

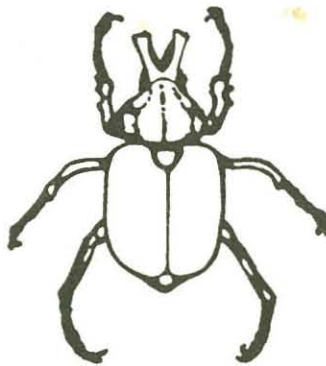
LIVING WORLD



Journal of the Trinidad and
Tobago Field Naturalists' Club
1987-88

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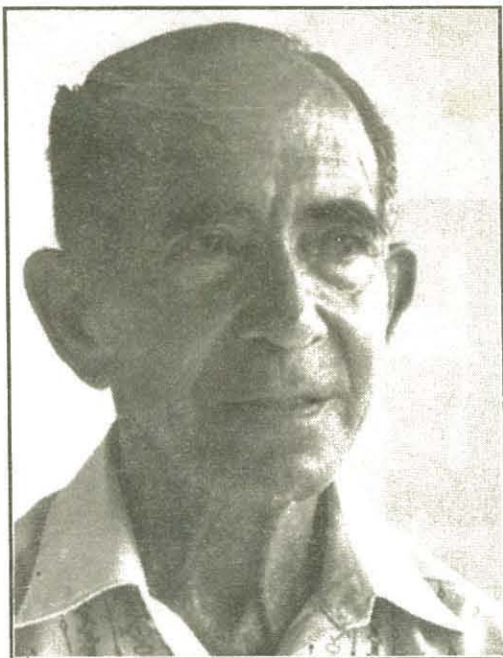
Journal of the Trinidad and
Tobago Field Naturalists' Club
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Natura Maxime Miranda in Minimis

Published August 1988

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Dedication

Frankie Farrell was born on 29th December 1907, and educated at Tranquility Boy's Government School and Queen's Royal College. In 1927 he failed to win an island scholarship by just a few marks and so, unfortunately, was deprived of the benefits of a university education. After leaving school he worked for a while as a laboratory assistant to Dr. Fred Hardy in the Soil Science Department at I.C.T.A. before joining the Civil Service as Clerk in the Supreme Court Registry. From there he rose through the ranks to become Chief Electoral Officer under the Elections and Boundaries Commission, from which post he retired in 1966.

Frankie cannot remember exactly when he joined the club and the club's relevant records have been lost, but he is reasonably sure it was in 1933. Later on he was elected Hon. Treasurer and served in the post for many years until the club lapsed into a period of inactivity in the late 1940s. When the club was reactivated in January 1954, Frank resumed his membership. His name appears in the minutes on the list of those present at the meeting of 18th February, 1954. Since then he has been a very active member, attending most meetings and field trips, and serving as Management Committee member, Vice-President and finally President for two years. He has delivered lectures at meetings of the club and has been a dedicated member of the Botany Group from its inception in 1977. He contributed an article on weeds to the club's journal of 1973 and co-authored the publications arising out of the studies of the Botany Group, one of which appears in this issue.

Frankie has been a member of the club for about 55 years ; he is, in fact, the only member still with us from the period before World War II and has the distinction of being a fellow member with some of the club's founder members. For his many contributions to the life of the club during this long period we dedicate to him this issue of our journal. It was originally conceived as an eightieth birthday present; unfortunately, it is late, but this fact in no way diminishes our gratitude. It simply means that we have that much more to thank him for. May you have many more happy birthdays Frankie.

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Cover

Melipona favosa queen laying (see p. 34)

Editorial

Field naturalists are familiar with the concept of evolution in relation to plants and animals. However, humans too evolve, and so do their societies, their communications media and their scientific journals. Our transition from a journal with a small-page format and no colour to a magazine-type format with coloured covers caused some criticism about "going glossy", with the implied judgement that somehow "glossiness" went hand in hand with lower scientific standards. But when the editors had the opportunity of including colour, "and gloss", they embraced it because of the educational value of colour photographs. It is for our readers to decide if there has been any change for the worse in content or standards.

Now however, it is possible to see clearly that the transition was a product of the "oil boom" where money was no problem. Times have changed, now money is a problem, both here and also elsewhere. For example, the American magazine Science Digest has become extinct. Others struggle to stay alive. We, too, are affected and we must adapt to avoid the ultimate catastrophe. Hence, our reduction in the use of colour and the change in the appearance of the covers. By the logic of our critics this should signify an improvement in scientific quality.

Improvement is always sought but, we fear, not so easily obtained. Few members of the club could imagine the workload that devolves on the principal editor in the production of each issue. There is no paid staff for editing typescripts or correcting proofs. Errors creep in despite every effort to detect and eliminate them. For this we apologise but there is little none that can be done about it in the circumstances. Authors can help by submitting typescripts, double-spaced, with adequate margins and as few hand-written corrections as possible. We acknowledge the march of technology but please give us computer print-outs on plain white paper and please give us adequate margins. In the long run though it is the scientific content that counts most. Keep the contributions coming, even short notes on isolated observations, but keep them to the point and as reliable and as accurate as you can make them.

Errata

In The Skipper Butterflies (Hesperiidae) of Trinidad, Part 4 by M.J.W. Cock (Living World 1985-1986) the numbering of the veins and spaces in the wings of *Urbanus prouti* was omitted. The figure is therefore reproduced in Part 5 in this issue.

Also in the same article (i.e. Part 4) the legends to plates 2 and 3 should be interchanged so that Plate 2 reads *E. socus chota* ♀ UPS. and Plate 3 reads *E. socus chota* ♂ UNS.

The Trinidad and Tobago Field Naturalists' Club

The Trinidad Field Naturalists' Club was founded on the 10th July, 1891. Its name was changed to the present one in 1974. The objects of the club are to bring together persons interested in the study of natural history, the diffusion of the knowledge thereof and the conservation of nature.

Monthly lecture meetings are held at St. Mary's College on the second Thursday of the month while field excursions are held on the last Sunday of each month, except December, when no official club activities are organised.

Membership is open to all residents of Trinidad and Tobago, of at least fifteen years of age, who subscribe to the objects of the club.

Management Committee:

President - Dr. V. C. Quesnel, Vice-President - Mr. Glenn Wilkes, Hon. Secretary - Miss Luisa Zuniaga, Hon. Asst. Sec. - Mrs. Lana Campbell, Hon. Treasurer - Mr. John Hilton, Mr. t. f. Farrell, Mr. John Seyjagat, Miss Caroline Chaboo.

Editorial Committee : Victor Quesnel, Hans Boos, Yasmin Comeau.

All enquiries concerning the club or its journal should be addressed to the Honorary Secretary, 1 Errol Park Road, St. Ann's, Trinidad W.I.

The Flowering Phenology of some plants of the Aripo Savannas

by T. Francis Farrell, Anne Hilton, John Hilton, Victor C. Quesnel and Luisa Zuniaga.
1 Errol Park Rd., St. Ann's, Trinidad.

In the latter part of 1985 the Botany Group of The Trinidad and Tobago Field Naturalists Club undertook a preliminary study of the flowering phenology of some of the more common and conspicuous plants of the Aripo Savannas as an adjunct to a more detailed study of their ecology being undertaken by Miss Sharon Schwab as work towards a degree from the College of Natural Resources, University of Wisconsin, U.S.A.

Methods

A site was chosen in Svanna III (Anonymous 1980) on which was marked out a plot as shown in Fig. 1. The narrow L shape was chosen so that all observations could be made without stepping into the plot. The location was also deliberately selected so that one arm of the L contained longer and the other shorter grasses and sedges. The plan was to visit the site once every month for a year. Observations were made in September and October of 1985 but as no visits were made in November and December of that year the monthly visits were continued until December 1986.

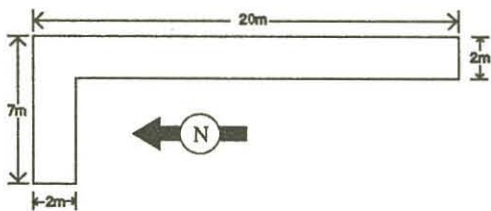


Fig. 1 Plan of the observation plot.

Difficulties were experienced in the identification of the *Utricularia* species and some were relatively rare in the plot. As a result, records for some of the different species were too few to be significant. Nevertheless, there is a good record for one species that was easily recognisable - *U. peckii*.

Although the rule for the dicots was to count the number of plants in flower, for the sedges the number of flowering stalks was counted instead. Grasses are excluded from the report as only the common *Paspalum pulchellum* was observed and it either did not flower during the period of observation or it was missed when it did. Its normal flowering time is early in the wet season. In what follows the nomenclature of the Flora of Trinidad and Tobago is used.

Results

The observations are recorded in Table I and Fig. 2. A brief inspection of the table shows that very few flowering specimens were observed for some species. Thus there were twelve *Xyris grisebachii*, thirteen *Drosera capillaris* and only one *Acisanthera bivalvis*. On the other hand some species were plentiful, e.g. *Perama hirsuta*, *Utricularia peckii* and *Rhynchospora longibrachiata*. Some show seasonal behaviour and some do not. Thus, *Sauvagesia sprengelii* flowered practically year round. *Drosera capillaris* may also flower year round. Although the table shows several months without flowers, a larger sample may well have produced flowers in every month since, as will be shown later, it is very sparing in the production of flowers. *Rhynchospora holoschonoides*, *Xyris gri-*

achii, *Abolboda americana* and *Utricularia peckii* seem to be definitely seasonal (Fig. 2). A third category is observable. It consists of *Perama hirsuta* and *Rhynchospora longibrachiata* which flower for many months of the year but have pronounced peaks of flowering over a 3-4 month period.

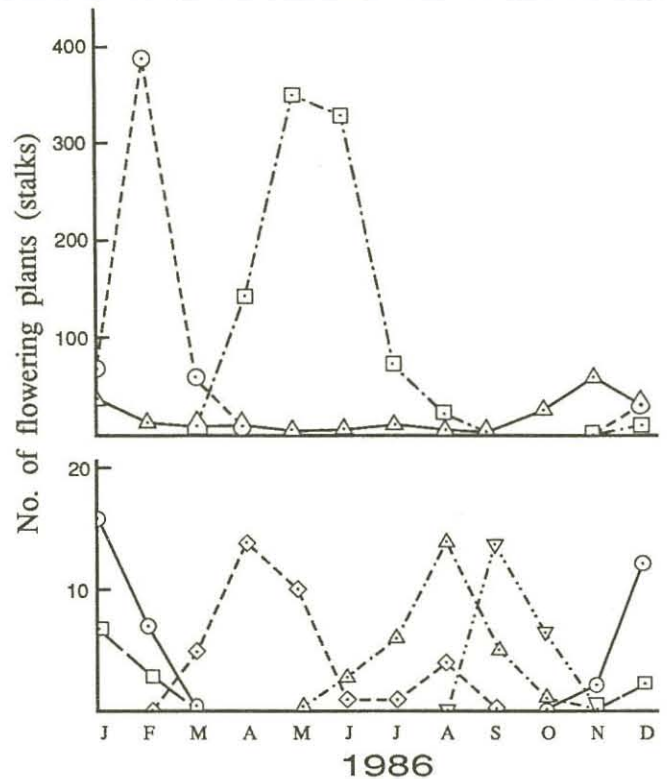


Fig. 2. The flowering behaviour of some plants of the Aripo Savannas during 1986

- | | |
|--------------------------------|--------------------------------|
| ○---○ <i>U. peckii</i> | □---□ <i>X. grisebachii</i> |
| □---□ <i>R. longibrachiata</i> | ◇---◇ <i>R. holoschonoides</i> |
| △---△ <i>P. hirsuta</i> | △---△ <i>S. grisebachii</i> |
| ○---○ <i>U. viscosa</i> | ▽---▽ <i>A. americana</i> |

Discussion

Although this study is concerned with only a small number of the species in the savannas and suffers from the defect that no grass is included, it nonetheless provides some useful information. Two species, *Utricularia peckii*, and *Rhynchospora longibrachiata* have sharply defined flowering periods in February and May - June respectively. Five other species with fewer recorded observations seem also to have well defined flowering periods. These are *Utricularia viscosa*, *Rhynchospora holoschonoides*, *Xyris grisebachii*, *Spiranthes griesbachii* and *Abolboda americana* with peaks in January, April, January, August and September respectively. Thus, of the seven species only two have their peak flowering period in the same month. This we find to be a very interesting phenomenon.

If water status is important as a trigger for flowering, the most

Table I. Numbers of plants (stalks) in flower per month

Species	1985		1986											
	Sep	Oct	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
<i>Drosera capillaris</i>	0	2	0	0	0	0	3	2	0	0	3	3	2	0
<i>Perama hirsuta</i>	22	16	40	12	7	7	3	3	10	5	1	27	59	29
<i>Acisanthera bivalvis</i>			1	0	0	0	0	0	0	0	0	0	0	0
<i>Sauvagesia sprengelii</i>			0	6	2	3	5	8	2	8	8	4	4	2
<i>Utricularia peckii</i> (yellow)		20	65	395	60	5	2	2	0	0	0	0	0	29
<i>U. spp</i> (all other yellow spp)			71	23	3	8	2	1	0	2	22	89	170	98
<i>U. viscosa</i> (pale violet)			16	7	0	0	0	0	0	0	0	0	2	12
<i>U. spp</i> (all other non-yellow)			11	34	1	3	0	0	0	1	1	2	4	0
<i>Rhynchospora longibrachiata</i>	65	52	0	0	4	144	350	330	68	43	0	0	1	9
<i>Rhynchospora holoschonoides</i>			0	0	5	14	10	1	1	4	0	0	0	0
<i>Xyris grisebachii</i>			7	3	0	0	0	0	0	0	0	0	0	2
<i>Abolboda americana</i>			0	0	0	0	0	0	0	0	14	6	0	0
<i>Spiranthes griesbachii</i>			0	0	0	0	0	3	6	14	5	1	0	0

likely time for a response is in May - June when rain brings the dry season to an end. The transition from wet to dry in December - January is likely to be protracted and less likely to act as a trigger. The "petit careme", or little dry season, about late September is also unlikely to act as a trigger because the water-logged condition of the soil at this time of the year would hardly have time to be affected. Of the seven species mentioned above only one, *R. longibrachiata*, has a flowering peak in May - June. The others are spread through the year. The peak flowering of *R. holoschonoides* in April may be a response to drought but those species with flowering peaks in the period November - February, viz. *U. viscosa*, *X. grisebachii* and *U. peckii*, are just as likely to have been triggered by shortening day length or cold temperatures as by drier conditions. *Spiranthes griesbachii* and *A. americana* with peak flowering in August and September respectively have no obvious environmental triggers and may simply flower a fixed time after growth from underground storage organs begins at the start of the wet season. Although *Perama hirsuta* flowers year round there is a peak in November. This may be due to shortening days, colder temperatures or a combination of both.

As mentioned above, identification of the different species of *Utricularia* was not always possible and as a result in Table I the flowering records of all yellow-flowered species other than *U. peckii* have been lumped together and all white, pink, mauve or purple species apart from *U. viscosa* were also grouped together. The former group includes *U. subulata* and *U. juncea* and the latter *U. amethystina* and *U. sp cfr denticulata*. The first group has a long season that peaks in November and the second has a shorter season that peaks in February like *U. peckii*. The long season of the first group may, of course, result from the grouping together of different species. The individual

species obviously require further study.

On our first visit to the site we counted all specimens (flowering or not) of some of the species within the plot. Some of the results are : *Drosera capillaris* 52, *Perama hirsuta* 191, *Rhynchospora longibrachiata* 630. at the peak of flowering of two of the species the number of individuals was a fair proportion of the total number. In the case of *Drosera*, however, the total number of plants in flower for the year was 13, only 25%, and the percentage at the peak only 6% of the total. Thus, it would seem that not all individuals flower every year ; in fact, the majority do not.

Although the savanna seemed fairly wet through most of the dry season of 1986, rainfall that year was close to average. Since then rainfall has been well below average. It would be interesting to repeat our observations in years of differing rainfall conditions, to expand them to include other species, to study the *Utricularia* species as individual species rather than as groups and to study the flowering of *Drosera* in a lot more detail. Such a project must be seriously considered.

Acknowledgements.

We thank Sharon Schwab and Yasmin Comeau for help in the field and for help with the identification of the plants.

References

Anonymous, (1980) Management and Development Plan : Aripo Savannas Scientific Reserve, Forestry Division Ministry of Agriculture, Lands and Fisheries, Port of Spain, Trinidad, 43 pp.

Faunal checklist of the Aripo Savannas (Scientific Reserve)

by Sharon Schwab

8221 100th Street, Wisconsin Rapids, WI 54494, USA

Most of the research in the Aripo Savannas has centered on the unique plants and soil conditions of the area, leaving the fauna relatively unknown and potentially misunderstood. Baseline information on species' abundance, habitat preferences, home ranges, social behaviour and birth/mortality rates is almost entirely lacking. Those persons who would pursue faunal studies in the Aripo Savannas are often discouraged by the inherent difficulty of obtaining necessary data from an area which, until recently, had not been given legal protection or considered of national concern.

During 1986 and part of 1987, Trinidad Parks and Wildlife staff, members of the Field Naturalists' Club, faculty and students of the University of the West Indies, Emperor Valley Zoo staff, and private citizens worked together to compile a comprehensive species list of the area. This list represents only a beginning for the fauna of the Aripo Savannas; future naturalists and researchers are left with the enormous task of expanding this list and understanding the complex ecological relationships between the members of the flora and fauna of this unique ecosystem.

Sources

H. Boos, R. ffrench, J. Michalski, V. Quesnel, S. Schwab, J. Seyjagat, G. White, and members of the Wildlife Section of the Forestry Division were all contributors to this faunal checklist. Species names came directly from the contributors, with scientific names, author citations, and verifications by Blake (1977), Boos (1986), Corbet and Hill (1980), De Schauensee (1966), Dyar (1928), ffrench (1980), Frost (1985), Grzimek (1973, 1975), Klots (n.d.), Pritchard and Trebbau (1984), Snyder (1949), Swartz and Thomas (1975), and Watson and Whalley (1975).

Those who want to refer to the original list (Schwab 1985) should contact the Parks Section, Forestry Division, Port of Spain. Persons requiring information on a specific faunal group found in the Aripo Savannas are directed to Adamson (1940), Alkins et. al (1981-82), ffrench (1980), Goodwin and Greenhall (1964), Hails (1983), Hislop (1985), Tikasingh (1974), The Trinidad Field Naturalists' Club (1979, 1985), and Trinidad Regional Virus Laboratory (1970, now the Centre for Epidemiology).

Detailed information on the vegetation and natural history of the area can be found in Bacon (1978), Beard (1946, 1953), Quesnel (1979), Richardson (1963), Forestry Division (1982), and Schwab (1988).

Invertebrates

Much speculation has surrounded the role of termites and earthworms in shaping the features of the open savanna including the building of mounds and hogwallow depressions. Adamson (1940) identified *Nasutitermes ephratae* as the termite responsible for the strange earthen mounds constructed of soil, saliva and feces (Bacon 1978) in the open savanna, the same species which curiously builds tree nests in the palm marsh and marsh forest! In a preliminary study of the open

savanna mounds, Hails (1983) determined that drainage and worm activity affected the density of termites, which in turn influenced the location of some savanna vegetation.

Other invertebrate studies in the Aripo Savannas have been limited. Tikasingh (1974) and the Trinidad Regional Virus Laboratory (1970) collected hundreds of insects from the area of which six mosquito species are listed here. J. Michalski recently completed a book on the dragonflies of Trinidad, and has contributed a narrative and his list of the dragonflies and butterflies of the area, totalling 46 and 15 species respectively. Other studies on the relative density of three species of savanna grasshoppers (F. Arman pers. comm.), and caterpillar and butterfly populations of the area (S. Smith pers. comm.) are pending.

The Odonata of the Aripo Savannas

by John Michalski

The odonate fauna of the Aripo Savannas, like that of so many other well-studied groups, contains many species that are not found commonly anywhere else in Trinidad. A few species, such as the damselfly *Lestes mediorufus*, have been found nowhere else on the whole island. Almost all odonates require standing or running water in which to pass their nymphal stages. In the rainy season, the savannas are, of course, very wet, much of the total area being actually submerged by a few inches of water, and this makes for very good odonate habitat indeed. However, much of the year the savannas are in fact quite dry and the species that have settled down in the savannas have had to cope with this problem in various ways.

The first, and perhaps most obvious, way of coping with seasonal conditions has been to limit the duration of the nymphal development to the wet season so that the adults emerge from the water and become airborne before everything dries up. This is surely what almost all of the Aripo species do. Even adult odonates need somewhat humid conditions however and added to this is the fact that many of the insects which make up their diet (mosquitos, midges, etc.) also need a very moist environment in which to live and reproduce. The species of the Aripo Savannas seem to make up for this by keeping largely to the hummocks and other shadier places as the savanna dries up. In addition, there are one or two places on the savanna where standing water remains throughout most of the year. An abandoned military ground provides several large craters where water collects to a depth of several feet and a canal that extends to the left of the main access road in Savanna #1 stays fairly wet throughout the dry season. Collecting at these spots is usually quite good, though they are dominated by the larger species of strong-flying dragonflies, whose eating requirements probably demand that they find larger "water holes" to patrol. The smaller, more weak-flying species, including most of the damselflies, keep to smaller wet patches and, in the very driest months, may even be seen flying along the deeper wheel ruts where the grasses are still green and the humidity must surely be somewhat higher than the surrounding savanna.

Some of the most spectacular species of odonates may be seen

at the Aripo Savannas and many of these are seldom, if ever, seen anywhere else on the island. These include the mammoth, lime green *Coryphaeschna viriditas*, and the almost fluorescent red *Aphylla producta*, *Rhodopygia hollandi*, and *Planiplax phoenicura*. The Trinidad range of these last three is so far restricted to the savannas. Also found here is the strange *Zenithoptera americana*, unusual not only because its wings are entirely metallic blue, but also because it flies and rests in the manner of the *Heliconius* butterfly, a behaviour I have seen in no other odonate.

Fish, Reptiles and Amphibians

Alkins et al. (1981-82) reported seven fish in the Aripo Savannas. Those species collected were from temporary, generally stagnant, ponds which form during the rainy season. These fish are adapted to deal with the problems of low oxygen in the temporary ponds and disperse once these ponds begin to dry up. Some of the area's fish use both aquatic and aerial respiration; some even use the intestine as a site for oxygen uptake. Dispersal problems have been solved by fish becoming efficient overlanders with well developed fins that act as "legs" to carry them to larger ponds or rivers as the temporary ponds dry.

Only four terrestrial turtles have been identified in Trinidad and all of them have been sighted in the Aripo Savannas (J. Seyjagat pers. comm.). These sightings are important because, to date, the Aripo Savannas area is the only place in Trinidad where all four are present. There is a relatively large number of snakes in the area (13) which use a variety of methods to kill their prey. The macajuel (*Boa constrictor constrictor*) suffocates its prey while the tigre (*Spilotes pullatus pullatus*), like most common snakes, swallows its prey alive. The two poisonous, and perhaps most feared snakes, the bushmaster (*Lachesis muta muta*) and fer-de-lance (*Bothrops atrox*) hunt primarily at night.

Birds

During a brief meeting with me in 1985, R. French identified 96 birds for the Aripo Savannas. In 1986, Wildlife Section staff and Field Naturalists' Club members reported an additional 32 birds for a total of 128 species for the area. This total represents 32% of the birds recorded for all of Trinidad.

Two species, the Large-billed Seed-finch or Twa-twa (*Oryzoborus crassirostris*) and the Lined Seedeater or chat (*Sporophila lineola*) have not been reported in recent years (G. Hislop, J. Kenny, pers. comm.). The former is considered to be extirpated from the island, although both are listed in the hope of their being seen again.

Mammals

Twenty-six mammals have been reported in the Aripo Savannas, ranging in size from the tiny grass mouse (*Akodon urichi*) to the dog-sized brocket deer (*Mazama americana*). The latter, in addition to the lappe (*Agouti paca*), agouti (*Dasyprocta leporina*), and tatoo (*Dasybus novemcinctus*) are favoured by hunters for their meat. Five species of water rat and four species of opossum also make their home in the area.

The List

Insecta

ODONATA (dragonflies and damselflies)

Anisoptera (dragonflies)

Aeshnoidea (clubtails and darners)

Gomphidae (clubtails)

Aphylla producta Selys

Aeschnidae (darners)

Coryphaeschna viriditas Calvert

Libelluloidea (skimmers)

Libellulidae

Brechmorhoga nubecula Rambur

Dythemis cannacrioides Calvert

Dythemis multipunctata Kirby

Erythemis credula Hagen

Erythrodiplax amazonica amazonica Sjostedt

Erythrodiplax basalis Kirby

Erythrodiplax castanea Burmeister

Erythrodiplax famula famula Erichson

Erythrodiplax umbrata Linn.

Idiataphe amazonica Kirby-

Macrothemis hemichlora Burmeister

Macrothemis imitans leucozona Ris

Macrothemis pumila Karsch

Micrathyria "near *eximia*" sp. nov. (undescribed)

Micrathyria "near *mengeri*" sp. nov. (undescribed)

Micrathyria laevigata Calvert

Micrathyria ocellata dentiens Calvert

Nephepeltia phryne Perty

Orthemis cultriformis Calvert

Orthemis ferruginea Fabricius

Perithemis electra Ris

Perithemis mooma Kirby

Perithemis thais Kirby

Planiplax phoenicura Ris

Rhodopygia hollandi Calvert

Tauriphila argo Hagen

Tramea binotata Rambur

Uracis imbuta Burmeister

Zenithoptera americana Linn.

Zygoptera (damselflies)

Calopterygidae (broad-winged damselflies)

Hetaerina macropus Selys

Lestidae (spread-winged damselflies)

Lestes forficula Rambur

Lestes mediorufus Calvert

Coenagrionidae (narrow-winged damselflies)

Acanthagrion kennedii Williamson

Acanthagrion luteum Racenis

Argia pulla Hagen

Argia translata Hagen

Ischnura capreola Hagen

Nehallenia minutum Selys

Ischnura ramburii Selys

Metaleptobasis brysonima Williamson

Metaleptobasis manicaria Williamson

Metaleptobasis mauritia Williamson

Telagrion raineyi Williamson

Aeolagrion dorsale Burmeister

ORTHOPTERA (grasshoppers)

Neoconocephalus sp., long-horned grasshopper

ISOPTERA (termites)

Nasutitermes ephratae Emerson

COLEOPTERA (beetles)

Aniara sepulchralis, black beetle

LEPIDOPTERA (butterflies and moths)

Frenatae

Castnioidea

Castniidae

Castnia licus Drury

Papilionoidea (butterflies)

Papilionidae (swallowtails)

Battus polydamas Linn., black page, gold rim,
polydamas swallowtail

Pieridae (whites, sulfurs, orange-tips)

Eurema sp. (either *nise* Cramer, *elatheia* (Rob.), or
albula Cramer)

Lycaenidae (gossamer-winged butterflies)

Tmolus sp.

Nymphalidae (brush-footed butterflies)

Anartia jatrophae Linn., white or American
peacock, biscuit butterfly

Junonia geneveva Cram.

Adelpha cytherea Linn.

Satyridae

Euptychia hermes Fabr.

Euptychia sp. (*palladia* Butl. or *penelope* Fabr.)

Heliconiidae (heliconians)

Dryas iulia Fabr.

Heliconius sara thamar Huebner

Heliconius ricini Linn.

Heliconius erato hydara Hewiston

Heliconius melpomene euryades Riff.

Danaidae (milkweed butterflies)

Danaus plexippus megalippe Linn.

