

## USC-VISCA Biological Expedition to Palawan, May-June 1982: I. Entomological Record

C.K. Starr and E. Schoenig

*Received August 1983*

### ABSTRACT

A group of seven scientists — five entomologists and two marine biologists — joined forces in exploring Palawan during May-June, 1982. Most of the entomological work of 119 man-days was done in Aborlan, Rio Tuba and in the southernmost island, Balabac. Attention was focused on Heteroptera, Coleoptera, Lepidoptera, Diptera and Hymenoptera, especially the social wasps.

The trip yielded roughly 1,000 different species with many interesting representatives, especially of the following families: Pyrrhocoridae, Cicindelidae, Nymphalidae, Pieridae, and, most of all, of Vespidae and Formicidae.

Balabac island proved a rich area. It contributed about 2/3 of all the species collected and many of them were not found in any of the other areas. The orchid garden-apiary at the Palawan National Agricultural College (PNAC) in Aborlan was unexpectedly rich, especially in spiders and aculeate Hymenoptera.

### INTRODUCTION

Biologically, Palawan is the outsider island of the Philippines. Together with associated smaller islands, most importantly the Calamian and Cuyo islands to the northeast and the Balabac-Bugsuk group to the southwest, it shows distinctly closer biotic affinities with Borneo than with the rest of the Philippine Islands (Dickerson et al. 1928, Carlquist 1965, Cuy 1981). The rest of the area within the Republic forms a coherent biogeographic area which may conveniently be called the *Philippines proper*. If we were to look at this division from the larger perspective of Southeast Asia as a whole though, we would make the opposite characterization: the Philippines proper are an outsider group, while the Palawan group is closer to the biogeographic center, a northern extension of Borneo. Henceforth we use the word *Palawan* to refer to Palawan Island together with associated smaller islands. This is nearly equivalent to the political unit of Palawan,

excluding only a few insignificant islands in the Sulu Sea. As such it is considered the fifth largest island group of the Philippines, with an area of 14,745 km<sup>2</sup>.

Migration of taxa between the Malay Archipelago and the Philippines has been overwhelming from the former to the latter, as expected. Taxonomic evidence shows that this has been principally from Borneo by way of Palawan (Dickerson et al. 1928). If Palawan is the outsider group of the Philippines, then this means that many taxa have moved northward into Palawan but failed to go further, while those which reached beyond Palawan have had a good chance of extending their ranges through much of the Philippines proper. One reason why this should be so is seen by reference to an ordinary atlas: Borneo and Palawan are on the Sunda Shelf, linked by an area of shallow water, while Palawan is separated from Mindoro, and Borneo from the Sulu group, by deeper water. Further, all major islands of the Philippines proper, with the exception of Mindoro, lie together on a similar shallow land shelf. At various times in the Pleistocene, then, with the lowering of the sea level, Palawan and Borneo formed part of a single land mass, while much of the Philippines proper was similarly united (Inger 1954). The outstanding topographic features of Palawan island are a central mountain range extending through much of its length, with an average height over 1,000 m and the absence of any large rivers and river valleys (Dickerson et al. 1928). The mountain range somewhat separates the two sides climatically, the dry season being more distinct on the western side. (For a concise textbook discussion of Philippine physico-biotic conditions of the past and present, see Chapter I of Alcalá 1976).

#### OBJECTIVES AND DESCRIPTION OF THE EXPEDITION

Palawan's biotic peculiarity was our main reason for our desire to make a collecting trip there for insects and arachnids. In addition, the area is little explored biologically, so that we could hope to find an uncommon number of species new to Philippine collections.

A cooperative Philippine-American zoological expedition visited Palawan island and stopped briefly at Balabac in 1947 (Hoogstraal 1951). The focus of the expedition was land vertebrates. Between 1959 and 1969, Prof. J.N. Jumalon led four collecting trips to Palawan, comprising about 212 man-days. Jumalon and company focused on butterflies. Dr. E. Schoenig spent two weeks collecting on Balabac in 1974 with special attention to mosquitoes. He returned in 1977 for a one-week stay close to

and some distance north of Puerto Princesa, with a group of Japanese entomologists. The entomologists of the present expedition, led by E. Schoenig (USC), were Dr. C.K. Starr (VISCA, specialist in social insects), Mr. T. Borromeo (USC and a private collector, concentrating on butterflies), Miss M.M. Tumilap (USC, specializing on Diptera), and Miss J.P. Cañete (VISCA, concentrating on Heteroptera and arachnids). The other members of the expedition were two marine biologists, whose report will be published later. Our main objective was to collect as widely as possible, making both specialized collections within the taxa mentioned above and general collections of insects and arachnids. In addition, Schoenig and Starr were to gather ecological data within their specialties and Cañete was to do the same for such Pyrrhocoridae (Heteroptera) as seemed warranted.

