Faunistical and taxonomical notes about Lucanidae in Nepal (Insecta: Coleoptera)

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Abstract
Notes about the distribution and the abundance of Nepalese Lucanidae and a key for the Nepalese species of the genera Serrognathus, Dorcus and Lucanus are given. Because a considerable variation of the external morphological characters sometimes causes difficulties in determination, pictures of the aedeagi and in a key the use of sexual characters of males are proposed.

Zusammenfassung

Key words: Coleoptera, Lucanidae, Nepal, faunistics, sexual characters, keys of determination

Introduction

Several expeditions to Nepal carried out in the last years by different museums gave the opportunity to study a variety of Lucanidae from Nepal and to present some notes about the distribution and the abundance of the species as well as the sexual characters of males in three genera of Nepalese Lucanidae.

Because several species are considerably variable in morphological characters and therefore the determination is not always easy, keys for three genera including the characters of the aedeagi should help to better succeed in determining species. Till now, the only key for Himalayan Lucanidae is the one by ARROW (1950), which doesn’t use sexual morphology. BOUCHER & HUANG (1991) gave pictures of the aedeagi of several species of Pseudolucanus and Boucher (1995) presented a very useful key for four species of this subgenus, however without including all Nepalese species.

Using the data of former studies about Nepalese Lucanidae and including data of new material, notes on the vertical and horizontal distribution as well as on the species’ abundance are discussed. At present, 51 species of 11 genera are known from Nepal (Sprecher & Bartolozzi 2002).

Material and methods

In this study, data of material (551 specimens) belonging to the Naturhistorisches Museum Basel (Switzerland), Naturkundemuseum Erfurt, Staatliches Museum für Tierkunde Dresden, Staatliches Museum für Naturkunde Stuttgart, Institut für Zoologie der Universität Mainz (Germany) and the Natural History Museum London (England) are included. Furthermore, some data were taken from the publications of Bartolozzi & Sforzi (1994), Araya (1995), Araya et al. (1998) and Sprecher & Bartolozzi (2002).

Faunistical notes

Vertical distribution
Figulus caviceps Boileau, 1902, Nigidius himalayae Gravely, 1915, Prosopoculus astacoides (Hope, 1840), P. biplagiatus (Westwood, 1855), P. giraffa (Olivier, 1789), and Dorcus antaeus Hope, 1842 were mainly found at an altitude below 1000 m.

Most species were found between 1000 m and 3000 m. Above 1000 m and until 2000 m 20 species were observed: Nigidius himalayae Gravely, 1915, Cyclommatus multidentatus (Westwood, 1848), Prosopoculus astacoides (Hope, 1840), P. parryi Boileau, 1913, Macrorhops bisignata (Parry, 1862), M. vernicata (Arrow, 1938), Serrognathus reichei (Hope, 1842), S. lineatopunctatus (Hope, 1831), S. titanus (Boisduval, 1835), Dorcus antaeus Hope, 1842, D. cylindricus Thomson, 1862, D. ratiocinatius Westwood, 1871, Neolucanus castanopterus (Hope, 1831), N. baladeva (Hope, 1842), Lucanus (s. str.) cantori Hope, 1842, L. (s. str.) lunifer Westwood, 1839, L. (s. str.) mearsii Hope, 1842, L. (s. str.) smithii Parry, 1862, L. (s. str.) westermani Hope & Westwood, 1845, and L. (Pseudolucanus) atratus (Hope, 1831).

Until 3000 m, 21 species were found: Aesalus sabuori Araya, Tanaka & Bartolozzi, 1998, Figulus caviceps Boileau, 1902, Hemisodorcus nepalensis (Hope, 1831), Serrognathus reich ei (Hope, 1842), S. lineatopunctatus (Hope, 1831), S. titanus (Boisduval 1835), Dorcus antaeus Hope 1842, D. cylindricus Thomson 1862, D. raticinatius Westwood 1871, D. saturalis Westwood, 1871, Odontolabis cayena Hope, 1842, O. siva (Hope & Westwood, 1845), Neolucanus castanopterus (Hope, 1831), N. baladeva (Hope, 1842), Lucanus (s. str.) smithii Parry, 1862, L. (s. str.) villusius Hope, 1831, L. (Pseudolucanus) atratus (Hope, 1831), L. (P.) confusus (Boucher, 1994), L. (P.) groutii (Planet, 1897), L. (P.) kerleyi (Boucher, 1994), L. (P.) oberthuieri (Planet, 1896).

