

STUDIES ON THE FAUNA OF SURINAME  
AND OTHER GUYANAS: No. 39.

INSECT COLLECTING IN SURINAME WITH  
THE HELP OF "MALAISE" TRAPS

by

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In April 1963, Dr. J. VAN DER VECHT, professor of Systematic Zoology at the University of Leiden, introduced two "malaise" traps during his survey of the Hymenoptera fauna in Suriname. These were simple, man's height, tent-like traps with one partition wall in the middle against which insects flying in from two sides were caught. At the top of the tent the trapped insects were killed in a bottle with calcium cyanide. The two openings of the trap were 60 cm high and 130–150 cm wide.

As in the experiments of VAN DER VECHT (1939) in Indonesia, this kind of trap proved to be useful in Suriname too.<sup>1)</sup> However, successful trapping was highly dependent on the place in which the traps operated. On an open lawn in the outskirts of Paramaribo, the results were much less than in a swampy forest nearby. The same poverty was observed in the open grass savanna near the seacoast at Matapica and at Coronie compared with the catches from the shrub vegetation on the savanna near Zanderij. In general the best results could be attained in thick vegetation.

During the Zoological Congress in Washington D.C., in August 1963, and thanks to the kindness of Dr. & Mrs. HENRY TOWNES in Ann Arbor, Michigan, I had an opportunity to be introduced to

<sup>1)</sup> In 1962 J. L. & M. K. GRESSITT described three improved versions of the malaise trap with some notes on the results in Malaya, Vietnam, Philippines, Borneo, New Guinea, Papua, Australia and Tahiti.

another type of malaise trap, used by these famous Hymenopterologists in their study on the ichneumonids. This type is described by TOWNES (1962) and is larger than the model used by VAN DER VECHT, having two perpendicular partition walls and the four sides open. The openings of this trap were about 1.20 m high and 2 m wide. In the original type there was on top of the tent-like roof a funnel of fine wire, turning back and down, ending in a metal ring, into which a killing bottle could be screwed.

At the end of July 1963, after Prof. VAN DER VECHT left Suriname, two malaise traps of the model used by him were copied and after my return from the U.S.A. in September of the same year one somewhat simplified model of the trap as used by Dr. TOWNES was constructed. The funnel of wire was replaced by a box of plywood closed on top and at bottom with a pane of glass, the bottom one with a hole of  $5 \times 5$  cm in the centre as an entrance to the killing space. This box could be removed and opened on top to take out the killed insects. Calcium cyanide was used as the killing agent.

Only the two smaller traps were used from September to the end of 1963. From January to December 1964 the bigger one too was operated. We tried to collect as many Hymenoptera as possible in different habitats, but soon it became evident that from a faunistical point of view, the insects of other orders taken in these traps were as important as the Hymenoptera. For this reason all insects collected were sorted out to orders and sometimes to families. In this manner the composition and the number of insects in the catches was found for the different localities. The results of these experiments give an idea of what can be taken in Suriname with the aid of these insect traps.

I am indebted to Prof. Dr. J. VAN DER VECHT for his suggestions and reading the ms, to Mr. R. HENGEVELD (Leiden) for making the curves, to Dr. & Mrs. HENRY TOWNES, Ann Arbor, Michigan, for their critical remarks and the correction of the English text.

## THE LOCALITIES

Sampling from the seacoast to the interior was carried out, to acquire some information on the insect population in the different environments. It was not possible to work in a logic order, but this

probably had no influence on the results, as in general more differences in quantities than in qualities existed.