Most of our itinerary was laid out in advance, with provisions for flexibility in altering our plans. As it was, we could not always stick to our timetable but we were able to visit nearly all the areas originally planned. We spent a total of 119 man-days in Palawan, of which we were able to spend about 85 doing significant collecting in nine localities. The remainder were taken up in travel or in waiting for a change in the weather or other inclement circumstances. The approximate distribution of the 85 man-days among localities was as follows:

Puerto Princesa	2
Napsan, Puerto Princesa	4
Aborlan	35
Mariwara, Narra	1
Brooke's Point	1
Rio Tuba, Bataraza	17
Bugsuk	2
Balabac	20
Indalawan, Balabac	3

We were fortunate to be able to divide the bulk of our collecting activity, 72 man-days, between three widely separated localities. Some description of these is in order.

Our collecting at Aborlan, 69 km south of Puerto Princesa, was all within walking distance from our base at the Palawan National Agricultural College (PNAC). Besides providing a pleasant and effective base to work from, this gave access to a number of good agricultural and post-agricultural habitats. The area appeared quite arid, with rather sparse vegetation over

pale sandy soil. Much of the landscape had a distinct "cattle country" look, complemented by the numerous termite mounds, a prominent feature of arid areas in Africa and Australia. This general look was apparently exaggerated at that time, though, by the lateness of the rains. The two nearby weather stations, at Iwahig, Puerto Princesa, and Puerto Princesa City show a mean annual rainfall of 1986 mm and 1567 mm respectively. This is dry by Philippine standards, though not outstandingly so, and is comparable to much of Cebu. Mean rainfall is reduced to about 50 mm/month during January-April in this area, while it is usually above 150 mm/month during the rest of the year. In 1982 Aborlan had very little rain in May, though, so that our visit came at the end of the dry season, rather than the beginning of the rainy season.

The experimental plots and ornamental plantings of PNAC provided a good hunting ground, especially for species attracted to flowers and fruits. Of note are a cashew orchard, which contained a far greater richness of species than the habitat's apparent sterility would suggest, and a combined orchid garden and apiary (Table 1). Outside of PNAC we found one area to

TABLE 1. SPECIES OF ACULEATE HYMENOPTERA FROM THE GARDEN APIARY AT THE PALAWAN NATIONAL AGRICULTURAL COLLEGE, ABORLAN.

Families	Number of Species	Taxa recognized
Chrysididae	1	
Scoliidae	1	
Mutillidae	2	
Pompilidae	1	
Sphécidae	5	<i>Sceliphron</i> sp. (Sphécinae), <i>Pison</i> sp. (Trypoxyloninae), 1 crabronine, 2 pemphredonines
Anthophoridae	3	<i>Xylocopa</i> 2 spp., <i>Anthophora</i> sp.
Apidae	3	<i>Apis dorsata</i> , <i>Trigona</i> 2 spp.
Eumenidae	2	
Vespidae	7	<i>Vespa affinis nigroventris</i> , <i>V. tropica</i> <i>Anthracina</i> , <i>Polistes</i> sp., <i>Ropalidia</i> 2 spp., <i>Parischnogaster</i> sp., <i>Liostenogaster</i> sp.
Formicidae	2	<i>Tetraponera</i> sp. (Pseudomyecinae), 1 ponerine
<b>TOTAL</b>	<b>27</b>	

be especially productive, a very scrub-covered, grassy secondary gallery forest along a small river. This habitat yielded many species of ants and some interesting spiders, among others.

The next station, Rio Tuba had to be reached by boat from Brooke's Point. At Rio Tuba we collected in the extensive scrub-covered secondary forest and open areas of the Rio Tuba Nickel Mining Company, as well as inside the company's residential area. The nearest weather station, at Brooke's Point, shows a mean annual rainfall of 1595 mm and a monthly pattern very similar to that of the two Puerto Princesa stations. The 1982 dry season did not extend into May at Rio Tuba, though, and we were seriously hampered by rain. Nonetheless, the collecting was good, and we did especially well with Diptera and Coleoptera.

Our base on the island of Balabac was the town of Balabac, and we walked to most of our collecting sites. Severe deforestation in Balabac is generally expected in the coming years, but at present it remains a pleasant place and very good for natural history studies. Within walking distance of the town are both near-primeval forest and various disturbed habitats. The uninhabited forest is extensive, and it is quite possible to wander in it for a day without encountering another human being. It was here that we collected all of our army ants (*Aenictus*), the first recorded from Palawan (Table 2). Balabac's richness in butterflies is shown in Table 3, and it was our best area for tiger beetles (Cicindelidae) and robberflies (Asilidae).

## RESULTS AND DISCUSSION

For most taxa we have made no attempt to count the number of species collected. It seems nearly certain that the total insect and arachnid specimens belong to no fewer than 1000 species. This figure is both round and appropriately vague.

