10. THE INSECT FAUNA OF LITTLE CAYMAN

R.R. Askew

Little Cayman is seldom mentioned in entomological literature. The 1938 Oxford University Biological Expedition spent thirteen days on the island and reports on the resulting collection deal with Odonata (Fraser, 1943), water-bugs (Hungerford, 1940), Neuroptera (Banks, 1941), cicadas (Davis, 1939), Carabidae (Darlington, 1947), Cerambycidae (Fisher, 1941, 1948), butterflies (Carpenter & Lewis, 1943) and Sphingidae (Jordan, 1940). During the 1975 expedition, insects of all orders were studied over a period of about five weeks and many additions will eventually be made to the island's species list. At present, however, identification of the insects collected has, with the exception of the butterflies which have been considered separately, proceeded in the majority of cases only as far as the family level. Application of family names for the most part follows Borror & DeLong (1966). In this paper the general characteristics of the insect fauna are described.

Collecting Methods

A. General collecting with sweep-net, pond-net, butterfly net and searching foliage, tree trunks and on the ground. A cone-net attached to a vehicle was used on one occasion. Also considered as being caught by 'general collecting' are insects found resting on walls adjacent to outside electric lights at Pirates' Point.

B. A Malaise trap (Model 300 Health-EE-X supplied by Entomology Research Institute, Minnesota) was erected on 17th July and operated almost continuously to the end of the expedition. It was situated at Pirate's Point, just south of the lagoon and road, in a glade between bushes of *Conocarpus* and other shrubs growing at the base of the northern face of the beach ridge. The ground vegetation was dominated by *Sporobolus* and *Ambrosia*. The trap was unbaited; 70% ethyl alcohol was used in the collecting beaker.

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C. A Robinson mercury vapour light trap, powered by a portable generator, was run in the grounds of Pirate's Point on the following occasions: 14th July (20.00-22.00 hours), 15th July (20.00-22.00), 16th July (20.00-22.00), 17th July (20.00-22.00), 18-19th July (22.00-4.00), 19-20th July (21.00-4.00), 21-22nd July (22.00-4.00), 24th July (20.00-21.30), 27th July (20.00-3.30) and 30th July (20.30-21.30 hours, when the generator irreparably broke down). The trap was also run on 28th July in the central forest south of Sparrowhawk Hill from 18.30 to 21.30 hours. Few insects arrived after 21.00 hours.

D. Other collecting methods attempted, with very poor results, were the use of a yellow trap, pit-fall traps and extraction funnel (charged with washed-up turtle grass).

The Fauna in General

By the methods outlined above, at least 613 insect species were collected. Closer examination of the material will probably reveal further species. Representatives of all orders except Protura, Plecoptera, Embioptera, Zoraptera, Anoplura, Strepsiptera, Mecoptera, Trichoptera and Siphonaptera were found. Only a few vertebrates were examined for ectoparasites and Siphonaptera will undoubtedly be present on the island. The other orders listed, if present, should have been detected and it can be concluded that they are represented on Little Cayman at the most by a few, rare species.

The numbers of species found in each order are shown in table 12. The ratio of the number of species (x 100) in each order to the number of species recorded in the United States north of Mexico (Borror & DeLong, 1966) is given for comparison. Of the larger orders, the Lepidoptera appear to be best represented although the use of a light trap undoubtedly biased collecting in their favour. The total of species recorded is a minimum; many microlepidoptera caught in the light and Malaise traps could not be identified because of their poor condition. Coleoptera, although the second most numerous order in terms of species caught, is disproportionately poorly represented. Among the smaller orders, Odonata, Orthoptera and Neuroptera are all well-represented. The curve showing the numbers of species recorded over the course of the expedition (fig. 4) only moderately levels off, from which it must be concluded that many more species remain to be discovered.

In terms of individuals, the subjective impression is that Culicidae, Corixidae and Formicidae are the most abundant groups on the island; *Aedes taeniorhynchus* Wied and a species of Corixid were easily the two most frequently encountered species.

Families with the highest numbers of included species are Noctuidae (45 species) and Pyralidae (15), Formicidae (19), Cicadellidae (17) and Staphylinidae (15). Within some of the larger families there is often a wide range of species' size.

Table 12. Ordinal distribution of species of insects found on Little Cayman. Numbers of species from North America north of Mexico are from Borror & DeLong (1966).

