

A review of the genus *Eremohadena* Ronkay, Varga & Fábián, 1995 subgenus *Megahadena* Ronkay, Varga & Gyulai, 2002 with description of a new species (Lepidoptera, Noctuidae, Xyleninae)

Authors: Ronkay, Gábor, Ronkay, László, and Landry, Bernard

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A review of the genus *Eremohadena* Ronkay, Varga & Fábíán, 1995 subgenus *Megahadena* Ronkay, Varga & Gyulai, 2002 with description of a new species (Lepidoptera, Noctuidae, Xyleninae)

Gábor Ronkay¹, László Ronkay^{1*} & Bernard Landry^{2*}

¹ *Heterocera Ltd, H-1137 Budapest, Szent István krt 4, Hungary*

² *Muséum d'histoire naturelle de Genève, C.P. 6434, CH-1211 Genève 6, Suisse*

* *Corresponding authors: laszlo.ronkay2@gmail.com, bernard.landry@ville-ge.ch*

Abstract: The subgenus *Megahadena* Ronkay, Varga & Gyulai, 2002 of *Eremohadena* Ronkay, Varga & Fábíán, 1995 is revised and a new species, *E. (M.) peterschucherti* sp. nov. from Pakistan, Baltistan, is described. The adults and the genitalia of both sexes are illustrated for all three species: *E. (M.) rjabovi* (Boursin, 1970), *E. (M.) megaptera* (Boursin, 1970), and the new species.

Keywords: *Bryohadena* - *Graphantha* - *Gryphadena* - *Iberihadena* - *Megahadena* - *Orohadena* - *Pseudohadena* - *Pseudohadenina* - *Rhiza*.

INTRODUCTION

The genus *Pseudohadena* Alphéraky, 1889 was first revised by Ronkay *et al.* (1995). This revision divided the great assembly of species into *Pseudohadena s. str.* and the newly established genera *Eremohadena* Ronkay, Varga & Fábíán, 1995, *Orohadena* Ronkay, Varga & Fábíán, 1995 and *Graphantha* Ronkay, Varga & Fábíán, 1995, distinguishing *Dysgraphhadena* Ronkay, Varga & Fábíán, 1995 as a new subgenus within the latter genus. This work was continued by Ronkay *et al.* (2002) with the division of *Eremohadena* into two subgenera (*Eremohadena* and *Megahadena* Ronkay, Varga & Gyulai, 2002) and the separation of *Orohadena* (with its subgenus *Bryohadena* Ronkay, Varga & Gyulai, 2002) from *Eremohadena* while *Gryphadena* Kusnetzov, 1908 was considered as a subgenus within *Graphantha* since *Dysgraphhadena* was synonymised with *Graphantha*. Subsequently, *Rhiza* Staudinger, 1889 was re-instated by Fibiger & Hacker (2005) for the *commoda* lineage, as a subgenus of *Pseudohadena* and two formerly described supraspecific taxa, *Dysgraphhadena* and *Gryphadena*, were synonymised with *Rhiza*. Finally, Ronkay & Fibiger (in Fibiger & Ronkay, 2007) established a new subtribe, *Pseudohadenina* Ronkay & Fibiger, 2007 for this generic complex, upgraded *Rhiza* to generic level with three

subgenera, *Rhiza*, *Gryphadena* and *Graphantha* (stat. rev.), and described a new subgenus, *Iberihadena* Fibiger & Ronkay, 2007 for *mariana* (Lajonquière, 1964) and the *immunis* (Staudinger, 1889) species group.

The subtribe *Pseudohadenina* actually includes some 70 species in six genera. *Eremohadena* comprises 21 species (and their subspecies) in three subgenera. The taxa of the subgenus *Eremohadena* are arranged into five species groups (the *coluteae*, *siri*, *chenopodiphaga*, *pexa* and *catalampra* lineages); the subgenus *Iberihadena* has two species groups (*mariana* and *immunis* groups); while *Megahadena* contains two closely related allopatric species, *E. (M.) rjabovi* (Boursin, 1970) and *E. (M.) megaptera* (Boursin, 1970).

During a thorough investigation of the Plante Noctuidae Collection in the Muséum d'histoire naturelle de Genève (MHNG), a short series of an externally *megaptera*-like species was found from Pakistan, Baltistan. Investigations of the genitalia show only slight differences in the male genitalia but remarkable differences in the female genitalia between the dissected Baltistan specimen and the known *megaptera* populations (Turkmenistan: Kugitang-tau Mountains, Kazakhstan: Central Tien Shan region and the typical population in eastern Afghanistan). Thus, the Baltistan population is described below as a

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new species distinct from *E. (M.) megaptera*, i.e. *E. (M.) peterschucherti* sp. nov.

