Grand Cayman: a permanent coastal pond and an inland temporary freshwater pond (Table 1). Because these habitats are so different from each other, it is likely specimens from these ponds actually represent different species.

Ephemeroptera

Only one mayfly, *Callibaetis*, was found in collections from the Cayman Islands (Table 1). This taxon was collected from submerged detritus on both Grand Cayman and Little Cayman. *Callibaetis* has been previously reported

on the eastern Caribbean islands of Antigua (Bass 2005), Nevis (Bass 2006), and St. Kitts (Bass 2006).

Odonata

Eleven species of odonates, two damselflies and nine dragonflies, were collected from permanent aquatic habitats (Table 1). All 11 taxa occurred on Grand Cayman while only two were found on Cayman Brac and three were collected from Little Cayman. Two dragonflies, *Brachymesia furcata* and *Erythrodiplax*, were collected on all three islands. Odonates act as predators, probably feeding mostly on other small insects. Nymphs were found crawling among living aquatic vascular plants and decomposing plant debris. All have been reported from several Lesser Antillean islands (Needham and Westfall 1955; Donnelly 1970; Harrison and Rankin 1976; Bass 2003a, 2003b, 2004b, 2005, 2006, 2007, 2008). Adult odonates are strong fliers and most likely colonized the Caymans from the nearby Greater Antillean islands, Central America, and South America.

Hemiptera

Twelve taxa of hemipterans were found in a variety of aquatic habitats across the Cayman Islands (Table 1). All are considered predators (Merritt, Cummins and Berg 2008). Eleven of these taxa occurred on Grand Cayman while four taxa were collected from each of Cayman Brac and Little Cayman. Only three taxa, *Belostoma minor*, *Microvelia* sp., and *Trichocorixa verticalis*, were found on all three Cayman islands. Some of the taxa collected, such as *Microvelia*, included wingless adults, an adaptation to island habitats (Roff 1990) commonly observed on small Caribbean islands (Bass 2003c).

Trichoptera

Only one caddisfly, *Chimarra*, was encountered in a single collection from an ornamental pond on Grand Cayman. Although uncommon in the Cayman Islands, numerous taxa of caddisflies, including *Chimarra*, are common on many of the more mountainous islands, especially in the Lesser Antilles (Flint 1968, 1970, 1996; Flint and Sykora 1993).

Lepidoptera

Ancentria was the only lepidopteran to be taken during these collections (Table 1). A single specimen was collected from leaf detritus in a natural pond on Grand Cayman.

Coleoptera

Nineteen species of beetle were collected from a variety of aquatic habitats on the Cayman Islands (Table 1). Grand Cayman composed 17 taxa, Cayman Brac held four taxa, and Little Cayman yielded five taxa. Twelve coleopteran taxa were limited to Grand Cayman and all of these have been reported elsewhere in the Caribbean basin. Only *Tropisternus lateralis* and *Berosus* were collected on all three Cayman islands. *T. lateralis* is one of the most widespread aquatic beetles in the Caribbean basin, being reported from Barbados (Bass 2003), Antigua (Bass 2005), Saba (Bass 2008), St. Kitts (Bass 2006), and Nevis (Bass 2006). Several collections yielded both larvae and adults of the same taxon, indicating those species are probably persisting and reproducing in the Caymans.

Diptera

Fifteen dipteran taxa were collected from a variety of freshwater habitats in the Caymans (Table 1) with 14 of these being found on Grand Cayman. The biting midge, *Culicoides*, was the only taxon collected from all three Cayman islands. Eight of the dipterans reported are midges belonging to the family Chironomidae. The abundant and eurytolerant midge, *Chironomus*, has a widespread distribution throughout the Holarctic region (Wiederholm 1983), and was collected from Grand Cayman and Cayman Brac.

Results of the similarity analysis (Sorenson 1948) of faunas among the Cayman Islands may be explained largely by proximity of the islands to each other (Tables 2-4). The two islands nearest each other, Little Cayman and Cayman Brac, had the highest similarity value of 0.50 and the two islands separated by the greatest distance, Grand Cayman and Cayman Brac, held the lowest value of 0.28.

However, when similarity values of island pairs are compared among other small Caribbean islands, the results are less clear (Table 2-4). Because only standing water is present on the Caymans, it is reasonable that they share the highest faunal similarity values to Antigua, Barbados, Nevis, St. Kitts, and Saba as the fauna of all of these islands is largely composed of lentic species. It appears that certain species with the capacity to colonize standing bodies of freshwater on small oceanic islands have been successful throughout the Caribbean basin (Bass 2003c). In addition, the relatively low number of species present in Antigua, Barbados, Nevis, St. Kitts, and Saba allow for only a few taxa in common between islands to raise the similarity values.

Island biogeography theory (MacArthur and Wilson 1967) predicts the number of species present on an island will increase as island size increases. This holds true when comparing the total number of freshwater macroinvertebrate taxa among the three Cayman islands. The largest of these, Grand Cayman, contains many more species than the two smaller sister islands. Both Cayman Brac (38 km^2) and Little Cayman (28 km^2) are considerably smaller than

Grand Cayman (197 km^2) and therefore, have less suitable habitat available for freshwater invertebrates. Not only do smaller islands have fewer suitable habitats, but they are also smaller targets for colonizers to locate.

Table 2. Sorensen's index of similarity values comparing the freshwater macroinvertebrate fauna of Grand Cayman to that of other small Caribbean islands, including approximate distances to those islands from Grand Cayman and approximate island sizes. Range of values: 0.00 = 0% common taxa and 1.00 = 100% common taxa.

Island	Approximate Distance (km)	Approximate Size (km^2)	Similarity Value
Little Cayman	128	28	0.36
Cayman Brac	161	38	0.28
Guanaja	589	69	0.12
Saba	1,925	13	0.26
Nevis	1,957	94	0.36
St. Kitts	1,967	177	0.34
Montserrat	2,036	83	0.21
Antigua	2,046	280	0.44
Dominica	2,159	751	0.20
St. Lucia	2,240	616	0.24
Grenada	2,243	346	0.17
Tobago	2,360	300	0.12
Barbados	2,417	430	0.36

The numbers and diversity of most freshwater insects occurring on Grand Cayman were reduced during the 2007 collecting period. Much of this island was flooded by the storm surge of Hurricane Ivan in 2004, (Cayman Department of Environment, pers. comm.), probably exterminating many freshwater populations. In addition, this flooding resulted in the creation of many additional microhabitats for mosquitoes, and insecticides were applied to combat the increased populations. Because insecticides are non-selective, many populations of non-target species were likely inadvertently destroyed. Seven of nine ponds on Grand Cayman showed a loss of species between the 2003 and 2007 collections. The application of these insecticides was curtailed in late 2007 and it appears most populations rebounded the following year, with seven of the nine ponds having increased numbers of species in the 2008 samples.

CONCLUSIONS

A total of 72 taxa are reported from the Cayman Islands. This includes 66 species from Grand Cayman, 18 species from Little Cayman, and 14 species from Cayman Brac. These numbers follow the prediction by McArthur and Wilson's island biogeography theory that a larger island will support more species than a smaller one. Because this is the first published report describing the biodiversity of freshwater invertebrates from the Caymans, most of these taxa are being reported from these islands for the first time.

Generally the freshwater macroinvertebrate fauna in the Cayman Islands is sparse, most likely due to the oceanic origin of the islands, their small sizes, a limited amount of freshwater habitats, natural and human disturbances, and challenges colonizing such habitats. Freshwater habitats in the Caymans are composed exclusively of standing waters, both natural and man-made. Therefore, any species inhabiting these lentic bodies of water must be capable of colonizing distant islands and be adapted to such environments. Large tropical storms and hurricanes periodically inundate freshwater habitats with large amounts of salt, and this may stress the invertebrate communities. In recent years, filling of land for road and housing developments has destroyed once productive freshwater habitats, such as Least Grebe Pond on Grand Cayman. Care should be exercised to prevent non-native species from being accidently introduced with imported aquatic plants in ornamental ponds. In addition, efforts to control mosquito populations through the application of pesticides has resulted in the loss of non-target aquatic insect populations, as observed in my 2007 collections. These freshwater invertebrate communities of the Cayman Islands require further study and continued monitoring, as well as protection, in order to insure that a healthy biodiversity will exist in the future.

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Table 3. Sorensen's index of similarity values comparing the freshwater macroinvertebrate fauna of Little Cayman to that of other small Caribbean islands, including approximate distances to those islands from Little Cayman and approximate island sizes. Range of values: 0.00 = 0% common taxa and 1.00 = 100% common taxa.

Island	Approximate Distance (km)	Approximate Size (km^2)	Similarity Value
Cayman Brac	7	38	0.50
Grand Cayman	128	197	0.36
Guanaja	711	69	0.06
Saba	1,804	13	0.11
St. Kitts	1,840	177	0.29
Nevis	1,871	94	0.23
Montserrat	1,930	83	0.14
Antigua	1,936	280	0.41
Dominica	2,056	751	0.13
St. Lucia	2,143	616	0.22
Grenada	2,153	346	0.12
Tobago	2,276	300	0.03
Barbados	2,320	430	0.20

Table 4. Sorensen's index of similarity values comparing the freshwater macroinvertebrate fauna of Cayman Brac to that of other small Caribbean islands, including approximate distances to those islands from Cayman Brac and approximate island sizes. Range of values: 0.00 = 0% common taxa and 1.00 = 100% common taxa.

Island	Approximate Distance (km)	Approximate Size (km^2)	Similarity Value
Little Cayman	7	28	0.50
Grand Cayman	161	197	0.28
Guanaja	733	69	0.06
Saba	1,772	13	0.19
St. Kitts	1,827	177	0.17
Nevis	1,837	94	0.16
Montserrat	1,898	83	0.21
Antigua	1,904	280	0.25
Dominica	2,024	751	0.11
St. Lucia	2,111	616	0.19
Grenada	2,121	346	0.08
Tobago	2,244	300	0.03
Barbados	2,288	430	0.16

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The Skipper Butterflies (Hesperiidae) of Trinidad
Part 16, Hesperiinae, Genera Group J, *Vettius* - *Naevolus*

Matthew J. W. Cock
CABI Europe - Switzerland, Rue des Grillons 1, CH-2800 Delémont, Switzerland.
m.cock@cabi.org

ABSTRACT
Trinidad skippers of the genera *Vettius*, *Turesis*, *Thoon*, *Justinia*, *Eutychide*, *Onophas* and *Naevolus* (Evans' Genera Group J; Moncini (part)) are treated. Details are given of the taxonomy, history, description, identification and biology of the 12 Trinidad species in these genera. Of these, only one species, *Vettius fantasos* (Stoll), occurs in Tobago. Adults of all species are illustrated, as are the male genitalia of *Vettius tertianus* (Herrich-Schäffer), *Eutychide complana* (Herrich-Schäffer) and *E. subcordata subcordata* (Herrich-Schäffer). The life histories of *Vettius phyllus phyllus* (Cramer) (from Colombian material), *Justinia justinianus hyperythrus* (Kaye), and *E. s. subcordata* are described and illustrated.

Key words: Trinidad, Hesperiidae, *Vettius*, *Turesis*, *Thoon*, *Justinia*, *Eutychide*, *Onophas, Naevolus,* life history.

INTRODUCTION

Over the years, I have treated the skipper butterflies of Trinidad in Living World (Cock 2007 and earlier) and all subfamilies and groups have now been covered apart from Evans' (1955) genera Groups I and J. These are a single group which Evans split on the pragmatic basis that Group I contains the "tawny" (orange marked) species. These groups contain many brown species with similar markings. They are relatively less well-known and collected than other Hesperiidae, and the life histories of most have not been documented.

Evans (1955) characterises these groups by the arrangement of the nudum (the greater portion is on the apiculus with only 3-4 segments on the club itself), and by the palpi, where the second segment is slender and cylindrical or quadrate, i.e. the inside width is equal to the width of the side against the head. Beyond this there is considerable variation. In practice, Trinidad collectors may find it simpler to consider these groups as all skippers that have not been treated in my earlier papers.

The present contribution covers the genera *Vettius* to *Naevolus* which Evans treats at the end of his Group J – my rationale being that these comprise some of the more obvious and larger species, which are more likely to be familiar to collectors, and relatively easily identified.

Infra-family classification of Hesperiidae is in a state of flux, as DNA methods and a global approach finally start to rationalise the subfamily and tribal classification (Warren *et al*. 2008). Below the subfamily level, the arrangement used by Evans (1955 and earlier works) was mostly a matter of conveniently grouping superficially similar species. Nevertheless, Evans' genera Group J mostly (or all) fall within the new tribe Moncini, together with some but not all species from genera Groups I, L, N and O (Warren *et al*. 2008). Of the general treated here, *Vettius* and *Eutychide* have been included in the new classification, but as yet not the others.

Increasingly, the internet provides a vehicle to make key rare works widely available, which might not otherwise have been consulted. The mammoth *Biologia Centrali-Americana* (Godman and Salvin 1879-1901) is a particular case in point. As their treatment of Hesperiidae includes colour figures of adults, accurate male genitalia drawings and drawings of male venation with brands and stigmas, it is a particularly useful resource. Volumes of Seitz's *Macrolepidoptera of the World* are starting to appear (Biodiversity Heritage Library 2009), and hopefully other important works such as Sepp (1843-48) which is referred to below, will also soon be available. This combined with the 2004 neotropical Butterfly Checklist (Mielke 2004), The Bibliography of neotropical Hesperiidae (Mielke 2005), and The Catalogue of Neotropical Butterfly Food Plants (Beccaloni *et al*. 2008) means that it is now possible to be confident that almost all works dealing with a particular Hesperiidae species can be identified, and in particular what illustrations and food life history information are available in the literature.

Similarly, internet based databases of plant names facilitate checking of names. Thus in this paper, the plant names used follow Tropicos (2009).

All specimens illustrated are in the author's collection unless indicated otherwise. Similarly, any specimens referred to without attributing a collector or collection, were collected by the author and are in either the author's collection or the collection of CAB International, Curepe, Trinidad. Other conventions and abbreviations follow earlier parts of this series (Cock 2007 and earlier papers). The museum abbreviations are given in the acknowledgements at the end of the paper.

Vettius Godman 1901

Most species of this genus have the UNH conspicu-

ously marked, making them relatively easy to recognise in the field. Several species feed on Marantaceae, Arecaceae or Poaceae, and have caterpillars with a pale head and strong dark lateral band from the apex to the ocelli. The caterpillar of *V. tertianus* (Herrich-Schäffer) is rather different in appearance and feeds on bromeliads in association with ant-gardens, suggesting it may not be congeneric.

184. J45/8 *Vettius phyllus phyllus* (Cramer 1777)

Figs. 1-6.

This species occurs in four subspecies from Panama to southern Brazil and Bolivia (Evans 1955; Mielke 2004). The nominate subspecies was described from Suriname, and its range extends to Panama in the north, through the Guianas to the Amazon and Matto Grosso in Brazil (Evans 1955). It was first recorded from Trinidad by Crowfoot (1893) as *Carystus phyllus*, and Kaye (1904, No. 280; 1921, No. 432) considered it "fairly frequent".

Sexes similar (Figs.1-2); female larger with more rounded wings; male with a triangular brand at base of space 2 and in adjacent space 1B UPF. UPF black, fringe concolorous; white hyaline spots in spaces 2, 3, 6, 7, lower cell; white spot lower space 1B; narrow orange streak space 12; blue streak basal half space 1A. UPH black; fringe concolorous, white at tornus; white discal spot across spaces 2-4, with veins dark, especially distally; basal half vein 1B white, blue hairs on basal half veins 1B, and to two-thirds on lower cell and vein 2. Thorax and abdomen black above with orange hairs on anterior thorax, blue hairs on posterior thorax and abdomen, pale blue scales on abdomen; head above black with white spots; collar orange-brown laterally; body white below, orange-brown immediately below the wings; legs black and white. UNF black, dark grey in spaces 1A and 1B; spots as UPF; a yellow sub-apical bar from space 4 at margin to space 8 at costa, dark on veins. UNH distinctive in black, yellow, white and orange-brown; ground colour black; fringe black, except white at tornus; costa narrowly black; a broad stripe from base of costa to margin of spaces 6, 7 and costa, orange-brown basal third, yellow distal two-thirds; a second broad yellow stripe from base of cell to margin of spaces 4-5, paler where the white discal spot lies UPH; a short white line on middle of vein 1B; space 1A orange-brown. F ♂ 16.5-17.5 mm; ♀ 19 mm. Illustrations in Godman and Salvin (1879-1901, ♂ venation and genitalia, Plate 102.28-29), Lewis (1973, ♂ UPS Fig. 88.26).

This species with its black, yellow and orange-brown striped UNS (Fig. 3, Colombia specimen) is unlikely to be confused with any other in the field, except *V. m. marcus* (Fig. 9). *Vettius p. phyllus* is larger, the yellow stripes are brighter yellow, and *V. m. marcus* does not have the orange-brown base to the yellow costal stripe UNH or space 1A UNH orange-brown.

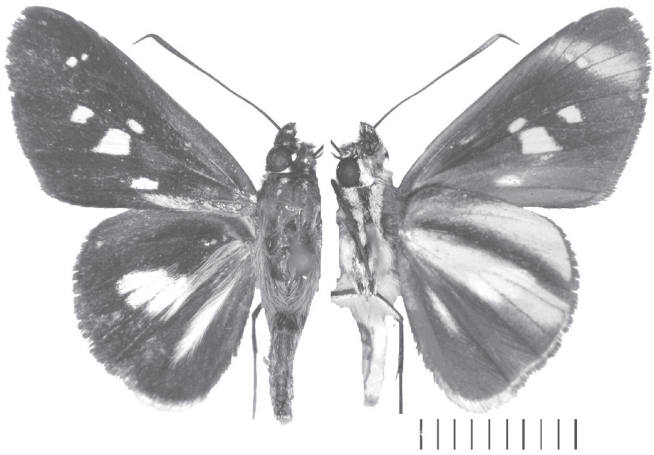

Fig. 1. Adult ♂ *Vettius phyllus phyllus* (Cramer), Arima-Blanchisseuse Road, milestone 9¾, Andrew's Trace, 17.iii.1982. Scale in mm.

Fig. 2. Adult ♀ *Vettius phyllus phyllus* (Cramer), Parrylands, 2.ii.1980. Scale in mm.

This is a species associated with forests in Trinidad. It is widespread, with records from the Northern Range including the drier forests of Morne Catherine and Point Gourde, as well as the southern forests. It seems to be commoner at lower altitudes, but is also found on the ridge-tops of the Northern Range. I have observed what appeared to be territorial behaviour in a forest clearing on the summit of Mt. Tabor (c. 570 m, 1860 ft.) between 09.30 and 10.30 (13.i.2004). Captures seem to be more frequent in the dry season, but it can probably be found in all months of the year.

Nothing seems to have been reported on the biology of this species (Mielke 2005) apart from my unpublished record of *Ctenanthe* sp. (Marantaceae) as a food plant in Chinchiná, Caldas, Colombia in Beccaloni *et al.* (2008) compilation of the food plants of Neotropical butterflies.

The following description is based on that rearing (MJWC 94/403).

Fig. 3. Newly emerged adult male *Vettius phyllus*, collected as caterpillar on *Ctenanthe* sp., Chinchiná, Colombia, 13.x.1994 (MJWC 94/403). This specimen is orange-brown at the base of the middle yellow stripe, which is not present in Trinidad specimens.

An 11 mm third instar caterpillar was collected in a leaf shelter of *Ctenanthe* sp., 13.x.1994 and reared through to adult on an ornamental *Calathea* sp. (Marantaceae). The original shelter was made by making a cut from the margin of a leaf to the midrib, leaving 90 mm of leaf distal to this; the distal portion of the leaf hung down under the weight of the cut portion, which was rolled upwards in several rolls, forming a spiral in cross-section. The caterpillar sheltered in the innermost portion of the roll, and fed from the cut edge within the shelter – an unusual example of a hesperiid caterpillar using its shelter to hide its feeding site. The caterpillar had a black head (2.0 x 1.5 mm high x wide) and the body was shiny dark green.

The fourth instar caterpillar (Fig. 4) grew to 23 mm. The head was rounded triangular, narrower than most Hesperiinae (2.7 x 2.0 mm high x wide), slightly indent at vertex; shiny, rugose; black, except for a short paler streak from apex of each epicranium, down face. T1 with narrow black plate on posterior margin. Body dull translucent green; anal plate dark; all legs concolorous.

The fifth instar caterpillar (Fig. 5) was 25 mm long three days after moulting, but the final length was not recorded. Head 3.8 x 2.6 mm (high x wide), nearly oval, but narrower dorsally, and slightly indented at vertex; matt, rugose; translucent dull green, with a broad black stripe from the vertex, laterally to the mouthparts; posterior margin narrowly dark. T1 dorsal plate concolorous. Body dull translucent whitish green due to the underlying fat bodies; dorsal line darker due to absence of fat bodies; ventrally and ventro-laterally white, with diffuse margin to lateral band, which is darker and clear due to absence of fat bodies. Spiracles at the margin between the ventro-lateral area and lateral stripe; light brown, inconspicuous, except that of A8 which is surrounded by white area. Gonads yellow, hemispherical. All legs concolorous. Wax glands in mature larva a ventro-lateral area from the posterior margin of A3 to A8, interrupted behind prolegs A4, between prolegs A4 and A5, then continuous around prolegs to A8.

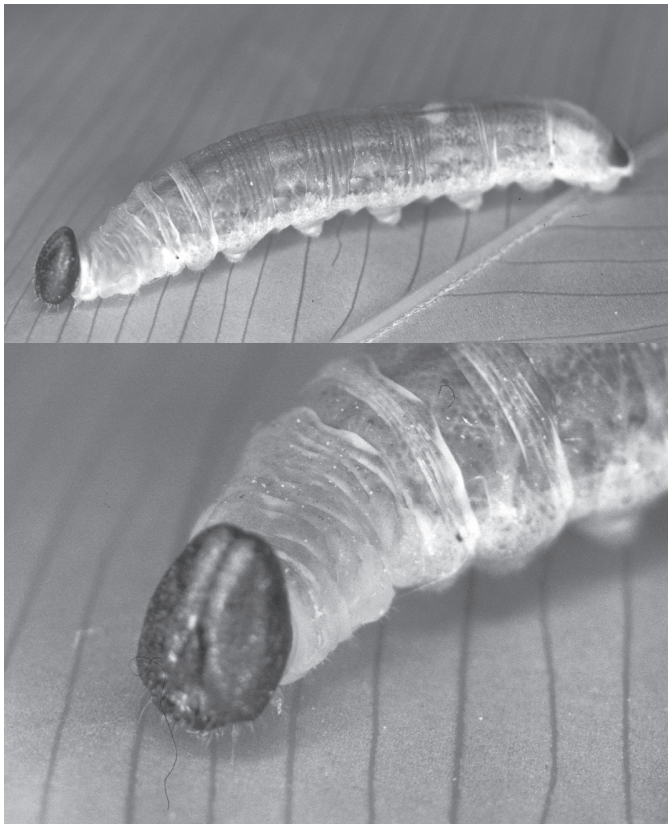

Fig. 4. Fourth instar caterpillar of *Vettius phyllus*, 23 mm. Collected on *Ctenanthe* sp., Chinchiná, Colombia, 13.x.1994 (MJWC 94/403). **Above**, dorso-lateral view; **below**, close up of head.

Pupa 19 mm, rather featureless, no frontal spike; proboscis extends to cremaster; light brown; lightly covered with white waxy powder, the lining of the shelter more so.

Subsequently, I found but failed to rear a caterpillar (Fig. 6) at Point Gourde, 14.vii.1996 (MJWC 96/7), which I could not distinguish from the fifth instar of my Colombian material. This caterpillar was on *Stromanthe tonckat* (Aubl.) Eichler (Marantaceae) in a shelter similar to that described for the Colombian caterpillar, so most likely was *V. phyllus*.