Order	Number of species found in Little Cayman	N. America	Ratio x100
Collembola	2	314	0.6
Thysanura	2	50	4.0
Ephemeroptera	1	550	0.2
Odonata	7	412	1.7
Orthoptera	18	1015	1.8
Isoptera	3	41	7.3
Dermaptera	2	18	11.1
Psocoptera	4	143	2.8
Mallophaga	1	318	0.3
Thysanoptera	2	606	0.3
Hemiptera Heteroptera	44	4500	1.0
Hemiptera Homoptera	37	5700	0.6
Neuroptera	9	338	2.7
Coleoptera	118	26576	0.4
Lepidoptera	173	10300	1.7
Diptera	105	16130	0.7
Hymenoptera	85	15218	0.6
Total	613	84061 (including orders not on L.C.)	0.7

Linear measurements of the largest and smallest species within a family are shown in table 13. Individuals of near average dimensions were selected for measurement. Comparable figures for the British fauna are also included in the table and, remembering that these are drawn from a generally much larger fauna, they emphasize the often considerable within-family size range of Cayman insects. This is particularly true for Lepidoptera, Orthoptera, and for some families of Coleoptera but not Carabidae or Staphylinidae. Large Carabids and Staphylinids seem to be absent and this may be because of exclusion by the many land crabs on Little Cayman. The range of size appears to be greatest in endopterygote families (except Diptera). In terrestrial exopterygote species, adults and immature stages often have a similar biology and this may suppress the establishment of species that are small as adults.

The large size range within families of Cayman insects is contributed to by both very small and very large species, but especially by the latter. In orders in which more than two representatives were found, the Diptera and Hymenoptera are the only ones in which a British species exceeds in linear dimensions the largest Cayman species obtained.

COLLEMBOLA

Neanuridae 1 species Entomobryidae 1 species

The Neanurid, a pinkish-orange species, occurred in aggregations on the surface of rain-water in pit-fall traps. The Entomobryid was found amongst litter near Spot Bay and, apparently the same species, in accumulations of washed-up turtle grass on the shore.

THYSANURA

Lepismatidae 2 species

EPHEMEROPTERA

Baetidae 1 species

A subimaginal skin and a live larva found in a rain-water pool on the bluff south of Crawl Bay.

ODONATA

Aeshnidae 1 species Libellulidae 6 species

Dragonflies were conspicuous and abundant, especially near to the brackish coastal lagoons and on the *Sesuvium* marsh in the east. No Zygoptera were noted on Little Cayman, although two species were found on Grand Cayman together with three species of Anisoptera not encountered on the smaller island. Fraser (1943) records twelve species of Odonata collected by the Oxford University expedition (six

Table 13. Within-family size ranges of Little Cayman and British insects.

Dimensions are body length (excluding antennae and abdominal appendages) except for Odonata, Neuroptera and Lepidoptera where wing expanse is given, and Scarabaeidae for which elytral length is shown.

Order	Family	Dimensions (mm.) of largest species (Little Cayman)	Magnitude range L. Cayman	Britain
Odonata	Libellulidae	82	1.5	1.6
Orthoptera	Blattidae	39	4.6	1.7
	Gryllidae	15	3.3	2.5
Heteroptera	Miridae	4.5	2.3	3.9
Homoptera	Cicadellidae	4	2.4	4.7
Neuroptera	Myrmeleontidae	118	2.1	-
Coleoptera	Carabidae	10	5.0	12.4
	Staphylinidae	12	6.7	11.7
	Hydrophilidae	38	20.0	20.0
	Elateridae	28	4.7	2.4
	Cerambycidae	(52)*	(10.4)	5.2
	Scarabaeidae	25	10.0	9.5
Lepidoptera	Sphingidae	143	4.6	2.7
	Noctuidae	148	6.7	4.6
	Pieridae	60	2.3	1.5
	Hesperiidae	49	2.1	1.3
Diptera	Chloropidae	2	1.8	5.0
Hymenoptera	Formicidae (workers)	7.1	5.1	4.7
	Sphecidae	23	5.1	7.0
	Braconidae	9	6.0	9.8

* species found on Cayman Brac

from Little Cayman) although not all are the same as those taken in 1975. The most numerous species, *Erythrodiplax naeva* (Hagen), was found all over the island including the dry interior. A larger *Pantala* species was also common but confined to the vicinity of coastal lagoons where large 'flocks' were frequently seen hawking until sunset at a height of about five metres.

ORTHOPTERA

Acrididae 1 species (Cyrtacanthacridinae)
Tettigoniidae 4 species (2 Conocephalinae, 2 Phaneropterinae)
Gryllidae 6 species (3 Mogoplistinae, 2 Oecanthinae, 1 Gryllinae)
Phasmidae 1 species Blattidae 6 species

The dominance of the terrestrial crickets and cockroaches over the other families may be related to the abundance of arboreal lizards. The Phasmid and the two Phaneropterinae, all tree-living, were each found only once. The Acridid, a large species, was widespread in all stages. An Oedipodine grasshopper with red hindwings was collected on Cayman Brac but not found on Little Cayman.