MATERIAL AND METHODS

The method of surveys was traditional taxonomic, based on materials of state museums and private collections, electronic databases and digitalised microscopic slides. We revised the comprehensive type material and other important voucher specimens from several internationally important European collections (see: Abbreviations).

The genital dissections were made with the technique published by Fibiger & Goater (1997). The cleaned genital capsule, everted vesica and female copulatory organ were stained with eosin red then mounted to Euparal.

The images are preserved in the photo catalogue of Heterocera Ltd, Budapest and the image database of the MHNG.

Terminology of genitalia follows Ronkay *et al.* (2011).

ABBREVIATIONS

HNHM – Hungarian Natural History Museum, Budapest, Hungary

LSNK – Landessammlungen für Naturkunde, Karlsruhe, Germany

MHNG – Muséum d'histoire naturelle, Geneva, Switzerland

MKB – Museum Koenig Bonn (Zoologisches Forschungsmuseum Alexander Koenig, Bonn), Germany

NHMW – Natural History Museum, Vienna (Naturhistorisches Museum Wien), Austria

OP – genitalia slides prepared by Oleg Pekarsky

PL – genitalia slides prepared by Jacques Plante

RL – genitalia slides prepared by László Ronkay

SYSTEMATIC PART

Genus *Eremohadena* Ronkay, Varga & Fábíán, 1995

Eremohadena Ronkay, Varga & Fábíán, 1995, *Acta Zoologica Academiae Scientiarum Hungarica* 41(3): 277. Type species: *Mamestra siri* Ershov, 1874, by original designation.

Diagnosis: The diagnostic features of the genus, in comparison with *Pseudohadena s. str.* are given in detail in the original description and later, in the 9th volume of the Noctuidae Europaeae (Fibiger & Hacker, 2007).

Bionomics and distribution: The members of the genus inhabit often both the xeromontane and the lowland desert and steppe biotopes (hence the derivation of the generic name). The species are univoltine, having a characteristic life cycle: the freshly emerged moths are active in the spring and the early

summer period, then aestivate and appear again at the end of the summer. Females may lay eggs in the autumn, but in certain species they may overwinter and lay the eggs only at the end of the winter; hence, the development of all *Eremohadena* species is probably very rapid.

The genus *Eremohadena* has a vast distribution range, extending from the Atlas Mountains to Mongolia and Transbaikalia. Only two species have wider Eurasiatic ranges while the others are more or less stenochorous.

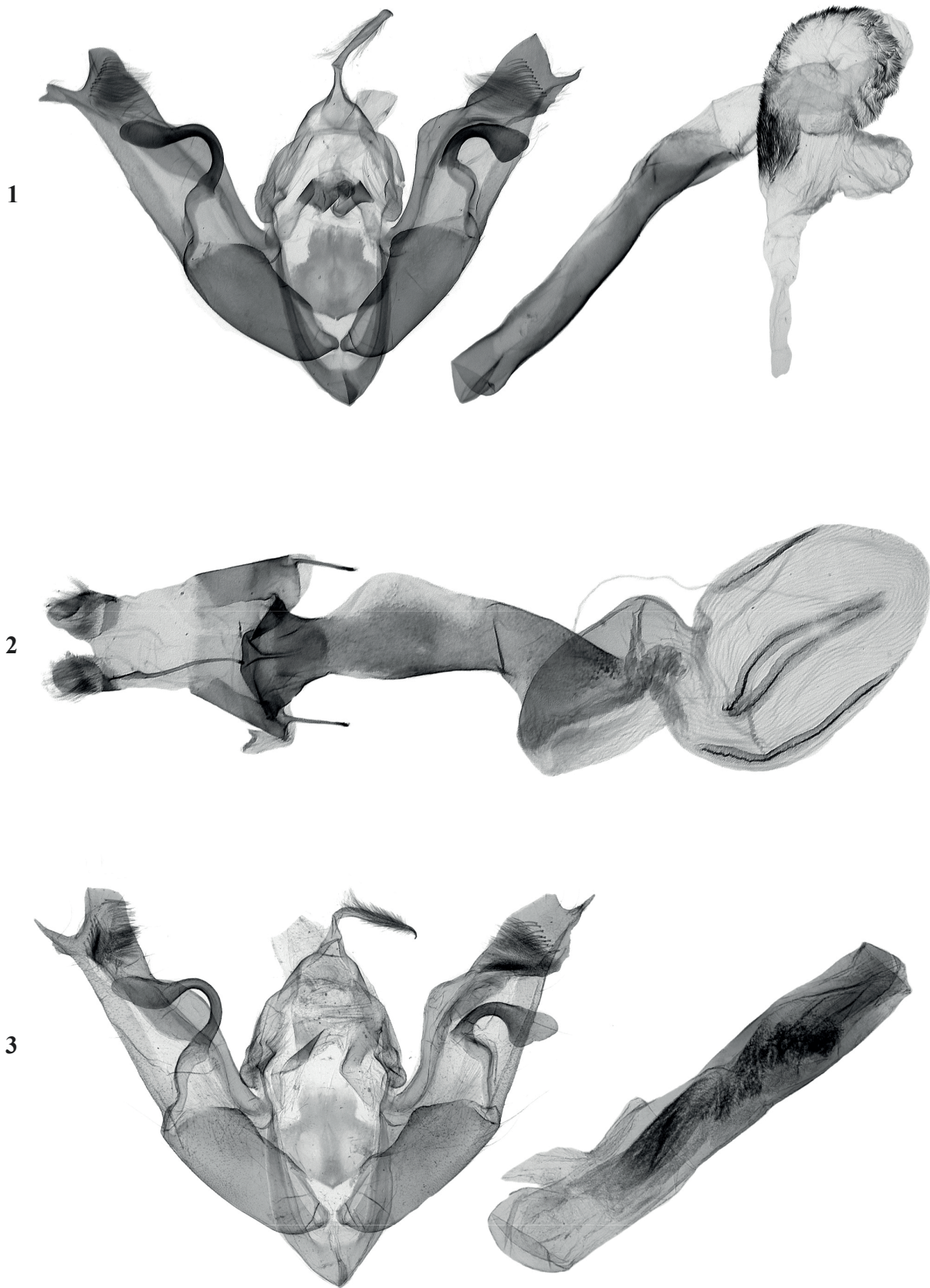
Subgenus *Megahadena* Ronkay, Varga & Gyulai, 2002