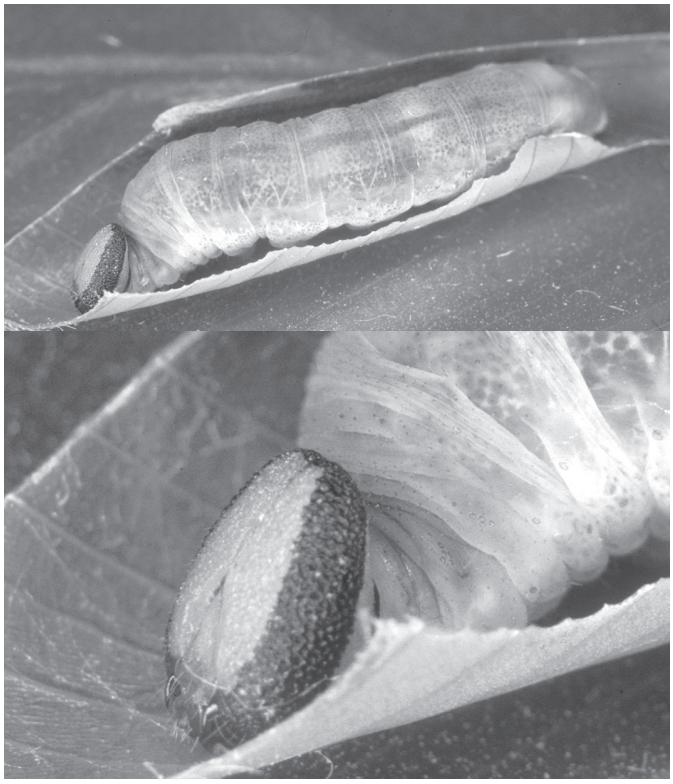

Fig. 5. Fifth instar caterpillar *Vettius phyllus*, 23 mm. Collected on *Ctenanthe* sp., Chinchiná, Colombia, 13.x.1994 (MJWC 94/403). **Above**, dorso-lateral view; **below**, close up of head.

Fig. 6. Fifth instar caterpillar probably of *Vettius phyllus*, 28 mm. Collected on *Stromanthe tonckat*, Point Gourde, 14.vii.1996 (MJWC 96/7). **Above**, dorso-lateral view; **below**, close up of head.

185. J45/9 *Vettius marcus marcus* (Fabricius 1787)
Figs. 7-9.

This species is treated as having two subspecies (Evans 1955; Mielke 2004). The nominate subspecies was described from Guyane (French Guiana), and ranges north to Guatemala and south to Argentina and Bolivia, whereas ssp. *aurelius* Plötz is found from Guatemala to western Venezuela and Colombia. Thus, the two subspecies seem to overlap in part of their range and their taxonomic status may justify further research.

Sexes similar (Figs. 7-8); female slightly larger with more rounded wings; male with no brand UPF. UPF dark brown; fringe concolorous; white hyaline spots in spaces 2, 3, 6, usually 7, and upper cell; small white spot in lower space 1B. UPH brown; fringe brown, except white in spaces 1B-1C; white discal spot from upper space 1C to 5; white tornal spot across upper space 1B and lower space 1C. Body dark above; head dark with white spots and orange-brown collar; white below; legs brown. UNF brown; yellow at base of costa; yellow sub-apical band from margin of space 4, to short of costa at space 7, veins dark brown; yellow-white spot across space 1B reaching white hyaline spot in space 2. UNH distinctive in brown, yellow and white; ground colour yellow; fringe brown, except white in spaces 1A to 1C; brown band from base to margin of space 5; brown band in distal half space 1A, distal third of space 1B, and from space 1B to margin at space 3 in a V shape with point at middle of UNH on vein 2; yellow ground colour paler where the white discal and tornal spots are UPH. F ♂ 15.5; ♀ 14.5-15.0. Illustrations in Godman and Salvin (1879-1901, ♂ genitalia, Plate 102.10), Lewis (1973, ♂ UPS Fig. 88.24, UNS Fig. 88.25), Canals (2003, p. 113 UPS and living adults).

In Trinidad, this species with its distinctive yellow and brown UNH (Fig. 9) is only likely to be confused with *V. p. phyllus* above, under which differences are discussed.

Fig. 7. Adult ♂ *Vettius marcus marcus* (Fabricius), Lower Morne Catherine, 17.i.1988. Scale in mm.

Fig. 8. Adult ♀ *Vettius marcus marcus* (Fabricius), Mt. Tabor, 1500 ft. (c. 460 m), 22.vii.1978. Scale in mm.

Kaye (1914; 1921, No. 430) reports *V. marcus* as "not rare in the island". It is a widespread and regularly encountered species in forests in both north and south Trinidad, including the north-west peninsula (Morne Catherine, Point Gourde). It does not seem to be found much on the ridge-tops and mountains of the Northern Range, although I have one specimen from about 1500 ft., on Mt. Tabor (22.vii.1978).

Fig. 9. Adult ♀ *Vettius marcus marcus* (Fabricius), Point Gourde, 27.ii.1994.

The recorded food plants are palms. Moss (1949) reared it from marajá palm (*Bactris* sp. according to MMPND (2009)) and cocínho palm, but does not record or illustrate any details of the early stages. Hayward (1969) states that the caterpillars feed on species of palms, but it is not clear whether this is based on fresh observations or on Moss (1949).

186. J45/12 *Vettius fantasos* (Stoll 1780)

Figs. 10-11.

Evans (1955) treated *V. fantasos* as having two subspecies, but these are now considered separate species: *V. fantasos* and *V. onaca* Evans (Monroe and Miller 1967; Mielke 2004). *Vettius fantasos* is found from Paraguay to Mexico (Evans 1955), and strays rarely into Texas (Scott 1986; Opler and Malikul 1992).

Kaye (1940, No. 428C) added *V. fantasos* (as *Carystus fantasos*) to the Trinidad list, based on "only one record so far of this fairly common and widely distributed species, i-ii.1926 (W. J. Kaye)". Before this, Sheldon (1936) had already recorded it from Speyside, Tobago, based on captures by A. Hall and himself.

Sexes similar (Figs. 10-11); female larger with more rounded wings; male with no brand UPF. UPF dark brown; fringe concolorous, paler in space 1B; white hyaline spots in spaces 2, 3, 6, 7, and a trace in 8; pale yellow-brown spot in lower space 1B. UPH brown; fringe paler; orange-brown discal spot from upper space 1C to space 5, with veins brown. Body dark above; white below; legs pale brown. UNF costa and distal third of wing chestnut brown, blackish on disc and dorsum; base of costa pale; diffuse pale patch in spaces 4-5; spot in space 1B white, extending across space in a narrow bar to spot in space 2. UNH distinctive in variegated chestnut brown and creamy white; veins brown; basal two-thirds of spaces 1B and 1C with a slight brown-grey tint; distal third of spaces 1B and 1C grey-brown. F ♂ 15-16 mm, a small individual of 12.5 mm; ♀ 16.5-17 mm. Illustrations in Godman and Salvin (1879-1901, ♂ genitalia, Plate 102.15), Lewis (1973, ♂ UNS Fig. 88.21), Riley (1975, ♂ Plate 23.10) and several internet sites.

A distinctive species – the chestnut and white variegated UNH with brown veins should serve to identify this species in the Trinidad fauna. Evans (1955) notes the UNH markings vary from largely chestnut to largely white, but they seem constant in Trinidad specimens examined.

Fig. 10. Adult ♂ *Vettius fantasos* (Stoll), Lower Morne Catherine, 17.i.1988. Scale in mm.

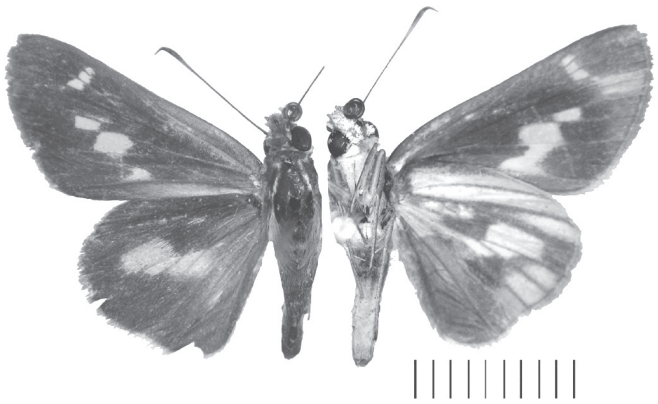

Fig. 11. Adult ♀ *Vettius fantasos* (Stoll), Lower Morne Catherine, 17.i.1988. Scale in mm.

In Trinidad, this species is restricted to the north-west peninsula, where it can sometimes be quite common on the lower slopes of Morne Catherine and on Point Gourde. It also occurs on Gasparee (S. Alston-Smith, ii. 2006). The association seems to be with drier forest.

Sepp (1843-48: 1847 p. 188, Plate 82) illustrates the life history and food plant from Suriname, and states that the food plant is the grass, *Panicum ramosum* L. This is an Asian grass now widely introduced and established throughout the tropics, and is usually known as *Urochloa ramosa* (L.) T. Q. Nguyen, but also sometimes as *Brachiaria ramosa* (L.) Stapf. Most probably based on Sepp's record, Draudt (1921-1924) states the caterpillars feed on grasses such as *P. ramosum,* and Hayward (1947) cites Draudt with the same information. Subsequent records of *B. ramosa* as the food plant (e.g. Scott 1986) are most likely also derived ultimately from Sepp. The grass in Sepp's plate is unlikely to be *U. ramosa* as the arrangement of the inflorescence is different, and it appears to be a *Lasiacis* sp. (Poaceae) (Y. Baksh-Comeau, pers. comm. 2008). Given that *Lasiacis* spp. are the normal food plants of *V. fantasos* (see below), Sepp's food plant record of *U. ramosa* is likely to be a misidentification.

Kendall (1976) collected caterpillars in Mexico on *Lasiacis* sp. "(? *ruscifolia*)" and reared one through. Subsequently, he stated that this was *Lasiacis* sp. "probably *divaricata*" (Kendall and McGuire 1984), which is now considered a synonym of *L. ligulata* Hitchc. and Chase. Janzen and Hallwachs (2009) include 38 rearing records in their database, nearly all from *Lasiacis procerrima* (Hack.) Hitchc. and *L. maculata* (Aubl.) Urb. (= *L. sorghoidea*), but also from *Olyra latifolia* L., two *Panicum* spp. and other grasses, and illustrate the caterpillar and pupa. The life history is not known from Trinidad or Tobago, but one or more of several recorded *Lasiacis* spp. grasses (Hitchcock 1936), including *L. ligulata* are most probably the main food plants.

Sepp (1843-48) states that the larvae hide between leaves, and that having fed upon one leaf, move to another to make a new shelter. He illustrates the caterpillar and pupa. The caterpillar is dull grey-green with a darker dorsal line, and paler ventrally including prolegs; the head is wider ventrally and indent at the vertex; it is similar in colour to the body, with what appears to be a strong dark line from vertex laterally to ocelli, and narrow dark lines close to the epicranial suture and along adfrontals. The pupa, which is shown in an opened leaf shelter, is slender with the abdomen rather elongate; there is a stout slightly upturned frontal spike; the colour is dull grey-green.

Janzen and Hallwachs (2009) include photographs of the final instar caterpillar in their database of Costa Rican rearing. The head is rounded triangular, indent at the vertex; translucent whitish green; a black stripe from vertex, laterally to the ocelli; a broad white stripe in front of this occupying about two-thirds of the width of the epicranium; the epicranial and adfrontal sutures narrowly dark; mouthparts reddish brown. The body is white due to underlying fat bodies; dorsal line darker; spiracles pale; legs concolorous. Although not an exact match to Sepp's (1843-48) painting – the head is broader in the latter and shows narrow black lines each side of the epicranial suture rather than along the suture – they are close enough that they are likely to represent the same species.

187. J45/13 *Vettius artona* (Hewitson 1868)
Fig. 12.

No subspecies are recognised for *Vettius artona* (Evans 1955; Mielke 2004), which was described from Brazil (Rio de Janeiro) and is found from Nicaragua to south Brazil (Evans 1955).

Sexes similar (Fig. 12); female larger with more rounded wings; male with no brand UPF. UPF dark brown; fringe concolorous; white hyaline spots in spaces 2, 3, 6-8 and an upper and lower cell spot; small white spot in lower space 1B. UPH brown; fringe paler; white spots in a row across spaces 1C or 2-4. Body dark brown above; collar weakly orange-brown; body white below; legs-brown. UNF costa light brown; distal third of wing lilac-brown with pale lines in middle of each space; disc and dorsum blackish brown; spot in space 1B larger than UPF, extending beyond spot in space 2, with diffuse margin. UNH ground colour lilac-brown, strongly infused with white on costa and dorsum; veins white; white spots in spaces 1C to 6, the last displaced inwards; white line down the middle of spaces 1C-6 distal to the white spots. F ♂ 16-17 mm; ♀ 17-17.5 mm Illustrations in Godman and Salvin (1879-1901, ♂ and genitalia, Plate 102.16-18), Lewis (1973, UNS Fig. 88.17), Canals (2003, p. 114 UPS, UNS).

The lilac-brown UNH with white veins, lines and spots

is distinctive in the Trinidad fauna, and easily recognised in the field. *Vehilius stictomenes stictomenes* (Butler) has similar markings but is a much smaller and darker butterfly.

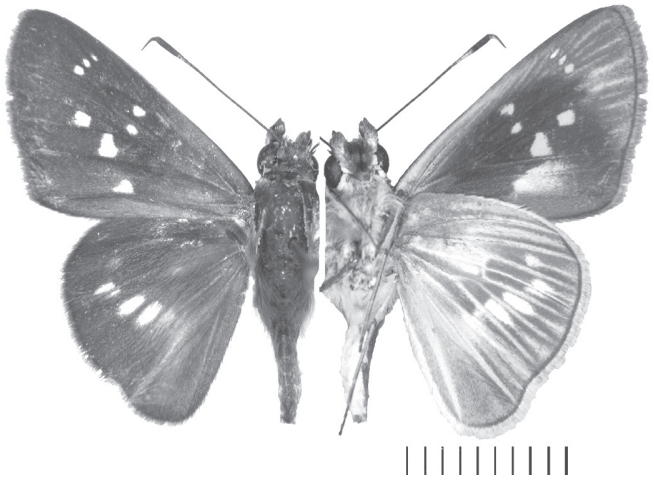

Fig. 12. Adult ♂ *Vettius artona* (Hewitson), Lalaja Ridge, 17.iii.1972. Scale in mm.

Kaye (1904, No. 279; 1921, No. 429) records this species from Trinidad based on "a single specimen from Tunapuna (P. L. Guppy)". This gives the impression that *V. artona* is not a common species, but actually it is a widespread and regularly encountered species in forests in both north and south Trinidad, including the north-west peninsula. It can be found at all altitudes, up to and including the summit of El Tucuche (19.vi.1979). Capture dates suggest a slight bias towards the dry season, but probably it can be found at all times of the year.

According to Beccaloni *et al*. (2008), Zikán and Zikán (1968) give *Bromelia* sp. (Bromeliaceae) as a food plant in Brazil.

187a. J45/21 *Vettius tertianus* (Herrich-Schäffer 1869)
Figs. 13-15.

There are no recognised subspecies of *V. tertianus* (Evans 1955; Mielke 2004), which was described from an unknown locality. However, Godman and Salvin (1879-1901) note that the male which they illustrate from Central America has the UNH more extensively white than South American specimens, and Steinhauser (1974) noted differences between the females from Central America and Colombia (and illustrated the genitalia from both). This is a rare but widespread species - there are specimens in the NHM from Costa Rica, Colombia and Trinidad, and synonyms were described from Suriname and Belem, Brazil (Evans 1955).

Strong sexual dimorphism. Male (Figs. 13-14). UPS and fringe dark brown. UNS body pale brown; legs brown. UNF brown distally, blackish brown on disc and dorsum; diffuse pale brown area at end cell to costa; costal vein of cell pale. UNH in shades of brown and white-brown: basal half of costa brown; a band from base of wing margin of spaces 6 and 7, white-brown basally, pale brown distally; brown band from base of wing to margin of spaces 2-5; pale brown in spaces 1B-1C, the basal part of space 1C paler; space 1A brown. F ♂ 15.5-16 mm. Illustration in Godman and Salvin (1879-1901, ♂ UNS 98.28).

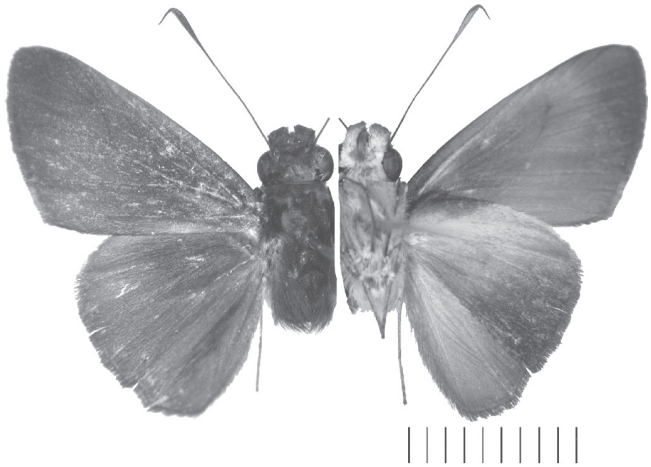

Fig. 13. Adult ♂ *Vettius tertianus* (Herrich-Schäffer), Mal d'Estomac Bay Trace, 5.ix.1982. Scale in mm.

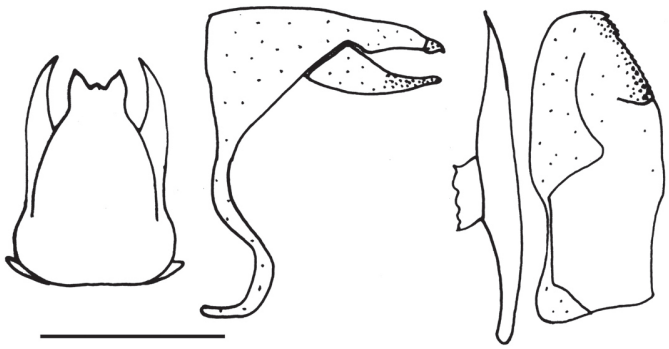

Fig. 14. ♂ genitalia of *Vettius tertianus* (Herrich-Schäffer), Mal d'Estomac Bay Trace, 5.ix.1982. From left to right: uncus and gnathos, dorsal view; uncus and gnathos, lateral view; aedaeagus, lateral view; left valve, internal view. Bar = 1 mm.

Female (Fig. 15). UPF brown; white hyaline spots in spaces 2, 3, 6 and 7; white spot in lower space 1B. UPH brown; diffuse white band from space 1C to 4, veins brown. Body brown above; white below; legs brown. UNF brown, paler on distal half of costa; spot in space 1B slightly larger than UPF; costal vein of cell pale. UNH predominantly white; fringe brown, white at apex; basal half of costa brown; brown band from base of upper space 1C across cell to space 5; broad brown margin widest in

space 2, narrowing and paler brown with increasingly diffuse margin to apex; spaces 1B and 1C with diffuse pale brown margin. Illustration in Steinhauser (1974, ♀ and ♀ genitalia).

Fig. 15. Adult ♀ *Vettius tertianus*, Las Lomas, 25.ii.1981, S. Alston-Smith, (specimen in SAS). Scale in mm.

Both male and female are distinctive amongst Trinidad skippers: the male by virtue of its plain brown UPS and unusual brown and white UNS, and the female by virtue of its distinctive UNS, particularly the white UNH marked with brown.

A male specimen listed by Evans (1955) in the NHM is the first published record of this species from Trinidad. I could not locate this specimen in the NHM, although there was an empty space over a "Trinidad" label. I overlooked Evans' record when compiling my 1982 list of the Trinidad and Tobago Hesperiidae (Cock 1982). I have taken a male (Mal d'Estomac Bay Trace, 5.ix.1982; Fig. 13) and Scott Alston-Smith (pers. comm.) has caught males at, Morne Catherine (i.1983, v.1986, iii.1984) and Edward's Trace, Moruga (v.1992), and females at Las Lomas, Spanish Farm (25.ii.1981; Fig. 15), Lalaja Ridge (viii.1990) and Inniss Field (v.2003). Thus unlike other species of this genus in Trinidad, this is one of the island's rarities, and it is difficult to suggest a pattern as to where it can be found, except that it will frequent forests where the epiphytic bromeliad, *Aechmea mertensii* (G. Mey.) Schult. & Schult. f., occurs in ant gardens (see below).

Moss (1949) bred this species once from "tiririca grande" (*Scleria* sp. Cyperaceae), reporting that "The pupa is brown and rounded at the extremities and is tightly packed in a closed web", but providing no information on the caterpillar. There is no preserved material of the early stages of this species from Moss' collection in the NHM.

An interesting study by Orivel and Dejean (2000) in Guyane showed that *V. tertianus* develops exclusively on the leaves of *Aechmea mertensii*, a bromeliad epiphyte restricted to ant gardens – the first record of myrmecophily by a hesperiid in the Americas. Plants of *A. mertensii* in gardens of *Pachycondyla goeldii* (Forel) (Ponerinae) are preferred, which is also unusual as this subfamily of ants do not normally interact with other arthropods in this way. Orivel and Dejean (2000) describe and illustrate the egg, caterpillar and pupa. The egg is large, approximately 2 mm in diameter, orange with a purple micropyle and is laid on the leaf upper surface, near the base. The caterpillars are green, lightly speckled with black, black spiracles and a brown head, darker posteriorly and darker in the earlier instars. However, there is no illustration of the face or description of any markings on the face, cf. Janzen and Hallwachs (2009) below. The caterpillars make a minimal shelter at the base of a leaf by pulling the sides together with a few threads of silk. The pupa is speckled yellow-brown, the head darker, with a short, stout pale brown frontal spike. It is formed on leaves or on the carton nest of the ant garden. The ants ignore the caterpillars and pupae, but the exact chemical mechanism was not identified.

From their work in Costa Rica, Janzen and Hallwachs (2009) include ten rearing records, all from *Catopsis floribunda* L.B. Sm. (= *C. nutans*) (Bromeliaceae), and illustrate the caterpillar and pupa. Their photographs show that the caterpillar has a dark patch each side of the anal plate and that the head is obscurely marked in shades of brown, showing a darker brown cross on the face with yellow-brown patches at the apex of each epicranium and in front of the ocelli. The pupa in their photographs is green with dark spiracles and the proboscis sheath extending to the cremaster, but basically similar to that illustrated by Orivel and Dejean (2000) – the difference in colour probably being attributable to age and lighting.

The well documented records of bromeliads as food plants for this species (Orivel and Dejean 2000; Janzen and Hallwachs 2009) suggest that Moss' (1949) record from a sedge may be incorrect. Furthermore, since Moss states there is no frontal spike on the pupa, whereas the above papers show that there is one, it seems that the early stages reported by Moss are not correctly associated with *V. tertianus*.

188. J47/1 *Turesis complanula* (Herrich-Schäffer 1869) Fig. 16.

This species has long been known as *T. lucas* (Fabricius) (e.g. Evans 1955; Cock 1982), but this was a long-standing misidentification as *lucas* has now been shown to be a senior synonym of *Panoquina sylvicola* (Herrich-Schäffer) (Robbins *et al*. 1996; Mielke and Casagrande 2002; Mielke 2004). The next available name is *complanula* (Herrich-Schäffer). It is found from

Guatemala to South Brazil, but is generally uncommon (Evans 1955).

Sexes similar (Fig. 16); female slightly larger, with wings more rounded. UPF brown, with ferruginous hairs basally; fringe brown; large yellow hyaline spots in spaces 2, 3, 6, 7 and upper and lower cell; yellow spot in lower space 1B. UPH brown, with ferruginous hairs over base and disc; fringe brown, paler at tornus; yellow hyaline spot in space 3 and a trace of one in space 2. Body brown above with ferruginous hairs; pale yellow-brown below on head and thorax, yellowish white on abdomen, with a weak darker ventral line basally. UNF chestnut on costa and apex, blackish brown on disc and dorsum; fringe concolorous except paler in space 1B; yellow spot in space 1B larger than UPF with a diffuse distal margin. UNH dark chestnut, space 1B less ferruginous; fringe paler; yellow hyaline spot in space 3, but only a trace in space 2. F ♂ 18 mm. Illustrations in Godman and Salvin (1879-1901, ♂ Plate 104.22-23).

