

**Redescription of *Lagria (Apteronympha) tenenbaumi* Pic, 1929,
with a checklist of the Western Palaearctic species of the genus
Lagria F. (Coleoptera: Tenebrionidae: Lagriini)***

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**Переописание *Lagria (Apteronympha) tenenbaumi* Pic, 1929
и конспект западнопалеарктических видов рода
Lagria F. (Coleoptera: Tenebrionidae: Lagriini)***

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This paper is dedicated to Dr Gleb Sergeevich Medvedev, leader of the Coleoptera Department and Head of the Laboratory of Insect Systematics, Zoological Institute, Russian Academy of Sciences (St. Petersburg), President of the Russian Entomological Society, an outstanding expert of Tenebrionidae, on the occasion of his 75th birthday.

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Abstract. *Lagria tenenbaumi* Pic, 1929 is redescribed and transferred to the subgenus *Apteronympha* Seidlitz, 1898. *Lagria hirta* (Linnaeus, 1758) is recorded from Israel for the first time. Type species of *Lachna* Billberg, 1820 (= *Lagria* Fabricius, 1775) is designated. A checklist of the Western Palaearctic species of *Lagria* and a key to the species of the subgenus *Apteronympha* are given.

Key words. Tenebrionidae, Lagriini, *Lagria tenenbaumi*, *Apteronympha*, *Lachna*, type species designation, checklist, Israel.

Резюме. Приведено переописание *Lagria tenenbaumi* Pic, 1929, этот вид переведен в подрод *Apteronympha* Seidlitz, 1898. *Lagria hirta* (Linnaeus, 1758) впервые указан из Израиля. Обозначен типовой вид рода *Lachna* Billberg, 1820 (= *Lagria* Fabricius, 1775). Даны аннотированный список западнопалеарктических видов рода *Lagria* и таблица для определения видов подрода *Apteronympha*.

Ключевые слова. Tenebrionidae, Lagriini, *Lagria tenenbaumi*, *Apteronympha*, *Lachna*, обозначение типового вида, список видов, Израиль.

* 15th contribution to the knowledge of Lagriini. 14th contribution: Acta Zoologica Academiae Scientiarum Hungaricae 50: 283–305.

Introduction

Lagria Fabricius, 1775 is a large collective genus of the primitive tenebrionoid subtribe Lagriina with more than 150 species in the temperate, tropical and subtropical areas of Europe, Africa (including Madagascar), Asia, New Guinea and northern parts of Australia (Northern Territory and Queensland). The genus contains species with very different general appearance and without any synapomorphy which would separate them from members of other genera. Virtually the absence of salient modifications in the antennae, pronotum, elytra and legs seems to be the only reason to put them together in this genus.

Seidlitz (1898) erected the subgenus *Apteronympha* for two Western Mediterranean species on the basis of flightlessness of females, although females with reduced hind wings occur in other (non-European) species of Lagriina (even in *Lagria* itself) as well. Males resemble *Lagria hirta* (Linnaeus, 1758), the type species of the genus, in all fundamental features. There is another feature that separates members of *Apteronympha* from other Western Palaearctic species of *Lagria*. This is the rugose (coarse and dense) punctation of pronotum; the other species have finely and sparsely punctate (sometimes nearly impunctate) pronotum. Although female flightlessness and difference in pronotal punctation are rather weak traits to support subgeneric distinction, the subgenus is retained for now as a separate group, since a thorough revision of the genus is a task of the future. Borchmann (1936) transferred *Lagria pygmaea* Brancsik, 1892 to *Apteronympha*, but this Madagascan species is unknown to the author, and it is quite possible that it is not closely related to the species from the Western Palaearctic.

Borchmann apparently overlooked *Lagria tenenbaumi* Pic, 1929, a species described from Palestine, because it is absent from his monograph of World “Lagriidae” (Borchmann, 1936). Only males were available when Pic published the very short description typical of him, so subgeneric assignment was impossible. A redescription of the species, including the description of the female, is given below. On the basis of the rugosely punctate pronotum and wingless female it is unequivocal that *Lagria tenenbaumi* should be assigned to the subgenus *Apteronympha*.