Megahadena Ronkay, Varga & Gyulai, 2002, *Acta Zoologica Academiae Scientiarum Hungarica* 48(1): 65. Type species: *Pseudohadena rjabovi* Boursin, 1970, by original designation.

Taxonomy: The subgenus includes three allopatric species, *E. (M.) rjabovi* (Boursin, 1970), *E. (M.) megaptera* (Boursin, 1970), and *E. (M.) peterschucherti* sp. nov.

Diagnosis: The original description still includes the characters of the later separated subgenus *Iberihadena*, therefore a short characterisation of *Megahadena* is provided here. The most typical apomorphy of the group is the striking dissymmetry of the male claspings apparatus (Figs 1, 3, 5) which is expressed mostly in the two harpes (claspers), in the shape and sclerotisation of the two cuculli. The aedeagus (phallus) is long and straight, not arched and distally tapering as in *Eremohadena*, the vesica is shorter and less complex, lacking the strong medial curve and the terminal cornutus being typical of *Eremohadena* and only smaller or larger scobinate or finely spinulose fields are present, consisting of minute, rather hair-like spiculi. The diagnostic features of the female genitalia (Figs 2, 4, 6) are the sclerotised antrum and long, flattened ductus bursae and the small appendix bursae versus the only partly sclerotised antrum having smaller sclerotised plates, the rather membranous ductus bursae with characteristically sclerotised and folded ribbons in the internal walls of the ductus bursae and the fairly separated fundus and appendix bursae in *Eremohadena*. The external appearance of the adults is most similar to that of the *immunis* lineage of *Iberohadena* and the *pexa* species group of *Eremohadena s. str.* but the moths are larger in size, having more robust body (“*Megahadena*”; wingspan 53–64 mm vs 44–52 mm) than the species having similar wing shape and forewing pattern.

Bionomics and distribution: The species are xeromontane, appearing at medium-high and high montane steppes and semi-deserts. The moths are on the wing from May to October. The range of the subgenus extends from eastern Turkey via the Elburs region and



Figs 1-3. (1) *Eremohadena (Megahadena) megaptera* (Boursin, 1970), RL13425m, paratype, Afghanistan, Paghman Mountains. (2) *Eremohadena (Megahadena) megaptera* (Boursin, 1970), RL13426f, paratype, Afghanistan, Paghman Mountains. (3) *Eremohadena (Megahadena) peterschucherti* sp. nov., PL1171m, paratype, Pakistan, Baltistan.

the western Turkestanian Mountains to the eastern Tien Shan chains, the eastern Hindukush and the border of the northern Himalayas and the western Karakoram massif.

