

CHAPTER 5

DISCUSSION

5.1 Fauna of Cunaxidae in Central Thailand

The predatory mite family Cunaxidae was recently revised by Smiley (1992) recognizing 166 species in 17 genera and 9 subfamilies. Additional species were subsequently reported from various parts of the world. The numbers of described species to date (March, 2004) are summarized in Table 4-1. Thirty-three species (13.30 % of the world fauna) in 9 genera and 4 subfamilies of cunaxid mites were found in this study. Of these, 16 species are recorded for the first time in Thailand.

Armscirus taurus (Kramer), *Cunaxa capreolus* (Berlese), *Cunaxa setirostris* (Herman), *Cunaxa rackae* Smiley, and *Cunaxa thailandicus* Smiley were previously reported from Thailand (Boonkong *et al.*, 1986; Smiley, 1992). Three of them, *C. capreolus*, *C. setirostris*, and *A. taurus*, were found in this study and their existences in Thailand were confirmed. *C. capreolus* is not treated here because its locality is beyond the scope of this study. *C. rackae* and *C. thailandicus* were not found in this study. However, their existences should be confirmed because their description were based on specimens associated with agricultural products of Thailand that were exported to the United State of America. As Swift (1996) noticed, the study of mites and their distributions depended on the presence of acarologists in some parts of the world. Many more species are waiting to be discovered. More study and research are needed.

5.2 Morphology and Taxonomy

The family Cunaxidae and its closely related family, Bdellidae, are placed under superfamily Bdelloidea on the basis of gnathosomal morphology which is snout-like, the chelicerae are separated and hinged at base, two pairs of sensillae are on dorsal propodosoma.

The Cunaxidae are distinguished from Bdellidae by the presence of two pairs of genital papillae, leg with claw-like empodium, palp terminating with a claw except for the genus *Parabonzia*. The trichobothrium is presented only on tibia IV, not on tarsi III and IV, and tibiae I and IV. The genus *Parabonzia*, not found in this study, is

considered as a most primitive group of Cunaxidae (Smiley, 1992) because a number of characters found in Bdellidae are found in this genus.

In prostigmata, the primitive set of 6 pairs of cupules which is homologous with lyrifissures of Mesostigmata, Opilioacarida, Holothyrida is found on idiosomal integument. It is maintained in Terpnacaridae and some Micropsammidae (Kethley, 1990), but cunaxids generally have only 2 pairs (*ip* and *ih*) except for the genus *Parabonzia* possessing 4 pairs (*ia*, *im*, *ip*, and *ih*) (Den Heryer, 1975) as in Bdellidae.

The palp of cunaxids may either be three (Cunaxoidiinae), four (Sirulinae), or five segments (such as Cunaxiinae, Coleoscirinae, Bonziinae). These numbers of palp segments and its setal type, number of dorsal setae, types of setae *hg*₁, types of pretarsi, and types of solenidia on basal part of tarsi I are used in characterization of cunaxid genera and subfamilies.

The geniculated setae *hg*₁ on ventral hypostome characterized subfamily Bonziinae comprising three genera: *Parabonzia*, *Bonzia*, and *Neoscirula* (Smiley, 1992). Only one genus *Neoscirula* with two species was found in this study. It differs from two other genera in having a spinelike seta, not multi-branch seta, on palp telofemur. A comparison of main characters between two species of *Neoscirula* are given in Table 4-2.

Subfamily Coleoscirinae consists of the genera *Coleoscirus*, *Pseudobonzia*, and *Scutascirus*. The characters shared by these genera are as follows: five segments palpi, distal apex of palp tibiotalus with a long seta, simple setae *hg*₁, and the present of setae *f*₂.

The genus *Coleoscirus* are characterized by having a dorsal plate extending from propodosoma into hysterosomal region, Left and right coxae I-II are fused as a sternal plate, and without subtriangular shield adjacent to genital shields. Four species of this genus were found. Comparisons between their characters are given in Table 4-4.

The genus *Pseudobonzia* differs from other two genera of Coleoscirinae in that dorsal shield are confined to propodosomal region and a sternal plate is absent. Four species of this genus were found in this study. In addition to key to species of the genus, the comparison of characters between them are given in Table 4-5.