ISOPTERA

Kalotermitidae, Termitidae, Rhinotermitidae (1 species each)

Little time was spent in collecting termites and more species are to be expected.

DERMAPTERA

Labiduridae 1 species (*Labidura riparia* (Pallas))
Labiidae 1 species (*Barygerax* sp.)

Only three specimens of earwig were found. The order has not hitherto been reported from the Cayman Islands and the *Barygerax* species is probably undescribed (*teste* A. Brindle).

PSOCOPTERA

The four species found, represented by only four individuals, are not yet identified to family.

MALLOPHAGA

A single biting louse was taken from a red-footed booby. Few other birds were examined.

THYSANOPTERA

Phloeothripidae 1 species Family ? 1 species

No special effort was made to locate thrips and the order is probably under-represented in the collections.

HEMIPTERA HETEROPTERA

Corixidae 2 species
Notonectidae 2
Veliidae 1
Anthocoridae 4
Miridae 7
Isometopidae 1
Reduviidae 2
Nabidae 1
Tingidae 3
Lygaeidae 4
Pyrrhocoridae 3
Coreidae 3
Corizidae 3
Saldidae 1
Scutelleridae 4
Pentatomidae 4

Corixidae were exceedingly abundant, coming to the mercury vapour trap in enormous numbers and often being seen in the brackish lagoons. One species dominated the collections, but more than two species may eventually be found to be present. Hungerford (1940) records only one water bug, *Trichocorixa verticalis* (Fieb.) from Little Cayman.

Most of the terrestrial species were rather local but sometimes plentiful. One of the Pyrrhocorids aggregated in large numbers on fallen fruits, and another was common on cultivated bean plants.

HEMIPTERA HOMOPTERA

Cicadidae 1 species	Membracidae 1 species
Cicadellidae 17	Tropiduchidae 1
Flatidae 3	Delphacidae 7
Cixiidae 4	Acanaloniidae 1
Aphididae 1	Aleyrodidae 1

Striking features of the Homopteran fauna are the paucity of Sternorhyncha and the apparent absence of Cercopidae.

NEUROPTERA

Mantispidae 1 species	Chrysopidae 3 species
Ascalaphidae 1	Myrmeleontidae 4

Neuroptera are very well-represented, in spite of the absence of Hemerobiidae. This latter may be related to the scarcity of aphids. The ant-lions were all collected as adults at light and two species were common. Banks (1941) reports the presence on

Little Cayman of *Chrysopa transversa* Walker and *Myrmeleon insertus* Hagen only, from material collected by the 1938 Oxford University expedition. Both of these species were found in 1975. No Mantispid has hitherto been reported from the Cayman Islands.

COLEOPTERA

Cicindelidae 2 species	Carabidae 11 species
Dytiscidae 2	Hydrophilidae 9
Leptodiridae 1	Staphylinidae 15
Pselaphidae 1	Orthoperidae 1
Cisidae 1	Cleridae 2
Elateridae 5	Buprestidae 1
Heteroceridae 1	Derodontidae 1
Rhizophagidae 2	Silvanidae 1
Phalacridae 1	Lathridiidae 2
Coccinellidae 6	Colydiidae 1
Anthicidae 1	Euglenidae 1
Oedemeridae 5	Meloidae 1
Mordellidae 1	Alleculidae 2
Tenebrionidae 1	Anobiidae 2
Bostrichidae 2	Scarabaeidae 10
Cerambycidae 9	Chrysomelidae 3
Bruchidae 4	Curculionidae 6
Platypodidae 2	Scolytidae 2

Two families of terrestrial carnivores, Carabidae and Staphylinidae, contain the highest numbers of beetle species found. Becker (1975) shows that the beetle fauna of islands tends to include a higher proportion of terrestrial carnivores than does the fauna of the adjacent mainland, and he postulates that carnivorous beetles, being more catholic in food requirements than most phytophagous species, are more easily able to become established on islands. On Little Cayman the percentage of terrestrial carnivorous species (counting only Cicindelidae, Carabidae, Staphylinidae, Cleridae and Coccinellidae) in the total number of phytophagous species (Buprestidae, Bostrichidae, Cerambycidae, Chrysomelidae, Bruchidae and Curculionidae only) plus terrestrial carnivores is 59. Corresponding figures given by Becker for Jamaica and Cuba are 66% and 41% respectively, whilst percentages for mainland Latin America range only between 21 and 37. All Carabids and Staphylinids found on Little Cayman are fully winged and all species were taken at light at night. The generally small size of the species is discussed above.