DIPTERA (true flies)

Culex portesi, mosquito

Culex taeniopus Dyar & Knab, mosquito

Cules declarator Dyar & Knab, mosquito

Culex vomerifer, mosquito

Lutzomyia flaviscutellata, sand fly

Wyeomyia arthrostigma, mosquito

Wyeomyia splendida Bonne-Wepster & Bonne

Pisces

CHARACINIDAE (characins)

Astyanax bimaculatus (Linnaeus), sardine

Hemigrammus unilineatus (Gill), tetras

Copeina arnoldi Regan, copeina

ERYTHRINIDAE

Hoplerythrinus unitaeniatus (Spix), yarrow

Hoplias malabaricus (Bloch), gaubine

GYMNOTIDAE (knife-eel or naked-backed fishes)

Gymnotus carapo Linnaeus, banded knife-fish

CALLICHTHYIDAE (callichthyid armored catfishes)

Callichthys callichthys (Linnaeus), chato

Corydoras aeneus (Gill), bronze catfish, pui-pui

CYPRINODONTIDAE (killifishes or toothcarps)

Rivulus hartii (Boulenger), Hart's rivulus

POECILIIDAE (livebearers)

Poecilia vivipara Bloch; Schneider

CICHLIDAE (cichlids)

Cichlasoma bimaculatum (Linnaeus), cascarob

SYNBRANCHIDAE

Synbranchus marmoratus Bloch, zange, eel

Amphibia

LEPTODACTYLIDAE (leptodactylids)

Leptodactylus wagneri (Peters), whistling frog

BUFONIDAE (true toads)

Bufo granulosus beebei Gallardo, granular toad

Bufo marinus (Linnaeus), marine toad, crapaud

MICROHYLIDAE

Elachistocleis surinamensis (Daudin)

Elachistocleis ovalis (Schneider)

Hyla minuta Peters

Hyla misera Werner

Hyla rubra (Daudin)

Flectonotus fitzgeraldi (Parker)

Reptilia

KINOSTERNIDAE (musk and mud turtles)

Kinosternon scorpioides (Linnaeus), South
American mud turtle

EMYDIDAE (common freshwater turtles)

Rhinoclemmys p. punctularia (Daudin), galap

CHELIDAE (snake-necked turtles)

Phrynops gibba (Schweigger), side-necked galap

TESTUDINIDAE

Geochelone denticulata (Linnaeus), yellow leg
morocoy

IGUANIDAE (iguanids)

Anolis chrysolepis planiceps Troschel, anole

Iguana iguana iguana (Linnaeus), iguana

Polychrus marmoratus (Linnaeus), 24-hr. lizard

SCINCIDAE

Mabuya mabouya (Lacépède), bronze stink

TEIIDAE (whiptail lizards)

Ameiva ameiva atrigularis Garman, zandolie,
giant ameiva

Tupinambis tequixin (Linnaeus), matte.

(See Presch 1973).

Cnemidophorus lemniscatus lemniscatus (Linn.),
whiptail, strand racerunner

BOIDAE (boas and pythons)

Boa constrictor constrictor Linnaeus, macajuel

Corallus enydris cookii Gray

Eunectes murinus gigas (Latreille), anaconda

COLUBRIDAE (common snakes)

Chironius carinatus (Linnaeus), golden-tree snake, machete savanne
Clelia clelia clelia (Daudin), black cribo
Helicops angulatus (Linnaeus), water mapepire
Leptophis ahaetulla coeruleodorsus Oliver, green horse-whip
Mastigodryas boddaerti boddaerti (Senzen), machete couesse
Oxybelis aeneus (Wagler), horse-whip
Pseudoboa newiedii (Duméril, Bibron and Duméril), ratonel
Pseustes poecilonotus polylepis (Peters), dos-cocrite
Spilotes pullatus pullatus (Linnaeus), tigre

CROTALIDAE (pit-vipers)

Bothrops atrox (Linnaeus), mapepire balsin, fer-de-lance
Lachesis muta muta (Linnaeus), mapepire z'anana, bushmater

CROCODYLIDAE (alligators and caimans)

Caiman crocodilus (Linnaeus), spectacled caiman

Aves

TINAMIDAE (tinamous)

Crypturellus soui andrei (Brabourne & Chubb) little tinamou

ARDEIDAE (bitterns and herons)

Bubulcus ibis (Linnaeus), cattle egret
Butorides striatus (Linnaeus), green-backed heron
Egretta caerulea (Linnaeus), little blue heron

CATHARTIDAE (American vultures)

Cathartes aura (Linnaeus), turkey vulture
Coragyps atratus (Bechstein), black vulture, corbeau

ACCIPITRIDAE (hawks, osprey, and eagles)

Buteo albonotatus Kaup, zone-tailed hawk
Buteo nitidus (Latham), gray hawk
Heterospizias meridionalis (Latham), savanna hawk
Leptodon cayanensis (Latham), grey-headed kite
Leucopternis albicollis (Latham), white hawk

FALCONIDAE (falcons and caracaras)

Falco femoralis Temminck, aplomado falcon
Falco rufigularis Daudin, bat falcon
Falco peregrinus Tunstall, peregrine falcon

CHARADRIIDAE (lapwings and plovers)

Charadrius semipalmatus Bonaparte, semipalmated plover
Pluvialis squatarola (Linnaeus), black-bellied plover
Vanellus chilensis Molina, southern lapwing

SCOLOPACIDAE (sandpipers and allies)

Actitis macularia (Linnaeus), spotted sandpiper
Bartramia longicauda (Bechstein), upland

sandpiper

Calidris melanotos (Vielillot), pectoral sandpiper
Calidris pusilla (Linnaeus), semipalmated sandpiper
Gallinago gallinago Linnaeus, common snipe
Limnodromus griseus (Gmelin), short-tailed dowitcher
Tringa flavipes (Gmelin), lesser yellowlegs
Tringa melanoleuca (Gmelin), greater yellowlegs
Tringa solitaria Wilson, solitary sandpiper

COLUMBIDAE (pigeons and doves)

Claravis pretiosa (Ferrari-Perez), blue ground-dove
Columba cayennensis Bonnaterre, pale-vented pigeon
Columba speciosa Gmelin, scaled pigeon
Columbina talpacoti rufipennis (Bonaparte), ruddy ground-dove
Columbina passerina albivitta (Bonaparte), common ground-dove
Geotrygon montana (Linnaeus), ruddy quail dove
Leptotila rufaxilla Richard & Bernard, gray-fronted dove
Leptotila verreauxi Tobagensis Hellm & Seilern, white-tipped dove
Zenaida auriculata stenura (Bonaparte), eared dove

PSITTACIDAE

Amazona amazonica (Linnaeus), orange-winged parrot
Ara manilata (Boddaert), red-bellied macaw
Forpus passerinus viridissimus (Laf.), green-rumped parrotlet
Touit batavica (Boddaert), lilac-tailed parrotlet
Touit heutilii (Temminck), scarlet-shouldered parrotlet

CUCULIDAE

Crotophaga ani Linnaeus, smooth-billed ani
Piaya cayana Linnaeus, squirrel cuckoo

STIGIDAE (owls)

Glaucidium brasilianum phaloenoides (Daudin), ferruginous pygmy owl

CAPRIMULGIDAE

Lurocalis semitorquatus (Gmelin), semicollared nighthawk
Nyctidromus albicollis (Gmelin), pauraque

APODIDAE (swifts)

Chaetura brachyura (Jardine), short-tailed swift
Reinarda squamata (Cassin), fork-tailed palm swift

TROCHILIDAE (hummingbirds)

Amazilia chionopectus (Gould), white-chested emerald
Amazilia tobaci (Gmelin), copper-rumped hummingbird
Anthracothorax nigricollis (Vieillot), black-throated mango

- Chlorestes notatus* (Reichenbach), blue-chinned sapphire
Chrysolampis mosquitus (Linnaeus), ruby-topaz hummingbird
Florisuga mellivora (Linnaeus), white-necked jacobin
Glaucis hirsuta insularum Hellmayr & Seilern, rufous-breasted hermit
Phaethornis guy (Lesson), green hermit
Phaethornis longuemareus (Lesson), little hermit
Polytmus guainumbi (Pallas), white-tailed goldenthrout
- TROGONIDAE (trogons)
Trogon violaceus (Gmelin), violaceous trogon
- ALCEDINIDAE (kingfishers)
Ceryle alcyon (Linnaeus) belted kingfisher
Chloroceryle aenea (Pallas) pygmy kingfisher
- MOMOTIDAE (momots)
Momotus momota bahamensis (Swainson), blue-crowned motmot
- GALBULIDAE (jacamars)
Galbula ruficauda Cuvier, rufous-tailed jacamar
- RAMPHASTIDAE (toucans)
Ramphastos vitellinus Lichtenstein, channel-billed toucan
- PICIDAE (woodpeckers)
Dryocopus lineatus (Linnaeus), lineated woodpecker
Piculus rubiginosus trinitatis (Ridgway), golden-olive woodpecker
- DENDROCOLAPTIDAE (woodcreepers)
Dendrocincla fuliginosa meruloides (Lafresnaye), plain-brown woodcreeper
Xiphorhynchus guttatus susurrans (Jardine), buff-throated woodcreeper
- FURNARIIDAE (spinetails and allies)
Synallaxis albescens trinitatis Zimmer, pale-breasted spinetail
- FORMICARIIDAE (antbirds)
Myrmeciza longipes (Swainson), white-bellied antbird
Myrmotherula axillaris (Vieillot), white-flanked antwren
Thamnophilus doliatus fraterculus Berl. & Hart., barred antshrike
- COTINGIDAE (cotingas)
Procnias averano carnobarba (Cuvier), bearded bellbird
- PIPRIDAE (manakins)
Manacus manacus trinitatis (Hartert), white-bearded manakin
Pipra erythrocephala flavissima Junge & Mees, golden-headed manakin
- TYRANNIDAE (tyrant-flycatchers)
Arundinicola leucocephala (Linnaeus), white-headed marshtyrant
Camptostoma obsoletum venezuelae Zimmer, southern beardless tyrannulet
Elaenia chiriquensis albivertex Pelzeln, lesser elaenia
Elaenia flavogaster (Thunberg), yellow-bellied elaenia
Fluvicola pica (Boddaert), pied water-tyrant
Megarhynchus pitangua (Linnaeus), boat-billed flycatcher
Muscivora tyrannus monachus (Hartlaub), fork-tailed flycatcher
Myiodynastes maculatus tobagensis Zimmer, streaked flycatcher
Pipromorpha oleagina pallidiventris (Hellm.), ochre-bellied flycatcher
Pitangus sulphuratus trinitatis (Hellmayr), great kiskadee
Platyrinchus mystaceus insularis Allen, white-throated spadebill
Tolmomyias flaviventris collingwoodi (Chubb), yellow-breasted flycatcher
Tyrannopsis sulphurea (Spix), sulphury flycatcher
Tyrannus dominicensis (Gmelin), gray flycatcher
Tyrannus melancholicus chloronotus Berlepsch, tropical kingbird
- HIRUNDINIDAE (swallows)
Hirundo rustica erythrogaster Boddaert, barn swallow
Progne chalybea (Gmelin), gray-breasted martin
- TROGLODYTIDAE (wrens)
Thryothorus rutilus Vieillot, rufous-breasted wren
Troglodytes aedon albicans Berl. & Tacz., house wren
- MIMIDAE (mockingbirds)
Mimus gilvis tobagensis Dalmas, tropical mockingbird
- TURDIDAE (thrushes)
Turdus albicollis phaeopygoides Seebohm, white-necked thrush
Turdus fumigatus aquilonalis (Cherrie), cocoa thrush
Turdus nudigensis Lafresnaye, bare-eyed thrush
- SYLVIIDAE (gnatcatchers)
Ramphocaenus melanurus trinitatis Lesson, long-billed gnat wren
- VIREONIDAE (vireos)
Cyclarhis gujanensis flavipectus Sclater, rufous-browed peppershrike
- ICTERIDAE (American orioles)
Cacicus cela (Linnaeus), yellow-rumped cacique
Icterus chryscephalus (Linnaeus), moriche oriole
Icterus nigrogularis trinitatis Hartert, yellow

oriole
Leistes militaris (Linnaeus), red-breasted
blackbird
Molothrus bonariensis minimus Dalmas, shiny
cowbird
Psarocolius decumanus insularis (Dalmas),
crested oropendola
Quiscalus lugubris Swainson, carib grackle

PARULIDAE (wood warblers)

Dendroica petechia aestiva (Gmelin), yellow
warbler
Geothlypis aequinoctialis (Gmelin), masked
yellowthroat
Seiurus aurocapillus Linnaeus, ovenbird
Seiurus noveboracensis (Vieillot), northern
waterthrush

COEREBIDAE (honeycreepers)

Coereba flaveola luteola (Cab.), bananaquit
Chlorophanes spiza Linnaeus, green
honeycreeper
Cyanerpes caeruleus longirostris (Cab), purple
honeycreeper
Cyanerpes cyaneus (Linnaeus), red-legged
honeycreeper
Dacnis cayana (Linnaeus), blue dacnis

THRAUPIDAE (tanagers)

Tanagra violacea rodwayi Penard, violaceous
euphonia
Habia rubica (Vieillot), red-crowned ant-tanager
Ramphocelus carbo magnirostris Lafr., silver-
beaked tanager
Tachyphonus rufus (Boddaert), white-lined
tanager
Tangara gyrola viridissima (Lafr.), bay-headed
tanager
Tangara mexicana vieilloti (Sclater), turquoise
tanager
Thraupis episcopus Linnaeus, blue-gray tanager
Thraupis palmarum melanoptera (Sclater), palm
tanager

FRINGILLIDAE (finches, seedeaters, and grosbeaks)

Oryzoborus crassirostris (Gmelin), large-billed
seedfinch
Saltator coerulescens brewsteri Bangs & Penard,
grayish saltator
Sporophila lineola bouvronides (Less), lined
seedeater
Sporophila minuta (Linnaeus), ruddy-breasted
seedeater
Volatinia jacarina splendens (Vieillot), blue-
black grassquit

Mammalia

DIDELPHIDAE (American opossums)

Caluromys philander (Linnaeus), woolly opossum
Didelphis marsupialis Linnaeus, American
opossum
Marmosa fuscata Thomas, mouse-opossum
Marmosa robinsoni Bangs, murine opossum

MYRMECOPHAGIDAE

Tamandua tetradactyla (Linnaeus), yellow
tamandua

PHYLLOSTOMIDAE (American leaf-nosed bats)

Carollia perspicillata (Linnaeus), short-tailed
leaf-nosed bat, Seba's short-tailed bat
Choeroniscus intermedius (J. A. Allen &
Chapman), long-nosed bat

THYROPTERIDAE (disk-winged bats)

Thyroptera tricolor Spix, Spix's disk-winged bat

DASYPODIDAE (armadillos)

Dasybus novemcinctus Linnaeus, nine-banded
armadillo, tatoo

SCIURIDAE (squirrels)

Sciurus granatensis Humboldt, squirrel

HETEROMYIDAE (pocket mice)

Heteromys anomalus (Thompson), Trinidad spiny
pocket mouse

CRICETIDAE (mice, rats, voles, gerbils, hamsters)

Akodon urichi J. A. Allen & Chapman, grass
mouse
Nectomys squamipes (Brants), water rat
Oryzomys capito (Olfers), terrestrial rice rat
Oryzomys concolor (Wagner), arboreal rice rat
Rhipidomys sclateri (Thomas), climbing rat
Zygodontomys brevicauda (J. A. Allen &
Chapman), cane rat

ERETHIZONTIDAE (New World porcupines)

Coendou prehensilis (Linnaeus), prehensile-
tailed porcupine

DASYPROCTIDAE (pacas and agoutis)

Agouti paca (Linnaeus), lappe
Dasyprocta leporina (Linnaeus), agouti

ECHIMYIDAE (spiny rats)

Makalata armata (I. Geoffroy) arboreal spiny rat,
pilori, porcupine rat
Proechimys trinitatus (J. A. Allen & Chapman),
terrestrial spiny rat, long-tailed pilori

MUSTELIDAE (weasels)

Eira barbara trinitatis Thomas, wood-dog, tayra

HERPESTIDAE (mongooses and civets)

Herpestes auropunctatus (Hodgson), Indian
mongoose

FELIDAE (cats)

Felis pardalis Linnaeus, ocelot, tigre

CERVIDAE (deer)

Mazama americana (Erxleben), brocket deer

Role of the Wildlife Section, Forestry Division in the Management Development of the Aripo Savannas Scientific Reserve

by Wildlife Section staff edited by Sharon Schwab

The proposal to make the Aripo Savannas a Scientific Reserve is encouraged because of the uniqueness of the area. There are no "virgin" savannas left in Trinidad; the Aripo Savannas are the only ones to remain relatively undisturbed and they are known to have the greatest diversity of flora, fauna and habitats.

The Wildlife Section should have two roles in the management of the Aripo Savannas. One role should be research on the existing fauna including studies of abundance, diversity, and interrelationships; the other role should be management and protection of the area. The proposal for a Scientific Reserve, although based on mainly floral and pedological studies of the area, mandates a better understanding of the fauna which inhabit the area. Such knowledge of the fauna should provide evidence to support designation of the Aripo Savannas as a protected Scientific Reserve and should bring the Aripo Savannas the recognition they deserve.

Protection of the area is an important aspect of management, for if the resource is not properly protected there will be nothing left to research or manage. Field studies by Wildlife Section staff and foreign researchers have revealed many abuses to the area. Illegal activities such as hunting, mistnetting, cutting of vegetation, squatting, and arson fires are examples of some of the activities that can harm wildlife habitat and species in the Aripo Savannas. The Conservation of Wildlife Act, Chapter 67:01 and the Forest Act, Chapter 66:01 provide the legislative support for patrols by game wardens in collaboration with park wardens. The Wildlife Section can help by providing research data which will support its designation as a Prohibited Area (until it is officially declared a Scientific Reserve) under the Forest Act.

The Wildlife Section can also assist in the wise use of the area by co-ordinating research activities. Regulations and written permission for University of the West Indies faculty and students as well as foreign researchers would provide a system for monitoring use. The Wildlife Section can encourage and develop interest and appreciation of local wildlife resources through education and distribution of published materials by collaborating researchers.

Today, the declaration of the Aripo Savannas Scientific Reserve is still pending. Wildlife Section staff and game wardens can visit the area only occasionally to monitor activities and to make their presence known. Plans are now being developed by the Wildlife Section to conduct a detailed faunal study of the area.

References

- Adamson, A.M. 1940. A second report on the termites of Trinidad, British West Indies. *Trop. Agric.* 17 (1): 12-15.
- Alkins, M., G. de Sousa, M. Julien, M. Koo, R. Lue Chee Lip, and S. Shadid. 1981-82. A study of the aquatic fauna of the Aripo Savannas. *Living World* 1981-82 : 16-19.
- Bacon, P. R. 1978. The flora and fauna of the Caribbean. Key

Caribbean Publ., Port of Spain. 319 pp.

Beard, J. S. 1946. The natural vegetation of Trinidad. Clarendon Press, Oxford, 152 pp.

Beard, J. S. 1953. The savanna vegetation of northern tropical America. *Ecol. Mono.* 23: 149-215.

Blake, E. R. 1977. Manual of neotropical birds. The Univ. of Chicago Press, Chicago. 1: 1-674.

Boos, H. E. A. 1986. A checklist of the mammals of Trinidad and Tobago. *Occas. Paper No. 1 Zool. Soc. of Trinidad and Tobago, Emperor Valley Zoo, Port of Spain.* 33 pp.

Borror, D. J., and R. E. White. 1970. A field guide to the insects of America north of Mexico. Houghton Mifflin Co., Boston, 404 pp.

Corbet, G.B., and J. E. Hill. 1980. A world list of mammalian species. *Brit. Mus. Nat. Hist. London, and Cornell Univ. Press, Ithaca,* 643 pp.

De Schauensee, R. M. 1966. The species of birds of South America and their distribution. *Acad. Nat. Sci., Livingston Publ. Co., Philadelphia,* 577 pp.

Dyar, H. G. 1928. The mosquitos of the Americas. *Carnegie Institute of Washington No. 387. W. F. Roberts Co., Washington,* 616 pp.

French, R. 1980. A guide to the birds of Trinidad and Tobago. Harrowood Books, Pennsylvania, 470 pp.

Forestry Division. 1982. Measurement and development plan : Aripo Savannas Scientific Reserve. *Tech. Doc. For. Div. Ministry of Agric., Lands and Food Prod, Port of Spain.,* 43 pp.

Frost, D. R. (ed.) 1985. Amphibian species of the world: a taxonomic and geographical reference. *Allen Press, Inc., and Assoc. of Systematics Collections, Lawrence, KS,* 732 pp.

Goodwin, G. G. and A.M. Greenhall. 1964. New Records of bats from Trinidad and comments on the status of *Molossus tinitatus* Goodwin. *Amer. Mus. Nov.* 2195: 1-23.

Grzimek, B. (ed.) 1973. *Grzimek's animal life encyclopedia, Fishes I.* Van Nostrand Reinhold, Co., New York, 4: 1-531.

Grzimek, B. (ed.). 1975. *Grzimek's animal life encyclopedia, Insects.* Van Nostrand Reinhold, Co., New York, 2: 1-643.

Hails, R. 1983. The Imperial College Expedition to the West Indies. *Prelim. Rep. Imperial College, London,* 19 pp. (Located at the Parks Section, Forestry Division, POS).

Hislop, G. 1985. Report on faunal census at Aripo Svannahs. *Mimeo. Wildl. Sect., For. Div., Ministry of Agric., Lands and Food Prod,* 11 pp.

Klots, A. B. The world of butterflies and moths. *McGraw-Hill Book Co., Inc., New York,* 207 pp.

Presch 1973. A review of the Tegu, Lizard Genus *Tupinambis* (Sauria: Teiidae) from South America: *Copeia* 1973, 740-745

Pritchard, P.C.H. and P. Trebbau. 1984. The turtles of Venezuela. Soc. for the study of amphibians and reptiles, Cushing-Malloy, Inc., Ann Arbor. 403 pp.

Quesnel, V.C. 1979. The Aripo Savannas. *Trinidad Naturalist* 2 (11): 22-29

Richardson, W.D. 1963. Observations on the vegetation and ecology of the Aripo Savannas, Trinidad. *J. Ecol.* 51: 295 - 313.

Schwab, S. 1985. Status report and inventory guidelines for the Aripo Savannas (Scientific Reserve). Mimeo. Parks. Sect., For. Div., Ministry of Agric., Lands and Food Prod., 227 pp. (Located at the Parks Section, Forestry Division, POS)

Schwab, S. 1988. Floral and faunal composition, phenology, and arson in the Aripo Savannas, Trinidad, W.I. M.S. Thesis, Univ. Wisc. Stevens Point.

Snyder, T. E. 1949. Catalog of the termites (Isoptera) of the world. *Smithsonian Misc. Coll. Publ.* 3953., Smithsonian

Instit., Washington, 112: 1-490.

Swartz, A. and R. Thomas. 1975. A checklist of West Indian amphibians and reptiles. *Carnegie Mus. Nat. Hist.*, Pittsburgh, 216 pp.

The Trinidad & Tobago Field Naturalists' Club. 1979 (29 Sept.). Interesting notes from Aripo. *Bull. of Trinidad and Tobago Field Nat. Club*, 1 pp.

The Trinidad & Tobago Field Naturalists' Club. 1985 (13 Jan.). Botany group tour to Aripo Savannas (Scientific Reserve). *Bull. of the Trinidad and Tobago Field Nat. Club*, 1 p.

Tikasingh, E.S. 1974. Enzootic rodent leishmaniasis in Trinidad, West Indies. *Bull. Pan Amer. Health Org. (PAHO)*. 8 (3): 232 - 242.

Trinidad Regional Virus Laboratory. 1970. Aripo/Waller Field. Annual Rep. Nat. Virus Lab. of Trinidad and Tobago, Port of Spain. pp. 10-11, 66, 75, Fig. 2.

Watson, A., and P.E.S. Whalley. 1975. The dictionary of butterflies and moths in color. McGraw- Hill Book Co., New York, 296 pp.

Some Trinidad Dragonflies that can be Identified on the Wing.

by John Michalski

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When the idea for this article was first proposed to me, it was suggested that I write and illustrate an article describing all known species of Trinidad dragonflies and damselflies (order Odonata). It was immediately apparent, as I quickly explained, that such an article would indeed be a book by itself, as my recent collecting experience suggests that there are at least 120 species, and perhaps as many as 150, in Trinidad alone!

Furthermore, many Odonata can only be specifically identified by examining their wing venation and, ultimately, their genitalia. In fact, I am currently in the process of writing just such a key to the species, but, sadly, this sort of work does not lend itself easily to the scope of the average "weekend naturalist" as a certain level of background knowledge is understood to be a prerequisite to its use. Nonetheless, the collection, observation, and study of dragonflies and damselflies can be an enjoyable and fascinating addition to any nature walk or bird-watching outing and, as many of the finest locations for bird-watching and botanical excursions are also great places to see dragonflies, the "slow hours" of the one interest may easily be taken up with the other (as any odonatist will tell you).

So, 120 species is just too many to cover in the space of this article. It then came to pass that, by thumbing through the spoils of my recent collecting trips in Trinidad and by the painstaking elimination of several personal favorites, I have selected twenty-five species of dragonflies to represent the much broader range of local species. The selected types, it is hoped, represent (in a general way) the range of sizes, colour patterns and forms found in this group. In addition, I have mainly chosen those species that are likely to be seen in the course of otherwise unrelated outings (for instance a trip to Fishing Pond or the Aripo Savanna looking for birds or plants). Also included are a few species that, because of their conspicuous or unusual design, will be certain to attract attention should they cross one's path. Finally, one or two have been chosen in the interest of scientific completeness, in case they are found (and recognized as not conforming to any of the more common families).

Before we get under way, let us settle a central question: What characterizes the Odonata? First of all, because they are insects, they all have the body divided into three segments - the head, the thorax, and the abdomen. The head of a dragonfly is dominated by the two, huge compound eyes. The somewhat triangular area in front of these, which may be termed the face for our purposes, has, at its lower surface, the mouthparts of the insect, and, at its uppermost surface (the vertex, the point at the top of the head in front of where, in dragonflies, the eyes meet), the three simple eyes or ocelli and the antennae. The antennae of Odonata are short, fine and very simple. Unlike many of the moths, whose great feathery antennae relate to them all the complexities of mate-seeking and food location, the antennae of the Odonata are relegated to very minor status. The great sensory organs of the Odonata are their huge, magnificent compound eyes. It is because the Odonata are so visually oriented that they are so splendidly coloured and are capable of

partaking in such aggressive territoriality and vivid mating behavior.

The thorax of Odonata is, for all purposes, a box full of flight muscles. The two pairs of wings are attached on top, to the rear of the thorax, while the three pairs of legs are placed underneath and far to the front of the thorax. These legs are nearly useless for walking; instead, they are armed with numerous long spines which, in combination with the legs themselves, create a large "basket" in which to trap flying prey. The prey of Odonata consists largely of mosquitoes, flies, midges and occasionally bees, butterflies and even other dragonflies! One can see from the illustrations which follow that the size of the legs increases from front to back, i.e. the hind pair are the longest, the front pair the shortest. This arrangement makes it possible for a dragonfly to remain horizontal even when it is holding onto a vertical reed or stem.

The abdomen of Odonata, apart from containing the digestive organs, contains the reproductive organs. The egg-laying device of the female, or ovipositor, is located under the last abdominal segment, the tenth. (All adult Odonate have ten abdominal segments. In the course of species identifications, one often has to look for features on specific abdominal segments, and it is often easier to count backwards from the tenth segment to locate, let us say, the seventh, than it is to properly find the seventh segment if one starts counting from the first. This is because the first two or three abdominal segments are somewhat "squashed together"). Like the females, male odonates have the genitalia on segment number ten, but they also have a second sexual apparatus on segment number two. This condition is unique to the Odonata, and all male odonates, without exception, possess two sets of sexual equipment. The set on abdominal segment two is known as the genital hamules; the set on abdominal segment ten is usually referred to as the male abdominal appendages.

In mating, the male transfers his sperm from segment ten to segment two by simply bending his abdomen around and underneath. When he locates a receptive female, he clasps her, using his abdominal appendages, behind her head. She then bends her abdomen around and underneath to join with his genital hamules on his segment number two. This position is the commonly seen "mating dance" of dragonflies. Once the female is laying, it is a common sight to see the male still holding her behind the head while she dips her abdomen into the water. Mated pairs collected in this condition are termed "in tandem", or labelled simply "mated pair". This is a significant mark in a collection of Odonata as many female damselflies cannot be determined without the male to the species and collecting a mated pair is the only recognized "sure way" to know which female is which. A final word on the abdomen of the Odonata: Oftentimes odonates will be seen to possess brilliant or conspicuously patterned abdomens. These are usually the males of the species and the colours carry a message: "This is my territory! You Stay Out!" Dragonflies are tirelessly territorial and much can be learned by careful and patient observations of their behaviour. There is much work yet

to be done in this area and anybody interested in animal behavior can still add much to the present knowledge of the field. Caution must always be exercised, however, not to draw conclusions too quickly and to avoid anthropomorphism.

