

**MUNIS**  
**ENTOMOLOGY & ZOOLOGY**

**Ankara / Turkey**

**Scope:** Munis Entomology & Zoology publishes a wide variety of papers on all aspects of Entomology and Zoology from all of the world, including mainly studies on systematics, taxonomy, nomenclature, fauna, biogeography, biodiversity, ecology, morphology, behavior, conservation, paleobiology and other aspects are appropriate topics for papers submitted to Munis Entomology & Zoology.

**Submission of Manuscripts:** Works published or under consideration elsewhere (including on the internet) will not be accepted. At first submission, one double spaced hard copy (text and tables) with figures (may not be original) must be sent to the Editors, Dr. Hüseyin Özdikmen for publication in MEZ. All manuscripts should be submitted as Word file or PDF file in an e-mail attachment. If electronic submission is not possible due to limitations of electronic space at the sending or receiving ends, unavailability of e-mail, etc., we will accept "hard" versions, in triplicate, accompanied by an electronic version stored in a floppy disk, a CD-ROM.

**Review Process:** When submitting manuscripts, all authors provides the name, of at least three qualified experts (they also provide their address, subject fields and e-mails). Then, the editors send to experts to review the papers. The review process should normally be completed within 45-60 days. After reviewing papers by reviewers: Rejected papers are discarded. For accepted papers, authors are asked to modify their papers according to suggestions of the reviewers and editors. Final versions of manuscripts and figures are needed in a digital format.

### **Preparation of Manuscripts**

All manuscripts must be typed in English, using Microsoft Word. Entire manuscript must be double-spaced, with margins of at least 2-3 cm on all sides of the page (A4). Pages should be numbered consecutively. Authors whose native language is not English are encouraged to have their manuscripts read by a native English-speaking colleague before submission. Nomenclature must be in agreement with the International Code of Zoological Nomenclature (4th edition 1999). Author(s) of species name must be provided when the scientific name of any animal species is first mentioned (the year of publication needs not be given; if you give it, then provide a full reference of this in the reference list). Authors of plant species name need not be given. Metric systems should be used. If possible, use the common font Times New Roman (12 pt) and use as little formatting as possible (use only bold and italics). Special symbols (e.g. male or female sign) should be avoided.

**Title and Name(s) of Author(s):** The title should be informative and as possible as brief, in boldface capital letters, not exceed twenty words. The higher taxa containing the taxa dealt with in the paper should be indicated in parentheses. Full name(s) of author(s) should come underneath the title with full address, each on a separate line. The author(s) name (s) should be given in boldface lower case.

**Abstract:** The abstract should be concise and should draw attention to the significant contents of the paper and the author's main conclusions. It should normally not exceed 200 words and should contain no uncommon abbreviations or references. Any new names or new combinations proposed in the paper should be mentioned. The abstract should be followed by a list of key words. Up to seven keywords should be suggested by the author.

**Text:** Regular papers include as the main sections (except in Book Reviews and Scientific Notes etc.); Introduction, Material & Methods, Results, Discussion, Acknowledgments and Literature Cited. The section introduction should be written without a title. However, the main sections may be varies with different types of papers. According to types of papers, main section can be changed. All scientific names (only genus and species group names) should be italicized throughout the paper, including literature cited. References should be cited in the text as Turgut (2003), Turgut & Turgut (2000) or Turgut et al. (2001) (3 or more authors), or alternatively in a parenthesis (Turgut, 2003; Turgut & Turgut, 2000 or Turgut et al., 2001). All literatures in the text must be listed alphabetically in the literature cited in the following format.

Journal paper:

**Turgut, S.** 2003. Title of the paper. Title of the journal in full, volume number: page range.

Book chapter:

**Turgut, S. & Turgut, A.** 2000. Title of the Chapter. In: Turgut, A., Turgut, B. & Turgut, C. (Eds.), Title of Book. Publisher name and location, page range.

Book:

**Turgut, A., Turgut, B. & Turgut, C.** 2001. Title of Book, Publisher name and location, number of pages (e.g. 123 pp).

Internet resources:

**Turgut, S.** 2002. Title of website, database or other resources, Publisher name and location (if indicated), number of pages (if known). Available from: <http://xxx.xxx.xxx/> (Date of access).

**Tables, Illustrations and Photographs:** Tables, illustrations and photographs should be submitted in a separate file, not embedded in the text. They should be given at the end of the manuscript. Please use the table function in your word processor to build tables so that the cells, rows and columns can remain aligned when font size and width of the table are changed. Illustrations should be clean, sharp, with good contrast. Small illustrations should be grouped into plates. For species illustration, line drawings are preferred, although good quality B&W photographs are also acceptable. Maximum size of printed illustration, including all legends, is 12 x 16 cm. Images must be submitted either in .tif, .jpg, or .pdf (PC compatible format strongly preferred). Digital versions of illustrations should be prepared as follows: photographs should be saved as .pdf or .tif format at 300 dpi. Line figures should be saved in .tif or .jpg at 300 dpi. All illustrations must be numbered consecutively using Arabic numerals. They should be cited "Fig. 1" or "Figs. 1–4" in sequential order. Photographs must be of exceptional quality, good contrast.

**Scientific Notes and Book Reviews.** These are usually short contributions, typically not exceeding one (Book Review) or two (Scientific Notes) printed pages. Scientific notes and book reviews lack an abstract and most of the main headings, except for the acknowledgments and the literature cited sections.

**Page Charge:** There is no page charge for publishing with MEZ.

MEZ is indexed in Zoological Record, Biological Abstract, Biosis Preview, Agricola, .....

**TAXONOMY IN CHANGING WORLD –  
THE ENDS AND THE MEANS  
(COMMENTS TO AGNARSSON & KUNTNER, 2007)**

**Roman B. Hołyński\***

\* PL-05822 Milanówek, ul. Graniczna 35, skr. poczt. 65, POLAND. e-mail: holynski@interia.pl

[**Hołyński, R. B.** 2008. Taxonomy in changing world – The ends and the means (comments to Agnarsson & Kuntner, 2007). *Munis Entomology & Zoology* 3 (2): 541-547]

That taxonomy is in a very deep crisis is evident to anybody having something to do with this discipline: both the symptoms and the final diagnosis have been well known and widely disputed, and Agnarsson & Kuntner (2007) aptly identify [some of] them: “*taxonomic experience is rarely required, or even relevant, when it comes to securing a job*” “*most top-ranking ... journals do not consider taxonomic revisions, and only allow species descriptions in exceptional cases of certain high-profile fossils and mammals*”, “*some lower ranking journals reject taxonomic descriptions unless in a paper on a broader subject*”, “*journals focusing on taxonomy typically have low measured impact ... [because] taxonomic descriptions are – not necessarily by fact ..., but by convention – low-impact scientific publications, barring those of newly described bird species, large mammals, or certain fossils*” – and thus, despite the alarming fact that “*species are disappearing at an ever increasing rate*”, “*species discovery and description – taxonomy – is facing a crisis*”. The ways to overcome the crisis are also frequently proposed, but unfortunately what overwhelming majority of them have to offer amounts to implementation of some fashionable (“modern”) technical gadgets [internet (Erwin & Johnson, 2000), DNA “barcoding” (Hebert & Gregory, 2005)] or procedural shortcuts like parataxonomy (Oliver & Beattie, 1993) and “PhyloCode” (Pickett, 2005). It is not my aim to evaluate these earlier ideas here (some of them have been commented upon, also by me – see e.g. Hołyński, 2001, 2008 – elsewhere), I wish only to remark on the suggestions of Agnarsson & Kuntner (2007).

The most extensively analysed by them is the problem of “*low measured impact*”, as one of the causes of the increasing aversion to taxonomy among “decision-makers” (funding agencies, institution directors, journal editors etc.). The measured impact is indeed inherently low in case of taxonomy (and not only of taxonomy), and this certainly negatively influences the attractiveness – and consequently funds, options for publication, availability of jobs, etc. – of the discipline, but this is only one aspect of much wider and much deeper problem. First of all, “impact factors”, “citation indexes” and similar “parameters” are grossly misconceived as measures of the value of publication – and not only, as frequently argued, for some particular disciplines [see Krell (2000, 2002, 2006), Valdecasas et al. (2000), Werner (2006), etc. for biodiversity studies, or e.g. Wiśniewski (2006) for humanities], but for

most if not all (even applied, though the consequences are much more dangerous for “basic” research) branches of science in general. They are indeed “objective”, easy to computerize etc., what makes them likable to “science managers”, but these qualities are of no more than secondary importance – otherwise we could evaluate scientists and their publications according to e.g. stature or date of birth, which are still more objective and manageable... Objectivity is of any importance if – **only** if! – the measure is relevant, and the problem with the “*measured impact*” is just its negligible relation to what it is claimed to measure: to the **real** scientific value of the publication or even to its influence on other scientists’ work! In this situation, Agnarsson & Kuntner’s (2007) suggestions how to improve the impact factors of taxonomic publications, though obviously rational in themselves, are doomed to remain insignificant cosmetics with but minor effect on the situation of taxonomy and taxonomists.

But the supremacy of impact factors and other elements of “parametric evaluation” of scientists and their work is itself also but one of the manifestations of the general decadence of science – and not only science... The overwhelming practice to evaluate everything in terms of profit (or success in “rat-race”) has increasingly detached large domains of human activity – economy as well as e.g. sport or art – from their essence and declared purpose: not the real achievement counts, but only marketing tricks, swindles, unfair competition. And this is now the preferred – in fact, coerced! – style of doing science: this is why scientists, journals, scientific institutions are evaluated not according to the true scientific value of their publications but according to formal “impact factors”, in fact according to the position (“quartile”) of the journals in which they have been published among the (also formally) selected set of periodicals (impact factors being based only on citations in journals from some “Mutual Adoration Society” membership-list, and at that excluding just those citations most closely related to the scientific value of the publication: the **true** impact of a paper cited 3, 5, 10 or 50 years after its appearance is (at least on the average) much greater than of that never referred to after one or two years! The inevitable consequence is just the situation that also in science marketing juggles and – to say it mildly... – not quite honest practices dominate over fruitful cooperation and truly valuable results: divide one serious study into ten “contributions to the knowledge of...” – that they will be less accessible and more difficult to use, no problem, but you will have ten publications instead of one; add the names of ten colleagues as “co-authors” of your paper, then they will add you as co-author of theirs – a fraud? well, but your publication list will expand again; perform a phylogenetic analysis of 10 species based on two molecular sequences taken from one specimen each – of course morphological characters checked on numerous specimens of all 100 known species would be much more informative, but your DNA-based grant application looks more “modern” and has much more chance to be accepted; publish your paper in a journal from the “top quartile” – it is

very expensive and so available only in few libraries, its publication cycle is very long, adjustment to editorial regulations requires detrimental modifications, few if any of your professional colleagues will find your paper in it, so many other journals would be much more appropriate for this kind of publication, O.K., but the “impact factor” will be high; etc., etc., etc. [if Darwin and his followers would have adopted this style of work, we would certainly have million of papers on minor specific questions but evolution would have probably still remained a controversial fancy concept, disdained by “serious” scientists but hotly debated by laymen on theological or philosophical grounds...]. This general attitude is the **real** cause of the troubles in taxonomy (and other disciplines not immediately and predictably profit-yielding nor impressive to laymen like cosmology or dinosaur palaeontology), and until this is not radically changed no (however reasonable as such) improvements in calculation of impact factors or any other formal index will significantly help!