Another ecological group of beetles well-represented on Little Cayman comprises species that feed as larvae in wood and Cerambycidae are especially common. Beetle borings were noted in stems of *Avicennia*, *Conocarpus* and *Rhizophora*.

LEPIDOPTERA

Rhopalocera 23 species (details elsewhere)

Sphingidae 11	Noctuidae 45
Pericopidae 1	Syntomidae 4
Cossidae 1	Notodontidae 1
Agaristidae 1	Psychidae 1
Arctiidae 2	Geometridae 13
Pyralidae 15	'Microlepidoptera' 39
Family ? 16	

Family identifications of the moths, particularly Microlepidoptera, are as yet incomplete. There are probably many more species of the smaller moths than are listed here; many were caught in the light trap and have been badly damaged by the enormous numbers of ants and Corixids that were also captured. Proper investigation of the Microlepidoptera requires a specialist able to study them full-time.

A feature of the light trap collections was the abundance of small moths and of the larger Sphingidae. The intermediate size range appeared to be under-represented compared with samples from temperate Europe. Most of the Noctuidae are small, but a single specimen of the very large *Ascalapha odorata* (L.) was found dead in the house at Pirate's Point. Jordan (1940) lists five species of Sphingid from Little Cayman, all of which were taken again in 1975 together with six more species.

A number of species captured at outside electric lights were not represented in the light trap samples. Some of these were among the most colourful species found and included *Noropsis hieroglyphica* Cr. and *Xanthopastis timais* Cr. (Noctuidae).

Two brightly coloured day-flying species, *Composia fidelissima* H.-S. (Pericopidae) and *Utetheisa* species (Arctiidae), were frequently seen, and another Arctiid, *Calidota strigosa* Wlk., was captured both in the light trap and at the house lights.

DIPTERA

Psychodidae 1 species	Culicidae 6 species
Ceratopogonidae 4	Chironomidae 1
Sciaridae 3	Cecidomyiidae 3
Stratiomyidae 3	Tabanidae 2
Asilidae 1	Empididae 1
Therevidae 3	Bombyliidae 6
Dolichopodidae 8	Syrphidae 4
Otitidae 7	Tephritidae 5
Sepsidae 1	Lauxaniidae 4
Lonchaeidae 3	Ephydridae 3
Drosophilidae 1	Chloropidae 9
Agromyzidae 3	Clusiidae 1
Asteiidae 1	Hippoboscidae 1
Streblidae 1	Calliphoridae 2
Sarcophagidae 5	Tachinidae 9
Muscidae 3	

In terms of numbers of individuals, the Culicidae is probably the most abundant insect family on the island. *Aedes taeniorhynchus* swarmed everywhere except on the beaches and in the central forest. It was especially abundant in mangroves and at the edges of the brackish lagoons, and females would feed at any time of day, sometimes on being disturbed from vegetation. Numbers increased noticeably on 26th July, three days after torrential rain. No special effort was made to collect mosquitoes on Little Cayman. The Mosquito Research and Control Unit has recorded 17 species from Little Cayman and 29 species from neighbouring Cayman Brac (M.E.C. Giglioli, pers. comm.).

Of the higher flies, the only conspicuous species are the Bombyliids. These were to be seen hovering over vegetation or resting on the ground, and they seem to occupy the place filled by Syrphidae in temperate regions. Syrphids are rather scarce although a large species was frequently seen, especially in the interior of the island. A species of *Microdon* was taken in some numbers in the Malaise trap, but not observed elsewhere. A *Tabanus* flew around members of the party still wet after bathing in the sea but no other Diptera were conspicuous in the field and the numbers of species captured in the Malaise trap was somewhat unexpected. Chloropids, Dolichopodids and Tachinids were families represented by most species in the Malaise trap. Some of the species of Sarcophagidae and Tachinidae are grey and black flies with reddish apices to their abdomens, and they superficially resemble two Sphecid wasps with similar colouration.

Two species ectoparasitic on vertebrates were found. The Hippoboscid was collected in the Malaise trap; the Streblid was taken from a specimen of the bat *Macrotus waterhousii* Gray.

HYMENOPTERA

Braconidae 11 species	Ichneumonidae 3 species
Eulophidae 10	Elasmidae 3
Encyrtidae 1	Eupelmidae 1
Torymidae 5	Pteromalidae 4
Eurytomidae 2	Chalcididae 1
Cynipidae 2	Ceraphronidae 1
Scelionidae 3	Diapriidae 1
Bethylidae 1	Tiphiidae 1
Mutillidae 1	Rhopalosomatidae 1
Formicidae 19	Vespidae 1
Pompilidae 1	Sphecidae 8
Megachilidae 1	Colletidae 1
Halictidae 2	

Formicidae dominate the hymenopterous fauna on Little Cayman and are probably exceeded in numbers of individuals only by Culicidae and Corixidae. All of the wasp species found (Sphecidae, Pompilidae, Vespidae, Rhopalosomatidae, Mutillidae, Tiphiidae) were frequent to abundant, but the bees (Colletidae, Halictidae, Megachilidae) were scarce.