Abbreviations of depositories: BMNH – Natural History Museum (formerly British Museum, Natural History), London, United Kingdom; HNHM – Hungarian Natural History Museum, Budapest, Hungary; NMMPR – National Museum, Prague, Czech Republic; TAUI – Tel Aviv University, Tel Aviv, Israel.

Transliteration of locality names is according to the Touring Map of Israel (1 : 250 000) + List of settlements, antiquity sites and road distances, (2001) Survey of Israel, Cartography Department, Tel Aviv.

***Lagria tenenbaumi* Pic, 1929 (Figs 1–4)**

Lagria tenenbaumi Pic, 1929: 2; Bodenheimer, 1937: 135.

Original description: “*Lagria Tenenbaumi* nov. (? var. de *tristis* Bon). ♂ Sat elongatus, parum nitidus, sat longe griseo pubescens, fortiter et pro parte dense ruguloso-punctatus, niger, elytris postice diverse pallidioribus. Long. 6,7 mill. Palestine: Gebatha (Tenenbaum, in coll. Tenenbaum et Pic).

En l’absence du sexe ♀, je ne puis me prononcer catégoriquement au sujet de cette nouveauté, mais j’incline à y voir simplement une variété, à coloration générale foncée de *L. tristis* Bon., les antennes ayant le dernier article environ de la longueur des quatre précédents réunis, le prothorax aussi large que long, densément ponctué.”

Redescription. Male (Fig. 1). Body winged, elongate, slender, almost parallel-sided, dark brownish black (teneral specimens paler), weakly shining; vestiture consisting of short, semierect greyish hairs leaving dorsal surface visible. Body length 4.8–6.1 mm (n = 42).

Head short, coarsely and densely punctate, interspaces much narrower than a puncture diameter; frons shallowly impressed; frontoclypeal suture deep; clypeus with anterior margin slightly concave; temples short, converging posteriorly; eyes large, bulging, interocular distance shorter than eye diameter. Pubescence sparse, with a few long hairs on temples. Maxilla with apical palpomere narrowly securiform. Labium with apical palpomere spindle-shaped, apex not emarginate. Antennae when posteriorly extended surpassing posterior margin of pronotum by last two antennomeres; antennomere 1 subglobose, 2 subequal in length and width, 3 twice as long as 2, 4 slightly shorter than 3, 5 and 6 slightly shorter than 4, 7–9 as long as 5 and 6 but slightly broader, 10 subequal in length and width, 11 as long as four preceding antennomeres combined.

Prothorax nearly as long as wide, constricted just posterior to middle, widest just anterior to middle; pronotum with dorsal surface slightly convex, with barely visible mesal impression immediately before posterior margin; punctation coarse and dense, interspaces narrower than a puncture diameter; pubescence partly proclinate. Prothoracic hypomeron and prosternum with coarse and sparse punctures and fine transverse wrinkles. Scutellum small, rounded triangular, coarsely punctate.

Elytra about 3.5 times as long as wide and 4 times as long as pronotum; sides parallel, barely diverging posteriorly; punctation relatively coarse and dense, without trace of longitudinal rows; punctures separated by interspaces of 0.5 to