Now that we know something of the structure of the Odonata how then are we to divide up Trinidad's one-hundred and twenty or so species? Firstly, into two broad suborders, the Anisoptera (dragonflies) and the Zygoptera (damselflies). Of the two, the Anisoptera are characterized, in most cases, by their larger compound eyes that meet at the top of the head, by their stronger flight, usually flying clear of pond vegetation (and, in fact, by their greater independence as adults from their aquatic environments) and, in general, by their larger size. Once in the hand, it will also be seen that the front and hind wings of the Anisoptera are dissimilar; that is, the hind pair is broader than the front pair. The hind pair is never the same size or smaller than the front pair. By contrast, the Zygoptera, without exception, have the compound eyes widely separated, and both pairs of wings are alike, with the hind pair occasionally somewhat smaller than the front pair. In addition, Zygoptera are much more bound to the aquatic environments (ponds, swamps, marshes, rivers, ditches, etc.) that they, as all odonates, grew up in. All Odonata spend their nymphal stages under water (with few exceptions), but, of the two, the Zygoptera are much less likely to stray from these habitats as adults, keeping close to the pond vegetation. Most Zygoptera are rather smaller than most Anisoptera, though this is not always the case.

Although the intent of this article is to aid in the field identification of Odonata on the wing, I offer here the following advice for those who wish to extend their interest to the collecting of specimens. The identification of most odonata requires the taking of specimens. Knowledge must first be gained of the wing venation and abdominal appendages and, finally, the genitalia of the various genera and species. The complexities of this area of study are such that many of the genera have entire works devoted to them alone, and, in many cases, the arrangement and even the validity of species is by no means settled as yet! Therefore, it is impossible to correctly identify most of the species simply by knowing that one is large and green while another is small and powder-blue with black wing bases. This sort of descriptive work may be sufficient in a relatively small or sparse area (such a Jamaica, as described by F.C. Whitehouse in 1943), but by no means will it suffice for a richly diverse country like Trinidad! For those interested, a list of useful works is given at the end of this article.

The collection of adult Odonata requires a few pieces of equipment, most of which can be made at home, though some have no homemade substitute. For collecting, a net consisting of a netbag of fine yet sturdy cloth attached to a pole not less than three feet long is essential. (We're talking about a standard "butterfly net".) Many collectors sew a nylon net-bag to a rim made out of a metal coat-hanger bent into a circle which is then attached to some lightweight (but strong!) handle, such as a wooden pole, aluminium rod, or a stick of bamboo. A two-inch wide band of heavy material, such a muslin, sewn over the netting around the wire rim will keep the net in better condition for a longer period of time. Specimens, once caught, will need to be killed and any alcohol, if strong enough, will suffice to do the job. I prefer to carry a box strapped over the shoulder that contains enough envelopes to hold my captives alive until I get them home. Specimens are put singly into each half of a folded

envelope with the wings closed over their backs. The envelopes need not be sealed, just closed and folded in half lengthwise.

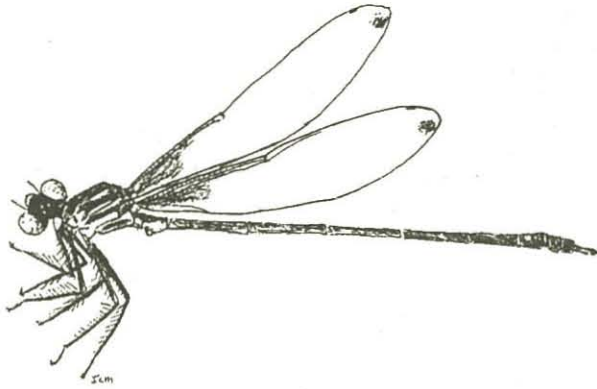
My preferred killing agent is acetone, which not only works quickly but will, if specimens are left in it overnight, preserve the beautiful colours of the body which otherwise fade to a dull brown. (Sadly, nothing has ever been found which will preserve the brilliant colours of the eyes). After the specimens are taken from the killing solution, they should be left to dry (for only a few minutes) with the wings over the back, not spread in the manner of butterflies, if they are to be studied in earnest. Dragonflies should be kept in separate envelopes with information stating where and when they were captured written on the outside. (Clear cellophane envelopes, designed specifically for dragonfly collectors, are available from American supply houses. With these, a standard index card is inserted behind the specimen and all data can be written on to the card). Mated pairs should be kept together. Collecting data is the most important element in your collection! Without this information, even the most precious specimen becomes useless as a scientific reference.

A pair of bent-tipped forceps is most useful, especially with the many smaller species, and as experience and continuing interest may develop, a dissecting microscope will be needed for many determinations. This last piece of equipment is, of course, the toughest to obtain but I have never owned one, and access to one has always been available to me upon request from local museums or universities and schools once my need has been explained. The microscope will not be necessary for the average enthusiast; However, persons keeping any insect specimens must take care to keep their specimens in some container that will prevent light, dust, and insect pests from destroying their collection. I have found out the hard way that any dead insect left unprotected, even for one night, will fall prey to thousands of Trinidadian ants in short order! (Trinidad is often referred to by Western Entomologists as "one, large anthill"). Tupperware or other air-tight plastic containers will do just fine. A few moth-balls or moth-flakes in the container will keep out other insect pests as well as mould.

Finally, having said these words on the collection of specimens, let us now proceed to the twenty-five selected species of Trinidad Odonata.

Part One: Zygoptera

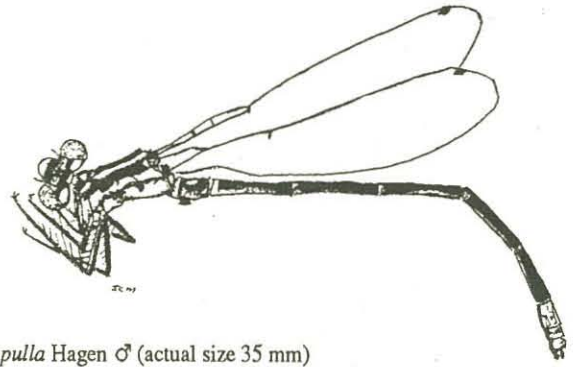
Number 1: *Hetaerina macropus* Selys - In naming plants and animals, biologists use the system of Latin names in which the first name denotes the genus, the second name denotes the species, (and successive names may denote subspecies, forms, varieties, etc.) and all are followed by the describer's name. In this species, the third name is a shorthand version of the odonatist Baron de Selys Longchamps. *H. macropus* is one of only two species in Trinidad belonging to the zygopteran family Calopterygidae which are characterized by, among other things, the many crossveins along the front margin of the wing between the wing base and what is called the nodus. (The nodus is shown as the sharp notch midway along the wing's leading edge. The black "rectangle" toward the wing tip is known as the stigma. In doing these illustrations, I chose to eliminate all but the most essential wing veins from my pictures as the venation of odonates is so complex that to draw all veins in all species would be both terribly time-consuming and not as



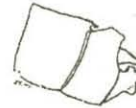
Hetaerina macropus f. occisa Selys ♂ (actual length 48 mm)



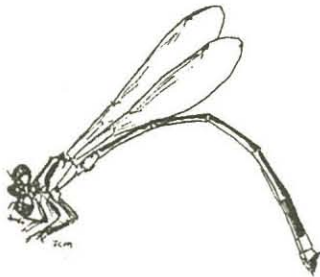
Abd. seg. 9 & 10 & male abdominal appendages (actual length 4 mm)



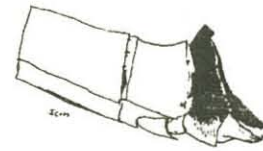
Argia pulla Hagen ♂ (actual size 35 mm)



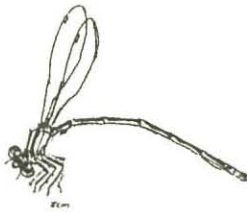
Abd. seg. 9 & 10 & male abdominal appendages (actual size <2mm) (drawn without colour pattern)



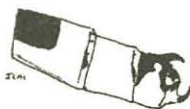
Acanthagrion luteum Racenis ♂ (actual length 36 mm)



Abd. seg. 8,9,10 & male abdominal appendages (actual length 3.5 mm)



Ischnura capriola Selys ♂ (actual length 22 mm)



Abd. seg. 8,9,10 & male abdominal appendages (actual length 2.5 mm)



Ischnura ramburi Selys (var. *credula* Calvert) ♂ (actual length 29 mm)



Abd. seg. 8,9,10 & male abdominal appendages (actual length 3 mm)

accurate as we might like. Let me also point out that I have drawn all twenty-five species to the same scale.)

H. macropus and its near relative, *H. caja*, will at once be distinguished from all other Trinidad Zygoptera by their larger size (46-50 mm) and by the conspicuous blood red patch at the base of each wing (shown with shading in my illustration). In *macropus* there is also a brownish-red spot at the tip of each of the four wings. In *caja* there is a clear red spot at the tips of the hind wings only. Note the enlarged drawing of the male appendages, which will also serve to separate this family from most other damselflies in the same size range. The damselflies of this genus live in and along quick, rocky rivers at higher elevations, such as the Arima, Guanapo, Quare and Rincon.

Number 2: *Argia pulla* Hagen - This damselfly belongs to the largest, by far, of the zygopteran families, the Coenagrionidae. This family can be distinguished from the last by the far fewer crossveins along the leading wing margin; whereas this area of the wing may resemble "train tracks" in *H. macropus*, in the present family there are but three or four crossveins in total. *Argia pulla* is one member of a very large genus of damselflies with dozens of species in the Americas, all characterized by the very long, slender and numerous spines on their legs. When a Coenagrionid damselfly is at hand and it bears long spines such as these on the legs, there is no doubt that it belongs to the genus *Argia*. In *A. pulla*, all of the "white parts" in my drawing are bright, electric blue in the living insect. In Trinidad, *pulla* can be distinguished from any other blue *Argia* by the blue tip to the abdomen. A second common blue species, *A. translata*, has no blue on the tip and the male appendages differ from those illustrated. In quick montane rivers, such as the Guanapo and the Arima above Simla, can be found a brilliantly metallic copper *Argia*; this is *A. orichalcea*.

Number 3: *Acanthagrion luteum* Racenis - This damselfly is certain to be noticed when it crosses one's path on account of its beautiful colouration which is bright yellow-orange (in the white areas of my drawing) with segments eight and nine bright, sky blue. the male appendages at once distinguish it from its near relatives in Trinidad. An all-blue damselfly with appendages like these is *A. kennedii* and a greenish species like this is likely to be *A. vidua*. So far, there are only three species of this genus known to inhabit Trinidad but I suspect others will turn up. They belong to the Coenagrionidae.

Number 4: *Ischnura capreola* Selys - This tiny damselfly is certainly the smallest odonate in Trinidad, and possibly in the world. Keeping close to the grasses and reeds, these little fellows are bright, clear green, with neon blue on the tip of the abdomen. Deceptively hard to catch, they fly very low, near the surface of the pond, and they are often glimpsed while holding on to a female of the species. The females come in two colour forms, one being much like the male illustrated, the other having no black stripes on the thorax. This second type is known as var. *citrine*. These coenagrionids, like the preceding species, prefer still water with lots of vegetation. *I. capreola* is seen most anywhere its habitat requirements are being met and I have taken them at Fishing Pond, Aripo Savanna, Nariva Swamp, and in great numbers at the Sewage Ponds at Laventille. This last location, although smelling quite high, is one of Trinidad's great odonate habitats.

Number 5: *Ischnura ramburi* Calvert - Looking very much like an outsized *I. capreola*, this species will also be found in

similar habitats throughout Trinidad. One feature of this species is that there are up to three distinct colour forms of the female! Thus one form is green and blue like the males (homeochromatic), one orange and one "olive" (both called heterochromatic).

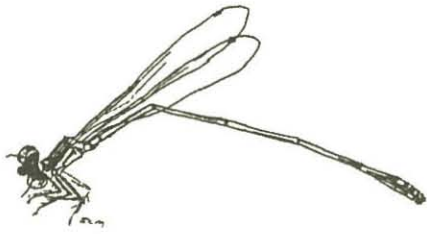
Number 6: *Protoneura amatoria* Calvert - This damselfly belongs to a somewhat smaller family, the Protoneuridae, which are characterized by very narrow wings and often by the very long, narrow abdomen, which tends to resemble a "sewing machine needle". There are two genera of the Protoneuridae in Trinidad, the other being the genus *Neoneura*, which are somewhat shorter and stouter. Of the two known Trinidad species of *Protoneura* (both uncommon), by far the commoner is *P. amatoria*. This remarkable damselfly is metallic, blood red (wherever I have left it white in my drawing), with fiery red-orange eyes in the living insect. They fly low, close to the water, in slow-moving woodland streams where the male/female pairs may be seen depositing eggs in floating mats of wood and leaves. I have caught this species and its relative (the red and white *P. tenuis* - a real rarity!) only along a tributary of the Rio Grande River in Matura near the Toco Main Road. I have seen a few *amatoria* at the Hollis Reservoir as well.

Number 7: *Lestes mediorufus* Calvert (a new record for the island) - This is one of a very few Trinidad members of the family Lestidae, the "spread-winged Damselflies". They can be distinguished from the Coenagrionidae by the way in which they hold their wings open while at rest. Coenagrionids always rest with the wings closed over their backs. This species, which is light blue in the paler areas and olive green and brick red in the shaded parts, is found in the Aripo Savanna among the reeds that grow in the large, shallow puddles alongside the dirt road that crosses the reserve.

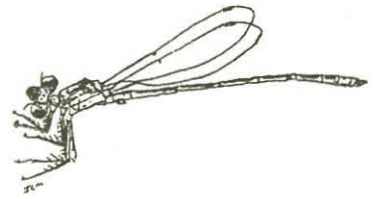
Number 8: (not illustrated) : *Mecistogaster ornatus* Rambur - This Damselfly, too large to illustrate here, is among the very largest of all Odonata and certainly the largest damselfly in Trinidad. It reaches a body length of 95 mm and is therefore easily distinguished from other Zygoptera. It belongs to the numerically small family Pseudostigmatidae that are all characterized by lacking a "true" stigma, which is a single black cell near the tip of each wing in all other Odonata. In the present family, it is replaced by a multi-celled coloured patch that is much larger than any "true" stigma. In *M. ornatus*, it is bright orange in the female while in the male it is yellow on the upper side and nearly black below. (This gives the wing tips the effect of "aircraft lights" when the insect is flying, and it makes the insects difficult to follow visually). *M. ornatus* is a species of the deep forest and one that is not necessarily found close to bodies of water as the nymphs spend their developmental stages in the water that accumulates in bromeliads.

Part Two : Anisoptera

Number 9 : *Erythrodiplax umbrata* Brauer - Perhaps one of the most commonly seen of all Trinidad odonates, this dragonfly may be found almost anywhere, near or far away from water. The body is a light olive green, the wings being clear with the distinctive black or brown (sometimes very faint) band crossing just past the nodus and before the stigma. A huge genus, *Erythrodiplax* contains no less than eight species in Trinidad and dozens in the Americas altogether. Of all



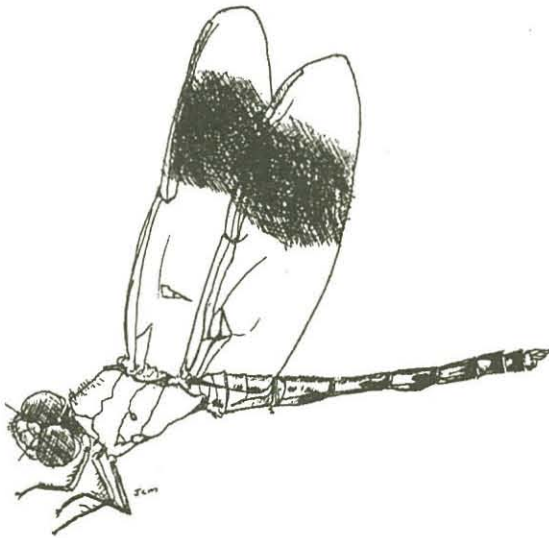
Protoneura amatoria Calvert ♂ (actual length 38 mm)



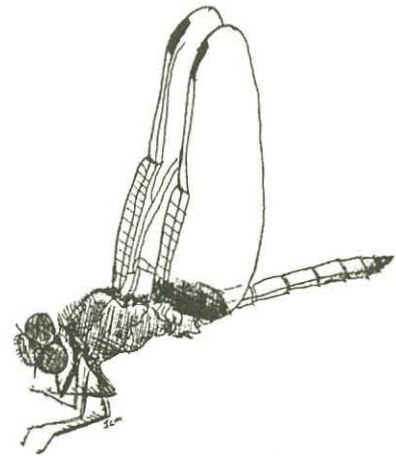
Lestes mediorufus Calvert ♂ (actual length 29 mm)



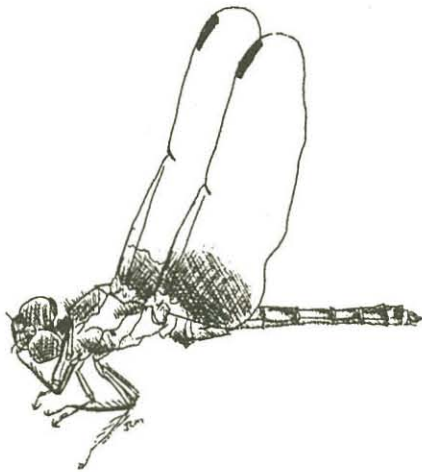
Abd. seg. 9 & 10 male abdominal appendages (actual length 3 mm)



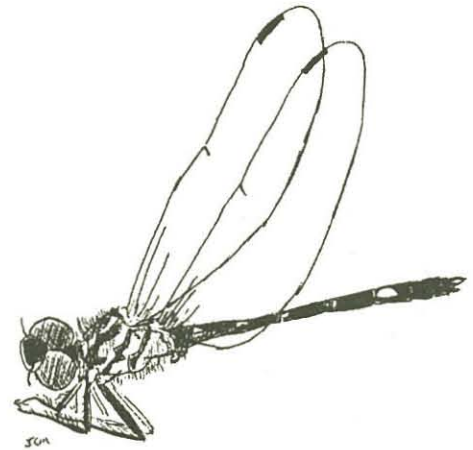
Erythrodiplax umbrata Brauer ♂ (actual length 45 mm)



Erythrodiplax connata fusca Calv. ♂ (actual length 33 mm)



Erythrodiplax fervida Evidson ♂ (actual length 35 mm)



Micrathyria didyma Calv. ♂ (actual length 39 mm)

Trinidad *Erythrodiplax umbrata* is by far the largest and the only one with such a band on the wings. The genus belongs to the largest anisopteran family, the Libellulidae. No other local dragonfly has similar markings on the wings.

Number 10: *Erythrodiplax connata fusca* Calvert - Another frequently seen species this little fellow, when fully mature, is rich black all over with the abdomen a light, powder blue, nearly white. This powdered look is termed pruinosity and is in fact a waxy secretion that increases with age in many odonate species. The wing bases are black. Females (which usually must be caught with the males to be certain of identification) are lighter brown all over with but a little rich yellow colouring at the wing bases. This species lives in a wide variety of habitats across Trinidad.

Number 11: *Erythrodiplax fervida* Erichson - This medium-sized dragonfly can be found in many areas where the water is marshy or ponds are allowed to stand permanently, such as the Sewage Ponds at Laventille. The body is generally orange-brown and the wing bases are washed in clear orange-red. A similar species, *E. famula famula*, is found in the Aripo Savanna where *fervida* apparently does not occur.

Number 12: *Micrathyria didyma* Calvert - Another species common at the Sewage Ponds, it is but one of several species of *Micrathyria* found in Trinidad, although easily the most common. The pale areas of the body are olive green and the pale spot on the seventh abdominal segment is light yellow. The pattern of the darker bands on the thorax is specific to this species. The frons (the large, blunt facial area in front of the eyes) is metallic violet when viewed from the top. It takes a bit more experience to separate the other species of this genus but, if compared with this series of drawings, they should all be readily identifiable as belonging to *Micrathyria*.

Number 13: *Dythemis multipunctata* Kirby - This species can be distinguished from the preceding species by the differing thoracic pattern of stripes, by the greater amount of abdominal marking and by a metallic-blue sheen all over the thorax. The frons is metallic violet as in the preceding species. This species is not uncommon over swift, rocky montane rivers where it flies busily back and forth, defending its territory against conspecific males. When at rest on the tip of a branch, it holds the wings downward and raises its abdomen nearly to the vertical. A close relative, with a brown instead of a metallic frons, is *D. sterilis*, which is somewhat larger and often has smokey-looking wings.

Number 14: *Erythemis plebeja* Burmeister - This insect, like all of the preceding dragonflies, is in the family Libellulidae. It is larger than the others already discussed and is rich, velvety black all over with black wing bases. It has a distinctly "fuzzy" look to it and prefers ponds, ditches and slow-moving rivers in low country. It is not likely to be confused with any other local species.

Number 15: *Erythemis peruviana* Kirby - Slightly smaller than the last species, this one can be identified by the solid black thorax and bright, red abdomen in the males (the females are rich brown with a darker thorax) and the light yellow line that runs down the back of the thorax. Wing bases are deep brownish black. This species likes still water and can be found at the Sewage Ponds and Nariva Swamp among other places.

Number 16: *Orthemis ferruginea* Kirby - This has to rate as one of the most familiar dragonflies in Trinidad. Whenever people first learn of my interest in "Battymamsels" or "Zings", they can be counted on to ask, "Have you seen that large red one?" The striped pattern in my illustration is that of the young male. In this form, the bands are rich brown, while the pale areas between them are yellow, the abdomen yellow-brown. With age, the entire insect becomes bright purple-pink with a trace of pinkish wax over the body. This is the colour pattern that is most familiar to the "average Trini" where these insects are noticed flying over drainage ditches and, generally, wherever there is water - even over rain barrels! As the insect gets even older, the thorax becomes almost black while the abdomen becomes even deeper blood red. The females retain the pattern of the illustration all their lives, but the abdomen is widely dilated on segments seven, eight, and nine, looking like "flaps".

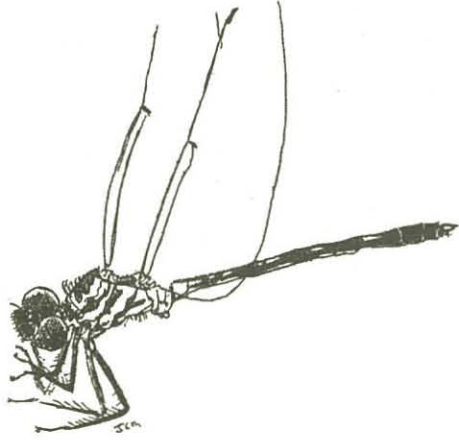
Number 17: *Orthemis concolor* Ris - The same length as the previous species, *O. concolor* is much leaner, with the abdomen black with a fine yellow line down the middle. The thorax is chestnut brown and yellow, with the chestnut colour predominating as the insect gets older. I have found this species at the Sewage Ponds at Laventille and in the Drain Nine area of Caroni Swamp.

Number 18: *Uracis fastigiata* Hagen - This is a genus of river dragonflies and I have caught them only in forest areas. The body is light green-grey with black markings and the wings tips each bear a dark brown band. Illustrated is the female, showing her quite large ovipositor projecting well beyond the apex of the abdomen. This is characteristic of the genus *Uracis*, which has only one other Trinidad species, *U. imbuta*. *Imbuta* may be distinguished from *fastigiata* by its smaller size, its relatively shorter ovipositor and by the near total absence of the brown markings on the wings.

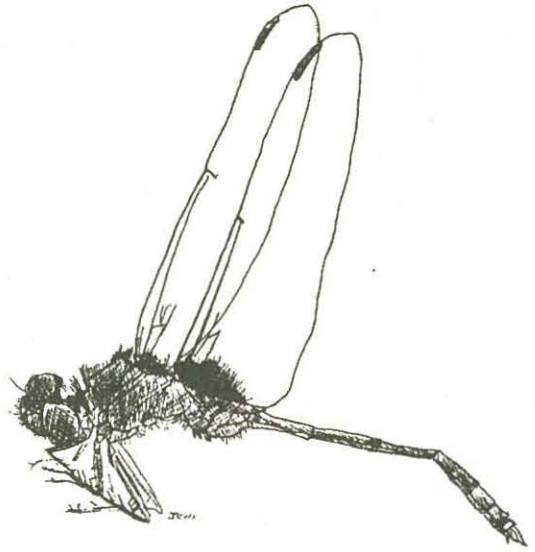
Number 19: *Perithemis mooma* Kirby - The female is illustrated. *Perithemis* is a confusing genus of tiny amber-coloured dragonflies that distinguish themselves at first glance. The males of all species have the wings deep amber-orange throughout, while the females have their wings mostly clear with various patterns of amber or brown spots and dashes. In this genus, it is therefore the females that are more important in species identification. *P. mooma* is a greatly variable form, however, and is largely determined by details of its wing venation and leg colouration. Nonetheless, *P. mooma* is so very common that any *Perithemis* caught in a populated area may be taken as *mooma* until an opportunity for further analysis presents itself. The body is light tan in colour.

Number 20: *Perithemis thais* Ris - This dragonfly is so small, that it's even rather tiny for a *Perithemis*! In this species, both sexes have the amber ground colour throughout the wings, as well as the darker spots. They will, at once, distinguish this species from any other in the genus. I have taken this species only down in Chatham on the Icacos Peninsula. (Note, in this illustration, that the head of the specimen is turned toward the reader, affording a view of the mouthparts below the eyes.)

Number 21: *Miathyria marcella* Carpenter (a new record for the island) - This species prefers to fly in great "swarms", rarely landing by day, hawking midges at such places as the Sewage Ponds and Drain Nine, Caroni Swamp. I find it in mixed swarms with *Pantala flavescens* and *Tramea calverti*.



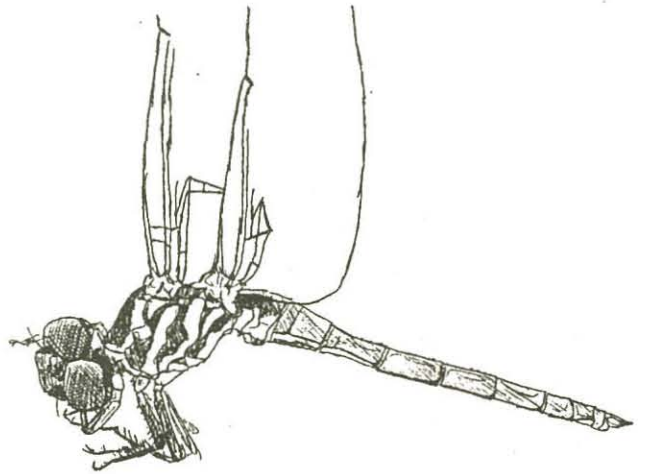
Dythemis multipunctata Kirby ♂ (actual length 38 mm)



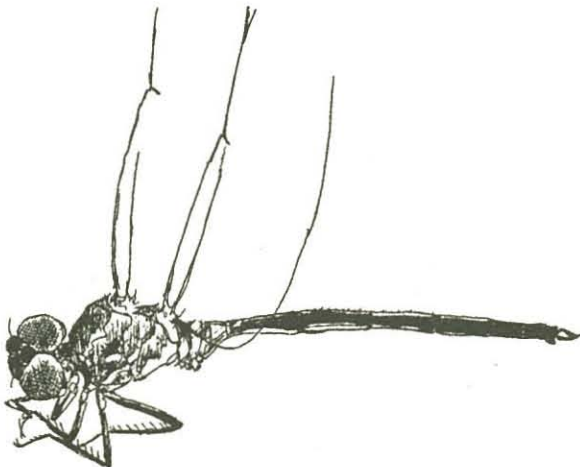
Erythemis plebeja Burmeister ♂ (actual length 47 mm)



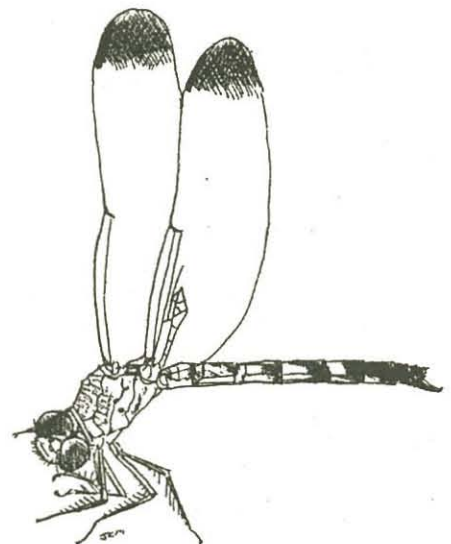
Erythemis peruviana Kirby ♂ (actual length 38 mm)



Orthemis ferruginea Kirby ♂ (actual length 52 mm)



Orthemis concolor Ris ♂ (actual length 49 mm)



Uracis fastigiata Hagen ♀ (actual length 37 mm)

The thorax is dark plum purple, the abdomen is yellow and black and the wing veins are yellow. The wings bases are dark brown, nearly black. The frons is deep metallic purple. The only other species in the genus is *M. simplex*, which is smaller, and deep red throughout with reddish wings bases. The only species that *marcella* might be confused with when on the wing is the less common *Tauriphila australis* which has black wing veins. *T. australis* has recently become a new species record for Trinidad.