Traps were in operation at the following places:

- (a) In *Avicennia* forest along the seacoast of Kwatta, N of Paramaribo, with a dense undergrowth of shrubs (*Cordia*) and ferns (*Acrostichum*) on heavy clay soil.
- (b) On a shellridge at Charlesburg near Paramaribo, covered with a light forest mixed with *Astrocaryum* palms.
- (c) Swamp forest in clayland of an uncleared part of Plantation Ma Retraite, N of Paramaribo.
- (d) Abandoned plantation near Domburg, partly replanted with citrus and mostly covered with secondary vegetation of shrubs and weeds, on mixed sandy-clay ground.
- (e) Old sandy ridges at Sumatra-weg Lelydorp, covered with savanna forest and partly occupied by shifting grounds.
- (f) Republiek along Coropina creek, in old secondary forest on loamy soil.
- (g) At Zanderij in savanna forest, near a small creek, on sandy soil.
- (h) At Zanderij, on dry sand savanna between shrubs.
- (i) Near Phedra, in rainforest in hilly area with lateritic soil, at the N frontier of the interior.

For the following the localities, the time during which the traps were in operation and the number of traps are indicated:

1963	Republiek, in forest and at forest trail	
	24 September – 10 November	2 smaller traps
	Domburg, in old plantation	
	24 November – 27 December	2 smaller traps
1964	Charlesburg, in light forest on shell ridge	
	11–23 January	1 large trap
	Plantation Ma Retraite, in swamp forest	
	2 January – 19 March	2 smaller traps
	Kwatta, seacoast in <i>Avicennia</i> forest	
	28 January – 16 March	1 large trap
	Lelydorp, sand ridges in savanna forest	
	23 March – 2 June	1 large trap 2 smaller traps
	Zanderij, savanna forest	
	11 June – 21 July	1 large trap 2 smaller traps
	Zanderij, sand savanna between shrubs	
	21 July – 6 October	1 large trap 2 smaller traps
	Phedra, rainforest in hilly interior	
	13 October – 28 December	1 large trap 2 smaller traps

Dependent on the accessibility of the locality, the traps were emptied every two days, twice a week or once a week. The collected insects were sorted out the same or the next day into orders and some