Finally above 3000 m, only seven species were found; three of them belong to Pseudolucanus. They are Aesalus himalayicus Kurosawa, 1985, Hemisodorcus nepalensis (Hope, 1831), Serrognathus lineatopunctatus (Hope, 1831), Dorcus ratiocinatius Westwood, 1871, Lucanus (Pseudolucanus)
gracilis Albers, 1889, L. (P.) kerleyi (Boucher, 1994), L. (P.) oberthuieri (Planet, 1896).
While the genera Nigidius and Prosopocoius seem to occur at lower altitudes up to 2000 m, all species of Pseudolucanus prefer higher altitudes above 2000 m. All records of Neolucanus and Lucanus s. str. are from places between 1000 m and 2000 m. Together with most species of Pseudolucanus, also Aesalus himalayicus, Hemisodorcus nepalensis, Serrognathus lineatopunctatus, and Dorcus raticinatus are mountainous species, which can be found until very high altitudes. In Nepal, the highest altitude, where actually Lucanidae were registered, is 3600 m. The medium altitude of the places, where the species were found, is shown in fig. 1.

**Horizontal distribution**
As an example, Dorcus suturalis is a species found only in West Nepal and known from places west of Nepal (Himalayas, Kashmir, Afghanistan). On the other side, a species occurring in East Asia (Assam, Darjeeling) and found only in East Nepal is Lucanus (s. str.) mearsii.
Among the species of Pseudolucanus, two species, P. wittmeri (Lacroix 1984) (known from Pakistan and Nepal) and P. groulti (known from Northwest India and Nepal), show a more western distribution, while P. atratus (known from India, Sikkim, Bhutan, Nepal), P. confusus (known from Sikkim, Bhutan, Nepal), P. gracilis (known from Sikkim, Nepal) and P. oberthuieri (known from Sikkim, Nepal) occur in more eastern zones. Some species are partly sympatric, Among the species of Pseudolucanus with a more western distribution, P. groulti seems to occur in higher altitudes than P. wittmeri. Among the species with a more eastern distribution, P. gracilis was found only above 3000 m, the others also below. Whether the species were found in West, Central or East Nepal is shown in fig. 2.
Abundance
Serrognathus lineatopunctatus, Neolucanus castanopterus, and Dorcus raticincatius are the species, which were found the most. Nearly half of all specimens studied belong to these three species. Especially, Serrognathus lineatopunctatus seem to be very common in all parts of Nepal. Dorcus cylindricus, Dorcus suturalis, and Lucanus (Pseudolucanus) gralliti were found with more than 20 specimens, Nigidius himalayae, Serrognathus reichei, and Lucanus (Pseudolucanus) gracilis with more than 15 specimens. Till now, only a single record of Aesalus himalayicus, Cyclommatus multidentatus, Macrodorcas vernicata, Serrognathus tianus, Lucanus (s. str.) cantoni, and Lucanus (Pseudolucanus) confusus were registered in Nepal. The number of specimens of each species included in this study is shown in fig. 3.

Endemic species
Till now, Aesalus saburoi, Figul/us wittmeri, Prismognathus delslei, Prosopocilus fuscoindecus, Hemisodorus dierli, Lucanus (s. str.) villosus, Lucanus (P.) kerleyi and probably also Lucanus (P.) atratus are known only from Nepal.

Widely distributed species
All Nepalese species of the genera Serrognathus and Neolucanus are widely distributed all over the Asiatic continent. Serrognathus reichei, S. lineatopunctatus, S. tianus, Neolucanus castanopterus, and N. baladeva are known from many regions in Asia and occur from China until Indonesia. Most of them are also very common in Nepal.

Palaeartic species
The fauna of Nepal is mainly oriental, but a few palaeartic elements are known such as P. blanchardi tibetanus (Tibet, Nepal), D. suturalis (Himalaya, Kashmir, Afghanistan) or L. (P.) wittmeri (Pakistan, Nepal).

