



## Orthoptera

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# Chapter 4

## Orthoptera

Piotr Naskrecki

### Summary

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Only three species of the Tettigoniidae were recorded during the present RAP survey, two of which appear to be Sichuan endemics (*Tettigonia chinensis* and *Teratura geniculata*). In addition, the third, widely distributed Palaearctic species (*Phaneroptera falcata*) was recorded. All three species of katydids were recorded only at Site 2 (Tongling). Other recorded Orthoptera included two species of Rhabdophoridae, two Gryllidae, six Acrididae, and one Tetrigidae. One species of *Kingdonella* (Acrididae: Catantopinae) is possibly new to science.

### Introduction

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Orthopteroid insects, a group consisting of such animals as grasshoppers, crickets, katydids, and their relatives have long been used as indicator species in a variety of environmental assessments, including both urbanized areas and natural ecosystems (Samways 1997, 2005). What makes them suitable for such purposes is both their sensitivity to habitat degradation, such as floral changes or the presence of heavy metals in the soil, and the ease with which they can be collected and identified.

The fauna of the Orthoptera of China has been studied extensively over the last 150 years, and over 1,200 species have been reported from its large territory. The most recent catalog of grasshoppers (Otte et al. 2005) lists 875 species of these insects. Katydid and their relatives have been cataloged by Jin and Xia (1994) who list 339 species. Recently Naskrecki and Otte (2005) updated this list to include species described since 1994, bringing it to 377 species of the Tettigonioidae. The least studied group of Chinese Orthoptera are crickets (Grylloidea), with only 51 species listed by Otte et al. (2005).

The recent Rapid Assessment survey (RAP) to Ganzi Prefecture in Sichuan Province, which took place in September 2005, failed to reflect this apparent richness. A combination of the low temperatures of the late summer and high elevations of the surveyed sites (above 2,400 m) resulted in an extremely low number of collected species of the Orthoptera. These insects are associated primarily with warm, low-elevation habitats, and few species survive above the elevation of 2,500 m, especially late in the season. For example, fewer than 10 species of Chinese Tettigoniidae are known from sites at the elevation higher than 2,000 m. This dependence on warm, low-elevation habitats was clearly reflected in the results of the current RAP – the highest diversity of species was found at the lowest site (Tongling village, ~2,400 m). It was also the only site where katydids (Tettigoniidae) were present.

### Methods and study sites

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During the survey 3 collecting methods were employed for collecting katydids: (1) collecting at incandescent and mercury vapor (MV) lights at night, (2) visual search during the day and at night, and (3) net sweeping of the vegetation during the day and at night.

Net sweeping was employed in the vegetation along the roads within the forest, the forest understory, and natural openings within the forest, such as edges of streams or grassy hills. Sweeping was standardized by performing 5 consecutive sweeps in a series before the content of the net was inspected. Collecting at night was the most effective method at low elevation site (Tongling), where nights were warm, but significantly less effective at higher elevations. The MV collecting was done sporadically at each site between approximately 8 pm and 11 pm. This method yielded no

Orthoptera, probably due to low temperatures of most nights, which resulted in low levels of activity of flying insects.

In addition to physical collection of specimens, stridulation of acoustic species was recorded using the Sony MZ-NHF 800 digital recorder and a Sennheiser shotgun microphone. These recordings are essential to establish the identity of potential cryptic species, in which morphological characters alone are not sufficient for species identification. An ultrasound detector Pettersson D 200 was also used to locate species that produce calls in the ultrasonic range, undetectable to the human ear.

Representatives of all encountered species were collected and voucher specimens were preserved in 95% alcohol. Following the survey, all collected specimens of the Orthoptera were left in China for in order to verify their identity for the purpose of issuing an exportation permit by the Chinese Academy of Sciences. Unfortunately, virtually all these specimens were destroyed during their shipment to the United States after the permit had been issued. As a result, identification of most specimens proved to be impossible, and the following description of the collected species could not include all recorded species.

### Three sites were surveyed during the RAP, all at elevations above 2,000 m:

**Site 1.** Kuiyong site, Donggu Town, Danba County. August 22-26, 2005. Danba County, road S of Donggu town (2-17 km S) along Kui Yong creek valley, 30°29'-30°35'N 101°45'-101°47'E. Collection of the Orthoptera was done at elevations 3200-3700 m, in both deciduous forest and grassy openings along streams. No katydids (Tettigoniidae) were recorded at this site, and the only Orthoptera were two species of Rhaphidophoridae (camel crickets) and 3 species of Acrididae (grasshoppers).