Number 22: *Pantala flavescens* Hagen - Perhaps the most cosmopolitan species of dragonfly in the world, I have collected this one back home in New Jersey, USA, and have specimens from the Philippines as well! This species flies in equal numbers with *Miathyria marcella*, creating swarms of hundreds and hundreds of individuals, rarely landing (though perching somewhat more frequently than do *M. marcella*). The body colour is a beautiful arrangement of yellow, tan, white, and black, but the overall look while on the wing is that of fiery orange. There is some clear yellow at the bases of the hind wings. Only one other species to this genus is known from the island, and this is *P. hymenea*. It can be distinguished from *flavescens* in that it possesses a round brown spot at the base of each hind wing. According to several writers, this spot is discernible even when the insect is on the wing.

Number 23: *Tramea calverti* Muttkowski - this genus of large and robust dragonflies can be distinguished from other genera by the dark irregular marks at the base of each hind wing. This is the signature of the genus *Tramea*. *T. calverti* differs from most other Trinidad members of the genus in the possession of two white diagonal bands across the sides of the thorax. The frons is a metallic, reddish-purple in colour. This species flies in the great mixed swarms of *Pantala flavescens* and *Miathyria marcella* that I have seen at Drain Nine and at the Sewage Ponds, but there are always only two or three individuals of *Tramea* for the hundreds of the others. I have also caught this species at Nariva Swamp and at Mount Tabor on the trail leading uphill from Mount St. Benedict. During the Petit Careme, this species may be seen flying in vast swarms in lowland populated areas such as St. Augustine.

Number 24: *Triacanthagyna septima* Selys - Let me take the time to explain that I have had to leave out one major family of dragonflies, the Gomphidae. There are no fewer than four known species in Trinidad, yet they are so scarcely collected that, at the time of writing, I had not one to illustrate. Gomphids may at once be distinguished from all other Anisoptera by the fact that their eyes are widely separated, as in the Zygoptera. This trait is found in no other family.

The present insect belongs to the family Aeschnidae, a group of large to giant-sized, strong-flying dragonflies, many of which fly only at dusk and more still that keep to the deep woods, flying along dry stream beds and so forth. Note the absolutely huge compound eyes which meet for some distance along a seam at the top of the head. The genus *Triacanthagyna* is made up of crepuscular predators, flying so late in the evening that it is often nearly impossible to follow them with the eye! I have caught several over the fish ponds at Simla around 6:30 p.m. and many have been caught as they flew into houses at night attracted by the lights. The specimen illustrated was collected just this way by a friend of the author, on the Eastern Main Road in San Juan. The body is tan and the thorax has two large pale green patches. Most individuals caught in the evening are

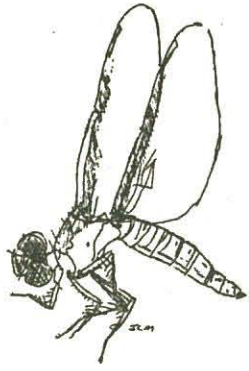
females, and most of these (as in the illustration) have had their abdominal appendages broken off. Intact, these appear as two long, plate-like flaps, flattened and twisted, and rounded at the tips. They may be nearly as long as the combined lengths of segments eight, nine and ten. The other species in the genus require special resources to separate. A related genus, *Gynacantha*, is made up of several species that are much larger, and one species, *G. membranalis*, has wings that, in many specimens, are almost black throughout.

Number 25: (not illustrated) : *Staurophlebia reticulata* obscura Walker - With this ominous name comes an ominous insect. The largest of Trinidad dragonflies, it is far too big to illustrate here. It is enormous, robust and powerful of flight. The thorax is dark green, the abdomen is brownish purple, the wings are clear throughout. That and its size (95 mm or so) should prove sufficient for identification should this creature be encountered. Another very large species, but a bright lime green throughout, is *Coryphaesha viriditas*. A species with body colours similar to *reticulata*, only smaller, would most likely be *Anax amazili*. *Amazili* is encountered somewhat regularly hanging around light fixtures in the late evening, as I have seen them many times at UWI. *S. reticulata* may be encountered flying low over sluggish creeks, coursing up and down for long distances throughout the day. They have been reported following dry stream beds, laying their eggs in wet clay.

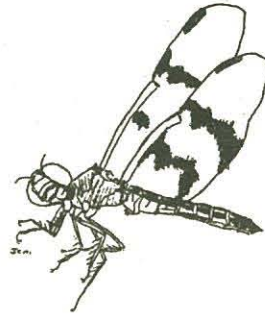
This, of course, barely scratches the surface of the odonate fauna of Trinidad. With a species list of 120 and growing (I think I have added at least 12 species to the list in three months), there is still plenty of work to be done. Areas that could repay some serious study include Trinity Hills, all of Icaos Peninsula, Chaguaramas and the Central Range. In fact, any place in Trinidad could do with additional collecting, provided that specimens are taken only as they will be useful for study. Overcollecting could be hazardous to isolated populations and good habitats should always be protected from trampling feet. Trinidad has a wealth of faunistic diversity and its people must appreciate that and do what they can to preserve and understand it. Within these limits, sensible collecting with detailed collection data can be invaluable in understanding the diversity and complexity of Trinidad's ecosystems.

For those who would pursue the collection and identification of the Odonata, there is a fine collection, supplied by K.W. Knopf, at CIBC in St. Augustine, and I have deposited a second collection at the Department of Zoology at the University of the West Indies, St. Augustine. Access to either collection should be available upon request. For further reading, to learn the structure and identification of the Odonata of Trinidad, the following list is recommended and I think, essential:

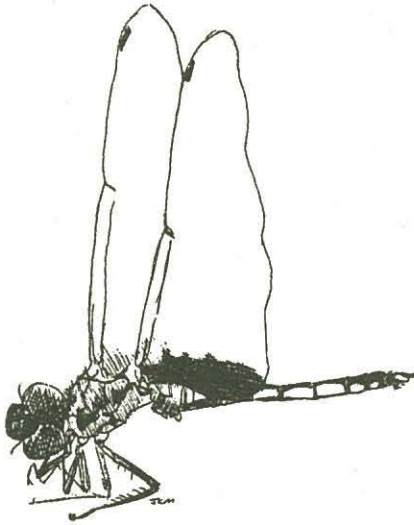
- Borror, DeLong & Triplehorn's *An Introduction to the Study of Insects*, 5th Ed. 1981, Sunders.
- This book includes a chapter describing the various terms used in odonate studies and a brief key to the various families as well as a word or two on collecting technique.
- Philip P. Calvert's volume on the Odonata (Neuroptera) in the 1908 masterwork, *Biologia Centrali-Americana*.
- This work is hard to obtain but the Zoology Dept at UWI now has a photocopy in their library. It is indispensable to the identification of tropical American Odonata.



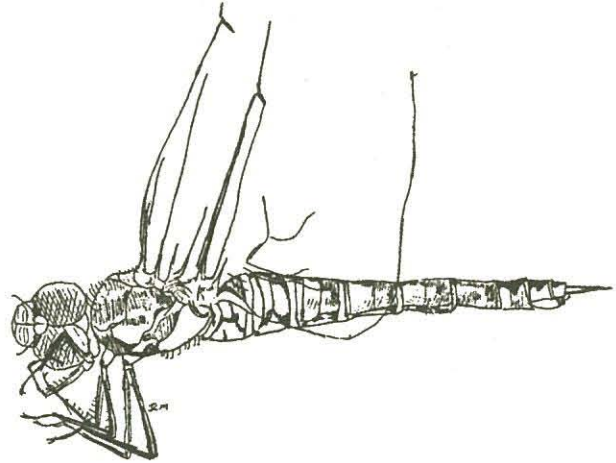
Penthemis mooma Kirby ♀ (actual length 23 mm)



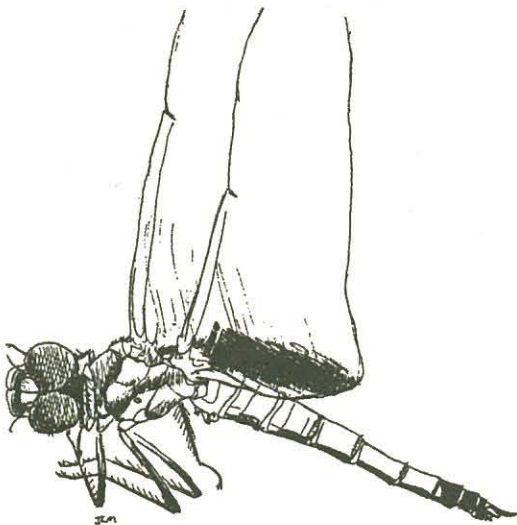
Perithemis thais Riz ♂ (actual length 21 mm)



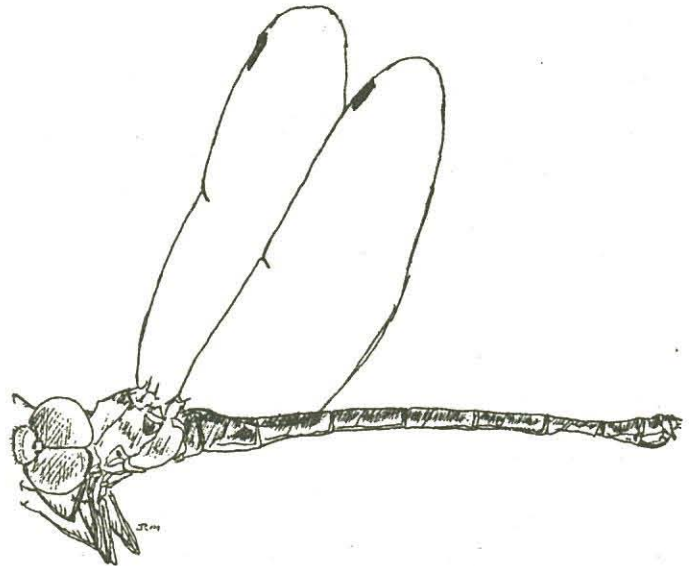
Miathyria marcella ♂ Carpenter (actual length 35 mm)



Pantala flavescens Hagen ♀ (actual length 50 mm)



Tramea calverti Muttkowski ♀ (actual length 44 mm)



Triacanthagyna septima Selys ♀ (actual length 58 mm) without appendages which are usually broken off

- D.C. Geijskes' The Dragonfly Fauna of Trinidad, British West Indies, 1932, 'S Rijks Mus. Nat. Hist, Vol 14, No. 4.

Until last year, this was the most thorough and up-to-date work devoted to Trinidad's dragonfly fauna. Very useful, but does not contain keys to determine the species.

- Needham & Westfall's Dragonflies of North America.

Although obviously devoted to the North American species, this book also covers most of the West Indies. Besides that, its instructive chapters on structure, life cycle and collecting and rearing of Odonata prove their worth over and over again. A great book.

- F. C. Whitehouse's Dragonflies of Jamaica, 1943, Bulletin of the Institute of Jamaica - Science series, No. 3.

This is a much less technical work but effective nonetheless in

aiding in the identification of certain species. Enjoyable reading and a good introduction to the study. UWI has several copies in the central library and in the Zoology Dept library.

- I will soon have my own book ready for publication by the Zoology Department of UWI, to be available shortly. It is intended to be the most up-to-date, inclusive and instructive guide available on the Odonata of Trinidad. The book contains all the information needed to identify all known species on the island. It will be approximately 150 pages long with five plates of line drawings. Proceeds will go to the Department of Zoology.

- In addition to the above list, the Department of Zoology at UWI should also have most of the papers that I have used in my recent work.

The Skipper Butterflies (Hesperiidae) of Trinidad

Part 5: Pyrginae, Genera Group C concluded

by M.J.W. Cock

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This contribution follows on directly from Part 4 of this series (Cock 1986). There are no new record here for Trinidad, but *Astraptes fulgerator* (No. 51 below) is a new record for Tobago. I would like to reiterate my thanks to the following for their assistance in examining Trinidad Hesperidae from various collections: Dr. Phillip Ackery of the British Museum (Natural History) (BMNH); Dr. Jeremy Holloway (C.A.B International Institute of Entomology); Dr. George McGavin of the Hope Department, Oxford University Museum (HD); Dr. Mark Shaw, Royal Scottish Museum, Edinburgh (RSM); and Mr. Scott Alston-Smith who collected records from his own collection (SAS) and the Barcant-Angostura collection (BA) and provided details of his rearing results which are included in the following account. I would also like to thank Dr. Steve Steinhauser (Allyn Museum of Entomology) for his advice, Dr. Chris Prior who took the plate of spread specimens and Dr. C. Dennis Adams (BMNH) who checked the plant names.

50. *Astraptes talus* Cramer 1777

Plate 1

This species is found from Mexico to South Brazil (TL* Surinam) and also in the Greater Antilles and St. Vincent. Evans (1952) records two males from Trinidad in the BMNH, and Kaye (1921) lists it without comment.

This species is more brown in colour than most of the genus. Basal 1/3 UPF, UPH except costa and margin, body UPS, extreme base UNF bright metallic green; palpi, UNS thorax, disc of UNH dusted with metallic green; UPF hyaline spots tinted yellow; UNH a pale brown bar at 3/4 in space 1C. Illustrations in Lewis (1974, Plate 81, No. 7) and Riley (1975, Plate 21, No. 17) Costal fold; F ♂ 24 mm.

This is a rare species in Trinidad and I know nothing of its habits. Dr. Holloway checked the BMNH collection and located one Trinidad male, collected from St. Anns Valley (ex Adams coll, acquired by BMNH in 1912). June and Floyd Preston captured a male 5.5 Km south of Siparia on the road to Quinam Bay (v.1982), and Scott Alston-Smtih took two males at Haleland Park (vii.1982). The larva is described as "black, the segments divided by a thin transverse dirty yellow line; head grey, with a medium black stripe; prolegs red" (Riley 1975) and feeding on *Paullinia* sp. (Sapindaceae) in Surinam (Sepp cited in Brown and Heineman 1972) and *Guarea* sp. (Meliaceae) in Puerto Rico (Wolcott cited in Brown and Heineman 1972).

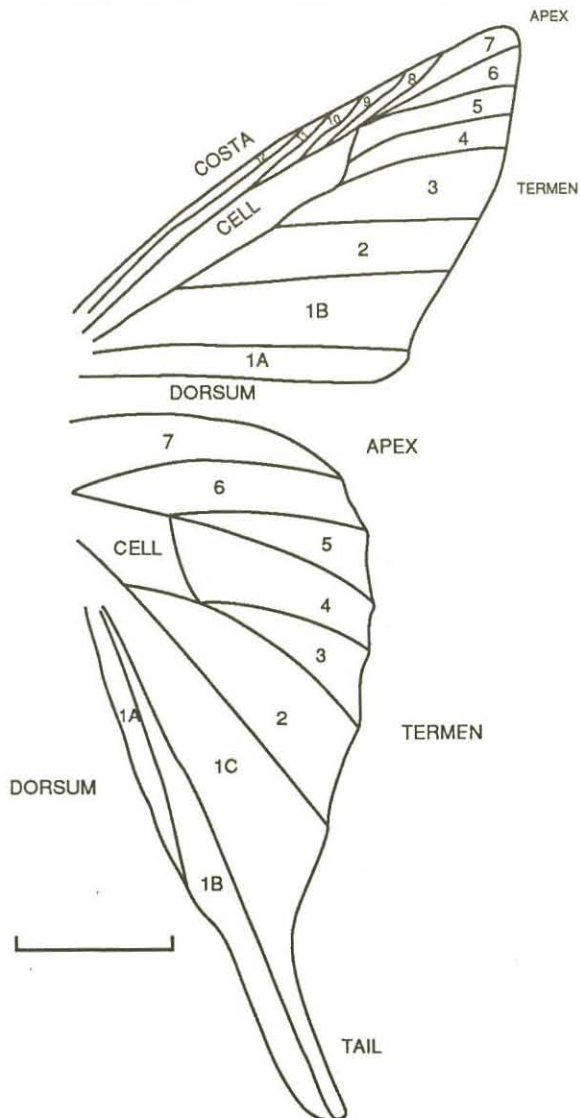
51. *Astraptes fulgerator fulgerator* Walch 1775

Plate 2

This species occurs in two subspecies: *A. f. azul* Reakirt from Texas to Venezuela and down the Andean countries to Bolivia, and *A. f. fulgerator* from the Guyanas to Argentina (TL unspecified). The Trinidad subspecies is *fulgerator*, matching Guyana rather than Venezuela. It was first recorded from Trinidad by Kaye (1904). I have captured a female on the ridgetop between Speyside and Charlotteville, Tobago, and this is a new record for that Island.

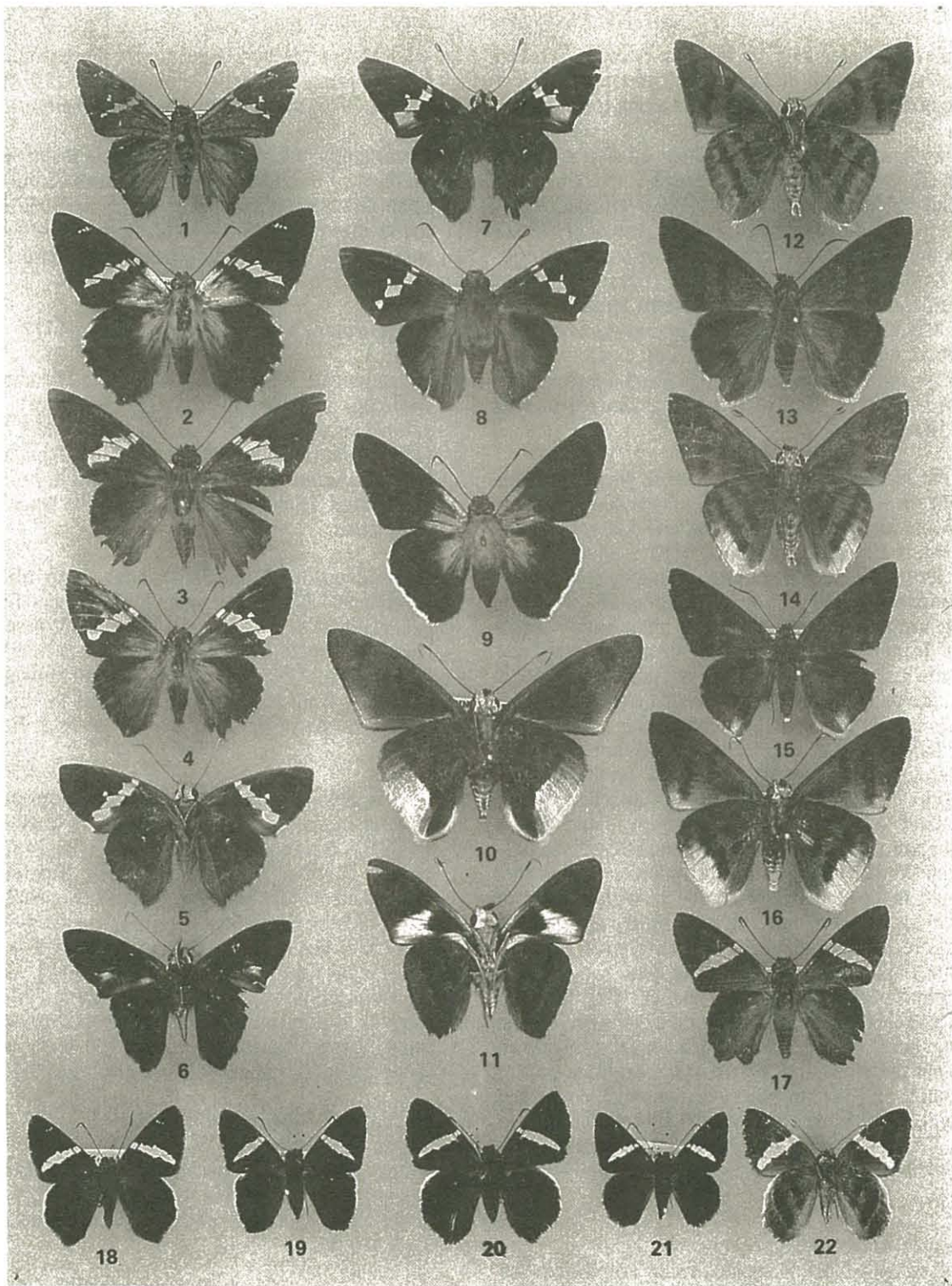
Ground colour UPS blackish brown, UNS brown. Basal 1/4 of UPS wings, thorax UPS, head UPS, basal 1/4 of UNF costa bright metallic green; white hyaline spots F; cilia UPF space 1 and margin UPH except at end of veins, basal 1/3 UNH costa, patch distal to hyaline spot space 1B UNF, cilia space 1 UNF, head UNS white; thorax UNS light brown; cilia margin UNH pale brown except at end veins; UNH with two indistinct bars of darker brown. Illustration in Lewis (1974, Plate 81, No. 3). Costal fold; F ♂ 25 mm, ♀ 29 mm.

This species is to be found occasionally in forested areas throughout Trinidad, but not apparently on the higher parts of the Northern Range. I have taken it at flowers only once, but



Wings of *Urbanus prona* ♂ illustrating numbering of veins and spaces.

* TL= type locality. For other abbreviations, UPF, UPH etc., see Part 4, Living World 1985-1986 p. 33



Plates 1-22

Adult Trinidad Hesperiidae (coll. MJWC except as stated) 1, *Astraptes talus* ♂, 6.5 km. S. of Siparia on road to Quinam Bay, 24.v.1982, J. & F. Preston (in coll. Prestons); 2, *A. fulgerator* ♀, Trinity Hills, Morne Derrick summit, 4.iv.1983; 3, *A. apastus* ♂ Brigand Hill, 25.xi.1980; 4, *A. enotrus* ♀, Curepe, 23.x.1981; 5, *A. enotrus* ♀ UNS, Moreau, 28.xii.1937 [Sir N. Lamont] (in coll. UWI); 6, *A. enotrus* var. ♂ UNS, Quinam, 16.i.1936 [Sir N. Lamont] (in coll. RSM); 7, *A. aulestis* ♂ UNS, Moreau, 28.xii.1937 [Sir N. Lamont] (in coll. RSM); 8, *Narcosius colossus* ♂, Moreau, 4.i.1938 [Sir N. Lamont] (in coll. UWI); 9, *Astraptes alardus* ♀, Curepe, larva on *Erythrina poeppigiana*, adult 18.xii.1981; 10, *A. alardus* ♀ UNS, Morne Bleu Textel Road, *Eupatorium* flowers, 5.x.1979; 11, *A. alector* ♂ UNS, Trinity Hills, Morne Derrick, 4.iv.1980; 12, *A. anaphus anoma* ♂ UNS, Andrews Trace, 9.iv.1980; 13, *A. a. anoma* ♀, West Moreau, 31.xii.1979; 14, *A. a. anetta* ♂ UNS, Blanchisseuse-Paria Bay track, 22.i.1980; 15, *A. a. anetta* ♀, Morne Bleu Textel Road, 11.x.1979; 16, *A. a. anetta* ♀ UNS, Parrylands, *Eupatorium* flowers, 13.ix.1980; 17, *Calliades zeutus* ♂, N. of Mt. Tabor, 22.xi.1981; 18, *Autochton neis* ♀, Fort George, 2.viii.1981; 19, *A. zarex* ♂, Morne Bleu Textel, 27.xi.1980; 20, *A. longipennis* ♀, Morne Catharine, 1500 ft., 6.viii.1979; 21, *A. itylus* ♂, Waller Field, 2.xii.1980; 22, *A. bipunctatus* ♀ UNS, 5.5 km. S. of Siparia on road to Quinam Bay, 1.v.1982, J. & F. Preston (in coll. Prestons). (Photo C. Prior).

Kaye (1921, p. 125) states that Sir Norman Lamont 'secured quite a number in the south at *Eupatorium* blooms'. I have found it most common in patches of sunlight along forest paths.

The subspecies *azul* is recorded feeding on *Karwinskia humboldtiana* (R. & S.) Zucc. (Rhamnaceae) in Texas and Mexico (Kendall 1975) and *Vitex mollis* HBK (Verbenaceae) in Mexico (Comstock and Vazquez 1961). However, Moss (1949) records the foodplants of subspecies *fulgurator* as *Inga* spp., *Cassia hoffmanseggii* Mart ex Benth (Caesalpiniaceae) and an unidentified legume vine in Belem, Brazil, while Beizanko and Mielke (1973) list *Cassia corymbosa* Lam., *C. ferruginea* Schrad. ex DC., *Delonix regia* (Boj. ex Hook.) Raf. and occasionally *Erythrina crista-galli* L. (Papilionaceae) and *Sesbania punicea* (Cav.) Benth. (Caesalpiniaceae) in Rio Grande do Sul, Brazil.

I have found the larvae in Trinidad on *Cassia fruticosa* Mill. saplings in light forest. The larvae match those described and illustrated by Moss and resemble in colour and pattern those of *Pyrrhopyge phidias* Linnaeus (see Cock 1981). Mature larva 3.5 cm; head large (17 mm diameter), rounded, indented at vertex and narrowed behind to a neck of about 2/3 width of head at widest; head colour reddish brown, dark brown streak down centre of front of head capsule, the ventral part of head capsule pale brown; three narrow streaks dorsally on each half of head - the inner pair diverge on face so that a corresponding dark brown triangle is apparent adjacent to the dark central streak; white hair on head, especially prominent laterally. Thoracic and abdominal segments brown-red, brighter below and on prothorax; mesothorax, metathorax and abdominal segments 1-9 each with a thin circular yellow band which dorsally lies at about 2/3 on each segment and laterally swings forward to reach the spiracle; thorax and abdomen with white, moderately dense hairs. Pupa brown, covered with white wax layer except for narrow clear lines delineating the appendages and body segments. The young larva shelters in an *Epargyreus*-type flap; the full grown larva spins two or three leaves together and pupates in the final shelter. One larva (x. 1981, Curepe) had three macrotype tachinid eggs upon it - one ventrally on the neck of the head capsule and the other two dorso-laterally on the meso and metathorax; twenty days after pupation two tachinid larvae emerged from the pupa, but unfortunately the resultant puparia failed to complete development. A larva collected in the third instar (xi.1981, Mt. Tabor) pupated 21 days later and the adult emerged 14 days after that.

[*Astraptus egregius* Butler 1870]

Evans (1952) does not list this species from Trinidad in the BMNH collection giving Mexico to Ecuador as the principal range (in two subspecies) with only one male from Venezuela, suggesting that it is unlikely to be a Trinidad species. Kaye (1940) records it from Trinidad on the basis of specimens captured at Siparia (20.xi.1920; W.J. Kaye) and Quinam (16.i.1936, Sir N. Lamont). Kaye's collection which has been incorporated into the Allyn Museum of Entomology does not include any *Astraptus* spp. with the data of his purported specimen (L.D. Miller pers. comm.), nor does Sir Norman Lamont's collection at UWI. However, Lamont's collection at the RSM includes a specimen from Quinam collected 16.i.1936 and labelled *Telegonus egregius* - clearly the specimen to which Kaye referred. Lamont's specimen resembles certain atypical individuals of *A. egregius* in the BMNH which lack the white hyaline spots F, and it seems likely that this is why the name

was used. However, dissection of the genitalia shows that this is an aberrant specimen of *A. enotrus* (S.F. Steinhauser pers. comm. 1986) under which it is treated below.

