

Chapter 23

A Review of Insect Fauna Reports for the Islands in Kagoshima Prefecture

Yositaka SAKAMAKI

1. Introduction

Most of islands in Kagoshima Prefecture are the northern part of in Nansei archipelago (=Ryukyu Archipelago), which extends from Kyushu in the north to Ryukyu Islands (Okinawa Prefecture) in the south. These islands are often called the Satsunan Islands and subdivided into three island groups: Osumi, Tokara and Amami Islands. Two additional island groups lie northwest of the Satsunan Islands: the Koshikijima and Uji / Kusagaki Islands. This chapter focuses only on the Nansei archipelago. As the climate of Kyushu is temperate and that of Ryukyu is subtropical, the islands can be regarded as a climatic transitional zone, in which many temperate and subtropical species come into contact.

Several reports on insect fauna of these islands have been published in Japanese. Unfortunately, no well organized publication has summarized the entire insect fauna of the area, other than AZUMA and KINJO (1987) and AZUMA *et al.* (2002), which are primarily checklists of the insect fauna of the adjacent Ryukyu Islands. These checklists treated over 8,000 species, and recorded about 4,000 species from Satsunan Islands. According to AZUMA *et al.* (2002), 3,054, 1,740, and 3,385 species of insects have been recorded from Osumi, Tokara, and Amami Islands, respectively. Many more species (*i.e.*, 4395) have been recorded from the Okinawa Islands, which are south of the Amami Islands. Although Okinawa is recognized as one of the most biodiverse areas in Asia, with 408 endemic species, 513 species are endemic to the Amami islands, reflecting the insect species richness of the Amami Islands and adjacent area. This section introduces characteristics of insect fauna in these areas below.

2. Characteristics of insect fauna in Osumi Islands

The Osumi Islands have various environments: Yakushima Is. has high mountainous area (about 2,000 m a.s.l.), Tanegashima and Mageshima Is. are flat, and Kuchinoerabujima and Iojima Is. with a very active volcanoes. Thorough surveys have been conducted on Yakushima Is. (OKADOME 1973, WATANABE 1980, NAKANE 1984, TAKAKUWA and FUJITA 2010), identifying many endemic species and subspecies of Coleoptera, Lepidoptera and Homoptera, *e.g.* *Dorcus striatipennis koyamai* (Nakane), *Prismognathus tokui* Kurosawa, *Dorcus rectus yakushimaensis* Tsuchiya, *Aesalus asiaticus sawai* Fujita & Ichikawa, *Leptura yakushimana* (Tamanuki), *Acalolepta masatakai* Makihara, *Necydalis yakushimensis* Kusama in Coleoptera, *Lyristes esakii* (Kato) in Homoptera, *Thermozeephyrus ataxus yakushimaensis* (Yazaki), *Scoparia yakushimana* Inoue, *Notocelia yakushimensis* Kawabe, *Trichoceroa yakushimaensis* Arita, *Phyllonorycter yakusimensis* (Kumata) in Lepidoptera. Yakushima Is. is also well-known as the southern limit of some hymenopteran species, *eg.* *Xylocopa appendiculata circumvolans* (Smith) and *Plyergus samurai* (Yano). Since the environment of the central high mountains ranges from subtropical to subarctic, many unique insects live there. Kuchinoerabujima Is. is home to the endemic species *Aphaenogaster erabu* Nishizono & Yamane, *Protaetia exasperate erabuana* Nomura, and is the northern limit of *Xylocopa amamensis* Sonan.