Fig. 16. Adult ♂ *Turesis complanula* (Herrich-Schäffer), Arima-Blanchisseuse Road, milestone 9¾, Andrew's Trace, 3.xi.1980. Scale in mm.

The large yellow hyaline spots F, hyaline spot in space 3 UNH and chestnut UNS will serve to recognise this species in Trinidad.

A single male listed by Evans (1955) from Trinidad in the NHM is the first record of *T. complanula* from the island. I have seen just five specimens from the island, two from the north (♂ Andrew's Trace, 3.xi.1980; ♂ Mt. Tabor, c. 1000ft., 22.xi.1981), one from Central Trinidad (♂ Caparo, F. Birch, NHM, listed by vans (1955)) and two from the south (♂ Parrylands, 13.ii. 1980; ♀ Rio Claro, 15.ii. 1926 (N. Lamont) NMS). Scott Alston-Smith (pers. comm.) has captured six specimens from scattered locations, mostly southern forests and one from Mt. Tamana. Thus, this is a rare species associated with forest situations and could probably turn up in forests anywhere in the island.

Janzen and Hallwachs (2009) have reared more than 200 specimens in Costa Rica, mostly on *Pharus latifolius* L. and *P. mezii* Prod. (Poaceae). Their photos of the head capsules of the final instar are variable in colour and intensity, but show a pale ground colour, dark epicranial suture which may extend along adfrontals, dark band from vertex laterally to ocelli and yellow or red area anterior to ocelli. Dyer and Gentry (2009) illustrate the caterpillar found on *Pharus* sp. in Costa Rica under this name, but note that more than one species may be involved. Observations from Trinidad would be of interest.

Pharus latifolius and *P. parvifolius* Nash occur in Trinidad (Hitchcock 1936) and *P. latifolius* or both are likely to be the food plants of this uncommon skipper in Trinidad.

189. J48/5 *Thoon taxes* Godman 1900

Figs. 17-19.

This species was described from Panama, and is found from there through the Guianas to south Brazil (Evans 1995), with no subspecies (Mielke 2004). Evans (1955) lists a male and two females from Trinidad, and this was the first record of this species from Trinidad. I have examined these specimens in the NHM. The male is discussed below, but in my opinion, the two females curated as *T. taxes* are females of *Arita arita* Schaus, a forest species in Evans' Group J, with confusingly similar females, which I will treat in a future contribution.

Male. UPS brown; fringe brown, paler UPH. UPF white hyaline spots in spaces 2, 3, 6 and upper cell; yellow spot in lower space 1B. Brand conspicuous, black, in two parts: the upper part covering the base of space 2, 2 mm long against vein 2, external margin in an arc extending in a very fine upper point to half the width of the base of space 2; the lower part under vein 2 just below and parallel to but slightly shorter than the lower margin of the upper part. All other specimens in the NHM have the outer margin of the upper brand truncate with no extension along the base of space 2. Body brown above; head pale below, palpi segment 2 slightly tawny; thorax pale brown below; abdomen white below with a thin ventral dark line. UNF brown; blackish brown on disc and dorsum; spot in space 1B on UPF is not present UNF, but there is a diffuse white area, with a sharp diagonal basal margin which at the upper end aligns with the middle of the white hyaline spot in space 2. UNH brown, fringe paler; pale spots in spaces 1C-5 and cell; a pale spot in space 1B, with the base pointed. Illustrations in Godman and Salvin (1879-1901, ♂ UPS and UNS Plate 97.39-40), Lewis (1973, ♂ UPS Fig. 87.36).

SAS has a specimen which probably belongs to this species (Fig. 18), but it lacks the white hyaline cell spot

UPF, and has dots in spaces 6-8; the upper arm of the brand in space 2 extends to the base of space 3, unlike any other specimens I have seen; UNH has more of an olive tint; UNH spots more diffuse; spot in cell UNH closer to end cell; UNS abdomen has no dark ventral line. They may well be different species, but if so, I could not match it in the NHM.

Fig. 17. Adult ♂ *Thoon taxes* Godman, Arima Dist., xii.1931-ii.1932, A. Hall, (specimen in NHM). Scale in mm.

Fig. 18. Adult ♂ *Thoon taxes* Godman, Trinidad, S. Alston-Smith, (specimen in SAS). Scale in mm.

Female, similar to male, but without the brand, and wings more rounded: the yellow spot in space 1B UPF is more pronounced; apical spots are present in spaces 6-8, that in space 8 displaced apically; the inner margin of the white area in space 1B UNF is diagonal.

Moss (1949) bred this species "from *Carex* sp. [Cyperaceae] and from a ground bamboo [*Olyra* sp. Poaceae]", but does not illustrate any early stages. His preserved material in the NHM includes three emerged pupae in leaf shelters, one with an associated cast caterpillar skin covered in white waxy powder. The head capsule is about 3.5 mm high, and 2.5 mm wide; pale brown, with a dark band from the vertex to the ocelli, and another along the epicranial suture and the afrontals. The pupal shelter is

Fig. 19. Adult ♀ *Thoon taxes* Godman, Brazil, Pará, reared on *Carex* sp., A. M. Moss, (specimen in NHM). Scale in mm.

made in a folded leaf of what appears to be *Olyra* sp. The inside of the shelter and the pupa are covered with white waxy powder. The pupa is 20 mm long, pale brown; no frontal spike; the proboscis sheath extends to the cremaster. There is another head capsule pinned with this pupa, which is incorrectly associated, as it does not match the one I have described which was within the shelter wedged against the cremaster. Moss labelled this material "*Rhinthon cynea*", and applied the same name to reared male and female *T. taxes* (in the NHM), so not only the immature stages, but the two sexes of this species should be correctly associated. I have not located any other information on the food plants or early stages.

***Justinia* Evans**

Males of *Justinia* and *Eutychide* (treated next) have distinctive brands at the base of space 2, over and under vein 2 and over vein 1. These brands, the relatively long antennae, and the reasonably distinctive UNH markings should help to identify these species.

190. J49/3 *Justinia gava* Evans 1955

Figs. 20-21.

Evans (1955) described this species from Guyana (formerly British Guiana), and its range is restricted to the Guianas and Trinidad (Cock 1982).

Sexes similar (Figs. 20-21); female larger, with more rounded wings; male with a three-part brown brand: a V shape along base of space 2 (2.5 mm) and above basal part of vein 2 (1.5 mm), below basal part of vein 2 (1.8 mm) and above vein 1 (2.0 mm). UPF dark brown; fringe concolorous, paler in space 1B; white hyaline spots in spaces 2, 3, 6, 7 and upper cell; semi-hyaline spot in space 1B. UPH brown; fringe paler. Body above dark brown; head orange-brown laterally; head pale brown below; thorax dark brown below; abdomen pale below with dark ventral line; legs dark brown. UPF basal half of costa chestnut; yellow spots at mid costa and end of space 8;

apex chestnut, paler and slightly lilac at the ends of spaces 3-5; disc and dorsum blackish brown, paler distal to the white spot in space 1B; thin black line along margin. UNH dark chestnut brown; space 1B grey-brown; a diffuse whitish band from base of space 1C, across cell to mid costa; marginal area of spaces 2-5 paler; one female has fine yellowish streaks at margin in middle of each spaces 2-5; a distinct white spot at mid space 1C; a thin black line along margin. F ♂ 15.5-16 mm; ♀ 16.5-17 mm.

The white bar UNH against a dark chestnut ground colour, together with the spot mid space 1C should suffice to distinguish this species in Trinidad. Evans (1955) states that the forewing length of this species is 18 mm and the material in the NHM curated by Evans are consistently distinctly larger than the Trinidad material that I have seen. It may be that the specimens from Trinidad represent a small strain, perhaps restricted to the island, or possibly a distinct species.

Fig. 20. Adult ♂ *Justinia gava* Evans, Morne Catherine, 24.iii.1982. Scale in mm.

Fig. 21. Adult ♀ *Justinia gava* Evans, Mal d'Estomac Bay Trace, 6.ix.1983. Scale in mm.

I added this species to the Trinidad list (Cock 1982) based on specimens from Morne Catherine (♂ 24.iii.1982), Upper Lady Chancellor Road (♀ 28.i.1979), the summit of El Tucuche (♂ 19.vi.1979), and Guanapo Valley (♂ 16.ii.1980). Since then I have seen specimens from Andrew's Trace (♂ 19.iv.1982) and Mal d'Estomac Bay Trace (♀ 6.ix.1983), and there is an undated specimen in HEC collected by F. W. Jackson from "Trinidad forests & mountains". Thus, this seems to be a fairly uncommon species of the Northern Range and immediate vicinity, usually associated with forest.

The biology and food plants do not seem to have been recorded (Mielke 2005; Beccaloni *et al*. 2008). Given the observations on the next species, the food plant is likely to be sedges, such as a *Scleria* spp.

191. J49/4 *Justinia justinianus hyperythrus* (Kaye 1914)
Figs. 22-27.

There are four subspecies of *Justinia justinianus* (Latreille) (Mielke 2004), which is recorded from Venezuela to Argentina (Evans 1955) Kaye (1914) described the Trinidad subspecies as *Euroto hyperythrus* based on the type which he collected near Port-of-Spain, in June 1898; the male type is in MGCL. Bell (1932) also described it from Trinidad, as *Eutychide insulanus*, and illustrated the male genitalia (Evans 1955; Mielke 2004). Evans (1955), and hence Cock (1982), treated the Trinidad subspecies as *tavola* Schaus, which was described from Trinidad (Schaus 1902). However, having examined the type specimen, Mielke (1994) reported that *tavola* had been misidentified by Evans (1955) and was another species - the one that Evans treated as *Phanes hoffmanni* Bell, which is restricted to Brazil and not found in Trinidad. Accordingly, the type specimen of *tavola* must have been incorrectly labelled as from Trinidad. Hence, *hyperythrus* Kaye is the senior name available for the subspecies of *Justinia justinianus* found in Trinidad (Mielke 2004), with *insulanus* a synonym. At present, it is reported only as an endemic subspecies.

This species occurs in the Trinidad literature under several names. Kaye (1904, No. 259; 1921, No. 405) first reports it as *Phanis* [sic!] *justinianus* based on "a single specimen in July", but this is actually *Phanes aletes* (Geyer), which Kaye incorrectly lists as a synonym, probably based on Godman and Salvin (1879-1901, Plate 99.24-27) who illustrate *Phanes aletes* (Geyer) as *justinianus*.

Then, as stated above, Kaye described it as *Euroto hyperythrus* (Kaye 1914; 1921, No. 408). In the same publications he also lists it as *Eutychide cingulicornis* (Herrich-Schäffer) from "St. Ann's (G. E. Tryhane)" (Kaye 1914; 1921, No. 403), which may reflect the uncritical inclusion of G. E. Tryhane's identification without seeing the specimen - since *cingulicornis* is a synonym of ssp. *justinianus* from south Brazil and Argentina.

Sexes similar (Figs. 22-23); female larger with more rounded wings, and may have a white spot in space 1B UPF; male has brands similar to those described for *J. gava* above. UPF dark brown; fringe concolorous; white hyaline spots in spaces 2 (narrow), 3, 6 and 7. UPH dark brown; fringe concolorous. Body dark brown above; head pale brown below; thorax brown below; abdomen dark brown with a pair of pale brown sub-ventral lines; legs brown. UNF dark orange-brown basal half of costa; dark chestnut brown with purple tint apically; black-brown on disc and dorsum; diffuse white spot in space 1B; a thin black line along margin. UNH dark chestnut with purple tint, paler basally and at margin; space 1B grey-brown; a thin black line along margin. F ♂ 15 mm – a small individual of 12 mm; ♀ 15.5 mm – a small individual of 13 mm. Illustrations in Lewis (1973, ♂ UNS Fig. 83.19).

A less distinctive species than others treated here. The male brands, narrow spot in space 2, purple tint UNS and especially the UNH with slightly paler base and margin (Fig. 24), should help to recognise it.

Fig. 22. Adult ♂ *Justinia justinianus hyperythrus* (Kaye), Lopinot-Arima Ridge, [Andrew's Trace] 8.ix.1979. Scale in mm.

Fig. 23. Adult ♀ *Justinia justinianus hyperythrus* (Kaye), edge of Aripo Savannah, 12.viii.1979. Scale in mm.

This is an occasional species in forests of Trinidad. Most records are from the Northern Range, including Morne Catherine, and it can be found to at least 2800 ft. (c. 850 m) on El Tucuche. I also have records from Las Cuevas, Aripo Savannah and Mt. Harris, but not from the south of the island.

Fig. 24. Female of newly emerged *Justinia justinianus hyperythrus*. Collected as pupa on *Scleria* ?*mitis*, swamp behind beach at Las Cuevas Bay, 17.01.2004 (MJWC 04/46A). The pale margin UNH is an artefact, as the butterfly has emerged from the pupa with scales missing here, perhaps due to some deformation of the pupa (although not visible, the right forewing is also slightly crumpled).

Nothing seems to have been recorded hitherto about the biology and food plants (Mielke 2005; Beccaloni *et al*. 2008). In the NHM collection there are five emerged pupae identified as *J. justinianus*, which represent two different species, neither of which match the material I describe below, one having no frontal spike, and the other a 2.5 mm forward pointing frontal spike.

In January 2004, in the swampy area immediately behind the beach at Las Cuevas Bay, I found a caterpillar and a pupa (MJWC 04/46) on a non-flowering sedge which I think was the same as one I collected from the same area in 2003 and was identified as *Scleria mitis* P. J. Bergius (MJWC 0267). The caterpillar completed its development on *Carex* spp. and I was able to rear through two females from this material. The account below is based on this collection.

I have also found a fourth instar caterpillar (Fig. 25) and an emerged pupa (MJWC 03/229) that may be this species on a large *Scleria* sp. (MJWC 0278) on Mt. Harris, 25.iii.2003. I was not able to rear the caterpillar, but I could not distinguish the caterpillar and pupa remains and photos from those of *J. justinianus hyperythrus*.

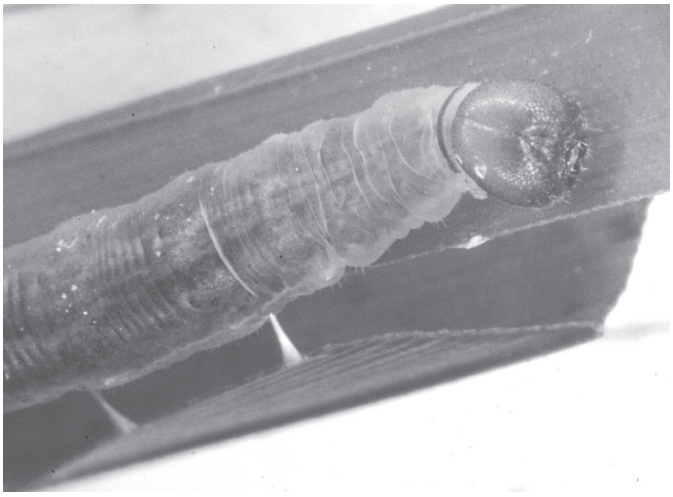

Fig. 25. Fourth instar caterpillar of *Justinia ? justinianus hyperythrus*, head and anterior body segments. Collected on *Scleria* sp. (MJWC 0278), Mt. Harris, 25.iii.2003 (MJWC 03/229).

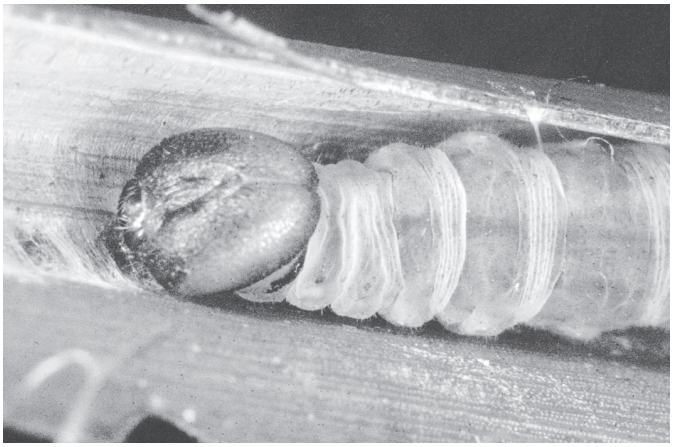

Fig. 26. Fifth instar caterpillar of *Justinia justinianus hyperythrus*, head and anterior body segments. Collected on *Scleria* ?*mitis*, swamp behind beach at Las Cuevas Bay, 17.01.2004 (MJWC 04/46B).

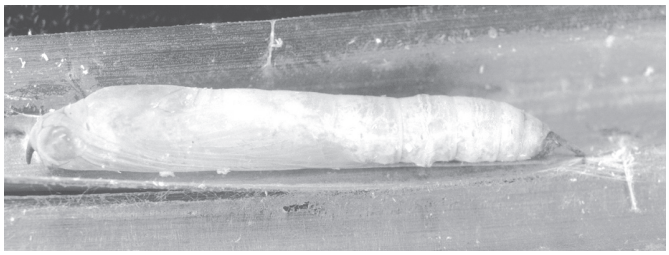

Fig. 27. Pupa of *Justinia justinianus hyperythrus*, lateral view. Collected on *Scleria* ?*mitis*, swamp behind beach at Las Cuevas Bay, 17.01.2004 (MJWC 04/46A).

Scleria mitis is widespread in Trinidad, as are several other *Scleria* spp. (Adams 1992), so there is no reason not to expect *J. justinianus hyperythrus* to occur in the south of the island as well.

The leaf shelter of the caterpillar and pupa was simply formed by pulling the edges of a leaf downwards to make a tube held by several strands of silk. The newly moulted fifth instar caterpillar (Fig. 26) measured 18 mm and grew to 24 mm. Head 2.6 x 2.2 mm (high x wide); oval, narrower at the top and slightly indent at vertex; ground colour light brown; brown ventrally, over clypeus and adjacent epicranium to the width of the clypeus, with a diffuse margin to this area. T1 with a narrow dark dorsal plate. Body dull dark, translucent green; trachea evident; spiracles pale; all legs concolorous. In the mature caterpillar, wax glands develop ventro-laterally behind the prolegs on A3-A6 and on the anterior margin of A7. The head of the fourth instar caterpillar (1.8 x 1.7 mm high x wide) is similar to that of the fifth instar.

The pupal shelter is lined with silk, and the rolled tube is blocked 12-17 mm behind the cremaster and 5-10 mm in front of the head with a loose tangle of silk threads mixed with white flocculence. There was no white waxy powder on the pupa, although there was on the cast caterpillar head. The pupa (Fig. 27) was attached by the cremaster directly to the silk lining, and there was no girdle. The pupa is very slender with a down-turned cremaster and a distinctive very short, downward directed frontal spike; cuticle almost transparent, so that body contents provide the colour, and will change over time as the pupa develops; when collected (18 days before emergence) ground colour pale, head with a brown tint, thorax with a yellow-green tint and abdomen with a creamy yellow tint; frontal spike and cremaster dark; spiracles inconspicuous.

192. J50/2 *Eutychide complana* (Herrich-Schäffer 1869)
Figs. 28-29.

This species can be found from Mexico south to the Amazon and Bolivia (Evans 1955), with no subspecies recognised (Mielke 2004).

Sexes similar (Fig. 28). UPS dark brown with yellow hyaline spots in spaces 2, 3, 6-8; fringe pale brown on termen H, spaces 1 and 2 F and brown for the rest of F. UNF brown, darker at base of disc; UNH brown with a variable purple sheen, margin slightly paler beyond dot in space 3; fringe as UPS. The ♀ often has a spot in space 1B against vein 1 UPF, and a dot in space 4. The ♂ is smaller with more pointed wings and grey-brown brands: a 2.5 mm long V above vein 2 and against cell, a 5 mm streak below origin vein 2, and a matching 4 mm streak above vein 1. F ♂ 22 mm. Illustrations in Godman and Salvin (1879-1901, ♂ venation and genitalia as *E. midia*

(Hewitson), a synonym, Plate 99.10-13) and Lewis (1973, ♂ UPS Fig. 82.58).

This species can be recognised by its size, arrangement of the brands in the ♂, yellow hyaline spots and lack of other markings. It is only likely to be confused with *E. subcordata*, which is treated next. These two species are not so easily distinguished, except by the yellow hyaline markings of *E. complana* compared to the white ones of *E. subcordata* – at least in fresh specimens. In addition, *E. subcordata* is slightly smaller; the spots in spaces 2 and 3 are not as wide as the space between them, whereas in *E. complana*, these spots are wider than the space between them; and the UNH of *E. subcordata* is darker and more uniform than that of *E. complana*. Godman and Salvin (1879-1901) point out that the genitalia are rather similar – the differences are more a matter of degree than qualitative, but they are clear in the claspers shown in Fig. 29.

Fig. 28. Adult ♂ *Eutychide complana*, nr. Moruga Bouffe, 12.iii.1981. Scale in mm.

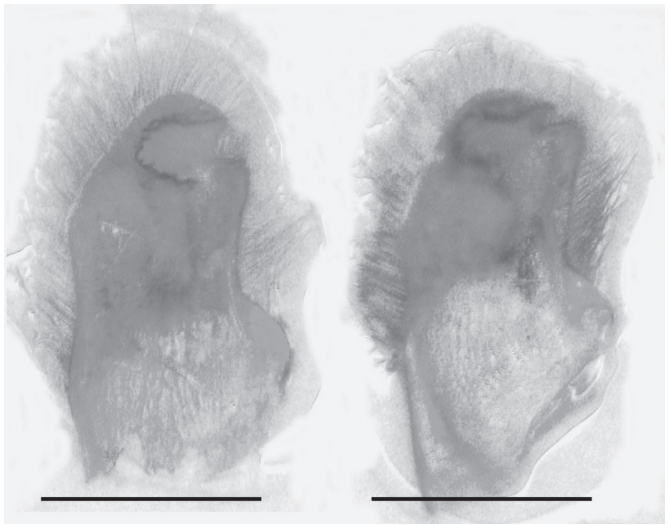

Fig. 29. Left claspers of *Eutychide* spp. **Left**, *E. complana*, Moruga Bouffe, 12.iii.1981; **right**, *E. subcordata*, Moruga East, 24.ii.1980. Bar = 1 mm.

I added this species to the Trinidad list based on my capture of a male near Moruga Bouffe, 12.iii.1981 (Cock 1982) and a previously unrecognised ♀ from Palmiste, 7.x.1947, in Sir Norman Lamont's collection in UWI. There have been no subsequent records, although this species could easily be overlooked as *E. subcordata* (Herrich-Schäffer) treated next. It does seem to be a rare species in Trinidad with no clear habitat association, except that given the intensity of collecting in the north of the island it may be that it is not found in the north.

Moss (1949) notes that the biology and food plants of *E. complana* are similar to those of *E. subcordata* (below), i.e. "on sugar cane, wild cane and on bamboo". I have found no other information regarding the life history of this species.

193. J50/3 *Eutychide subcordata subcordata* (Herrich-Schäffer 1869) Figs. 30-33, 35-38.

Eutychide subcordata occurs in two subspecies: *ochus* Godman from Central America and the nominate *subcordata* from Colombia, the Guianas and Amazon (Evans 1955; Mielke 2004). Kaye (1914) described and illustrated *Cobalopsis rogersi* from a male taken in Emperor Valley, 28.i.1913 by K. St. A. Rogers, but which Evans (1955) recognised as a subspecies of *E. s. subcordata*. Kaye (1914; 1921, No. 402) also included the Central American subspecies as *Eutychide ochus* based on a record from St. Ann's (G. E. Tryhane). As suggested for *J. justinianus* above, this may represent the uncritical inclusion by Kaye of an identification by G. E. Tryhane, without actually seeing the specimen(s), as he would surely have recognised that Tryhane's specimen and his *rogersi* were the same species.