Accordingly, until Kaye's specimen is found (which now seems unlikely), I conclude that his inclusion of this species is based upon this aberrant specimen. In Cock (1982) I suggested that the species intended may have been *A. colossus* but this is now shown to be incorrect and *A. egregius* sensu Kaye should now be inserted in the synonymy of *A. enotrus*.

52. *Astraptus apastus apastus* Cramer 1777

Plate 3

The nominate subspecies occurs from Nicaragua to the Upper Amazons and the Guyanas (TL Surinam), while a second subspecies, *A. a. pusa* Evans, occurs in South Brazil. Crowfoot (1893) first recorded *A. apastus* from Trinidad; Kaye records both *A. apastus* (Kaye 1904, 1921) and *A. briccius* Plotz (Kaye 1940) from Trinidad, but Evans lists the latter as a synonym of *A. apastus*.

Ground colour UPS black with deep blue tint in fresh specimens, UNS brown; white hyaline spots F; base UPF, UPH except costal 1/3, thorax UPS, head UPS, basal 1/4 UNF costa, base UNH metallic green; head UNS white; palpi UNS pale brown-green; UNS body, UNH greenish brown; UNF white spot extending from hyaline spot space 1B to vein 1, wing mauve from this spot to termen. No costal fold; F ♂ 31-32 mm, ♀ 33mm.

This is a widely distributed but scarce species in Trinidad. I have seen specimens from Maraval (ix.1891, [S. Kaye] in BMNH), Balandra Bay (xii.1981), Brigand Hill (x.1980), Grande Ravine (x.1977, J.O. Boos), Siparia (i.1921, Sir N. Lamont in RSM), Moreau (xii.1937, Sir N. Lamont in RSM) and S. Alston-Smith reports specimens from Maracas Lookout (iii.1972, BA), Arima-Blanchisseuse Road milestone 16 (i.1977, BA) and Parrylands (ii.1983, SAS). All dated captures are from the period September to March. Moss describes the larva as "strongly yellow, faintly freckled with brown and the pupa...brown and lightly covered with white wax"; the foodplant in Brazil is *Erythrina corallodendron*.

53. *Astraptus enotrus* Stoll 1781

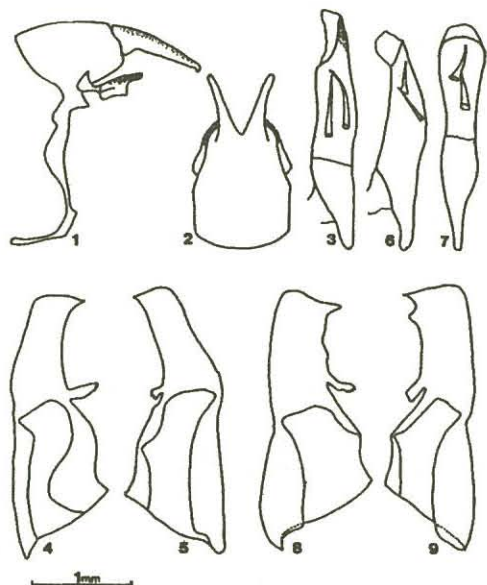
Plates 4-6, Figures 1-5

Evans (1952) records this species from Mexico to Paraguay (TL unspecified), but judging from the number of specimens in the BMNH it is generally scarce. First recorded from Trinidad by Kaye (1921).

Ground colour blackish brown with deep blue sheen in fresh specimens; F hyaline spots white; basal 1/4 UPF, UPH (except costal 1/3), thorax and head UPS metallic blue-green; UNF white area basal to hyaline spot in space 1B; palpi UNS pale brown; head UNS white; UNH a small spot at end cell and scattered scales along dorsum and in submarginal and discal bands yellowish white. Cilia concolorous except white on lower half of space 1B F. This species is very similar to *A. aulestis* Stoll in appearance; differences are discussed under that species below. Costal fold; F ♂ 22-25 mm, ♀ 25-26 mm.

As discussed under *A. egregius* above, there is a unique aberrant specimen of *A. enotrus* in coll. Lamont at RSM, taken at Quinam, 16.i.1936. UPS ground colour blackish brown with dark blue sheen; basal 1/3 UPF, UPH except costa and margin,

UPS head and body metallic bluish-green. UNF dark brown with cell, basal half spaces 2-5, basal 1/3 spaces 6, 7, basal 1/2 spaces 8, 9 with inconspicuous deep blue sheen; at about 2/3 in upper 1/2 of space 1B a white, near quadrate spot, concave on distal side; diffuse white area just above vein 2 at about 1/2 in space 2; space 1A pale brown. UNH dark brown, marginal 1/3 slightly paler; scattered yellow scales form two diffuse bands. Cilia brown except lower 1/2 space 1B F. Weak costal fold; F ♂ 23 mm.



Figs. 1-9 Male genitalia of *Astraptes* spp.

1-5: aberrant *A. enotrus* (coll. Quinam, 16.i.1936, N. Lamont); 1, genitalia with valves removed, lateral view; 2, uncus and gnathus, dorsal view; 3, aedeagus, lateral view from left; 4, left valve, internal view; 5, right valve, internal view.

6-8: *A. aulestis* (coll. Moreau, xii.1937, N. Lamont); 6, aedeagus, lateral view from left; 7, aedeagus, ventral view; 8, left valve, internal view; 9, right valve, internal view.

This is a generally scarce species; there are specimens in the BMNH (♂ St. Anns; 2♂, ♀ Trinidad), BA (♂, ♀ St. Anns, ix. 1938) and in the Admiral Bourke Collection (HD). In Sir Norman Lamont's collection at UWI there are a male and three females from Moreau all captured between 26.xii.1937 and 4.i.1938, and I have caught two females at Curepe (vii.1981; x.1981). Moss (1949) records the larva as much commoner than the adult at Para, Brazil, but was unable to identify its leguminous host plants. The larva he describes as olive green, light ochre dorsally with a brown dorsal line, six dorsal yellow or brown V shape marks and a brown head with red eye spots.

54. *Astraptes aulestis* Stoll 1780

Plate 7, Figures 6-8

This is the species treated as *A. granadensis* Möscher 1878 by Evans (1952) and listed as such by Cock (1982). Steinhauser (1986) states that the type of *A. granadensis* is a male "*A. colossus rhoda*" (see under *Narcosius colossus* below); but in any event *A. aulestis* is an earlier valid name. This is a generally scarce species found from Central America to Paraguay including Venezuela and the Guyanas (TL Surinam). Evans's (1952) listing of one male from Trinidad in the BMNH was the first record from the island.

Markings as *A. enotrus* except green-brown on UPS rather than blue-green and following differences UNH. UNH brown with

green (basal) and blue (distal) sheen; small white spot end cell; scattered yellow scales along dorsum and in two diffuse bands, one through end cell, other about 3 mm from termen; beyond the distal band there are scattered grey scales which tint this marginal area. To distinguish *A. enotrus* from *A. aulestis* without having specimens of both side by side is not easy. On the UPS *A. aulestis* is more green-brown and *A. enotrus* more blue-green, but the difference is slight; UNH *A. enotrus* lacks the blue sheen and grey margin of *A. aulestis*. The male genitalia are also similar (Figs 6-8) and are somewhat variable, but the valves of *A. aulestis* are consistently shorter and heavier, and the dorsal processes stouter; also the thorns of the cornutus are straighter and stouter than in *A. enotrus* (S.R. Steinhauser pers. comm.). Illustration in Lewis (1974, Plate 80, No. 48, as *A. "aulestes"*). Costal fold; F ♂ 25 mm.

The male in the BMNH recorded by Evans (1952) is labelled simply "Trinidad/ 29.xii.1934", and there is a male in the RSM from Moreau (xii.1937, Sir N. Lamont). Although this species is easily confused with *A. enotrus*, it would seem to be somewhat rarer in Trinidad. Foodplant and life history unknown.

55. *Narcosius colossus granadensis* Moschler 1878

Plate 8

This is the species treated as *Astraptes colossus rhoda* Evans by Evans (1952) and hence Cock (1982). In fact, Evans had misused the name *granadensis* (see *A. aulestis* above) as the type is of the same subspecies as Evan's *A. colossus rhoda* (Steinhauser 1986). Accordingly *rhoda* Evans is a junior synonym of *granadensis* Möscher. Steinhauser (1986) has reviewed this group of species and erected a new genus, *Narcosius*, in which *A. colossus*, *A. parisi* and other, non-Trinidad species are now placed. As Steinhauser plans to review further groups of this section of Pyrginae, I have, for the time being retained the species sequence used by Evans (1952) and Cock (1982) although this means that the two species of *Narcosius* are bracketed by the remainder of *Astraptes* for the present.

Steinhauser (1986) recognises two subspecies of *N. colossus*: *N.c. colossus* (TL Venezuela) from Mexico to Venezuela, and *N. c. granadensis* (TL Venezuela) from Venezuela to the Guyanas, Brazil, Ecuador, Peru and Bolivia. Kaye (1921) lists *Astraptes granadensis* Schaus from Trinidad, but this is a synonym of *A. anaphus* (No. 59 below) and does not refer to *N. c. granadensis*. Cock (1982) recorded this species from Trinidad on the basis of a male in the collection of Sir Norman Lamont at UWI.

Ground colour black above, dark brown UNF, green tinted dark brown UNH; white hyaline spots F spaces 1B, 2, 3, cell, costa. Basal 1/4 UPF, UPH cell and spaces 1A to 3, body UPS with dark green-blue hairs; cilia of lower 1/2 space 1B F white; cilia H white, dark at end of veins; UNH with scattered yellow scales indistinctly grouped into bands; UNS head pale brown. Note that there is no overlap between the spots in spaces 1B and 2 unlike the similar *N. parisi* which follows; also the outer edge of the spot in space 2 F is convex. *Narcosius narcosius* Stoll and *N. samson* Evans are also similar and occur in Venezuela or the Guyanas, but have the spot in space 1B closer to the termen than to the spot in space 2. Costal fold; F ♂ 29 mm.

Sir Norman Lamont's specimen in UWI was collected at

Moreau, 4.i.1938; there is another male with the same data in the RSM. In view of the date and the habits of the genus, it may well have been at flowers of *Chromolaena odorata* (L.) King & Robinson. Nothing else is known of this species in Trinidad. Life history and foodplant unknown.

56. *Narcosius parisi parisi* Williams 1927

Steinhauser (1986) transferred this species from *Astraptus* to his new genus *Narcosius* (see comments under *N. colossus* above). Evans (1952) and Steinhauser (1986) recognise two subspecies: the nominate *parisi* Williams from Venezuela to Paraguay (TL South Brazil) and the central American *helen* Evans. Evans (1952) records five males from Trinidad in the BMNH; Steinhauser (1986) lists six in the BMNH and a female in the American Museum of Natural History. Kaye ought to have seen some of these, but does not record this species. Possibly his inclusion of *A. briccius* (a synonym of *A. alardus*) which is already listed in Kaye (1921) actually refers to *A. parisi*.

Ground colour dark brown; distal half UPF, UPH, disc UNF blue-black; white hyaline spots F in spaces 1B (upper half of space, at 4/5 to termen), 2 (under origin of vein 3; inner margin oblique; outer margin deeply excavate), 3 (small; above outer 1/2 of upper margin of spot in space 2), cell (across whole cell; outer margin excavate; outer margin reaches base of vein 3) and costa (parallel to cell spot); basal 1/4 UPF, spaces 1, 2, base of 3 and cell UPH, UPS body green-brown. UNH overlaid with pink-mauve scales in margin; scattered yellow scales on disc forming two indistinct bands. UNF a white spot in space 12 between the hyaline spots in costa and cell. Cilia concolorous except white at lower part of space 1B F and spaces 1C, 2 UPH. Rather similar to *A. colossus rhoda*, but can be most easily distinguished by the concave outer edge of the spot in space 2 F. Costal fold; F ♂ 27-29 mm.

Four of the specimens in the BMNH are labelled "Trinidad", the fifth is from St. Anns (G.E. Tryhane). Nothing more is known of this species in Trinidad. Life history and foodplant unknown.

57. *Astraptus alardus alardus* Stoll 1790

Plates 9, 10

The nominate subspecies occurs from Columbia to Bolivia and Argentina (TL Surinam) but, judging from the collection of the BMNH, is only common in Venezuela and Trinidad - perhaps a reflection of the extensive use of its foodplant, Immortelle, as a shade tree for cocoa. There are separate subspecies found in Central America and the Cauca Valley (Colombia); specimens from Cuba and Haiti are now treated as a distinct species (Riley 1975). First recorded from Trinidad by Kaye (1904).

Ground colour blackish brown; UPF basal 1/4, UPH basal 1/2, UPS head, UPS body metallic green. UNS paler brown than UPS; UNS head and a broad band UNH termen white. Illustration in Lewis (1974, Plate 80, No. 45). No costal fold; F ♂ 31 mm, ♀ 31-35 mm.

This species is widespread and fairly common in Trinidad where its foodplant, Immortelle, grows. It can be taken along forest paths, at flowers (Kaye 1921, p. 125, mentions 'scentless jasmine') and on hill tops. It rests under leaves with the wings closed and suns itself with the wings partially spread - the hindwings more so than the forewings. As mentioned above, the larvae feed on Immortelle, *Erythrina poeppigiana* (Walp.) O.F. Cook. (Papilionaceae) and the characteristic *Epargyreus-*

type larval shelters are easily found on the large leaves of saplings or suckers from cut stumps of this tree. Mature larva c. 3.5 cm; head black, large, 7 mm across, slightly chordate, with short pale setae and a pair of large orange or red eye spots; prothorax red-brown with red legs; mesothorax, metathorax and abdomen dark translucent green liberally speckled with yellow to give a yellow-green appearance; an orange spot above the spiracle of abdominal segment 8 and orange around the posterior margin of segment 9; true legs, prolegs and spiracles red. Young larvae lack the eye spots on the head and have the prothorax dark brown or black dorsally, but are otherwise similar. I have found larvae of this type in October, November, January and March.

I have also found a larva on the same hostplant (v.1982, Morne Catharine) which had a brown head with black eye spots; prothorax red; mesothorax and abdomen laterally yellow-green, dorsally dark translucent green; a pair of dorsolateral orange spots on abdominal segment 8. In due course this specimen emerged - apparently a normal female *A. alardus*. Whether this is a different, sibling species, a variety of *A. alardus* or even a seasonal form, cannot be resolved without rearing additional larvae of this form.

The pupa (of the black-headed form) is reddish brown, covered with a light, white wax bloom; although the spiracles are dark, the appendages, unlike *A. fulgerator* above, are not delineated. A 9 mm larva collected x.1981 pupated after 20 days while one of the same size collected in ix.1981 pupated after 22 days; pupal durations noted include 12, 14, 14 and 16 days. Of five small to medium sized larvae collected on La Laja Ridge (iii.1982) one, when in the fourth instar, produced three small tachinid larvae which pupated but failed to complete development. Moss (1949) gives a minimal description of the larva (compatible with either of the above) and records the foodplant in Belem, Brazil, as *Erythrina corallodendron* which is, however, most likely to be a mis-identification (C.D. Adams pers. comm.). Further south, in Rio Grande do Sul, Biezanko & Mielke (1973) record *Erythrina crista-galli* and *Bauhinia candicans* Benth. (Caesalpinaceae) as foodplants.

58. *Astraptus alector hopfferi* Plötz 1882

Plate 11

This generally scarce species occurs from Mexico to the Amazons, although the nominate subspecies is restricted to Central Colombia. It was first recorded from Trinidad by Cock (1982). Kaye (1914, 1921) lists *A. parmenides* Stoll from Trinidad on the basis of a G.E. Tryhane specimen from St. Ann's Valley. *A. parmenides* is a synonym of *A. creteus* Cramer (Evans 1952) and not otherwise known from Trinidad. It occurs widely in Central and South America including Venezuela and the Guyanas. As it closely resembles *A. alector* (but lacks the white base of costa UNH), until Tryhane's specimen is located or further specimens are obtained from Trinidad, I prefer to regard Kaye's record as a misidentification for *A. alector*.

Above this species resembles *A. alardus* but the female has a diffuse white band UPF from near tornus to mid cell. UNS brown except UNF costa to 1/2, broad band UNF tornus to mid cell, UNH costa to 1/3 and head white; UNH with two darker brown bands. Evans (1952, p. 113) states that the base of the costa UNF is shining green, but in Trinidad specimens there is only a faint green tint. The white costa UNH distinguishes this species from the otherwise similar *A. creteus*. Illustration in

Lewis (1974, Plate 81, No. 4; ♀, as *A. hopfferi*). No costal fold; F ♂ 24-25 mm (an atypical ♂ from the Northern Range has a trace of the white band UPF and F 19 mm only); ♀ 26 mm.

In Cock (1982) I listed 10 captures of this species (3 from Moreau; 1 from Parrylands; 5 from Trinity Hills; 1 from Andrew's Trace) and S. Alston-Smith has taken 3 ♂, 1 ♀ from the south-west (Guapo, Parrylands, Los Bajos), showing this species to be much more common in the south of Trinidad than the north. My female was captured at flowers of *Chromolaena odorata*, and on one occasion five males were captured in the summit clearing of Morne Derrick, Trinity Hills. The specimen from Andrew's Trace, as mentioned above, is atypical and further captures from the north of Trinidad would be of interest. Life history and foodplant unknown.

59. *Astraptus anaphus anetta* Evans 1952

Plates 14, 15

Astraptus anaphus anoma Evans 1952

Plates 12, 13

Two of the five subspecies of *A. anaphus* recognised by Evans (1952) occur in Trinidad. Of these five subspecies, *anausis* Godman & Salvin is restricted to the Caribbean islands, but the other four have rather unlikely distributions - all four occurring in Peru for example - such that I am inclined to think the use of the term "form" would be more appropriate than subspecies. To a degree the Trinidad specimens of the two subspecies intergrade and the distinguishing characters of *anetta* (TL Costa Rica) with "UPH tornal yellow colouring narrow, not reaching vein 2 and divided by a brown tongue to end vein 1: UNH the broad yellow border shaded to vein 2" and *anoma* (TL Trinidad) with "UPH no yellow at tornus; UNH the yellow border outwardly edged by conical brown spots" (Evans 1952, pp. 118-119) do not adequately serve to describe the range of variation or sexual dimorphism of the two subspecies in Trinidad. Breeding the different forms would be an interesting project and might help resolve their taxonomic status. This species was first recorded from Trinidad as *Telegonus grenadensis* Schaus (a synonym) by Crowfoot (1893) and by Kaye (1904).

Ground colour brown; indistinct dark brown bands UPS and UNS. Yellow markings variable:

anoma ♂ sullied yellow at UNH tornus,

♀ space 1C UNH distal to the discal dark brown band sullied yellow,

anetta ♂ UPH margin space 1B and a triangle on the termen of space 1C yellow; UNH margin of space 1B, space 1C beyond the discal band yellow; UNH space 2 and parts of space 3 beyond the discal band yellow sullied with brown,

♀ UPH 2 mm margin of space 1B, space 1C distal to the discal band yellow; UNF sullied yellow at tornus; UNH margin and apex of space 1B, spaces 1C and 2 distal to the discal band yellow; UNH spaces 3 and 4 distal to the discal band sullied yellow.

Illustrations in Barcant (1970, Figure 4, No. 14; cf. ♀ ssp. *anetta*), Brown & Heineman (1972, Plate IX, No. 6; ♀ ssp. *anausis*, cf. ♂ ssp. *anoma*), Lewis (1974, Plate 80, No. 46; cf. ♀ ssp. *anetta* UPS), Riley (1975, Plate 21, No. 18; ♂ ssp. *anausis*, cf. ♂ ssp. *anoma*) and Smart (1976, p. 112, No. 21; ssp. *anetta*). No costal fold; F ♂ 25 mm, ♀ 28-29 mm.

This is not a particularly common species in Trinidad, and is obtained more frequently in the south than the north; thus, I have seen 17 specimens from the south (mostly in colls. Lamont) and 5 from the north. It occurs up to 2,000 ft in the Northern Range and is quite common at *Eupatorium* (s.l.) spp. flowers. I have observed a female oviposit on *Chromolaena odorata* (West Moreau, xii.1979) but believe it was misled by the legume vine growing on the bush; certainly Cruttwell (1974) in her survey of the insects of *C. odorata* never found this species. The larvae are plain yellow, have a large, round, brown head with prominent eye spots and feed on a legume vine in Brazil (Moss 1949). Kendall (1976) reared ssp. *anetta* from larvae on *Pueraria lobata* (Willd.) Ohwi (Leguminosae) in Mexico, and it seems likely that similar legume vines are used in Trinidad.

60. *Calliades zeutus* Möschler 1878

Plate 17

This is a rare species; Evans (1952) lists just four males in the BMNH, one each from Guyana, Peru, Bolivia and "South America". The type locality is Colombia. De Jong (1983) records one female from Surinam and Cock (1982) added this species to the Trinidad list on the basis of one male.

Ground colour brown; F hyaline bar in spaces 1b, 2, 3, cell and costa; slight green sheen body and disc UPH; UNF base costa, UNF dorsum, base UNH pale brown; UNH with an indistinct dark brown discal band, and beyond this a few yellow scales in space 2; cilia brown. Similar in appearance to next genus, but larger. The illustration in Lewis (1974, Plate 81, No. 21) of *C. oryx* Felder (as *C. phrynicus*) is very similar to *C. zeutus*, but lacks the white hyaline spot at the base of space 3 F. No costal fold; F ♂ 23 mm.

I can add little to my record (Cock 1982) of a male taken on the ridge to the north of Mt. Tabor at about 1,400 ft (xi.1981). The specimen rested with its wings closed on the thin trunks of sapling trees and was difficult to capture. S. Alston-Smith has a male from Trinidad with no data. Clearly this is a rare species everywhere. Life history and foodplant unknown.

Autochton

This is a genus of rather similar species, of which five are represented in Trinidad. All are blackish brown above, with a white hyaline bar across the F, and lighter brown below with indistinct markings on UNH. They can be distinguished as follows:

A. neis has three apical spots, no white on termen UNH, a green sheen to the body UPS, and H produced at vein 1B.

A. longipennis has no apical spots, white margin to termen UNH, usually a tiny dark spot at the origin of vein 3 within the hyaline band and vein 2 within the hyaline band usually dark.

A. zarex usually has no apical spots but sometimes there is one small one; it has a white margin to the termen UNH and the white hyaline bar F is clear at the origin of vein 3 and along vein 2.

A. bipunctatus has two apical spots, no white on termen UNH, no green sheen to body and H rounded.

A. itylus never has a white hyaline spot at the base of space 3 UPF; all the other species do.

A. longipennis and *A. zarex* are a little difficult to distinguish, especially the females, but the males have very distinct genitalia (Figures 10,11). It is a straightforward matter to brush

the scales from the tip of the abdomen of a pinned specimen with a stiff, cut-short paint brush to show the shape of the end of the valves.

All species seem to be restricted to secondary forest and none is fond of flowers. They rest with the wings held closed above the body.

61. *Autochton neis* Geyer 1832

Plate 18

No subspecies are recognised of this common skipper which can be found from Mexico to Paraguay (TL Brazil). First recorded from Trinidad by Kaye (1904).

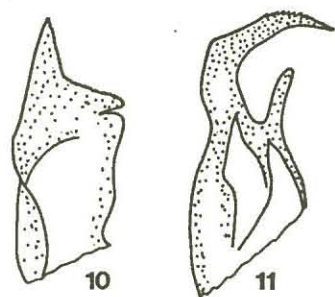
Ground colour blackish brown; metallic green sheen above on body and base of wings; white hyaline spots F, a continuous bar through spaces 1B, 2, 3, cell and costa, and apical spots in spaces 6, 7 and 8; cilia of H termen pale, otherwise dark; UNH paler brown, with two brown discal bands, brown spot towards base of space 7, and in space 2 on outer margin of the outer discal band a few pale scales. Illustrations in Lewis (1974, Plate 81, No. 33; as *Cecropterus neis*) and Riley (1975, p. 167, Fig. 18). No costal fold; F ♂ 16-17mm, ♀ 18mm.

This is the commonest and most widespread member of the genus in Trinidad. It occurs in lowland secondary forest throughout the island and up to 1,700 ft. in the Northern Range. Moss (1949) describes the larva from Brazil as "grey with a round head" and his illustration shows it to have the sides and dorsal line paler. It feeds on *Miconia* sp. (Melastomataceae) in Brazil.

62. *Autochton longipennis* Plötz 1882

Plate 20, Figure 11

This species is found from Mexico to southern Brazil (TL "South America") and is generally common. The listing by Evans (1952) of eight specimens in the BMNH is the first published record for Trinidad.



Figs. 10-11 Male genitalia of *Autochton* spp.
10, *A. zarex* (coll. Mome Bleu Textel Road, 27.xi.1980) left valve, internal view; 11, *A. longipennis* (coll. Maracas Valley, 500 ft., 9.i.1980) left valve, internal view.

Colouring similar to *A. neis*; UNH termen spaces 4-7 narrowly white; no apical spots F; veins, including base of vein 3, within the hyaline band are dark; UNH darker than *A. neis* except spaces 1A, 1B and 1C which are paler brown; discal bands UNH narrower. No costal fold; F ♂ 18-19mm, ♀ 18-20mm.

This is a moderately common species in secondary forest of the Northern Range up to 2,300 ft. I have seen only one specimen from the south of Trinidad (Siparia, i. 1916, Sir N. Lamont in RSM). Life history and foodplant unknown.

63. *Autochton zarex* Hübner 1818

Plate 19, Figure 10

This common species occurs from Mexico to Argentina (TL

Surinam). Kaye (1904) records *A. zarex* as well as its synonym *aunus* Fabricius on the basis of a record by GB Longstaff (Kaye 1914). If Kaye actually recognised two different species, one may have been *A. longipennis* (No. 62 above which he does not record), as the two are very similar.

Colouring as *A. longipennis*, but veins in F. hyaline band concolorous. Illustration in Lewis (1974, Plate 81, No. 32; as *Cecropterus aunus*). No costal fold; F ♂ 16-18mm, ♀ 18mm.

This is a common species in the secondary forest of the Northern Range; it is usually found in the valleys, but I have seen it up to 2,300 ft. I have seen no specimens from central or south Trinidad, but it probably occurs in woodland throughout the island.

In Trinidad the larva feeds upon *Desmodium incanum* DC. and perhaps other members of the genus. Mature larva: 2.3 cm; head rounded, slightly indented at vertex, black; prothorax narrow relative to head, dark dorsally; rest of thorax and abdomen dark green tinted brown-orange especially posteriorly and with yellow-white speckling; segments paler posteriorly; dorsal line clear, darker; metathorax and abdominal segments 1-8 with a dorso-lateral yellow spot on anterior margin; legs concolorous. Medium sized larva: 1.0 cm; head and thorax shiny black; rest of thorax, abdomen dark green with white speckles giving a milky green appearance, tinted yellow anteriorly; a dorso-lateral row of white spots. Small larva: 0.5 cm; head and prothorax shiny black; rest of thorax, abdomen dark green with a faint dorso-lateral longitudinal stripe. The small larva was found in an *Epargyreus*-type leaf flap in light woodland (x.1981, Curepe). The larva, its habits and foodplant are similar to those of *Urbanus dorantes* Stoll (Cock 1986) but perhaps *A. zarex* prefers shady situations whereas *U. dorantes* prefers open sunny habitats.

63a. *Autochton bipunctatus* Gmelin 1790

Plate 22

Although recorded from Mexico to Brazil, there are only scattered records of this species outside Colombia and Venezuela. In Cock (1982) I suggested that this was not a Trinidad species as Kaye (1921) only lists it on the authority of Crowfoot (1893) who could easily have misidentified it for one of the common species which he didn't record. Since then I have been able to confirm that this is a Trinidad species on the basis of captures by June and Floyd Preston (Cock 1984).

Ground colour dark brown, rather than blackish brown; F hyaline bar in spaces 1B, 2, 3, cell, costa and apical spots in spaces 7 and 8. H termen from vein 4 to vein 7 very narrowly white, with white cilia; UNH paler brown with two slightly indistinct brown discal bands; the outer margin of the outer band is quite clearly delineated by a pale brown border. F ♀ 18 mm.