Two Bembicine (Sphecidae) wasps were especially numerous, the large *Stictia signata* (L.) and a smaller species. The former is widespread on the island and nests in colonies in sandy ground where dappled shade is provided by trees and shrubs. The smaller Bembicine species is found around the coast but not in the interior, again nesting in sandy ground but usually where there is no shade.

Of interest is the fact that five of the thirteen wasp species provision their nests with crickets which are well-represented on Little Cayman. These are the Rhopalosomatid, a generally rare group but one species of which was taken in some numbers at night in the Malaise trap and light trap, and four Sphecid species (two Larrini, two Chlorionini - *Sphex* sp. and *Prionyx* sp.). Of the remaining wasps, three prey upon Endopterygote larvae (the Vespid (Eumeninae), Mutillid and Tiphiid), three upon flies (the two Bembicini and one Oxybelini), and two upon spiders (the Pompilid and *Sceliphron jamaicense* (F.)).

The majority of species of parasitic Hymenoptera was obtained whilst sweep-netting on the disturbed ground of the old coastal plantations. In general they are rather scarce, an opinion reinforced by the small numbers caught in the Malaise trap. Only Braconidae and Eulophidae were represented by fairly large numbers of species, and their relatively high frequency is probably related to the many species of Microlepidoptera found on the island. Ichneumonidae are distinctly scarce and it is suggested that their niche on Little Cayman is occupied by the rather large number of Tachinid (Diptera) species.

No species of Symphyta was found.

Sweep-net samples

Eleven samples were collected with a sweep-net at various localities and on different dates. No attempt was made to standardise the amount of time spent in collecting each sample. Catches were small. In seven of the samples, Hemiptera Heteroptera are the most numerous group, in two Hemiptera Homoptera, and in one each Coleoptera and Hymenoptera Parasitica.

Janzen and Pond (1975) present data from standardised sweep-net samples of secondary vegetation in England and Michigan (U.S.A.). Their catches from Michigan are shown in table 14 together with the total Little Cayman catch. Although detailed comparisons between the two samples can not be made because of differences in collecting methods, it is likely that the more marked disparities reflect real differences between the two areas. Percentage representation of exopterygotes is greater in the Cayman samples; of endopterygote groups only Hymenoptera Aculeata and Coleoptera on Little Cayman slightly exceed their representation in the Michigan samples. Species of Diptera are markedly less well-represented in the Cayman samples. Janzen and Pond compare their temperate latitude samples with those collected in a comparable manner in Costa Rica, and draw attention to

Table 14. Percentage composition of sweep-net samples from Little Cayman compared with those reported by Janzen and Pond (1975) from Michigan, U.S.A.

	Little Cayman		Michigan	
	species	individuals	species	individuals
Orthoptera	5.4	5.3	1.6	0.8
Psocoptera	1.5	0.4	0	0
Hem. Heteroptera	14.6	36.0	7.5	12.1
Hem. Homoptera	16.9	10.6	13.2*	27.8
Thysanoptera	0.8	0.2	?	'many'
Neuroptera	0.8	0.6	0	0
Coleoptera	10.0	12.8	9.1	5.0
Mecoptera	0	0	0.3	0.1
Lepidoptera	3.1	1.0	4.7	0.8
Diptera	17.7	12.7	32.7	16.1
Hym. Aculeata	9.2	9.6	8.2	31.7
Hym. Parasitica	20.0	10.8	22.6	5.5
N	130	491	318	3963

* Excluding aphids

the preponderance of Orthoptera and other large exopterygotes in the tropical sample. They suggest as a reason the lack of seasonal constraints upon growth in the tropics. The smaller exopterygotes (Homoptera and Thysanoptera) are probably better represented in temperate regions, although aphids have been claimed (Janzen, 1973) to be a prominent feature of the insect fauna of Caribbean islands. This is certainly not the case on Little Cayman where the paucity of aphids resembles the situation in Costa Rica (Janzen & Pond, 1975).

Ants are relatively very abundant in the tropics; eleven of the twelve species of aculeate Hymenoptera in the sweep-net samples from Little Cayman are ants and they comprise all but one of the aculeate individuals swept. In Michigan only eleven of the twenty-six aculeate species collected by Janzen and Pond are ants.