While modifications of impact factor or citation customs would be only ineffective, the Agnarsson & Kuntner's (2007) “advices for future taxonomists” are plainly **destructive**, accepting and in fact promoting just the formalistic and primitively utilitarian attitude described above: scientific value of your work does not matter, accuracy of your results does not matter, appropriateness of applied method to your particular problem does not matter, the only things which matter are “requirements of the job market” and your “career”! So you must develop a series of fashionable “modern” panacea skills “good for anybody and serving any purpose” rather than selecting them according to your predispositions and to what you consider necessary for optimal realization of the planned kind of research on the group of organisms you have chosen as your speciality! Indeed, you should not be specialist at all – or, more exactly (though in fact meaning the same...) you should be specialist in everything from sound knowledge of the studied animals (or perhaps **just this** is not needed? – sequencing-machine, computer programs, &c. can work without any such information...) to molecular methods and interactive databasing; after all, our stone-age ancestors also did everything themselves: performed magic celebrations and built huts, prepared stone-axes and hunted mammoths, skinned their prey and made clothes, so the XXI-century scientist should do the same: this is required by the job market, this is priced by decision-makers and funding-providers, so this most efficiently promotes your career...

The question is: **what taxonomists are for?** Is their prime duty to increase the ranking position of their institutions, impact factors of journals, and own score in the rat-race? – if so, then they should indeed be trained and, then, work according to Agnarsson & Kuntner (2007) advices: carefully watch the job market, funding policies, editorial preferences etc. and accordingly plan their activity – develop “modern” skills, choose “important” research projects, apply fashionable methods, publish each minor piece of results in separate paper (in mutual

“coauthorship” with several colleagues), send it to “high impact” journals, etc. So trained, and accustomed to this style, they will quickly ascend up the “monkey ladder” and soon, as influential professors, editors, directors or ministers will themselves similarly shape the job market, funding policies, editorial preferences... But, as Nobel Prize winner physicist Heinrich Rohrer (2006b) warns, “*competition is a cheap measure of whatever performance. ‘Better’ does not even mean ‘good’ and science is too serious a matter for racing contests*”, so if, however, the pivotal task of taxonomists (like other scientists) is to perform sound **scientific** research [*“science: human activity aiming at methodical study of the world, and description of the results of that study in the framework of a coherent system”* – according to the encyclopaedic definition], what for taxonomy means adequate discovery, description and natural classification of the elements of biodiversity, then Agnarsson & Kuntner’s (2007) postulates should be reversed: rather than to trim the qualifications and work of taxonomists according to Procrustean template of “requirements of the job market” etc., the job market, funding policies and editorial preferences should be so adjusted as to preferentially support the best taxonomists [some recent publications – e.g. Nentwig et al., 2007 – point somewhat in this direction, but generally in the present absurd situation “*the talents needed to perform good scientific work are radically different from those helpful in raising funds*” (Selve, 1980), although no much thought is needed to realize that the safest way to receive funds **should be** just good scientific work, and that the best scientists (taxonomists being no exception) are certainly not those “flexible” opportunists eager to subordinate their research plans and ways of their realization to perspectives of easy career! Scientists should be “*paid for what they do, and not ... do what they are paid for*” (Rohrer, 2006b)]!

As to the “*synthesising knowledge not merely describing species*”, “*integrating descriptive taxonomy with other biological fields such as phylogenies, biodiversity conservation, molecular biology, ecology, ethology and biogeography*” and “*embracing and acquiring skills in the use of new tools and technologies*”, these are very good ideas and I would not say a bad word on them as long (but **only as long**) as they are followed according to the specific talents and interests **of particular taxonomist** and **his/her** evaluation of needs **of particular project**, not to schematic – ruled by short-sighted expectation of immediate profit or simply snobistic “latest vogue” – “requirements of the job market”! Contrary to Agnarsson & Kuntner’s (2007) suggestion, the time of “experts in everything” is long over, the contemporary science is by far too “voluminous” and complex to realistically expect of anybody to acquire **true** skill and knowledge on more than few (rather narrow) fields; “multidisciplinary expert” is in fact almost invariably multidisciplinary fumbler! Thus, each scientist must carefully select **which** skills to train, **which** knowledge to acquire, **which** methods to apply, and the selection should be based on careful evaluation of his/her



abilities, interests, and particular needs of his/her actual and planned projects! Important is not whether a procedure or theoretical approach is new or old, “modern” or “traditional”, sophisticated or simple, but only whether it is the most appropriate for the project we plan to realize: molecular analysis may be necessary (e.g. in phylogenetical study of organisms poor in good morphological characters, like bacteria, nematodes, or parasitic copepods), may significantly improve the accuracy of the reconstruction (as in birds, mammals, and other taxonomically well known taxa), or may be practically worthless or even confusing (when the target group is very speciose, morphologically well differentiated, with good fossil record and/or museum material unsuitable for DNA extraction) – so a specialist in beetles, snails or brachiopods should think twice before he/she decides to enroll for a course of molecular techniques rather than to devote more time and effort to botany, geography, geology, or e.g. to study Chinese! On the other hand, people’s abilities and interests are also widely variable, and the applied methods and even the research projects should be selected accordingly: excellent field-collector need not be a polyglot, “theoretizing” imagination is not necessarily paired with technical skills, observational perceptivity and ability to keep pace with hard- and software armament-race are not always characteristics of the same person, etc. In particular, many (especially, but not only, elder) scientists have no talents or “skills” allowing to efficiently work with the techical gadgets currently *en vogue*: “*Ernst was truly a non-technical person; the most sophisticated tool he used was a Dictaphone. ... he did not even know the location of the keys on the keyboard ... Computers were out of question ...*” (Bock, 2007) – these words do not refere to some stupid backward but to the arguably most eminent biologist of XX century, a position which he had achieved, among others, just because his “*belief in himself rested on a realistic assessment of his own strengths and limitations, constraining him ... to stay within his competence. For instance, he decided after many months of preliminary study not to extend his book Animal Species and Evolution to discuss plants, or The Growth of Biological Thought to include physiology and embryology, because he recognized his lack of familiarity with these subjects*” (Diamond, 2007) – although he had evidently much better knowledge concerning e.g. plants than do most taxonomists **really** know of modern phylogenetical or statistical methods they, as required by “job market”..., regularly use (“*Are molecular models poor fits to the highly complex datasets compiled by modern systematists? unfortunately, and a bit embarrassingly, we still do not know the answer to this tenth crucial question for the great majority of published datasets*” – Gatesy, 2007). Well, I do not believe that any editor would reject **Ernst MAYR’s** paper for having not been submitted “online”, yet such “non-technical” but serious (even if less influential) scientists are many! Of course probably everybody (even Ernst Mayr...) would be able to learn how to use computer or internet, but it would cost him disproportionally much time and effort, what would be

lost (as ecologists say, *free lunch does not exist...*) for his really valuable work: a baker could perhaps produce butter or cheese, but it is certainly better if he concentrates on baking good bread, and similarly the task of a scientist is to do research rather than drudge at technical tricks!

At the end, I must apologize Drs. AGNARSSON & KUNTNER for the slight but – if not admitted – probably awkward “fraud” I have “sharpened the contrast” by presenting the **consequences** of possible (and indeed, in my opinion, inevitable) tendentiously or inadvertently oversimplified interpretation of their “advice” so as if it were their **intention**. In fact, of course, I do not believe that they really wished to promote unprincipled, in fact dishonest, careeristic attitude to scientific research, though unfortunately their paper can, and certainly sometimes will, be so understood...

To sum up, I hope that young talented scientists will prefer – and **be given the possibility** – to follow the advice of the already quoted Nobel Prize winner physicist: “*Ich wünschte, dass Ihr Euch nicht überrollen lässt von einer Welt gefüllt mit allgegenwärtigen Schlagworten wie kompetent, innovative, zukunftssträchtig, trans- und interdisziplinär, wettbewerbsfähig, ganzheitlich, nachhaltig, umweltbewusst, global, Kooperation, Programme, Wettbewerb, und was auch immer. Orientiert euch an Euren Fähigkeiten und Überzeugungen und konzentriert Euch auf Euer Kerngeschäft, erstklassige Wissenschaft und Forschung*” [**I wish**, that you do not allow yourself to become overridden by the world filled with such ubiquitous slogans as competent, innovative, future-minded, trans- and interdisciplinary, competitive, comprehensive, lasting, ecological, global, cooperation, program, contest, and whatever else. Follow your abilities and convictions and concentrate on your main duty, the first-class science and research] (Rohrer, 2006a; display in **bold** in original). This is the only efficient solution for a science in crisis (to get out) and for those currently not in crisis (to avoid getting into)!

## LITERATURE CITED

- Agnarsson, I. & Kuntner, M.** 2007. Taxonomy in changing world: seeking solutions for a science in crisis. *Syst. Biol.* 56 (3): 531-539.
- Bock, W. J.** 2007. Ernst Mayr, 5 July 1904 – 3 February 2005. *Proc. Am. Phil. Soc.* 151 (3): 357-370.
- Diamond, J. M.** 2007. An incomparable life [Review: Haffer J. 2007. Ornithology, evolution, and philosophy: the life and science of Ernst Mayr 1904-2005]. *Nature* 449: 659-660.
- Erwin, T. L. & Johnson, P. J.** 2000. Naming species, a new paradigm for crisis management in taxonomy: rapid journal validation of scientific names enhanced with more complete descriptions in the Internet. *Col. Bull.* 54 (3): 269-278.