***Eremohadena (Megahadena) rjabovi* (Boursin, 1970)**

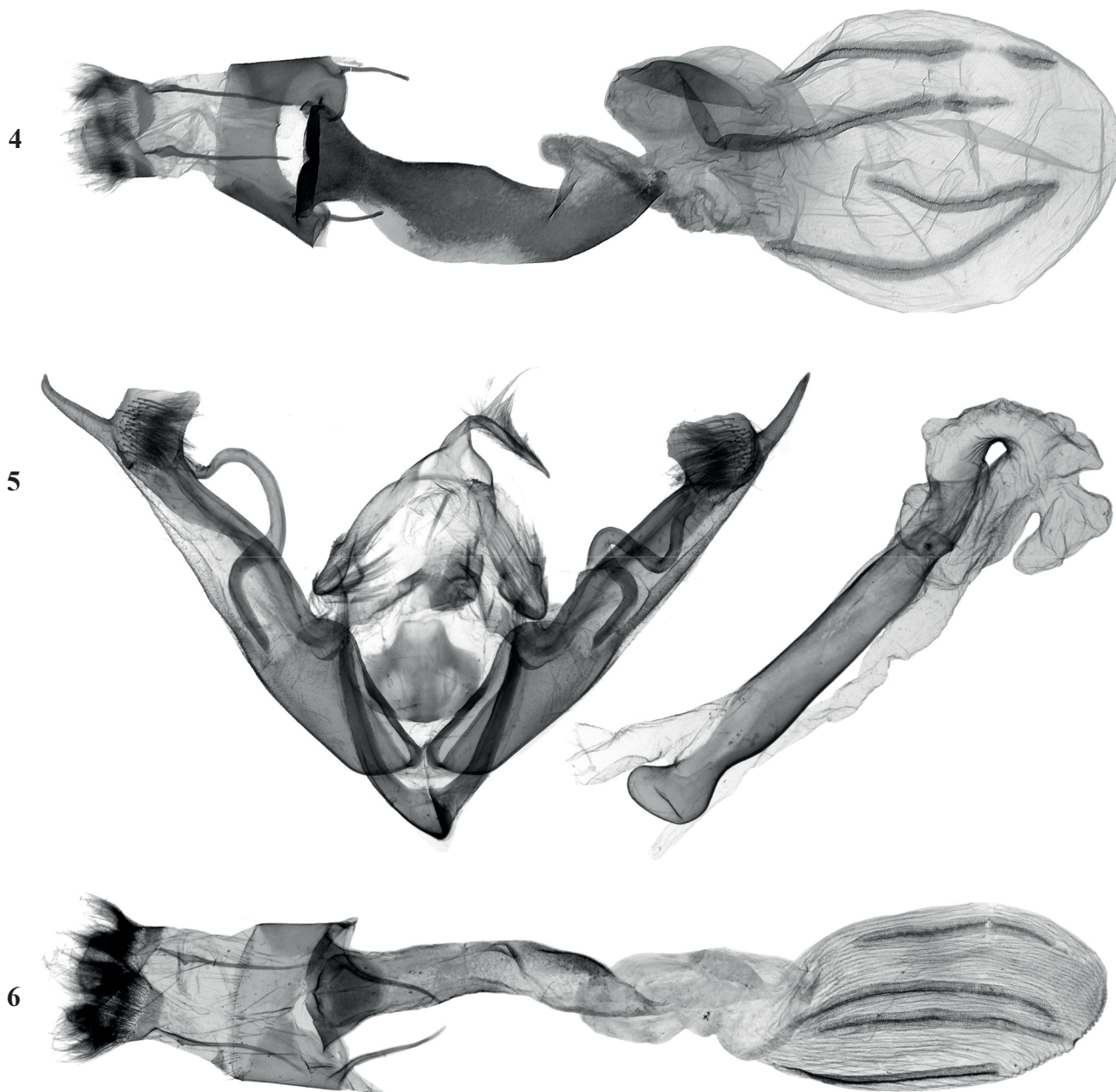
Figs 5, 6, 7-10

Pseudohadena rjabovi Boursin, 1970, *Entomops* 18: 66, fig. 95.

Type locality: [Iran] Persia, Derbend, 25 km N of Teheran. Holotype: male, in coll. NHMW.

Type material examined: Holotype male, “5.-17.X.1963. Iran | Derbend, 25 km N v. | Teheran, 2000 m | E. & A. Vartian”, “Holotypus” (red label), “PRÉPARATION | N°. 2180 | CH. BOURSIN”, “Pseudoh. | rjabovi | Brsn. ♂ | Boursin det.” (the name is in handwriting of Boursin) (coll. NHMW). – Paratype, male, South Iran, 100 km S of Abadeh, north of Didegan, 2000 m, 9.VI.1969, leg. Vartian (coll. NHMW).

Additional material examined: Iran. 2 males, 6 females, Prov. Semnan, 40 km W of Damgan, 36°00'N,



Figs 4-6. (4) *Eremohadena (Megahadena) peterschucherti* sp. n., OP6454f, holotype, Pakistan, Baltistan. (5) *Eremohadena (Megahadena) rjabovi* (Boursin, 1970), RL13360m, Iran, West Azerbaijan. (6) *Eremohadena (Megahadena) rjabovi* (Boursin, 1970), RL13362f, Iran, Semnan.