The only Trinidad specimens I have seen are the two taken by June and Floyd Preston 5.5 - 6.0 km south of Siparia on the road to Quinam Bay (♂ xi.1981; ♀ v.1982). This is apparently a rare species, perhaps restricted to the south-west peninsula. Larval foodplant and life history unknown.

64. *Autochton itylus* Hübner 1823

Plate 21

This species occurs in Venezuela, the Guyanas (TL Surinam), Brazil and the Amazon basin. Kaye (1904, 1921) listed it from

Trinidad on the basis of Crowfoot's (1893) list, but there are no specimens from Trinidad in the BMNH (Evans 1952). However, I have been able to confirm this as a Trinidad species (Cock 1982).

Ground colour blackish brown; white hyaline discal bar in spaces 1B, 2, cell, costa and apical spots in space 8 and sometimes 7. UNH brown with indistinct brown discal bands; all cilia concolorous in male, pale brown from vein 4 to 7 UNH in female. Illustration in Smart (1976, Page 112, No. 16). No costal fold; F ♂ 16mm, ♀ 16 mm.

This is not a common species, and seems to be restricted to lowland forest in eastern Trinidad - e.g. Cunapo Southern Road, milestone 9 1/2 (ii.1980), Valencia Forest (viii.1979, iv.1980), Aripo Savanna (i.1986, S. Alston-Smith) and Waller Field (xii.1980). Larval foodplant and life history unknown.

65. *Cabares potrillo reducta* Mabille & Boulet 1917

The subspecies *reducta* (TL Venezuela) occurs from Panama to Trinidad (Evans 1952), while the nominate subspecies occurs north of this to Mexico and in the Greater Antilles. Kaye (1914) adds this species to the Trinidad list from a St. Ann's record by G. E. Tryhane.

Ground colour brown; white hyaline spots F spaces 1 (vertical dash in upper 1/2 at 3/4; a dot immediately below this in lower 1/2), 2 (near vertical dash, excavate on inner and outer margins; the upper margin starting just beyond origin vein 3; the lower margin reaching level of spot in space 1B), 3 (a small vertical dash just beyond outer margin of spot in space 2), 7 (dot), 8 (dot), two in cell (lower spot: parrallel to spot in space 2; excavate inner and outer margin; lower margin just before origin of vein 3; upper spot: in two parts, the lower parrallel to spot in space 2, the upper along edge of cell parrallel to costa; the latter about twice as long as the former), 12 (parrallel to and about 2/3 as long as upper part of upper cell spot), costa (parrallel and contiguous to last; about 2/3 as long as last); the spots in cell, space 12 and costa form a straight line; head below pale brown; UNH with two weak discal bands of dark brown, extending indistinctly to UNF, the basal line terminating just basal to the costal hyaline spots and the distal line terminating just distal to the apical hyaline spots. Hyaline spots larger in female. Illustrations in Lewis (1974, Plate 81, No. 18, ssp. *potrillo* UNS), Riley (1975, Plate 22, No. 8, ssp. *potrillo* ♂), Brown & Heineman 1972, Plate IX, No. 13; ssp. *potrillo* ♂). No costal fold; F ♂ 17-18 mm, ♀ 20mm.

I have not taken this species in Trinidad. I have seen 3 males from St. Ann's (xi.1931-ii.1932, A. Hall in BMNH; 2 of iii.1932, A. Hall in BMNH), one from St. Joseph (at 400 ft (i.e. probably on the slopes of Maracas Valley), xii. 1921, F.W. Jackson in HD), one from Arima (xii.1931-ii, 1932. A. Hall in BMNH) and a female labelled Trinidad in the BMNH; S. Alston-Smith reports a male in BA (St. Ann's, 5.v.1927). Thus all specimens with data were taken in the north during the dry season. Brown & Heineman (1972) suggest the habitat of ssp. *potrillo* in Jamaica is low vegetation under coconut palms. Such localities in Trinidad would be worth checking for this elusive skipper. On the other hand, the fact that no specimens have been taken for 50 years, indicates this species may no longer be resident in the island. Kendall & Rickard (1976) record the larval foodplant in Texas and Mexico as *Priva lappulacea* (L.) Pers. (Verbenaceae) mentioning that the small

larvae are glossy black and that the larval shelters are difficult to find and recognise.

References

As this paper follows on directly from Cock (1986), only those references which are not cited in that paper are listed here. Thus, for details of Barcant 1970, Brown & Heineman 1972, Cock 1982, Evans 1952, Kaye 1921, 1940, Lewis 1974, Moss 1949, and Riley 1975 the references for Part 4 of this series (Cock 1986) should be consulted.

Biezanko, C.M. & Mielke, O.H.H. (1973). Contribuição ao estudo faunístico dos Hesperíidae Americanos. IV Espécies do Rio Grande do Sul, Brasil, com notas taxonômicas e descrições de espécies novas (Lepidoptera). Acta Biologicae Parana, 2, 51-102.

Cock, M.J.W. (1984). Lepidoptera notes I-VI. Living World. Journal of the Trinidad and Tobago Field Naturalists' Club, 1983-1984, 35-37.

Cock, M.J.W. (1986). The skipper butterflies (Hesperíidae) of Trinidad. Part 4: Pyrginae (second section). Living World. Journal of the Trinidad and Tobago Field Naturalists' Club, 1985-1986, 33-47.

Comstock, J. A. & Vazquez G. L. (1961). Estudios de los ciclos biológicos en Lepidopteros Mexicanos. Anales del Instituto de Biología, 31, 349-448.

Cruttwell, R. E. (1974). Insects and mites attacking *Eupatorium odoratum* in the neotropics. 4. An annotated list of the insects and mites recorded from *Eupatorium odoratum* L., with a key to the types of damage found in Trinidad. Technical Bulletin of the Commonwealth Institute of Biological Control, 17, 87-125.

Kaye, W.J. (1904). A catalogue of the Lepidoptera Rhopalocera of Trinidad. Transactions of the Entomological Society of London, 1904, 159-224.

Kaye, W.J. (1914). Additions and corrections to my catalogue of the Lepidoptera Rhopalocera of Trinidad (1904). Transactions of the Entomological Society of London, 1913, 545-585.

Kendall, R.O. (1976). Larval foodplants for thirty species of skippers (Lepidoptera: Hesperíidae) from Mexico. Bulletin of the Allyn Museum, 39, 9 pp.

Kendall, R. O. & McGuire, W.W. (1975). Larval foodplants for twenty-one species of skippers (Lepidoptera: Hesperíidae) from Mexico. Bulletin of the Allyn Museum, 27, 7 pp.

Kendall, R. O. & Rickard, M.A. (1976). Larval foodplants, spatial and temporal distribution for five skippers (Hesperíidae) from Texas. Journal of the Lepidopterists' Society, 30, 105-110.

Smart, P. (1976). The illustrated encyclopedia of the butterfly world. Hamlyn, Salamander Books, London, 275 pp.

Steinhauser, S.R. (1986). A review of the skippers of the *narcosius* group of species of the genus *Astraptus* Hübner (sensu Evans, 1952) and erection of a new genus. Lepidoptera: Hesperíidae. Bulletin of the Allyn Museum, 104, 43 pp.

Metamorphosis of *Historis acheronta* (Fabricius) Lepidoptera Nymphalidae.

by F. C. Urich

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I have always mentioned to my several co-collectors that it was my opinion that if and when the host plant of *Historis acheronta* was discovered it most certainly would be *Cecropia peltata* ("Bois Canot").

Eventually, during the month of March 1986, the chance of proving my hunch presented itself. On 22nd March 1986, a female *Historis acheronta* was caught in a baited trap. Knowing that the cut leaves of *Cecropia* do not last more than a day or two before fading and curling, which would not be very attractive to a female should she decide to lay, I placed a cover over a small live plant in the ground and introduced the female along with some rotten banana.

On close examination under the leaves on 23rd March, 9 eggs were observed close to the secondary veins of the leaf. These hatched on 26th March. This amazed me, as never have I had the experience of any species of butterfly hatch in so short a time.

With most of the Nymphalidae, the young larvae position themselves individually at the edge of the leaf using their frass and silk to form a small extension outwards and beyond the end of the vein. On this they remain motionless after having eaten. In so doing, they minimize the chances of being spotted and taken away by predators.

However, as is well known, on most *Cecropia* plants there are present hundreds of a medium-sized, redish ant (*Aztech* sp.?) that attack and kill newly-hatched larvae.

Nevertheless, it would be easy to understand how elated I was to be able to confirm at last my prediction that when any of us was lucky enough either to find a caterpillar or to see a female laying it would be on *Cecropia*. So after decades of searching and hoping, the time at last arrived when my prediction would become a certainty.

However, a series of misfortunes took place. Seven of the nine small caterpillars were attacked and removed by the ants mentioned above. I was indeed lucky to have found the two that so far had not been attacked. These two were removed, and I had no alternative but to place them on a cut leaf. Misfortune did not end there; in my anxiety to get these established on the leaf in my breeding cage, when I saw crawling on the leaf something which I thought was an ant, I rolled it off, and then realised that it was one of the small larvae and not an ant. I was now left with a single one.

Eventually, when it pupated. I saw for the first time what the pupa of the butterfly looks like; it was probably the first time anyone had seen this, or the larvae of this butterfly for that matter.

Strangely enough I had pictured the pupa to be similar to that of the *Historis odius orion*, but of course somewhat smaller. This also turned out to be correct. It is very similar to that of the *Historis odius orion* except that it is narrower and a bit longer,

plus the fact that the two protrusions at the bottom of the pupa are separated by a small space whereas these protrusions in the case of the *orion* actually touch. So at long last I was able to prove without a doubt that the educated guess regarding the host plant was correct.

Tragedy did not end there, however, as my finger slipped whilst setting the imago, inflicting a small smudge at the tip of one of the forewings. It might be worth mentioning that a friend of mine José I. Castro, who wrote a book "The Sharks of North American Waters" and who is an extremely good photographer, took pictures of all stages of this metamorphosis, but the film turned out to be faulty and so no plates are available. All the scores of pictures that were taken of other species came out beautifully. But the very ones I needed most were no good.

Never have I recorded any species of butterfly that goes through it's metamorphosis in so short a period of time; from egg laying to hatching of imago; 29 days. At the end of this article, I shall give the dates and various details of the ecdyses.

Things do happen in very strange ways. Shortly afterwards, Scott Alston-Smith a co-collector and a good friend of mine, on a trip he made to Innis field in the South of Trinidad about the 22nd May 1987, was fortunate enough to see two females laying on *Cecropia*. He collected some 28 eggs. He very kindly gave me 6 and kept 22 for himself. It was during the rearing of the larvae that both he and myself realised that the larvae are highly dimorphic.

For example, the lone larva that I brought through was brownish greenish black, with four patches of "bird-like" patterns (yellow) in four places on the dorsal side whereas the ones he brought through had no such exact designs though some had yellowish markings. Amongst those he gave me, there were lines running the lengths of the bodies at both sides. One or two had irregular orange markings along the dorsal side but not the yellow bird-like marks as on the one that I brought through.

Details of Life History Stages

Egg laid on 23rd March 1986.

Hatched 26th March 1986.

First ecdysis 31st March 1987

Second ecdysis 4th April 1987

Third ecdysis 8th April 1987

Pupated 13th April 1987

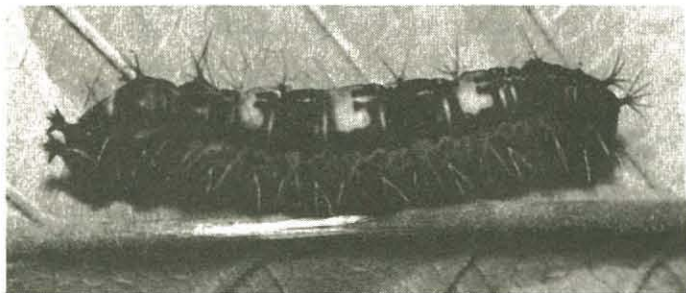
Hatched 21st April 1987

From laying of egg to hatching of imago : 29 days

Scott Smith has informed me that most of his came through in an even shorter time.

Egg : Globular, whitish, and ribbed from top centre downwards, more or less 1 mm in diameter. It is extremely difficult to spot when the eggs are laid at the side of the secondary ribs of the *Cecropia*.

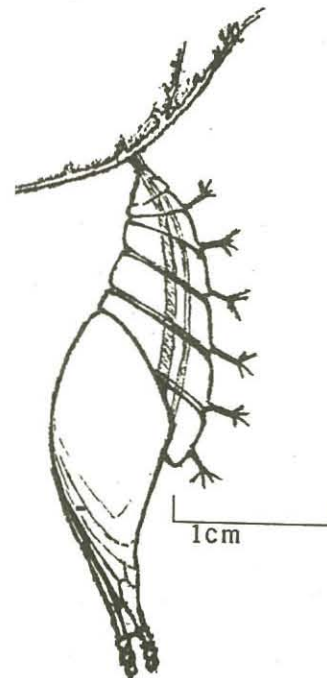
Larva : On hatching it is extremely thin, smooth, 4 mm long, greenish brown in colour with an oval, black, smooth head. Whitish small dots run the length of the body and the body is covered with short whitish thin hairs thinly dispersed on the surface of the body. After the first ecdysis, the head is still black with two short blunt knobs, one on each side. A row of short Christmas-tree spines run the length of the body in the mid-dorsal line, with a dorso-lateral row of similar spines on each side and rows of stiff, straw-coloured hairs laterally above the legs. Along the length of the area from which these spiny hairs protrude run two light straw coloured lines.



After the second ecdysis, the head is still black, but now has a slight indentation from top to bottom, the indentation at the top being deeper than at the bottom, which becomes almost flat at that point. Each lobe of the head supports a short thick horn from the ends of which extend four short, pointed, smaller horns. After the third ecdysis, everything remains the same except that there are now three "dove-like" patterns situated on the dorsal side which are bright yellow with two circular black dots on each yellow marking.

Pupa: The pupa is very similar to that of *Historis odious orion*. The main difference is the fact that it is somewhat more flattened, but is more or less ham-shaped as in *orion*. There are six four-pronged spines along the mid-dorsal line arranged in single file. Near the point where the spines end on the pupal case a ridge curving back towards the ventral side marks off the area of the thorax. Anteriorly there is a pair of blunt, short, rough protrusions, which are separated by a distance of about 2 mm and do not actually touch as they do in *Historis odious orion*.

Biege is the predominant colour of this pupa, with streaks of darker brown to almost black. The position of the eyes of the imago can plainly be seen represented by bulges on both sides of the pupa.



Melipona trinitatis and *Melipona favosa*, the only species of the Genus *Melipona* in Trinidad.

by Marinus J. Sommeijer and Luc L. M. de Bruijn,
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The stingless bees (Meliponinae) compose together with the Honeybees (Apinae), the Bumblebees (Bombinae) and the Orchid bees (Euglossinae) the family of the Apidae (Michener 1974). All species of the stingless bees are "eusocial"; this implies that, in a similar way to the honeybee (*Apis mellifera*) they live in permanent colonies with specialized queen and worker castes. The Meliponinae (about 400 species) form a diverse group. The smallest bees measure only 2 mm., while the largest (much bigger than the honeybee) measures about 15 mm. All species have a distribution restricted to the tropics. In Trinidad about 15 species of stingless bees are known to occur, among which are the well known "pegone", *Trigona amalthea*, and various small black bees (some of which are called "sweat bees").

The subfamily of stingless bees can be divided into various groups. One major group is formed by the species of the neotropical genus *Melipona*, with a distribution ranging from Argentina to Mexico. The systematics of this groups are still insufficiently studied. The largest stingless bees, and possibly as a consequence also those that are important for domestication, belong to this genus.

In addition to their great ecological value as the most important pollinators of the tropics, the stingless bees are valuable also for the production of honey and wax. This form of beekeeping, meliponiculture, was very widespread in the American tropics before the introduction of the European honeybee, *Apis mellifera*, by Spanish settlers. Archeological data and historical accounts indicate the great importance of stingless bees in the Maya and Aztec cultures of Meso-America and at the present time meliponiculture is still very common in this region.

The Genus *Melipona* in Trinidad.

Only two species of this group are recorded from Trinidad:

Melipona favosa (cover illustration) and *M. trinitatis*. *M. favosa* in Trinidad belongs to the subspecies *M. favosa favosa*. This subspecies is also recorded from Tobago, Surinam, Guyana, French Guyana and Venezuela, while other subspecies are recorded from Panama, Colombia, Ecuador etc.

M. trinitatis was considered a subspecies of *M. fasciata*. The *fasciata* group forms a large complex (many subspecies) with a wide distribution. The Trinidad species has also been named *M. scutellaris trinitatis*. The fact that the Trinidad subspecies is rather distinct in various characteristics supports its separation as a distinct species (Roubik, pers. comm. 1985). Pending further taxonomic treatment, we will here refer to this species as *M. trinitatis*. At present this species has been recorded only from Trinidad.

M. trinitatis and *M. favosa* are widespread on the island of Trinidad; we collected both species at various localities from Chaguaramas to Rio Claro. It is evident however that *M. trinitatis* is much more abundant than *M. favosa*. In Trinidad both species are found especially in forested areas. Local names are "Moko grande" for *M. trinitatis* and "Moko chiquite" for *M. favosa*.

Nest Sites and Architecture of Nest Sites

The nests of *Melipona* bees are constructed in cavities, mostly in hollow trees. From outside only a narrow entrance is visible, surrounded in both species by a structure of radiating mud ridges. This narrow entrance allows for efficient guarding of the nest by only a single bee. Various tree species are used: mango, tropical almond, immortelle, etc.

The architecture of the nest inside the cavity has the general characteristics of the nests of most stingless bee species (Fig. 1). The broodcells are constructed in a system of horizontal

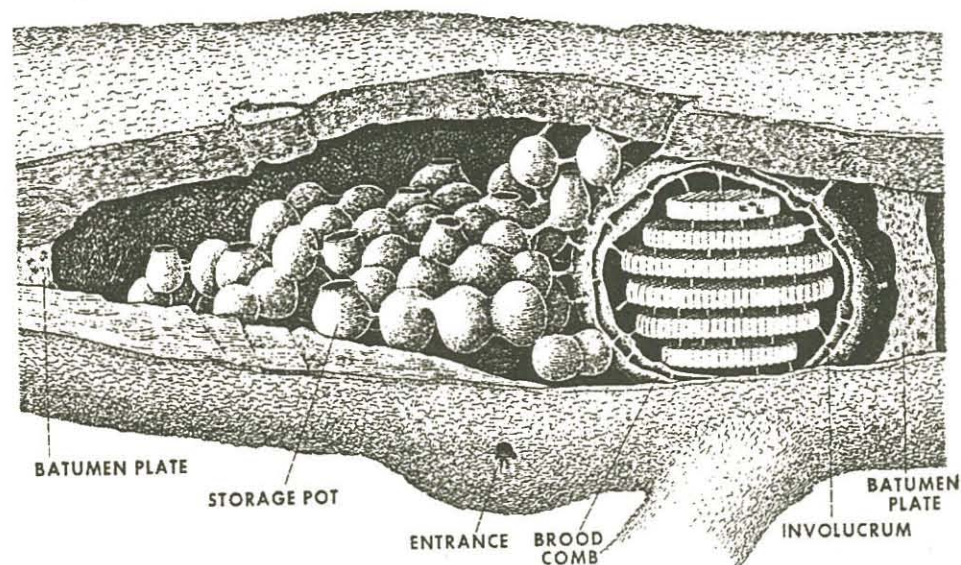


Fig.1 Diagram of nest of *Melipona*
(from Michener 1974; original drawing by J.M.F. de Camargo)

disks enveloped by waxy sheets: the involucre. The cells are used only once. As soon as the bees have emerged, the remains of the cells are removed. Gradually a whole comb is removed. When the bees have built their broodnest up to the ceiling of the nest cavity, they will start to utilize the space that became free at the bottom of the broodnest. So, there is a cyclic movement of the place where the young combs are located in the broodnest. The storage pots for honey and pollen are several times bigger than the brood-cells. They are arranged in an irregular compact cluster separated from the brood unit.

The Behaviour Inside the Nest

In both species behavioural characteristics are found that are typical of all stingless bees. The egg-laying behaviour (oviposition) and the system of larval feeding are basically different from that of the honeybee.

1. Mass-Provisioning of Brood Cells

The total amount of larval food is discharged into the broodcell immediately prior to oviposition by the queen. The egg is placed vertically on the surface of the liquid larval food. Immediately after oviposition the cell is closed by a single worker who in a rotating movement folds the cell-collar inwards.

2. Rhythmicity of Oviposition Behaviour

The construction of broodcells takes place during periods of several hours that are well separated from the periods in which oviposition takes place. These oviposition periods are typically very short (minutes), during which the cell is also filled with larval food. The activities of the oviposition period can be performed in this short time because of the synchronous increase of activity of queen and workers, giving this period an appearance of excitement.

The temporal sequence of the acts and the cyclic occurrence of cellbuilding, cell provisioning and oviposition are very typical of all stingless bees.

3. Laying Workers

In comparison with the social behaviour of the honeybee where the queen blocks ovary-activation in workers, it is remarkable that *Melipona* workers commonly release eggs in the presence of their queen. These worker eggs are released during the oviposition period, immediately after the provisioning of the broodcell with larval food. As soon as the laying worker withdraws from the cell her egg is eaten by the queen. After this the queen will proceed with her own oviposition in this cell.

Behavioural Interactions Between Queen and Worker.

The intranidal behaviour was especially studied in *M. favosa*. Here the queen rests during the cell construction phase at fixed places away from the cell. She becomes active only shortly before the provisioning of the broodcell. The court of workers surrounding the queen during the extra-oviposition period at her resting place is formed principally by those workers who are also actively participating in cell building in that period. These bees shuttle frequently between the cell which they are building and the distant resting queen. The typical court behaviour is characterized by antagonistic behavioural elements and was found to be important for the regulation of the activity of the queen. By this behaviour workers inform the queen about the state of cell construction (Sommeijer and Bruijn 1984).

Foraging Behaviour and Foodplants

In 1979 we made a first comparative study of foodplants of stingless bees and honeybees in Trinidad by means of an analysis of pollen samples. Returning pollen foragers were intercepted and samples were taken from the corbicular pollen loads. These samples were further analysed at the palynological institute of Utrecht University (Sommeijer, et al 1983)

Recording the pollen flights, we found that pollen was collected especially from 0530 to 0900 hours with a peak at 0800 hours. The nectar flights were most frequent between 1000 and 1600 hours. We found a considerable overlap of pollen spectra for the different species of bees. There was an evident interspecific similarity between *M. favosa* and *M. trinitatis*. Major foodplants for both *Melipona* species were *Spondias mombin* (hogplum), *Mimosa pudica* and *Psidium guajava* (guava). However, some plants were of major importance to the honeybees but not to *Melipona*, eg. *Cocos nucifera* (coconut).

M. trinitatis differed from *M. favosa* by collecting considerable quantities of pollen from unidentifiable palms, hereby resembling *Apis mellifera*. Nectar samples, too, were collected from these bees but still await analysis so a list of the more important nectar-supplying plants cannot be given.

Meliponiculture

In Trinidad the domestication of stingless bees is common, especially in the Central Range. Nearly all domesticated colonies are *M. trinitatis*; *M. favosa* is only rarely domesticated. The honey, which is sold at a high price, is called bush honey or forest honey. It is used for regular consumption, for various medical treatments and in religious ceremonies. The domesticated nests are generally located in wooden boxes of about 75 x 30 x 30 cm. The extraction of the honey is performed only once a year. The amount harvested does not exceed the contents of a few bottles, which is considerably less than the harvest of a honeybee hive. Next to the domestication of colonies in hives, the regular extraction of honey from a nest at its natural forest site is not uncommon. The advent of Africanized honeybees (an African race of *Apis mellifera*) is causing great difficulties for apiculture with the well known races of *Apis mellifera* which were originally introduced from Europe. In Trinidad the aggressiveness of the present bybirds is also responsible for an increasing interest in the development of meliponiculture with the indigenous stingless bees.

References

- Michener, C. D. (1974). The social behaviour of the bees. Belknap Press of Harvard University Press, Cambridge, Massachusetts, 404 pp.
- Sommeijer, M.J., De Rooy, G.A., Punt, W.A. and de Bruijn, L.L.M. (1983). Comparative study of foraging behaviour and pollen resources of various stingless bees (Hym., Meliponinae) and honeybees (Hym., Apinae) in Trinidad, West-Indies. *Apidologie* 14(3) : 205-224.
- Sommeijer, M.J. and de Bruijn, L. L. M. (1984). Social behaviour of stingless bees: "bee-dances" by workers of the royal court and the rhythmicity of brood cell provisioning and oviposition behaviour. *Behaviour* 89 (3/4): 229-315.

The Status and Distribution of Wetland - Dependent Birds in Trinidad.

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The avifauna of Trinidad has been studied for over 100 years and is now generally well known (French 1980). Few studies, however, have looked at habitat dependence of the individual species and fewer still (French 1966, Bacon 1970) have concentrated on mangroves and associated marshes. French (1966), considering the mangrove avifauna, mainly from the Caroni Swamp, recorded 94 species and Bacon (1970) found 137 species in the mangroves and marshes of the Caroni Swamp. Both studies listed all species present in the study areas without considering their dependence on the habitat for survival.

Mangroves and adjacent marshes in Trinidad have undergone pronounced changes in their physical and biological character during the past 30 years as a result of reclamation and channelization. This paper is an attempt to describe the present status and distribution of all species of birds that depend on these habitats for their survival and has arisen out of a study to describe the living resources of the major wetlands in Trinidad.

The Study Area

Trinidad is the southernmost island of the Caribbean archipelago and lies between 10° 3' and 10° 44' N and 61° 44' W. It has an area of 4772 km² and of this, 180 km² are occupied by mangroves and marshes. The major wetlands, all coastal, occur on the east (North Oropouche 6 km², Naiva 90 km²), south (Los Blanquizontales 12 km², Icacos 5.5 km²) and west (Roussillac 5 km², South Oropouche 15 km², Caroni 50 km²) with numerous smaller ones scattered around the island (Fig. 1)

The vegetation comprises mainly mangroves in the brackish seaward areas and marshes in the less saline to freshwater areas. The mangrove flora is dominated by *Rhizophora* (red mangrove), with *Avicennia* (black mangrove) and *Laguncularia* (white mangrove) having a patchy distribution with local dominance in some areas. In the Naiva swamp, because of unique environmental conditions, the mangroves are also mixed with salt tolerant tree species and palms.

The marsh flora consists mainly of grasses and sedges with the major ones being *Eleocharis mutata*, *Cyperus articulatus*, *Cyperus giganteus*, *Phragmites australis*, *Leersia hexandra*, and various species of *Scirpus* and *Panicum*. In the Naiva and Los Blanquizontales swamps, the aroid, *Montrichardia arborescens*, is also common.

With the exception of the North Oropouche Swamp, all the above named wetlands were studied. The North Oropouche was omitted from the study because of a combination of temporal constraints on the field work and the impression gained from previous observations that the avifauna was generally depauperate. It is felt that the poverty of the avifauna may be the result of the fringing nature of the mangrove in a low salinity environment and the seasonal conversion of much of the marshes to agricultural land.

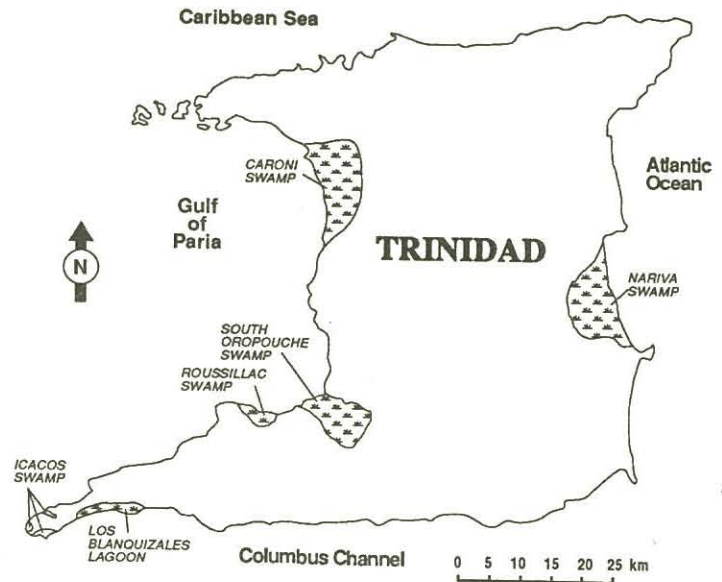


Fig.1 Wetlands in Trinidad.