This species (Figs. 30-31) is confusingly similar to *E. complana* and is discussed under that species above.

Fig. 30. Adult ♂ *Eutychide subcordata subcordata*, Moruga east, 24.ii.1980. Scale in mm.

F ♂ 20-20.5 mm – rather larger than the 18 mm given by Evans (1955); ♀ 19.5-21.5 mm. Illustrations in Godman and Salvin (1879-1901, ♂ venation and genitalia of ssp. *ochus,* Plate 99.10-13) and Kaye (1914 as *C. rogersi*).

This species is quite common and widespread in lowland situations in Trinidad, not extending to any great

Fig. 31. Adult ♀ *Eutychide subcordata subcordata*, collected as pupa on *Bambusa vulgaris*, Arima Valley, milestone 3¾, by river, 18.xii.1981 (MJWC 30B). Scale in mm.

altitude – the highest locality I have seen being 600 ft (c. 180 m; ♂ Hololo Mountain Road, 17.i.1928, F. W. Jackson, HEC). I have one record of a female attracted to a MV light trap (Curepe, 6-11.xii.1981, F. D. Bennett). It does not seem to be attracted to flowers, resting quietly in shady situations.

Moss (1949) reared this species "from an ugly lead-coloured caterpillar with a dull brown pupa with rounded end. They were found on sugar cane, wild cane and on

Fig. 32. Adult ♂ *Eutychide subcordata subcordata,* collected as caterpillar on *Bambusa vulgaris*, 16.i.2004, Inniss Field (MJWC 04/26B).

Fig. 33. Adult ♀ *Eutychide subcordata subcordata,* collected as caterpillar on *Bambusa vulgaris*, 16.i.2004, Inniss Field (MJWC 04/26G).

bamboo" and illustrates the caterpillar (Moss 1949, Fig. V.15). Beccaloni *et al*. (2008) add records from grass and *Bambusa vulgaris* Schrad. ex J.C. Wendl. from Trinidad based on (Cock pers. comm.). Margaret E. Fontaine reared this species in Trinidad (specimens in NHM), but did not paint the early stages or include the food plant on the specimen labels.

My unpublished record of "grass" in Beccaloni *et al*. (2008) is an error that I made when reference numbers on two specimens from Curepe were transposed. Hence the record from an unidentified broad-leaved grass (MJWC41) is actually *Cobalopsis nero* (Herrich-Schäffer), and the record of *C. nero* from bamboo in the same compilation should be *E. subcordata*. Fortunately, my notes and the associated larval and pupal remains with the two specimens leave no room for doubt as to the correct association. Similarly, Beccaloni *et al*. (2008) list an unpublished record of mine of *Enosis angularis*? (Möschler) (Cock 2005) on *B. vulgaris*, whereas closer examination of the remains of the early stages and the adult that I dissected from the dead pupa show that it is a female *E. subcordata*.

Thus, I have reared *E. subcordata* only from *B. vulgaris* (Fig. 34) in Trinidad as follows: Arima Valley, milest. 3¾, by river, MJWC 30B; Inniss Field, MJWC 04/26; Lower Morne Catherine, MJWC 94/13; and Inniss Field, MJWC 04/26, 04/35. The following account is based mostly on a collection made at Inniss Field, 16.i.2004 (MJWC 04/26) of seven caterpillars of instars 3-5, three of which were reared through to adult.

Fig. 34. Seven caterpillars of *Eutychide subcordata* were collected from leaves of *Bambusa vulgaris* in this roadside patch, Inniss Field, 16.i.2004 (MJWC 04/26).

An egg laid on the edge of a young leaf, was probably that of *E. subcordata subcordata* (Fig. 35). It was hemispherical with a slight rim around the base, 1.27 mm diameter, 0.74 mm height, finely reticulated except at apex, and white. The irregular dark internal markings suggest that it was infertile.

Fig. 35. Egg found on *Bambusa vulgaris* in the vicinity of several shelters and caterpillars of *Eutychide subcordata subcordata*, and assumed to be of the same species, Inniss Field, 16.i.2004 (MJWC 04/26H), 1.37 mm in diameter.

The shelters of the larger caterpillars were mostly formed by making a cut from the edge of a leaf, fairly near the base, folding the distal portion over upwards and tying with silk (Fig. 36); the basal flap was closed neatly, and often the caterpillar fed on the basal portion of the leaf below the cut. However, the caterpillar did not normally feed on the distal portion of the leaf, but rather fed on adjacent leaves (Fig. 36), thereby making the leaf with the shelter less conspicuous (at least to this human searcher).

One shelter (MJWC 04/26D) was made by rolling the whole leaflet downwards with no cuts or feeding. However,

Fig. 36. Leaves of *Bambusa vulgaris* with a typical shelter of *Eutychide subcordata subcordata* on the distal leaf, and extensive feeding on three of the four next leaves.

the caterpillar that made this shelter was parasitized by a tachinid macro-type egg layer and did not feed before dying, and so may not have been behaving normally.

The caterpillars of instars 3, 4 and 5 are similar (Fig. 37). Newly moulted, instar 4 measured 19 mm and instar 5 measured 22 mm, and grew to 35 mm. The head capsules of the three instars measured 1.9 x 1.8 mm, 2.6 x 2.4 mm and 3.3 x 2.9 mm (high x wide, +/- 0.1 mm) in one individual (MJWC 06/26E). Head colour varied from brown to dark black-brown, sometimes paler towards apex of epicranium, epicranial suture darker; head surface slightly shiny, rugose, no setae. T1 with a short, narrow diffuse dark band. Body dull translucent green; spiracles pale, surrounded by star of trachea visible through cuticle; legs concolorous. The wax glands of the mature larva are a pair of short transverse ventro-lateral bars on each side, between the prolegs, on the posterior margin of segment with prolegs (A3-A6) running onto the anterior margin of the next segment (A4-7).

The pupal shelter is lined with white waxy powder, as is the cast caterpillar skin, but the pupa itself is only very finely covered. There is a simple silk girdle near the posterior margin of the thorax. The pupa (Fig. 38) is 22 mm long, slender and rounded in outline, the thorax slightly bulbous; no frontal spike, but a slight bulge on the frons; the proboscis sheath is light brown distally and extends at least two abdomen segments beyond the wing cases. Short, brown setae on the anterior and posterior parts of the eye; longer erect brown setae on anterior part of thorax in a band on each side, running anterior-lateral to posterior-dorsal. Colour yellow-white; spiracle T1 light brown, slightly protuberant; other spiracles inconspicuous, concolorous. The empty pupa is transparent and flimsy. Pupation lasted 19-21 days in captivity.

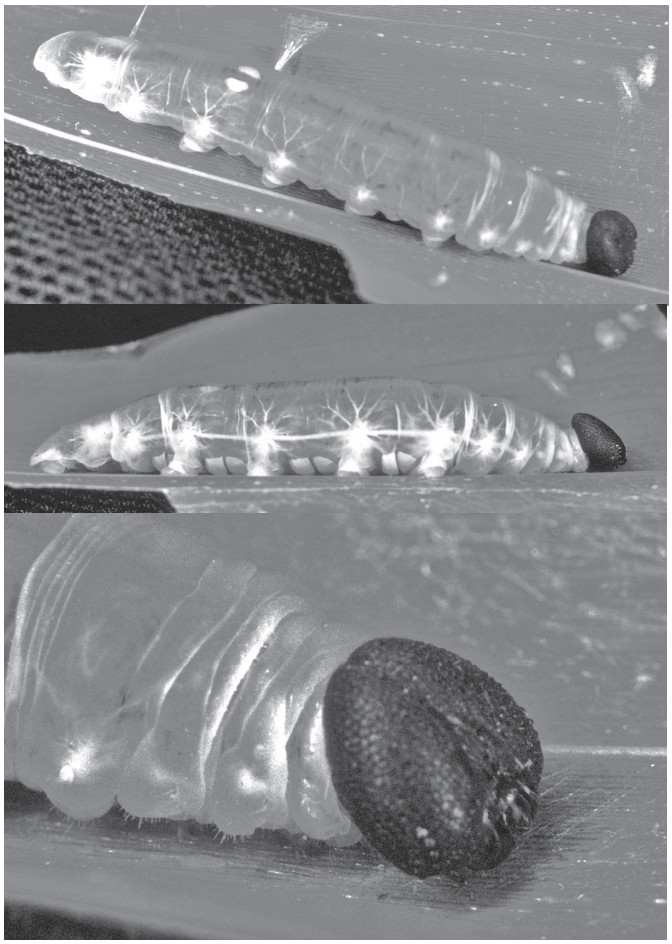

Fig. 37. Fifth instar caterpillar of *Eutychide subcordata subcordata* collected on *Bambusa vulgaris*, 16.i.2004, Inniss Field (MJWC 04/26B). **Top**, dorso-lateral view; **middle**, lateral view (note ventro-lateral wax glands); **bottom**, close up of head.

Two of the caterpillars collected at Inniss Field were parasitized by tachinids. One fifth instar caterpillar (MJWC 04/26D) had four macrotype eggs on its thorax, and died soon after collection, and the tachinids failed to complete their development. Another caterpillar (MJWC 04/26F), also collected as a fifth instar, pupated successfully although there was some discoloration visible ventrally on the thorax (Fig. 38); a tachinid puparium formed in the head and thorax of the pupa, leaving the abdomen empty, and the adult fly emerged two weeks after pupation of the host. As yet, it has not been identified.

This is perhaps the commonest hesperiid on bamboo in Trinidad, but other species feed on this food plant, including *Flaccilla aecas* (Stoll) (= *Aecas aecas*) (author's unpublished observations). The mature larva of *F. aecas* is similar to that of *E. subcordata*, but the head is narrower, the apices are distinctly paler brown, and the body has a subcutaneous layer of fat with darker spots, giving a rather different appearance. The pupa of *F. aecas* is relatively robust, light brown, with a very small, dark, downward turned frontal protuberance.

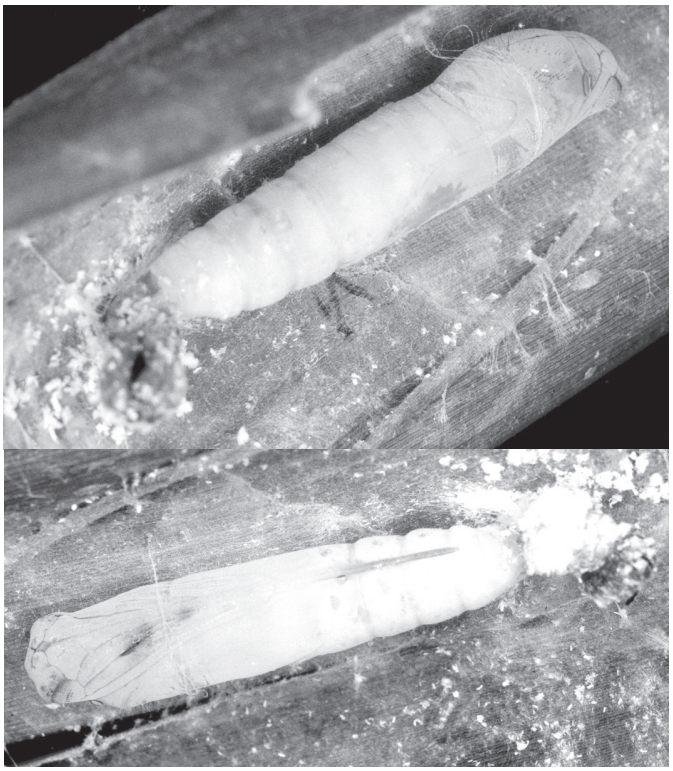

Fig. 38. Pupa of *Eutychide subcordata subcordata*, lateral view and ventral view; collected as caterpillar on *Bambusa vulgaris*, Inniss Field, 16.01.2004 (MJWC 04/26E). **Above**, lateral view; **below**, ventral view (the discoloration in the thorax is the larva of a tachinid parasitoid).

194. J51/1 *Onophas columbaria columbaria* (Herrich-Schäffer 1870) Figs. 39-41.

This subspecies is found from Panama to Ecuador and the Amazon, but is uncommon everywhere except Trinidad (Evans 1955). Two further subspecies are restricted to south Brazil and Peru (Evans 1955; Mielke 2004). Kaye (1914; 1921, No. 399) recorded this species from Trinidad based on one or more specimens "in coll. H. J. Adams" (now in NHM).

Sexes similar (Figs. 39-40); female is larger with more rounded wings; male has a narrow black tripartite stigma, which runs from just before origin of vein 3, across spaces 2 and 1B to vein 1, interrupted at vein 2, and in the middle of space 1B. UPS brown, with a strong blue gloss on thorax, head and base of wings, weaker on abdomen; fringe concolorous. UPF with diffuse pale brown spots in space 1B (above vein 1 and below vein 2), 2 and 3; the spot in lower space 1B is stronger in the female. UNS of thorax and head whitish with blue tints; UNS of abdomen white with a single dark ventral line; legs brown. UNF yellow-brown on costa, pale brown distally, and blackish brown on disc; fringe concolorous; diffuse whitish brown spots to match the UPS, that in space 1B stronger and extending further towards termen. UNH yellow-brown, shading to brown at margin, especially in spaces 1C and

2; fringe concolorous. F ♂ 15-16.5 mm; ♀ 16.5-17 mm. Illustrations in Godman and Salvin (1879-1901, ♂ venation and genitalia, Plate 98.34-37), Lewis (1973, ♀ UPS Fig. 84.23).

The strong blue gloss is noticeable in the field (Fig. 41), and together with the plain yellow-brown UNS, makes this species distinctive in Trinidad.

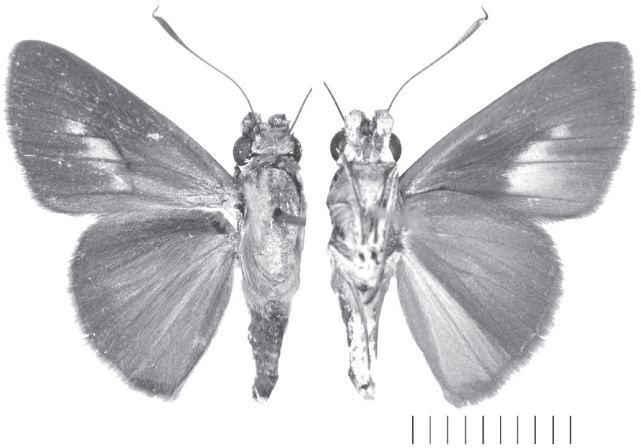

Fig. 39. Adult ♂ *Onophas columbaria columbaria*, North Coast Road, milestone 2, 1.i.1980. Scale in mm.

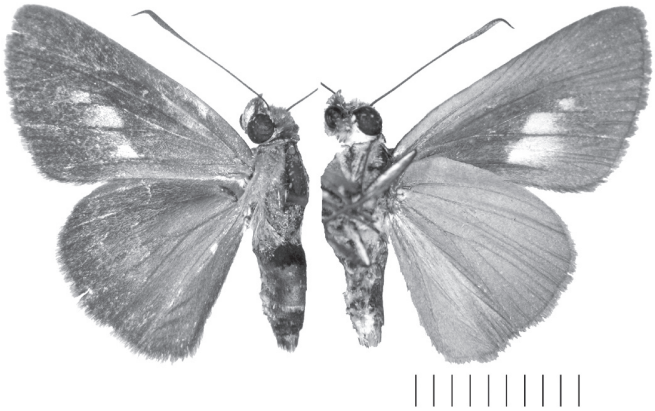

Fig. 40. Adult ♀ *Onophas columbaria columbaria*, Irois Beach, 8.xii.1980. Scale in mm.

Evans (1955) lists 29 ♂, 7 ♀ from Trinidad in the NHM, and I have seen a further 19 specimens. Nevertheless, I would consider this species to be occasional rather than common – it may that it is caught disproportionately more often because it is a distinctive species. It is generally found in forest clearings or forest edges, and is widespread in Trinidad. It mostly occurs at lower to medium altitudes - I have one record from the summit ridge of Mt. Tamana (♂ 12.xi.1995), as well as from lower parts of the Northern Range (Fort George, Mt. Tabor, Hololo Mountain Road, North Coast Road milestone 2). Dates of capture are between November and March, suggesting this species flies mainly in the dry season.

Moss (1949) records that "one specimen was reared from wild cane" but does not illustrate the early stages. There are no preserved early stages of this species from Moss' collection in the NHM. I am not aware of any further published information.

Fig. 41. Mating pair of *Onophas columbaria columbaria*, Trinidad (K. Preston-Mafham, Premaphotos).

195. J53 *Naevolus orius orius* (Mabille 1883)
Figs. 42-44.

The nominate subspecies is found from Mexico to South Brazil, and a second subspecies, *naevus* Evans is found in Ecuador (Evans 1955; Mielke 2004).

Kaye (1940, No. 386A) added this species to the Trinidad list (as *Cydrus naevolus* (Godman), a synonym), based on a specimen from Fondes Amandes, 10.iv.1922, F. W. Jackson. This is a common species in Trinidad – Evans (1955) lists 12 ♂, 6 ♀ in the NHM, and I have seen a further 20 specimens, including one of Sir Norman Lamont's dating back to 1916 (♂ Palmiste, 3.xii.1916, NMS). It is strange that W. J. Kaye was not aware of this species in his earlier catalogues (Kaye 1904, 1921).

Sexes similar (Figs. 42-43); male has a strong black tripartite stigma UPF along base of space 2, wider at base; under vein 2 in line with bottom of stigma in space 2, and in a broad arc below this extending to near vein 1. UPF dark brown; fringe concolorous, pale in spaces 1B and 2; white hyaline spots in spaces 2, 3, 6-9 and double cell spot; white semi-hyaline spot in space 1B. UPH dark brown; fringe pale, weakly chequered brown at end of veins; faint pale spots in spaces 2-5. Body dark brown above; head white-brown below; body brown below; abdomen white ventrally with a single dark ventral line; legs brown. UNF brown; blackish base to disc; fringe concolorous, pale in spaces 1B and 2. UNH purple-brown ground colour; margin beyond spots brown; space 1B brown; diffuse pale spots in spaces 1C-6, base of space 6 and end cell. F ♂

20.5-22 mm; ♀ 23 mm. Illustrations in Godman and Salvin (1879-1901, ♂ UPS, UNS and genitalia, Plate 97.19-21 as *Cydrus naevolus*) and Lewis (1973, UNS Fig. 84.9, as *Naevolus naevolus*, Fig. 84.8 in legend).

This is a relatively large species, and this together with the arrangement of spots F and UNH, and the black tripartite stigma in the male should serve to identify this species in Trinidad. In the field, the size and arrangement of the UNH spots on a purplish ground colour are distinctive (Fig. 44).

This species is common and widespread in lowland forests, disturbed situations and gardens. Adults come to flowers, including bougainvillea (Fig. 44). They probably

Fig. 42. Adult ♂ *Naevolus orius orius*, Curepe, at light, 6.ix.1978. Scale in mm.

Fig. 43. Adult ♀ *Naevolus orius orius*, St. Augustine, at flowers, 25.x.1979. Scale in mm.

also fly at dusk or in the early evening since I have three records from my house lights in Curepe (♂ 6.ix.1978; ♂ 28.vi.1979; ♂ 15.ix.1980) and one from a MV light trap (♂ St. Augustine, iv.1981, F. D. Bennett, CABI).

Janzen and Hallwachs (2009) have reared this species twice from a bamboo, *Guadua paniculata* Munro, but do not include photographs of the early stages. Nothing else seems to have been recorded regarding the biology and food plants of this species (Mielke 2005).

Fig. 44. Adult *Naevolus orius orius* feeding at flower of bougainvillea, St. Benedict's, 16.x.1993.

ACKNOWLEDGEMENTS

I reiterate my thanks to Dr. C. Dennis Adams, Dr. Yasmin Comeau, Mr. Bhorai Kalloo and Mr.Winston Johnson of the National Herbarium who identified the plants from which I reared Hesperiidae in Trinidad. The following have very kindly assisted in providing access to the collections in their care: Dr. George McGavin of the Hope Entomological Collections, Oxford University Museum (HEC); Dr. Phillip Ackery and Blanca Huertas of the Natural History Museum (NHM) (formerly British Museum (Natural History)); Dr. Mark Shaw of the Royal Scottish Museum (RSM); Mr. Scott Alston-Smith to his private collection (SAS); Professor Julian Kenny and Dr. Gene Pollard of the University of the West Indies, St. Augustine (UWI); Dr. Gerald Legg of the Booth Museum, Brighton (BM); Drs. Lee and Jacqueline Miller of the Allyn Museum of Entomology, Sarasota, Florida (AME), now incorporated into McGuire Center for Lepidoptera and Biodiversity (MGCL). Figs. 15 and 18 are of specimens in SAS, and Figs. 17 and 19 are of specimens in the NHM.

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OBITUARY

Floyd Lucas (16/08/70 – 10/1/09) and **Karl Ramjohn (17/05/72 – 10/01/09)**

A Personal Note from Kevin Mahabir

Let us take these moments to commiserate over the departure of our dear brethrens Floyd Lucas and Karl Ramjohn. January 2009 was a tumultuous month for us all, a surreal weekend of tragedy, and for a lot of us: a lifetime of imagining them still there. Their unfortunate passing occurred after their boat tipped over off the south coast of Trinidad. They were in the middle of a marine sample session very early that morning when the incident occurred. Their Environmental Consultancy firm, Strategic Environmental Services (S.E.S.), was founded on such a courageous notion by the young couple, Floyd Lucas and Carol Ramjohn. With little Fern part of the family, with Master of Philosophy (M. Phil.) degrees still being pursued, with various trials of life to learn from, these heroes took the seminal step to establish S.E.S. and produce international calibre work.

For me, my professional experience with Floyd and Karl opened up personal friendships that are virtually unmatched elsewhere. We came to be together at such a delicate time. I made my bones with them ploughing through swamps, hiking through forests, picking through coastlines, wading through rivers. I define who I am today by their hands. I won't be exaggerating by saying that they actually constitute an integral part of me. Being good friends and mentors - Floyd and Karl – I believe that a lot of us would share these very thoughts and more about these fine men. An inspiration to us all, and very good teachers, it is unfortunate to accept that we will never see them again.

Contrary to physical evidence, these gentlemen didn't go under. We will persist with Karl's quip that someone should have developed the standard fish, of precise dimensions, so that we won't have to do all this sampling, this weighing, these measurements, these diversity accounts... I will persist in discovering the intricacies of the environment, of business, and of friendships as Floyd had inspired me to. We will persist in our relationships with their families, as we have lived together, cooked, worked, smiled and played with Fern Gemma Lucas together.

To Floyd, Karl, Carol, Fern, Ryan and Captain Cyril Adolphus - without whom Ryan may not have made it back to us - our love goes out to you and your wonderful families.

Pseudautomeris spp. (Lepidoptera: Saturniidae, Hemileucinae) in Trinidad, West Indies

Matthew J. W. Cock

CABI Europe - Switzerland, Rue des Grillons 1, CH-2800 Delémont, Switzerland.

m.cock@cabi.org

ABSTRACT

Two species of *Pseudautomeris* Lemaire (Lepidoptera: Saturniidae, Hemileucinae) occur in Trinidad: *P. salmonea* (Cramer) and *P. lata* (Conte). Earlier records of *P. salmonea* from Trinidad are misidentifications for *Automeris zurobara* (Druce), whereas *P. salmonea* was misidentified as *P. irene* (Cramer) (= *A. irene*). *Pseudautomeris lata* is a new island record for Trinidad. *Pseudautomeris salmonea* is reported to feed on *Malanea macrophylla* Bartl. ex Griseb. (Rubiaceae) and mulberry, *Morus nigra* L. (Moraceae) (incorrectly published as a food plant for *P. irene). Pseudautomeris lata* is reported to feed on *Gonzalagunia spicata* (Lam.) M. Gómez (Rubiaceae). Caterpillars of both species are illustrated.

Key words: Lepidoptera, Saturniidae, Hemileucinae, *Pseudautomeris, salmonea, irene, lata, Malanea macrophylla, Morus nigra,* Trinidad.