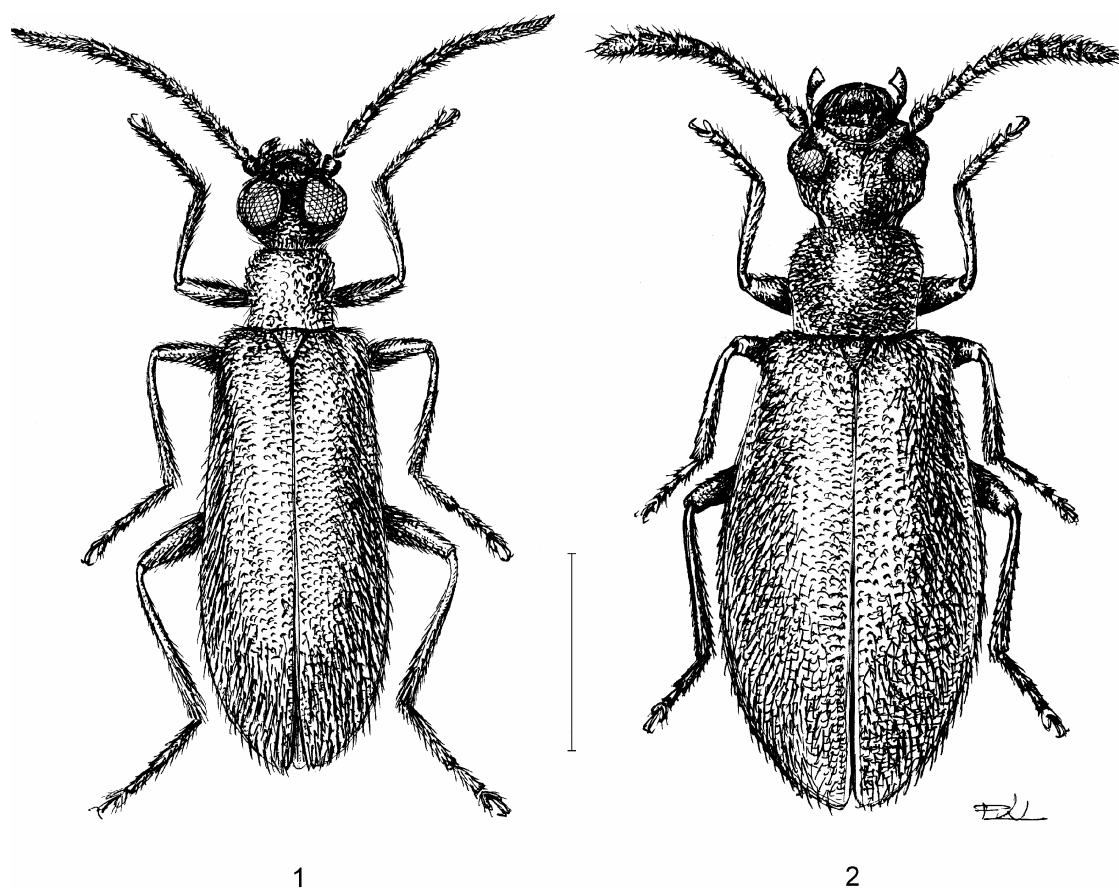
1 puncture diameter; interspaces without microreticulation. Pubescence reclinate. Mesoventrite finely punctate; mesoventral process about 1/5 times as wide as mesocoxa; mesepisternum, metepimeron, and metepisternum coarsely and densely punctate, metaventrite very finely and sparsely punctate.

Legs long and slender; femora subequal in length to tibiae, and practically not clavate; length of hind femur about twice width of elytron at level of hind coxae; tibiae nearly straight, subequal in width; femora and tibiae without denticles, angulations or any other modifications; tarsi definitely shorter than tibiae.

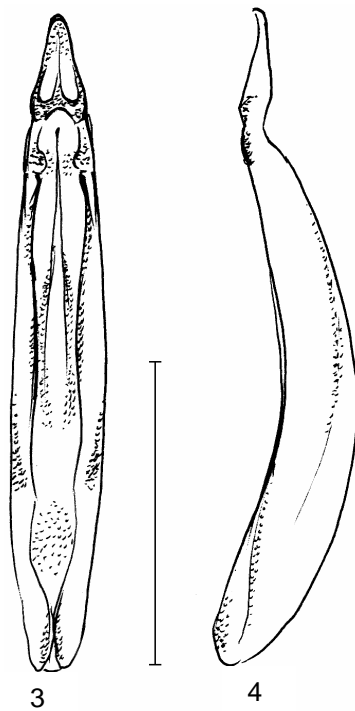
Abdominal ventrites finely and sparsely punctate, punctuation becoming denser toward lateral portion; last ventrite rounded posteriorly. Aedeagus with basale about 8 times as long as apicale, latter narrowly triangular (Figs 3, 4).

F e m a l e (Fig. 2). Body wingless, shorter and broader. Body length 6.8–7.0 mm (n = 2). Eyes small, transverse; interocular distance 2.5 times eye diameter; antennae short, when posteriorly extended barely surpassing posterior margin of pronotum; antennomere 11 twice as long as 10; prothorax slightly transverse, disc without midlongitudinal impression; elytra distinctly widened posteriorly, with traces of longitudinal elevations in posterior half.

