An update list of Pamphagidae Brumster 1840 (Insecta: Orthoptera) of Iran with a key to the genera

Seyed Hossein Hodjat

Jalal Afshar Zoological Museum, Faculty of Agriculture, University of Tehran, Karaj, Iran.

Abstract: The Orthoptera family Pamphagidae is classified differently by various authors. The family recently has been grouped into five subfamilies: Akinerinae, Priotropinae, Tropidauchinae, Nocarodesinae and Pamphaginae. This family has 103 species in Iran. Here, a key to genera is provided which identifies 10 genera with 33 winged species in Trinchini, and 11 genera with a total of 70 wingless species. Saxetania Mischenko and Tropidauchen Saussure have many characters in common and were combined into a single genus in the past. However, here both genera are considered valid with 16 recorded species for Saxetania and 7 recorded species for Tropidauchen. The morphological differences between them are described. A list of Pamphagidae species recorded for Iran is provided with a short revision of their taxonomy.

Keywords: Iran, Pamphagidae, Saxetania, Tropidauchen

Introduction

Iran has a high biodiversity of wild plants and animals. Many insects are coexisting with these plants. Climate warming is gradually changing the distribution of these plants and animals to higher regions with more rainfalls. Pamphagidae survive the winter in the nymphal stage (Uvarov, 1966). Most species of Pamphaginae have restricted and well described geographical ranges in Iran. Species of the wingless Pamphagini tribe are more restricted to their local habitats than winged tribe Thrinchini. For example, Acrostia euphorbiae Garcia-Becerra & Oromi, 1992. (Pamphagidae) is dependent to Euphorbia lamarckii for food and avoiding predation (Lopez et al., 2007). We have no knowledge of the local distribution and habitats of Pamphagidae species in Iran. The first step for species identification is to differentiate various genera recorded in Iran. The morphological traits and food plant association of various species in Pamphagidae genera require careful phylogenetic and ecological studies.

A list of 291 species and subspecies of Iranian grasshoppers is published by Mirzayans (1959). Many species in Shumakov’s (1963) list are not in Mirzayans records. Garai’s (2010) list of Orthoptera collected during 2000-2005 in Iran contains 157 species of Orthoptera and 109 species of Acridoidea. Garai (2010) arranged Pamphagidae species in accordance with Zhang et al. (2003). A few species mentioned by Myrzayans (1959) and Shumakov (1963) are now synonyms or are in different taxonomic positions. However, some of the species mentioned by Myrzayans (1959) are not in Shumakov’s list. Shumakov (1963) did not include subspecies in his list. Mirzayans (1979) followed Dirsh’s (1952) proposal and without any explanation produced a new list of Pamphagidae of Iran by changing the Iranian species of Saxetania Mischenkeno, 1951 to Tropidauchen Saussure, 1887. Two genera in the tribe Thrichnini, Tropidauchen and

---

Handling Editor: Dr. Ali Asghar Talebi

*Corresponding author, e-mail: seyedhossein.hodjat@yahoo.com

Received: 17 April 2012; Accepted: 4 September 2012
Saxetania are superficially similar and have been frequently confused by taxonomists in the past. In Tropidauchen the frontal ridge is rounded in profile and is without a depression under the median ocellus. In Saxetania a distinct depression is seen under the median ocellus in profile view of the frontal ridge (Bei-Bienko and Mishchenko, 1951). The list of Acrididae published by Mirzayans (1979, 1998) does not agree with the recent list of species of Orthoptera (Eades et al., 2011). Examination of many species in these two genera proved that Saxetania is a valid genus with 16 species in Iran. All 14 species of Saxetania in Mirzayans (1959) list have been changed to Tropidauchen by Mirzayans (1998).

Table 1 and the key to genera of Pamphagidae explain most of the morphological differences described in this family.

### Material and Methods

Garai (2010) collected most Acridoidea from Iran by systematic searching and netting. Species of the genera Nocarodes, Paranothrotes, Saxetania and Tropidauchen were generally found at early sunrise. Exact locality and the collection dates or subspecies position which are not given by Shumakov (1963) were given by other authors (Myrzayans 1959, 1998; Bei-Bienko and Mishchenko, 1951; Eades et al., 2011). In addition specimens stored in the Afshar Museum of the University of Tehran were included in this study which amounted to four boxes of Trinchini and three boxes of Pamphagini with about 20 insects in each box.

