Entomofauna

ZEITSCHRIFT FÜR ENTOMOLOGIE

Band 35, Heft 11: 205-216 ISSN 0250-4413 Ansfelden, 2. Januar 2014

Platygastroidea (Hymenoptera) of Andaman and Nicobar Islands, Indian Ocean (India)

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Abstract

The Andamans and Nicobars are oceanic islands in the Bay of Bengal, Indian Ocean having acquired biotic elements from both the Indian and the Southeast Asian regions. Species level endemics among plants, invertebrates and vertebrates occur here. With the exception of some species of *Telenomus* and *Gryon* the Platygastroidea fauna of the islands remain unstudied. A week's survey of South Andaman – which is only one of over 300 islands in the archipelago – recorded a rich diversity of 39 genera of platygastrids belonging to all the four subfamilies. Two genera *Gastrotrypes* and *Oethecoctonus*, not hitherto known from the Indian mainland has been found on these islands. This study is a pointer to the necessity for intensification of studies on the Platygastroidea of the Andaman and Nicobar islands. It also indicates the overwhelming efficacy of yellow pan traps in rapid surveys like this one, for the collection of Platygastroidea.

Key words: Hymenoptera, Platygastroidea, Andaman and Nicobar islands.

Zusammenfassung

Die Andamanen und Nikobaren sind Oceanische Inseln in der Bucht von Bengalen im Indischer Ocean. Sie haben biologische Elemente der Indischen und Südostasiatischen Regionen übernommen. Hier kommt ein endemisches Artenspectrum von Pflanzen, Invertebraten und Vertebraten vor. Mit Ausnahme einiger Arten von *Telenomus* und *Gryon* ist die Platygastridea-Fauna der Inseln unerforscht. Ein einwöchentlicher Aufenthalt auf Süd-Andaman, sie ist eine der 300 Inseln dieser Inselgruppe, erbrachte eine reiche Diversität von 39 Gattungen der Platygastridea, welche alle den vier Subfamilien angehören. Zwei Genera *Gastrotrypes* und *Oethecoctonus*, die bisher nur vom Indischen Festland bekannt waren, wurden auf diesen Inseln festgestellt. Diese Studie ist ein Hinweis, auf die Notwendigkeit zur Intensivierung der Studien der Platygastroidea der Andamanen und Nikobaren Inseln. Auch wird auf die überwältigende Effizienz von Gelbschalen hingewiesen, die einen schnellen Überblick, wie in diesem Fall, für das Sammeln der Platygastroidea geben.

Introduction

The Andaman and Nicobar islands are a group of about 349 volcanic islands (ANON., 2007) situated in the Bay of Bengal, Indian Ocean (Fig. 1, 2) that have never been connected to any of the neighbouring land masses by land bridges. Though politically a part of India the Andamans have closer faunistic affiliation with Burma while the Nicobars exhibit faunistic affinities with Sumatra (PRASHANTH & VEENAKUMARI 1996).

Figure 1. Location of the Andaman and Nicobar islands in the Bay of Bengal, Indian Ocean

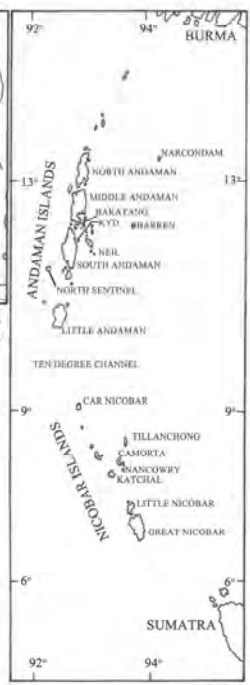

Figure 2. Exploded view of the Andaman and Nicobar islands

Juxtaposed between the Indian land mass to the West and the Southeast Asian region to the East, the Andaman and Nicobar islands are an amalgam of biotic elements from both regions. Their isolation has also ensured the development of endemics in various groups of organisms. A little over 10 per cent of the plants (RAMAKRISHNA et al. 2010) and 12.5 per cent of

the birds (RIPLEY & BEEHLER 1989) are endemic to these islands. Among, butterflies, which as elsewhere, are the best studied group of invertebrates five per cent are endemic at species level while over 50 per cent of the subspecies are endemic to these islands (MOHANRAJ & VEENAKUMARI 2012).