The abundance of parasitic Hymenoptera in temperate latitudes, compared with their status in the tropics, is often remarked upon. Although it was my impression that Parasitica were scarce on Little

Cayman, they did feature quite prominently in the sweep-net collections. It is possible, however, that there was some sampling bias towards their collection.

The estimated species diversity of the Little Cayman samples is less than that of the Michigan samples. Margalef's index of species diversity is 20.8 for Little Cayman and 38.3 for Michigan, although the Michigan value would probably be lower if aphids and thrips could be included in its calculation. Nevertheless, the low value for Little Cayman is rather surprising and tends to contradict the general rule that the diversity of tropical faunas is greater than that of temperate regions.

Malaise trap samples

The Malaise trap was operated for eight non-consecutive 24-hour periods and for five additional daytime (6.00 - 18.00 hours) periods. Total catches obtained are given in table 15 and, for comparison, data presented by Matthews & Matthews (1971) for Surinam and Kansas. These latter figures can be compared to, and be seen to agree closely with, the 24-hour catches percentage representation of orders by individuals on Little Cayman. The Kansas sample (Marston, 1965) was obtained over a length of time similar to that for the Little Cayman sample, and it is interesting that the total numbers of insects caught at the two places are also fairly close.

Diptera are typically the dominant order in Malaise trap samples, with Hymenoptera generally occupying the second position (Matthews & Matthews, 1971). In the Little Cayman samples Diptera are the most abundant order, but second place is shared by Hemiptera and Hymenoptera, reinforcing the view suggested by the sweep-net samples that certain Hemiptera are particularly well-represented on Little Cayman. The Surinam sample includes few Hemiptera.

From the daytime catch of 900 insects in 60 hours it can be estimated that the 24-hour catches of 2149 insects are composed of approximately twice as many insects caught during daylight than at night. Differences in percentage representation between the 12-hour and 24-hour catches concern especially Diptera, with Nematocera, particularly Culicidae, being more active at night and other flies being caught mostly during daytime. Aculeate Hymenoptera are also relatively most frequent in the daytime catch, but the larger percentages of Lepidoptera, Coleoptera and Orthoptera in the 24-hour catches indicate that they, like the Nematocera, are predominantly nocturnally active.

On 20th July the Malaise trap was emptied at 6.00 a.m. and thence every two hours until 6.00 p.m. The greatest number of Diptera was obtained in the pre-noon period with a depression in numbers during mid-afternoon. This parallels the flying activity of butterflies discussed elsewhere. Conversely, Hymenoptera attain maximum activity in mid-afternoon, usually the hottest time of day.

Table 15. Percentage composition of Malaise trap samples from Little Cayman, and from Surinam and Kansas (Matthews & Matthews, 1971).

	Little Cayman				Surinam	Kansas
	24 hr. periods		12 hr. (day) periods			
	spp.	inds.	spp.	inds.	individuals	
Odonata	0.6	0.1	0	0	<0.1	0.1
Orthoptera	2.9	0.8	1.0	0.1	1.7	0.5
Dermaptera	0.6	0.1	0	0	0	0
Psocoptera	0.6	<0.1	1.0	0.1	0.1	0
Heteroptera	1.8	0.1	2.9	0.4	2.3	6.8
Homoptera	7.6	12.2	6.7	6.0		
Neuroptera	0.6	0.1	0	0	0.4	0.1
Coleoptera	17.6	4.8	9.6	1.3	4.6	5.6
Dipt. Nematocera	5.9	35.9	3.8	3.2	58.0	66.3
Diptera-other	30.6	24.4	48.1	68.6		
Hym. Parasitica	4.7	0.5	3.8	0.6	19.0	12.3
Hym. Aculeata	10.0	11.8	13.5	17.1		
Lepidoptera	16.5	9.0	9.6	2.6	14.0	4.8
(Collembola)	0	0	0	0	0	3.5
N	170	2149	104	900	90182	2927

Margalef's index of species diversity is 22.0 for the 24-hour samples and 15.1 for the daytime samples.

Mercury vapour light trap samples (Macrolepidoptera)

Data on the numbers of species and individuals of Macrolepidoptera caught in the same type of trap as that used on Little Cayman are available for an English site (Woodchester Park, Gloucestershire). On Little Cayman, 457 individuals of Macrolepidoptera belonging to 66 species were caught at Pirate's Point over a period of ten nights (37 hours). The species diversity values are 10.6 (Margalef) and 20±3 (Williams). These are greater than those obtaining in any year at Woodchester Park where traps were operated in periods during June or July (table 16). The English samples resulted from all-night collections, whereas the Little Cayman samples were biased towards moths flying in the early part of the night. This bias would probably depress the species diversity indices for Little Cayman and

Table 16. Comparison of light trap catches of Macrolepidoptera on Little Cayman and at Woodchester Park, Gloucestershire, England.