### Classification of Pamphagidae

Pamphaginae was first divided to two tribes: Thrinchini and Pamphagini (Bei-Bienko and Mishchenko, 1951). However, Shumakov (1963) divided Pamphaginae into three tribes: Thrinchini, Pamphagini and Uvaroviini. Uvarov (1966), Dirsh (1952) and Storzhenko and Paik (2011) divided Pamphagidae into the subfamilies Pamphaginae and Akinerinae. In all these attempts of classification the major division was made between winged and wingless forms of Pamphagidae.

Detail classification of Storozhenko and Paik (2011) divided Pamphaginae into Euryparphini, Finotiini, Haplotropiini, Nocarodeini and Pamphagini. The division of Pamphagidae into Akinerinae, Prionotropisinae, Tropidaucheninae, Nocarodesinae and Pamphaginae is used by Eades et al. (2012) in the Orthoptera species file. The taxonomy of Pamphagidae is also revised and explained with further comments in Zhang et al. (2003) and Storozhenko and Paik (2011).

### Table 1 The diagnostic characters of Tropidauchen from Saxetania.

<table>
<thead>
<tr>
<th>Morphological Characters</th>
<th>Tropidauchen</th>
<th>Saxetania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presternal process between fore coxa</td>
<td>Cylindrical or sharp apices</td>
<td>Dome or wedge shaped</td>
</tr>
<tr>
<td>Shape of the hind femur</td>
<td>Do not narrow to the apex</td>
<td>Narrowing to the apex</td>
</tr>
<tr>
<td>The dorsal or the upper lobe of the hind femur</td>
<td>Extends up to the apex</td>
<td>Not reaching the apex</td>
</tr>
<tr>
<td>Profile view of the head</td>
<td>Vertex vertical</td>
<td>Frons and vertex slightly sloping</td>
</tr>
<tr>
<td>Hind femur</td>
<td>Less narrowed towards the distal end</td>
<td>More narrowed towards the distal end</td>
</tr>
<tr>
<td>Width of hind femur before the genu</td>
<td>1/2 - 2/3 greater</td>
<td>1/4 - 1/3 greater than the greatest width of the ventral genicular lobe</td>
</tr>
<tr>
<td>Frontal ridge</td>
<td>Rounded</td>
<td>With a distinct notch</td>
</tr>
<tr>
<td>Frontal ridge at median ocellus</td>
<td>Without depression</td>
<td>With a depression</td>
</tr>
</tbody>
</table>
Results

Taxonomic characters of Pamphagidae
- Vertex is completely horizontal projecting anteriorly between eyes.
- Hind femora between longitudinal carinae only with tubercles and small ridges and without regular feather shaped areas.
- Vertex sometimes inclined and forming an obtuse widely rounded angle bringing frons and foveolae very close together.
- Pronotum often projecting in a point in front above the occiput; anterior margin either raised like a plate or with a process or conical tubercles, or only slightly convex in the anterior part.
- Transverse groove of mesosternum in the middle often extending posteriorly between the lateral lobes.
- Tegmina developed with an open median field and without a median spurious vein.

Pamphagini
- No flight organ or they are strongly abbreviated.
- Median carina of pronotum never intersected by the transverse groove, straight or arcuate.
- Middle tibiae of the male without tubercles along the dorsal margin.
- Fastigium always edged with ridge.

Trinchini
- Flight organs completely developed.
- Median carina of pronotum distinctly incised by the posterior transverse groove or sharply depressed in the metazona.
- Middle tibia of the male usually with a row of tubercles along the dorsal margin.
- Fastigium often broad and frequently without ridge along the margin; if with ridge, then with well marked procellar foveolae.

The following key is adopted from Bei-Bienko and Mishchenko (1951).