At least some of the endemic species known from these islands are confined to very small geographic areas. The Narcondam hornbill (*Rhyticeros plicatus*) for example is confined to one small island – the Narcondam island- which is a mere 6.8 square kilometres in area. The three endemic swallowtail butterflies (*Papilio mayo*, *Pachliopta rhodifer* and *Graphium epaminondas*) are confined to the Andaman islands (MOHANRAJ & VEENAKUMARI 2012). While the Nicobars too have their share of endemics, some species are endemic to both groups of islands.

Platygastroidea, the third largest superfamily in the Parasitic Hymenoptera, consists of four subfamilies: Telenominae, Teleasinae, Scelioninae and Platygastrinae. This group of insects plays a vital role in the natural biological control of insect pests belonging to Lepidoptera, Hemiptera, Orthoptera, etc. Some are egg parasitoids of Coleoptera and even Arachnida.

The study of Indian Platygastroidea is still in its infancy with only a little more than 45 genera known from this region. No attempts have been made to study the fauna of platygastrids from the Andaman islands which have since the nineteenth century been politically a part of India. *Telenomus* and *Gryon* are the only platygastrids recorded previously. These include *Telenomus* ?*seychellensis* KIEFFER on *Dysphania andamana* MOORE (Lepidoptera: Geometridae), *T. remus* NIXON on *Scirpophaga incertulas* (WALKER) (Lepidoptera: Pyralidae) and unidentified species of *Telenomus* on the eggs of many lepidopterans, viz., *Pachliopta aristolochiae goniopeltis* ROTHSCHILD, *P. rhodifer* BUTLER, *Elymnias cottonis cottonis* HEWITSON, *Ambadra rafflesi* MOORE, *Polyura schreiber tisamenus* FRUHSTORFER. An unidentified species of *Gryon* was recorded on eggs of *Leptocorisa acuta* (THUNBERG) (Hemiptera: Coreidae) on rice (BHUMANNAVAR et al. 1991; VEENAKUMARI & MOHANRAJ 2004).

A survey was undertaken in the island of South Andaman between the 17th and 27th February, 2012 to study the fauna of Platygastroidea of these islands.

Study Sites

Six locations on the island of S. Andaman and one on Neil island were surveyed for Platygastroidea. From South to North, area surveyed were Chiriyatapu, Garacharma, Sippighat, Chouldari, Mount Harriet and Mile Thilak. No collections were made from the other islands in the Andaman group, nor were collections made from any of the Nicobar islands.

Chiriyatapu forms the southern tip of the island and is known for its rich diversity of birds. The area we surveyed here was marshy and bordered by the sea on one side and lowland deciduous forest on the other. It was dominated by the latopyhtic grasses and sedges with a smattering of shrubs.

The sites at Garacharma, Sippighat and Chouldari all with farm lands. The vegetation at Garacharma included plantation crops (coconut, arecanut), spice crops (cinnamon),

ornamentals and various vegetables (brinjal, cucurbits, etc). Seasonal streams which were full during the period of our survey ran through this patch of land. The farm at Sippighat was largely under coconut in close proximity to a mangrove creek. The crops at both these farms were interspersed with natural vegetation and weeds. The Chouldari farm was situated in a valley cleared of its natural vegetation. Red gram (*Cajanus cajan*) was in cultivation. All along one edge of this farm was a heavily disturbed forest. A fish pond, a narrow stream were present on this farm.

The area from which collections were made from Mile Thilak too was farm land, which however was overgrown with rank vegetation. A stream flowed through this farm too and it was surrounded by a little disturbed dense semi-evergreen forest. Mount Harriet being a National Park with a semi-evergreen forest was the only area surveyed which had natural vegetation.

Eggs of a green lacewing (Neuroptera: Chrysopidae) were collected during a brief stopover at Neil, an island situated to the north east of South Andaman.

Material and Methods

A variety of methods including sweep nets (SN), yellow pan traps (YPT), pitfall traps (PFT) and malaise traps (MT) were used. The time spent sweep netting at each of the sites and the number and types of traps deployed was uneven between the sites (Table 1). Insect eggs were also collected opportunistically from the vegetation. Collections by means of the sweep net were made from all the sites. The remaining techniques were utilized at selected sites depending on accessibility, amount of time we could spend at the site and our assessment of the possibility of retrieving the traps without being stolen. Sippighat was the only place where we used all the collection methods. Garacharma was however, the site we collected from most intensively.

