Climatic Conditions from July 1939 to July 1940

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The accompanying table is compiled from readings obtained by Mr. Tan Hock Lim, chemist to the Christmas Island Phosphate Company. It indicates the meteorological conditions under which the present insect collections were made. It covers the period from July, 1939, to June, 1940. During this period the temperature followed roughly its usual rhythm, but the rainfall and humidity were abnormal, and for this reason I have included, in brackets under the monthly figures, the average of the readings for the previous ten years. From these it will be seen that there is normally a wet season from November (with December drier) to June, and a dry season from July to October. On the average April, which recorded as many as 40·5 inches in 1935, and as little as 1·45 in. in 1925, is the wettest month, but the rainfall is very variable. Nine of the twelve months have featured, at least once, as the wettest month of the year since 1900. The seasons are not clear-cut, and there is usually a few inches of rain, mostly at night, throughout the supposed dry weather and short clear, sunny periods occur in all months of the wet season. In a dry year like 1940 these latter may be of several weeks duration.

The longest of these dry spells nearly always occurs in December, the warmest month (mean maximum temperature 89·5°, mean minimum 75·8°), soon after the beginning of the rains. In 1939, after a dryish November, which allowed the red crabs to begin their migration to the sea, and then caught the females before they had finished their descent, there was a long warm dry interval covering most of December. This, as usual, brought out large numbers of Lepidoptera, most of the island forms occuring during the wet season and appearing suddenly, in waves lasting a few days or weeks, in the dry periods. The commonest and most conspicuous forms emerging at this time are *Mimeusemia econia, Brana calopasa, Porthesia pulversa* and *Cosmoclostis quadriquadra*. Two other species, *Endotricha listeri* and *Zinckenia nigerrimalis*, the most abundant moths on the island, also appear in December, and remain very plentiful until a little beyond the end of the rainy season. The same weather, hot and dry with the ground damp, inspires the large grasshopper, *Locusta migratorioides*, to great activity, and by early January all bushes and plants are covered with small larvæ. Three or four kinds of tipulid, several beetles and the common mosquito, *Aëdes* (*Stegomyia*) *aegypti*, also appear. The latter

CHRISTMAS ISLAND—METEOROLOGICAL READINGS, JULY, 1939—JUNE, 1940

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
Total Rainfall in inches	8·63 (3·74)	6·74 (2·56)	1·77 (1·81)	1·58 (1·14)	2·03 (1·36)	1·26 (5·77)	8·19 (7·64)	1·29 (11·1)	7·20 (10·7)	11·91 (14·3)	6·42 (9·64)	0·93 (8·01)
Days of Rain	24 (16)	19 (11)	9 (8)	11 (7)	9 (11)	5 (11)	18 (15)	7 (19)	16 (21)	24 (19)	23 (19)	11 (17)
Relative Humidity (%)	79·5 (81·1)	77·0 (78·0)	72·8 (75·2)	73·8 (74·3)	74·7 (76·7)	64·4 (77·8)	76·0 (79·4)	73·3 (83·8)	76·3 (84·2)	79·9 (85·9)	80·2 (85·3)	74·2 (83·8)
Mean Maximum Temperature ..	82·1	82·8	83·4	84·7	86·8	89·5	87·5	88·3	88·7	87·1	85·9	85·4
Mean Minimum Temperature ..	72·9	72·2	72·9	74·0	75·7	75·8	74·8	75·0	75·9	76·4	75·9	74·9

The figures in brackets below the first three items represent the average of the readings for the years 1930 to 1939.

emerges in large numbers in the days following the first wet spell and, as the species is diurnal, it immediately becomes impossible for one to stand still in the jungle for more than a minute or two. During the height of the dry season this pest almost disappears. On the negative side, the definite beginning of the wetter weather results in a reduction in the number of the flying hymenoptera. Several of the larger species, like *Odynerus polyphemus* and the two *Megachiles*, are commoner in the dry season, while the smaller forms do not appear until later. One exception to this is the ichneumon *Ophion flavocephalus*, which becomes most plentiful about a month after the start of the rains.

January should be a wet month, and from then on until May or June the weather is usually bad. In addition to the rain this is the season of north and north-easterly gales, the wind shifting round from its usual quarter in the south-east for days, or even weeks, at a time. This change does not have much effect on the insect fauna of the island, except that on the north coast it is generally heralded by all the individuals of *Brana calopasa* in the neighbourhood collecting in a large swarm, covering two or three square feet, on the trunk of a *Gyrocarpus asiaticus* or the fronds of a coconut palm. The northerly winds also bring considerable numbers of dragonflies, appearing a day or two after they have ceased, and remaining very plentiful over all the open spaces for several week.[1] There are no suitable breeding places and they are not resident on the island.

In the specific period under consideration January was wet, as it should be, but February turned out unexpectedly dry. It was, in fact, so dry that the insect fauna came to resemble that of November. The number of moths taken at light dropped appreciably and *Ophion flavocephalus* and *Nacaduba aluta* vanished, but *Eriboea pyrrhus andrewsi* became plentiful, and *Cephonodes hylas, Precis villida villida* and even *Danaida chrysippus*, (the most conspicuous dry weather forms) appeared. The hymenoptera swung back four months, and the diptera became reduced to species of Muscidae and allied families.

With March the rainy season reasserted itself, and from then until the end of the period, though the fall was below normal, the sequence of events followed its usual course. The nights as well as the days were warm (the mean minimum temperature for April was 76·4°), and the air was damp. There were a few periods of heavy rain, and irregular light showers were frequent. Between the middle of March and the end of May there were fifty-eight wet days. The heterocera, especially the smaller

1. I noticed the same phenomenon on the Cocos-Keeling Islands, during my stay there in 1941. The insects are mostly *Pantala flavescens* (F.), and, in smaller numbers, *Anax guttatus* (Burm.). *Trithemis trivialis* (Ramb.) was also recorded by Andrews on Christmas Island.

moths, became very common. *Zinckenia nigerrimalis* was so plentiful that on some nights over fifty were attracted to a single light. Hemiptera, of all kinds, also became abundant, both in the long grass and low plants along the clearings and at light, and so did certain of the orthoptera, the smaller hymenoptera, including winged forms of the Formicidae, a rich green lace-wing fly, *Chrysopa esakii*, and several Coccinellidae. A number of unusual forms appeared among the diptera, mostly in the dry spells, including species of Dolichopodidae and Syrphidae.

Towards June the numbers dropped a little as the dry spells became longer again, and the days on which rain fell sank to one in three. Among the lepidoptera a fresh range of species arrived, characterised by *Mocis frugalis, Marasmia venilialis, Eucosma* sp., *Pyroderces* sp., and *Acrocercops* sp. The coleoptera also became plentiful, as at the beginning of the wet season, including *Sessinia andrewsi*, which was abundant. Then with the end of June and July the dry weather established itself fully, and the greater part of the insect fauna disappeared. The climate from the close of the latter month on through September is about at its best—reminiscent of the Scilly Isles in August, with clear rainless days, a slight cooling wind and a glorious, clean, blue sky—but it is bad for collecting. Some of the diptera (a species of Bombyliidae, the Asilids and a number of Muscidae), the larger of the hymenoptera, a few of the orthoptera and about three dozen of the lepidoptera alone remained of the visible forms. The freely flying coleoptera became reduced to some fifteen species, of which about one-third were Lamiidae.