- Gatesy, J.** 2007. A tenth crucial question regarding model use in phylogenetics. *TREE* 22 (10): 509-510.
- Hebert, P. D. N. & Gregory, T. R.** 2005. The promise of DNA barcoding for taxonomy. *Syst. Biol.* 54 (5): 852-859.
- Holýński, R. B.** 2001. Crisis management in taxonomy: medicine or poison? *Coll. Bull.* 55 (2): 243-247.
- Holýński, R. B.** 2008. Taxonomy crisis, biodiversity disaster – and sabotaging regulations. *Munis Ent. Zool.* 3 (1): 1-6.
- Krell, F.-T.** 2000. Impact factors aren't relevant to taxonomy. *Nature* 405: 507-508.
- Krell, F.-T.** 2002. Why impact factors don't work for taxonomy. *Nature* 415: 957.
- Krell, F.-T.** 2006. Irrungen, Wirrungen und neue Entwicklungen zu Impact und Impact Factor. *Ges. Biol. Syst. News* 17: 64-67.
- Nentwig, W. et al.** [Swiss Academy of Sciences]. 2007. The future of systematics in Switzerland: systematics as a key discipline in biology. *J. Zool. Syst. Ev. Res.* 45 (4): 285-288.
- Oliver, I. & Beattie, A. J.** 1993. A possible method for the rapid assessment of biodiversity. *Conserv. Biol.* 7: 562-568.
- Pickett, K. M.** 2005. The new and improved PhyloCode, now with types, ranks, and even polyphyly: a conference report from the First International Phylogenetic Nomenclature Meeting. *Cladistics* 21: 79-82.
- Rohrer, H.** 2006a. Was ich mir von einem jungen Wissenschaftler wünschte. *Vierteljahrschr. Naturf. Ges. Zürich* 151 (1-2): 1-3.
- Rohrer, H.** 2006b. Key-players for the scientific progress. *Abstr. Forum on Science Frontiers*: 4 pp.
- Selye, H.** [1964] 1967. [From dream to discovery] *Od marzenia do odkrycia naukowego*. [NYork: McGraw Hill] Warszawa: PZWL: 1-456.
- Valdecasas, A. G., Castroviejo, S. & Marcus, L. F.** 2000. Reliance on the citation index undermines the study of biodiversity. *Nature* 403: 698.
- Werner, Y. L.** 2006. The case of impact factor versus taxonomy: a proposal. *J. Nat. Hist.* 40 (21-22): 1285-1286.
- Wiśniewski, A.** 2006. Dlaczego humaniści nie są wielbłdami, czyli o ocenie parametrycznej jednostek naukowych [Why humanists are not camels, or on the parametric evaluation of scientific institutions]. *Nauka* [2006], 1: 121-128.

**A NEW SPECIES OF THE GENUS  
*STICTOLEPTURA* CASEY, 1924 FROM TURKEY  
(COLEOPTERA: CERAMBYCIDAE: LEPTURINAE)**

**Hüseyin Özdikmen\* and Semra Turgut\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / Türkiye. E-mails: ozdikmen@gazi.edu.tr and semraturgut@mynet.com

**[Özdikmen, H. & Turgut, S. 2008. A new species of the genus *Stictoleptura* Casey, 1924 from Turkey (Coleoptera: Cerambycidae: Lepturinae). Munis Entomology & Zoology 3 (2): 548-553]**

**ABSTRACT:** *Stictoleptura gevneensis* sp. n. is described from Gevne Valley (S Turkey). Distinguishing characters, photo of adult, photo and drawing of male genitalia are given. It is compared with related species (*erythroptera* species group). A short key is given to species of the *erythroptera* group (including new species).

**KEY WORDS:** new species, *Stictoleptura*, Lepturinae, Cerambycidae, Turkey.

### INTRODUCTION

Until 1985, the species group *erythroptera* in SW Palaearctic region had included only three species as –*erythroptera* (Hagenbach, 1822), –*rufa* (Brullé, 1832) and –*heydeni* (Ganglbauer, 1889). In that time, a new species for this group was described by Slama from Crete. So Miroshnikov (1998) stated that the species group *erythroptera* in SW Palaearctic region is represented four species as mentioned above species. For the present, the number of species in the species group *erythroptera* is five with this new species.

*S. erythroptera* (Hagenbach, 1822) occurs in Europe (Spain, France, Croatia, Bosnia-Herzegovina, Serbia, Greece, Bulgaria, Romania, Hungary, Austria, Switzerland, Germany, Czechia, Slovakia), Caucasus, Transcaucasia, Turkey and Iran. *S. rufa* (Brullé, 1832) occurs in Europe (Italy, Albania, Slovenia, Croatia, Bosnia-Herzegovina, Macedonia, Greece, Bulgaria), Caucasus, Transcaucasia, Near East, Turkey and Iran. *S. heydeni* (Ganglbauer, 1889) occurs in Caucasus, Turkey and Iran. Finally, *S. martini* (Slama, 1985) is endemic to Crete.

The species group *erythroptera* is characterized by some features according to Miroshnikov (1998). Pronotum with long erect hairs; base of elytra with or without shorter erect hairs. Last abdominal sternite of male abdomen and last sternite and tergite of female abdomen with or without conspicuous apical emargination. Antennae entirely black, or partly of different coloration, but without distinct light rings at bases of segments. In male genitalia, paramers to some extent curved.

**Genus *STICTOLEPTURA* Casey, 1924**

= *Corymbia* Des Gozis, 1886

= *Aredolpona* Nakane & Hayashi, 1957

= *Melanoleptura* Miroshnikov, 1998

= *Batesiata* Miroshnikov, 1998

**Type species:** *Leptura cribripennis* LeConte, 1859

The taxonomic status of the genus is uncertain. We think that the genus includes 2 subgenera as *Stictoleptura* Casey, 1924 and *Melanoleptura* Miroshnikov, 1998 now. Miroshnikov (1998) stated that *Stictoleptura* Casey, 1924 was a junior synonym of *Corymbia* Des Gozis, 1886. On the other side, according to E. Vives (2000) *Corymbia* Des Gozis, 1886 is a junior homonym of *Corymbia* Walker, 1865 (Lepidoptera, not nomen oblitum) and must be replaced by *Aredolpona* Nakane et Hayashi, 1957. Moreover, in Sama (2002), he regarded *Stictoleptura* Casey, 1924 identical with *Corymbia* Des Gozis, 1886. Under this circumstance, *Stictoleptura* Casey, 1924 must be regarded as a valid generic name according to Principle of Priority (ICZN). Finally, we accept Sama's proposal for this group. Also Danilevsky (2007) accept Sama's proposal on a large scale. But he still prefer the name *Aredolpona* Nakane et Hayashi, 1957 for the species *rubra* Linnaeus, 1758 and *dichroa* Blanchard, 1871 as a subgenus. Vitali (2007) also stated that "originally described as a genus, *Melanoleptura* was considered as a subgenus of *Paracorymbia* (Danilevsky, 2002) or as a synonym of *Stictoleptura* (Sama, 2002). Clearly different from *Paracorymbia* for both adult and larval characters, it is currently considered as a subgenus of *Stictoleptura* (Vitali, 2005), due to the particular elytral sculpture".

***Stictoleptura gevneensis* sp. n.****Description:**

Body length: 13.75 mm., Length of pronotum: 2.7 mm., Width of pronotum: 2.6 mm., Length of elytra: 8.6 mm., Width of elytra: 4 mm.

Body black. Head entirely black, covered with erect, dense and whitish hairs. Punctuation of head denser but smaller than that of pronotum. Antennae entirely black, with fine punctuation, covered with fine, dense, recumbent and black hairs; reach to posterior half of elytra. Pronotum black, covered with long, erect and whitish hairs. Punctuation of pronotum slightly more sparse but slightly larger than that of head. Elytra uniformly brownish red or red, with long reddish yellow and small black hairs. The hairs erect and same length of hairs of pronotum at elytral base; hairs in remaining parts of elytra semierect and recumbent. Elytral punctuation homogeneous, larger than pronotum but distance among the

points more than pronotum. All legs (except black colored coxae, trochanters and claw segments) uniformly red or brownish red.

Material: Holotype male: S Turkey: Antalya province: Alanya, Gevne valley (between Sarımut and Çayarası), 1108 m., 14.06.2007, 36°38'N 32°23'E, 1 male. Paratype absent.

Etymology: The species name “*gevneensis*” is dedicated to Gevne valley (S Turkey: Antalya province).

## DISCUSSIONS

This species, *Stictoleptura gevneensis* sp. n., is in the species group *erythroptera* clearly and without black spot at elytral apex. Only *S. erythroptera* (Hagenbach, 1822) in the species group *erythroptera* without black spot of elytral apex. All other known species except *S. rufa* (Brullé, 1832) with that. So this new species is very close to *S. erythroptera* (Hagenbach, 1822) and *S. rufa* (Brullé, 1832). Chiefly, it differs from *S. erythroptera* by coloration of legs. In *S. erythroptera*, body black, elytra brownish red or dark red; fore legs (except for base of femora), middle tibiae (usually also tarsi), rather often apex (or spots on it) of middle femora, and apex of hind tibiae red or brownish red; antennae black, occasionally brownish in apical half in male. In *S. gevneensis* sp. n., body black, elytra brownish red; all legs (except black colored coxae, trochanters and claw segments) uniformly red or brownish red. antennae entirely black in male.

On the other side, coloration of the legs of the new species is the same of *S. rufa* (Brullé, 1832) among the species in the species group *erythroptera*. This new species can easily distinguish from *S. rufa* by punctuation and shape of pronotum (Plate I).

Moreover, this new species has an unique male genitalia as in plate II. d and f.

### A short key of the *erythroptera* group

1. Elytral apex with black spot.....2
- Elytral apex without black spot.....4
  
2. All femora and tibiae yellow, orange or red.....
- .....***rufa* Brullé, 1832** (partly)
- Legs at least partly totatlly or predominantly black.....3
  
3. Hind legs predominantly black.....***martini* Slama, 1985**
- In male, all legs totally or predominantly black.....
- .....***heydeni* Ganglbauer, 1889**

4. Fore legs (except for base of femora), middle tibiae (usually also tarsi), rather often apex (or spots on it) of middle femora, and apex of hind tibiae red or brownish red.....***erythroptera* Hagenbach, 1822**  
 -. All legs (except black colored coxae, trochanters and claw segments) uniformly red or brownish red.....5
5. Punctuation of pronotum and base of elytra, and shape of pronotum as in plate I. a and c .....***gevneensis* sp. n.**  
 -. Punctuation of pronotum and base of elytra, and shape of pronotum as in plate I. b and d .....***rufa* Brullé, 1832** (partly)

### ACKNOWLEDGEMENTS

Special thanks to M. L. Danilevsky (Russia) for discussions on this subject. This study was supported by a TUBITAK Project (105T329).