Material. I s r a e l. 'Adullam, 17 V 2002, V. Mandelik & V. Chikatunov (1 ♂, 1 ♀; TAUI); Amnun, light trap, 15 III 2003, V. Kravchenko & V. Chikatunov (1 ♂; TAUI); Amnun, light trap, 15 V 2003, V. Kravchenko & V. Chikatunov (3 ♂; TAUI); Been Mashichim [= Be'er Mash'abim], 7 XII 1996, R. Hoffman (1 ♂; TAUI); Esdraelon, Mount Gilboa [= Yizre'el Valley, Hare Gilboa'], unknown date and collector [probably Q. Argaman] (1 ♂; TAUI); Gan Shomeron, 27 IX 1957, Hebr[ew] Univ[ersity] (1 ♂; TAUI); Golan, Senir, 23 IX 1997, V. Chikatunov (2 ♂; TAUI); Haifa, Checkpost, 20 IV 1998, V. Chikatunov & T. Pavliček (1 ♂; TAUI); Hammat Gader, 15 VI 2002, light trap, V. Kravchenko (1 ♂; TAUI); Kokhav HaYarden, light trap, 15 VI 2002, V. Kravchenko (1 ♂; TAUI); Lod, 8 X 1997, R. Hoffman (1 ♂; TAUI); Majdal Shams, 2 X 2002, V. Kravchenko (1 ♂; TAUI); Majdal Shams, 20 V 2001, V. Kravchenko (2 ♂, HNHM; 3 ♂, TAUI); Merom



Figs 1, 2. *Lagria (Apteronympha) tenenbaumi* Pic, 1926, male and female. Scale = 2 mm.



Figs 3, 4. *Lagria (Apteronympha) tenenbaumi* Pic, 1926, aedeagus, ventral and lateral views. Scale = 0.5 mm.

Golan, 12 VI 2000, V. Chikatunov (1 ♂; TAUI); Mikhmoret, unknown date and collector [probably Q. Argaman] (2 ♂; TAUI); Nahal Dishon, Rt. 886, light trap, 22 V 1998, A. Freidberg (1 ♂, BMNH; 2 ♂, TAUI); Nahal Oren, Mt. Carmel, SFS [= south-facing slope], light trap, 30 X 1997, T. Pavliček (2 ♂, NMPR; 1 ♂, HNHM); Nahal Oren, S1, 5 X 1997, V. Chikatunov & T. Pavliček (1 ♂; TAUI); Nahal Oren, SFS1 [= south-facing slope], 30 X 1997, V. Chikatunov & T. Pavliček (1 ♂; TAUI); Nahal Oren, SFS2 [= south-facing slope], light, 21 V 1998, V. Chikatunov & T. Pavliček (1 ♂; TAUI); Nahal Sansan, 17 V 2002, V. Mandelik & V. Chikatunov (1 ♂; TAUI); Ramallah, 600 m, 10 IX 1958, J. Klapperich (1 ♂; HNHM); Ramot Avishov, 17 V 2002, V. Mandelik & V. Chikatunov (1 ♀; HNHM); Samaria, Wadi el Faria [= Nahal Tirza], unknown date and collector [probably Q. Argaman] (2 ♂; TAUI); Segula, Qiryat Gat, 5 V 1996, V. Chikatunov (1 ♂; TAUI); Tel Dan, 15 VI 2002, light trap, V. Kravchenko (1 ♂; TAUI); Tel Dan, 5 X 2002, light trap, V. Kravchenko & V. Chikatunov (1 ♂, BMNH; 1 ♂, TAUI); Zekharya, 17 V 2002, V. Mandelik & V. Chikatunov (1 ♂; TAUI); Zur Hadassa, light trap, 29 IV 2001, V. Kravchenko (1 ♂; TAUI).

Distribution. All known localities of this species are in Israel.

Diagnostic characters of *L. tenenbaumi* see in the key below (with data on the distribution of the species in the Iberian Peninsula after Español, 1964 and Viñolas, Cartagena, 2005).