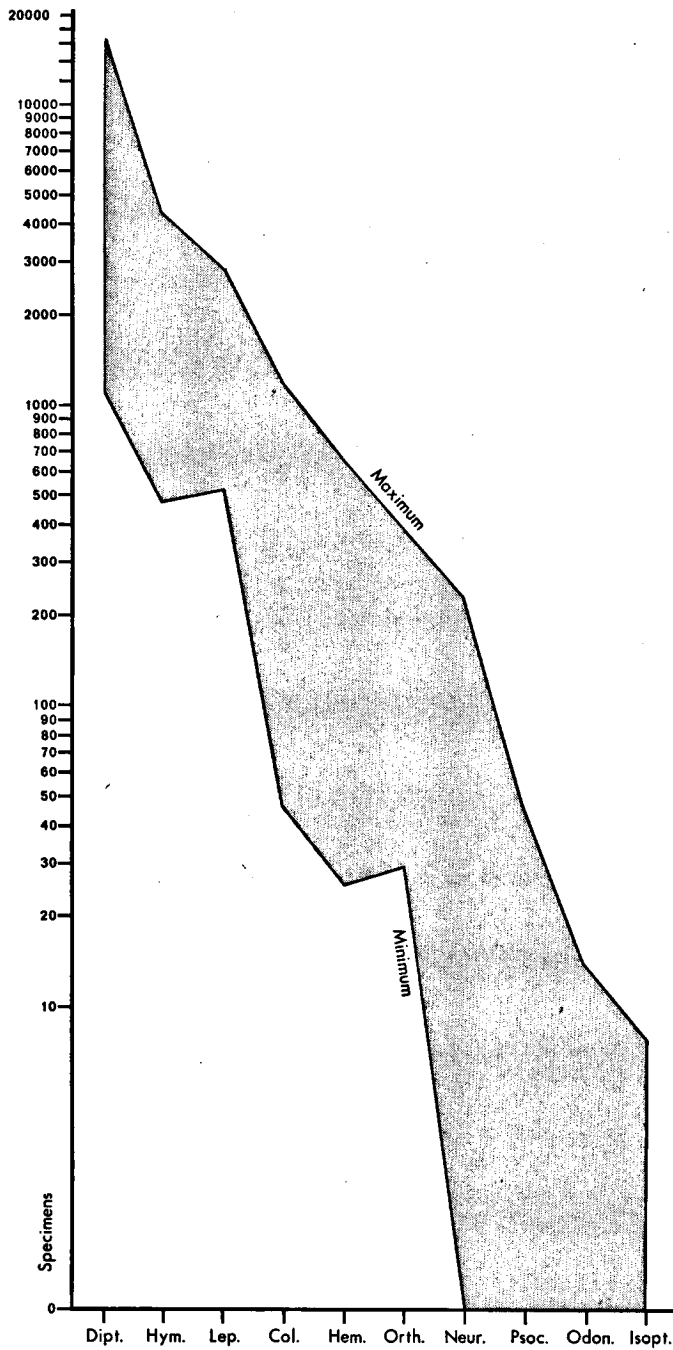


Fig. 102. Logarithmic curve of specimens of insects taken in "malaise"-traps in nine localities in Suriname during September 1963 to December 1964.

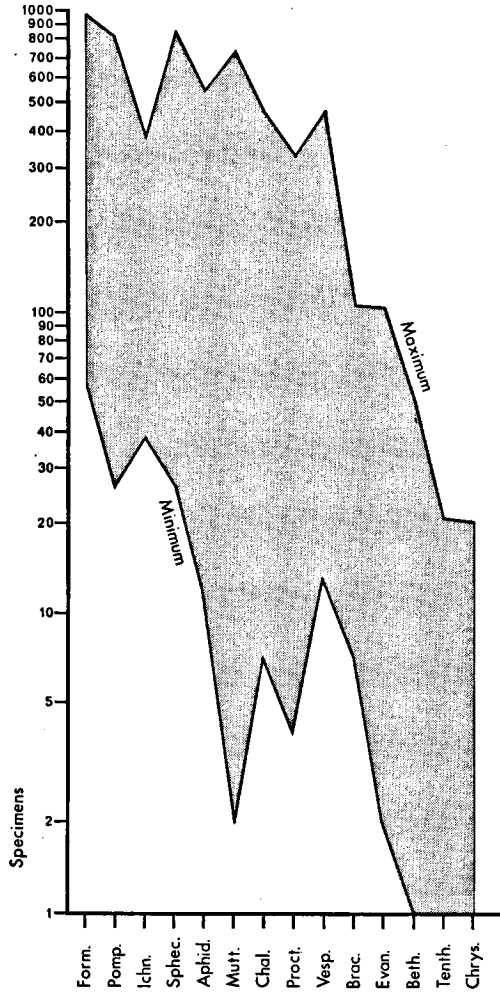


Fig. 103. Logarithmic curve of Hymenoptera families taken in "malaise" traps in nine localities in Suriname during September 1963 to December 1964. - Mutill. means Mutillidae plus Scoliidae and Tiphidae; Proct. means Proctotrupidae and other small parasitic forms.

TABLE 5  
Number of insects as trapped in nine localities,  
arranged according to frequency.

Localities	Dipt.	Hym.	Lep.	Col.	Hem.	Orthop.	Neur.	Psoc.	Odon.	Isop.
Kwatta	17351	3254	2895	1182	676	320	66	5	—	5
Charlesburg	1061	493	733	328	252	31	6	—	1	—
Ma Retraite	5341	2367	1304	463	471	138	—	46	2	—
Domburg	1490	509	1232	48	26	30	—	—	6	—
Lelydorp	6138	2252	2611	353	45	184	48	—	14	—
Republiek	5376	1253	826	437	153	392	—	—	13	—
Zanderij for.	4844	754	540	364	168	50	3	23	1	8
Zanderij sav.	6821	4378	1287	355	158	185	240	30	2	—
Phedra	3945	1745	995	658	196	198	3	4	—	—
<b>Totals:</b>	<b>52367</b>	<b>17005</b>	<b>12423</b>	<b>4188</b>	<b>2145</b>	<b>1528</b>	<b>366</b>	<b>108</b>	<b>39</b>	<b>13</b>
90.182	58%	19%	14%	4.6%	2.3%	1.7%	.04%	.01%	.04%	.01%

TABLE 6  
Number of Hymenoptera as trapped in nine localities,  
arranged according to frequency.