### LITERATURE CITED

- Bense, U.** 1995. Illustrated key to the Cerambycidae (excl. Dorcadionini) and Vesperidae of Europe. Margraf Verlag, Germany, 512 pp.
- Danilevsky, M. L.** 2007. Systematic list of longicorn beetles (Cerambycoidea) of the territory of the former USSR. Updated 28. 04. 2007. Available from: <http://www.zin.ru/Animalia/Coleoptera/eng/danlists.htm>
- Miroshnikov, A. I.** 1998. Reclassification of longhorn beetles of the Anoplodera complex, Tribe Lepturini (Coleoptera: Cerambycidae) of the Holarctic fauna: II. Entomological Review 78 (8): 911-936.
- Özdikmen, H.** 2007. The Longicorn Beetles of Turkey (Coleoptera: Cerambycidae) Part I - Black Sea Region. Munis Entomology & Zoology 2 (2): 179-422.
- Sama, G.** 2002. Atlas of the Cerambycidae of Europe and the Mediterranean Area, Volume I, Kabourek, Zlin, 173 pp.
- Vitali, F.** 2007. Biolib. Taxon profile: Subgenus *Melanoleptura* Miroshnikov, 1998. Available from: <http://www.biolib.cz/cz/taxon/id173211/>
- Vives, E.** 2000. Coleoptera, Cerambycidae. Fauna Iberica, Vol. 12. Museo Nacional de Ciencias naturales. CSIC. Madrid, 715 pp.

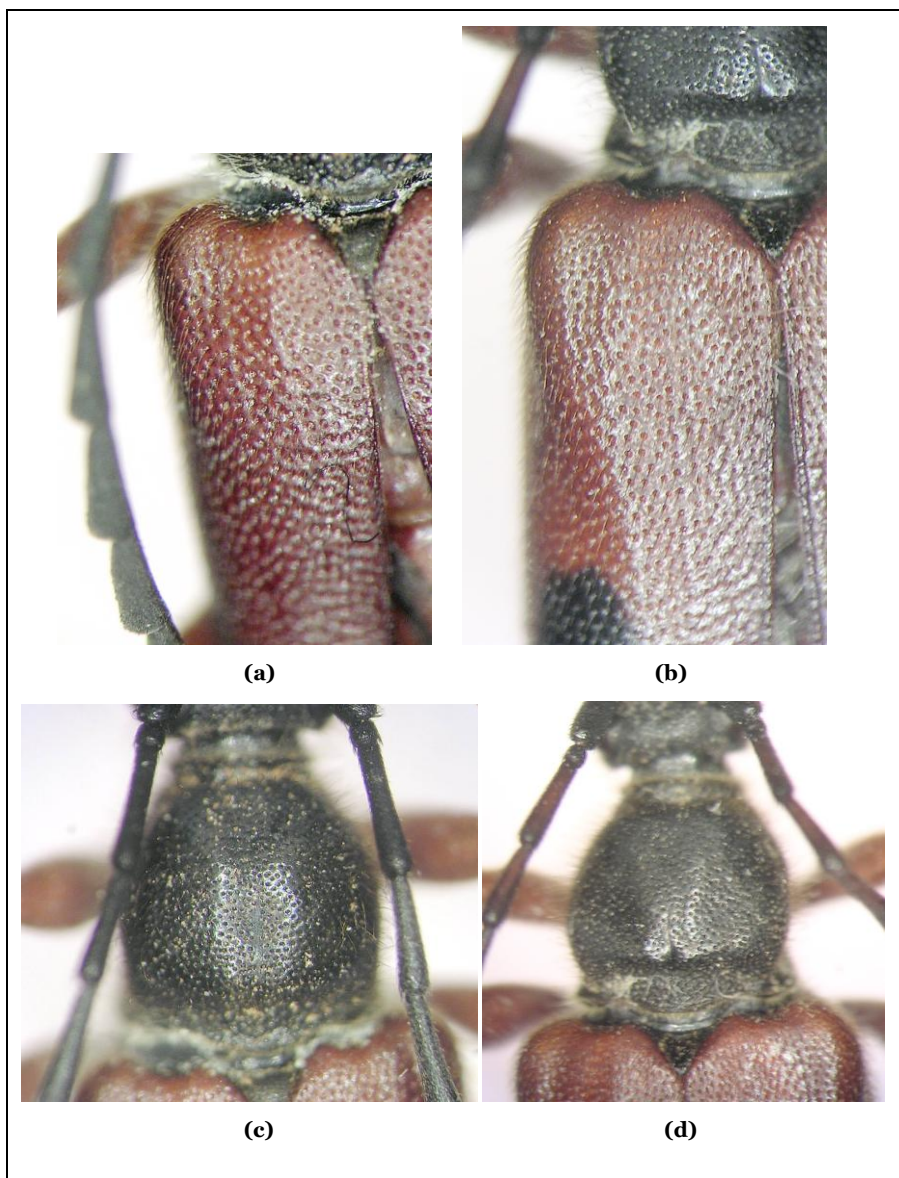


Plate I. Punctuation of base of elytra: (a) *S. gevneensis* sp. n. (b) *S. rufa*; Punctuation and shape of pronotum: (c) *S. gevneensis* sp. n. (d) *S. rufa*. The compared specimens of *S. gevneensis* and *S. rufa* were collected by the authors from Gevne valley env. (S Turkey: Antalya province).



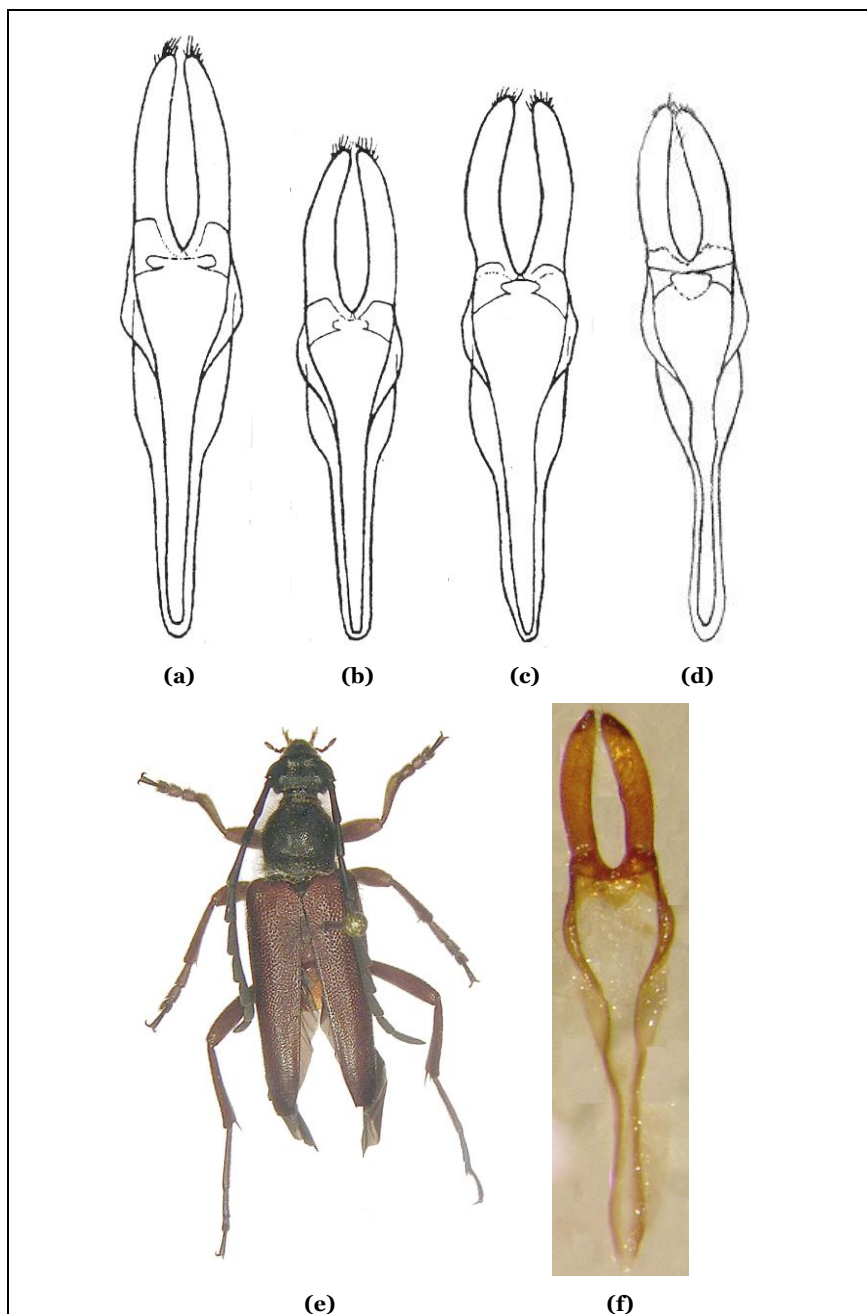


Plate II. Drawings of male genitaliae (a) *S. erythroptera* (b) *S. heydeni* (c) *S. rufa* from Mirosnikov (1998) (d) *S. gevneensis* sp. n. (e) Holotypus of *S. gevneensis* sp. n. (f) Photo of male genitalia of *S. gevneensis* sp. n.

**TURKA NOM. NOV., FOR THE PREOCCUPIED  
PALAEARCTIC ROBBER FLIES GENUS *TURKIELLA*  
LEHR, 1996 (DIPTERA: ASILIDAE)**

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mail: ozdikmen@gazi.edu.tr

**[Özdikmen, H. 2008. *Turka* nom. nov., for the preoccupied palaearctic robber flies genus *Turkiella* Lehr, 1996 (Diptera: Asilidae). Munis Entomology & Zoology 3 (2): 554-555]**

ABSTRACT: A junior homonym was detected among the genus group names of Asilidae and the following replacement name is proposed: *Turka* nom. nov. for *Turkiella* Lehr, 1996. Accordingly, new combinations are herein proposed for the species currently included in this genus. *Turka cervinus* (Loew, 1856) comb. nov.; *Turka nudus* (Lehr, 1996) comb. nov.; *Turka tridentatus* (Loew, 1871) comb. nov. and *Turka zaitzevi* (Lehr, 1996) comb. nov.

