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LEPIDOPTERA IRANICA

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“If you know not the names of things,
the knowledge of things also perishes.”

(Carl Linnaeus, 1739)

This catalogue is dedicated to the many pioneer entomologists who explored remote areas of Iran and spent much time studying the fauna of the country. As a result of those scientific activities, many identified materials are now preserved in natural history collections for the next generations of entomologists.

Hans Georg Amsel
Fred Hermann Brandt
Wilhelm Brandt
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Preface

Although scientific studies on the Lepidoptera of Iran started in 1828 when French entomologist Jean Baptiste Boisduval described *Zygaena cuvieri*, it took over a century until another French entomologist, Jean Barou, published the first checklist of the Lepidoptera of Iran in 1967, in which 350 species were listed, sorted in 255 genera and 32 families. A second list was published by well-known Iranian entomologists Hayk Mirzayans and Gholam Hossein Kalali in 1970, including 165 species in 139 genera and 27 families.

In spite of a large number of errors and misidentifications in both these lists, they were never updated or corrected by their authors or by others. In 2014, two Turkish entomologists, Ahmet Ömer Koçak and Muhabbet Kemal, updated the list of Lepidoptera of Iran to include 3,925 species in 1,449 genera and 57 families. Unfortunately, this list was not peer-reviewed or checked by specialists, so the several scientific errors are not a surprise. Moreover, the list suffers from many structural problems (e.g., not the generic names but the author names are written in italics and all genera are sorted alphabetically).

Due to an incomplete literature review and to the lack of a comprehensive checklist of the Lepidoptera of Iran, many research institutions, administration organs and management systems inside or outside Iran have a big information gap for planning of conservation projects, pest control or even educational programs. As an example, in the recent publication entitled "Research guidelines of the insect classification", edited by Ebrahimi in 2021, the number of lepidopteran species in Iran is underestimated at 3,000 species, which represents half of the names reported in the literature.

Realizing this big gap, with the current catalogue we attempt to compile all lepidopteran taxa known from Iran and their accessible distributional data as a baseline for the country. With the current global warming and extreme anthropogenic habitat disturbance, this catalogue should be a guideline for further monitoring programs on the fauna of Iran and neighbouring countries.

We hope that this catalogue will be useful for researchers, collectors, administrations and management organizations, as well as for conservation officers.

Although 73 well-known, world-class specialists were involved in the preparation of this catalogue and although it was critically reviewed by 20 expert taxonomists, we may not have filtered out all potential flaws or errors. We plan to update this catalogue periodically and all readers are welcome to improve future versions by clarifying uncertainties, correcting mistakes and providing new information. Also, we invite all taxonomists to share their new publications on the fauna of Iran with us, to be used in the next edition of this publication.

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This work would not have been possible without the aforementioned vast community of colleagues who have shared their time and expertise. If we have missed anyone, we sincerely apologize for the oversight.

We thank Daniel Whitmore (Germany), editor-in-chief of the journal *Integrative Systematics*, for his passion, tolerance and encouragement during the preparation of this catalogue. Due to the complexity of this catalogue, the peer-review process was extremely important to eliminate as many flaws as possible from the final product. Therefore, we split the catalogue into several parts, which were reviewed separately by Joaquin Baixeras, Wolfgang Eckweiler, Ulf Eitschberger, Oleg Gorbunov, Peter Huemer, Rahul Jushi, Ryan St Laurent, David Lees, Théo Léger, Deborah Matthews Lott, Wolfgang Nässig, Erki Öunap, Mehrdad Parchami-Araghi, František Slamka, Axel Steiner, Paolo Triberti, Niklas Wahlberg, Zoltán Varga and two anonymous reviewers, who greatly improved the quality of the catalogue with their constructive comments and criticism.

