

Studies on Phototropism in Rhyparochrominae (Lygaeidae : Heteroptera) from Southern India*

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Nearly two-thirds of the common Rhyparochrominae from southern India are reported to be attracted towards light. For the first time species of Drymini [*Appolonius cincticornis* (Walk.) and *A. picturatus* Dist.] and Lethaeini (*Lethaeus indicus* Dall. and *Lethaeus* sp.) are reported to be phototropic. Such phototropism is stronger in females than in males, and further it is maximum during monsoon season and minimum in summer. The seasonal influence on light attraction is highly significant.

Key Words : Phototropism, Rhyparochrominae, Lygaeidae Heteroptera

Introduction

The information on the ecology or developmental stages of Lygaeidae is not enough except that of economically important species (Miller 1956). The Rhyparochrominae are still poorly known, especially in tropical and sub-tropical areas (Slater 1964). Several nocturnal species of Rhyparochrominae mostly from the temperate regions of N. America and Europe are already known to be attracted towards light (Thangavelu 1979). These reports lack any information on the periodicity of attraction, seasonal variations and relative attraction of different sexes and species towards light. Therefore, a detailed investigation on photo-

tropism in Indian Rhyparochrominae was undertaken.

Materials and Methods

A locally fabricated Robinson-type light trap (provided with a 125 watt mercury vapour lamp), located at Coimbatore (11°N, 77°E), in an wasteland (supporting many naturally-growing herbs and shrubs) was used. The experiment was conducted for two years (September 1977-August, 1979). Light trapping covered local time between 18.00 and 06.00 hr everyday. Extreme care was taken to keep the light trap working daily, except when there was power failure. To kill the

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insects 2 ml of Dichlorvos 76% EC (Nuvan), a fumigant insecticide, was carefully smeared inside at the bottom of the collecting drum. The insect collection was removed to the laboratory for sorting and identification on the following day.

The daily insect catch in the light trap varied from 9 to 800 in different months and, hence, arcsine transformation was used to carry out the analysis of variance. (Snedecor & Cochran 1977). Analysis of variance was used to test the significance.

Results and Discussion

The rhyparochromines are mostly found in the litter zone of the ground layer

and, generally, do not fly, rarely they make 'short-flights' during day time but many of these species readily fly towards the source of light in the night. Thangavelu (1979) recorded thirty species of *Rhyparochrominae* to be commonly occurring in southern India (latitude east-west 76°—86° and south-north 8°—20°), of these nearly twenty species are found to be phototropic (table 1). Eighty percent of the day-to-day catch of rhyparochromines in the light trap is collected between 19.00—21.00 hr and 15% during 18.30—19.00 hr; this is with reference to light trap which was working regularly from 18.00—06.00 hr of the next day, otherwise whenever the light is switched on during the night, they readily

Table 1 *Light-trapped Rhyparochrominae from Southern India and their frequency of catch*

Species	Tribe	Sex ratio M/F	Total catch 1977-78	% of catch	Sex ratio M/F	Total catch 1978-79	% of catch
RHYPAROCHROMINI							
<i>Dieuches coloratus</i> (Dist.)		1 : 2	15	1.67	1 : 1	14	0.63
<i>D. discoguttatus</i> (Dist.)		1 : 3	74	7.87	1 : 2	86	3.86
<i>D. indicus</i> Eyles		1 : 1	5	0.53	1 : 1	7	0.31
<i>D. neolateralis</i> Scud		1 : 1	7	0.75	1 : 1	5	0.22
<i>D. ornatus</i> (Dist.)		1 : 3	5	0.53	1 : 1	6	0.27
<i>Elasmolomus lineosus</i> (Dist.)		3 : 5	160	17.02	3 : 4	283	12.70
<i>E. sordidus</i> (Fab.)		2 : 3	112	11.91	2 : 3	188	8.44
<i>Lachnethus singalensis</i> (Dohr)		2 : 3	229	24.36	2 : 3	482	21.63
<i>Metochus bengalensis</i> (Dall.)		1 : 3	17	1.80	1 : 3	14	0.63
<i>M. uniguttatus</i> (Thun.)		1 : 3	46	4.89	1 : 2	56	2.51
<i>Naphiellus dilutus</i> (Horvy)		1 : 1	17	1.80	1 : 1	17	0.76
<i>Poantius festivus</i> Dist.		1 : 1	5	0.53	1 : 1	13	0.58
MYODOCHINI							
<i>Horridipamera nietneri</i> (Dohrn)		1 : 2	19	2.02	2 : 3	242	10.86
<i>Pachybrachius nigriceps</i> (Dall.)		2 : 3	95	10.11	2 : 3	416	18.67
<i>Pseudopachybrachius guttus</i> (Dall.)		1 : 2	40	4.26	2 : 3	244	10.95
ANTILLOCORINI							
<i>Botocudo signanda</i> (Dist.)		1 : 2	14	1.49	1 : 2	62	2.78
DRYMINI							
<i>Appolonijs cineticornis</i> (Walk.)		1 : 2	20	2.13	1 : 2	19	0.85
<i>A. picturatus</i> Dist.		1 : 2	25	2.66	1 : 1	10	0.45
LETHAEINI							
<i>Lethaeus indicus</i> Dall.		1 : 2	20	2.13	1 : 1	33	1.48
<i>Lethaeus sp.</i>		1 : 1	15	1.60	1 : 1	31	1.30