Key to subfamilies and genera of Pamphagidae

1. Median carina of pronotum distinctly incised by the posterior transverse groove or sharply depressed in the metazona; organs of flight present but may be reduced; middle tibia of the male usually with a row of tubercles along the dorsal margin; fastigium often broadened and without a marginal ridge; if bordered by a ridge then with a procellar foveolae (TRINCHINI) ..................................................2

- Median carina of pronotum never intersected by a transverse groove straight or arcuate; no flight organs; middle tibiae of the males are without tubercles along the dorsal margin; fastigium edged with a ridge; no procellar pit (PAMPHAGINI) ........................................13

2. Pronotum roof-like; median carina when examined from the side, at least slightly arcuate; narrowly cut into by the posterior transverse groove, metazona always convex in cross section; median carina of pronotum is raised high up ..................................................3

- Pronotum saddle shaped; in the prozona the median carina in profile always raised; median carina is depressed posterior of transverse groove; median carina is always low at the beginning of the metazona but it may be raised posteriorly ..................................................5

3. Prosternum without a strong lamellate process on the anterior margin; fastigium roundly projecting forward ........................................4

- Prosternum with strongly raised anterior margin, in the form of a plate or a bi-dentate process; fastigium narrowly cut into by a groove of the frontal ridge..................................................9

4. Tegmina are long reaching the middle of the hind tibiae, or far beyond the posterior knee….5

- Tegmina are not very long, in the female not reaching the posterior knee; hind femur is usually wide and flat, their dorsal carina high, plate-like, straight in profile, reaching to the end of the knee; wings blue with a wide dark band...................... Iranotmethis Uvarov, 1943

5. Posterior lateral border of pronotum with rounded margin and is turned caudad; empodium between the claws of the tarsus is very small and narrow, shorter than half the claw; wings with a dark spot or with darkened veins on the apex; the dark band begins in the middle of the anterior margin of the wing, or the wings are dark for the greater part; hind tibia brightly colored red, yellow or dark..................... Eremopeza Saussure, 1888
- Posterior lateral border of pronotum narrow, pointed, and at least partly turned caudad; empodium between the claws of front and middle tarsi in the male wide, triangular, narrowly reaching the middle of the claws; wings transparent on the apex; the dark band narrow, weak and sometimes incomplete, situated closer to the apex of the wing than to the base; hind tibiae are sulfur-yellow.

………………..…

Eremotmethis Uvarov, 1943

6-Median carina of pronotum with a low thin longitudinal groove, straight in profile; metazona flat, acute angled, with straight thickened margins; frontal ridge narrow below the ocellus and strongly narrowed towards the clypeus; fastigium is projecting forward at an angle………………Eremocharis Saussure, 1884

- Median carina of pronotum without a thin longitudinal groove, distinctly raised in the prozona, sharply lowered behind the posterior transverse groove…………………………7

7- Body covered by dense long hairs; metazona without thickened margin; hind femur greatly widened at the base, dorsal carina distinctly depresses in the pre-genicular part; vertex depressed, greatly roughened; foveolae with distinct margins….. Asiomethis Uvarov, 1943

- Body not covered by long dense hair …………………7

8-Wings black with a light apex; metazona of pronotum posteriorly acute angled, with thickened margin; tympanal lobe transversely quadrangular; tegmina of the female abbreviated and not reaching posterior genu. …………………Melanotmethis Uvarov, 1943

- Wings often red; vertex nearly smooth, without tubercles or small ridges, anteriorly narrowly cut into by the frontal ridge; lateral margin raised a little with blunt edge; tympanal lobe very large, covering half of the opening of the tympanal organ …………Tmethis Fieber, 1853

9- Anterior margin of pronotum without acute angled process in the middle of the anterior margin; prosternum not swollen, only slightly convex in the anterior part, anterior margin only slightly raised …………………………………………

………………Thrinchus Fischer von Waldheim, 1833

- Anterior margin of pronotum with a strong sharp process in the middle; margin of lateral lobes acute; prosternum swollen; anterior margin strongly raised in the form of a plate and covering the mouth from below………………Strumiger Zubovski, 1896

10- Tympanal organ present on first abdominal segment; median carina of pronotum is high and arcuate. ……………………………11

- Tympanal organs are absent from the first abdominal segments; median carina of pronotum not very high…………………….. 14

11- Antennae with 14 segments; tergites of abdomen with paired rounded distinct tubercles or darker spots ……………………..