INTRODUCTION

The saturniid moth genera *Automeris* Hübner and the closely related *Pseudautomeris* Lemaire include more than 135 and 16 respectively small to large, colourful species with conspicuous eye-spots on the hind wing upper surface (Lemaire 2002). In previous contributions I have treated *A. liberia* (Cramer) (Cock 2005) and *A. metzli* Sallé (Cock 2008). There are a further seven species of *Automeris* known from Trinidad, and two rather similar species belonging in the closely related genus *Pseudautomeris*, which are discussed here. Apart from features of the male and female genitalia, the eye-spots of the hind wing differ from those of *Automeris* spp. having the pupil of the upper hind wing an arc or boomerang shape (Figs. 1, 2) (D'Abrera 1995; Lemaire 2002).

The following abbreviations are used here: A1-9, abdominal segments 1-9; T1-3, thoracic segments 1-3; UNS, underside (ventral surface); UPF, upper side of fore wing; UPH, upper side of hind wing; UPS, upper side (dorsal surface). The following abbreviations are used for collections consulted: CABI, CAB International collection in Curepe; HEC, Hope Entomological Collections, Oxford University Museum; NHM, the Natural History Museum, London; NMS, the National Museums of Scotland; UWI, the University of the West Indies (St. Augustine). Specimens not attributed to a collection are in my own collection.

Pseudautomeris salmonea (Cramer)

In the Trinidad literature, the species treated as *P. salmonea* (= *A. salmonea*) was misidentified. Kaye and Lamont (1927) list *A. salmonea* from Trinidad based on specimens from Fyzabad, 7.xi.1917; San Fernando, 18.xii.1917 (R. M. Farmborough); Palmiste, vii.1915; 31.xii.1920; 11.i.1921; 23.iv.1922 (N. Lamont). I have seen the two R. M. Farmborough specimens in HEC, and specimens dated 31.xii.1920 and 11.i.1921 in Lamont's collection in UWI, the former an unidentified male and the latter a female labeled as *A. salmonea*. In addition, I have seen a second female specimen collected at Fyzabad by R. M. Farmborough in HEC dated x.1917-vi.1918 and identified as *A. salmonea* by "Sir N. Lamont and W. J. Kaye, 1923". There are also two additional females in Lamont's collection in UWI labeled as *A. salmonea* (29. xii.1946, 21.ix.1947). All these specimens are *A. zurobara* Druce. Thus it is clear that Kaye and Lamont (1927) misidentified *A. zurobara* as *P. salmonea*. D'Abrera (1995) and Lemaire (2002) include Trinidad in the distribution of *A. zurobara*.

Pseudautomeris salmonea has been collected in Trinidad, but was hitherto misidentified by Kaye (1901) and Kaye and Lamont (1927) as *P. irene* (Cramer) (= *A. irene*). The outer discal line of the UPF of *P. irene* comprises a straight double line, pale basally and dark distally, and the inner discal line is almost straight and dark only. In contrast, the outer discal line of *P. salmonea* is straight or slightly curved, with the inner margin only conspicuously pale at the veins, and the inner discal line is irregular and angled towards the costa (D'Abrera 1995; Lemaire 2002).

Kaye (1901) recorded *A. irene* "in the National Collection" (i.e. Natural History Museum, London) from Trinidad. There are no Trinidad specimens of *P. irene* in the NHM, but there is an old specimen of *P. salmonea* which is the right vintage for Kaye to have seen.

Fig. 1. Male *Pseudautomeris salmonea* (Cramer), at MV Light, Simla, Arima Valley, 30.vii.1981 (M. J. W. Cock); **above**, UPS; **below**, UNS. Scale in mm.

Kaye and Lamont's (1927) treatment of *A. irene* lists specimens taken by Sir N. Lamont (Palmiste: 17.xi.1915, 13.xii.1918), and R. M. Farmborough. They add that Lamont captured a colony of larvae at Palmiste on mulberry which pupated 22.xii.1921 and emerged at intervals from 26.i to 15.iv.1922. "Mulberry" is usually used to refer to *Morus nigra* L. (Moraceae), although it is also used for other species of *Morus*. However, in Trinidad only *M. nigra* seems to be involved (Freeman and Williams 1928). I have located the specimens listed by Kaye and Lamont (1927) in UWI, HEC and NMS, and all are *P. salmonea*, although the specimens in NMS had been labeled *A. irene*. It is clear that Kaye and Lamont (1927) misidentified *P. salmonea* as *P. irene*.

I have found this to be an uncommon species in Trinidad, and agree with Lemaire (2002) that it is a forest species. I have seen specimens from Simla (♂ 30.vii.1981 (Fig. 1), ♂ 28.iii.1982, ♀ 30.iii.1989 (R. Brown) [CABI]), and I have a female collected at light in Parrylands Oilfield, ii.1980 by J. O. Boos (Fig. 2). In addition I have

Fig. 2. UPS female *Pseudautomeris salmonea* (Cramer), at light, Parrylands Oilfield, ii.1980 (J. O. Boos). Scale in mm.

two caterpillar records: one photographed on the ground at Simla by K. Preston-Mafham with no food plant associated (Fig. 3) and the other I found feeding on *Malanea macrophylla* Bartl. ex Griseb. (Rubiaceae) on Andrew's Trace (x.1979). I reared this specimen (♂, xii.1979), but did not record details of the caterpillar.

Lemaire (2002) illustrates the caterpillar, and there are other illustrations published on the internet (Lahousse 2009; Wolfe 2009; Ziereis *et al*. 2009), which are all similar and comparable to the caterpillar in Fig. 3.

The caterpillar collected on *M. macrophylla* (below) spun up its cocoon between leaves in captivity. The cocoon consists of loosely spun chestnut brown silk, with no clear structure. The pupa is matt dark brown, rather featureless, about 30 mm long and 12 mm wide at the thorax.

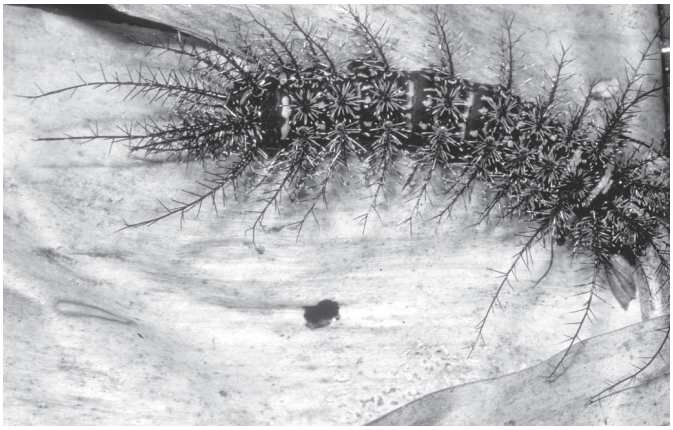

Fig. 3. Final instar caterpillar of *Pseudautomeris salmonea* (Cramer), Simla (Photo: Ken Preston-Mafham, Premaphotos).

***Pseudautomeris lata* (Conte)**

This species has not previously been recorded from Trinidad, and I have not found any specimens in the collections outside Trinidad that I have reviewed. I have seen males collected at light at Curepe (1970s, F. D. Bennett, CABI) and Morne Bleu Textel Station (21.vii.1989, R. G. Brown and T. Cassie, CABI). The only female specimen that I know from Trinidad is one that I reared from a caterpillar collected on *Gonzalagunia spicata* (Lam.) M. Gómez (Rubiaceae) on Morne Catherine on 28 January 1980, and reared through to an adult female which emerged on 1 March 1980.

Fig. 4. UPS male *Pseudautomeris lata* (Conte), Morne Bleu, Textel Station, 21.vii.1989 (R. G. Brown and T. Cassie); specimen in CABI. Scale in mm. (Photo: Perry Polar, CABI).

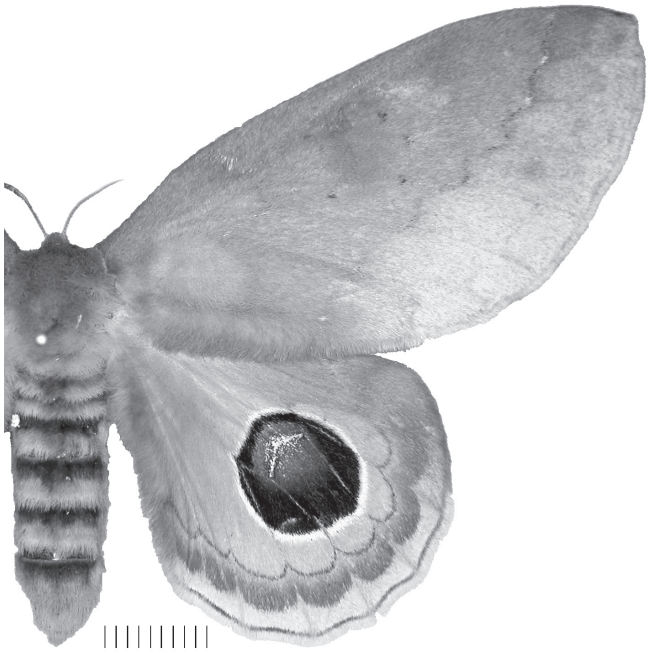

Fig. 5. UPS female *Pseudautomeris lata* (Conte), collected as caterpillar on *Gonzalagunia spicata,* Morne Catherine, 28.i.1980 (M. J. W. Cock). Scale in mm.

Pseudautomeris lata has distinctively oval ellipsoid fore wings and a crenulated fore wing diagonal line (Figs. 4-5). The male (Fig. 4) is smaller and the fore wing colouring varies from yellow-brown to dark brown (Lemaire 2002).

Lemaire (2002) and Wolfe (2009) illustrate the caterpillar, which agrees with that illustrated here.

When collected, the caterpillar, which was in the final instar, measured 7 cm (Fig. 6). Head pale yellow with black triangle over clypeus and adfrontals and a black oval spot on each epicranium. Body segments T1-A2 have four pairs of scoli (sub-dorsal, dorso-lateral, lateral and ventro-lateral), segments A2-A7 have three pairs of scoli (no ventro-lateral), and segments A8-A9 have a dorsal scolus and two pairs of scoli (dorso-lateral and lateral). The length of the scoli were estimated using a ruler in mm (Table 1). The scoli of segments T2-T3 and A8-A9 are conspicuously longer than the others (Table 1, Fig. 6).

The scoli are simple, covered with spines; the shorter scoli are plain, longer ones with a black band before apex, and those of segments T1-T3 and A8-A9 have the apex white. The spines of the scoli of segments T1-T3 and A8-A9 are black basally, the lower spines with white bands, the remainder with white tips, except the apical ones are white. The scoli of segments A1-A7 are green in the basal half and black in the distal half; the lower spines are plain, and the distal ones have a black band before apex. The body is pale yellow with black markings. T1 is unmarked

Table 1. Approximate scoli length in mm of final instar caterpillar of *Pseudautomeris lata*, collected Morne Catherine, 28.i.1980. Measured by eye compared to a ruler marked in mm held adjacent to the caterpillar and parallel to the scolus, accurate to +/-1mm.

Segment(s)	Sub-dorsal	Dorso-lateral	Lateral	Ventro-lateral
T1	15	12	6	4
T2-T3	45	30	9	5
A1	12	12	10	5
A2	12	18	11	5
A3-A7	12	18	11	-
A8	45[1]	30	11	-
A9	9[1]	30	18	-

[1] dorsal scolus

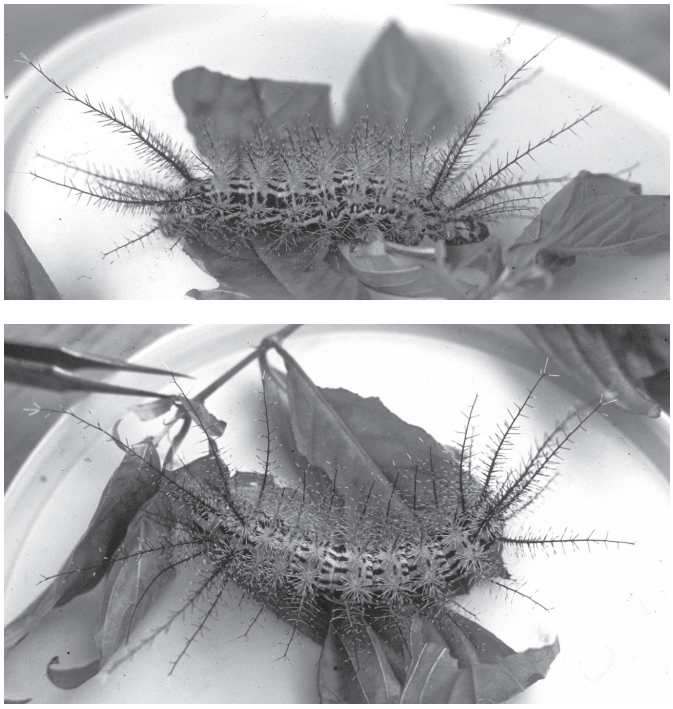

Fig. 6. Final instar caterpillar of *Pseudautomeris lata* (Conte), collected on *Gonzalagunia spicata,* Morne Catherine, 28.i.1980 (M. J. W. Cock); **above**, lateral view; **below**, dorsal view.

. Segments T2-A9 more or less follow the scheme shown in Fig. 7. The clasper is dull brown-green with black markings. True legs orange-brown; prolegs concolorous; spiracles white.

The cocoon and pupa are similar to those described for *P. salmonea* above.

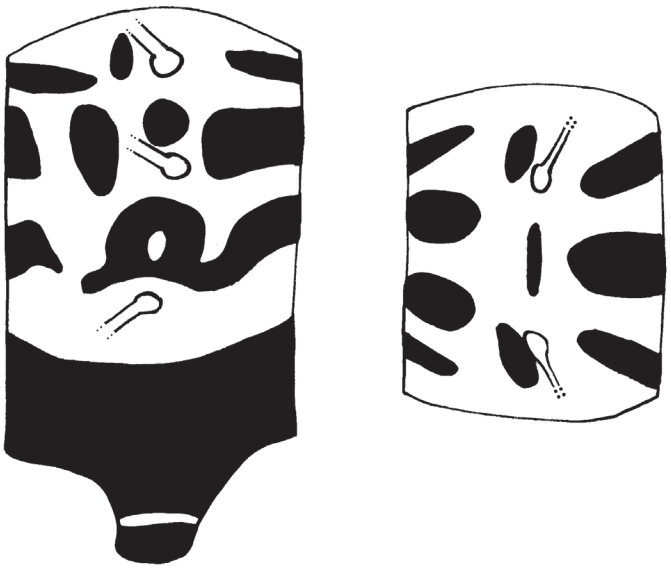

Fig. 7. Diagrams of *Pseudautomeris lata* caterpillar segment A3: **left,** lateral view, with anterior margin to the right, and **right**, dorsal view with anterior margin to the right. Scoli are shown as the truncated bases only. The white and black areas represent pale yellow and black respectively, except the pale area just above the subventral black area is tinted orange. The white spot surrounded by black between the ventro-lateral and lateral scoli in the lateral view is the white spiracle.

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I thank Perry Polar who checked the CAB International collection in Curepe (CABI) for *Pseudautomeris* spp. and sent me photographs of all that he found, and Keith Bland who checked the National Museums of Scotland (NMS) for Lamont's material of *Pseudautomeris*. I also thank the following for facilitating access to the collections in their care: members of staff of the University of the West Indies (UWI) Department of Zoology on various occasions; George McGavin, Hope Entomological Collections (HEC), Oxford University Museum; Martin Honey and Geoff Martin, the Natural History Museum (NHM).

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NATURE NOTE

Two Additional Spider (Arachnida: Araneida) Families for Trinidad and Tobago

Currently there are 47 recorded spider families for Trinidad and Tobago as given by Sewlal and Cutler (2003), Cutler (2005) and Sewlal and Alayón (2007). During a review of the spider collection for Tobago housed at the Smithsonian Institution, Washington D.C., in July 2008, a specimen, *Drymusa* nr. *nubila* from Drymusidae was recorded. Sewlal and Cutler (2003) gave a brief description of this family and had suggested that the family might exist in Trinidad. I can now confirm its existence.

Sewlal and Cutler (2003) also inadvertently omitted Tetrablemmidae from the annotated list of spider families for Trinidad and Tobago. According to Shear (1978), specimens of this family were collected by N. A. Weber in Trinidad and are now lodged at the Museum of Comparative Zoology, Cambridge. There is no locality data available to give the exact area in Trinidad and Tobago where this species is found.

Tetrablemmidae – small araneomorph spiders, with six very small, single-segmented spinnerets. Members have six eyes on the raised part of the carapace which can take on one of six patterns; however, some species are eyeless. They possess a single row of teeth on paired claws and there is abdominal sclerotization including pleural plates. The tibiae have two trichobothria and metatarsi with one trichobothria (Shear 1978). The posterior respiratory organs are absent and the anterior ones are represented by book lungs with one or two leaves and are not functional.

Cribellum and calimistrum lacking and the colulus present and is small and sclerotized. The males have strongly modified carapaces and lack knobbed apophysis projecting from posterior margin of the sternum. The palp of the female lacks a claw. Only one species is listed from Trinidad, *Tetrablemma extorre* (Platnick 2008).

An annotated description of Drymusidae was included in Sewlal and Cutler (2003).

With the addition of Tetrablemmidae and the confirmation of the presence of the family Drymusidae, the total number of spider families known from Trinidad and Tobago now stands at 49.

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Jo-Anne Nina Sewlal
Dept. of Life Sciences, University of the West Indies,
St. Augustine, Trinidad and Tobago.
joannesewlal@gmail.com

A Preliminary Survey for Spiders on Grenada, West Indies

Jo-Anne Nina Sewlal
Dept. of Life Sciences, University of the West Indies,
St. Augustine, Trinidad and Tobago.
joannesewlal@gmail.com

ABSTRACT
During a two-week period in 2008, a wide variety of habitats on the island of Grenada, West Indies were surveyed for the presence of spiders. Contrary to the results of previous surveys in the Eastern Caribbean, Grenada exhibited a higher species richness in natural habitats. Members of the families Araneidae and Tetragnathidae comprised of almost half the species found. Some 12 localities were surveyed from 11 habitats, including six man-made habitats. Ten families representing 22 species were collected.

Key words: Spiders, Grenada, Araneidae, Barychelidae, Mimetidae, Oxyopidae, Pholcidae, Salticidae, Sparassidae, Tetragnathidae, Theridiidae, Thomisidae.

Spiders have a worldwide distribution, occupying all land environments except at the polar extremes. Currently there are 40,462 species of spiders that have been named so far (Platnick 2008), representing what is approximately one-fifth of the total. Thus it can be seen that the worldwide spider fauna is still far from being completely known. This situation is especially true of the spider fauna of the neotropics. Information on the diversity and distribution of arachnids is seriously lacking in the Caribbean as well as northern South America. Currently, the islands of Cuba (Alayón 1995), Barbados (G. Alayón and J. Horrocks, unpubl.), St. Vincent and the Grenadines (Simon 1894; de Silva *et al*. 2006), Anguilla (Sewlal and Starr, Inpress.), Antigua (Sewlal, unpubl.), Nevis (Sewlal and Starr 2007) and St. Kitts (Sewlal 2008) are the only islands in the Caribbean where the spider fauna has been documented at the species level, although this has been done at the family level for Trinidad (Cutler 2005; Sewlal and Cutler 2003; Sewlal and Alayón 2007; Sewlal, unpubl.). Additional information on the family Pholcidae of these islands, including Grenada, Anguilla and St. Kitts was documented by Sewlal and Starr (2008).

Surveys have tended to be in the favour of sampling vertebrates and plants, because they are very short and resource-limited, thus only the well-known and least diverse groups are adequately sampled (Scharff *et al*. 2003). As a consequence of this information on diverse groups are lacking (Longino 1994). Arthropods comprise the most diverse organisms in any terrestrial environment.

Arthropods are challenging to sample due to traits as small size, short generation time, diversity, limited distribution and strict environment requirements (microhabitats). These traits make it possible in theory to map environmental diversity and track environmental changes faster and more precisely than longer lived and flexible organisms like vertebrates and plants.

During 28 September to the 12 October, 2007, I spent two weeks on the island of Grenada conducting a survey of the spider fauna of this island with the aim of collecting a substantial part of the spider fauna in a broad variety of habitats. Grenada is the most southerly isle of the Leeward Islands in the Eastern Caribbean (17°20'N 62°45'W). The island has an area of 168 km^2. It has a central point and the highest elevation on the island of approximately 1156 m. It has a range of habitats including: secondary forest, scrubland, montane forest, elfin woodland, dry forest, littoral woodland and riparian vegetation.

During this survey, 12 localities covering 11 habitats were sampled, including six that were man-made habitats or heavily influenced by human activities. Due to the fact that different taxa of spiders live in different microhabitats a variety of collecting methods were utilised. The main collecting methods employed were visual search, both at the ground level and above ground, including in shrubs and low trees and sweep-netting. In addition, many more cryptic microhabitats, especially under rocks, rotting logs and bark were also searched.

The sampling effort produced a total of 22 species representing 10 families (see Table 1). Littoral woodland, montane, dry forest as well as in and around houses had 9 species each while gardens yielded only one species (see Table 1). One expects the modifications found in altered habitats most likely to provide many and/or suitable points of attachment for families that construct webs to catch their prey. Some habitats also provide a natural path or gap in the vegetation where prey in particular flying insects can be blown into webs. Both of these requirements are usually met by roadside, garden habitats as well as the area in and around houses. The results of this survey did not strongly follow the trend found on islands previously sampled, as only one altered habitat exhibited such high species richness. Another feature of most altered habitats, in particular gardens and roadside, is the presence of artificial lighting which during the night attracts flying insects so that noc-

Table 1. Showing the species of both Araneomorphae and Mygalomorphae spiders for each habitat sampled in Grenada during 28th September to 12th October, 2007.

Family and Species	Habitat										
	Garden	Farm-land	Roadside	In and On Buildings	Abandoned Buildings	Secondary Forest	Montane Forest	Elfin Woodland	Dry Forest	Littoral Woodland	Riparian Vegetation
Araneidae *Argiope argentata*		✓	✓	✓	✓		✓		✓	✓	✓
Eustala anastera				✓						✓	
Gasteracanta cancriformis			✓						✓		
Metepeira compsa			✓							✓	
Wagneriana sp.								✓			
Barychelidae Sp. A				✓							
Mimetidae Sp. A				✓							
Oxyopidae *Oxyopes salticus*						✓				✓	
Sp. A									✓		
Pholcidae *Modisimus* sp.							✓				✓
Physocyclus globosus				✓							
Salticidae *Beata octopunctata*									✓		
Hentzia vernalis						✓	✓		✓	✓	
Menemerus bivittatus			✓	✓		✓	✓			✓	
Sparassidae *Olios* sp.		✓				✓	✓		✓		
Tetragnathidae *Leucauge argyra*			✓	✓	✓		✓				✓
Leucauge regnyi	✓	✓		✓	✓	✓	✓	✓	✓	✓	
Tetragnatha sp.								✓			
Theridiidae *Argyrodes elevatus*		✓	✓				✓			✓	
Sp. A									✓		
Sp. B				✓							
Thomisidae *Misumenops* sp.			✓				✓		✓	✓	
TOTAL	1	4	7	9	3	5	9	3	9	9	3

turnal species have a ready food supply.

However, high species richness was observed to occur predominantly in natural habitats. The vegetation structure is still recovering from the effects of successive hurricanes Ivan and Emily in 2005 and 2006 respectively. Many forests lost their closed canopy and the sparse understory was replaced by a thick carpet of razor grass (*Scleria secans*). One such habitat is montane forest as that sampled on Mount Qua Qua. This modification would make the habitat suitable for generalist species as well as others. Over time, when the habitat returns to its original state, those species suited to the original habitat will stay while others would be absent either through migration or local extinction. The dry forest did not experience major damage from the hurricanes so it is safe to assume that the species found there were present before the hurricanes hit the island.

Habitats at higher altitudes produced less species, which may be due to the decreasing number of habitats because of less available area.