Key to species of the subgenus *Lagria (Apteronympha)*

- 1a. Body unicoloured dark brownish black, at most tibiae slightly paler. Female without midlongitudinal impression on pronotum. – Israel *Lagria tenenbaumi* Pic, 1929
- 1b. Body not unicoloured: at least elytra light reddish brown. Female with more or less distinct midlongitudinal impression on pronotum. – Western Mediterranean 2
- 2a. Male with interocular distance more than half of eye diameter. Legs, antennae, head and pronotum entirely black. Elytral pubescence shorter. Female with shallow midlongitudinal impression restricted to posterior half of pronotum. – Iberian Peninsula *Lagria rubida* Graells, 1855
- 2b. Male with interocular distance less than half of eye diameter. Legs and antennae (frequently also pronotum and head) at least partly reddish brown. Elytral pubescence somewhat longer. Female with deep midlongitudinal impression almost reaching anterior margin of pronotum. – Iberian Peninsula, southern France, northern Italy, southern Switzerland; ?Morocco .. *Lagria rugosula* Rosenhauer, 1856

Lagria hirta (Linnaeus, 1758)

This is the second species of *Lagria* occurring in Israel. It has winged females, larger and bicoloured body (the elytra are reddish brown, the rest is black) and finely punctate pronotum.

Material. Jerusalem, 8 IV 1966, unknown collector (1 ♂; TAUI); N kziv [= Nahal Keziv], 4 VI 1999, M. Finkel (1 ♂; TAUI); Nahal Keziv, 28 IX 1999, M. Finkel & V. Kravchenko (1 ♂; TAUI); Mt. Meiron [= Har Meron], 18 IX 1976, A. Freidberg (1 ♂; TAUI), and 12 VII 2002, light trap, V. Kravchenko (1 ♀; TAUI).

Checklist of the Western Palaearctic species of the genus *Lagria*

Much of the synonymy is based on Borchmann (1936). A few names were synonymised by Merkl (2004). *L. brevipilis* Desbr. and *L. pici* Normand are unknown to the author; it is not impossible that these names are synonyms of other, well known species of *Lagria* occurring in North Africa.

Subgenus *Apteronympha* Seidlitz, 1898: 336

Type species *Lagria rubida* Graells, 1855, designated by Merkl, 2004: 284.

***Lagria rubida* Graells, 1855: 74.** Spain
= *Lagria parvula* Perris, 1864: 291
= *Lagria elliptica* Fairmaire, 1880: 242

***Lagria rugosula* Rosenhauer, 1856: 223.** Europe: France, Italy, Portugal, Spain, Switzerland;
North Africa: Morocco

= *Lagria tristis* Bonelli, 1812: 172, not Fabricius, 1801: 70
= *Lagria glabrata* Olivier, 1792: 446, not Fabricius, 1775: 125
= *Lagria pubescens* Latreille, 1804: 351, not Linnaeus, 1767: 603
= *Lagria melichari* Reitter, 1890: 173

***Lagria tenenbaumi* Pic, 1929: 1.** Asia: Israel

Subgenus *Lagria* Fabricius, 1775: 124

Type species *Chrysomela hirta* Linnaeus, 1758, designated by Borchmann, 1916: 59.
= *Lachna* Billberg, 1820: 35. Type species *Chrysomela hirta* Linnaeus, 1758, here designated.

***Lagria atripes* Mulsant et Guillebeau, 1855: 74.** Europe: north to Belgium, Germany and Poland;
Asia: Iran, Turkmenistan, Turkey

= *Lagria atripes* var. *puncticollis* Seidlitz, 1898: 337
= *Lagria atripes* var. *tenuicollis* Seidlitz, 1898: 337, not Fairmaire, 1895: 450

***Lagria brevipilis* Desbrochers des Loges, 1881: 143.** North Africa: Algeria

***Lagria grenieri* Brisout de Barneville, 1867: 181.** Europe: France, Portugal, Spain

***Lagria hirta* (Linnaeus, 1758: 377) (*Chrysomela*).** Europe: north to Fennoscandia; North Africa: Algeria, Morocco; Asia: Russia (Western and Eastern Siberia), Israel, Cyprus, Turkey, Iran, Iraq, Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan

= *Cantharis spadicea* Scopoli, 1763: 43
= *Chrysomela pubescens* Linnaeus, 1767: 603
= *Lagria glabrata* Fabricius, 1775: 125
= *Tenebrio villosus* De Geer, 1775: 44
= *Cantharis flava* Geoffroy, 1785: 155
= *Lagria lurida* Krynicki, 1832: 137
= *Lagria nudipennis* Mulsant, 1856: 20
= *Lagria depilis* Mulsant, 1856: 21
= *Lagria caucasica* Motschulsky, 1860: 144
= *Lagria fuscata* Motschulsky, 1860: 144
= *Lagria pontica* Motschulsky, 1860: 144
= *Lagria hirta* var. *limbata* Desbrochers des Loges, 1881: 142
= *Lagria seminuda* Reitter, 1889: 259

***Lagria lata* Fabricius, 1801: 70.** Europe: Spain; North Africa: Algeria, Morocco
= *Lagria rugata* Desbrochers des Loges, 1881: 145

***Lagria pici* Normand, 1936: 161.** North Africa: Tunisia

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References

- Billberg G. J. 1820. *Enumeratio insectorum in museo Gust. Joh. Billberg*. Stockholm: Gadelianis. [4] + 138 pp.
- Bodenheimer F. S. 1937. Prodomus faunae Palaestinae. Essai sur les éléments zoogéographiques et historiques du sud-ouest du sous-règne Paléarctique. *Mém. Inst. Egypte*. **33**: 1–286.
- Bonelli F. A. 1812. Specimen faunae subalpinae sistens Insecta Pedemontii hucusque inedita, aut rariora, aut ea quae commodi damnive gratia quod inferunt, prudentis agricolae magis interest cognoscere. Per genera naturalia et species digesta. Fasc. I. Coleoptera plerumque inedita comprehendens. *Mem. R. Soc. Agric. Torino*. **9**: 149–183.
- Borchmann F. 1916. Die Lagriinae (Unterfamilie der Lagriidae). *Arch. Naturgeschichte*. **81A** [1915]: 46–188.
- Borchmann F. 1936. Coleoptera Heteromera Fam. Lagriidae. *Genera Insectorum. Fasc. 204*. Bruxelles: Louis Desmet-Verteneuil. 561 pp.
- Brisout de Barneville C. 1867. *Lagria grenieri*. *Matériaux pour servir à la faune des Coléoptères de France*. Paris: A. Grenier: 181–182.
- De Geer C. 1775. *Mémoires pour servir à l'Histoire des Insectes*. T. 5. Stockholm: Pierre Hesselberg. 448 pp.
- Desbrochers des Loges M. 1881. Insectes Coléoptères du nord de l'Afrique nouveaux ou peu connus 1. Mémoire. Tenebrionides. *Bull. Acad. Hippone*. **16**: 51–168.
- Español F. 1964. Las *Lagria* de España. *Graellsia*. **20**: 281–286.
- Fabricius J. C. F. 1775. *Systema entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Flensburgi et Lipsiae: Libraria Kortii. [32] + 832 pp.
- Fabricius J. C. F. 1801. *Systema eleutheratorum secundum ordines, genera, species adiectis synonymis, locis, observationibus, descriptionibus*. Kiliae: Bibliopolii Academici. T. 1. xxiv + 506 pp.; T. 2. 687 pp.
- Fairmaire L. 1880. Descriptions de Coléoptères d'Espagne et de Turquie. *Ann. Soc. Entomol. France. Cinquième série*. **10**: 237–244.
- Fairmaire L. 1895. Description de Coléoptères de Madagascar et îles voisines. *Ann. Soc. Entomol. Belgique*. **39**: 443–454.
- Geoffroy E. L. 1785. In: Fourcroy S. F.: *Entomologia parisiensis; sive Catalogus Insectorum quae in Agro Parisiensi reperiuntur; secundum methodum Geoffraeanam in sectiones, genera & species distributus: cui addita sunt nomina trivalia & fere trecentae novae species. I*. Parisiis: Serpentineis. vii + 231 pp.
- Graells D. M. P. 1855. *Memorias de la Comision del Mapa Geológico de España, año de 1855. Parte zoológica*. Madrid: Imprenta Nacional. 111 pp.
- Krynicky I. 1832. Enumeratio Coleopterorum Rossiae meridionalis et praecipue in Universitatis Caesareae Charkoviensis circulo obvenientium, que annorum 1827–1831 spatio observavit. *Bull. Soc. Natur. Mosc.* **5**: 65–179.
- Latreille P. A. 1804. *Histoire naturelle, générale et particulière, des crustacés et des insectes. Ouvrage faisant suite aux oeuvres de Leclerc de Buffon, et partie du cours complet d'histoire naturelle rédigé par C.S. Sonnini, membre de plusieurs sociétés savantes. Tome dixième*. Paris: F. Dufart. 445 pp.
- Linnaeus C. 1758. *Systema naturae per regna tria naturae, secundum classes, ordines, genera species, cum characteribus, differentiis, synonymis, locis. Editio decima, reformata. Tomus I*. Holmiae: Laurentii Salvii. [4] + 823 + [1] pp.
- Merkl O. 2004. On taxonomy, nomenclature, and distribution of some Palaearctic Lagriini, with description of a new species from Taiwan (Coleoptera: Tenebrionidae). *Acta Zool. Acad. Sci. Hung.* **50**: 283–305.
- Motschulsky V. de. 1860. Coléoptères de la Sibérie orientale et en particulier des rives de l'Amur par MM. Schrenck, Maack, Ditmar, Voznessenski etc. *Dr. L. v. Schrenk's Reisen und Forschungen im Amur-Lande. Band II. Zweite Lieferung. Coleopteren*. St.-Petersbourg: Kaiserl. Akad. Wissenschaften. 79–257 + [1] pp.