Localities	Form.	Pomp.	Ichn.	Sphec.	Apid.	Mutt.	Chal.	Proct.	Vesp.	Brac.	Evan.	Beth.	Tenth.	Chrys.
Kwatta	325	298	383	88	551	87	463	338	471	104	104	28	—	14
Charlesburg	58	26	203	26	12	8	44	84	13	—	8	—	9	2
Ma Retraite	969	194	353	53	85	56	241	244	96	43	11	—	12	10
Domburg	198	19	140	57	26	2	15	—	48	—	2	—	2	—
Lelydorp	734	275	160	212	83	194	156	174	46	75	67	51	11	20
Republiek	117	164	186	128	87	66	46	4	36	7	20	—	1	3
Zanderij for.	351	62	38	51	59	38	7	66	19	40	7	1	13	1
Zanderij sav.	974	809	44	862	399	755	139	48	157	99	46	39	1	6
Phedra	553	169	159	88	75	80	96	244	110	98	47	—	21	5
<b>Totals</b>	<b>4279</b>	<b>2016</b>	<b>1666</b>	<b>1565</b>	<b>1377</b>	<b>1286</b>	<b>1207</b>	<b>1202</b>	<b>996</b>	<b>466</b>	<b>312</b>	<b>119</b>	<b>70</b>	<b>61</b>

groups (Hymenoptera) into families, and counted. Of the Diptera, the Tabanidae and the Syrphidae were separated, of the Lepidoptera only a division into Rhopalocera and others was made, whereas in the Orthoptera those with short and with long antennae were distinguished.

#### THE CATCHES

From September 1963 to December 1964 the traps gave a supply of about 90.000 insects. In Table 5 the numbers of the different orders are listed according to the places in which they were taken. The data from the nine localities are not comparable, because the time of operation varies, the number of traps changed from one to three, the habitats are different and the seasons were not the same. In spite of these discrepancies these provisional experiments show that the traps select at every station a more or less constant percentage of the insect population present. Always a special pattern in the catches appears, that can be traced back to the mode of trapping. The "malaise" trap works as a screen, day and night, in the field close to the ground, where many insects fly around, taking mostly the fast flying species and a number of fluttering forms, that are more locally concentrated.

In Suriname this pattern shows the following characteristics:

Diptera	58%
Hymenoptera	19%
Lepidoptera	14%
Coleoptera	4.6%
Hemiptera	2.3%
Orthoptera	1.7%

The numbers in the other orders are eliminated, being less than one percent. The percentages of the orders varies considerably in the different localities.

Of the following groups the maximum in percentages was found at the following places:

Orthoptera	4% (Republiek)
Hemiptera	9% (Charlesburg)
Neuroptera	2% (Zanderij savanna)

Lepidoptera	37% (Domburg)
Diptera	72% (Zanderij forest)
Hymenoptera	33% (Zanderij savanna)
Coleoptera	11% (Charlesburg)

The minimum in percentages was found at the following places:

Orthoptera	1% (Kwatta, Charlesburg, Ma Retraite, Domburg, Zanderij forest)
Hemiptera	0.5% (Lelydorp)
Lepidoptera	8% (Zanderij forest)
Diptera	36% (Charlesburg)
Hymenoptera	11% (Zanderij forest)
Coleoptera	1% (Domburg)

These differences are probably the result of many factors, of which we do not know much at present.