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Abstract

The most comprehensive catalogue of the Lepidoptera of Iran is presented. We reviewed all taxonomic publications on the fauna of Iran, including papers, books, short reports, congress contributions and historical regional checklists, and updated all old taxonomic data. Additionally, the materials of many institutional and private collections were examined and added. The catalogue provides a general overview of the Lepidoptera fauna Iran, highlights gaps in knowledge and provides an estimate of the number of Lepidoptera species expected to occur in the country. The catalogue also provides a historical review of lepidopterology in Iran over the last 225 years. Finally, 1,193 locality names that were difficult to localize on geographic maps were georeferenced and are presented, together with alternative spellings, in a gazetteer. In total, 6,191 species-level names were evaluated across 70 families, of which 1,262 are regarded as junior synonyms and 4,929 are considered valid at the species level. Of the valid species, 117 are considered as having been erroneously reported from Iran in the literature, even though 24 of these are likely to occur in the country. Of the 4,812 valid species, 4,518 are regarded as resident in Iran, while the presence in the country of 294 species remains unconfirmed. All unconfirmed taxa as well as erroneous records are detailed with notes.

All taxa are systematically sorted based on the most updated phylogenetic results. Synonyms are listed only when included in published reports from Iran. Known distributional data by province are provided for each species. Two superfamilies (Micropterigoidea and Urodoidea), three families (Micropterigidae, Eriocottidae and Ustyurtiidae) and 182 species are reported as new to the fauna of Iran. Four new species in the genera *Agonopteryx*, *Ectoedemia*, *Ptilophora* and *Zygaena* and a new subspecies of *Phaselia erika* were discovered in the course of this project and will be described in separate papers. Additionally, 21 taxonomic changes, including 12 new synonymies, seven new combinations, one new status and one revised status are introduced, as follows: family CRAMBIDAE: *Apyrausta persicalis* f. *sulfuralis* (Amsel, 1951) is a junior synonym of *Palpita persicalis* (Amsel, 1951), **syn. n.**; family GEOMETRIDAE: *Catarhoe cuculata decolor* (Schwingenschuss, 1939) is a junior synonym of *Catarhoe cuculata* (Hufnagel, 1767), **syn. n.**; *Eupithecia inquinata* Schütze, 1961 is a junior synonym of *Eupithecia dominaria* Shchetkin, 1956, **syn. n.**; *Eupithecia iranica* Koçak & Kemal, 2001 is a junior synonym of *Eupithecia dominaria* Shchetkin, 1956, **syn. n.**; *Eupithecia eduardi* Mironov & Ratzel, 2012 is a junior synonym of *Eupithecia dominaria* Shchetkin, 1956, **syn. n.**; *Eupithecia subvaticina* Vojnits, 1982 is a junior synonym of *Eupithecia harenosa* Brandt, 1938, **syn. n.**; *Eupithecia relativa* Vojnits, 1982 is a junior synonym of *Eupithecia elbursiata* Schütze, 1960, **syn. n.**; *Eupithecia subvulgata* Vojnits, 1982 is a junior synonym of *Eupithecia vulgata* (Haworth, 1809), **syn. n.**; *Eupithecia sincera* Brandt, 1938 is a junior synonym of *Eupithecia asperata* Brandt, 1938, **syn. n.**; *Comibaena bajularia tikhonovi* Hausmann, 1999 is a junior synonym of *Comibaena bajularia serrulata* Fletcher, 1963, **syn. n.**; family EREBIDAE: *Manulea demavendi* (Daniel, 1939) is a junior synonym of *Manulea hyrcana* (Daniel, 1939), **syn. n.**; family NOCTUIDAE: *Hadena gladys* (Wiltshire, 1947) is a junior synonym of *Hadena clara* (Staudinger, 1901), **syn. n.**; family TORTRICIDAE: *Aphelia christophi* Obraztsov, 1955 is newly combined as *Zelothereses christophi* (Obraztsov, 1955), **comb. n.**; *Aphelia conscia* Razowski, 1981 is newly combined as *Zelothereses conscia* (Razowski, 1981), **comb. n.**; family GELECHIIDAE: *Hypsolophus apludellus* Lederer, 1869 is newly combined as *Megacraspedus apludellus* (Lederer, 1869), **comb. n.**; family NYMPHALIDAE: *Hyponephele cyri latistigmoides* Tshikolovets, Naderi & Eckweiler, 2014 is newly combined as *Hyponephele davendra latistigmoides* Tshikolovets, Naderi & Eckweiler, 2014, **comb. n.**; family GEOMETRIDAE: *Tephрина sengana* Brandt, 1940 is newly combined as *Isturgia sengana* (Brandt, 1940), **comb. n.**; *Tephрина wehrlii* Brandt, 1940 is newly combined as *Isturgia wehrlii* (Brandt, 1940), **comb. n.**; family EREBIDAE: *Lithosia muscula* Staudinger, 1899 is newly combined as *Muscula muscula* (Staudinger, 1899), **comb. n.**; family GEOMETRIDAE: *Comibaena serrulata* (Fletcher, 1963) is downgraded to a subspecies, as *Comibaena bajularia serrulata* (Fletcher, 1963), **stat. n.**; *Muscula* Koçak, 1991, **stat. rev.** is resurrected from synonymy under *Eilema* Hübner, [1819].