All the material collected was transferred to 70 per cent ethyl alcohol. This was examined under a stereo bionocular microscope and Platygastroidea were sorted and mounted on card strips following standard procedures.

Results

A total of 1.306 specimens belonging to 39 genera of Platygastroidea were collected in 10 days from six localities from the island of South Andaman. The only live specimens collected were *Telenomus* sp. from the eggs of a chrysopid (Neuroptera) from Neil island. The collection sites, methods adopted, and the number of specimens collected from each genus is detailed below.

T e l e n o m i n a e THOMSON 1860

Paratelenomus DODD 1914

M a t e r i a l : India: Andaman Islands; South Andaman, Chiriyatapu (SN); Chouldari (YPT); Sippighat (YPT); Garacharma (YPT); Mile Thilak (SN).

Number of specimens examined: 50.

Psix KOZLOV & LE 1976

M a t e r i a l : India: Andaman Islands; South Andaman, Chouldari (YPT); Garacharma (YPT, SN); Sippighat (SN).

Number of specimens examined: 11.

Telenomus HALIDAY 1833

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (MT, YPT, SN); Sippighat (YPT, SN, PFT); Mile Thilak (SN); Chiriyatapu (SN); Mount Harriet (SN); Chouldari (MT, YPT); Andaman Islands: Neil Island (emerged from chrysopid eggs).

Number of specimens examined: 135.

Trissolcus ASHMEAD 1893

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (SN, YPT); Sippighat (SN); Chouldari (YPT).

Number of specimens examined: 6.

T e l e a s i n a e ASHMEAD 1902

Trimorus FOERSTER 1856

M a t e r i a l : India: Andaman Islands; South Andaman, Chouldari (MT, YPT); Sippighat (YPT, SN); Chiriyatapu (SN); Garacharma (SN); Mile Thilak (SN).

Number of specimens examined: 90.

Xenomerus WALKER 1836

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT); Chouldari (YPT).

Number of specimens examined: 4.

S c e l i o n i n a e FÖRSTER 1856

Baeus HALIDAY 1833

M a t e r i a l : India: Andaman Islands; South Andaman, Chouldari (MT, YPT); Sippighat (YPT); Chiriyatapu (SN); Garacharma (YPT).

Number of specimens examined: 78.

Baryconus FOERSTER 1856

M a t e r i a l : India: Andaman Islands; South Andaman, Mile Thilak (SN); Garacharma (YPT); Sippighat (SN).

Number of specimens examined: 25.

***Calliscelio* ASHMEAD 1893**

M a t e r i a l : India: Andaman Islands; South Andaman, Chouldari (YPT, MT); Sippighat (SN, YPT); Garacharma (SN, YPT); Chiriyatapu (SN); Mile Thilak (SN); Mount Harriet (SN)

Number of specimens examined: 33.

***Calotelea* WESTWOOD 1837**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (SN, MT).

Number of specimens examined: 2.

***Ceratobaeus* ASHMEAD 1893**

M a t e r i a l : India: Andaman Islands; South Andaman, Sippighat (YPT); Garacharma (YPT); Mile Thilak (SN); Chouldari (MT, YPT); Chouldari.

Number of specimens examined: 25.

***Cremastobaeus* ASHMEAD 1893**

M a t e r i a l : India: Andaman Islands; South Andaman, Chouldari (YPT); Chiriyatapu (SN); Mile Thilak (SN); Sippighat (YPT); Garacharma (YPT); Mount Harriet (SN).

Number of specimens examined: 43.

***Dicroscelio* KIEFFER 1913**

M a t e r i a l : India: Andaman Islands; South Andaman, Sippighat (YPT, SN, PFT); Chouldari (YPT, MT); Chiriyatapu (SN); Garacharma (SN, YPT); Mount Harriet (SN).

Number of specimens examined: 38.

***Doddiella* KIEFFER 1913**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (SN, YPT); Sippighat (YPT).

Number of specimens examined: 7.

***Duta* NIXON 1933**

M a t e r i a l : India: Andaman Islands; South Andaman, Sippighat (SN, YPT); Garacharma (SN, YPT); Chouldari MT, YPT); Mile Thilak (SN); Chiriyatapu (SN).

Number of specimens examined: 50.

***Dyscirtobaeus* PERKINS 1910**

India: Andaman Islands; South Andaman, Sippighat (YPT); Garacharma (YPT); , Mile Thilak (SN)

Number of specimens examined: 15.