Almost half of the species found belonged to the orb-weaving families Araneidae and Tetragnathidae. Therefore it came as no surprise that the most ecologically diverse species found also belong to these families. This included *Leucauge regnyi* and *Argiope argentata* which were recorded from 9 and 8 habitats respectively.

Specimens from the Mygalomorphae group or tarantulas were collected from homes however; they pose no danger to humans as the venom of this family is not known to be fatal.

Voucher specimens were deposited in the Land Arthropod Collection of the University of the West Indies, St. Augustine, Trinidad and Tobago.

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NATURE NOTES

Range Expansion of the Neotropical Whiptail Lizard, *Cnemidophorus lemniscatus* (L. 1758) (Reptilia: Sauria: Teiidae) on the North Coast of Trinidad

The Neotropical whiptail lizard *Cnemidophorus lemniscatus* (Linnaeus 1758) is a small teiid that ranges widely from Guatemala to northern South America (into Brazil) and many of the associated continental islands, including Trinidad and Tobago (Murphy 1997). This lizard is a beach-savannah species. They prefer open sunny areas and rarely venture into deep forests. In Trinidad and Tobago, there is the potential to confuse *Cnemidophorus lemniscatus* with the locally more common and more well-known *Ameiva ameiva* (L. 1758) or Zandolie (Boos and Quesnel 1968). *C. lemniscatus* has a much more restricted range in Trinidad and Tobago than does *A. ameiva*. Here I report a new locality record for *C. lemniscatus* in Trinidad.

I visited the village of L'anse Noire (N 10º50.148´, W 060º58.794´) on the north coast of Trinidad from 4 to 6 July, 2008 and searched for amphibians and reptiles in the area between L'anse Noire and Sans Souci. Over the course of my time there, I recorded at least five sightings of *Cnemidophorus lemniscatus* (four adult females and one juvenile, all in roadside low grass and leaf litter within a 600 m stretch straddling the 51.5 km post marker along the Paria Main Road). All animals were seen between 1035 h and 1430 h.

Although several *Ameiva ameiva* were observed in the area over the 3-day period, there is no doubt that the identification of the *Cnemidophorus lemniscatus* is correct. The author is very familiar with both species and has no trouble in distinguishing the two from each other. The animals noted as *C. lemniscatus* were each seen in good light at close quarters (less than 5 m) and exhibited the species characteristic behavior of lifting and vibrating a single front leg (not associated with *A. ameiva*) (Murphy 1997). No animals were captured to serve as voucher specimens.

Boos (1984) speculates that *Cnemidophorus lemniscatus* is a geologically recent colonist on Trinidad and Tobago. He reasoned that its occurrence only on the south and east coasts of Trinidad, its presence on Chacachacare Island and Huevos Island in the Bocas and in coastal southwestern Tobago, and its absence (at the time) from suitable coastal habitats on western and northern Trinidad indicate that it did not have enough time to disperse into and colonize the latter mentioned areas. Boos (1984) notes that (on the east coast) he had not observed them as far north as Toco Point (Pt. Galera), or on any of the suitable beaches on the north coast. Murphy (1997) notes a museum specimen collected from the vicinity of the 21.75 milepost on the Matura-Toco Road on the east coast, but does not give any north coast localities for the species. It seems unlikely that this normally easily observed species was previously missed and it is probable that this record represents a natural range expansion, with possible land dispersal from the east coast, around Pt. Galera and westward along the north coast. It would be useful to conduct intensive surveys of the area between Matura Bay and L'anse Noire, as well as further west along the north coast of Trinidad to get a more detailed understanding of the local distribution of the species.

I thank the Wildlife Section of the Forestry Division of the Government of Trinidad and Tobago for approval of animal research permits, Dr. George A. Middendorf III for field equipment and advice, Mr. Michael Benacia and Ms. Melissa Charles for transportation and housing and most importantly my family for their great logistics and moral support.

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Stevland P. Charles
Dept. of Biology, Howard University,
Washington D.C., U.S.A.
stevlandcharles@gmail.com

A New Locality Record for the Coral Snake, *Micrurus circinalis* (Reptilia: Serpentes: Elapidae) on Monos Island, Trinidad and Tobago

The most extensive treatment to date of the distribution of the terrestrial herpetofauna of the satellite islands off Trinidad's north-western peninsular has been that of Boos (1984). Following this, additions to the herpetofauna were noted by Boos (1990) and Boos and Quesnel (1994). Temple (1996) conducted a fairly intensive study of the distribution of plants and animals on the Five Islands (a subset of the aforementioned north-western satellite islands comprised of six of the smallest of these islands) and based on his findings predicted that the much larger Bocas Islands (also a part of this north-western satellite island group) would be expected to host a greater number of reptile species than had previously been recorded there. Indeed, Temple's speculations have proven to be of some merit as several new locality records for reptiles in the Bocas Islands have been made since then (Lall and Hayes 2000; Hayes and Eitniear 2002; Charles 2007; Charles and Smith 2008). We visited the Bocas Islands during July and August 2008 and conducted brief herpetological surveys. Here we report one new locality record for a snake on Monos Island.

On 16 August, 2008, at 1015 h, a live specimen of the snake *Micrurus circinalis* (Duméril, Bibron and Duméril 1854) was observed at Grand Fond Bay, Monos Island. The snake was found in the leaf litter at the base of a small tree approximately 1m above sea level and 50 m inland north of the beach in an area of secondary forest adjacent to the coconut palms near the beach. The animal was photographed *in situ* and then collected. It's snout to vent length measured 337 mm; tail 62 mm; jaw width 7.1 mm and jaw length 12.9 mm. Each side of the head exhibited 7 supralabial scales and 7 infralabial scales. The ventral scale count was 183, the subcaudal scale count was 48 and the anal plate was divided. There were 15 scale rows at mid body. Its mass was 9.0 g and it possessed 33 black bands (not including the nape band). With reference to Murphy (1997) the ratio of its tail length to its snout to vent length (18.4%) and the number of black bands on its tail (10) suggest that the specimen collected was male. The snake was preserved in a 10% formalin solution and kept as a voucher specimen. This species is locally referred to as the Common Coral Snake or the Small Coral Snake (Boos and Quesnel 1968; Boos 2001).

This paper represents the first record of the species *Micrurus circinalis* (Duméril, Bibron and Duméril 1854) for Monos Island. It is not entirely surprising that naturalists previously failed to observe this species on Monos. These snakes are fossorial and spend much of their time hidden under leaf litter, under rocks and logs or burrowing in the soil (Murphy 1997; Boos 2001). Mention must be made that Boos and Quesnel (1994) noted that a watchman of the Siegert House on Monos Island named Tommy Griffith reported a 'coral snake' killed in a house on Monos. They are careful not to speculate as to what particular species of 'coral snake' it might have been (with the understanding that two species of coral snakes are known to occur on Trinidad, as well as a number of colubrid snakes commonly mistaken for coral snakes). *M. circinalis* is also known from the nearby island of Gaspar Grande (Boos 1984).

We thank the Chaguaramas Development Authority for permission to conduct research as well as transportation in the Bocas Islands, the Wildlife Section of the Forestry Division of the Government of Trinidad and Tobago for approval of animal research permits, Mr. Hans E. A. Boos for advice, Dr. George A. Middendorf III for field equipment and advice and most importantly our respective families for their great logistics and moral support.

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Stevland P. Charles[1] and **Stephen Smith**[2]
Dept. of Biology, Howard University,
Washington D.C., U.S.A.
1. *stevlandcharles@gmail.com*
2. *cascabeldormillon@yahoo.com*

Gonatodes vittatus as Prey of *Hemidactylus palaichthus* and Potential Prey of *Scolopendra gigantea*

Gonatodes vittatus (Lichtenstein 1856) (Reptilia: Sauria: Gekkonidae) or the Streak Lizard (Quesnel 1957) ranges across northern regions of Colombia and Venezuela and into Trinidad and Tobago (Rivero-Blanco 1979; Murphy 1997). It is a very familiar lizard, seen even in urban areas in Trinidad and Tobago. Unlike the majority of its congeners, it is particularly associated with dry forest edge and savannah environments and is very common on Chacachacare Island off Trinidad's northwestern peninsula. Little is known regarding the animals that commonly prey upon the members of the genus *Gonatodes*. Rivero-Blanco (1979) suggested that birds and snakes are probably the main predators of *Gonatodes*. Others have discovered *Gonatodes* in the stomach contents of a number of leaf litter foraging snake species (Dixon and Soini 1975; Martins 1991; Ávila-Pires 1995; de Albuquerque *et al*. 2007). Quesnel (2008) reported the large gecko, *Thecadactylus rapicauda* (Houttuyn 1782) preying upon male *Gonatodes vittatus* in Trinidad. Here, we report on two other possible predators of the lizards of the genus *Gonatodes*.

On 3 August, 2008, the authors visited Chacachacare Island and conducted a search for reptiles in the area around the abandoned Nuns' Quarters (of the old Leprosarium) (location N 10º40.787´, W 061º 45.112´ at 10 m to 15 m above sea level). At 1135 h we discovered an adult *Hemidactylus palaichthus* (Kluge 1969) (Reptilia: Sauria: Gekkonidae) or Spiny Gecko (Boos 1981) behind a wooden door about 0.5 m up a concrete wall. We captured the lizard unharmed and observed a small grey fleshy mass lining its lips and protruding from its mouth. By gently prying the animal's jaws apart we saw the scaly tail of some small reptile, which when gently extracted, proved to be an adult male *Gonatodes vittatus* (snout to vent length 32 mm). We photographed both predator and prey, preserved the *G. vittatus* in ethanol and one of us (S. S.) kept and successfully maintained the *H. palaichthus* in captivity for further observation and photography.

At 1250 h on the same day, we observed a Giant Centipede, *Scolopendra gigantea* (L. 1758) (Chilopoda: Scolopendromorpha: Scolopendridae) approximately 20 cm long, foraging about 3 m up on the trunk of a tree. In close proximity to the centipede (at times less than 0.3 m) were at least three adult Streak Lizards (*Gonatodes vittatus*). We observed these animals for about ten minutes. The centipede appeared to be actively foraging; repeatedly moving around the tree trunk and the bases of the nearby branches. Each time the centipede came near to a lizard, the lizard reacted by scurrying around to the other side of the tree trunk. Although we observed no capture of the lizard by the centipede, we surmise that our observation represented active foraging by the centipede with the Streak Lizards as potential prey items.

In preparation of this report, we reviewed the literature for records of the diet of the lizards of the genus *Hemidactylus*. Rocha and Anjos (2007) conducted a study of the diet of *Hemidactylus mabouia* (Moreau de Jonnès 1818) in a rocky outcrop in southeastern Brazil and found that they ate arthropods (mainly insects and spiders) as well as gastropods (snails and slugs). In another study of this species in an urban area in southern Brazil, Bonfiglio *et al*. (2006) reported that arthropods (again, mainly insects and spiders) were the mainstay of the diet, but also noted two cases of cannibalism on juveniles by adult male *H. mabouia*. Avery (1980) found only arthropods (mainly insects) in the stomachs of *Hemidactylus brookii* in Ghana. Our report may represent the first record of the generally nocturnal *Hemidactylus palaichthus* preying upon the diurnal *Gonatodes vittatus*. Bonfiglio *et al*. (2006) suggest that *H. mabouia* is a generalist and an opportunist in its feeding behaviour, its diet varying based on what is available at a particular site. Perhaps the same is true for its congener, *H. palaichthus*. Our single observation does not allow us to suggest the level of importance of vertebrates such as smaller lizards in the diet of *H. palaichthus*.

Our observation of a Giant Centipede, engaged in what appeared to be foraging for Streak Lizards, is supported by

other records of centipedes of the family Scolopendridae preying on a wide array of live vertebrate prey, including frogs, snakes, lizards and even bats (Easterla 1975; Clark 1979; McCormick and Polis 1982; Carpenter and Gillinham 1984; Mollinari *et al*. 2005). One of us (S. S.) maintained a live specimen of *Scolopendra gigantea* from Chacachacare Island in captivity. This specimen was similar in size to the individual observed at the Nun's Quarters. While in captivity, it readily fed on live adult *Gonatodes vittatus* placed in its enclosure.

The two observations here recorded, as well as those previously reported by other investigators, suggest that the lizard *Gonatodes vittatus* and it congeners are prey species for a wide array of predators including vertebrates and invertebrates.

We thank the Chaguaramas Development Authority for permission to conduct research as well as transportation in the Bocas Islands, the Wildlife Section of the Forestry Division of the Government of Trinidad and Tobago for approval of animal research permits, Mr. Hans E. A. Boos for advice, Dr. George A. Middendorf III for field equipment and advice and most importantly our respective families for their great logistics and moral support.

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Stevland P. Charles[1] and **Stephen Smith**[2]
Dept. of Biology, Howard University,
Washington D.C., U.S.A.
1. *stevlandcharles@gmail.com*
2. *cascabeldormillon@yahoo.com*

A Historical Note on *Pseudosphinx tetrio* (L.) (Lepidoptera: Sphingidae) in Trinidad, West Indies

Members of the Trinidad and Tobago Field Naturalists' Club will be familiar with the reputation and art of Michel Jean Cazabon (1813-1888). A number may know of Margaret Mann, the young British lady from the island of Guernsey who was taught water-colour painting by Cazabon during the four years (1847-1851) that she lived in Trinidad. Some of Margaret Mann's paintings were recently acquired by and exhibited at the City Museum in Port-of-Spain.

Last year saw the appearance of the book "The Letters of Margaret Mann" by Danielle Delon (2008). In it are reproduced letters penned by Margaret Mann to her family in Guernsey. Much of what she writes home describes everyday, rather routine, aspects of her family life in Trinidad, together with some valuable social comment. In addition, there are a few interesting observations

on local animals and plants. One of these, from page 148, follows:-

"The hibiscus and Barbadoes pride are handsome flowers and there is one small, pink, sweet scented blossom of a large shrub, whose name I do not know that is very pretty. By the by, this shrub is now covered with the most singular and magnificent caterpillars you ever saw! They are longer and thicker than a man's finger with rings of scarlet and yellow on a black body, scarlet heads, and thick scarlet legs with black specks on the scarlet ground. Their hindmost legs are very much like an elephant and their manner of moving also!

But the most singular feature in their construction is the tail they have. They actually have little thin black tails half as long as their body which they wave about in the funniest way you can imagine. They are in numbers on three trees of this species and will remain there, our black servants tell us, till they have eaten all the leaves and then they will turn into butterflies! This is rather a digression from my subject but I do not think I need apologise for it."

The caterpillars that Margaret Mann describes are, one assumes, those of *Pseudosphinx tetrio* (L.) and this opinion is confirmed by Matthew Cock who recently discussed the species in detail in Living World (Cock 2008). There is one error in Margaret Mann's description in that she writes of "scarlet bands". *P. tetrio* larvae have *yellow* rings on an otherwise black surface but it is probable that the red head and legs of the larvae gave the impression of there being both red and yellow bands. In analysing the species' apparent dependence in Trinidad on ornamental frangipani (*Plumeria* spp), Cock made the interesting final comment "…it may well be that *Pseudosphinx tetrio* has only established breeding populations in historical times". It was clearly present – and presumably reproducing – when Margaret Mann was writing 160 years ago and was well-recognised then by local people.

An interesting point, however, is the identity of the shrub with "small, pink, sweet scented blossom" on which the larvae were feeding. Was this another colour-form of frangipani or some other plant?

Hawk moths (family Sphingidae) have always attracted the attention of naturalists and members of the public on account of their size and often spectacular appearance. It is apparent from Danielle Delon's book that Margaret Mann was not a naturalist but she was observant and recorded what she saw. It is perhaps surprising that she did not deduce that the horned caterpillars she observed in Trinidad might be related to the hawk moth larvae that she would almost certainly have seen as a child on Guernsey. Cock (personal communication) surmises that this may have been on account of the long fine tail on *P. tetrio,* which is only a feature of the first instar of European sphingids and therefore rarely seen by the casual observer.

We are grateful to Matthew Cock for permitting us to refer to his comments on Margaret Mann's observations and for his helpful advice on this Note.

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John Cooper and **Margaret Cooper**
School of Veterinary Medicine,
The University of the West Indies,
St. Augustine, Trinidad & Tobago.
ngagi2@gmail.com

Current Address:
Professor J. E. Cooper
Department of Veterinary Medicine,
University of Cambridge
Madingley Road, Cambridge CB3 OES,
United Kingdom.

The Status of *Lithobates palmipes* (Spix) in Trinidad and Tobago

Lithobates palmipes (Spix), previously named *Rana palmipes,* has generally been considered one of the rarer frogs of Trinidad. Comparatively few specimens have been collected (Kenny 1969; Murphy 1997), and it's distribution is limited to the Central Range and southeast Trinidad. There is one locality record (questioned by Murphy 1997) from Arima Valley.

On 10 July, 2007, one of us (GW) came across a shallow pool at the edge of the forest along Edward's Trace, Grid Reference UTM 0700667E, 1118645N. The pool was about 10 m across with a maximum depth of approximately 40 cm. Entering the pool resulted in splashing sounds and movements of the plants at the edge of the pool. At first it was assumed that there were Paradoxal frogs *Pseudis paradoxa,* possibly 10-20 individuals in the pool. When one frog was seen however it looked like a Ranid, so a field

description was taken. The frog was about 8 cm nose to tail, with a distinct dorso-lateral fold from the nose along the edge of the back. The fold was dark brown below, and buff above. A pale bar across top of iris was continuous with the dorso-lateral fold. The dorsum was green, with the lower back, flanks and legs brownish grey with transverse bars. There were three black spikes along mid-back and a pale 'malar' streak on the head.

The frog was identified as *Lithobates palmipes* from the photograph in Murphy (1997) as the distinguishing features noted by Murphy in the text refer to preserved specimens and not from a live individual. *Pseudis paradoxa* lacks a dorso-lateral fold and does not show the iris pattern observed. Of the Leptodactylids, *L. bolivianus* has a similar fold but is darker and lacks the green dorsum and the iris pattern.

Lithobates palmipes was previously placed in the genus *Rana*, but renamed following Frost *et al*. (2006) (not seen but cited in Murphy 2008). While this species has been previously known from the locality, there have been no recent published sightings and congregations of this nature have not been recorded in Trinidad.

The presence of the frogs has been confirmed by one of us (S. A.) who has conducted extensive field work in southern Trinidad and found *L. palmipes* in such habitats from just west of Chatham, throughout the Victoria Mayaro Reserve to within 4 km of Mayaro. Contrary to expectations, the frog is not uncommon with 151 records from 33 site visits. An individual photographed by S. Ali is shown on the front cover of this issue of Living World.

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Graham White[1] and **Saiyaad Ali**[2]
1. *g.whitett@gmail.com*
2. *saiyaad-ali@hotmail.com*

Young Chicken as Prey of *Bufo marinus*

The following paragraph was extracted from the diary of one of the founding fathers of The Trinidad Field Naturalists' Club, T. I. Potter. The editor has assumed that the toad was Bufo marinus.

18 April, 1889. "Today I witnessed an extraordinary sight. A huge frog swallowed a young chicken whole. The chick had got away and went up a passage under a step in the drying room where toads and frogs occasionally hide themselves and there happened to be one there at the time. He was a huge unsightly creature and when the chick was looked for, no trace of it could be found. No one believed for a moment that a frog or frogs of any kind ate chickens for we know that frogs feed on flies and insects generally and are considered most harmless creatures. But when the board at the back of the passage was removed and the frog pushed out (he was too torpid to move) there was one foot of the poor little chick sticking out of his mouth confirming his guilt. Needless to say, he was dispatched soon after."

Submitted by:
I. Reginald Potter
rpotter@opus.co.tt

Report of the Trinidad and Tobago Rare Birds Committee: 2008

Martyn Kenefick
36 Newalloville Ave., San Juan, Trinidad and Tobago.
martynkenefick@hotmail.com

The Trinidad and Tobago Rare Birds Committee was established in 1995 with the principal aim to assess, document and archive the occurrence of rare or unusual birds in Trinidad and Tobago. The Committee has now assessed all records submitted during 2008. In all, 38 records were adjudged, representing 30 different species. As a result of these submissions, one additional species has been added to the Official List of Birds of Trinidad and Tobago, bringing the running total to 469 species. Additionally, one more species has been found on Tobago for the first time. Of those assessed, in only one case did the Committee feel that the identification had been inconclusive. The records tabulated below follow the nomenclature and taxonomic order of the American Ornithologists Union South American Checklist; 10th version February, 2006.

The Committee comprises the following members: Martyn Kenefick (Secretary), Geoffrey Gomes, Floyd Hayes, Bill Murphy, Courtenay Rooks and Graham White. Richard ffrench resigned from the Committee early this year for health reasons. It was Richard himself who formed the Committee and has been a steadying influence in its evolvement over the years. I would like to take this opportunity, on behalf of all of us, to record here our most grateful thanks for all his help and guidance.

Archived records including photographic submissions are held at 36 Newalloville Ave., San Juan.

We are aware that a number of other rare birds are found each year in Trinidad and Tobago and urge finders not only to report their sightings to us but to document same. A recently revised list of those species considered by the TTRBC can be accessed from the home page of the Trinidad and Tobago Field Naturalists' Club website at "www.ttfnc.org"

RECORDS ACCEPTED

Three different sightings of the **Muscovy Duck, *Cairina moschata*** were made in 2008. A single bird was found in North Oropouche on 9 July, 2008 (JK) followed by one flying south over Sudama Steps on 24 July, 2008 (MK *et al*.) and finally three birds at Icacos from 17-19 September, 2008 (KS). These are the first documented records for at least 13 years.

An immature **Gray Heron, *Ardea cinerea*** was found at Bon Accord ponds, Tobago on 1 April, 2008 (BM, PT *et al*.). A second bird, the first adult to be found in our islands was seen at Lowlands, Tobago on 28 November, 2008 (GW, PP). This brings to seven, the number found in the last 10 years.

Three different **Reddish Egrets, *Egretta rufescens*** were found during 2008. Firstly, an immature or very worn plumaged non-breeding bird was seen briefly at the high tide roost by Brickfields Fish Quay on 8 July, 2008 (MK, GG) before flying north over Caroni Swamp. On 10 July, 2008 a similarly plumaged but clearly different individual began a stay on the Diego Martin River (FO, GW); being last recorded on 1 August, 2008. Finally, a much darker plumaged and very confiding bird was present on the shoreline at Erin from 23-30 August, 2008 (TM, DS). (See Plate). These are the first records of this species for Trinidad and Tobago since a Tobago sighting in July, 2003.

A single **Glossy Ibis, *Plegadis falcinellus*** flew west over the Caroni Rice Project on 26 July, 2008 (MK *et al*.). On the same date, a different juvenile was seen and photographed in South Oropouche freshwater marsh (KS). This bird showed a colored numbered band strikingly similar to a bird banded in Spain and seen in the UK in August, 2008, posing a real possibility that this was a transatlantic vagrant as opposed to a wanderer from mainland South America. Ten individuals have now been found in Trinidad during the last ten years.

A **Roseate Spoonbill*, Platalea ajaja*** was seen briefly amongst a feeding flock of Egrets in rice fields close to Caroni bridge on 6 December, 2008 (RT). This is the first report of this species since August, 1999.

A flock of **American Flamingo, *Phoenicopterus ruber*** spent several months on the west coast tidal mudflats either side of Orange Valley. Eight birds were originally found on 19 April, 2008 peaking at 37 during June before slowly fragmenting. Eight birds were still present on 9 September and a lone sub-adult finally until 23 October (TM, NL *et al*.). (See Plate).

An adult male **Snail Kite, *Rostrhamus sociabilis*** was found along Rahamut Trace, South Oropouche on 21 October, 2008 (MK). This is the first sighting of this species since the well documented birds on Caroni Rice Project during 1998-2002.

Two adult **Crane Hawks, *Geranospiza caerulescens*** were found during 2008. The first at Rousillac on 31 May (KS) and the other near Penal on 26 October (KS). There have now been 13 sightings since this species was first identified in Trinidad in 2001.