……………… Neoparanothotes Mirzayans, 1990

- Antennae 12 segmented; abdominal tergites without paired dark spots or distinct tubercles……………………………………12

12- Median carina of pronotum with a median groove; the basal part of coxae of first legs with a distinct lamellate projection ……………………..Paranothotes Mishchenko, 1951

- Median carina of pronotum without a groove and in profile low or straight; mesosternum with wide transverse lateral lobes, the greatest width of the lobe greater than its length. ……………………Ananothodes Mishchenko, 1951

13- Vertex in profile nearly vertical; ridges of fastigium meet at occiput (Fig. 1); prosternal process cylindrical with pointed apex (Fig. 2); median carina of pronotum perfectly arcuate and without basal projection (Fig. 3); mesosternal lophi are separated by arc shaped ridges; a balloon shaped ridge with a median nipple is seen between the two lophi (Fig. 4); hind femur is gradually narrowing towards apex (Fig. 5) ………………………………..

……………….. Tropidauchen Saussure, 1887

- Vertex in profile slopes moderately. Ridges of fastigium of two edges cross on occiput (Fig. 6); prosternal process with flat or wedge shaped apex (Fig. 7); pronotum with straight median carina, if arcuate then with basal process (Fig. 8); mesosternal lophi are separated by rectangular ridge and without upper balloon shaped ridges (Fig. 9); hind femur is not gradually narrowing towards the apex (Fig. 10).……………… Saxetania Mishchenkov, 1951
14- Dorsal lobe of hind femur with strongly developed carina; the femoral carina with finely sinuous dorsal margin and with a preapical notch which can be very low ........................................ 15
15- The median process of metasternum strongly depressed in the region of mesosternum; pronotum strongly widened in the median part, greatest width considerably greater than its length; its anterior part without lateral carina; median carina of pronotum without a longitudinal median groove or the groove is indistinct. ............... Bufanocarodes Mishchenko

- The median process of metasternum is strongly projecting into the region of mesosternum; pronotum slightly widened in the middle part; greatest width is equal to or distinctly less than its length; pronotum with lateral carinae on its anterior parts; frontal ridge slightly projecting forward; median carina of pronotum with an indistinct or without a longitudinal median groove .............................................................................. Nocarodes Fischer von Waldheim, 1846

16- Body slender; frons, in profile, slightly sloping; frontal ridge in the dorsal half nearly parallel-sided, below the median ocellus sharply diverging toward the clypeus; metasternum narrow; its greatest width less than the length of the meso- and metasternum together. ................. Araxiana Mishchenko, 1951

- Body stout; frons in profile not sloping; frontal ridge gradually diverging towards the clypeus; metasternum wide, greatest width equal to or greater than the length of the meso and metathorax together ........................................ 17
17- Median carina of pronotum without median longitudinal groove; fastigium bordered by small ridge; pronotum with two lateral carinae on each side; hind femur has small teeth on the dorsal margins of their femoral carina; dorsal lobe of femur slightly and uniformly developed .......... Savalania Mishchenko, 1951

- Median carina of pronotum with a median longitudinal groove ........................................ 18

18. Median groove is sharply narrowed towards the posterior margin ........................................ Paronocaracris Mishchenko, 1951

- Median carina of pronotum with a median groove throughout its length ........................................ 19
19. Frontal ridge in profile dorsally strongly projecting; median carina of pronotum with a sharp longitudinal groove reaching its length; prothorax with a strongly developed anterior margin; anterior margin of prothorax in the form of a semicircular collar.

.................................................. Iranacris Mishchenko 1951

- Frontal ridge in profile strongly sloping; median carina of pronotum not intersected by a transverse groove ....... Nocaracris Uvarov, 1928

Taxonomic characters of Tropidauchen Saussure, 1887
- Frontal ridge in profile rounded and without a notch under the median ocellus.
- Vertex in profile nearly vertical, fastigium is bordered by a ridge.
- No preocellar foveolae.
- Median carina of pronotum arcuate, not intersected by a transverse groove.
- Tegmina and wings reduced or completely absent.
- Middle tibiae in the male without tubercles along the dorsal margin.
- Hind femora slightly narrowed toward the distal end.
- Dorsal lobe of femur reaching its dorsal end without narrowing.
- Dorsal margin of hind femur with large pointed spines, ventral lobe slightly narrowed toward the distal end.
- The width of hind femur before the genu is ½-2/3 the greatest width of the ventral genicular lobe.
- Prosternum with sharp median process.
- First abdominal tergite with a large tympanal organ.