***Fusicornia* RISBEC 1950**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (SN, YPT); Chouldari (YPT); Sippighat (SN).

Number of specimens examined: 8.

***Gryon* HALIDAY 1833**

M a t e r i a l : India: Andaman Islands; South Andaman, Sippighat (YPT, SN); Chiriyatapu (SN); Garacharma (YPT, SN); Mile Thilak (SN); Chouldari (MT, YPT).

Number of specimens examined: 51.

***Habroteleia* KIEFFER 1905**

M a t e r i a l : India: Andaman Islands; South Andaman, Sippighat (SN); Chiriyatapu (SN); Garacharma (YPT); Mile Thilak (SN); Mount Harriet (SN).

Number of specimens examined: 18.

***Idris* FOERSTER 1856**

M a t e r i a l : India: Andaman Islands; South Andaman, Chouldari (YPT); Sippighat (SN, YPT); Garacharma (YPT); Mount Harriet (SN).

Number of specimens examined: 138.

***Macroteleia* WESTWOOD 1835**

M a t e r i a l : India: Andaman Islands; South Andaman, Sippighat (SN); Chiriyatapu (SN); Mile Thilak (SN); Garacharma (SN).

Number of specimens examined: 30.

***Oethecoctonus* ASHMEAD 1900**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT).

Number of specimens examined: 1.

***Opisthacantha* ASHMEAD 1893**

M a t e r i a l : India: Andaman Islands; South Andaman, Chouldari (YPT); Sippighat (SN, YPT); Garacharma (YPT); Chiriyatapu (SN); Mount Harriet (SN); Mile Thilak (SN).

Number of specimens examined: 20.

***Palpoteleia* KIEFFER 1926**

M a t e r i a l : India: Andaman Islands; South Andaman, Chiriyatapu (SN); Sippighat (SN); Chouldari (MT); Mile Thilak (SN); Mount Harriet (SN); Garacharma (SN, YPT).

Number of specimens examined: 63.

***Paridris* KIEFFER 1908**

M a t e r i a l : India: Andaman Islands; South Andaman, Chouldari (YPT); Mount Harriet (SN); Sippighat (PFT); Chiriyatapu (SN); Garacharma (YPT).

Number of specimens examined: 6.

***Platyscelio* KIEFFER 1905**

M a t e r i a l : India: Andaman Islands; South Andaman, Sippighat (SN); Garacharma (SN)

Number of specimens examined: 4.

***Probaryconus* KIEFFER 1908**

M a t e r i a l : India: Andaman Islands; South Andaman, Chiriyatapu (SN); Chouldari (MT); Sippighat (YPT, SN); Garacharma (SN, YPT); Mile Thilak (SN); Mount Harriet (SN).

Number of specimens examined: 28.

***Psilanteris* KIEFFER 1916**

M a t e r i a l : India: Andaman Islands; South Andaman, Chouldari (MT, YPT); Sippighat (PFT, YPT); Mount Harriet (SN); Garacharma (SN).

Number of specimens examined: 12.

***Scelio* LATREILLE 1805**

M a t e r i a l : India: Andaman Islands; South Andaman, Chiriyatapu (SN); Sippighat (SN, YPT); Chouldari (YPT); Mile Thilak (SN); Garacharma (YPT, SN); Mount Harriet (SN).

Number of specimens examined: 43.

***Sparasion* LATEREILLE 1802**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT); Sippighat (YPT)

Number of specimens examined: 13.

***Triteleia* KIEFFER 1906**

M a t e r i a l : India: Andaman Islands; South Andaman, Chiriyatapu (SN); Garacharma (YPT, SN); Sippighat (SN).

Number of specimens examined: 29.

P l a t y g a s t r i n a e HALIDAY 1833

***Allotropa* FOERSTER 1856**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT).

Number of specimens examined: 1.

***Amblyaspis* FOERSTER 1856**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT); Sippighat (YPT); Mile Thilak (SN); Chouldari (MT, YPT).

Number of specimens examined: 7.

***Fidiobia* ASHMEAD 1894**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT); Sippighat (YPT); Chouldari (YPT); Mile Thilak (SN).

Number of specimens examined: 20.

***Gastrotrypes* BRUES 1922**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT); Sippighat (YPT).

Number of specimens examined: 2.

***Iphitrachelus* HALIDAY 1836**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT).

Number of specimens examined: 1.