KEY WORDS: nomenclatural change, homonymy, replacement name, Diptera, Asilidae.

Order Diptera  
Family Asilidae  
**Genus *Turka* new name**

*Turkiella* Lehr, 1996. Robber flies of subfamily Asilinae (Diptera, Asilidae) of Palaearctic. Ecological and morphological analysis, taxonomy and evolution. Dalnauka Vladivostok: 131. (Insecta: Diptera: Asilidae: Asilinae). Preoccupied by *Turkiella* Zumpt & Till, 1953. An. Inst. Med. trop., Lisboa, 10, 215. (Acari: Parasitiformes: Mesostigmata: Dermanyssina: Dermanyssoidea: Laelapidae).

**Remarks on nomenclatural change:** Lehr (1996) proposed the palaearctic robber flies genus *Turkiella* in Asilidae. The genus name is currently used as a valid generic name. It has four species now.

Unfortunately, the generic name was already preoccupied by Zumpt & Till (1953), who had described the mite genus *Turkiella* with the type species *Androlaelaps theseus* Zumpt, 1950 in Acari. It is currently used as a valid generic name.

So the genus name *Turkiella* Lehr, 1996 is invalid under the rule of homonymy, being a junior homonym of *Turkiella* Zumpt & Till, 1953. Under the International Code of Zoological Nomenclature (ICZN 1999) it must be rejected and replaced. In accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (1999), I propose to substitute the junior homonym *Turkiella* Lehr, 1996 for the nomen novum *Turka*.

Etymology.— from the Turkish word “Türk”.

Summary of nomenclatural changes;

*Turka* **nom. nov.**

pro *Turkiella* Lehr, 1996 (non Zumpt & Till, 1953)

*Turka cervinus* (Loew, 1856) **comb. nov.**

from *Turkiella cervinus* (Loew, 1856)

= *Epitriptus cervinus* Loew, 1856

Distr.: Palaearctic Region: Russia, Kazakhstan, Kirgizia, Turkey, Iraq, Iran, North Africa (Morocco, Tunisia, Egypt).

*Turka nudus* (Lehr, 1996) **comb. nov.**

from *Turkiella nudus* Lehr, 1996

Distr.: Palaearctic Region: Russia, Kazakhstan.

*Turka tridentatus* (Loew, 1871) **comb. nov.**

from *Turkiella tridentatus* (Loew, 1871)

= *Mochtherus tridentatus* Loew, 1871

Distr.: Palaearctic Region: Russia, Kazakhstan, Kirgizia, Turkey.

*Turka zaitzevi* (Lehr, 1996) **comb. nov.**

from *Turkiella zaitzevi* Lehr, 1996

Distr.: Palaearctic Region: Russia, Kirgizia.

## LITERATURE CITED

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Lehr P. A.** 1996. The robber flies of subfamily Asilinae (Diptera, Asilidae) of Palaearctic. Ecological and morphological analysis, taxonomy and evolution. Vladivostok: Dalnauka. 184 pp.

**Zumpt, F. & Till, W.** 1953. The genera *Turkiella* nov. (= *Androlaelaps* auct.) and *Haemolaelaps* in the Ethiopian region, with keys and descriptions of three new species (Acarina: Laelaptidae). Anais do Instituto de Medicina Tropical, Lisboa. 10 (2): 215-249.

## **SIDE-EFFECTS OF THREE ACARICIDES ON THE PREDATORY MITE, *PHYTOSEIULUS PERSIMILIS* ATHIAS-HENRIOT (ACARI: PHYTOSEIIDAE) UNDER LABORATORY CONDITIONS**

**Ahmad Nadimi\*, Karim Kamali\*,  
Masoud Arbabi\*\* and Fateme Abdoli\*\*\***

\* Department of Entomology, Tarbiat Modares University, Tehran, Iran. E-mail: ahmad\_nadimi@yahoo.com

\*\* Department of Agricultural Research Zoology, Iranian Plant Protection Research Institute.

\*\*\* Department of Biology, Guilan University, Rasht, Iran.

[Nadimi, A., Kamali, K., Arbabi, M. & Abdoli, F. 2008. Side-effects of three Acarides on the predatory mite, *Phytoseiulus persimilis* Athias-Henriot (Acari: Phytoseiidae) under laboratory conditions. Munis Entomology & Zoology 3 (2): 556-567]

**ABSTRACT:** The predatory mite *Phytoseiulus persimilis* Athias-Henriot is an economically important species in integrated mite pest management and biological control of spider mites in many countries throughout the world. For optimal biological mite management, it is important to know if acaricides have adverse undesirable effects on the predatory mites. The toxic effects of hexythiazox (Nisorun®, EC 10%), fenpyroximate (Ortus®, SC 5%) and abamectin (Vertimec®, EC 1.8%) on *P. persimilis* were evaluated. The acaricides were applied on detached bean leaves using a Potter Tower spray which deposited 2 mg spray solution per cm<sup>2</sup>. Percent predator mortality was evaluated from the protonymph up to the adult stage including first five days of the oviposition period. The results showed that the total effect values of all concentrations of hexythiazox were below the lower threshold thus it could be considered a harmless acaricide to this predatory mite. In contrast, the total effect of all concentrations of fenpyroximate, and field, as well as, one half the field concentration of abamectin were found toxic to predatory mite and above upper threshold.

**KEY WORDS:** *Phytoseiulus persimilis*, Side effect, Acaricide, Predatory mite

### **INTRODUCTION**

The two spotted spider mite, *Tetranychus urticae* (Koch), is one of the most important mite pest species with a wide range of host plants and world distribution (Bolland *et al.*, 1998). In Iran it is found on a number of outdoor and indoor agriculture crops (Arbabi *et al.*, 1997). Many efforts have been undertaken to manage *T. urticae* problems in agricultural crops such as the application of new acaricides with the lower concentrations and release of predacious mites such as *Phytoseiulus persimilis* in glasshouses on cucumbers (Arbabi, 2007) and in fields of beans, cotton as well as soybeans (Daneshvar & Abaii, 1994). Among glasshouse pests recorded in the world, spider mites are known for their high fecundity, short life span and several generations per season. Under these circumstances spider mites are quickly selected for pesticide resistance pesticides (Helle & Sabelis, 1985). It has gained increasing attention by research scientists in many parts of the world. Selective pesticides that can be used to control pests without adversely affecting important natural enemies are urgently needed. Testing programme

represented by IOBC (International Organization for Biological Control), is not only meant to provide valuable information on the side effects of pesticides on beneficial organisms but it also gives the testing members an opportunity to improve testing techniques, compare results and exchange experience with colleagues in the Working Group (Hassan et al., 1991).

Mass rearing and releasing natural enemies mainly phytoseiid mites are one of the goals of biological control of these pests in indoor and outdoor conditions (McMurtry & Croft, 1997). Biological control of these pests is increasing because of the pressure on growers to find alternatives to chemical pesticides (van Lenteren, 2000). In the presence of chemical applications, biological control of spider mites may be achieved by the selective use of pesticides that are less toxic to natural enemies than to pest species (Zhang & Sanderson, 1990). Ruberson et al. (1998) suggested that selective pesticide were the most useful tool of integration of biological control agents into pest control programs.

A strain of *P. persimilis* was introduced into Iran from the Netherlands (Department of Entomology, Wageningen Agricultural University) in 1988 (Daneshvar, 1989) and it was effective in controlling spider mites under greenhouses and outdoor conditions (Daneshvar & Abaii, 1994). However, Biological control of spider mites using this predaceous mite is effective only against low population densities of the pest (Pralavorio et al., 1985). When the population densities are high an acaricide treatment is needed to reduce the pest population before release of beneficial mites (Malezieux et al., 1992).

The effects of pesticides on *T. urticae* are being widely studied and its resistance to new products is frequently monitored (Castagnoli et al., 2005). Failures of chemical control of *T. urticae* caused by resistance have been reported in several countries for compounds, such as Hexythiazox (Herron & Rophail, 1993), Fenpyroximate (Sato *et al.*, 2004) and Abamectin (Beers et al., 1998). Although various aspect of pesticide effects on *P. persimilis* have been studied by many workers in the past (Samsøe-Petersen, 1983; Zhang & Sanderson, 1990; Oomen et al., 1991; Blumel et al., 1993; Hassan et al., 1994; Shipp et al., 2000; Blumel and Gross, 2001; Cloyd et al., 2006). Only Kavousi & Talebi (2003) investigated side-effects of heptenophos, malathion and pirimiphos-methyl on *P. persimilis* in Iran. Moreover, there is no information on the susceptibility of this introduced strain to other pesticides, especially acaricides.

In this study, we report the effects of abamectin, fenpyroximate and hexythiazox on *P. persimilis* used in biological control programs in glasshouses. The three acaricides are currently used for control of spider mites in Iran. The results will be used to develop IPM programs with *P. persimilis* in agricultural crops.

## MATERIALS AND METHODS

### 1. Origin and rearing of mites

The *T. urticae* strain originated from the glasshouse of the Department of Agricultural Zoology, Iran Plant Protection Res. Institute (IPPRI) and was reared on beans (*Phaseolus vulgaris* L. var. Lordegan) sown in earthen pots in several months. *P. persimilis* strain originated from IPPRI that was reared on bean plants for 13 years without exposure to pesticides.

The two species were mass reared on bean leaves placed upside down on a layer of water-saturated cotton in a Petri dish and surrounded by wet cotton-wool to prevent the mites from escaping and, at the same time, provide water. Mite cultures were maintained in a controlled climate chamber at  $25 \pm 2$  °C,  $65 \pm 10\%$  RH with 16:8 h (L:D) photoperiod.

### 2. Test Units Environment

The test unit consisted of a detached bean leaf placed lower side on a layer of water-saturated cotton in a Petri dish (80-mm diameter) with a hole drilled in the center. The Petri dish was placed in another larger Petri dish (90-mm diameter) to provide a continuous water supply to the cotton layer. Thus predatory mites were provided with drinking water and a barrier that impeded their escape. It is very important that all leaves are of the same quality in tests that are to be compared. Young, dark green, primary leaves were chosen that were roughly 5.5 cm wide at the widest part near the base (Samsøe-Petersen, 1983). The bean leaves were excised with their petioles intact and placed upside down onto wet cotton, the petioles were immediately embedded in moist cotton to extend the high quality of leaves and initiate the growth of roots (Bernard et al., 2004). Test units were kept in a controlled climate chambers.

