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# Incidence and distribution of False Katydids (Phaneropterinae) from district Mansehra

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**Abstract**
Extensive field surveys were carried out to collect Phaneropterinae fauna of district Mansehra during the year 2017 – 2018. A total of 562 specimens belonging to family Tettigoniidae, Subfamily Phaneropterinae, 6 tribes, 6 genera and 12 species. During the present study, *Trigonocorypha nr. angustata* Uvarov,1922, *Phaneroptera gracilis* Bei-Bienko, 1954, *Phaneroptera roseata*, Walker, 1869, *Letana rufonotata* (Serville, 1838) and *Himertula marmorata* (Brunner von Wattenwyl, 1891) have constructed new record for district Mansehra. Additionally, *Trigonocorypha unicolor*, Stål, 1873, *Trigonocorypha angustata*, Uvarov, 1922, *Phaneoptera spinosa*, Bei-Bienko, 1965*Phaneroptera bivittata* Bei-Bienko, 1954, *Ducetia japonica*, Thunberg, 1815 and *Himertula kinneari* (Uvarov, 1923) are re-dscribed from district Mansehra. Nevertheless, the study based on distributional data has shown as a useful tool for identification of Phaneropterinae fauna of district Mansehra.

**Keywords:** Phaneropterinae, Incidence, distribution

## 1. Introduction
District Mansehra is the land of diversified relief. It has different ecological zones from Alpine, sub alpine and sub-tropical zones. The land of Mansehra has great variety of insects including grasshoppers. The grasshoppers are generally grouped as short horn grasshoppers (caelifera) and long horn grasshopper (Ensifera) [1, 2]. District Mansehra is rich for long horn grasshopper, particularly for Phaneropterinae. The Phaneropterinae is a sub family of bush cricket or katydids belonging to family Tittigoniidae, sub order Ensifera and order orthoptera [2]. The name Phaneropterinae is based upon the old world genus Phaneroptera, meaning "visible wing" referring to the exposed tip of the inner wing [3].
They are among the largest wing katydids [4]. Their legs vary from genus to genus but the front and middle legs are always much short than the hind ones. The ovipositor and the male genitalia are also variable depending on the genus [5].
Till now a total of 47 species of Tettigonidae are described from different localities of Pakistan in which Phaneropterinae constitutes 43.6% [2]. Fourteen species belonging to Phaneropterinae have been recorded previously but half of the species were reported from Pakistan which belong to 8 genera and 5 tribes [2].
There are 85 described genera comprising nearly 2060 species described worldwide [6]. Ragge [6] carried significant work on the Phaneropterinae of African and Arabian region. He reported 27 genera as new to science while he revised 6 genera with keys, description and recorded 33 new species along with on new sub-species [6].
Ingrisch and Shishodia [7] catalogued the new taxa and distribution pattern of Tettigoniidae from India. They reported 1 new genus *Indogneta* 3 subgenera i-e, *Indoteratura*, *Nefateratura* and *Para-kuzicus* and 10 new species viz: *Mirollia compressa*, *Indogneta lata*, *Holochlora curvicera*, *H. longiloba*, *Tapieena latifolia*, *Letana mursigna* of sub family Phaneropteinae.
Katydid occur in a wide variety of habitats from trees, shrubs, herbs and grasses and swamps [8]. The present investigation was carried out to investigate the incidence and distribution of false katydids in district Mansehra.

## 2. Material and Methods
### 2.1 Collection
The samples were collected from different localities of district Mansehra with plains, hills, and agricultural lands with dense vegetation.

**2.2 Killing**
The collected insects of Phaneropterinae were killed and stored by using the methodology of Panhwar [2].

**2.3 Preservation**
The collected grasshoppers were pinned by using austrerliz insect pin put into the centre of pronotum. The different body parts including tegmina & wings were stretched on stretching board by giving attention to many dedicated parts like antennae, legs etc. to show important taxonomic features and variation among species were documented by different method. From one side the tegmina and wings were spread on stretching board with pins and the insects were left for 24 hrs. After that, abdomen was also set upstanding to show many taxonomic characteristics for viewers on complete dryness of sample. For cleaning the material dry camel hair-brush of zero number was used. After 24 hrs. The fully dried samples were removed from stretching board and then placed into insect cabinets with standardized labels, showing locality, name of species, collection date, name of collector and name of host plant. To preserve samples longer, the ball of naphthalene were kept in insects boxes [2].

**2.4 Method of Identification**
All the preserved samples were examined under a stereoscopic dissecting binocular microscope [2].

**2.5 Repository**
All the captured samples were housed in the Department of Zoology, Hazara University Mansehra, Pakistan.