***Leptacis* FOERSTER 1856**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT) Sippighat (YPT); Chouldari (YPT); Mile Thilak (SN); Chiriyatapu (SN).

Number of specimens examined: 43.

***Platygaster* LATEREILLE 1809**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (YPT); Sippighat (YPT); Chouldari (YPT); Mile Thilak (SN).

Number of specimens examined: 35.

***Synopeas* FOERSTER 1856**

M a t e r i a l : India: Andaman Islands; South Andaman, Garacharma (SN, YPT); Mile Thilak (SN); Sippighat (YPT, SN); Chiriyatapu (SN).

Number of specimens examined: 121.

Discussion

Garacharma where our collection effort was the greatest was the only site from where we collected all the 39 genera reported here. Four genera (*Calotelea*, *Oethecoctonus*, *Allotropa* and *Iphitrachelus*) were collected from Garacharma alone. The other sites yielded lesser numbers of genera, roughly in proportion to the number of collection

methods employed and the collecting effort invested (in terms of time spent collecting) at each of these sites.

Telenomus, Gryon, Calliscelio, Cremastobaeus, Opisthacantha, Palpoteleia, Probaryconus and *Scelio* were the eight genera that were collected from all the localities surveyed. The most abundant (over 100 specimens collected) were *Idris, Telenomus* and *Synopeas* while the rare (less than 5 individuals collected) ones were *Calotelea, Oethecoctonus, Platyscelio, Allotropa, Fidiobia* and *Iphitrachelus.* The subfamilies Teleasinae and Platygastrinae are for the first time being reported from these islands.

Although we did not employ all the trapping methods in all the localities surveyed, some interesting patterns emerge. Pitfall traps were used in only one locality. *Telenomus*, *Dicroscelio*, *Paridris* and *Psilanteris* were the only genera that were caught in these traps. They were however captured by other methods too. Even more interesting are the six genera (*Xenomerus, Oethecoctonus, Sparasion, Allotropa, Gastrotypes, Iphitrachelus*) which were caught exclusively in yellow pan traps. None of them was collected by any of the other methods employed during this survey. *Telenomus* was the only genus that was captured by all the trapping methods used.

A comparison of the different trapping methods at Garacharma is more valid, than at the other places where we collected, as we employed all three (SN, YPT, MT) collection methods in the same plots of land within this farm. The YPTs were the most successful: 34 of the 39 genera collected during this survey turned up in these traps; of these 20 genera were caught only from Garacharma. Of the 19 genera caught by sweep netting, 14 were also caught in YPTs while one was also found in Malaise traps. Four genera were caught only in YPTs. In all the places where YPTs were used, namely Garacharma, Sippighat and Chouldari, they were the most efficient, trapping a significantly larger number of genera.

This study indicates that the Andaman islands harbour a rich platygastrid fauna. Of the 45 or so genera known form the Indian mainland, thirty seven are now known to occur on a single island (6,408 km^2 in area) in the Andaman archipelago. Two additional genera - *Gastrotrypes* and *Oethecoctonus* – which have so far not been reported from the Indian mainland are being reported for the first time from the Andamans. The Andaman islands, along with the Nicobars, have therefore to be explored systematically for their platygastrid diversity. Some of these may prove to be of value for use in the biological control of crop pests while others would be endemic to these islands.

If a mere 10 days survey on just one island could yield such a rich diversity of these microhymenopterans, a more thorough survey across the numerous islands in this archipelago is bound to reveal many interesting taxa including novelties.

Acknowledgement

We are thankful to the Director, NBAII, Bangalore and the Director, CARI, Port Blair for providing facilities. We thank Dr. A. Polaszek, Natural History Museum, London for identifying *Gryon* and the various species of *Telenomus*. We are also thankful to Dr. T. Venkatesan for the parasitized eggs of Chrysopidae from Neil island.

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Table 1: Time (hours) spent using sweep net and various traps (number) at sites in South Andaman for the collection of Platygastroidea

	Chiriyatapu	Garacharma	Sippighat	Chouldari	Mount Harriet	Mile Thilak
Sweep net (hours)	5.0	9.0	2.5	5.0	1.0	1.5
Yellow pan trap (number)	-	40	25	25	-	-
Pit fall trap (number)	-	-	30	-	-	-
Malaise trap (number)	-	2	2	2	-	-

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Druck, Eigentümer, Herausgeber, Verleger und für den Inhalt verantwortlich:
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