### 3. Preparation of the predator

The test was done with the most susceptible life stage, i.e. protonymphs (larvae are too fragile to be used). Protonymphs of uniform age obtained according to the procedure described by Bakker et al. (1992).

### 4. Acaricides

The toxicity of abamectin (Vertimec®, EC 1.8%), fenpyroximate (Ortus®, SC 5%) and hexythiazox (Nisorun®, EC 10%) were evaluated at N, 1/2N and 1/4N where N represents the field rate recommended in Iran. Tap water was used in the controls (Table 1).

### 5. Spraying

The experiment was carried out using the detached leaf method according to Oomen (1988). Single detached leaves were sprayed at day 0 of the experiment on the lower side with a potter spray tower (Burchard Manufacturing, Uxbridge, United kingdom) was calibrated to achieve a

wet deposit of 2 mg cm<sup>-2</sup>. The dry residue was used to test contact toxicity to juvenile predators. After the spray residue had dried, predator protonymphs of uniform age were placed on the leaf arena using a fine brush and a surplus of spider mites was added as food. 60 predator protonymphs (15 × 4 replicates) were used in each test unit. Finally, a plastic mesh was provided in the center of cover of the Petri dishes.

## 6. Assessment

Mortality and escape of predators up to 5 days after the adult stage and reproduction per female during the first 5 days of the adult stage were assessed. All dead and live mites were counted, and dead mites were removed daily. Mites were considered dead when they failed to move after repeated gentle prodding with a brush. Predator eggs were counted and removed daily from 3 to 7 d after spraying. All assessments were made with a stereomicroscope.

## 7. Analysis

To avoid overestimating mortality, cumulative mortality was calculated by summing dead mites and dividing this number by the total number of live and dead mites at each mortality assessment, excluding unaccounted escapees (Blumel et al., 1993). The escape rate was calculated as a portion of number of mites present at the start of experiment. Mortality rates were corrected for the control mortality with the following formula (Abbott, 1925):

$$M_a = (M_t - M_c) / (100 - M_c) \times 100\%$$

$M_a$ : Mortality corrected according to Abbott

$M_t$ : Mortality in treatment

$M_c$ : Mortality in control

Possible changes in the number of females present on the test units during the reproduction period were taken into account by the following formula:

$$R_{ry} = (nE_{d3} / nF_{d3}) + [nE_{d4} / ((nF_{d3} + nF_{d4})/2)] + [nE_{d5} / ((nF_{d4} + nF_{d5})/2)] + [nE_{d6} / ((nF_{d5} + nF_{d6})/2)] + [nE_{d7} / ((nF_{d6} + nF_{d7})/2)]$$

d3 to d7: examples for evaluation days

$R_{ry}$ : Reproduction in replicate number y

$nE_{dx}$ : number of eggs (in replicate number y) on day x

$nF_{dx}$ : number of females (in replicate number y) on day x

Mean values of the escape rate, of the mortality rate and of the reproduction per female of the different treatments were analyzed statistically. Data were checked for normal distribution with Anderson-Darling test (Minitab 13) and analyzed by univariate variance analysis

(ANOVA, Duncan-test; SPSS 13.0 for windows). Data were transformed before analysis (square root).

Effect on reproduction was determined by:

$$E_r = R_t / R_c$$

Where:  $E_r$  = Effect on reproduction  
 $R_t$  = Reproduction in treatment  
 $R_c$  = Reproduction in control

Subsequently effect on survival and effect on reproduction were combined using the following formula (Overmeer & van Zon, 1982):

$$E = 100\% - (100\% - M_a) \times E_r$$

Where:  $M_a$  = Mortality corrected according to Abbott  
 $E$  = Total effect

Based on total effects, rating of toxicity of acaricides was evaluated through the Working Group's joint pesticide testing programme in guideline IOBC (Bakker et al., 1992):

Class 1: $E < 30\%$	(harmless)
Class 2: $30 < E < 80$	(slightly harmful)
Class 3: $80 < E < 99$	(moderately harmful)
Class 4: $E > 99\%$	(harmful)

## RESULTS

There was a significant difference in 7 d cumulative mortality effects of all three acaricides at all three concentrations on *P. persimilis* (Table 2). Mortality was highest after exposure to fenpyroximate at all concentrations and abamectin at field rate (100% mortality). Application at half and quarter of the field rate of abamectin resulted in 62.27 to 71.23% mortality (Table 2). In contrast, *P. persimilis* exposed to dry residues of all three concentrations of Hexythiazox suffered only 5.43 to 18.44% mortality.

Acaricides differed significantly in their effects on female fecundity (Table 2). The lowest reproductive performance was caused by fenpyroximate at all three concentrations and abamectin at field rate. Fenpyroximate caused a complete cessation of egg lay. Application at half and quarter the field rate of hexythiazox increased the reproduction performance on *P. persimilis* (Table 2).

All three acaricides had no repellent attributes (Table 4). The results of total effects ( $E$ ) of the product applications are listed in Table 3. When the toxic effects of the acaricides are classified according to IOBC classification, all three concentrations of hexythiazox were harmless



(class1,  $E < 30$ ). At one quarter the field rate, abamectin was moderately harmful (class 3,  $80 < E < 99$ ) and half the field rate, abamectin and all three concentrations of fenpyroximate were harmful (class 4,  $E > 99$ ).

## DISCUSSION

Among the 3 acaricides evaluated, only hexythiazox was harmless to *P. persimilis*. Fenpyroximate at the 3 concentrations evaluated and abamectin at the field and one half the field rates were harmful to *P. persimilis*. The use of these two compounds in the field would probably result in severe reduction of *P. persimilis*. Thus they are incompatible in IPM programs using this species. Our results are consistent with results reported for fenpyroximate and abamectin (Blumel & Hausdorf, 2002). Even at one quarter the field rate, Abamectin was moderately harmful to *P. persimilis*. Based on our observations these effects could be caused by a direct effect of these two acaricides on survival and reproduction of the predator mite.

Although various phytoseiid species have responded differently to abamectin, a reduction in reproduction is common to all (Zhang & Sanderson, 1990). Kim et al. (2005) showed that application of abamectin was highly toxic to *Amblyseius cucumeris* (Oudemans) adult females causing 92% mortality at 168 h after treatment and the number of eggs deposited by adult female predators decreased to 5.4 compared to 131.6 in the control.

Zhang and Sanderson (1990) believe that one reason of fewer egg produced is reducing mobility and thus consuming fewer prey. Also, they suggested that a lack of prey and quick elimination of spider mite by these acaricides may cause such effects.

Application of Hexythiazox at different concentrations was harmless to *P. persimilis*. Our results are consistent with the results by Oomen et al. (1991), Hassan et al. (1987, 1991), van der Staay (1991) and Blumel & Gross (2001). It would be an appropriate substitute to fenpyroximate and abamectin in integrated pest management (IPM) programs.

Our observations showed that exposure to hexythiazox at one half and one quarter the field rates increased fecundity of *P. persimilis*. These results are not the first documented case of pesticide increasing fecundity in a phytoseiid mite. Kavousi & Talebi (2003) showed that heptenophos at the recommended concentration increased the fecundity of *P. persimilis*. Also, James (1997) reported increased fecundity in *Amblyseius victoriensis* by imidacloprid. The fecundity-enhancing property of hexythiazox can make *P. persimilis* an excellent choice as a biological control agent in greenhouses and other horticulture crops.

Van de Vrie et al. (1972) believed that certain pesticides can stimulate mite reproductive physiology; therefore, positive effect of hexythiazox at these two concentrations on reproduction may be physiological. Our results indicated that further studies on the effect of hexythiazox on fecundity and reproduction of *P. persimilis* and other phytoseiid species

are clearly warranted. For example, investigation of different concentrations of pesticides (especially lower rates) and comparative effects on the other stages should be assessed.

The relative toxicity of pesticides to pests, predators and immature stages (e.g. neonates) of the predators should provide an adequate indication for selectivity of pesticides, which is essential for development of pest management programs (Jeppson et al., 1975). Nevertheless, few populations consist of one life stage in nature and a true estimate of effect will not be gained by testing neonates only. If there is differential susceptibility among life stage, population toxicology is warranted (Stark & Banken, 1999). Furthermore, less susceptible stages can compensate for the loss of young and an accurate estimate of the toxic effect is therefore not obtained when toxicological studies are conducted with neonates only (Stark & Wennergren, 1995; Kareiva et al., 1996; Walthall & Stark, 1997; Stark et al., 1997). Ultimately, Stark & Banken (1999) suggested that to conduct more realistic toxicological studies, it is probably best to test a mixed age population.

Blumel et al. (2000) suggested that studies should be focused on the protonymph the most susceptible developmental stage, we suggest that side-effects of hexythiazox and other pesticides should be studied on other life stages.

There were no differences in the number of *P. persimilis* that escaped in treatments, but percentage was higher in control (25% escapes). The predatory mite, *P. persimilis* is a highly motile active predator, so higher escape levels are not surprising. Also, escaping from the treated test surface is a common problem in this method (Kavousi & Talebi, 2003). However, escape is a change in the behavior of the test mites, which as a test parameter should be addressed at higher test tiers (i.e. semi field and field trials) (Blumel et al., 2000).

It seems likely that several factors are affected on estimating the escape rate under laboratory conditions:

- a) lethal effect of acaricides may conceal their repellent effects
- b) handling of test units including adding food, removing eggs and dead mites and even light produced by stereomicroscope may cause overestimation in escape rates as repellent effects.

Thanks to the reasons cited above, as well as the high escape rates observed in the control block, it was not possible to estimate this parameter.

## CONCLUSION

Of the three acaricides evaluated in the laboratory, hexythiazox may be incorporated in IPM programs based on *P. persimilis* without any additional studies. The other two acaricides fenpyroximate and abamectin were too toxic. A more detailed understanding of their toxicity under field conditions is required before any recommendations for their suitability or unsuitability in IPM programs in Iran can be made.