Table 2 shows the number of species collected in the families Pyrrhocoridae, Cicindelidae and Vespidae and two ant genera, along with the numbers previously reported from Palawan. Each of the pyrrhocorids we collected was among those already known. This suggests that the family is fairly complete in the area. This cannot be said of the Cicindelidae (tiger-beetles), as seen from the fact that we collected ten species where only five had been recorded in the USC collection. Our collections included four of those five.

One feature of the social wasps (Vespidae) is that where they exist, they are almost never rare. Together with their usually large size and active,

TABLE 2. COMPARISON OF NUMBER OF SPECIES IN SELECTED TAXA PREVIOUSLY KNOWN FROM PALAWAN WITH NUMBERS COLLECTED BY THE USC-VISCA EXPEDITION.\*

Taxa	Species previously known from Palawan	Sources	Species collected by expedition
Heteroptera:			
Pyrhocoridae	17		9
<i>Dysdercus</i>	5	Banks 1909 Taeuber 1929	3
<i>Antilochus</i>	3	"	1
<i>Dindymus</i>	6	"	4
<i>Ectatops</i>	2	"	1
<i>Melamphaus</i>	1	"	0
Coleoptera:			
Cicindelidae	5		10
<i>Cicindela</i>	3	R. Huber (pers. comm.)	5
<i>Tricondyla</i>	1	"	1
<i>Neocollyris</i>	1	"	1
<i>Therates</i>	0	"	1
Undetermined			2
Hymenoptera:			
Vespidae	5		9
<i>Vespa</i>	2	Kojima 1982b	2
<i>Polistes</i>	1	Baltazar 1966	2
<i>Ropalidia</i>			
( <i>Icariola</i> )	2	"	2
( <i>Icarielia</i> )	0	Kojima 1982a	0
Stenogastrinae	0	Baltazar 1966	3
Hymenoptera:			
Formicidae	9		
<i>Polyrhachis</i>	9	Baltazar 1966	11
<i>Aenictus</i>	0	Wilson 1964	2

\*These data are compiled from the USC collection, rather than the literature or a wider survey of research collections, so that it may be less complete.

diurnal habits, this ensures that a reasonable collecting effort in any area will turn up most available species and often all of them. This generalization must be moderated somewhat for the sometimes secretive subfamily Stenogastrinae but at least for the genera *Vespa*, *Ropalidia* and *Polistes* we are fairly certain that all species from Palawan are now known. Despite the

small amount of material available to him, Kojima's (1982b) treatment of Philippine hornets (*Vespa*) seems quite accurate, and his conclusions about which species are found in Palawan are apparently correct. We found both of his species and no others. Similarly, Kojima's (1982a) suggestion that the subgenus *Ropalidia* (*Icarielia*), known throughout the Philippines proper, is absent from Palawan can now be regarded as firmly established. It is quite unlikely that Palawan has any paper wasps (*Polistes*) we did not collect, and quite possibly there are no other stenogastrines.

The interesting and attractive Old World ants *Polyrhachis* comprise more species in the Philippines than any other genus (Baltazar 1966). They include nearly all of the ants which make nests of silk. *Polyrhachis* do not seem to be especially prominent in Palawan, unlike, for example, on Mount Makiling or in many parts of Samar. We have not determined our specimens to species, so that it is not certain how many are new records. A separation into subgenera and a comparison with the subgenera of previously recorded species, though, suggests that there is considerable overlap, i.e. that few of ours are new for Palawan. Baltazar (1966) records no species endemic to Palawan, and our collections support the idea that *Polyrhachis* species are widespread in the Philippines; most Palawan specimens match specimens from the Philippines proper.

We were very fortunate to encounter three colonies of army ants in the forests of Balabac: one of *Aenictus powersi* Wheeler & Chapman and two of the widespread *A. laeviceps* (Smith). There is no reason to believe that *Aenictus* does not also live on Palawan Island. In a short stay such as ours, though, there is a large element of chance in finding army ants.

One highly noticeable feature of the Balabac insect fauna was the abundance of day-active Lepidoptera. Table 3 shows the number of species of butterflies and hesperiids which the expedition (mostly Mr. Borromeo) collected on Balabac and Palawan Islands and the number of those common to both islands. Although our collecting effort on Balabac, in terms of man-days, was somewhat less than 1/3 as much as on Palawan Island, we collected about 2/3 as many species there. Even more interesting is that almost 3/4 of the species from Balabac were not collected on Palawan Island. For butterflies and hesperiids, then, Balabac seems to be an outstanding outsider island, most likely with strong affinities to Borneo. It was also an especially good place for cicindelids and robberflies (*Asilidae*), of which about 12 species were collected as compared to 14 for the combined localities.

It is an undisputed truism in biology that most taxa have their greatest species diversity in the tropics. There is less unanimity about just which