Zusammenfassung

Die vorliegende Arbeit beinhaltet den vollständigen Katalog der im Iran vorkommenden Lepidopteren. Hierzu wurden alle taxonomischen Veröffentlichungen über die Fauna des Irans, einschließlich Abhandlungen, Bücher, Kurzberichte, Kongressbeiträge sowie historische regionale Checklisten gesichtet und sämtliche veralteten taxonomischen Daten aktualisiert. Darüber hinaus wurde das Material zahlreicher institutioneller und privater Sammlungen untersucht und dem Katalog hinzugefügt. Dieser Katalog gibt einen allgemeinen Überblick über die Lepidopteren-Fauna im Iran, weist auf Wissenslücken hin und liefert eine Schätzung der im Land zu erwartenden Arten an Lepidopteren. Zudem umfasst der Katalog eine historische Übersicht der Lepidopterologie im Iran der letzten 225 Jahre. Des Weiteren wurden 1193 Fundortnamen, die auf geografischen Karten schwer zu lokalisieren waren, georeferenziert und zusammen mit alternativen Schreibweisen in einem alphabetischen Ortsverzeichnis (Gazetteer) präsentiert. Insgesamt werden in diesem Katalog 6191 Artnamen aus über 70 Familien evaluiert, von denen 1262 als Junior-Synonyme und 4929 als valide Arten betrachtet werden. Von den validen Arten wurden 117 in der Literatur fälschlicherweise aus dem Iran gemeldet, obwohl 24 von ihnen vermutlich tatsächlich im Land vorkommen. Von den 4812 validen Arten gelten 4518 als im Iran verbreitet, während das Vorkommen von 294 Arten im Iran nicht bestätigt werden konnte. Alle unbestätigten Taxa sowie irrtümliche Meldungen sind mit Anmerkungen versehen.