List of Tropidauchen Saussure, 1887 species of Iran
Tropidauchen cristatum Mishchenko, 1951
T. flavipes Mishchenko, 1951
New list of Pamphagidae of Iran

J. Crop Prot.

T. iranicum Werner, 1939
T. marginatum Bolivar, 1912
T. pretetshenkii Mishchenko, 1951
T. serratum Mishchenko, 1951
T. viridis Bei-Bienko, 1950

Saxetania Mishchenko, 1951

Shumakov (1963) described the localities for 13 species. His list does not include the following species recorded by Mirzayans (1959): S. parmonovi (Dirsh), S. onerosa Mishchenko, S. muricana, two subspecies recorded from Khorassan, and S. nizwai (Dirsh) which is now a synonym of S. spinosa (Mishchenko, 1951).

Diagnostic characters of Saxetania Mishchenko, 1951
- Frontal ridge in profile with a distinct notch right under the median ocellus.
- The dorsal part of the frontal ridge projecting forward.
- Vertex in profile moderately sloping, fastigium bordered by a ridge.
- No preocellar foveolae.
- Median carina of pronotum arcuate, not intersected by transverse groove.
- Median tibiae of the male without tubercles along the dorsal margin.
- Hind femur strongly narrowed apicad, dorsal lobe not reaching the distal end but strongly narrowed towards it. Dorsal margin with large pointed spines.
- Ventral lobe of hind femur narrowed towards the distal end, width near the genu 1/4-1/3 the greatest width of the ventral genicular lobe.
- Prosternum with a sharp median process. First abdominal tergite with a large tympanal organ.
- 16 species described and all recorded in Iran.

List of Saxetania Mishchenko, 1951 species of Iran
S. alexandrovi (Bei-Bienko, 1950): the type species of the genus.
S. aelleni (Dirsh, 1952)
S. cultricollis (Saussure, 1887)
S. decumana Mishchenko, 1951
S. dehbidi (Dirsh, 1952)
S. edentulum (Uvarov, 1923)
S. elbursiana (Ramme, 1929)
S. escalarai (Bolivar, 1912)
S. irrasa Mishchenko, 1951
S. parmonovi Bei-Bienko & Mishchenko, 1951
S. popovi (Dirsh, 1952)
S. sabulosa (Uvarov, 1923)
S. spinosa (Mishchenko, 1951) (synonym: S. nizwai Dirsh, 1952)
S. onerosa Mishchenko, 1951
S. muricata muricata Mishchenko, 1951
S. m. femoralis Mishchenko, 1951

Other genera and species of Pamphagidae recorded in Iran

PAMPAGINI
Araxiana Mishchenko, 1951
A. voronowi (Uvarov, 1918)
Bufonocarodes Mishchenko, 1951
B. intricatus Mishchenko, 1951
B. robustus Mishchenko, 1951
B. sabaalanicus Descamps, 1967
B. mistshenkoi Descamps, 1967
B. m. mistshenkoi Descamps, 1967
B. m. luteipes Descamps, 1967
B. tumulosus Mishchenko, 1951