Methods

1. Field Visits

Thirty-nine field visits were made during three periods: September - October, 1981; January - February, 1982; and April - June, 1982.

During each visit, notes were made on the presence, abundance, nesting, habitat and other ecological characteristics of the species recorded.

2. Status terminology

The abundance of each species was derived according to the following criteria:

- Abundant: Always present in significant numbers; can be confidently predicted to be recorded.
- Common: Present in numbers; may fluctuate
- Fairly Common: Usually seen on visits; recorded numbers vary between 5 and 20 individuals per visit.
- Uncommon: Not always seen on visits; or seen regularly but less than 5 individuals per visit.
- Rare: Only occasional individuals seen.

Results and Discussion

1. Distribution and abundance of wetland avifauna

The known avifauna of Trinidad comprises in excess of 400 species, and, of these, 287 are found in the coastal wetlands (French and Ramcharan, in press). One hundred and eighty-nine (189) species are recorded for the Caroni Swamp, 204 for

the Nariva, 134 for South Oropouche, 71 for Icacos, 68 for Los Blanquiales and 43 for Roussillac. One hundred and three (103) species occur in one wetland only with 31 in Caroni, 65 in Nariva, 4 in South Oropouche, 1 in Icacos and 2 in Los Blanquiales. Further, 67 of the remaining 184 species are present in not less than two of the Caroni, Nariva and South Oropouche Swamps and a total of 167 species occur exclusively in these areas. Considering the occurrences of all species over the range of wetlands studied, French and Ramcharan (in press) found that one species (Ruddy Ground-Dove) was abundant, 13 were common, 37 were fairly common, 74 were uncommon, 70 were rare and three (Bat Falcon, Blue-and-yellow Macaw, Large-billed Seed Finch) were extirpated locally. The remaining 89 species occurred in varying degrees of abundance over their wetland range. From the species restricted to one wetland, 56 were rare, 27 fairly common and 8 common.

2. Taxonomic and ecological groupings

The wetland avifauna comprises 56 families, with the number of species in a family ranging from 1 (Jacanas, Storks, etc.) to 24 (Tyrant Flycatchers). Twenty-one families are represented by only 1 species, 35 by 5 or less, 46 by less than 10 and the ten largest families have 141 species. The nineteen largest families comprise the bulk of the avifauna with 211 species. Some of the families that are represented by large numbers of species are the herons (19 spp), rails, gallinules and coots (12 spp), ducks and geese (13 spp), kites, hawks and eagles (18 spp), sandpipers and snipe (18 spp) and hummingbirds (13 spp).

The avifauna can also be grouped according to ecological and habitat characteristics and preferences. Within the region, Trinidad holds a unique position as a stepping stone between the continental neotropics and the more oceanic Antilles. In addition, the extensive wetlands are situated at a cross roads, as it were, not only for wetland species that are northern and southern migrants but also for those species dispersing to and from the Orinoco delta. This is well expressed in the fact that a significant component of the avifauna (82 species) is non-resident. Fifty-five come from North America and the Antilles and while many are present for only a short time during the months of July to October, some stay until April and a few remain between April and July. The remaining 27 species of non-residents come from South America and these are usually present between April and September. There is some dispersal from Trinidad during the year and some species that are resident visit the South American mainland on a regular basis.

Within the wetland areas some species tend to be specific in their microhabitat selection, preferring either the mangrove or the freshwater marshes, whereas others are cosmopolitan. Species that prefer the mangrove habitat include the Boat-billed Heron, Rufous Crab-Hawk, Mangrove Cuckoo, and Straight-billed Woodcreeper. While many species are adapted to both mangrove and marsh, a significant number prefer the latter, presumably because they depend on a diet that cannot be found in saline or brackish conditions. These include the Least Grebe, Striped-backed Bittern, Pinnated Bittern and several species of ducks, rails and gallinules.

Included in the rest of species recorded for the wetlands are several species that occur in habitats ranging from sea-coasts to scrub, savanna and forest where they reach optimum abundance. This fauna is not dependent on mangroves and marshes for its survival and its intrusion into the wetland

habitat is due to a number of factors including the presence of food during the dry periods of the year, increased urbanization and the loss of natural habitats to development. Common elements of this group include the sandpipers and snipes, pigeons and doves, swifts, hummingbirds, tyrant-flycatchers, swallows, American orioles, wood warblers, tanagers, finches, seedeaters and grosbeaks.

3. The obligate mangrove and marsh avifauna

This group of birds comprises 100 species of which 16 are confined to the mangrove, 52 to the freshwater and brackish water herbaceous marsh, 16 to the mangrove/marsh interface zone, 5 to the marsh/seacoast interface and 8 to the marsh/swamp-forest interface, with 3 species having as yet undetermined preference (Table 1). Three species, Reddish Egret (Caroni), Azure Gallinule (Nariva) and Red-winged Blackbird (Caroni), are new records to the island but there are no recent records to indicate the presence of the Horned Screamer (Nariva), White-faced Tree-Duck (Caroni), Ash-throated Crake (Caroni) and Blue-and-Yellow Macaw (Nariva), all of which were previously recorded. For 14 other species there have been few recent records. Finally, one race of the Straight-billed Wood-creeper is endemic to Trinidad where it is found exclusively in the mangroves of the Caroni Swamp.

The Fulvous Tree-Duck which was formerly almost extirpated locally has been recorded in increasing numbers with flocks of up to 400 birds occurring in the Caroni and South Oropouche swamps during June to October. Four other species, the Limpkin, Yellow-breasted Crake, Gray-breasted Crake and Long-winged Harrier have been found to be more widespread and common than previously suspected, while the White-tailed Kite and Spotted Tody-flycatcher are now local residents. In addition, 2 species, the Spotted Rail and Ringed Kingfisher, have extended their previously known ranges to include the South Oropouche and Icacos swamps respectively.

Not only have there been changes in the wetland-dependent avifauna but in the non-dependent fauna as well. The semicollared Nightjar, a forest species, was recorded for the South Oropouche Swamp and a vast roost of the Carib Grackle, a bird of urban areas, scrub and secondary forests, was found in the Caroni. After an absence of over ten years, the Dickcissel has returned to the Nariva Swamp.

a. The Mangrove Avifauna The mangrove avifauna comprises 16 species and those with the largest populations, Scarlet Ibis, Greater Ani, Black-crested Antshrike and Bicoloured Conebill, are all resident. The remaining 12 species are either uncommon or rare and include the migrants, White Ibis, Rufous Crab-hawk, Ringed Kingfisher and Belted Kingfisher. The distribution of the species is patchy with 14 occurring in the Caroni Swamp, 7 in the Nariva, 6 in South Oropouche and one each in Roussillac, Los Blanquiales and Icacos swamps. Four species, the White Ibis, Rufous-necked Woodrail, Dark-billed Cuckoo and Straight-billed Woodcreeper are found only in the Caroni where they are rare, while 3, the Mangrove Cuckoo, Little Cuckoo and Belted Kingfisher occur in both the Caroni and Nariva, and a further 2, the Night-heron and Ringed Kingfisher, occur in the Caroni and South Oropouche Swamps. One species, the non-resident Rufous Crab-hawk, occurs in the Nariva only and another, the resident Spotted Tody-flycatcher, occurs uncommonly in both the Los Blanquiales and Icacos swamps.

b. The Brackish/Freshwater marsh avifauna The most

striking feature of this group of 52 species is the large number of species that are either rare (21 spp.) or uncommon (17 spp.) over the extent of their ranges. No species exerts numerical dominance in all the wetlands where it occurs and only the Jacana, Yellow-throated Spinetail, Fork-tailed Flycatcher, Common Gallinule, Black-bellied Tree Duck and Great Egret express dominance in any wetland.

Fifty species occur in the Caroni. Of this number, seventeen species, 10 of which are non resident, occur in this wetland only. The common species are Great Egret, Blue-winged Teal, Common Gallinule, Jacana, Yellow-Throated Spinetail and Fork-tailed Flycatcher.

The Nariva Swamp, with the largest marshes in the country, has an avifauna of 26 species that is dominated by Jacana and the Black-bellied Tree Duck. One species, the Azure Gallinule, occurs in this wetland only and another, the Horned Screamer, is thought to have recently become locally extinct. Further observations will clarify this issue. Out of the remaining 22 species, 18 are either rare or uncommon and 4 (Common Gallinule, Purple Gallinule, Pectoral Sandpiper and Fork-tailed Flycatcher) are fairly common.

In the south Oropouche Swamp, the marsh avifauna comprises 30 species and is dominated by the Fork-tailed Flycatcher, Yellow throated Spinetail, Jacana and Common Gallinule. Eighteen species are either uncommon or rare in their occurrences. Eight (including Nacunda Nighthawk, Least Sandpiper, Comb Duck, Ring-necked duck and Pied-billed Grebe) occur only in the Caroni and South Oropouche and a further 9 are present in the Caroni, Nariva and South Oropouche.

The marsh avifaunal composition of the Icacos, Los Blanquizaes and Roussillac swamps is depauperate with 1 species (Jacana) in Roussillac, 5 (Gray-breasted Crake, Jacana, Green-throated Mango, Yellow-throated Spinetail and Fork-tailed Flycatcher) in Los Blanquizaes and 12 in Icacos.

c. The avifauna of the mangrove/marsh interface This group of birds comprises 16 species of which one (Roseate Spoonbill) is a non-resident. Many different species dominate both locally in individual wetlands and across the extent of their ranges. These include the Little Blue Heron, abundant in Caroni and Nariva, the Cattle Egret, abundant in Caroni, South Oropouche and Nariva and the Yellow-hooded Blackbird, abundant in the Caroni, South Oropouche, Nariva and Icacos swamps. Other species which commonly occur are the Snowy Egret (Caroni), Pied Water-Tyrant (Caroni, South Oropouche, Nariva and Icacos) and the White-headed Marsh-Tyrant (Caroni, South Oropouche, Nariva).
Two species, (Red-capped Cardinal and Roseate Spoonbill)

occur in one wetland (Caroni) only, 5 in three wetlands, 4 in four, 3 in five and a similar number in six. Sixteen species occur in the Caroni, 14 in the South Oropouche, 12 in Icacos, 10 in Nariva, 5 in Los Blanquizaes and 3 in Roussillac.

d. Birds of the marsh/swamp-forest interface There are eight species in this group. One, the Blue-and-yellow Macaw, is considered locally extinct and only 1, the Red-bellied Macaw, occurs with any degree of abundance, the others being either rare or uncommon throughout their ranges. All 7 extant species occur in the Nariva while 3, (Limpkin, Rufescent Tiger-Heron and Chestnut-bellied Heron) occur in the Caroni, 1 (Limpkin) in the South Oropouche and 1 (Moriche Oriole) in Los Blanquizaes.

e. Birds of the marsh/seacoast interface This group comprises five species of which the commonest are the Semipalmated Plover and Large-billed Tern. All are recorded for the Caroni, 3 for South Oropouche, 2 for Nariva and 1 each for Los Blanquizaes and Roussillac.

f. Birds of undetermined habitat This group comprises three species, 2 of which, Gray Heron and Little Egret, have been recorded only once and the third, Osprey, which ranges over all the different habitats in the wetland system.

Acknowledgements

This paper was prepared while the senior author was on sabbatical leave at the Coastal Ecology Institute, Center for Wetland Resources, Louisiana State University. I thank Professor John O'Neill for his critical review of the manuscript, Terry Caldwell for excellent secretarial services and the Director of the Institute of Marine Affairs for his permission to use data which formed part of the IMA's research results for its project describing the living resources of the coastal wetlands of Trinidad.

References

- Bacon, P. R. 1970. The Ecology of the Caroni Swamp. Special Publication of the Central Statistical Office, Trinidad. 68 pages.
- French, R. P. 1966. The utilization of mangroves by birds in Trinidad. *Ibis* 108 : 423 - 424.
- French R. P. 1986. A guide to the birds of Trinidad and Tobago. Harwood Books. Valley Forge, Pennsylvania, U.S.A.
- French, R. P. and E. K. Ramcharan. In Press. The wetland Avifauna of Trinidad. In Inventory of the Living Resources of Coastal Wetlands in Trinidad. Research Report, Institute of Marine Affairs, Trinidad.

Table 1 Checklist of the wetland-dependent birds of the major wetlands of Trinidad.

Symbols:

a - abundant; c - common; fc - fairly common;
 u - uncommon; r - rare; e - locally extinct
 x - visitor; n - nesting; mg - mangrove
 mr - marsh; mm - mangrove/marsh

ms - marsh/seacoast; mf - marsh/swamp forest
 1 - Caroni; 2 - Nariva; 3 - South Oropouche;
 4 - Icacos; 5 - Los Blanquizontales; 6 - Roussillac;
 7 - Residence status; 8 - Breeding status; 9 - Habitat

	1	2	3	4	5	6	7	8	9		1	2	3	4	5	6	7	8	9			
GREBES										Blue-winged Teal	c	u	u						x	mr		
Least Grebe	r							n	mr	Northern Shoveler	r								x	mr		
Pied-billed Grebe	fc		u					n	mr	Lesser Scaup	r								x	mr		
CORMORANTS										Ring-necked Duck	r		r							x	mr	
Neotropic Cormorant	u	u	u	u			x		mr	Comb Duck	r		r						x	mr		
ANHINGA										Muscovy Duck	r	r								x	mr	
Anhinga	u	u	u	u			x		mr	Masked Duck	u								n	mr		
HERONS										KITES, HAWKS, AND EAGLES												
Gray Heron			r				x			White-tailed Kite	u	u	u							mr		
Great Blue Heron	u	u	u				x		mr	Everglade Kite	r	r							x	mr		
White-necked Heron	u	u	u				x		mr	Black-collared Hawk		e							x	mf		
Great Egret	c	u	c	r			x	n	mr	Rufous Crab-Hawk		r							x	mg		
Little Egret	r						x			Long-winged Harrier	u	u	u						n	mr		
Snowy Egret	c	fc	fc	fc				n	mm	OSPREYS												
Little Blue Heron	a	fc	a	fc	fc	fc		n	mm	Osprey	fc	u	fc	u	u	u	x					
Tricoloured Heron	a	u	a	u				n	mm	LIMPKINS												
Reddish Egret	r						x		mr	Limpkin	r	u	r						n	mf		
Green Heron	r	r					x	n	mr	RAILS, GALLINULES, AND COOTS												
Striated Heron	fc	fc	fc	u	u	u		n	mm	Clapper Rail	fc		fc	u						n	mm	
Chestnut-bellied Heron	r	r					x	n	mf	Spotted Rail	r		r							n	mr	
Cattle Egret	a	a	a	c	c	c		n	mm	Gray-necked Wood-Rail	u		u	u	u					n	mm	
Black-crowned Night-Heron	u		u	u				n	mm	Rufous-necked Wood-Rail	r									n	mg	
Yellow-crowned Night-Heron	u		u					n	mg	Sora	u	u	u						x	mr		
Rufescent Tiger-Heron	r	r						n	mf	Ash-throated Crake	r									n	mr	
Striped-backed Bittern	u							n	mr	Yellow-breasted Crake	u										mr	
Least Bittern	u		u	u				n	mm	Gray-breasted Crake	u	u	u	u	u	u				n	mr	
Pinnated Bittern	u	u	u	u				n	mr	Common Gallinule	c	fc	c	fc							n	mr
BOAT-BILLED HERONS										Purple Gallinule	fc	fc	fc	u							n	mr
Boat-billed Heron	r		r					n	mg	Azure Gallinule		r									mr	
STORKS										Caribbean Coot	r									x	n	mr
Wood stork	r						x		mr	JACANAS												
IBISES AND SPOONBILLS										Jacana	a	a	a	a	u	u					n	mr
White Ibis	r						x			PLOVERS												
Scarlet Ibis	a	u	c	u	u	u		n	mg	Semi-palmated Plover	fc	fc	fc		u				x		ms	
Glossy Ibis	r	r					x		mr	Thick-billed Plover	u	u								n	ms	
Roseate Spoonbill	u						x		mm	SANDPIPERS AND SNIPE												
SCREAMERS										Solitary Sandpiper	fc		fc	fc						x		mr
Horned Screamer	r								mr	Least Sandpiper	fc		fc							x	mr	
DUCKS AND GEESE										Pectoral Sandpiper	fc	fc	fc								x	mr
Snow Goose	r						x		mr	Common Snipe	u	u	u							n	mr	
Fulvous Tree-Duck	u		c					n	mr	GULLS AND TERNS												
White-faced Tree-Duck	r							n	mr	Large-billed Tern	fc		fc			fc	x	n		ms		
Black-bellied Tree-Duck	fc	c	fc	u				n	mr	Gull-billed Tern	u		u						x		ms	
American Wigeon	u						x		mr	Yellow-billed Tern	u	u	u						x		mr	
White-cheeked Pintail	u						x	n	mr													

	1	2	3	4	5	6	7	8	9
SKIMMERS									
Black Skimmer	fc						x		ms
MACAWS, PARROTS AND PARAKEETS									
Blue-and-Yellow Macaw		e							mf
Red-bellied Macaw		c					n		mf
CUCKOOS									
Mangrove Cuckoo	u	r					n		mg
Dark-billed Cuckoo	r						n		mg
Little Cuckoo	u	u					n		mg
Greater Ani	fc		fc	fc		u	n		mg
NIGHTHAWKS									
Nacunda Nighthawk	fc		fc				n		mr
HUMMINGBIRDS									
Green-throated Mango	u	u	u	u	u		n		mr
White-tailed Goldenthrout	r						n		mr
KINGFISHERS									
Ringed Kingfisher	r			r			x	n	mg
Belted Kingfisher	u	u					x		mg
Pygmy Kingfisher	u	u	u	r			n		mm
Green Kingfisher	u	u	u				n		mm
WOODCREEPERS									
Straight-billed Woodcreeper							n		mg

	1	2	3	4	5	6	7	8	9
OVENBIRDSY									
ellow-throated Spinetail	c		c	c	fc			n	mr
ANTBIRDS									
Black-crested Antishrike	c	c	fc		fc	fc		n	mg
TYRANT FLYCATCHERS									
Pied Water-Tyrant	c	c	c	c		fc		n	mm
White-headed Marsh Tyrant	c	c	c					n	mm
Fork-tailed Flycatcher	a	fc	a		fc		x	n	mr
Sulphury Flycatcher		u						n	mf
Spotted Tody-Flycatcher					u	u			mg
Crested Doradito	r						x	n	mr
AMERICAN ORIOLES AND BLACKBIRDS									
Yellow-hooded Blackbird	a	a	a	a	c			n	mm
Red-winged Blackbird	r						x		mr
Moriche Oriole		u		r				n	mf
HONEYCREEPERS									
Bicoloured Conebill	c	fc	c		fc	fc		n	mg
FINCHES, SEEDEATERS AND GROSBEAKS									
Red-caped Cardianl	r							n	mm
Large-billed Seed-finch		e							

Notes on two Localised Frogs

by Graham White

14 Santa Anna Gardens, Tunapuna, Trinidad W.I.

On a trip to Icacos made by myself, John Seyjagat and Morley Read in July 1986, a rare Leptodactylid frog was found. This was identified as *Leptodactylus bolivianus* by Dr. Ronald Hayer of the Smithsonian Institute, Washington D.C. Kenny (1969) records this frog from 5 locations in the Mayaro area and, by voice, from the Nariva Swamp. The specimens from the Icacos peninsula were caught while calling in a flooded coconut estate. On a Field Naturalists' Club trip to Icacos in January 1987, another search was made. The grass beneath the coconuts yielded many *Leptodactylus fuscus* = *L. sibilatrix* and *Hyla rubra* but no others. However in the muddy drainage canals between the coconuts we found two specimens of *L. bolivianus* and four specimens of *L. macrosternum*. all specimens found were females and all were sitting in small puddles at the edge of the water. Illustrations of these frogs are found in Kenny (1969) and (1977).

Kenny (1979) suggests the possibility that *L. macrosternum* is a

recent colonizer of Trinidad from Venezuela because of its restriction to the Cedros peninsula. It is possible that the colony of *L. bolivianus* from the Icacos area represents an independent colonization by this species since it is now quite common in the area and unlikely to have been missed by Professor Kenny. On that same night a Leather-back was seen laying on the beach at Icacos.

References

- Kenny, J. S. 1969 "The Amphibia of Trinidad", Studies fauna Curacao and other Caribbean islands, 29, 1 - 78
- Kenny, J. S. 1977 "The Amphibia of Trinidad - an addendum" Studies fauna Curacao and other Caribbean islands, 51, 92 - 95.
- Kenny, J. S. 1979 "Some recent animal colonizations" Living World, Trin. Tobago Field Nat. Club 1978 - 1979. p 27.

Bird Observations in Tobago December 1985 to November 1987

by David Rooks

Heale House, Speyside, Tobago

New records for Tobago

Catharacta skua, Great Skua

While I was fishing on the north-east coast of Tobago 1.5 km outside of Bloody Bay on 7th March 1986, accompanied by five other persons of company executive status, this bird arrived alongside our boat at a distance of 8 m and stayed around for half an hour. I requested all persons present to observe it closely and memorize a description. On returning to shore I gave each "A guide to the birds of North America" and had each one find and identify the bird seen without assistance or prompting. Each person identified the bird as *Catharacta skua*, which confirmed my identification.

Description: A big, brown, chunky bird with white patches on the primary feathers of each wing, bigger and very different from the jaegers which I see in the area regularly.

Oceanites oceanicus, Wilson's Storm-Petrel

I first saw this species off Toco in 1975. In Tobago my first sighting was outside of Scarborough on 12 April 1986. I have since seen it regularly all around the island, usually far offshore, the nearest sighting to shore being approximately 1 km outside Charlotteville. In April 1987, one of these birds fed around my stationary boat for 4 hr, several times coming as close as 3 m. Careful observation was eminently possible. The bird had only one leg. It appeared to stand on tip-toe while "hover-fluttering" over the wave tops and pecking into the water. Its food, being very small, remained unseen.

Description: A generally brown bird about 15 cm long. Wings appear longer than the body. Pale to light buff wings bars; white rump bar; tail convex; feet yellow.

Milvago chimachima, Yellow-headed Caracara

One was seen on the Claude Noel Highway at 4.30 p.m. on 15th November 1987. I drove up to it and it flew into a coconut tree. I got so close to it I could have hit it with the truck.

Description: See French (1973)

General observations

Haematopus palliatus, American Oystercatcher

As reported earlier (Rooks 1984), I observed a bird of this species on the rocks at Arnos Vale in 1982. From February to March 1986, small groups of two or three were regularly observed on the rocks of Man O' War Bay and Speyside. The bird has a startlingly red beak: it reminds one of a traffic light.

Tachybaptus dominicus, Least Grebe

Frequently seen in dams and any reasonably large body of water.

Puffinus Lherminieri, Audubon's Shearwater

Seen as often feeding in the night as in the day. Though they feed far offshore in the day, they feed around the boat when we fish near the St. Giles islands at night using a bright lantern to attract fish. They can be seen close up in holes in the bank of the track leading up to the rest house on Little Tobago during

their breeding season.

Buteogallus urubitinga, Great Black Hawk

Widespread and frequently seen in forested areas along Main Ridge.

Falco peregrinus, Peregrine Falcon

Seen regularly from October to April, especially in the presence of sea birds which they have been observed attacking.

Sterna dougallii, Roseate Tern

Nested in May and June 1986 and 1987 on Booby Island, Man O' War Bay. Nests with eggs and nestlings were visible from 7 m in indentations in the sheer rock face. Yellow-crowned Night Herons (*Nyctanassa violacea*) and Little Blue Herons (*Florida caerulea*) also use this island for nesting.

Anous stolidus, brown Noddy Tern

Sterna fuscata, Sooty Tern

Sterna anaethetus, Bridled Tern

All arrive in Tobago at the same time and nest at the same time, at the end of April, as the Roseate Tern but they use all the coastal islands and rocks for nesting as long as these are big enough to have some vegetation. They do not appear to nest on those that have no vegetation. They also nest in Alexander Bay, Little Tobago.

Sterna maxima, Royal Tern

These arrive in March. They nest on the Sisters with the nest being visible from the sea. I suspect that they also use the St. Giles Islands but I haven't seen any nests yet.

Larus atricilla, Laughing gull

Laughing Gulls arrive and nest at the same time as the Royal Terns. They nest on the St. Giles Islands and the outside face of Little Tobago.

Campylopterus ensipennis, White-tailed Sabrewing

This species has made a marked come-back from its near extirpation by hurricane Flora in 1963. I have observed it in the Louis d'Or valley and regularly in Main Ridge Forest Reserve.

Chiroxiphia pareola, Blue-backed Manakin

Widespread, even quite common, in all forested areas.

Cyanerpes cyaneus, Red-legged Honeycreeper

One of the most common birds feeding around Forestry Division's look-out hut, Main Ridge. Also commonly seen at the water trough near the rest house on Little Tobago during the dry season of 1987.

Forpus passerinus, Green-rumped Parrotlet

Now common on the western end of the island.

Thraupis palmarum, Palm Tanager

This species, unrecorded from Tobago before 1982 (Rooks 1982), is not plentiful but is widespread. It was first observed at Speyside and it has now been seen in Charlotteville.

References

ffrench, Richard (1973). A Guide to the Birds of Trinidad and Tobago. Livingston Publishing Co., Wynnewood, Pennsylvania, 470 pp.

Rooks, David (1982). Tobago field trip - 9th - 13th June 1982. Bull. Trin. Tob. Field Nat. Club. Fourth Quarter.

Rooks, D. (1984). The American Oystercatcher in Tobago. Bull. Trin. Tob. Field Nat. Club. Third Quarter. 29 June 1984.

Noteworthy Bird Records

by Graham White.

14 Santa Anna Gardens, Tunapuna, Trinidad W.I.

Paint-billed Crake, *Neocrex erythrops*. A dead specimen of this bird was found on Cumuto road about 1/2 to 2 km south of the junction with Churchill-Roosevelt Highway. This is the first record of the species in Trinidad. The specimen was preserved and is still in my possession. With me at the time were Anil and Vasheist Kokaram. The Paint-billed Crake is very similar to the Ash-throated Crake except that the base of the bill is red. A complete description is as follows.

A small rail-like bird 20.5 cm long. Bill greenish-yellow with red base. Crown, nape, mantle, back, rump dark olive brown. Upper sides of wings mid-brown. Sides of head, neck, breast and belly slate grey. Throat and chin whitish. Two white feathers 1 cm behind eye and 5 mm above ear. Iris red (bird dead). Underwing coverts brown barred white. Thighs, flanks, vent and undertail coverts dark brown barred white. Tail short, 37 mm, mid-brown. Feet pulplish-red. This description fits very well with that of the bird in Birds of Venezuela. (Meyer de Schauensee & Phelps 1978).

The habitat of this bird includes swamp and pastureland. There is ample pasture in the area in which the bird was found. The range of the Paint-billed Crake includes Monagas so it is unlikely that this is an escapee.

Marbled Godwit, *Limosa haemastica* On 86.10.05 I saw this bird at the Port of Spain sewage ponds. I had never before seen either the Marbled or Bar-tailed Godwit. I took a description into a taperecorder and identified the bird at home. Unfortunately I was the only observer but I am confident of my identification as the bird was only 7 m away. It is a rare species with only a few recent records (ffrench 1986)

Ornate Hawk-Eagle, *Spizaetus ornatus*. A bird of this species attempted to nest at the Asa Wright Nature Centre. More information can be gained from the centre.

White Ibis, *Eudocimus albus*. On a trip to see Scarlet Ibis with Mr. Winston Nanan in August 1985 one White Ibis was seen in the flock. I pointed this out to Mr. Nanan who agreed that it was a White Ibis and claimed that he does see the occasional White Ibis in the flocks of Scarlet Ibis. The bird seen was white but with black wing tips. ffrench (1980) gives its status as an "accidental visitor to Trinidad".

Brown-Throated Parakeet, *Aratinga pertinax*. For the past two

years I have been seeing small flocks of parakeets. I saw them first in North Valsayn and I have seen them in Tunapuna and St. Augustine. Professor Kenny had reported them from Maracas Valley. The birds are Brown-throated Parakeets. Many views have been good enough for identification. I have viewed them from about 5 m in Valsayn and about 7 m on campus, UWI.