fly towards the light. Species of the tribes Drymini (*Appolonius cincticornis* (Walk) and *A. picturatus* (Dist.) and Lethaeini (*Lethaeus indicus* Dall. and *Lethaeus* sp.) are reported to be attracted towards light for the first time. The following species, viz., *Lachnesthus singalensis* (Dohrn), *Pachybrachius nigriceps* (Dall.), *Elasmolomus lineous* (Dist.), *E. sordidus* (Feb.), *Dieuches discoguttatus* (Dist.), *Pseudopachybrachius guttus* (Dall.), *Horridipamera nieteri* (Dohrn), *Metochus uniguttatus* (Thun.) and *Botocudo signanda* (Dist.) are regularly attracted in large numbers (table 1), while the other species are attracted towards light sporadically. Thus, only nine of the twenty species are readily attracted towards light. Miller (1953) and Southwood (1960 & 1961) correlated the large scale attraction towards light to the diurnal flying habit of Reduviidae and Miridae respectively. Sixty per cent of the light-attracted rhyparochromines from this region belongs to Rhyparochromini and only about 15% of them represents Myodochini and both these tribes comprise species with extremely long legs (Malipatil 1978). Females of several species are more readily attracted towards light than the males, while equal sex ratio is observed in few species (table 1). The preponderance of females may be a reflection of their abundance in the natural population, increased longevity over males and greater activity than the males (Thangavelu 1979).

The proportioned catch varied during different months indicating higher value during September-February and phototropism is less during rest of the months (March-August) in both the years (table 2). Nearly, 41% and 53% of the total catch were during October and November in the years 1977-78 and

Table 2 Monthly variation in light trap catch

Months	1977-78		1978-79	
	Total catch	% catch	Total catch	% catch
September	92	9.787	311	13.958
October	273	22.042	800	35.906
November	178	18.638	383	17.190
December	100	10.638	88	3.949
January	70	7.446	178	7.989
February	109	11.595	294	13.195
March	39	4.148	74	3.321
April	20	2.127	26	1.166
May	24	2.553	15	0.673
June	9	0.957	12	0.540
July	11	1.170	17	0.763
August	15	1.595	30	1.346

1978-79 respectively, whereas only 12.5% and 7.8% were recorded during March-August (six months) in the corresponding years (table 2). The analysis of variance indicates that the variation in rhyparochromines attraction to light in the different years, seasons and months is highly significant. The differences among the four seasons are highly significant as compared to the differences between the years and among the months (table 3). Perusal of the geometric mean table indicates higher catch during the monsoon season followed by winter, while summer and spring recorded lower catches (table 4). Most of the rhyparochromines in southern India were abundant during September-December and January-February (Thangavelu 1979) and this population trend appears to be in conformity with the monthly variation of

Table 3 Analysis of variance

Source	d.f.	S.S.	M.S.	F	S.E.	S.E.D.	C.D.
Years	1	0.3534	0.3534	14.700**	0.0447 (1.1084)*	0.0632 (1.1566)	0.1392 (1.3778)
Between seasons	3	6.1194	2.0398	84.850**	0.0632 (1.1566)	0.0894 (1.2285)	0.1968 (1.5733)
Months within seasons	8	0.6104	0.0763	3.1749**	0.1096 (1.2871)	0.1550 (1.4289)	0.3482 (2.1938)
Error	11	0.2644	0.0240				

* Values in parantheses represent the original values

** Significant at 1% level

Table 4 Geometric Mean

Seasons/Months	Transformed value	Original value
(Monsoon)	2.4383	274
September	2.2283	169
October	2.6697	467
November	2.4168	261
(Winter)	2.0901	123
December	1.9723	94
January	2.0478	112
February	2.2529	179
(Summer)	1.4554	29
March	1.7302	54
April	1.3580	23
May	1.2782	19
(Spring)	1.1597	14
June	1.0167	10
July	1.1357	14
August	1.3266	22

rhyparochromines recorded in the light trap (table 4). There is no other convenient sampling technique for estimating the population density of the cryptic coloured, fast-moving and litter-dwelling rhyparochromines other than direct counting (Sweet 1964), which is laborious as well as time consuming practice (Thangavelu 1979). Hence, it is suggested that Robinson-type light trap may be used for population sampling of such rhyparochromines which are regularly and readily attracted towards light.

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