The genus *Scutascirus* is easily distinguished from other the genera of the family by processing a pair of subtriangular shields adjacent to genital shields. Not like other cunaxids, the cuples *ip* of *Scutascirus* are slit like on the main dorsal shield. Only one species was discovered in this study.

The subfamily Cunaxiinae also have five-segmented palp. But its chaetotaxy differs considerably from other five-segmented palp cunaxids. The Cunaxiinae consists of three genera, *Armscirus*, *Cunaxa*, and *Dactyloscirus*. Their palpi are elongate; each segment usually bears spinelike setae and/or apophyses.

The genus *Armscirus* are closely similar to *Dactyloscirus* in having a long apophysis on apical part of palp genu. However, the elongate-based solenidion on basal part of tarsi I can be found only in the genus *Dactyloscirus* and, in my opinion, this character, although minute, is useful for separating it from *Armscirus*, which possess a simple solenidion. Two species of each genus were found in this study. The comparisons of characters between members of *Armscirus* and *Dactyloscirus* are presented in Table 4-6. and Table 4-8, respectively.

In the genus *Cunaxa*, not like *Armscirus* and *Dactyloscirus*, the apophysis on apical part of palp genu is absent. It also has a relative slender and attenuate tarsus. Nine species of *Cunaxa* were found in this study. A comparison of their main characters is given in Table 4-7

The cunaxids with three-segmented palp were placed under the subfamily Cunaxoidinae viz, *Cunaxoides*, *Neocunaxoides*, and *Pulaeus*. The genus *Cunaxoides* was not found in this study. Many species were reported from palaeartic and ethiopian regions, except for one species from oriental region (India) (Smiley, 1992). *Neocunaxoides* can be easily distinguished from *Pulaeus* by the absence of setae f_2 , while this setae is present in *Pulaeus*. However, Inayatullah and Shahid (1989)

described two new species of *Neocunaxoides* from Pakistan, but were not presented in Smiley (1992)'s publication. Their figures clearly show the presence of setae f_2 . These two species, based on Smiley (1992), should be transferred to the genus *Pulaeus*. Four species of *Neocunaxoides* and 5 species of *Pulaeus* were recognized in this study. The comparisons of characters of both genera are presented in Table 4-9 and Table 4-10, respectively.

5.3 Biology

Members of family Cunaxidae are all predators, feeding on smaller microarthropods, and nematodes (Den Heyer, 1981; Walter and Kaplan, 1991; Smiley, 1992). However, their knowledge on biology is very limited. In this study, *Cunaxa vizcayana* was observed that it fed on a tarsonemid mites on pomello leave. *Coleoscirus simplex* and probably other cunaxids usually attack mobile preys such as living nematodes and other mites. They ignored eggs of nematodes and microarthropods. Mites of Subfamily Cunaxiinae did not fed on nematodes, but they usually attack arthropod preys (Walter and Kaplan, 1991).

Walter and Kaplan (1991) found that *Coleoscirus simplex* is cruise predator that locates prey by searching preys constantly while cunaxine mites (*Armascirus*, *Cunaxa*, and *Dactyloscirus*) are ambush predators waiting for a long time to catch the approached preys. This behavior was also observed in *Cunaxa vizcayana*.

In this study, guarding pharate tritonymph female by male of *Cunaxa vizcayana* was observed. Walter and Kaplan (1991) also reported this behavior in other species of cunaxid mites namely *Coleoscirus simplex* and *Dactyloscirus innermis*. However, their mating was not been observed, but probably occurred by direct insemination since spermatophores were not observed and male had an aedeagus. (Walter and Kaplan, 1991; Evans, 1992). Precopulation can also be found in Tarsonemina, Cheyletidae, Tydeidae (Evans, 1992).

5.4 Ecology

Cunaxid mites live in soil and decomposing plant materials, on tree trunk, in canopy level, and store products. This study suggested that members of the genera *Neoscirula*, *Coleoscirula*, *Pseudobonzia*, *Scutascirus*, *Neocunaxoides*, *Pulaeus*, and

Dactyloscirus are soil-litter inhabiting. None of them were collected from canopy level. *Armascirus* and *Cunaxa* can be found on ground level and canopy levels (Table 4-11). However, more studies are needed to confirm their ranges of habitats.

The high number of individuals and species of mites in soil-litter may be explained by the complexity of this habitat, which provides a variety of niches to be used by cunaxid mites (Walter and Procter, 1999)



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