Iranacris Mishchenko 1951
Iranacris dentatus Mishchenko, 1951
Neoparanthorotes Mirzayans, 1990
N. broumandi Mirzayans, 1998
Nocaracris Uvarov, 1928
N. cyanipes (Fischer von Waldheim, 1846)
Nocarodes Fischer von Waldheim, 1846
N. armenus Ramme, 1951
N. balachowskyi Descamps, 1967
N. corrugatus Mishchenko, 1951
N. crispus Mishchenko, 1951
N. ebneri Ramme, 1951
N. gibbosus Mishchenko, 1951
N. humerosus Mishchenko, 1951
N. keredjensis (Werner, 1939),
N. nanus Mishchenko, 1951
N. scabiosus Mishchenko, 1951 (Descaps, 1967)
N. s. mistshenkoi Descamps, 1967
N. schelkovnikovi Uvarov, 1918 Collected from Maragheh, Iran Berlin zoo. Mus. = Paranothrotes opacus
N. serricolis Fischer von Waldheim, 1846
N. specialis Mishchenko, 1951
N. urmianus Ramme, 1939
N. znojkoj Miram, 1938
Paranothoretos Mishchenko, 1951
P. citinus Mishchenko (Reported by Mirzayans from Kordestan)
Paranothoretos demavandi (Ramme, 1951)
P. diamesus Bei-Bienko, 1957
P. elbursianus (Ramme, 1951)
P. gotvendicus (Bolivar, 1912)
P. g. rectus (Mishchenko, 1951)
P. iranicus (Ramme, 1951)
P. margaritae (Miram, 1938)
P. ocellatus Mishchenko, 1951
P. opacus (Brunner von Wattenwyl, 1882)
P. opacus marginatae (Miram, 1938)
P. opacus nigripes (Schelkanovtzev, 1916)
P. opacus ornatus Mishchenkov, 1951
P. opacus apicalis (Bolivar, 1912)
P. opacus nigripes (Schelkanovtzev, 1916)
P. opacus ornatus Mishchenkov, 1951
Paranocaracris Mishchenko 1951
P. rubipes (Fischer von Waldheim, 1846)
(Enal, 2002)
Savalania Mishchenko, 1951
S. pulla Mishchenko, 1951 (Descamps, 1967)
Thrinchini
Asiotmethis Uvarov, 1943
A. artemianus Shumakov, 1949
A. turritus (Fischer von Waldheim, 1833)
Eremopeza Saussure, 1888
E. bicoloripes (Moritz, 1928)
E. cinerascens (Stal, 1875)
E. c. cinerascens (Stal, 1875)
E. c. virescens (Uvarov, 1933)
E. festiva (Saussure, 1884)
E. gibbera (Stal, 1876)
E. g. reducta (Uvarov, 1934)
E. g. lata (Uvarov, 1934)
E. gigas (Kirby, 1914)
E. saussurei (Uvarov, 1918)
Tmethis saussurei Uvarov, 1917; Synonym: E.
s. saussurei (Uvarov, 1917)
E. s. cinercencs (Uvarov, 1918)
E. s violacea (Uvarov, 1922)
Eremotmethis Uvarov, 1943
E. carinatus (Fabricius, 1775)
Eremocharis Philippi, 1860
E. granulosa (Walker, 1871)
E. g. khorasana Uvarov, 1933
E. g. bampura Uvarov, 1933
E. subsulcata (Stal, 1875)
Iranotmethis Uvarov, 1943
I. cyanipennis (Saussure, 1884)
I. c. kurdus Bei-Bienko & Mishchenko, 1951
I. c. cyanipennis (Saussure, 1884)
I. lutipes Bei-Bienko, 1951
I. persa (Saussure, 1888)
I. persa persa (Saussure, 1888)
I. p. zagrosi (Uvarov, 1933)
Melanotmethis Uvarov, 1943
M. fusciens (Redtenbacher, 1889)
Strumiger Zubovskii, 1896
S. desertorum Zubovskii, 1896
Tmethis Fieber, 1853
T. pulchripennis (Serville, 1838)
T. p. asiaticus Uvarov, 1943
Thrinchus Fischer von Waldheim, 1833
T. arenosus Bei-Bienko, 1948
T. arenosus arenosus Bei-Bienko, 1948

Discussion

Shumakov (1963) is the best reference for the Acridoidea of Iran. Many morphological traits for local forms forced Orthopterists to describe subspecies with overlapping characters. Perhaps this is the reason why Shumakov (1963) has omitted the subspecies of Iranian records from his list. The number of Acridoidea species recorded by Mirzayans (1959) shows a change from 291 to 157 records by Garai (2010). Garai might have missed to record many known species but the reduction in rain fall and climate change might have resulted in the loss of some species as well. A complete biodiversity check is required to measure the species loss in Iran.

Saxetania is morphologically distinct but the characters of some species overlap with Tropidauchen. Some of the main differences between the two taxa are as follows:

In Tropidauchen viridis T. cristatum T. serratum and T. flavipes muricata muricata the ridges on border of eyes cross in occiput (Fig. 1). In Saxetania enoda, S. cultricollis tumulus and S. cultricollis cultricollis ridges on the border of fastigium do not cross in occiput (Fig. 6). The
prosternal process in *Tropidauchen* is sharp with a median process (Fig. 2). In *Saxetania* it is conical or pyramidal with compressed sharp lateral apex or wedge shape with notch apex, in *S. cultricollis* (Sauss.) and *S. scutata* Mishchenco. (Fig. 7). Pronotum is arcuate in *Tropidauchen* (Fig. 3), but in *Saxetania* less arcuate or with a process in distal end (Fig. 8). In *Tropidauchen viridis* Bei Bienko, *T. serratum* Mishchenko, *T. cristatum* Mishchenko, *T. flavipes* Mishchenko, and *T. predtetshenskii* Mish. mesosternum is with balloon shaped ridge between the lophi with the nipple in between (Fig. 4). In *Saxetania* these balloon shaped ridges are not seen in *S. escaleriae* (Bolivar), *S. alexandrovi* (Bei Bienko), *S. cultricollis gibbosa* Mishchenko, *S. miramae* (Mishchenko), and *S. muricata femoralis* Mishchenco (Fig 9). In *Tropidauchen* hind femora is slightly narrowed toward the distal end. In *Saxetania* the ventral lobe of hind femur is suddenly and much narrowed at apex (Figs. 9, 10). Prevailing data proves that *Saxetania* is morphologically quite distinct and the Iranian species reported in this article are valid.

**Figures 1-10** Distiguishing characters of *Tropidauchen* and *Saxetania*: 1-*Tropidauchen serratum* Mishchenko (male), 2-*T. serratum* Mish. (male) and *T. cristatum*, 3- *T. viridis* Bei-Bienko (male), 4- *T. cristatum* Mish. (male), 5- *T. cristatum* Mish (male), 6- *Saxetania muricata muricata* Mish. (male), 7- *S. cultricollis cultricollis* (Sauss.) (male) and *S. scutata* Mish., 8- *S. onerosa* (female), 9- *S. escalerai* (I. Bol.) (male), 10- *S. elbursiana* (Rme.) (female). (Figures rearranged from Bei-Bienko and Mishchenko, 1951)
Acknowledgement

I am grateful to Dr. A. Saboori to permit me to study in Afshar Museum, University of Tehran. I also thank the editorial help of Dr. A. A. Talebi and for his helpful suggestions. Martin Husemann (Baylor University, Texas, USA) made numerous suggestions and comments for improving the manuscript. His help is greatly appreciated. I am grateful to Mr. Alikhani, keeper of the Afshar Museum, for his help.

References

Bei-Bienko G. J. and Mishchenko, L. L. 1951. Orthoptera fauna of the USSR and the adjacent countries. Academy of Sciences of the USSR.


فهرست جدید ملخ‌های کلیدشناسی جنس‌ها

در ایران به همراه Pamphagidae Brumster 1840 (Insecta: Orthoptera)

سید حسین حجت

موزه استاد جلال افشار، گروه گیاهپرستی، پردیس کشاورزی و منابع طبیعی، دانشگاه تهران.

* پست الکترونیکی نویسنده مسئول مکاتبه:
seyedhossein.hodjat@yahoo.com

دریافت: ۲۹ فروردین ۱۳۹۱؛ پذیرش: ۱۴ شهریور ۱۳۹۱

چکیده: کارشناسان مختلف ملخ‌شناسی خانواده Pamphagidae را به روش‌های مختلفی رده‌بندی می‌کنند. این رده‌بندی در ترتیب‌بندی جدید به پنج زیر خانواده Akinerinae, Priotropinae, Trinchiini, Nocarodesinae, Tropidauchinae تقسیم شده است. این مجموعه حاوی پانزده جنس Pamphaginae و گونه‌ها Pamphagini و Trinchiini در ایران به همراه دو گونه Saxetania Mishchenko و Tropidauchen Saussure مشترک می‌باشند و به رغم اینکه در گذشته هر دو در یک جنس ادغام شده بودند، ولی در این پژوهش هر دو جنس معنی‌شناسی و تفاوت شکلی آنها Tropidauchen و Saxetania هفت گونه از جنس Saxetania شده و نام شناسی گونه‌های جنس Pamphagidae با مورری بر رده‌بندی خانواده شرح داده شده است.

واژگان کلیدی: کارشناسان، ایران، تاکسومونی، کلیدشناسی، رده‌بندی، نویسنده مسئول، مکاتبه، پست الکترونیکی، پذیرش، دریافت، موزه استاد جلال افشار، گروه گیاهپرستی، پردیس کشاورزی و منابع طبیعی، دانشگاه تهران، Akinerinae, Priotropinae, Trinchiini, Nocarodesinae, Tropidauchinae, Pamphagidae, Pamphaginae, Pamphagini, Trinchiini, Saxetania Mishchenko, Tropidauchen Saussure, سید حسین حجت.