54°04'E, 1250 m, 13.V.2001, leg. G. Csorba, slide Nos RL13362f, RL13375f; 2 males, 3 females, Prov. Mazandaran, Elburs Mountains, 10 km E of Valiabad, 3200 m, 20. and 22-25.VII.2000, leg. B. Benedek, slide No. RL13361m; 1 male, Prov. West Azarbaijan, 1000 m, 38°50'N, 45°13'E, 23.IX.2000, leg. G. Csorba, B. Herczig & G. Ronkay, slide No. RL13360m (coll. G. Ronkay, NHMW). Turkey. 1 male, [Prov. Hakkari] "Ost Türki | Van 2600 m | Güzeldere | Paß 6.7.1979 | leg P. Kuhna (coll. MKB)".

Diagnosis: The external appearance of the three *Megahadena* species is very similar, there is no key feature for their separation though the hindwing of *E. (M.) rjabovi* is somewhat paler than in the other two species.

The distinctive characters of the male genitalia of *E. (M.) rjabovi* (Fig. 5) are the longer and slenderer valvae with much longer and almost symmetrical, acute subapical ventral processes, the much longer harpes of both sides, without apical dilatations, and the strongly reduced scobinate-spinulate areas of the vesica. The two other congeners (Figs 1 and 3) have shorter and broader valvae with well-expressed medial costal lobe and more asymmetrical cuculli, shorter and weaker subapical ventral processes, shorter and apically strongly dilated and flattened harpes and larger and denser spinulose areas in the vesica.

The female genitalia of *E. (M.) rjabovi* (Fig. 6) have, in comparison with *E. (M.) megaptera* (Fig. 2) and *E. (M.) peterschucherti* (Fig. 4), more calyciform antrum, straighter ductus bursae without medio-lateral dilatation but with tapering anterior section and smaller, more elongated appendix bursae.

Bionomics and distribution: The species occurs in arid and xeric, rocky steppes and montane semi-deserts, between 1000-3200 m in altitude. The moths appear in May and in the lower regions have a long summer diapause while in the high montane biotopes they are active also in the midsummer period. The species is known to occur in south-eastern Turkey and north-western Iran; it is local and rare.

***Eremohadena (Megahadena) megaptera*
(Boursin, 1970)**

Figs 1, 2, 11-14

Pseudohadena megaptera Boursin, 1970, *Entomops* 18: 69, figs 100-103. Type locality: Afghanistan, Sarobi. Holotype: male, in coll. LSNK.

Type material examined: 1 male, 1 female paratypes, Afghanistan, Paghman, 30 km NW Kabul, 2500 m, 12-15.VI.1965, leg. Kasy & Vartian; slide Nos RL13425f, RL13426m (coll. NHMW).

Additional material examined: Turkmenistan. 1 male, Kugitang-tau Mountains, 2500 m, 1 km SW of Airi-