**2.6 Data Analysis**
SPSS version 16.0 was used to analyse the data.

**3. Results and Discussion**
During the present study, single Subfamily Phaneropterinae, 6 tribes (Trigonocoryphini, Phaneropterini Ducetini, Holochlorini, Letanaeini and Himertulini), 6 genera (*Phaneroptera*, *Trigonocorypha*, *Ducetia*, *Holochlora*, *Letana* and *Himertula*) with 12 species i-e. *Trigonocorypha unicolor*, Stål, 1873, *Trigonocorypha angustata*, Uvarov, 1922, *Trigonocorypha nr. angustata* Uvarov,1922, *Phaneoptera spinosa*, Bei-Bienko, 1965, *Phaneroptera roseata*, Walker, 1869, *Phaneroptera gracilis* Bei-Bienko, 1954, *Phaneroptera bivittata* Bei-Bienko, 1954, *Holochlora japonica*, Brunner von Wattenwyl, 1878, *Ducetia japonica*, Thunberg, 1815, *Letana rufonotata* (Serville, 1838), *Himertula kinneari* (Uvarov, 1923) and *Himertula marmorata* (Brunner von Wattenwyl, 1891) have been recorded from district Mansehra. Earlier, Ragge [9] carried out work on the genus *Phaneroptera* and composed a revised key to Tettigoniidae species. He added one new species i-e, *Phaneroptera faagilis* to science and re-desrcibe *P. oretagea* Uvarov 1929, *P.bivittata* Bei-Bienko 1954 and *P. spinosa* Bei-Bienko 1954. Baroni *et al.* [10] carried detail survey on the 9 species of Ensifera and Caelifera of Bhutan, from Orthpteran fauna 15 were belonging to Tettigonioidea, 4 to Gryllacridoidea, 31 Grylloidea and 19 Caelifera. Nickle [11] studied the morphology and function of female sound producing organs in ensiferans with special reference to Phaneropterinae. He compared stridulatory file of 15 species pertaining to 4 genera of Phaneropterinae. Furthermore, he reported that stridulatory field of Phaneropterinae is complex, stout curved spines on dorsal surface of the anal area of right Tegmina in Phaneropterinae. Ragge [6] carried significant work on the Phaneropterinae of African and Arabian region. He reported 27 genera as new to science while he revised 6 genera with keys and description and recorded 33 new species along with on new sub-species. Kang *et al.* [12] worked out on the fauna and zonal distribution of Tettigonioidea from China and enlisted 58 species and they stated that Maximum population of Tettigoniidae i-e, 74.2% was occurred in field compare to the Gryllidae.
Massa [13] reported 44 species of Phaneropterinae from National Parks of Central Africa out of these 8 species viz: *Phlaurocentrum morrettoi*, *P.parotuberosum*, *P.elegans*, *Myllocentrum raggei*, *Poreuomena sanghensis*, *Centromoecha longicerca*, *C.maginicerca* and *Goetia purpurea* were new to science. Further, he also synonymized some species of Phaneropterinae. Panhwar [2] reported *Trigonocorypha nr. angustata* Uvarov,1922 from Hyderabad, *Phaneroptera gracilis* Bei-Bienko, 1954 from Sindh, *Phaneroptera roseata*, Walker, 1869 from Hyderabad, *Letana rufonotata* (Serville, 1838) from Karachi and *Himertula marmorata* (Brunner von Wattenwyl, 1891) from Chitral. At the present, *Trigonocorypha nr. angustata* Uvarov,1922, *Phaneroptera gracilis* Bei-Bienko, 1954, *Phaneroptera roseata*, Walker, 1869, *Letana rufonotata* (Serville, 1838) and *Himertula marmorata* (Brunner von Wattenwyl, 1891) have constructed new record for district Mansehra. Additionally, *Trigonocorypha unicolor*, Stål, 1873, *Trigonocorypha angustata*, Uvarov, 1922, *Phaneoptera spinosa*, Bei-Bienko, 1965*Phaneroptera bivittata* Bei-Bienko, 1954, *Ducetia japonica*, Thunberg, 1815 and *Himertula kinneari* (Uvarov, 1923) are re-dscribed from district Mansehra.
The highest population was recorded for *Trigonocorypha unicolor*, Stål, *Phaneroptera roseata*, Walker, 1869 and *Himertula kinneari* (Uvarov, 1923) with 16.19%, 12.63% and 11.56%, while lowest population of *Trigonocorypha nr. angustata* Uvarov,1922, *Letana rufonotata* (Serville, 1838) and *Holochlora japonica*, Brunner von Wattenwyl, 1878 2.49%, 3.55% and 4.27% respectively (Table I & Fig I). Hopefully, present study will contribute in the distribution of false katydids and useful tool for the identification of species.