## LITERATURE CITED

- Abbott, W. S.** 1925. A method of computing the effectiveness of an insecticide. *Journal of Economic Entomology*, 18: 265-267.
- Arbabi, M.** 2007. Study on effectiveness of *Phytoseiulus persimilis* in control of cucumber two spotted spider mite (*Tetranychus urticae* complex) in woody and iron greenhouse structures in Varamine region. Pajouhesh and Sazandegi, 74 (In press).
- Arbabi, M., Baradaran, P. & Khosrowshahi, M.** 1997. Plant feeding mites in agriculture of Iran. Agricultural Research, Education and Extension Organization Publication. pp 27.
- Bakker, F. M., Grove, A. J., Blumel, S., Calis, J. N. M. & Oomen, P. A.** 1992. Side-effects for phytoseiids and their rearing methods. *Bull. OILB/SROP*, 15: 61–81.
- Beers, E. H., Riedl, H. & Dunley, J. E.** 1998. Resistance to Abamectin and reversion to susceptibility to Fenbutatin oxide in spider mite (*Acari: Tetranychidae*) populations in the Pacific Northwest. *Journal of Economic Entomology*, 91: 352-360.
- Bernard, M. B., Horne, P. A. & Hoffmann, A. A.** 2004. Developing an ectotoxicological testing standard for predatory mites in Australia: acute and sublethal effects of fungicides on *Euseius victoriensis* and *Galenromus occidentalis* (*Acarina: Phytoseiidae*). *Journal of Economic Entomology*, 97: 891-899.
- Blumel, S. & Gross, M.** 2001. Effect of pesticide mixtures on the predatory mite *Phytoseiulus persimilis* (*Acarina: Phytoseiidae*) in the laboratory. *Journal of Applied Entomology*, 125: 201–205.
- Blumel, S. & Hausdorf, H.** 2002. Results of 8th and 9th IOBC joint pesticides testing programme: persistence test with *Phytoseiulus persimilis* Athias Henriot (*Acari: Phytoseiidae*). *IOBC/wprs*, 25: 43-51.
- Blumel, S., Bakker, F. & Grove, A.** 1993. Evaluation of different methods to assess the side-effects of pesticides on *Phytoseiulus persimilis* A-H. *Experimental and Applied Acarology*, 17: 161-169.
- Blumel, S., Pertl, C. & Bakker, F. M.** 2000. Comparative trials on the effects of two fungicides on a predatory mite in the laboratory and in the field. *Entomologia Experimentalis et Applicata*, 97: 321-330.
- Bolland, H. R., Gutierrez, J. & Flechmann, C. H.** 1998. World Catalogue of the spider mite family (*Acari: Tetranychidae*). Brill Pub., Leiden, 392 pp.
- Castagnoli, M., Liguori, M., Simoni, S. & Duso, C.** 2005. Toxicity of some insecticides to *Tetranychus urticae* and *Tydeus californicus*. *Biocontrol*, 50: 611-622.
- Cloyd, R. A., Galle, C. L. & Keith, S. R.** 2006. Compatibility of three miticides with the predatory mites *Neoseiulus californicus* McGregor and *Phytoseiulus persimilis* Athias-Henriot (*Acari: Phytoseiidae*). *HortScience* 41: 707-710.
- Daneshvar, H.** 1989. The introduction of *Phytoseiulus persimilis* A.H (*Acari: Phytoseiidae*) as active predator in Iran. In: proceeding 9th Plant Protection Congress of Iran, 9-14, September, Mashhad, Iran, pp, 69-70.
- Daneshvar, H. & Abaii, M. G.** 1994. Efficient control of *Tetranychus turkestanii* on cotton, soybean and bean by *Phytoseiulus persimilis* (*Acari: Tetranychidae, Phytoseiidae*) in pest foci. *Applied Entomology and Phytopathology*, 61: 61-75.

**Hassan, S. A., Albert, R., Bigler, F., Blaisinger, P., Bogenschütz, H., Boller, E., Brun, J., Chiverton, P., Edwards, P., Englert, W. D., Huang, P., Inglesfield, C., Naton, E., Oomen, P. A., Overmeer, W. P. J., Rieckmann, W., Samsøe-Petersen, L., Staubli, A., Tuset, J. J., Viggiani, G. & Vanwetswinkel, G.** 1987. Results of the third Joint Pesticide Testing Programme by the IOBC working group 'Pesticides and Beneficial Organism'. *Journal of Applied Entomology*, 103: 92-107.

**Hassan, S. A., Bigler, F., Bogenschutz, H., Boller, E., Brun, J., Calis, J. N. M., Chiverton, J., Coremans-Pelseneer, J., Duso, C., Lewis, G. B., Mansour, F., Moreth, L., Oomen, P. A., Overmeer, W. P. J., Polgar, L., Rieckmann, W., Samsøe-Petersen, L., Staubli, A., Sterk, G., Tavares, K., Tuset, J. J. & Viggiani, G.** 1991. Results of the fifth Joint Pesticide Testing Programme of the IOBC/WPRS-working group 'Pesticides and Beneficial Organisms'. *Entomophaga*, 36: 55-67.

**Hassan, S. A., Bigler, F., Bogenschutz, H., Boller, E., Brun, J., Calis, J. N. M., Coremans-Pelseneer, J., Duso, C., Grove, A., Heimbach, U., Helyer, N., Hokkanen, H., Lewis, G. B., Mansour, F., Moreth, L., Polgar, L., Samsøe-Petersen, L., Sauphanor, B., Stäubli, A., Sterk, G., Vainio, A., van der Veire, M., Viggiani, G. & Vogt, H.** 1994. Results of the sixth joint pesticide testing programme of the IOBC/WPRS-working group 'Pesticides and Beneficial Organisms', *Entomophaga*, 39: 107-119.

**Helle, W. & sabelis, N. W.** 1985. Spider mites: Their Biology, Natural Enemies and Control. Vol.1A. Elsevier, Amsterdam, the Netherlands.

**Herron, G. A. & Rophail, J.** 1993. Clofentezin and Hexythiazox resistance in *Tetranychus urticae* Koch in Australia. *Experimental and Applied Acarology*, 17: 433-440.

**James, D. J.** 1997. Imidacloprid increases egg production in *Amblyseius victoriensis* (Acari: Phytoseiidae). *Experimental and Applied Acarology*, 21: 75-82.

**Jeppson, I. R., McMurtry, J. A., Mead, O. W., Jessor, M. J. & Johnson, H. G.** 1975. Toxicity of citrus pesticides to some predacious phytoseiid mites. *Journal of Economic Entomology*, 68: 707-710.

**Kareiva, P., Stark, J. D. & Wennergren, U.** 1996. Using demographic theory, community ecology, and spatial models to illuminate ecotoxicology. In *Ecotoxicology: Ecological Dimensions* (L. Malby and P. Grieg-Smith, EDs.), pp.13-Chapman & Hall, London.

**Kavousi, A. & Talebi, K.** 2003. Side-effects of three pesticides on predatory mite, *Phytoseiulus persimilis* (Acari: Phytoseiidae). *Experimental and Applied Acarology*, 31: 51-58.

**Kim, S. K., Seo, S. G., Park, J. D., Kim, S. G. & Kim, D. I.** 2005. Effect of selected pesticides on predatory mite, *Amblyseius cucumeris* (Acari: Phytoseiidae). *Journal of Entomological Science*, 40: 107-111.

**Malezieux, S., Lapchin, L., Pralavorio, M., Moulin, J.C. & Fournier, D.** 1992. Toxicity of pesticide residues to a beneficial arthropod, *Phytoseiulus persimilis* Athias-Henriot (Acarina: Phytoseiidae). *Journal of Economic Entomology*, 85: 2077-2081.

**McMurtry, J. A. & Croft, B. A.** 1997. Life- styles of phytoseiid mites and their roles in biological control. *Annual Review of Entomology*, 42: 291-321.

**Oomen, P. A.** 1988. Guideline for the evaluation of side effects of pesticides on *Phytoseiulus persimilis* A-H. *Bull. SROP*, 11: 51-63.

- Oomen, P. A., Romeijn, G. & Wieggers, G. L.** 1991. Side-effects of 100 pesticides on the predatory mite *Phytoseiulus persimilis*, collected and evaluated according to the EPPO Guideline. Bull. OEPP/EPPO Bull, 21: 701–712.
- Overmeer, W. P. J. & van Zon, A. Q.** 1982. A standardized method for testing the side-effects of pesticides on the predacious mite, *Amblyseius potentillae* (Acari: Phytoseiidae). Entomophaga, 27: 357–364.
- Pralavorio, M., Millot, P. & Fournier, D.** 1985. Biological control of greenhouse spider mites in southern France. In "Biological Pest Control: The Glasshouse Experience" (N. W. Hussey and N. Scopes, Eds.), pp. 125–128. Cornell University Press, Ithaca, NY.
- Ruberson, J. R., Nemoto, H. & Hirose, Y.** 1998. Pesticides and Conservation of Natural Enemies in Pest Management, In: Conservation Biological Control. Ed. P. Barbosa. Academic Press, 396 pp.
- Samsøe-Petersen, L.** 1983. Laboratory method for testing side effects of pesticides on juvenile stages of the predatory mite, *Phytoseiulus persimilis* (Acarina: Phytoseiidae) based on detached bean leaves. Entomophaga, 28: 167–178.
- Sato, M. F., Miyata, T., da Silva, M. & de Souza Filho, M. F.** 2004. Selection for Fenpyroximate resistance and susceptibility, and inheritance, cross resistance and stability of Fenpyroximate resistance in *Tetranychus urticae* (Acari: Tetranychidae). Applied Entomology and Zoology, 39: 293–302.
- Shipp, J. L., Wang, K. & Ferguson, G.** 2000. Residual toxicity of avermectin bl and pyridaben to eight commercially produced beneficial arthropod species used for control of greenhouse pests. Biological Control 17: 125–131.
- Stark, J. D. & Banken, J. O.** 1999. Importance of population structure at the time of toxicant exposure. Ecotoxicology and Environmental Safety, 42: 282–287.
- Stark, J. D. & Wennergren, U.** 1995. Can population effects of pesticides be predicted from demographic toxicological studies? Journal of Economic Entomology, 88: 1089–1096.
- Stark, J. D., Tanigoshi, L., Bounfour, M. & Antonelli, A.** 1997. Reproductive Potential: It's influence on the susceptibility of a species to pesticides. Ecotoxicology and Environmental Safety, 37: 273–279.
- Van de Vrie, M., McMurtry, J. A. & Huffaker, C. B.** 1972. III. Biology, ecology, and pest status, and host plant relations of tetranychids. Hilgardia, 41: 343–342.
- Van der Staay, M.** 1991. Side-effects of pesticides on predatory mites. Medical Faculty, Landbouw. Rijksuniversiteit, Gent, 56: 355–358.
- Van Lenteren, J. C.** 2000. A greenhouse without pesticides: fact of fantasy? Crop Protection, 19: 375–384.
- Walthall, W. K. & Stark, J. D.** 1997. A comparison of acute mortality and population growth rate as endpoints of toxicological effects. Ecotoxicology and Environmental Safety, 37: 45–52.
- Zhang, Z. Q.** 2003. Mite of Greenhouses: Identification, Biology and Control. CABI Publishing, 244.
- Zhang, Z. Q. & Sanderson, J. P.** 1990. Relative toxicity of Abamectin to the predatory mite *Phytoseiulus persimilis* (Acari: Phytoseiidae) and twospotted spider mite (Acari: Tetranychidae). Journal of Economic Entomology, 83: 1783–1790.