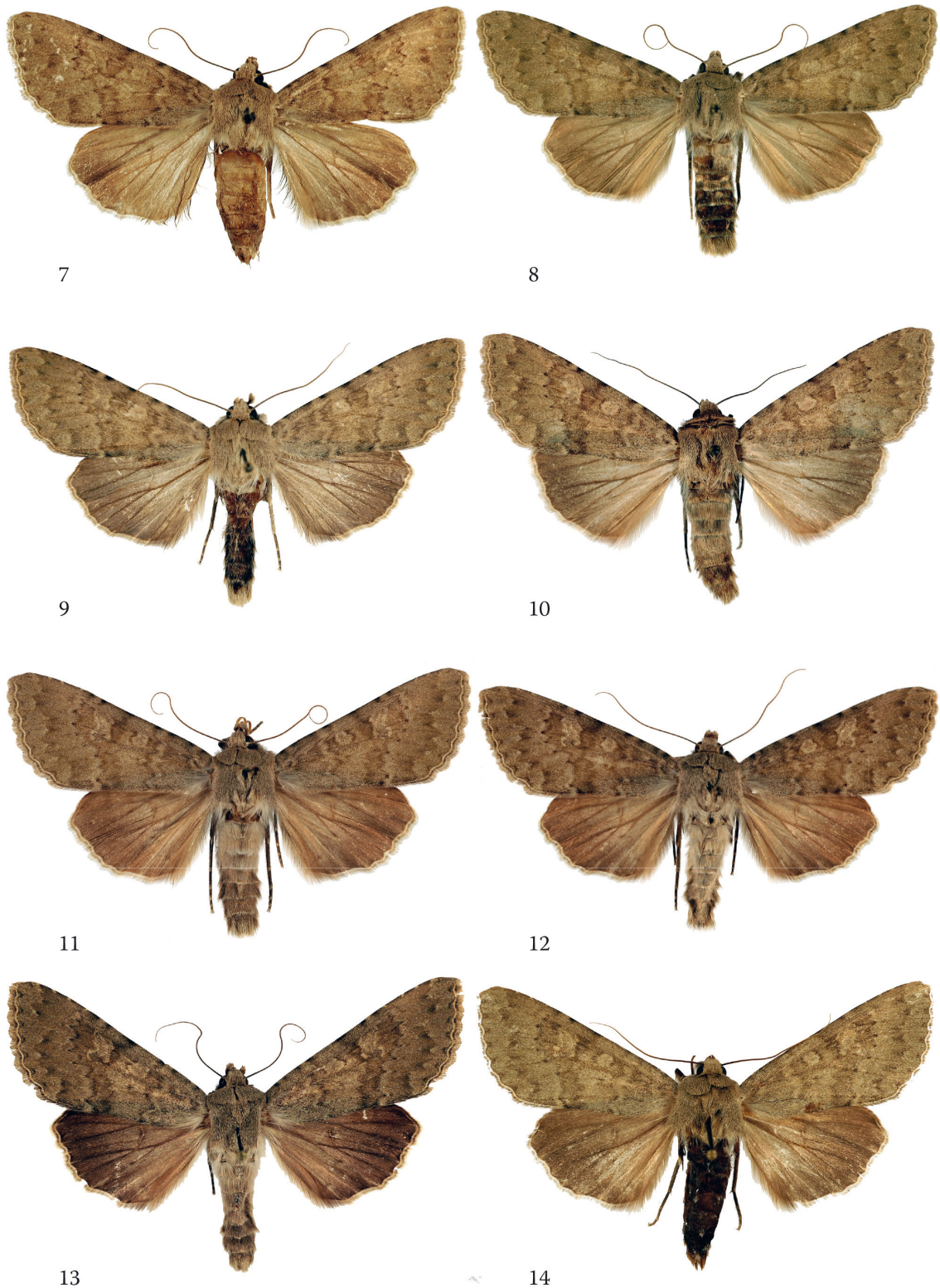
Baba peak, 66°37'E, 37°52'N, No. L23, 20-21.V.1991, leg. M. Hreblay & G. Ronkay, slide No. RL13363m (coll. G. Ronkay, NHMW). Kazakhstan. 1 male, 1 female, Prov. Almaty, 8 km NW Kok-Pek, Mt. Syugeti, 1000 m, 78°37'E, 43°32'N, 29.IX.-1.X.1994, leg. Gy. Fábíán & Gy.M. László, slide Nos RL4984m, RL13539f (coll. Gy. Fábíán and G. Ronkay, NHMW); 1 male, Prov. Zailisky Alatau, 15 km S Issyk, 1750-1950 m, 77°24'E, 43°13'N, 20-22.IX.1994, leg. Gy. Fábíán & Gy.M. László (coll. Gy. Fábíán and G. Ronkay, NHMW). Afghanistan. 1 female, Badakhshan, Darwaz, Kotal-e-Kamkhas, 3200 m, 15.VII.1972, leg. Brade & Naumann, slide No. RL3840f (coll. HNHM).

Diagnosis: The moths are very similar externally to the other *Megahadena* species, having somewhat sharper defined forewing pattern than in its close relatives, especially of *E. (M.) peterschucherti* while the hindwings are paler than in this latter species but darker than those of *E. (M.) rjabovi*.