An adult **Rufous Crab-Hawk, *Buteogallus aequinoctialis*** was photographed at mangrove edge in Moruga on 13 September, 2008 (TM, DS, KS), possibly the same as one found close by in July, 2007. Whilst adults are straightforward to identify, immatures still prove to be problematic. There have now been eight accepted sightings in the last five years.

A sub-adult **White-tailed Hawk, *Buteo albicaudatus*** spent much of 2008 intermittently hunting the freshwater marsh, northeast of Kernahan Settlement, Nariva. First found on 22 February, it was regularly seen between 31 March and 27 April, and then again from 13 November into early December (RN, RG, MK, NH *et al*.). This remains a rare visitor from mainland South America with just four birds found in the last 13 years.

An adult **Black Hawk-Eagle, *Spizaetus tyrannus*** was seen and photographed close to Quinam on 26 April, 2008 (KS). Whilst a total of 17 birds have now been documented in the last 10 years, this remains a rare, local resident species.

Two adult and a juvenile **Crested Caracara, *Caracara cheriway*** frequented the Icacos area during the period 19-29 September, 2008 (KS). There have now been 11 sightings, almost all in eastern and southwestern Trinidad, in the last eight years.

A single **Spotted Rail, *Pardirallus maculates*** was first found on 25 January, 2008 in an area of shallow freshwater marsh close to Abidh Trace, Cacandee. This is the first of this species to be found alive in the last 13 years at least. The bird was still showing up to 3 February, 2008 together with three Sora Rails, *Porzana carolina*, two Yellow-breasted Crakes, *Porzana flaviventer* and a Striped-backed Bittern, *Ixobrychus involucris* (GW, MK *et al*.).

A **Marbled Godwit, *Limosa fedoa*** was found on Freeman's Bay, San Fernando on 15 September, 2008 (TM). (See Plate). The species is a rare visitor with only six records in the last 13 years.

A single **Upland Sandpiper, *Bartramia longicauda*** was found in South Oropouche freshwater marsh on 6 September, 2008 (KS). There have now been seven records in the last eight years.

A first winter plumaged **Black-headed Gull, *Chroicocephalus ridibundus*** was found at Barbados Bay, Tobago on 21 March, 2008 (PD *et al*.). There have been eight records in the last 14 years; three of which were from Tobago.

A group of five **Eurasian Collared Dove, *Streptopelia decaocto*** were found in Barataria on 23 October, 2008 (MK). As a result of this sighting, the Committee has re-assessed and accepted the single bird reported from Waterloo on 8 October, 2000 (GW). This species has a long history of range expansion on a global scale. It is spreading southwards through the Antilles island chain; is now common as far south as Dominica and present in St. Lucia and it has now been accepted onto the Official List of species in Trinidad and Tobago.

Up to four **Rufous-shafted Woodstars, *Chaetocercus jourdanii;*** two partially breeding plumaged and two non-breeding plumaged males, were found on the entrance track to Morne Bleu tracking station between 8-15 June, 2008 (RC, GW *et al*.). (See Plate). All were hunting tiny insects from favored perches; none were seen taking nectar. This is the first documented record of male plumaged birds for Trinidad.

A **Ringed Kingfisher, *Megaceryle torquata*** was seen flying south over Bon Accord on 1 December, 2008 (MK). This is the second sighting for Tobago. Whilst this is the same site as the first bird found on 16 July, 2007, the locality is well watched and the likelihood of the same bird lingering unseen for so long is remote.

Single, rather dull-plumaged **Black-whiskered Vireos, *Vireo altiloquus*** were found on Montevideo Trace, Grande Riviere 29 February, 2008 and the upper Blanchisseuse Road on 11 March, 2008 (MK *et al*.). A total of 19 birds have now been documented in the last eight years during periods January to May and October to December.

An adult female **Swallow Tanager, *Tersina viridis*** was found at Cuffie River Nature Resort, Tobago on 21 April, 2008 (JC). This is the first record for the island.

An adult male **Lesson's Seedeater, *Sporophila bouvronides*** was found in a patch of pigeon peas adjacent to marshland in South Oropouche on 9 December, 2008 (KS). This is the first sighting for five years.

A flock of eight **Lined Seedeaters, *Sporophila lineola*** were found on agricultural land in South Oropouche on 16 August, 2008 (KS). This site is just a mile from where the species was first recorded for Trinidad and Tobago during 2007.

A single male **Summer Tanager, *Piranga rubra*** was found close to Cumuto Village on 24 February, 2008 (NL, KL, TM). There have now been six documented records of this wintering visitor in the last 14 years.

A splendid adult male **Scarlet Tanager, *Piranga olivacea*** was seen and photographed at a Mt. Irvine garden bird table on 11 April, 2008 (DK). This brings to nine, the number of spring migrants documented passing through Trinidad and Tobago during the last 25 years with all sightings from 8-28 April. There are an additional two autumn migrants.

An **Ovenbird, *Seiurus aurocapilla*** was found in the Main Ridge Forest Reserve, Tobago on 27 November, 2006 (KM, DH). This is the first documented record for

35 years.

A flock of approximately 45 **Bobolink, *Dolichonyx oryzivorus*** were found in freshwater marsh at South Oropouche on 22 November, 2008 (TM, DS, KS). (See Plate). This species remains a scarce passage migrant through Trinidad and Tobago. Whilst there have been no other sightings in the last five years, access to their most likely feeding area, the Caroni Rice Project, is now extremely difficult.

INCONCLUSIVE RECORDS

Just one record was considered inconclusive of **Bay-breasted Warbler, *Dendroica castanea.*** Whilst submissions of **Red-and-Green Macaw, *Ara chloropterus*** and **Tricolored Munia** were correct in identification, they were both considered of unnatural origin.

South American Classification Committee

For ornithological classification, Trinidad & Tobago are considered part of South America and, consequently, we contribute to the Official South American Checklist compiled and maintained by the above group. Their criteria for record acceptance of a new species to the region is far stricter than that adopted by the Trinidad and Tobago Rare Birds Committee, insisting on photographic or specimen evidence.

Currently, there are eight species, accepted to the "Trinidad and Tobago list" but not documented elsewhere in South America, where no such photographic evidence has been archived. The species involved are as follows:

Snow Goose, *Chen caerulescens* :- sightings December 1975 and December 1984.

Northern Gannet, *Morus bassanus* :- seen off north-east Tobago November 1991.

Common Ringed Plover, *Charadrius hiaticula* :- single bird mist netted in October 1962.

Spotted Redshank, *Tringa erythropus* :- single bird in Tobago February 1983.

Common Greenshank, *Tringa nebularia* :- two different sightings; south-west Tobago July 1977 and Waller Field early 1987.

White-eyed Vireo, *Vireo griseus* :- single record, Buccoo Marsh, Tobago January 1998.

White Wagtail, *Motacilla alba* :- one record from Waller Field, Trinidad December 1987.

Red-winged Blackbird, *Agelaius phoeniceus* :- one close to Caroni Swamp from June 1980 - mid 1981.

If anyone has photographic evidence of any of the above, the Committee would be delighted to hear from you.

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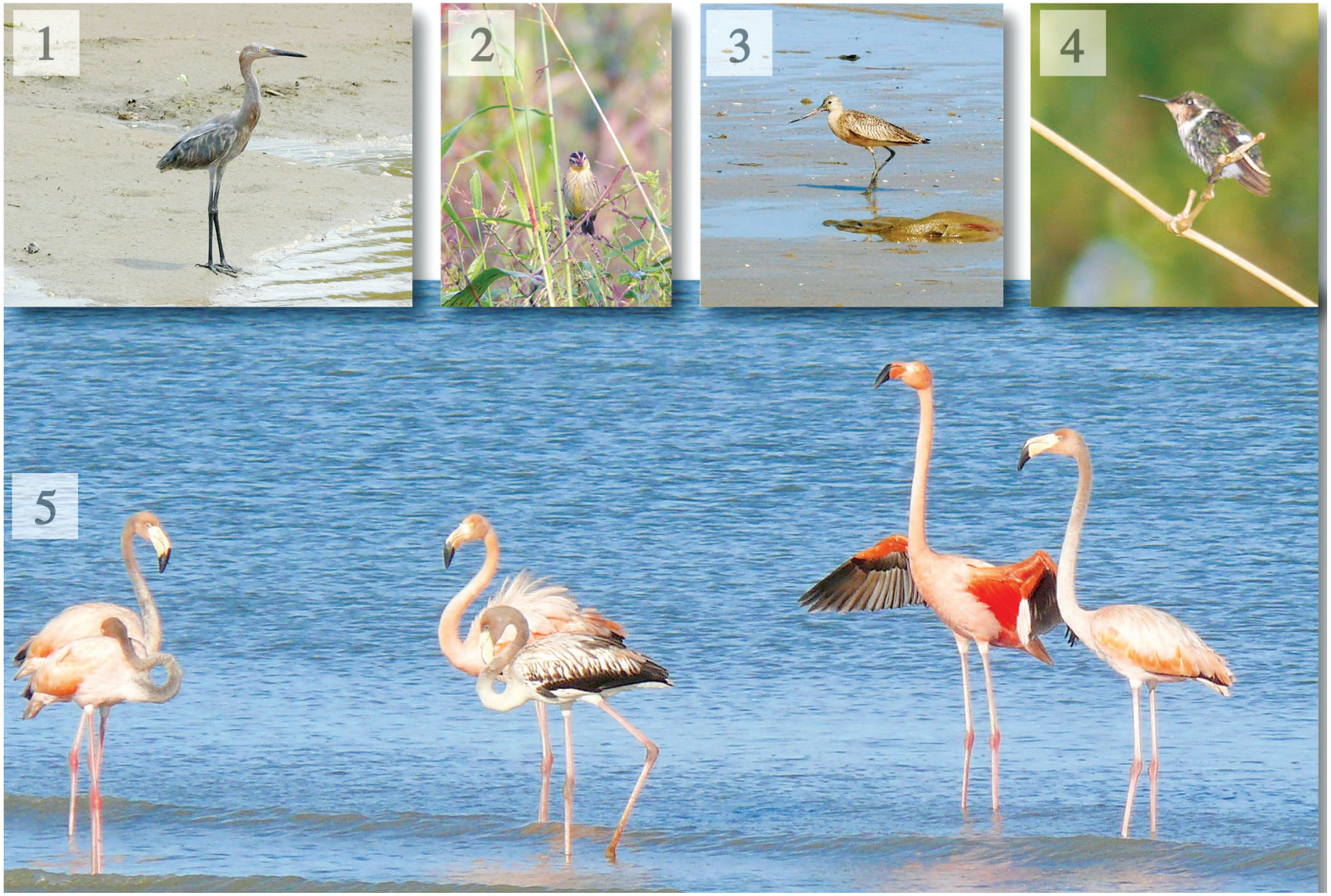

1. Reddish Egret. Photographed by Tarran Maharaj at Erin Bay on 23 August, 2008
2. Bobolink. Photographed by Dave Smith at Rahamat Trace, Oropouche on 6 December, 2008
3. Marbled Godwit. Photographed by Tarran Maharaj at Freeman's Bay, San Fernando on 15 September, 2008
4. Rufous-shafted Woodstar. Photographed by Graham White at Morne Bleu on 15 June, 2008
5. American Flamingo. Photographed by Tarran Maharaj at Waterloo, July, 2008

Population of Oilbirds, *Steatornis caripensis*, Recorded on Christmas Bird Counts, Trinidad, 1969-2008

Ian Lambie[1] and **Vishnu Debie**[2]
1. Lot 31 Grafton Estate, Stone Haven Bay, Tobago.
ilambie97@gmail.com

2. 113 Savannah Drive, Orange Grove, Trincity, Trinidad.
vislis@flowtrinidad.net

On Christmas Day of 1900 in northeastern USA and in eastern Canada, on the invitation of the ornithologist, Frank Chapman, twenty-seven avid birders participated in the first Christmas Bird Census. For these participants, this census replaced the annual and traditional holiday event known as the "Side Hunt", an event in which the team that shot the most birds and small mammals was adjudged the winner. Since that time, the Christmas Bird Count (CBC) has become an annual event in many countries in North, Central, and South America and in the Caribbean. In 2006, the 106th count, there was a record number of 2060 locations with 57,156 participants.

At each bird-count location, an area within a circle 15 miles in diameter (approximately 177 square miles) is designated as the count area. In Trinidad, the designated area is centred on Arouca and includes Las Lapas Trace, Caroni Swamp and San Rafael (ffrench 1986). Participants in the count try to cover as much of the area as possible and record each individual bird seen or heard within one day (24 hours).

The first Trinidad Christmas Bird Count occurred in 1969, and since that time the Christmas Bird Count has become an annual event eagerly anticipated by local birders. The results of the Trinidad bird counts from 1969 to 1996 have been published (ffrench 1986; Lambie and Debie 1998, 2000, 2001).

The Trinidad Christmas Bird Count is the only bird count which regularly records the Oilbird, *Steatornis caripensis* and this occurs at the Dunstan Cave, Asa Wright Nature Centre (AWNC).

The results of the counts illustrate the changes in the Oilbird population at the cave (see Fig. 1).

A decline in the bird population started in 1981 with a single bird being reported during the CBC of 1984. The Management of the AWNC sought the reason or reasons for the decline in the population. The interior of the cave was searched on more than one occasion for a possible predator e.g. a snake or an opossum, and the Zoology Department of the UWI placed traps at various locations near to the cave, but no potential predator was seen or

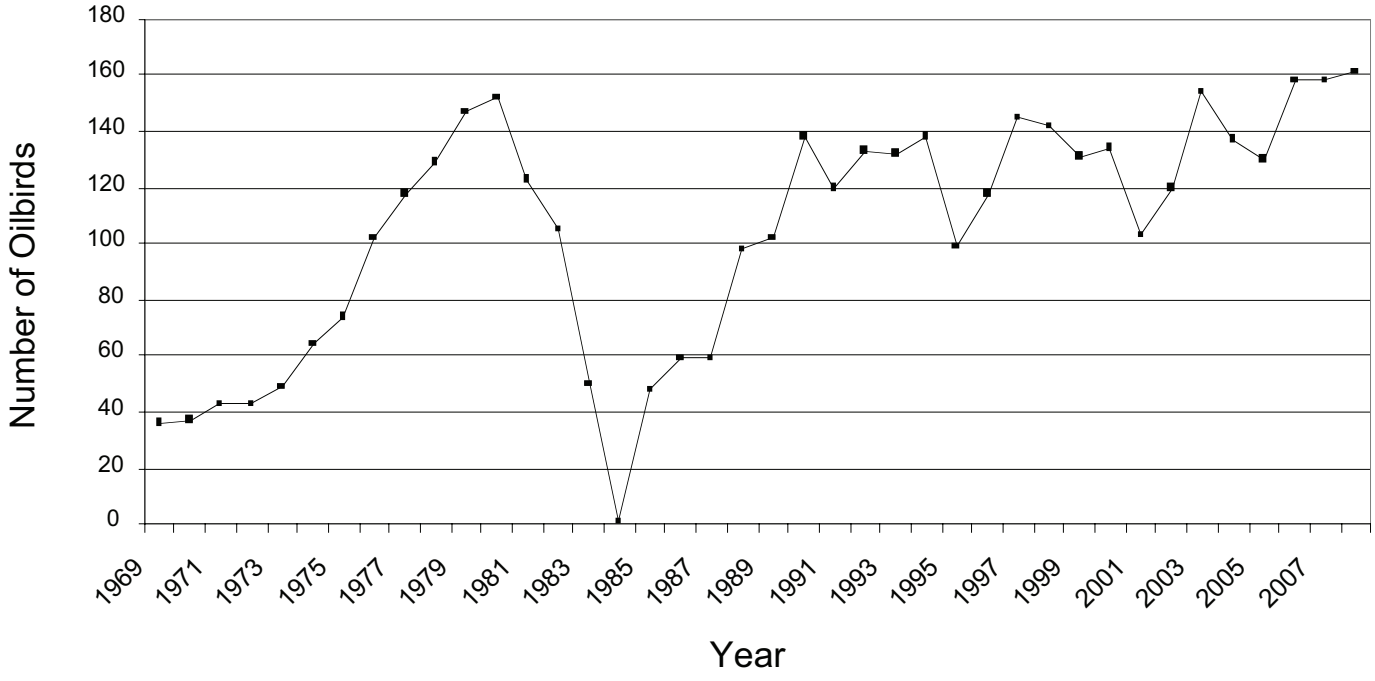

Fig. 1. Oilbird population of the Dunstan Cave, Trinidad, 1969-2008 as recorded at the Christmas Bird Counts.

captured.

The possibility of a reduction in the food supply of the birds was considered, but no supporting evidence could be found. Another possibility considered was human disturbance, as up to that time visitors were permitted to enter the *"inner chamber"* of the cave and to be only five or six feet away from the roosting birds.

In February 1982, no birds were seen in the cave so that visitors were no longer permitted to enter the *"inner chamber"* and there was an almost immediate return of some birds as 105 birds were recorded for the 1982 CBC. However, the population fluctuations continued during the traditional nesting period of the birds and further restrictions were imposed. In 1985, visitors were required to view the birds from outside the cave entrance and had to be accompanied by an AWNC guide. Flash photography was permitted from this distance, but photography requiring continuous lighting was not permitted.

The Oilbird population began to recover in subsequent years and this increase probably reflects adult birds returning to or colonizing the cave as the increase was too rapid to be due to natality. By 2008, the population increased to 161 birds which was the highest number recorded to date.

ACKNOWLEDGEMENTS

We must express our appreciation for the assistance given to this project over many years by the various Interpreter/Guides at the Asa Wright Nature Centre.

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REVIEWERS 2005-2009

Members of the Editorial Committee wish to thank the following individuals who have given their time over the past five years to review articles for Living World.

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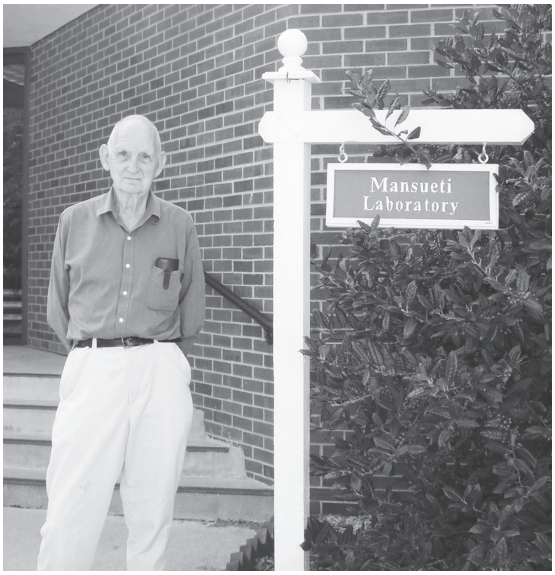
A Love Affair with a Tropical Island: Dave Hardy and the Struggle to Know Tobago's Biota

Christopher K. Starr[1] and **Jo-Anne N. Sewlal**[2]
Dept. of Life Sciences, University of the West Indies,
St. Augustine, Trinidad and Tobago.
1. *ckstarr99@gmail.com*
2. *joannesewlal@gmail.com*

Jerry David Hardy is well known in our region for his long-time, passionate interest in the island of Tobago and its biota. During a recent stay with him in Tobago, we found that he is known all over the island. Speaking with a fisherman in Speyside one day, we noted the man's near-amazement to learn that our companion was none other than the legendary "Snake Man". Dave's main scientific expertise is in the systematics of fishes, amphibians and reptiles, and his paper on Tobago's biogeography (Hardy 1982) remains the definitive work in that area. The following biographical article is mostly drawn from an interview conducted in Trinidad on 27 November, 2007.



J. David Hardy in front of a laboratory at the Chesapeake Biological Laboratory in Maryland, where he once worked. The laboratory is named for his mentor in herpetology, the late Romeo Mansuetti.

Dave was born in 1929 in Pennsylvania, USA. After just three days, the Hardy family - parents, older sister and the infant Dave - moved to 22 Wade Avenue on the outskirts of Baltimore, Maryland, the house where he still lives today. He blames himself for the Great Depression, which began in 1929. "My mother took one look at me, got all depressed, and it just sort of spread from there."

His father had a master's degree in Biology from Johns Hopkins University in Baltimore. An episode from the Depression illustrates something of the times and the elder Mr. Hardy's personal philosophy. "Despite his background in science, my father began work as a Methodist minister. There was massive unemployment at the time, and he lost that job. He wound up making yeast for a whiskey distillery, the only job he could find. However, he still wanted to be involved in the Methodist Church, and one day he applied to become a deacon. He was told that he wasn't acceptable as a deacon as long as he was involved in making whiskey, so he immediately quit his job at the distillery. My mother was not pleased, in fact utterly devastated. And she wasn't the only member of the family who disapproved of my father's decision, I can assure you. Jobs were very hard to come by at that time, and I think we lived on nothing but cornmeal mush for at least six months. Just by dumb luck, though, in about six months he got a job as head of the YMCA in Baltimore, a very good job in those days."

Surprisingly, his father's training in biology had no apparent influence on Dave's own career path. As a child he aspired to be an airplane pilot, and for a time later in life he had a small plane of his own. Even so, he gained an interest in amphibians and reptiles at an early age. "There are certain definitive moments that change your whole life, even if you don't realize it at the time. When I was 11 years old both of my parents were working. What should they do with my sister and me in the summer time, when we were not in school? One day at breakfast they saw an advertisement for a summer nature school at Druid Hill Park in Baltimore, and that seemed to be the solution. So, I was at Druid Hill Park every weekday that summer, and it was there that I met Romeo Mansuetti.

"Romeo was 18 years old and absolutely intrigued by amphibians and reptiles. Soon he had me hooked on herpetology, and I have been that way ever since. Before I met Romeo, I was scared to death of snakes, so that is definitely the beginning of my interest in herpetology. He motivated me to overcome my fear, so that a couple of years later I was catching [venomous] copperheads."

"Even now, though, I have a reflexive reaction if I come upon a snake suddenly. If I am out turning over logs, where I expect to find snakes, that's okay, but if I am walking along at night and suddenly there is a snake on the trail, I go 'Aaahhh!!'. And then I realize I shouldn't do that, especially in Tobago, where all snakes are harmless."

Dave was in the U.S. Army and then did his undergraduate degree at Elon College [now Elon University] in North Carolina. After that he was in graduate school at the University of Maryland, although he left without completing his PhD. For many years he has worked for the National Oceanographic & Atmospheric Administration (NOAA)

in Washington. However, since the early 1990s his base has been the Division of Fishes of the National Museum of Natural History (NMNH), Smithsonian Institution, even as he continues as an NOAA employee. His job is to help develop the Integrated Taxonomic Information System (ITIS), which is intended to list every scientific name of the entire world's biota.

Dave first came to Tobago in the early 1960s, while still a graduate student. The story of his first encounter is best told in his own words.

"I had come to Trinidad with a Smithsonian group led by Bob Tuck. Somebody said we should go to Tobago. I didn't really want to go, but Janet Olmon thought it sounded wonderful and persuaded me. And I fell in love with the place, right then and there. We kept seeing things that we hadn't seen in Trinidad. We didn't know what they were, but we knew they were different. I never bothered much with Trinidad after that."

"That first Tobago trip was another defining moment in my life. In Trinidad, Janet and I had been collecting *Mannophryne trinitatis*, commonly known as the yellow-throated frog. It has a distinctive call, 'pidip pidip pidip pidip', familiar to anyone who goes into the forest in the rainy season. We were in Tobago, walking around in the forest, and Janet said 'Dave, stop. Listen.' What was I listening to? What Janet had noticed - although I had not - was that in Tobago the yellow-throats were going 'peep peep peep peep', not 'pidip pidip pidip pidip'. And that is why, when I came to describe the Tobago yellow-throat as a new species, I named it after her, *Colostethus olmonae* [now *Mannophryne olmonae*, the Bloody Bay poison frog]."

"You might say that hearing that 'peep peep peep peep' was a defining moment within the larger defining moment of my first encounter with Tobago. I said to myself that this was the place to be. Since then we have discovered three more undescribed frogs in the island. I have been back between 40 and 50 times, I would estimate, on average a little more than once a year."