Sämtliche Taxa sind auf der Grundlage der neuesten phylogenetischen Ergebnisse systematisch geordnet. Synonyme werden nur aufgeführt, wenn diese Namen aus dem Iran gemeldet sind. Für jede Art sind die bekannten Verbreitungsdaten nach Provinz angegeben. Zwei Überfamilien (Micropterigoidea und Urodoidea), drei Familien (Micropterigidae, Eriocottidae und Ustyurtiidae) und 182 Arten werden hier als neu für die Fauna des Iran gemeldet. Vier neue Arten aus den Gattungen *Agonopteryx*, *Ectoedemia*, *Ptilophora* und *Zygaena* und eine neue Unterart von *Phaselia erika* wurden im Rahmen dieses Projekts entdeckt und werden in separaten Artikeln beschrieben werden. Darüber hinaus werden hier 21 taxonomische Änderungen, darunter 12 neue Synonyme, 7 neue Kombinationen, ein neuer Status und ein revidierter Status, wie folgt eingeführt: Familie CRAMBIDAE: *Apyrausta persicalis* f. *sulfuralis* (Amsel, 1951) ist ein Synonym von *Palpita persicalis* (Amsel, 1951), **syn. n.**; Familie GEOMETRIDAE: *Catarhoe cuculata decolor* (Schwinghamer, 1939) ist ein Synonym von *Catarhoe cuculata* (Hufnagel, 1767), **syn. n.**; *Eupithecia inquinata* Schütze, 1961 ist ein Synonym von *Eupithecia dominaria* Shchetkin, 1956, **syn. n.**; *Eupithecia iranica* Koçak & Kemal, 2001 ist ein Synonym von *Eupithecia dominaria* Shchetkin, 1956, **syn. n.**; *Eupithecia eduardi* Mironov & Ratzel, 2012 ist ein Synonym von *Eupithecia dominaria* Shchetkin, 1956, **syn. n.**; *Eupithecia subvaticina* Vojnits, 1982 ist ein Synonym von *Eupithecia harenosa* Brandt, 1938, **syn. n.**; *Eupithecia relativa* Vojnits, 1982 ist ein Synonym von *Eupithecia elbursiata* Schütze, 1960, **syn. n.**; *Eupithecia subvulgata* Vojnits, 1982 ist ein Synonym von *Eupithecia vulgata* (Haworth, 1809), **syn. n.**; *Eupithecia sincera* Brandt, 1938 ist ein Synonym von *Eupithecia asperata* Brandt, 1938, **syn. n.**; *Comibaena bajularia tikhonovi* Hausmann, 1999 ist ein Synonym von *Comibaena bajularia serrulata* Fletcher, 1963, **syn. n.**; Familie EREBIDAE: *Manulea demavendi* (Daniel, 1939) ist ein Synonym von *Manulea hyrcana* (Daniel, 1939), **syn. n.**; Familie NOCTUIDAE: *Hadena gladys* (Wiltshire, 1947) ist ein Synonym von *Hadena clara* (Staudinger, 1901), **syn. n.**; Familie TORTRICIDAE: *Aphelia christophi* Obraztsov, 1955 wird neu kombiniert zu *Zelothereses christophi* (Obraztsov, 1955), **comb. n.**; *Aphelia conscia* Razowski, 1981 wird neu kombiniert zu *Zelothereses conscia* (Razowski, 1981), **comb. n.**; Familie GELECHIIDAE: *Hypsolophus apludellus* Lederer, 1869 wird neu kombiniert zu *Megacraspedus apludellus* (Lederer, 1869), **comb. n.**; Familie NYMPHALIDAE: *Hyponephele cyri latistigmoides* Tshikolovets, Naderi & Eckweiler, 2014 wird neu kombiniert zu *Hyponephele davendra latistigmoides* Tshikolovets, Naderi & Eckweiler, 2014, **comb. n.**; Familie GEOMETRIDAE: *Tephрина sengana* Brandt, 1940 wird neu kombiniert zu *Isturgia sengana* (Brandt, 1940), **comb. n.**; *Tephрина wehrlii* Brandt, 1940 wird neu kombiniert zu *Isturgia wehrlii* (Brandt, 1940), **comb. n.**; Familie EREBIDAE: *Lithosia muscula* Staudinger, 1899 wird neu kombiniert zu *Muscula muscula* (Staudinger, 1899), **comb. n.**; Familie GEOMETRIDAE: *Comibaena serrulata* (Fletcher, 1963) wird zur Unterart, als *Comibaena bajularia serrulata* (Fletcher, 1963), **stat. n.**, herabgestuft; *Muscula* Koçak, 1991 **stat. rev.** wird aus der Synonymie von *Eilema* Hübner, [1819] herausgenommen.