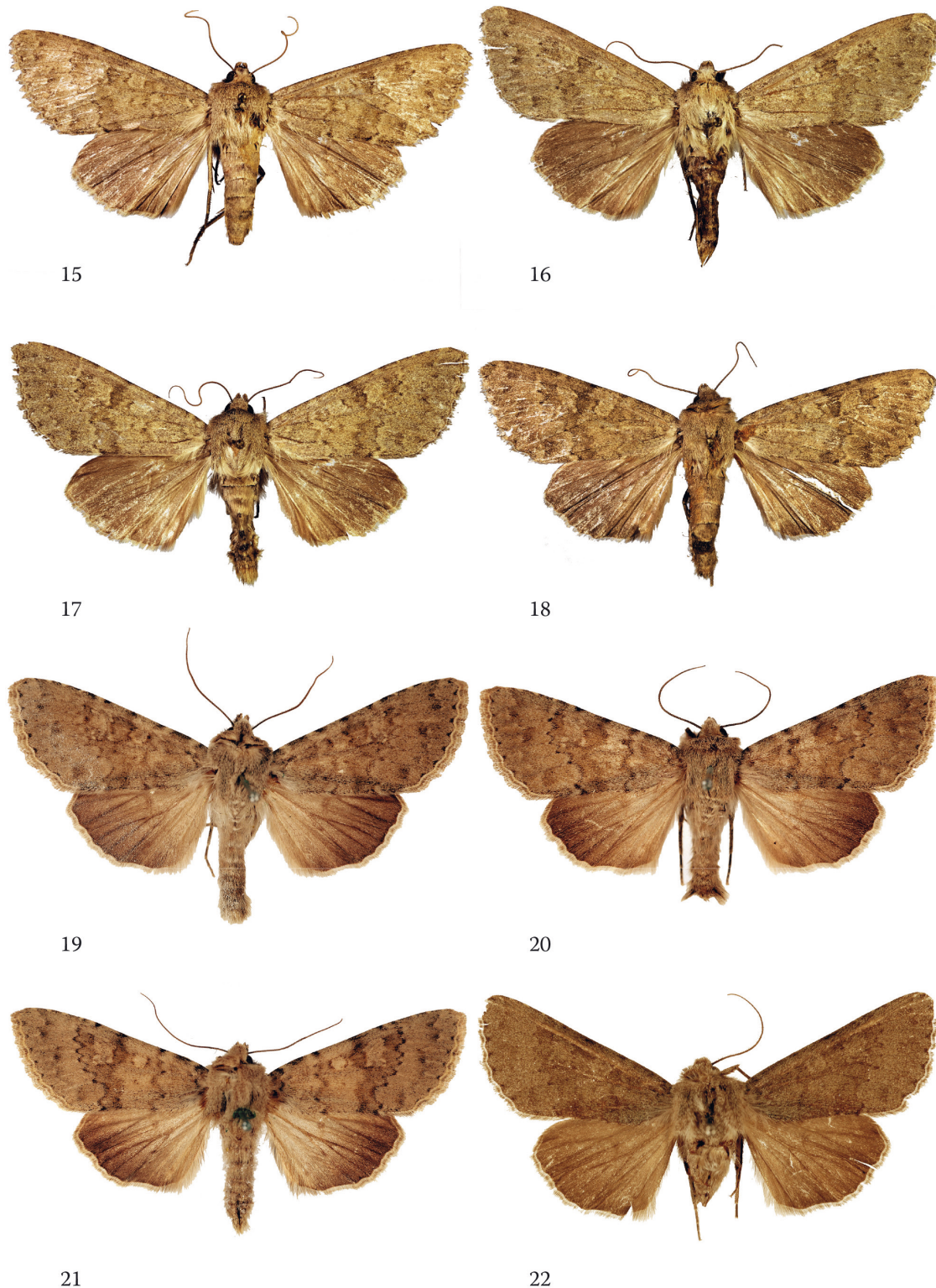
The male clasping apparatus of *E. (M.) megaptera* (Fig. 1) differs from that of *E. (M.) peterschucherti* (Fig. 3) by the somewhat differently shaped cuculli (the left one is smaller, the right one is broader and the ventro-apical processes are shorter and less acute on both sides) and the smaller flattened apical parts of both harpes. The male genitalia of these two species differ conspicuously from those of *E. (M.) rjabovi* (Fig. 5) by the shorter and broader valvae with more asymmetrical cuculli and smaller, weaker ventro-apical processes and shorter, distally strongly dilated harpes, and the much stronger spinulose fields of the vesica.

The female genitalia of *E. (M.) megaptera* (Fig. 2) and *E. (M.) peterschucherti* (Fig. 4) are also very similar but the former species has larger and broader sclerotised antrum, more posteriorly positioned lateral lobe and less curved but broader anterior end of ductus bursae, having smaller antero-lateral appendage at junction to appendix bursae. The ductus bursae of both species is remarkably broader than that of *E. (M.) rjabovi* possessing large medio-lateral lobe and broader anterior section at junction to appendix bursae; the appendix is also much larger in *E. (M.) megaptera* and *E. (M.) peterschucherti* than in *E. (M.) rjabovi*.

Bionomics and distribution: The known distribution of the species extends from the eastern Kopet-Dagh Mountains through the Kugitang-Tau Mountains to the eastern Hindukush region and the Badakhshan area of the Pamir Mountains in Afghanistan and the Central Tien Shan massif in Kazakhstan (Lödl *et al.*, 2012); it occurs most probably in many other high mountains of Central Asia. The moths appear in xeromontane steppes and rocky slopes between 1000-3500 m in elevation and are on the wing from May to October.