3. Characteristics of insect fauna in Tokara Islands

The Tokara Islands consist of 10 small islands extended north and south, and the insect fauna is characterized by a high endemic rate, as well as

being the northern or southern limit of the distribution of many species. Takarajima Is. is home to the endemic species *Crenitis (Acrentis) tokarana* Nakane, *Dorcus titanus takaraensis* (Fujita & Ichikawa), and *Rhabdoblatta takarana* Asahina, and is the northern limit of the ranges of *Zizina otis riu-kuensis* (Matsumura) and *Prosopogryllacris okadai* Ichikawa, southern limit of *Symploce striata* Shiraki. Akusekijima Is. is home to the endemics *Drilaster akusekianus* Nakane, *Melanotus akusekianus* Ohira, *Cryptophagus callosipenis* Grouvella, and *Camponotus kaguya* Terayama, and is the northern limit of *Hexacentrus unicolor* Audinet-Serville. Nakanoshima Is. hosts the endemics *Madrastos kazumai* Ochi, Johki & Nakata, *Panelus ovatus* Nomura and *Papilio dehaanii tokaraensis* Fujioka, and is the northern limit of *Rhyothemis variegata imperatrix* Selys, *Hermatobates weddi* China and *Curtos costipennis* (Gorham), and the southern limit of *Planaeschna milnei* (Selys). *Protaetia exasperate suwanoseana* Nomura is endemic to both Suwanosejima and Yokoatejima Is.

4. Characteristics of insect fauna in Amami Islands

Since Amami-Oshima Is. with Kakeromajima Is. has high mountains inland area and many mountain streams, they have diverse dragonfly faunas. *Asiagomphus amamiensis amamiensis* (Asahina), *Planaeschna ishigakiana nagaminei* Asahina, and *Coeliccia ryukyuensis amamii* Asahina are known as endemic subspecies, and the islands are the northern limit of *Matrona basilaris japonica* Förster, and *Rhipidolestes amamiensis* Ishida. Many endemic species in the other insect orders are found, e.g. *Pararrhynchium tsunekii* Tano & Yamane, *Vollenhovia amamiana* Terayama & Kinomura, *Pyrocoelia oshimana* Nakane, *Dorcus titanus elegans* (Boileau), *Diestrammena gigas* Sugimoto & Ichikawa and *Papilio okinawensis* Fruhstorfer etc.

Although Ukeshima Is. is a small island, it is very close to Amami-Oshima and Kakeromajima Is. The Ukeshima population of a stag beetle *Neolucanus protogenetivus* Kurosawa is distinct from the Amami-Oshima population and is regarded as an endemic subspecies. On Yoroshima Is., which is

also small and near Ukeshima Is., two stag beetle subspecies coexist: *Aegus subnitidus taurulus* Didier, which mainly occurs on Amami-Oshima Is., and *Dorcus titanus tokunoshimaensis* (Fujita & Ichikawa) from Tokunoshima Is.

Kikaijima Is. is also home to endemic species and subspecies, including *Nocticola uenoi kikaiensis* Asahina, *Agrypnus miyamotoi kikai* Kishii, and *Paracardiophorus tokara kikai* Kishii. Tokunoshima Is. has a central mountainous area like Amami-Oshima Is. and many endemic species and subspecies, e.g. *Dorcus amamianus kubotai* (Fujita & Ichikawa), *Drilaster iokii* Sato, *Tiphia tokunoshimana* Tsuneki, and *Planaeschna naica* Ishida (endemic to Tokunoshima and Amami-Oshima Is.).

Though Okinoerabujima Is. is relatively flat, it also has many endemic species, e.g. *Symploce okinoerabuensis* Asahina, *Aegus laevicollis tamanukii* Ichikawa & Imanishi and *Dorcus titanus okinoerabuensis* (Fujita & Ichikawa). Moreover, the island is known as the northern limit of the tropical lamp beetle *Curtos okinawanus* Matsumura.

5. Taxa-specific records and fragmented faunal records

The Atlas of Insects, -Common insects in Kyushu, Kagoshima area- (FUKUDA *et al.*, 2009) treated 2,542 species of common insects (286 Butterflies, 871 moths, 161 Dragon flies, 135 orthopterans, 668 beetles, 421 other insects) in Kagoshima including the islands, and recorded detailed distributional information. For some insect taxa, the distributional records in the island series were good, e.g. Aculeata in Hymenoptera (YAMANE *et al.* 1999), Odonata (HIRAMINE, 1981), Orthoptera (YAMASHITA, 2001), Cecidomyiidae in Diptera (YUKAWA, 1988), aquatic beetles in Coleoptera (MATSUI *et al.* 1988) and Cerambycidae in Coleoptera, (MORI, 1988).