**Site 2.** Tongling site, Pengta Town, Kangding County. August 29 to September 3, 2005. Road up Zhong Gu Lou gou Valley, 30°28.518'N-30°29.755'N, 102°17.709'E-102°19.178'E. This site, located at the relatively low elevation of 2390-2500 m was the only site where katydids were recorded. Night temperatures there were relatively high (14-17 °C), resulting in high acoustic activity of two species of the Tettigoniidae. Other Orthoptera at the site included two species of crickets (Gryllidae), one species of camel crickets (Rhaphidophoridae), and two species of grasshoppers (Acrididae).

**Site 3.** Decha site, Decha Town, Yajiang County. September 6-9, 2005. Valley south of Decha village. 29.66°N 100.76-100.78°E. This alpine site was the highest in elevation (3630-4700m) and no katydids were recorded there. The fauna of grasshoppers included at least five species, one of which (*Kingdonella* sp.) is possibly new to science.

## Results

Due to a combination of the late season, high elevations, and relatively high level of disturbance of most visited habitats, the number of recorded katydid species recorded during this RAP was shockingly low. Only three species were recorded, of which only two were recorded as multiple specimens. The remaining Orthoptera included two species of the Rhaphidophoridae, two species of the Gryllidae, one species of the Tetrigidae, and six species of the Acrididae.

**Katydids (Tettigoniidae):** The katydid fauna of China is very rich and high in endemic genera and species. Most of these species occur at elevations below 2,000 m, and their activity is often restricted to the warm summer months. Consequently, the present survey recorded very few species at the visited high elevation sites, late in the season.

*Phaneroptera falcata* (Poda, 1761) – This widely distributed species is known from the almost entire Palaearctic region, including central Asia, China, and Japan (Ragge and Reynolds 1998.) It is a small, slender katydid, feeding primarily on flowers and tender leaves. Males produce a faint call in the evening and at night; it is the only known katydid producing the song during the opening strokes of the fore wings (most katydids produce the call while closing the fore wings) (Heller 1988.) Multiple specimens of this species were recorded at the Site 2.

*Tettigonia chinensis* Willemse, 1933 – This large, predaceous species appears to be endemic to Sichuan Province. It could be heard at Site 2 after dark every night, and both males and females were observed feeding on insects.

*Teratura (Megaconema) geniculata* (Bey-Bienko, 1962) – This small, little known species is also endemic to Sichuan Province. Only one specimen was collected at Site 2.

**Camel crickets (Rhaphidophoridae):** The camel cricket fauna has not been studied extensively in China, and there is a high probability of finding new species on its territory. The present survey recorded two species of *Tachycines* (at Sites 1 & 2), yet their identity could not be confirmed due to the nearly complete destruction of the collected specimens during their shipment from China.

**Crickets (Gryllidae):** Only 51 species of crickets have been recorded from China, but this number represents but the fraction of the actual diversity of this hyperdiverse group. During the present survey one species of *Gryllus* (Gryllinae) and one of *Pteronemobius* (Nemobiinae) were collected at Site 2.

**Grasshoppers (Acrididae):** The grasshopper fauna of China is extremely rich, with at least 875 recorded species, many of them endemic. Like most Orthoptera, these insects show the higher levels of diversity at low elevations, with relatively few alpine or sub-alpine taxa. During the present survey two species of *Chorthippus* (Sites 1 & 2), one species of *Omocestus* (Gomphocerinae) (Sites 1 & 2), one species of *Bryodemina* (Oedipodinae) (Site 3), one species of *Podismopsis* (Site 3), and one of *Kingdonella* (Site 3) (Catantopinae) were recorded. The last species appears to be new to science, but the destruction of all its available specimens makes the final determination and description impossible.

**Pygmy grasshoppers (Tetrigidae):** The fauna of pygmy grasshoppers in China is virtually unknown. One species of *Tetrix* was collected at Site 2.

## Conservation Recommendations

Due to the small sample size of the recorded Orthoptera, and the inability to identify most of them, not conservation recommendations for the visited sites based on the Orthoptera sampling can be provided.

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