Figs 7-14. (7) *Eremohadena (Megahadena) rjabovi* (Boursin, 1970), holotype male, Iran, Elburs Mountains (wingspan 53 mm). (8) *Eremohadena (Megahadena) rjabovi* (Boursin, 1970), paratype male, Iran, Elburs Mountains (wingspan 57 mm). (9) *Eremohadena (Megahadena) rjabovi* (Boursin, 1970), male, Iran, Elburs Mountains (wingspan 57 mm). (10) *Eremohadena (Megahadena) rjabovi* (Boursin, 1970), male, Turkey, Prov. Van (wingspan 54 mm). (11) *Eremohadena (Megahadena) megaptera* (Boursin, 1970), paratype male, Afghanistan (wingspan 60 mm). (12) *Eremohadena (Megahadena) megaptera* (Boursin, 1970), paratype female, Afghanistan (wingspan 62 mm). (13) *Eremohadena (Megahadena) megaptera* (Boursin, 1970), male, Turkmenistan, Kugitang-Tau (wingspan 60 mm). (14) *Eremohadena (Megahadena) megaptera* (Boursin, 1970), male, Kazakhstan, Zailiskiy Alatau (wingspan 58 mm).



Figs 15-22. (15) *Eremohadena* (*Megahadena*) *peterschucherti* sp. n., holotype female, Pakistan, Baltistan (wingspan 59 mm). (16) *Eremohadena* (*Megahadena*) *peterschucherti* sp. n., paratype male, Pakistan, Baltistan (wingspan 54 mm). (17) *Eremohadena* (*Megahadena*) *peterschucherti* sp. n., paratype female, Pakistan, Baltistan (wingspan 59 mm). (18) *Eremohadena* (*Megahadena*) *peterschucherti* sp. n., paratype female, Pakistan, Baltistan (wingspan 62 mm). (19) *Eremohadena* (*Iberohadena*) *immunis immunis* (Staudinger, 1889), lectotype male, Issyk-Kul (wingspan 49 mm). (20) *Eremohadena* (*Iberohadena*) *immunis immunis* (Staudinger, 1889), male, China, Xinjiang, Altyn-Tagh (wingspan 48 mm). (21) *Eremohadena* (*Iberohadena*) *immunis immunis* (Staudinger, 1889), paralectotype male, Issyk-Kul (wingspan 51 mm). (22) *Eremohadena* (*Iberohadena*) *immunis lesghica* (Boursin, 1944), holotype male, Russia, Dagestan (wingspan 46 mm).

***Eremohadena (Megahadena) peterschucherti* sp. nov.**

Figs 3, 4, 15-18

Holotype: Female, “PAKISTAN, BALTISTAN | 17 kms Nord de SKARDU | ROUTE DE SHIGAR | 18-10-1989 Alt, 2300 m | F. AULOMBARD et J. PLANTE”, MHNG-ENTO-52414, slide No. OP6454f (coll. MNHG).

Paratypes: 1 male, 2 females, with same data as holotype, MHNG ENTO 52411, 52412 (slide No. PL1171m), 52413 (coll. MNHG).

Etymology: This species is dedicated to Peter Schuchert, scientist and curator, specialist of marine invertebrates at the MHNG, co-editor of the *Revue suisse de Zoologie* and database coordinator at the MHNG for many years. He always assumed his many tasks with great professionalism and kindness.

Diagnosis: The new species differs externally from the other two close relatives by its rather uniformly darker, usually dark greyish-brown hindwings and the weaker defined forewing crosslines and stigmata. Wingspan 54-62 mm.

The diagnostic features of the male genitalia of *E. (M.) peterschucherti* (Fig. 3), compared with those of *E. (M.) megaptera*, are the larger, broader flattened apical parts of both harpes, the narrower right and more angular left cucullus and the longer and more acute subapical ventral processes in both valvae. The new species has shorter and broader valvae than in *E. (M.) rjabovi*, having large medial costal lobe, considerably shorter and thinner subapical processes and differently shaped, less angular cuculli, and the harpes are shorter on both sides, having large flattened apical parts while the longer harpes of *E. (M.) rjabovi* are evenly slender throughout. Finally, the new species has large spinulose fields in the vesica which are reduced in the westerly distributed relative.

In the female genitalia, the antrum of *E. (M.) peterschucherti* (Fig. 4) is smaller, more funnel-like than in *E. (M.) megaptera* (Fig. 2), the ductus bursae is the broadest in its medial third and the anterior section has larger rugose-ribbed appendage at junction to appendix bursae. The ductus bursae of the new species is much broader and more arched anteriorly than in *E. (M.) rjabovi* (Fig. 6), its anterior section is considerably broader and has a large lateral appendage which is missing in the latter species, and the appendix bursae is larger, more ample and more sclerotised.

Bionomics and distribution: The species was collected only once at the type locality in Baltistan, in August.

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