**Table I:** Showing the Distribution of Species Phaneropterinae from District Mansehra

| Species | Tehsil Oghi (n=261) | | | | | Tehsil Mansehra (n=131) | | | | | Tehsil Balakot (n=170) | | | | Total n=562) | Percentage |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OP | KH | TW | DB | AG | MP | SV | KV | BFA | PKL | BP | KGV | BN | GH | | |
| *Trigonocorypha unicolor* | 10 | 8 | 7 | 5 | 6 | 5 | 5 | 4 | 4 | 4 | 7 | 9 | 6 | 11 | 91 | 16.19 |
| *Trigonocorypha angustata* | 3 | 3 | 8 | 4 | 4 | 3 | 4 | 2 | 2 | 2 | 2 | 4 | 4 | 2 | 47 | 8.36 |
| *Trigonocorypha. nr. Angustata* | 3 | 1 | 2 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 3 | 14 | 2.49 |
| *Phaneoptera spinosa* | 4 | 3 | 5 | 4 | 3 | 3 | 2 | 3 | 2 | 1 | 3 | 3 | 4 | 3 | 43 | 7.65 |
| *Phaneroptera gracilis* | 5 | 4 | 6 | 4 | 3 | 3 | 2 | 3 | 1 | 2 | 3 | 2 | 4 | 3 | 45 | 8.0 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Phaneroptera roseate* | 9 | 7 | 6 | 6 | 6 | 3 | 5 | 4 | 4 | 1 | 4 | 5 | 4 | 7 | 71 | 12.63 |
| *Phaneroptera bivittata* | 6 | 4 | 4 | 3 | 4 | 2 | 1 | 2 | 3 | 2 | 3 | 5 | 2 | 3 | 44 | 7.82 |
| *Holochlora japonica* | 3 | 2 | 3 | 1 | 3 | 0 | 1 | 0 | 2 | 0 | 2 | 1 | 0 | 6 | 24 | 4.27 |
| *Ducetiajaponica* | 5 | 4 | 6 | 4 | 5 | 1 | 2 | 1 | 4 | 1 | 4 | 4 | 5 | 4 | 50 | 8.89 |
| *Letana ruf onotata* | 3 | 3 | 0 | 3 | 3 | 1 | 1 | 0 | 1 | 1 | 2 | 1 | 0 | 1 | 20 | 3.55 |
| *Himertula kinneari* | 6 | 7 | 4 | 5 | 7 | 4 | 5 | 4 | 3 | 2 | 5 | 5 | 3 | 5 | 65 | 11.56 |
| *Himertula marmorata* | 3 | 5 | 3 | 5 | 6 | 3 | 2 | 3 | 2 | 2 | 3 | 4 | 3 | 4 | 48 | 8.54 |
| Total | 60 | 51 | 54 | 44 | 52 | 28 | 31 | 26 | 28 | 18 | 38 | 45 | 35 | 52 | 562 | 100 |

**Note:** OP=Oghi proper, KH=Khabal, TW=Tanawal,DB=Darband, AG+Agror, MP=Mansehra proper, SV=Srin valley, KV=Konsh valley, BFA=Baffa, PKL=Pakhal, BP=Balakot proper, KGV=Khagan valley, BN=Besian, GH=Ghari Habibullah

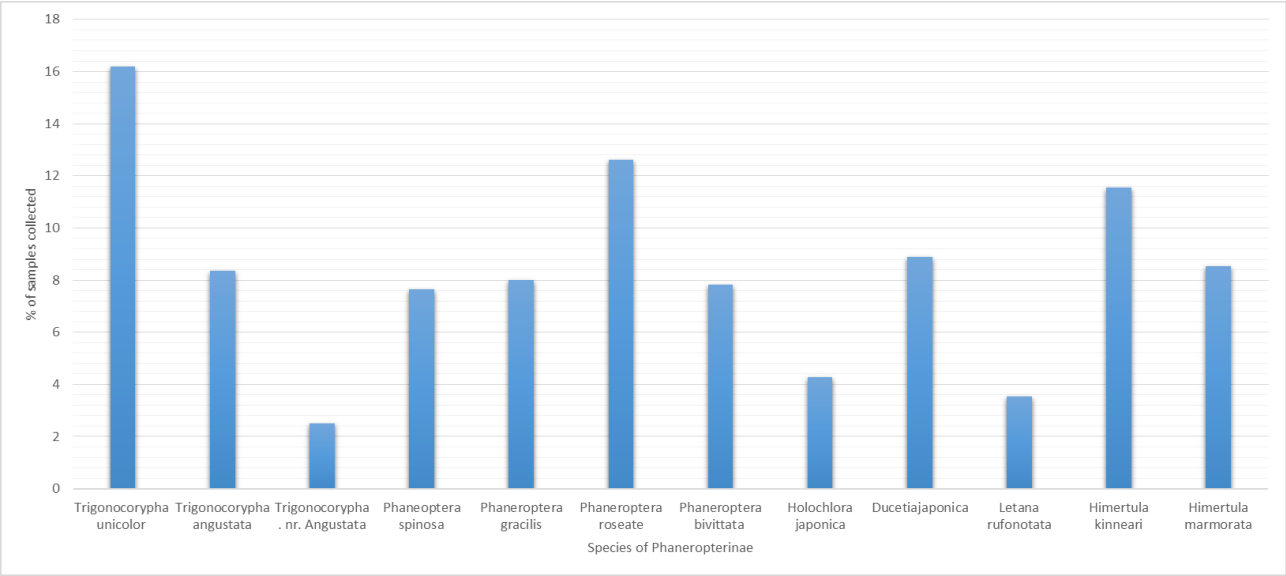


**Fig I:** Showing the Distribution of Species Phaneropterinae from District Mansehra

## 4. Conclusion

The present study concludes that if more surveys of False Katydids may be carried out in the studied locality may reveal the finding of new species or record.

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