چکیده

مجموعه‌ی پیش رو، کامل‌ترین کاتالوگ بالپولکداران ایران تا به امروز است. برای رسیدن به این هدف، تمام مطالب منتشر شده تا بحال، شامل همه‌ی مقالات، کتب، گزارش‌های کوتاه، خلاصه مقالات کنگره‌ها، و چک‌لیست‌های منطقه‌ای درباره‌ی فون این گروه از حشرات ایران مرور شده و همه داده‌های تاکسونومیک قدیمی به روز شده‌اند. علاوه بر آن، تعداد زیادی نمونه از مجموعه‌های موسسات، موزه‌ها و نیز مجموعه‌های شخصی مطالعه و به لیست افزوده شده‌اند.

این کاتالوگ، ضمن دادن تصویری کلی از فون بالپولکداران ایران، مرزهای دانش و حفره‌های شناختی در این حوزه را پُررنگ کرده و تعداد گونه‌های احتمالی بالپولکداران در کشور را تخمین می‌زند. همچنین مروری تاریخی بر مطالعات بالپولکدارشناسی در ایران از ۲۲۵ سال پیش تا به امروز انجام شده است. در انتها، ۱۱۹۳ نام محلی که یافتن آنها بر روی نقشه دشوار بوده مکان‌یابی شده و در یک فرهنگنامه اماکن جغرافیایی به همراه املاهای مختلف این مکان‌ها ارائه شده‌اند. این کاتالوگ در مجموع ۶۱۹۱ نام گونه در ۷۰ خانواده را مورد ارزیابی قرار داده، که از این تعداد ۱۲۶۲ بعنوان مترادف (سینونیم) و ۴۹۲۹ بعنوان نام‌های معتبر در نظر گرفته شده‌اند. در بین اسامی گونه‌های معتبر، ۱۱۷ گونه بعنوان گزارش‌های اشتباه در منابع مشخص شده‌اند، اگرچه در بین این گزارش‌های اشتباه هنوز احتمال حضور ۲۴ گونه در ایران وجود دارد. از ۴۸۱۲ گونه معتبر باقی مانده، حضور قطعی ۴۵۱۸ گونه در ایران تایید شده و حضور ۲۹۴ گونه نیازمند تایید مجدد هستند. دلایل عدم تایید گونه‌های ثبت شده و نیز ثبت‌های اشتباه توضیح داده شده‌اند.

تمام تاکسون‌ها (آرایه‌ها) بصورت سیستماتیک و بر اساس جدیدترین نتایج مطالعات تبارشناسی (فیلوژنتیکی) مرتب شده‌اند. در لیست نام‌های مترادف، تنها نام‌هایی ذکر شده‌اند که حداقل یک گزارش از آنها از ایران منتشر شده باشد. محدوده‌ی پراکنش جغرافیایی هر گونه در حد استانی ارائه شده است.

در این کاتالوگ، دو بالاخانواده (*Micropterigoidea* و *Urodoidea*)، سه خانواده (*Eriocottidae*، *Micropterigidae* و *Ustyurtiidae*) و ۱۸۲ گونه، بعنوان رکوردهای جدید برای فون ایران به ثبت رسیده‌اند. در حین آماده‌سازی این کاتالوگ، چهار گونه‌ی جدید برای علم در جنس‌های *Zygaena* و *Ptilophora*، *Ectoedemia*، *Agonopteryx* و نیز یک زیرگونه‌ی جدید برای *Phaselia erika* کشف شدند که در مقالات جداگانه توصیف خواهند شد.

بعلاوه ۲۱ تغییر تاکسونومیک جدید، شامل ۱۲ مورد مترادف جدید، هفت مورد ترکیب جدید، یک وضعیت جدید و یک وضعیت بازنگری شده‌ی جدید، در اینجا معرفی شده‌اند (برای مشاهده‌ی لیست این تغییرات تاکسونومیک به چکیده انگلیسی مراجعه کنید).