	Numbers of			Estimates of species diversity	
	spp.	inds.	moths/trap/hr.	Williams	Margalef
Woodchester 1968	73	2783	107	14±5	9.1
" 1969	72	3368	37	14±5	8.7
" 1970	57	3314	61	9.5±5	6.9
" 1971	54	605	13	14±7.5	8.3
Little Cayman 1975	66	457	12	20±3	10.6

the figures may be taken to indicate a truly higher diversity of Macrolepidoptera on Little Cayman. On Little Cayman moths were captured at the low rate of only twelve an hour, and this compares unfavourably with the rate of capture at the English site, although comparisons of these figures are of doubtful value because so many variable factors are involved.

The single night's trapping in the central forest south of Sparrowhawk Hill yielded 90 Macrolepidoptera of 25 species. This is too small a sample to give a reliable diversity estimate, but it is interesting that eight of the species were not caught at Pirate's Point. These are species belonging to families other than Sphingidae and Noctuidae; all Sphingids and Noctuids caught in the central forest were found also at Pirates' Point, perhaps a demonstration of the strong-flying, dispersive flight-activity in these two families.

Comparison of collecting methods

The numbers of species caught by general collecting (as defined on page 97), the Malaise trap and the light trap are shown in table 17. Most species were caught by general collecting, fewest in the Malaise trap. The Malaise trap, however, caught considerably more Diptera than were taken by either of the other two methods, whilst most species of both Coleoptera and Lepidoptera were captured in the light trap. General collecting yielded most species of the other groups. The high numbers of Coleoptera and Hemiptera taken in the light trap are noteworthy and may be related to a high incidence of nocturnal activity in these orders. Hemiptera, at least, are generally considered as predominantly diurnal insects. Malaise trap samples also suggest that many insects on Little Cayman are nocturnal. The obvious explanation is the high density of day-active lizards on the island.

Since the Malaise trap was operated only at Pirates' Point, and the light trap mostly at this site, it is not surprising that seventy-four percent of species found on Little Cayman were taken at Pirate's Point. Forty-nine percent were found elsewhere on the island, twenty-three percent being captured at both Pirate's Point and elsewhere.

Discussion

The size of the insect fauna of Little Cayman is probably in accord with the area of the island. Brackish lagoons occupy a considerable part of the island and insects able to develop in their waters comprise a major element in the entomofauna. Culicidae, Corixidae and Odonata may be cited in this respect. Of terrestrial groups, attention has been drawn already to the abundance of most groups of exopterygote insects. Orthoptera tended to occur in the undisturbed interior of the island, but the majority of Hemiptera were found around the coast and many may well owe their presence on Little Cayman to the affect man has had on the coastal vegetation. Many endopterygote species also were found only on the disturbed ground of the coastal strip; this is true especially for parasitic Hymenoptera. Coleoptera and Diptera were widespread but, although quite rich in species and families, with the exception of mosquitoes seemingly in relatively low numbers. This apparently high diversity is expected in a tropical region although it can be quantitatively shown only for Macrolepidoptera. Species diversity in Malaise trap and sweep-net samples is not high.

Two biotic features of Little Cayman probably have an unusually strong influence on the entomofauna. These are the abundance of land crabs and arboreal lizards, the possible effects of which are discussed above.

On specific identifications so far made, it appears that Little Cayman shares much of its insect fauna with Cuba and Jamaica. The seemingly low incidence of endemism is probably a product of a relatively short sea distance (about 200 km.) separating Little Cayman from Cuba and Jamaica, together with a high incidence of very strong winds in the region. Only a very few flightless species were found.

Three areas on Little Cayman are of special interest in supporting species not found elsewhere and in having an apparently unmodified flora. These areas are the central forest south of Sparrowhawk Hill, the *Sesuvium* marsh at the eastern end of the island, and the interior scrub adjacent to the north shore track about one kilometre north of Blossom Village. It is in these areas that endemic species are most likely to occur.

Table 17. Numbers of species caught by different methods on Little Cayman.

Figures in parentheses show the numbers of species caught only by the method indicated, and the percentages are of the number of species caught by each method out of the total number of species found on the island belonging to the group.