Dave has also visited several other Caribbean islands, beginning with Cuba in 1947. Then, from 1962 into the 1970s he worked in the Lesser Antilles. Part of what persuaded him initially to visit Tobago was one particular puzzle. He had seen frogs identified as *Eleutherodactylus urichi* on Grenada and then on Trinidad. They were clearly different, so he wanted to see what was present on Tobago. While some Tobago specimens matched those from Trinidad, others were the same in some characters but not all. Later analysis by Dave and others showed that what had been treated as one species was, in fact, a complex. *E. urichi* is present on both islands, while *E. charlottevillensis* is a Tobago endemic, and *E. euphronoides* is a Grenada endemic. (All are now being placed in the genus *Pristimantis*).

Thus Dave was led into a broader study of the amphibians and reptiles of Tobago, which by stages has become a major project to inventory the entire biota of the island.

"In 1979 I got some funding from the Organization of American States and EarthWatch, and there has been various other external support. The Tobago House of Assembly (THA) contributed TT$3000. However, I have financed the greater part of it, myself. I estimate that I have spent something more than US$200,000 of my own money over the years. I have no dependents or expensive tastes, so that I can afford to devote a large part of my earnings to my life's work, the Tobago project."

Naturally, a project of this magnitude is not the work of one man. Dave has been able to draw many collaborators into it, specialists in various groups of organisms. Many of these have visited Tobago on trips that he led.

"The best trip of all was in 1991. Several people from the Smithsonian's Division of Fishes came down, as well as the crustacean specialist Marilyn Schotte, all outstanding in their various fields. They discovered a number of new species of fishes and, I think, about 20 new crustaceans. Aside from being very productive, it was an extremely enjoyable trip, as everyone got along well together."

The project has also benefited from association with a number of local people in both islands. In Tobago these have included the late Jane Boyle, Earl Caesar (former head of Fisheries for Tobago) and Pat Turpin. "Some years ago I spent a week with Jane Boyle working on mollusks. She was very dedicated, but she didn't keep precise locality data, so all we know for sure about her specimens is that they came from somewhere around Tobago."

The main goal of the project is annotated lists of the biota of Tobago, several parts of which are now published (e.g. Peck *et al*. 2002) or close to completion. An important auxiliary goal is a comprehensive electronic bibliography of the natural history of Tobago, amounting to about 7500 references.

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BOOK REVIEWS

Catalogue of the Hostplants of the Neotropical Butterflies

G. W. Beccaloni, A. L. Viloria, S. K. Hall and **G. S. Robinson**

m3m-Monografías Tercer Milenio, Volume 8. Zaragoza, Spain. 536 p. 2008

This book sets out to compile most of the published food plant records, and many unpublished records, for the butterflies (including skippers) of the Neotropics – and it succeeds. It includes more than 18,000 records of which 3,656 are previously unpublished. These have

been compiled from 884 scientific papers and books in five languages up to the end of 1999, together with personal communications from 79 individuals. There are plausible records of food plants for 1,991 of the 7,783 Neotropical species (26%) and for 614 of the 957 genera (64%). All butterfly and food plant names have been updated in line with current usage – the butterflies based on Lamas (2004).

Trinidad is well represented considering its size and the smallness of its butterfly fauna compared to the mainland Neotropical countries. There are records from Trinidad of food plants for 287 species (Beccaloni pers. comm. 2008), based on published observations (mainly Barcant 1970) and unpublished records from Margaret E. Fontaine, Scott Alston-Smith, Clive Urich and myself. This represents more than 40% of the butterfly fauna, and is well above the average.

The body of the book is a list of the butterfly species grouped into families and subfamilies with, for each butterfly species, the family and species of food plant, the compilers' assessment as to whether the food plant record is plausible, dubious or erroneous, the country of observation and the source. The source references are given in full in the bibliography.

This is followed by appendices of (1) common names of food plants from the sources examined, (2) synonyms, misspellings and old combinations of names of food plants, (3) a catalogue of the 169 food plant families and species, listing the butterflies associated with each. Indexes to the plants and butterflies complete the work.

In the introduction, the authors discuss some of the problems of such a list, including perpetuating errors, multiple repetitions based on a single observation, records becoming firmer and simplified as they are compiled in later works; the citation of captive rearing food plants as field food plants, etc. The authors attempt to address some of these problems by making their own assessment of the validity of each record (plausible, dubious, erroneous), taking care to evaluate the wording of the original source, and not including recent observations based on previous published work (although these may not always be obvious if sources are not given).

Using unpublished observations carries the risk that some observations are less critically evaluated, and may establish misidentifications of butterflies or their food plants in the literature. Many of the unpublished observations are taken from Janzen & Hallwachs (2009), and here they benefit from the use of their unique reference numbers for each rearing, so that records can be rechecked. With hindsight, I wish I had done the same!

I used this book in preparing the latest section of the skipper butterflies of Trinidad (Cock 2009), and it was useful – not only to track down food plant records, but also to recognize those species where nothing seems to

have been recorded. The case of *Vettius fantasos* (Stoll) highlighted that there are some omissions – the oldest observations by Sepp (1847) were missing, as was this source in the bibliography. Nevertheless, subsequent repetitions of the information without source (Draudt 1924; Scott 1984) were included. The case of *Eutychide subcordata subcordata* (Herrich-Schäffer) illustrates the risk of using unpublished information, as I have found two errors in my unpublished records. These errors are now in the catalogue (based on the information as I provided it, I hasten to stress), and the corrections now published (Cock 2009) will, unfortunately, be easily overlooked.

Although the compilation stops at the end of last century, I do not think this is so critical inasmuch as internet sources and indexing services make it relatively easy to track down more recent publications, particularly research papers. As I said above, I found the book a very useful source. In the case of Hesperiidae in particular, it is complemented by the excellent bibliography of the Hesperioidea by Mielke (2005) which lists whether publications include food plant information, but without giving details. Working with both gives me confidence that I missed very little published information in preparing my latest account of the Trinidad skippers (Cock 2009).

This book can be ordered online at http://www.seaentomologia.org/ for 18 Euros. All references mentioned here are included in my Part 16 of my series on the skipper butterflies of Trinidad (Cock 2009), elsewhere in this volume, and so are not repeated here.

Matthew J. W. Cock
CABI Europe - Switzerland,
Rue des Grillons 1,
CH-2800 Delémont, Switzerland.
m.cock@cabi.org

The Biological Diversity of Trinidad and Tobago

Julian Kenny

Prospect Press, Trinidad and Tobago. 2008.
Bibliography, Glossary, illustrated (maps and photographic plates) xiv; 265pp. ISBN 978-976-9508-23-1

The term *Biological Diversity* is in common usage today in the print and electronic media, yet its full meaning is perhaps not appreciated by the general public. The United Nations Convention on Biological Diversity defines the term as '*The variability among living organisms from all sources, including, inter alia, terrestrial, marine and other aquatic ecosystems and ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.'*

Attempting to cover the biological diversity of a country in 265 pages is a tall order and requires an imaginative treatment of the subject to include all relevant aspects. It is thus necessary for the author to determine quite clearly his intended readership and to cast the material at a level and depth appropriate to such an audience.

Julian Kenny, a well-known local naturalist and a past Professor of Zoology at the St. Augustine campus of The University of the West Indies, has chosen as his audience students in the sixth forms of our Secondary Schools, first year undergraduate students and the interested adult reader who wishes to get a general feel for the subject, and has thus aimed not at producing 'a comprehensive guide to the natural history of Trinidad and Tobago', but 'a general introduction, from the very personal perspective of someone who has looked at the subject both directly and through the eyes of others.'

The work treats with living organisms in one of three ways: grouped according to habitat, for example *Freshwater fish, Marine invertebrates, Epiphytes* to mention a few; by division/phylum as *Amphibians, Reptiles, Birds;* or occasionally as a family as is the case with *Orchids;* there is further, a treatment of natural ecosystems such as *Savannas, Caves, Beaches* and man-made ecosystems such as *Agricultural ecosystems, House and Garden ecosystems* and the interactions among the organisms in each system, with each other and the environment in which they exist. A feature of interest in the sections on organisms is the inclusion of a brief statement on the palaeontology of the group in question, which places present-day forms in some context.

The stage on which the information unfolds is set in an initial Chapter on *Trinidad and Tobago,* detailing the location, climate, topography and soils, the developmental processes of these features and the direct relationship each has with the biological diversity of the islands.

The treatment of the groups is somewhat uneven; greater detail is given to those groups with which the author is more intimately familiar. This is to be expected, for as he points out the work is based on personal experiences. It must also be remembered that a comprehensive account

was not intended.

The author holds that the effective management of a country's natural heritage requires not only an understanding of the organisms and ecosystems but also the threats posed to these. He therefore treats with hazards; threats to the systems and various treaties (and the meaning of the terminology therein) which the country has signed for the protection of its biodiversity.

The text is clearly written; all technical terms are clearly defined in a glossary; and the scientific names of all species mentioned, the family to which each belongs and the local names are given. From the coverage and treatment given, the author has realized his objective and the reader should gain a better understanding of the breadth of the term biological diversity and become more familiar with the diversity that exists in the twin island Republic.

The book is on sale at local bookstores.

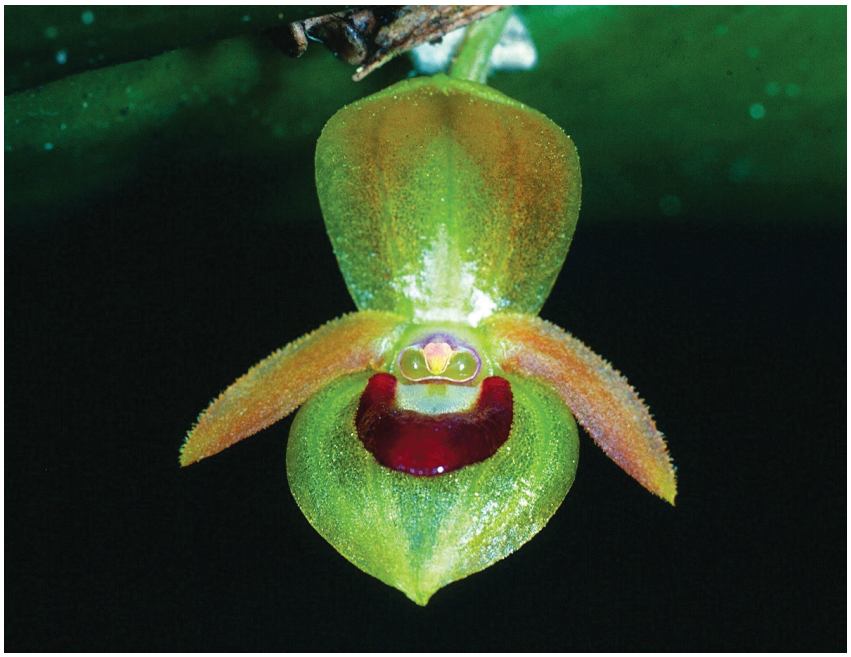
Julian Duncan
pippa1@mail.tt

Orchids of Trinidad and Tobago

Julian Kenny

Prospect Press, Trinidad and Tobago. 2008.
Illustrated, Appendices, Glossary, Bibliography, Index; xi, 117p. ISBN 978-976-9508-24-8

Orchids are popularly referred to as being 'exotic,' a word that can mean either or both: *'introduced from or originating in another country;'* or *'attractively or remarkably strange or unusual.'* It is likely that most persons in Trinidad and Tobago think of these plants in both senses mentioned above, unaware of the number and variety of orchid species in the local flora.



Pleurothallis archidiaconi, one of the many orchids photographed by J. S. Kenny.

Julian Kenny, author of the book under review, is a well-known naturalist and an avid photographer who has had an interest in orchids for over half a century, an interest sparked when, as a boy, he observed that a potted orchid brought home by his father, grew without soil, contrary to what he had been taught that plants need to be rooted in soil. At that time he no doubt thought that orchids were of foreign origin.

Years later, as a student in Canada, he was introduced to a wider variety of orchids than the potted plant at home and noted terrestrial orchids for the first time. On his return to Trinidad and Tobago, he took up an appointment with the Fisheries Division of the then Ministry of Agriculture, a position that necessitated travelling the length and breadth of the country and he began 'to look at the natural world' about him. Being an avid photographer, he began recording aspects of the flora and fauna of the twin islands and over the years has built up an impressive collection of images of these elements of our natural history.

As he had done with his earlier publication *Flowers of Trinidad and Tobago* (2006), he has put together his images of the orchids in his collection, on which images the book is based.

The work consists principally of eight chapters, the first three of which deal, one each with: the biology of orchids; the orchid flora of Trinidad and Tobago; and orchid habitats of the twin islands. These are amply illustrated with full-plate or half-plate photographs in colour. The remaining five chapters are less conventional and consist of galleries of quarter or half-page images of species grouped according to some common feature among them. Thus there are: Showy species; Terrestrial species; 'Botanicals' (species that do not fall naturally into any of the other categories);

Others and miniatures; and Threatened and endangered species.

There is a legend accompanying each image in the galleries, giving the botanical name of the species and the common name where one is known, a brief ecological note on the species, dimensions in centimeters and the type of inflorescence borne.

There are two appendices, one detailing the orchid species recorded in Trinidad and Tobago, stating which species occur in both islands and which in one island only, and giving an indication of the status of the species, whether rare, uncommon, common, or uncertain. The other appendix deals with the need for and means of conserving the orchid flora of the twin islands. A Glossary of terms used, a Bibliography and an Index complete the work.

The photography is in most instances superb. A few of the images suffer from the size at which they were rendered and here and there a slight shift in colour.

A problem that an author of works such as this book experiences, is the frequency with which systematists of some plant groups either lump genera together or split them into smaller groups. This results in name changes which often take place during the gestation period of the book. The current work has not escaped the 'curse' with the result that there are a few name changes from the ones used. For example, the species listed as belonging to the genus *Pogonia,* have been assigned to the genus *Cleistes*.

The printer's imp has been a bit busy with a few of the specific epithets, rendering the initial letter in the upper case.

Overall the work is attractively laid out; the text makes for easy reading; and the sections on orchid habitats and conservation of our orchids a valuable inclusion, for our information and education in a day and age when in the name of 'development' so many natural habitats are being destroyed. For the general reader, the book, which is on sale in major book stores in the country and at the University of the West Indies Book Store, should not be only an attractive addition to the coffee table collection, but also an eye-opener to the variety of orchid species in the local flora.

Julian Duncan
pippa1@mail.tt

A Naturalist's Year

Richard ffrench

Port of Spain: Prospect Press. 173 p. 2007. TT$120.

Richard ffrench was born in 1929 and spent his earliest years in India. His schooling was in England, where he qualified as a teacher. Although he is today the foremost authority on the birds of Trinidad and Tobago, Richard was a latecomer to natural history, when his wife, Margaret, and her family introduced him to bird-watching. This set him on the course that produced the monumental *A Guide to the Birds of Trinidad & Tobago* (2nd ed. 1991, Cornell Univ. Press).

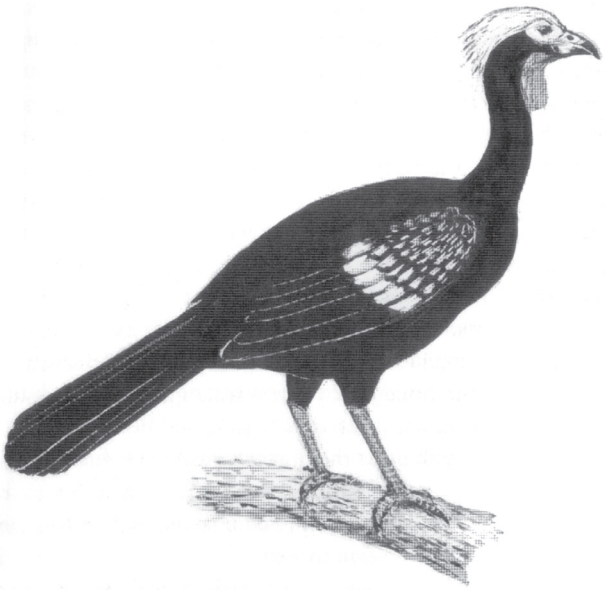
Richard's first teaching post was in Barbados, from which he made occasional visits to other islands. He "found Trinidad utterly fascinating, big enough to be quite wild in places ... and most exciting in the opportunities open to a birdwatcher." After three years in Barbados, he was very happy to move to Trinidad to teach in Pointe-à-Pierre from 1958 until retirement in 1984. He emigrated to England in 1985, from which he worked as a birdwatching tour guide for many years.

A Naturalist's Year is a selection from his column "Nature Notes", which appeared in the *Trinidad Guardian* newspaper during his last three years here, with a few new pieces written especially for the book. The 52 chapters -- mostly of one or two pages -- are arranged according to month.

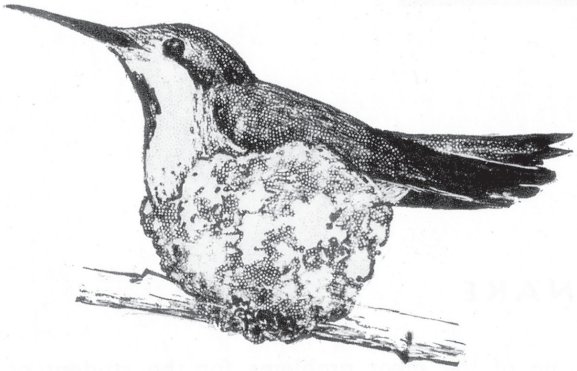
Despite his late start, Richard ffrench is a hard-core naturalist. Here we find an unswerving love of wild things and their habitat, a constant curiosity about how they live, and a concern for their survival in perilous times. Not surprisingly, more than half of the chapters are about birds, but this is no narrow-focus book. Among the many themes treated are ecological succession, mud volcanoes, the naked-Indian tree, leaf-cutter ants, fiddler crabs, the unlovely marine toad, a stalking mongoose, the blue-and-yellow macaw (a conservation success story), and what it must have been like to be the last bird-of-paradise on Little Tobago. Original illustrations by Margaret ffrench add a fine polish to the text. I especially appreciate those of the pawi, a hummingbird on her nest, and a bemused prehensile-tailed porcupine.

In short, this is a book to be welcomed by naturalists interested in the New World tropics.

That said, I must remark on some serious shortcomings. This will require a bit of perspective. The key problem facing book publishing in the English-speaking Caribbean is distribution. With a population of only about six million, the market is small and very fragmented, so that books published in one island territory often do not reach others.



Trinidad piping-guan or pawi



A ruby-topaz hummingbird on its nest

Prehensile-tailed porcupine

This comes forcefully to one's attention on stepping into the Front Line Bookstore in Dominica, for example, where one finds a wealth of local books and booklets that deserve to get around but don't. Other islands present a repetition of this experience. One might expect the region's publishers to form a distribution association to overcome this shared problem, but I am not aware that this has ever been attempted. In the case of *A Naturalist's Year*, the print run (1000) is quite generous, but distribution is limited to Trinidad and Tobago.

Regrettably, this book is stamped with just such a narrow geographic outlook. Its origin in a local newspaper column introduces limitations that the author and publisher have made little attempt to overcome. Many local terms and references will be quite opaque to readers elsewhere. And, despite the title, there is usually no particular mention of the time of year, so that seasonal references are lost on readers beyond our shores. The 12 pages of chapter notes are a recognition of this problem, but far from a solution. It would have been well worth the trouble to integrate these and much more supporting information -- including the scientific name of every species mentioned -- into the chapters, along with explanations of such things as where and what the Caroni Swamp is.

Beyond this, two other features could have given the book some welcome heft and reach. First, it opens with a "biography" and a foreword, each of less than one page. This will not do. A book of this nature calls for a substantial account of the author's life and the motivation behind the writing. Second, seasonality is not well integrated into the framework of the book. An opening chapter on the climate and biota of Trinidad & Tobago, with at least one full-page map, would have strengthened the framework.

A Naturalist's Year is an admirable book. I wish many more naturalists would write the books that are in them. At the same time, it is important to recognize the broader readership that is out there if we can reach it.

Christopher K. Starr
Dept. of Life Sciences,
University of the West Indies,
St. Augustine, Trinidad and Tobago.
ckstarr@gmail.com

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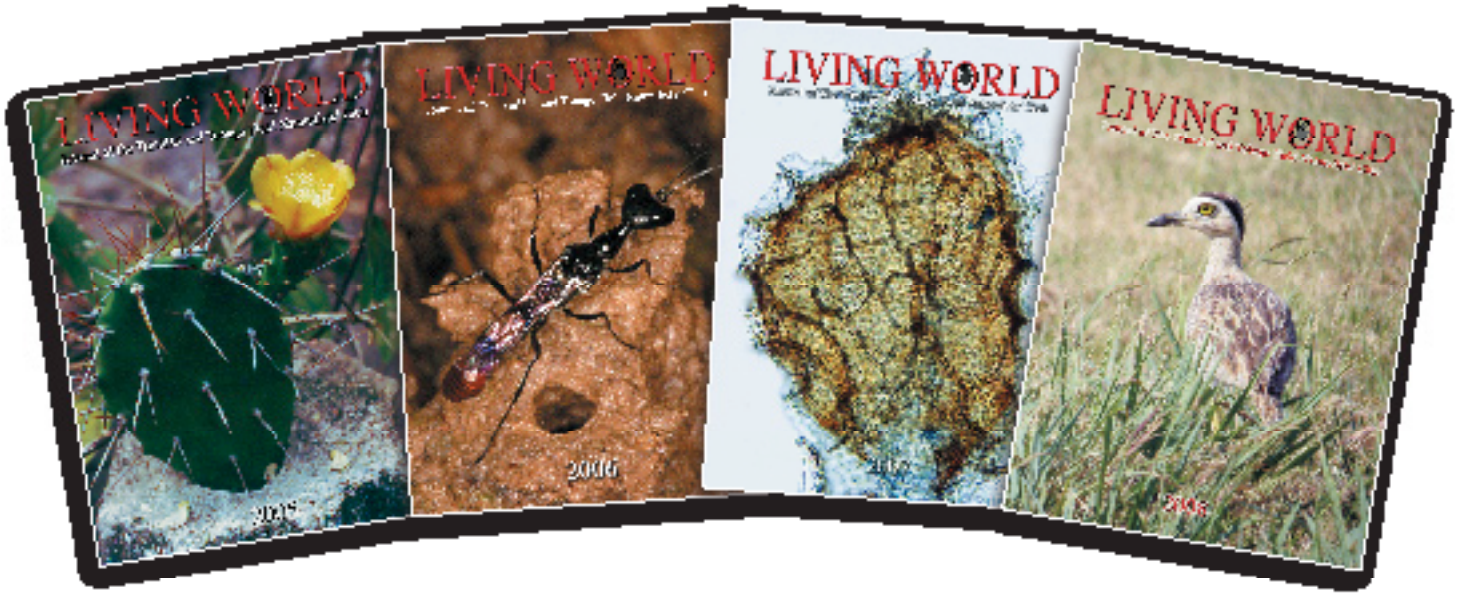

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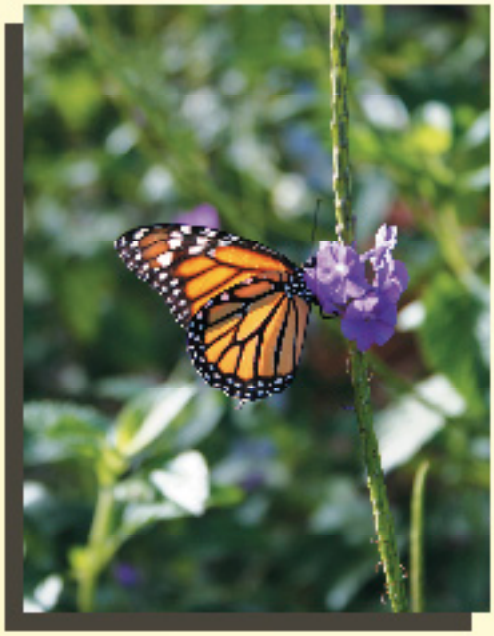

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