A few peculiarities should be mentioned: the Orthopteroidea found in the traps show a trapping at night; they are represented mostly by Blattidae, Gryllidae, a few Acrididae and Locustidae and very few Mantidae, but no Phasmidae. Odonata are trapped by accident; they belong to Zygoptera, Gomphidae and Libellulidae, all dayflying species. VAN DER VECHT once trapped a species of *Gynacantha*, known to fly at twilight. At some places a few Psocoptera were found among the killed insects and these were probably active at night. This was surely the case with a number of Neuroptera belonging to Myrmeleonidae, Ascalaphidae, Chrysopidae and Memerobiidae, which appeared locally abundant (Kwatta Hemerob., Zanderij Myrm.). Of the Hemiptera the number of Heteroptera was much less than the number of Homoptera (in ratio 1: 9). In the Lepidoptera the number of moths and micro's was 10 times greater than the Rhopalocera. Most of the Coleoptera found in the traps belong to smaller species of Staphylinidae, Coccinellidae and Curculionidae which may fly at night.

The Hymenoptera and Diptera however are dayfliers with the exception of some wasps (*Apoica* sp.), some ichneumonids and chalcidids and the Nematocera of the Diptera. In sequence of abundance, the following families of Hymenoptera were found: Formicidae (winged and apterous forms), Pompilidae, Ichneumonidae, Sphecidae, Proctotrupidae and other smaller parasites, Apidae, Chalcididae, Vespidae and the parasitic groups Mutillidae, Scoliidae, Tiphiidae, then Braconidae, Evaniidae and last Tenthredinidae, Chrysididae and Bethyidae. Bees and wasps (Vespidae) were best represented along the seacoast (Kwatta) and on the open savanna (Zanderij), Sphecidae appeared most frequently in half open areas more inland (Lelydorp, Republiek, Zanderij). Pompilidae and Formicidae occurred everywhere but seem to prefer open savannah, while the parasitic forms like Ichneumonidae, Chalcididae, Braconidae etc. and the few Tenthredinidae are mostly found in the forest.

In the Diptera the ratio of Nematocera to Brachycera and Cyclorhapha was 1: 6; of the flies 1/5 belonged to the tabanids. In the swamp forest of Plantation Ma



Retraite, the Tabanidae outnumbered the other flies  $1\frac{1}{2}$  times. As the Diptera form half of the total number of insects caught in the traps, the tabanids were a dominant group. It is planned to give them special attention in a separate publication, the more so as the identification of the material found in the "malaise" traps is already kindly performed by Dr. G. B. FAIRCHILD, Canal Zone of Panama. The Syrphidae have been studied and are published by P. H. VAN DOESBURG, Sr., Baarn, in "Studies Fauna Suriname" vol. IX, 1966. Of the other groups, specialists are invited to study the available material.

#### SUMMARY

- (1) Faunistic insect collecting was done in Suriname from September 1963 to December 1964 with two types of "malaise" traps.
- (2) Trapping was practised on nine localities in different habitats, operating from the seacoast near Paramaribo via the older coastal belt and the savanna region into the rainforest of the hilly interior.
- (3) During this operation, a total of about 90,000 insects was collected. There was but little variation in the proportions of the different orders of insects taken in the nine localities. This is explained by the mode of sampling.
- (4) The catches show the following relative abundance: Diptera  $1/2$ , Hymenoptera  $1/5$ , Lepidoptera  $1/7$ , Coleoptera  $1/20$ , Hemiptera  $1/40$ , Orthoptera  $1/50$ , others less than one percent.
- (5) The variation within the orders was: Diptera 36–72%, Hymenoptera 11–33%, Lepidoptera 8–37%, Coleoptera 1–11%, Hemiptera  $1/2$ –9% and Orthoptera 1–4%.
- (6) Most of the collected insects belong to dayflies, i.e.: Diptera, most of the Hymenoptera (Aculeata), Lepidoptera Rhopalocera and Odonata. Other species collected are active at night. The moths and micro's were represented 10 times as many as the Rhopalocera, but the Nematocera formed only  $1/6$  of the Diptera. Among the flies  $1/5$  belonged to the Tabanidae.

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PLATE IIa. - "Malaise" trap (smaller type) in rainforest near Phedra, Suriname.



IIb. - "Malaise" trap (large type) in rainforest near Phedra, Suriname.