- Mulsant E., Guillebeau F. 1855. Notes pour servir à l'histoire des Lagries (Insectes Coléoptères Hétéromères). *Ann. Soc. Linn. Lyon.* **2**: 65–74.
- Mulsant E. 1856. *Histoire Naturelle des Coléoptères de France. Latipennes*. L. Paris: Maison. [4] + 44 + [5] pp.
- Normand H 1936. Contribution au Catalogue des Coléoptères de la Tunisie (9e fascicule). *Bull. Soc. Hist. Nat. Afr. Nord.* **27**(5): 144–164.
- Olivier A. G. 1792 [1791]. *Encyclopédie Méthodique. Histoire naturelle. Insectes. Tome sixième.* (1). Paris: Panckoucke: 369–704.
- Perris É. 1864. Description de quelques espèces nouvelles de Coléoptères et notes diverses. *Ann. Soc. Entomol. France. Quatrième série.* **4**: 275–303.
- Pic M. 1929. Notes diverses, nouveautés. *Échange.* **45**: 1–2.
- Reitter E. 1889. Berichte über die von E. v. Oertzen im Jahre 1887 in Griechenland u. Klein-Asien gesammelten Coleopteren. IX. Neue Arten aus verschiedenen Familien. *Deutsche Entomol. Zeitschr.*: 251–259.
- Reitter E. 1890. Neue Coleopteren aus Europa, der angrenzenden Ländern und Sibirien, mit Bemerkungen über bekannte Arten. *Deutsche Entomol. Zeitschr.*: 165–176.
- Rosenhauer W. G. 1856. *Die Thiere Andalusiens nach dem Resultate einer Reise zusammengestellt, nebst den Beschreibungen von 249 neuen oder bis jetzt unbeschriebenen Gattungen und Arten*. Erlangen: Theodor Blaesing. VIII + 429 pp.
- Scopoli J. A. 1763. *Entomologia Carniolica exhibens Insecta Carnioliae indigena et distributa in ordines, genera, species, varietates methodo Linnaeana. I.* Vindobonae: N. Trattner. 420 pp.
- Seidlitz G. von. 1898. Lagriidae. *Naturgeschichte der Insecten Deutschlands. Erste Abtheilung. Coleoptera. Fünfter Band. Zweite Hälfte*. Berlin: Nicolaische Verlags-Buchhandlung: 306–364.
- Viñolas A., Cartagena M. C. 2005. *Fauna de Tenebrionidae de la Península Ibérica y Baleares. Vol. I. Lagriinae y Pimeliinae*. Barcelona: Argania editio. 428 pp.