These birds fly in noisy flocks of 2 to 7. They are basically blue-green above with a brown throat and greenish yellow belly. There is a yellow eye-ring. The tail is long as is typical of parakeets (note, not parrotlets.) After the first sighting I consulted Birds of Venezuela (Meyer de Schauensee & Phelps 1978) and was thus, on future sightings, able to look for specific features.

The range of this bird includes the delta region in extreme south-east Monagas and in Delta Amacuro. However the birds seen are probably escaped cage birds since they are most common in semi-urban areas. These birds have not been recorded before in Trinidad.

Black-necked Stilt, *Himantopus himantopus*. The T & TFNC bird group has recorded nesting of this bird in 1985, 1986 & 1987 at the Port of Spain sewage ponds. The bird group has also noted the presence of Stilts at the ponds all year round.

Black-bellied Whistling-duck, *Dendrocygna autumnalis*. A large flock (more than 50 of these birds) was seen by myself in a pond behind Buccoo Bay in Tobago. One had 5 chicks. I am very familiar with both of the common species of whistling duck. They are not recorded in Birds of Trinidad and Tobago by R. ffrench (1980).

References

ffrench, R. P. 1980. A Guide to the Birds of Trinidad and Tobago. Harrowood Books, Pennsylvania, 470 pp.

Meyer de Schauensee, R. & Phelps W. H. Jr. 1978. A Guide to the birds of Venezuela. Printston University. Press, Princeton, New Jersey. 424 pp.

ffrench, R. 1986. Additional notes on the birds of Trinidad and Tobago. Living World. J. Trin. Tobago Field Nat. Club 1985-1986 p.q.

The songs of the Rufous-browed Peppershrike, *Cyclarhis gujanensis*

by Victor C. Quesnel
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When writing my review (Quesnel 1986) of French's book "Birds of Trinidad and Tobago" (French 1986) I knew that I would in time have to justify my statement there about the songs of the peppershrike. French had written "Each bird has its own tune which it hardly alters". Commenting on this in my review I wrote "this is what the situation appears to be but the reality, revealed only to someone who lives where the bird is common, is much more fascinating. Each bird has a repertory of over forty tunes and within a district each bird apparently has the same repertory". This is the statement I now want to support with such evidence as I have.

The Peppershrike's song is a melodious phrase from three to nine (or ten) notes long with one or perhaps two notes emphasized. As French (1973) puts it, "it invites rendition into English" and several writers have, in fact, rendered it in English. Thus, Belcher and Smooker (1937) say that the call has been rendered variously as "do you wash every week" and "We're waiting to hear you". Both Herklots (1961) and French (1973) quote this, with Herklots adding that the call is variable and French adding that "there is no set cadence, each individual repeating its own pattern". Even the Venezuelan birds speak English, it seems! Meyer de Schauensee and Phelps (1978) say that the call may be rendered as "please, please don't go 'way". Chapman (1894) does not translate the call into English but does say "If one answered the caller it would change the order of its notes until it became a refrain of the ordinary call. At times two birds would respond to each other in this way, continuing the performance for many minutes". What Chapman meant by the ordinary call is not at all clear to me but he did note that the song is variable.

Methods and Observations

Near Talparo where I live the bird is very common and I hear it constantly, perhaps every day. I agree with Belcher and Smooker (1937) that there is no season at which one may not hear it. After I heard one bird sing "doux-doux you love me?" I began to translate the songs I heard for fun and over many months built up a collection of over forty translations. By means of these I was able to recognize each of the common songs almost instantly and was then in a position to study the songs more seriously. I also recorded most of the songs on a small tape recorder and could thus listen to the songs played back at a slower speed. I did not note the day of my first translation but it was before December 1983 at which time I made a list of the songs I had heard that month. I made other lists in January 1985, June 1986, July 1986 and in August 1987 when I was writing this paper. The August 1987 list is the most complete and an attempt was made to note, as far as my work permitted, every song that was sung on twenty of the thirty one days of the month. All the observations were made at Haven Hill Farm, Leotaud Trace, Talparo.

The contents of the lists illustrate one difficulty that arose. In the earliest list several translations occur that do not reappear in later lists and these are omitted from Table I. All of these translations appear just once. This means that the song was a relatively rare one. Presumably, when the song recurred later I

did not recognize it as one I had heard before and either retranslated it or ignored it. With increasing familiarity the later translation would prevail. A second difficulty is that the distance at which the song is heard influences the rendition. Thus, a sound that is heard as a single syllable at a distance may be heard as two syllables closer up. This is the case with the word "me" in the song that started the whole series of observations. When heard from close at hand the sound is more like the "Hughie" that turns up in other songs. Also, at a distance the lower parts of songs may not be heard at all.

In rendering the song in English not only were the words chosen to approximate the original sounds as closely as possible but the sentence was chosen to duplicate the rhythm of the sounds as accurately as possible. However, for some of the more complicated songs I could think of no really accurate rendition and the chosen phrase serves basically as a label I could use for identification. (In fact, all the renditions are just labels). Although standard English was used where possible, many of the songs were better rendered in the local dialect (Trinispeak George Orwell might have called it) with even a few French or French patois words thrown in. The term "doux-doux", for instance, is a patois term for sweetheart. Sometimes I could find no suitable rendition with these resources and was forced to leave a part of the phrase in peppershrikese. These parts should be easily recognizable. If some of the renditions have a touch of humour this should surprise no one seeing that the project was begun just for fun.

Table 1 gives a list of 71 songs heard in August and September 1987 with the number of times they were heard in August and in two previous months. The list is much longer than I thought it would be from earlier lists and some rare songs still remain untranslated. Those with a zero in the August 1987 column were translated in September 1987. The counts for the two earlier months cannot be used for exact comparison because the time spent on the August 1987 list was much greater. However, numbers within a month may be compared. In December 1983, the commonest call was No. 43, heard on eight occasions and the least common Nos. 54 and 67, each heard on one occasion only. In July 1986, the most common, No. 30, was noted eleven times and several others just once. In August 1987, the most common, No. 66, was noted 29 times and several others only once. Thus, it is clear that some songs are popular and are sung on many occasions; others are rarely sung. The songs of August 1987, can be divided into three groups: the very popular songs, Nos. 66, 47 and 29, sung 29, 26 and 24 times respectively; the fairly popular songs, Nos. 65, 5, 60, 43 and 12, sung 18, 18, 17, 16 and 15 times respectively; relatively unpopular songs comprising all the others which were sung twelve times or fewer. In the last group are 19 songs sung only once or twice. The popular songs in August 1987 were also popular in the other months and the methods used here would be adequate for more exact comparisons.

Table 1 shows, too, that five and six syllable songs account for 41 of the 71 songs. Nine and ten syllable songs are rare, and possibly there are no ten syllable songs at all. With that many

syllables it becomes difficult to know just how many there are. The eight most popular songs in August 1987 all had from five to eight syllables.

Short songs are often parts of longer songs. Thus, No. 1. "way too low" is part of the longer songs "This is way too low" and "This is the way to go". In any extended bout of singing these short songs are likely to give way to the longer versions or to be included in a bout of the longer versions and this might explain the comparative popularity of some. It is an aspect that needs further study just to establish the facts much less the interpretation.

A singing bird repeats one of the songs for many minutes at a time. I have no detailed records but my notes record songs lasting approximately 10 min. on two occasions and 12 min. on another. On 6 August 1986, one bird sang song No. 55 ninety times with 4-9 sec. breaks between repetitions. This means that the same song was sung for a period of about 10 min. Periods of 15 min. or more do not seem impossible. However, in an extended period of song, the song often changes to some other song without any longer-than-normal break between songs and I have heard up to six different songs sung in succession seemingly by the same bird. Sometimes the songs in a series are similar and the change from one to another very subtle. At other times the change is abrupt and startling because the songs are so different. Yet again, the change from one recognizable song to another recognizable one may take place through several intermediate ones that are not familiar. I have actually seen birds as they change from one song to another on three occasions and on one of these occasions four different songs were sung. Therefore, there is absolutely no doubt that a peppershrike can sing more than one song.

Interpretations and Questions

The facts having been stated, it is now possible to discuss ffrench's (1986) statement "each bird has its own tune which it hardly alters" and my opposing view that each bird has a large repertory of tunes. In my review of ffrench's book (Quesnel 1986) I interpreted ffrench's statement to mean that each bird sings one tune and that this is different from that of every other bird.* Clearly, each bird does not have a repertory of only one tune which is different from the tunes of all other birds because it is possible to hear up to four birds singing the same tune at the same time and because I have heard and seen a bird change song on three occasions. Furthermore, on that basis, to account for the 71 different tunes in one small area one would have to assume either a large resident population or a small resident population with a large, and changing, non-resident population. Neither of these assumptions appeals to me.

However, my opposing view is not the only possible one. *A priori*, other possibilities are (1) that each bird has a small repertory of tunes, each of which is different from those in the repertory of every other bird and (2) that each bird has a small repertory with some tunes common to those in the repertoires of other birds. Let us examine each in turn. The first is ruled out by the observation of simultaneous singing of the same tune by four different birds. Furthermore, assuming a repertory of four tunes per bird and a resident population of four birds, to account for 71 tunes there would have had to be a non-resident population of about 14 birds ($\frac{71-16}{4}$) passing through the area.

* See ffrench's explanatory note following this article

This is not unreasonable but it means increasing the number of assumptions. In the second case with each bird having a small repertory of 4 - 6 tunes with some of them being common to all, the fact of simultaneous singing of one tune receives an explanation but this interpretation, too, requires the assumption of a large non-resident population passing through the area. Alternatively, if the number of tunes in the repertory is assumed to be about twenty with a small number in common, say four, then this too would account for a total of 71 tunes. It must be admitted that all the observations can be explained by this interpretation. However, the simplest interpretation is my original one, viz. that each bird has a repertory of all 71 tunes. This, therefore, is the one I favour.

This attempt to interpret the facts is hindered by uncertainty about the function of the song. I have tacitly assumed that the song is connected with the acquiring and keeping of a territory and that, perhaps, only the male sings. These assumptions may be wrong. To try to decide if they are, I have begun a new series of observations, but the difficulties are great. Male and female plumage is the same and is such that a bird is very inconspicuous in the canopy of a tree. Furthermore, although I have seen peppershrikes low down, at or near eye level, I have seldom heard them sing when at this level. The results of the new observations, therefore, may be just as difficult to interpret as the ones now being considered.

When ffrench spent three days with me in February 1987, he raised the possibility that the songs may form a developmental series. It is not impossible that this is so but, so far, there is little evidence for it. It was mentioned above that several songs occur in versions of different length. Is this evidence for development? Is the shortest version learnt first and the longer versions later? Two calls that are basically the same may have obvious or subtle differences. Thus, the "Yankee give it to Peter" song has a counterpart "Yankee give it to Petér" (é as in me) with the final syllable in the second version rising rather than falling. Is this evidence for development? The song "Artie check your breathing" is similar to the song "Artie check your brother". In the first song the penultimate syllable rises and the last falls in pitch ; in the second song the syllables "your brother" are on a falling sequence. Are these subtle differences evidence for development? Perhaps ; but if so, the stages in the development remain there for use.

More difficult questions arise. What limits the number of syllables in a song to a maximum of nine (or ten)? What determines the popularity of a song? Are the unpopular songs transitional songs sung by young birds learning the repertory? Why does this species need such an elaborate set of songs? Could it not get along with just a few songs the way other species do? How much is instinctive and how much is learnt behaviour? The peppershrike could do with some of the detailed study that has gone into the chaffinch. See Hinde (1982) and references therein.

The peppershrike songs of the Talparo area and Brazil Village are the same as those of Haven Hill Farm. The Aripo Savannas are only a few kilometres from Talparo, yet on my frequent visits I get the impression that the songs of the peppershrikes there are usually different from those of the Talparo district. This impression may be the result of incomplete observation or it may represent fact, in which case there would be evidence that young birds learn from older birds and that different districts are likely to have their own dialects. Such a situation

would presumably arise if the districts are isolated from each other but there is no obvious isolation of the Aripo area from the Talparo area. At the present time speculation could run riot. What is needed is a thorough study by a competent biologist with the time and equipment appropriate to the job. Then, eventually, we may get some answers to the many questions.

Acknowledgement.

I thank Richard ffrench for his perceptive criticisms of the first draft which enabled me to present the material more clearly and for the stimulating discussions during those three days in February 1987, when we talked of peppershrikes and many other things if not of cabbages and kings.

Table I. The frequency of songs of the Rufous-browed Peppershrike at Haven Hill Farm, Talparo heard during the months shown. Songs are arranged in order of complexity starting with the simplest according to the number of syllables but with variations of the song immediately after the simplest version.

No.	No. Syll	Dec. '83	July '86	Aug. '87
1. Way too low (way to go)	3		2	10
2. This is way too low	5			1
3. This is the way to go	6	3		1
4. Free for you	3			5
5. This is free for you	5	4	7	18
6. The real wee-wee	4			2
7. You do the real wee-wee?	6		2	6
8. Please see Hughie	4	4	4	5
9. What don't you reap?	4	2	3	5
10. He sweet for sure	4		6	8
11. He is sweet for sure	5			1
12. Gimme wur-wee	4			15
13. Did he gimme wur-wee	6			1
14. To each of you	4			0
15. Sleep every day	4			0
16. Would you believe?	4		2	9
17. Up-chivy-oh	4	3	1	6
18. Yankee, up-chivy-oh	6	2		5
19. You changed your car	4			6
20. If you changed your car	5			2
21. If you could change your car	6			2
22. Check your breathing	4			1
23. Artie check your breathing	6	6	4	8
24. Artie check your brother	6			0
25. Doux-doux you love me?	5	6	1	6
26. Did he talk to me?	5		5	5
27. Civy chivy bird	5	2	1	1
28. Did you see U-wee? (U.W.I.)	5	4	5	6
29. Give it to Peter	5	2		24
30. Yankee give it to Peter	7	2	11	4
31. Give it to Petér (é as in me)	5		1	2
32. Yankee give it to Petér	7			0
33. Richard de Brodure	5	5	5	7

No.	No. Syll	Dec. '83	July '86	Aug. '87
34. King Richard de Brodure	6			6
35. Please speak to Hughie	5		2	6
36. Did you speak to Hughie	6			0
37. All you bring your yip?	5			6
38. Give me some to wear	5			3
39. Lucky three-o'-we	5			0
40. He need to wherro	5			1
41. Take it back from me	5			1
42. Chivy cupid ho (stupid whore)	5			1
43. Yankee chivy cupid ho	7	8	5	16
44. He married too young	5			2
45. You want to wee-wee?	5			4
46. You want to wait to wee-wee?	7		4	4
47. We wait for Pettigew	5	7	7	26
48. This is from me to you	6	4	4	11
49. Look at the jumbie bird	6		6	9
50. Leave it to Chillowep	6	2	3	8
51. Yankee watch your haircut	6	5	1	12
52. Yankee speak to Hewit	6			6
53. Look in the box for me	6	5	3	11
54. Things are there for the work	6	1	2	8
55. Is he here for a fee?	6		3	10
56. Do you feel to wee-wee?	6	4	2	8
57. Did he fail to wee-wee?	6			2
58. Did he eat it for sure?	6			3
59. Artie get carried away	7	2	1	7
60. It's a pity you wherro	7	4	2	17
61. I got the feel to wherro	7			2
62. Up-chivy the law for me	7	3	2	2
63. We trying to go sea-shore	7	2	2	10
64. Things are there for the worrier	8	6	3	15
65. I caught you trying to wherro	8	5	3	18
66. We trying to go through the room	8	6	9	29
67. Chivy Chubby the worrier	8	1	3	3
68. Up-chivy Chubby the worrier	9			1
69. You getting he to get and go	8			1
70. Would you please take care of the wherro	9		3	7
71. Would you please take it clear of the wherro	10	6	2	5

References

Belcher, C. and G. D. Smooker (1973). Birds of the colony of Trinidad and Tobago, Part 6. *Ibis* (14) 1 : 504 - 550.

Chapman, F. M. (1894). On the birds of the island of Trinidad. *Bull. Am. Mus. Nat. Hist.* 6 : 1 - 86.

ffrench, R. P. (1793). A guide to the birds of Trinidad and Tobago. Livingston Publishing Co., Wynnewood, Pennsylvania, 470 pp.

ffrench, R. (1986). Birds of Trinidad and Tobago. Macmillan Publishers Ltd., London and Basingstoke, 87 pp.

Herklots, G. A. C. (1961). The birds of Trinidad and Tobago. Collins, London, 287 pp.

Hinde, R. A. (1982) Ethology. Fontana Paperbacks, (William Collins Sons & Co. Ltd.) Glasgow, 320 pp.

Meyer De Schauensee, R. and W.H. Phelps Jnr. (1798). A guide to the birds of Venezuela. Princeton Univ. Press, Princeton, New Jersey, 424 pp.

Quesnel, V.C. (1986). Review of "Birds of Trinidad and Tobago" by Richard ffrench. *Living World. J. Trin. Tobago Field Nat. Club*, p 52.

Peppershrike Song

With reference to Victor Quesnel's contention, perhaps I should revise and re-state my position.

My previous statements (french 1973, 1986) that the Peppershrike repeats the same phrase are based on very long, but general, experience. If you listen to a Peppershrike singing, it appears to repeat the same phrase many times, usually without variation, or perhaps sometimes with a slight variation. This "variation" may depend more on the singer's exact position when singing, or even on the listener's ability to hear all or perhaps nearly all of the notes. At any rate, one would describe the Peppershrike's song as a phrase repeated many times. If you said that it called various different phrases habitually in a series, this would definitely give the wrong impression.

Quesnel's thesis is that an individual can and does change its tune, and he is probably right, at least to the extent that a bird may have more than one tune in its repertoire. Paul Schwartz recorded in Venezuela such a change in the song of a Peppershrike included in his record "Bird Song of the Tropics" during the 1960's. And J. C. Barlow, who studied the closely related Chestnut-sided Shrike-Vireo (1975), states that a Peppershrike has from two to six song-types in its repertoire.

How often such changes occur in a song-series is a point that we still need to determine. Certainly my field experience leads me to believe that it happens rather rarely. I have recently followed individual singing birds, counting the repeated phrases, on several occasions. Each time the bird "dried up" without changing its tune at all, after singing the repeated phrase up to 150 times without a break. I believe this to be the normal feature of Peppershrike song. But more research needs to be done to clarify the picture.

Richard ffrench

References

Barlow, J. C. & R. D. James 1975. Aspects of the biology of the Chestnut-sided Shrike-Vireo. *Wilson Bull.* 87 : 320-334.

R. P. ffrench. 1973. A guide to the Birds of Trinidad & Tobago. Livingston Pub Co. Waynwood, Pa. U.S.A.

ffrench, R. 1986. Birds of Trinidad & Tobago. Macmillan Pub. Co. Basingstoke, U.K.

Incidents involving Whales in Trinidad waters during 1987.

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The occurrence of marine mammals in our waters is not uncommon. Porpoises are often seen off Trinidad's north coast and in Tobago waters. Pilot whales were once so abundant in the Gulf of Paria that a whaling station was built at Pointe Baleine on the west side of Gaspar Grande island, where whales were processed for meat and oil. One of the many names given to the Gulf of Paria was Golfo de la Ballena, or Gulf of Whales (Borde 1876 and 1883). At present, however, encounters with whales are fairly rare. It is therefore of great interest that in 1987 three separate incidents involving whales were recorded.

On the morning of June 10th 1987, a killer whale, *Orcinus orca* (Linnaeus, 1758) was landed by a fisherman at the Small boats jetty at Chaguaramas. The whale was identified by its stout conical teeth in both jaws, prominent dorsal fin and distinctive coloration. The fisherman, Kenneth Miller, reported that the whale had become entangled in his drift gill net as it was being hauled in. At the time he was out in the gulf of Paria between Kronstadt and Gaspar Grande islands, in 6-7 metres of water. The victim was a member of a pod numbering about 15. The others in the pod made many attempts to free their trapped colleague, bumping the boat and tugging at the net. It must have been a very frightening experience for those on board the 10 m pirogue. The trapped whale eventually died at around 1.30 a.m. after struggling for more than an hour.

The fisherman towed the carcass ashore where it was examined; it measured about 4.5 metres in length, was female and probably about 8-10 years old (judging from gonad condition). Stomach examination revealed the remains of a turtle. It is of interest to note that the pod remained offshore until around 9.00 a.m., when the fisherman cut up the carcass and removed it from the beach. The Institute of Marine Affairs was keen to acquire the skeleton for their reference collection but the fisherman sold the carcass for quick cash so as to replace the damaged nets.

As far as is known, this is the first authentic record of killer whales in Trinidad waters. Northridge (1984) stated that there had been no report of interactions between killer whales and fisheries in this fishing area (western central Atlantic) and that such interactions were unlikely because of the low density of the species in the area. The incident has been reported to Marine Resources Assessment Group in London which keeps worldwide records of interactions between marine mammals and fisheries.

The killer whale is carnivorous but its reputation as a vicious man-eater is quite unfounded. It is found in all oceans of the world and in some areas such as around Iceland and Norway it has been considered to be deleterious to the stocks of halibut and herring. The populations off Western Canada are well studied; they feed on the salmon as it schools prior to the spawning migration. Individuals have been kept in aquaria and trained to perform tricks.

On May 1st 1987, a pod of whales stranded themselves on a beach at La Filette on the North Coast. They were identified as short-finned pilot whales, *Globicephala macrorhynchus*; Gray, 1846, by the presence of conical teeth in both jaws, the characteristic bulging forehead, the lack of a beak, and the fact that they were found in

tropical waters. The other species of the genus, *G. melaena* (Traill, 1809) is found in the North Atlantic and in the Southern Hemisphere south of the tropics. The pod consisting of 15 adults and two calves was sighted around 5.00 a.m. by fishermen, who then reported the matter to the Institute of Marine Affairs. Research officers from the Institute and from Fisheries Division arrived on the scene around 10.00 a.m. By this time, one of the calves had died. The officers and the fishermen managed to tow the whales back out to sea by tying the flukes to the fishermen's boats with rope and pulling them out. Unfortunately, the other calf and one of the cows died during the attempt. This exercise took several hours. The carcasses were quickly removed for sale.

At around 1.30 p.m. on the same day, a large bull (5 m) beached itself amongst rocks at Blanchisseuse. Two of the Institute's staff got it to return to the sea by prodding it with rods, after which it was not seen again.

On January 23rd 1987, the Institute of Marine Affairs received a report of a dead whale found floating in Pointe-a-Pierre harbour. On the following morning a staff member visited Pointe-a-Pierre where the dead whale had been towed in and secured to a jetty. It was probably a sub-adult male (it was not possible to examine the genital duct), about 7 m in length. The ventral surface which was uppermost was brownish white in colour and the dorsal surface was mottled grey and white. The longitudinal striations in the ventral surface identified the specimen as one of the rorqual whales (*Balaenoptera*). These whales lack teeth but have plates of baleen (the whalebones of the once ubiquitous corsets) hanging from the upper jaw. The baleen plates are used to sift relatively small prey, such as plankton and small fish from the water. This specimen was identified as probably Bryde's whale (*Balaenoptera edeni* Anderson, 1878) which is confined to tropical waters. The ventral grooves reaching the navel are also characteristic of the fin whale, *B. physalus* (Linnaeus, 1758) and the blue whale, *B. musculus* (Linnaeus, 1758) but these occur mainly in polar latitudes. Unfortunately it was not possible to examine the specimen for other taxonomic details. Bryde's whale has previously been reported from the Caribbean (Scot-Ryen 1961) and the gulf of Mexico (Rice 1965).

References

Borde, Pierre-Gustave-Louis. 1876 and 1883. The history of the island of Trinidad under the Spanish Government. Paris: Maisonneuve et Cie. Republished in 1982 by Paria Publishing Co. Ltd., Trinidad.

Northridge, S. 1984. World review of interactions between marine mammals and fisheries. Rome: Food and Agriculture Organization of the UN (FAO Fisheries Technical Paper 251) 190 pp.

Rice, D.W. 1965. Bryde's whale in the Gulf of Mexico. Norsk Hvalfangstid 54: 114-115.

Scot-Ryen, T. 1961. On a Bryde's whale stranded on Curacao. Norsk Hvalfangstid 50: 323-332.

BOOK REVIEWS

A Birder's Guide to Trinidad and Tobago.

William L. Murphy.

Peregrine Enterprises Inc., Maryland. 1986. 124 pp. US \$12.95.

As birdwatching has developed in many western countries during the last 20 years into a major leisure-time activity, people have not been slow to exploit the commercial opportunities that have arisen from this. Trinidad and Tobago offer probably one of the most desirable locations in the world for tourist birdwatchers, with more than 400 recorded species within a relatively small area, in an accessible situation well provided with modern amenities. So it is not surprising that a "birder's" guide to our islands has now appeared, catering principally to foreign visitors.

William Murphy's booklet effectively covers what is needed in such a publication. In a lengthy introduction he gives a brief account of the islands' geography and climate, he advises visitors in detail on what to bring with them, when to visit, how to travel, and deals with such matters as immigration control, customs and bird-tours. He discusses where birdwatchers should stay, giving (I thought) decidedly unbalanced accounts of three locations in Trinidad and five in Tobago and also explains the important matter of internal transportation and the availability of good driver/guides.

In the main portion of the guide Murphy advises on the best places to find birds, suggesting thirteen locations in Trinidad and four in Tobago, gives useful map-diagrams for several of these and illustrates many with black and white photographs, some of them rather inadequate. In this section his selection was clearly guided by his experience as a bird-tour leader for an American agency. The locations described are mostly those which the tour groups visit, based at their hotels in Port of Spain, St. Augustine and Arima valley within Trinidad, or at either end of Tobago. Thus little space is given to more remote parts of the islands, and none at all (apart from Little Tobago) to offshore islands. But the main locations are generally well described.

In a less successful section the author briefly notes the status and habitats of 156 "more unusual species... frequently missed by visitors", lists accidental species and local hunting laws, and gives a complete checklist for the islands. He also gives bar-graphs showing seasonal distribution and abundance of selected species. As I don't have space here for a comprehensive critique, I can only say that it is a mistake to include what purports to be scientific information in a travel guide, unless it is based on published and verifiable sources. As it is, much of this section could mislead the serious ornithologist and is not of much use to the more casual birdwatcher.

Two articles are included by other authors, a bibliography of recent references to local birds, by Roger Clapp (which even includes chatty articles in "Trinidad Naturalist" - then why not articles from "Trinidad Guardian?") and, a bit inconsequentially, a snorkeler's guide to Arnos Vale by Tom and Katharine Almy.

Among a small crop of typographical and other errors are the mention of the *Strong*-billed Woodcreeper (twice), the placing of Matura forest in *southeast* Trinidad, and the occurrence of *Hooded*, instead of Prothonotary, Warbler in Tobago. Moreover, in a book like this it is inevitable that certain statements will be obsolete before they are printed (as Bacon and I found out in "Nature Trails"!.) Thus I doubt whether many birders can now go very far along the Old Castara Road in Tobago. I also find it a pity that the author hasn't found space for a mention of the Trinidad & Tobago Field Naturalists' Club and its activities, which might well interest visiting birdwatchers.

All in all, this is a useful enough book, giving some valuable information for a visiting birdwatcher who is not a member of a tour group. But those in tour groups hardly need this book, nor can I see much value in it for local resident birdwatchers, except perhaps for complete novices who have seldom set foot outside Port of Spain all their lives!

Richard ffrench

Butterflies and other Insects of the Eastern Caribbean.

P.D. Stiling

Macmillan Caribbean, 1986.

The author seems to have been torn between writing a general introduction to entomology and a guide to butterflies. The section on butterflies (occupying 28 out of 85 pages) is the more successful part. The general entomology text is patchy in style and content and contains some dubious or inaccurate statements.

The photographs with which the book is profusely illustrated are amateurish, and are mostly of insects that are obviously dead.

The captions are inconsistent, varying from Latin binomials to basic English (eg. "Killer bee"), and do not always fit the picture printed (eg. a mole-cricket labelled "cricket"; a picture of a wasp "and nest" when the wasp is posed on a flower).

The printing and reproduction are excellent. It is a pity that the contents are not of an equivalent standard.

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