Kagoshima Prefectural Museum continues to survey the insect fauna of some of the islands irregularly, focusing mainly on Osumi islands and Tokara islands, and the resulting insects lists have been published in *The Bulletin of the Kagoshima Prefectural Museum*. The reports in the past three decades for each island are as follows:

- 1: Yakushima Is.: KANAI (2011), NAKAMINE (2010)
- 2: Kuchinoerabujima Is.: HIROMORI, (1999a)
- 3: Kuroshima Is.: KANAI *et al.* (2012), NAKAMINE *et al.* (2007), EHIRA and ONODA (1996), HATADA (1987, 1990a), FUKUDA and HIROMORI (2002)
- 4: Takeshima Is.: NAKAMINE (2006)
- 5: Iojima Is.: HATADA (1990b)
- 6: Kuchinoshima Is.: KANAI and MORIYAMA (2012), NAKAMINE (2005), NAKAMINE and MORIYAMA (2010), and HIROMORI (1999b)
- 7: Nakanoshima Is.: KANAI and MORIYAMA (2012), NAKAMINE (2005, 2008), HIROMORI and YAMASHITA (2001), EHIRA (1996) and KUROE (1996)
- 8: Suwanosejima and Tairajima Is.: NAKAMINE and MORIYAMA (2010), NAKAMINE (2008), HATADA (1991), FUKUDA (1991) and FUKUDA and EHIRA (1992)
- 9: Akusekijima Is.: HIROMORI (2003), Ehira (1993)
- 10: Takarajima and Kodakarajima Is.: HIROMORI (2001) and KUROE (1994, 1995)

Numerous fragmented records for every island other than above-mentioned lists are included in volumes 1-63 for Satsuma (1950-2012); this is the bulletin of Kagoshima Entomological Club. However, I have not list them because of the limited space.

6. Agricultural pest insects

SETOGUCHI (2002) collected distributional information on agricultural pest insects, treating 431 insect species from 83 families and 16 species of Arachnida from five islands in the Amami Islands. Starting with this report, I modified his pest records in English and added some new records especially on Lepidoptera (Appendix, see page 151). Unfortunately, however, no good review of agricultural pest insects on the other islands has been published. Generally, the pest insect fauna on small islands is poor, but the Amami islands, which consist of Kikaijima Is., Amami-Oshima Is., Tokunoshima Is., Okinoerabujima Is. and Yoronjima Is., have a rich fauna, with both temperate and tropical pests, probably because of the agriculture practiced on the islands. Many temperate zone crops and vegetables are cultivated on the subtropical Amami Islands in winter.

7. Faunistic survey bias depending on taxa

Although many faunistic surveys have been conducted, knowledge on the total insect fauna of the islands inadequate because of bias in the insect groups targeted in every faunistic works. For example, considering the micromoths in the Gelechioidea, which are the main target of my taxonomic study, AZUMA *et al.* (2002) recorded only 22 species from eight families from Nansei archipelago, while recording 145 species or subspecies of butterflies in seven families. Therefore, I collected many specimens from major domestic museum and revised distribution information for Gelechioidea on the islands and found 81 species in 11 families from Nansei islands. Of these, 40 species of 11 families inhabit the Satsunan Islands (SAKAMAKI, 2013). However, I exclude some undescribed species from this list and because I could not obtain enough specimens to determine their distribution (SAKAMAKI, 2013). If I had included these species, the actual number of Gelechioidea species in the Nansei Islands would be double the number stated. Therefore, to determine the actual richness of the insect fauna, we should conduct more survey of the island.

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