	General collecting		Malaise trap		Light trap	
	species	%	species	%	species	%
Apterygota, Exopterygota (excl. Hemiptera)	36(30)	85.7	9(3)	21.4	4(3)	9.5
Heteroptera	34(21)	77.3	6(2)	13.6	17(8)	38.6
Homoptera	23(16)	62.2	14(7)	37.8	10(5)	27.0
Neuroptera	7(3)	87.5	1(0)	12.5	5(1)	62.5
Coleoptera	49(25)	41.5	34(13)	28.8	69(52)	58.5
Lepidoptera	82(48)	47.4	21(9)	12.1	114(78)	65.9
Diptera	36(18)	34.3	78(54)	74.3	20(6)	19.0
Hymenoptera	57(39)	67.1	33(17)	38.8	19(10)	22.4
Totals	324(200)	52.9	196(105)	32.0	258(163)	42.2

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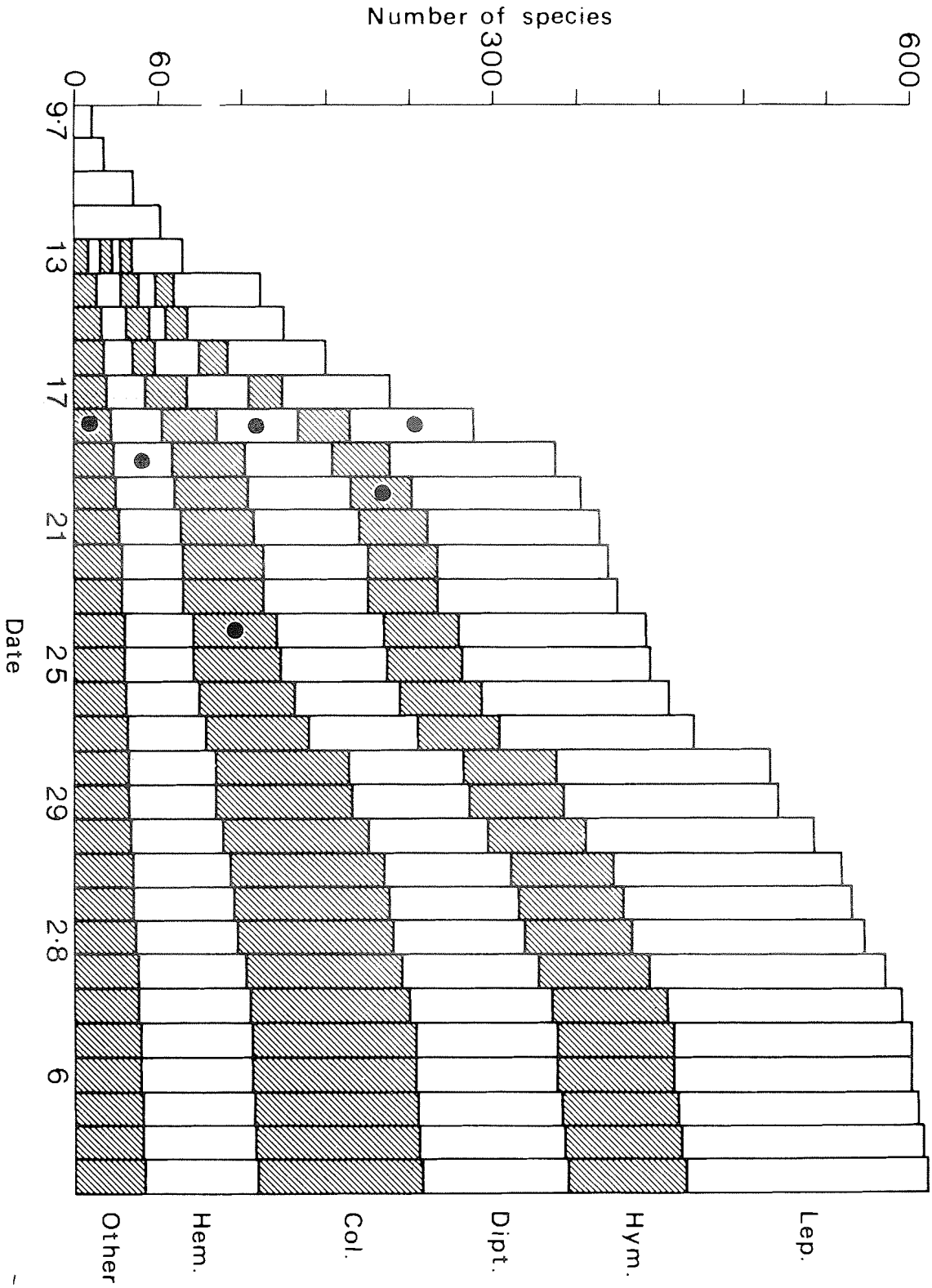

Figure 24. The progression of insect species recorded on Little Cayman by dates. Full circles signify dates on which half the final total of species in each group were found. The light trap was first operated on 14 July, the Malaise trap on 16 July, and the main central forest collections were made on 28 July