A key to species for three genera of Nepalese Lucanidae (males)

Genus Serrognathus (fig. 4)
1. Seventh joint of the antenna as long as the eighth, parameres with teeth, flagellum with two short appendages.......................... tianus
   - Seventh joint of the antenna not as long as the eighth, parameres without teeth.......................................................... 2
2. Mandibles with small teeth or none, distal part of the flagellum filiforme, gonoporus oblong.............................. lineatopunctatus
   - Mandible bearing a single strong tooth close to the base in small specimens, advanced and double in larger ones, flagellum robust and large.......................................................... reichei

![Fig. 4. Aedeagi of the three species of Serrognathus known in Nepal.](image)

Genus Dorcus (fig. 5)
1. Head and pronotum smooth or very finely granular.......................... 2
   - Head and pronotum rugose or strongly punctured................... 6
2. Shoulders of the elytra sharply angular........................................ 3
   - Shoulders of the elytra not sharp......................................... 5
3. Hind tibia bearing a lateral spine............................................. 4
   - Hind tibia without a lateral spine, flagellum with short appendages of about 1 mm length.................................... curvidens
4. Mandibles strongly curved, flagellum with long appendages of half of the length of the flagellum.............................. antaeus
   - Mandibles slightly curved, flagellum filiforme without appendages.......................................................... submolaris
5. Lateral angle of the pronotum blunt, distal part of the flagellum much longer than the appendages, gonoporus oblong........ suturalis
   - Lateral angle of the pronotum acute, distal part of the flagellum not much longer than the appendages, gonoporus slender... raticincatius
6. Shoulders of the elytra rounded, flagellum about 5 mm long............... velatius
   - Shoulders of the elytra sharply angular, flagellum about 3 mm long... cylindricus
Genus *Lucanus*
Mandibles much longer than the head and with teeth
Mandibles short and little toothed or toothless

**subg. Lucanus s. str.**

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<td>1.</td>
<td>Antennal club more or less short and tritile.</td>
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<td>2.</td>
<td>Antennal club oblong and tetrafile.</td>
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<td>3.</td>
<td>Interior carena smooth without a tooth, flagellum of the aedeagus more than 20 mm long.</td>
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<td>4.</td>
<td>- Antennal club oblong and tetrafile.</td>
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<td>5.</td>
<td>- Mandibles with a tooth at the interior side, flagellum of the aedeagus much shorter.</td>
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<td>6.</td>
<td>- Mandibles strongly curved and with a faint tooth, flagellum of the aedeagus large at the proximal part and getting thinner to the distal part.</td>
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<td>7.</td>
<td>- Mandibles less curved and with a distinct tooth, flagellum on the whole length more or less of the same width.</td>
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<td>8.</td>
<td>- At least one tooth at the interior side of the mandibles.</td>
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<td>9.</td>
<td>Epistoma trid, proximal part of flagellum only slightly winged and little sclerotised, anterior border of the gonapophor strongly convex.</td>
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<td>10.</td>
<td>- Epistoma concave, proximal part of flagellum largely winged and strongly sclerotised, anterior border of the gonapophor straight.</td>
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<td>11.</td>
<td>Mandibles strongly curved and with a faint tooth at the inner side, flagellum of the aedeagus more than 5 mm long, gonapophor triangular.</td>
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<td>12.</td>
<td>- Tooth at the internal side of the mandibles robust, flagellum of the aedeagus not longer than 4 mm long, gonapophor oblong and small.</td>
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**subg. Pseudolucanus**

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**Discussion**

As Nepal is a country more and more investigated, the number of Lucanidae known in Nepal will certainly increase in the next years. Each investigation reports new records for Nepal. Six species are only known by single specimens and it is to found that in future more species, even as a single specimen, will be discovered.

For the determination of Nepalese species of Lucanidae, the comparison of the characters of the aedeagi is quite useful. Although in some cases, especially among the *Lucanus* s. str., the aedeagi are rather similar, differences in the length
of the flagellum and the shape of the gonoporus can be distinguished. As a first step, the keys for males proposed here should clear some problems of determination among species of the genera *Serrognathus*, *Dorcus*, *Lucanus* s. str., and *Lucanus* (*Pseudolucanus*). There is no doubt, that a key using characters of genitalia and including all species from Nepal would be helpful. However, till now a clear definition of the present genera does not yet exist. This means, that first a full revision of all Nepalese genera would be necessary before a complete key for all species can be proposed. Mainly the status of the genus *Serrognathus* is doubtful. Furthermore, *Serrognathus lineatopunctatus* and *Dorcus submolaris* are supposed to be synonyms, *D. submolaris* being small specimens of *S. lineatopunctatus*. A further problem is the determination of the females. The females of many species are rather similar each other and the characters used in keys are not always sufficient. As a result, doubtful determinations may occur. Thus, the use of characters of female genitalia should help to eliminate such doubts. The study of female genitalia could therefore be a future project with the aim to be able to propose a well working key for the females of Nepalese Lucanidae.

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References


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