Table 1. Acaricides

Active ingredient	Brand name	field rate recommended (N) (ml/l)
hexythiazox	Nisorun, EC 10%	2.5
abamectin	Vertimec, EC 1.8%	0.2
fenpyroximate	Ortus, SC 5%	0.5

Table 2. Effect of three acaricides at different concentrations on the survival and fecundity of *P. persimilis*

Treatments	Concentrations	% Mortality rates* (Mean±SE)	Total eggs/female* (Mean±SE)
Control	-	-	15.61±0.33 <sup>b</sup>
hexythiazox	N	18.44±2.86 <sup>a</sup>	15.53±0.27 <sup>b</sup>
hexythiazox	1/2N	4.49±3.19 <sup>a</sup>	19.12±0.28 <sup>a</sup>
hexythiazox	1/4N	5.43±2.46 <sup>a</sup>	20.00±0.78 <sup>a</sup>
abamectin	N	100±00 <sup>c</sup>	no surviving female
abamectin	1/2N	71.23±4.21 <sup>b</sup>	0.13±0.47 <sup>d</sup>
abamectin	1/4N	62.27±3.33 <sup>b</sup>	3.01±0.03 <sup>c</sup>
fenpyroximate	N	100±00 <sup>c</sup>	no surviving female
fenpyroximate	1/2N	100±00 <sup>c</sup>	no surviving female
fenpyroximate	1/4N	100±00 <sup>c</sup>	no surviving female

\*Means in columns followed by different letters are significantly different; Duncan-test;  $P < 0.05$

Table 3. Total effect and toxicity of three acaricides at different concentrations on *P. persimilis* (IOBC evaluation categories).

Treatments	Concentrations	Total effects	Toxicity class
Control	-	-	-
hexythiazox	N	23.7	1
hexythiazox	1/2N	-15.29	1
hexythiazox	1/4N	-9.11	1
abamectin	N	100	4
abamectin	1/2N	99.73	4
abamectin	1/4N	92.24	3
fenpyroximate	N	100	4
fenpyroximate	1/2N	100	4
fenpyroximate	1/4N	100	4

Table 4. Repellency of *P. persimilis* after exposure to fresh residues of acaricides at different concentrations

Treatments	Concentrations	% Escape rates <sup>*</sup> (Mean±SE)
Control	-	25.00±94 <sup>a</sup>
hexythiazox	N	21.66±0.83 <sup>a</sup>
hexythiazox	1/2N	10.83±1.56 <sup>a</sup>
hexythiazox	1/4N	20.00±3.33 <sup>a</sup>
abamectin	N	15.00±0.83 <sup>a</sup>
abamectin	1/2N	23.33±2.88 <sup>a</sup>
abamectin	1/4N	21.66±0.83 <sup>a</sup>
fenpyroximate	N	15.00±0.83 <sup>a</sup>
fenpyroximate	1/2N	16.66±2.88 <sup>a</sup>
fenpyroximate	1/4N	16.66±2.15 <sup>a</sup>

<sup>\*</sup>Means in columns followed by the same letter are not significantly different; Duncan-test;  $P > 0.05$

**A NEW SPECIES AND A NEW SUBSPECIES  
OF THE SUBGENUS *PHYTOECIA* (*BLEPISANIS*)  
PASCOE, 1866 FROM TURKEY  
(COLEOPTERA: CERAMBYCIDAE: LAMIINAE)**

**Hüseyin Özdikmen\* and Semra Turgut\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / Türkiye. E-mails: ozdikmen@gazi.edu.tr and semraturgut@myynet.com

**[Özdikmen, H. & Turgut, S. 2008.** A new species and a new subspecies of the subgenus *Phytoecia* (*Blepisanis*) Pascoe, 1866 from Turkey (Coleoptera: Cerambycidae: Lamiinae). *Munis Entomology & Zoology* 3 (2): 568-581]

**ABSTRACT:** *Phytoecia* (*Blepisanis*) *samai* sp. n. is described from Amanos Mountains (S Turkey). Distinguishing characters, photo of adult, photos of male genitalia are given. It is compared with related species, *Phytoecia* (*Blepisanis*) *vittipennis* Reiche, 1877. On the other side, *Phytoecia* (*Blepisanis*) *vittipennis* var. *inhumeralis* (Pic, 1900) is raised to subspecies rank.

**KEY WORDS:** new species and subspecies, *Blepisanis*, Lamiinae, Cerambycidae, Turkey.

**Subfamily LAMIINAE Latreille, 1825**

**Tribe SAPERDINI Mulsant, 1839**

- = *Phytoecia* Mulsant, 1839
- = *Saperdina* Thomson, 1859
- = *Saperditae* Thomson, 1860
- = *Saperdites* Fairmaire, 1864
- = *Phytoecites* Fairmaire, 1864
- = *Obereini* Thomson, 1864
- = *Obereitae* Thomson, 1864
- = *Phytoeciini* Pascoe, 1864
- = *Saperdides* Lacoedaire, 1872
- = *Glénéides* Lacordaire, 1872
- = *Gleneini* Lacordaire, 1872

Vitali (2007) stated that “Saperdini, *Phytoecini*, *Obereini* and *Gleneini* are characterised by mutual characters that do not allow to consider them as separated tribes. Breuning’s systematics, the only world-wide revision, is adopted here“. We agree with Vitali’s approach now. In fact that Ohbayashi & Niisato (2007) accepted Saperdini = *Gleneini* = *Phytoeciini*. We agree with these approaches and prefer now to return to Breuning’s position. So the tribe includes currently at least 79 genera.

**Genus *PHYTOECIA* Dejean, 1835**

- = *Cardoria* Mulsant, 1863
- = *Opsilia* Mulsant, 1863
- = *Pilemia* Fairmaire, 1863
- = *Helladia* Fairmaire, 1864
- = *Musaria* Thomson, 1864
- = *Blepisanis* Pascoe, 1866
- = *Hoplotoma* Perez, 1874
- = *Semiangusta* Pic, 1892



- = *Pygoptosia* Reitter, 1895
- = *Pseudomusaria* Pic, 1900
- = *Neomusaria* Plavilstshikov, 1928
- = *Cinctophytoecia* Breuning, 1947
- = *Pseudoblepisanis* Breuning, 1950
- = *Mimocoptosia* Breuning & Villiers, 1972

**Type species:** *Saperda cylindrica* Fabricius, 1775 = *Cerambyx cylindricus* Linnaeus, 1758

Now, we think that the presence of mixed characters in the whole genus does not allow us to consider the subgenera as valid genera as stated by some authors. Breuning's systematics is adopted here.

In this case, the genus includes 14 subgenera as *Blepisanis* Pascoe, 1866; *Cardoria* Mulsant, 1863; *Cinctophytoecia* Breuning, 1947; *Helladia* Fairmaire, 1864; *Mimocoptosia* Breuning & Villiers, 1972; *Musaria* Thomson, 1864; *Neomusaria* Plavilstshikov, 1928; *Opsilia* Mulsant, 1863; *Phytoecia* Dejean, 1835; *Pilemia* Fairmaire, 1863; *Pseudoblepisanis* Breuning, 1950; *Pseudomusaria* Pic, 1900; *Pygoptosia* Reitter, 1895 and *Semiangusta* Pic, 1892.

### **Subgenus BLEPISANIS Pascoe, 1866**

**Type species:** *Saperda melanocephala* Fabricius, 1787

*Blepisanis* Pascoe, 1866 is an African subgenus chiefly. Mostly it distributes in Africa (especially C and S Africa). It also occurs in E Europe, Turkey, Caucasus, Iran, Kazakhstan, Turkmenia, Afghanistan and India. However, it is represented only by a few species there.

Breuning (1966) gave eighty-two species in this subgenus. However, some of these species were either synonyms of other taxa or transferred to another subgenera. For example, Breuning (1966) gave two species as *Phytoecia ciliciae* Breuning, 1951 (Distr.: Cilicia) and *Phytoecia moreana* Breuning, 1943 (Distr.: Greece). However, according to Sudre (2000), these species are synonyms of *Phytoecia* (*Pilemia*) *hirsutula* (Frölich, 1793). Moreover, Breuning (1966) gave *Phytoecia* (*Blepisanis*) *prawei* as a subspecies of *Phytoecia* (*Blepisanis*) *vittipennis*. Danilevsky (2007) stated that “after study of big series of Balcan *P. vittipennis* and Armenien *P. prawei* I see the distinct constant differences, so I cancel the synonymy published by Lobanov et al. (1981) and prefer now to return to Plavilstshikov's position on two different species. Breuning (1951) regarded both as subspecies”. However, Danilevsky (personal communication, December 2007) also stated that “I agree with Breuning (1951) now as *P. vittipennis* ssp. *prawei* Plav.”. Moreover, some new species have been described in the subgenus since 1966. Recently, *Phytoecia* (*Blepisanis*) *magnanii* was described by Sama et al. (2007) from S Iran: Fars prov.

Until the present study, the subgenus *Blepisanis* has been represented only by single species in Turkey as *Phytoecia* (*Blepisanis*) *vittipennis* Reiche, 1877. This species was recorded by various authors from Turkey. These are: Turkey (Winkler, 1924-1932; Danilevsky & Miroshnikov, 1985; Lodos, 1998; Sama & Rapuzzi, 2000); Turkey as *Opsilia vittipennis* a. *pallidior* Pic, 1901 (Winkler, 1924-1932); İzmir prov.: Bergama (Demelt & Alkan, 1962; Demelt, 1963); Ankara prov. (Breuning et Villiers, 1967); Antalya prov. – Demelt, 1961 and 1963 (Ex. Öymen, 1987); Ankara prov.: Kızılcahamam, Erzurum prov.: Aşkale (Adlbauer, 1992); Adıyaman prov.: Karadut village env. (Rejzek & Hoskovec, 1999); Osmaniye prov. (Rejzek et al., 2001); Erzincan prov., Erzurum prov. (Tozlu et al., 2003); Burdur prov.: Yeşilova (Eşeler Mt.), Yozgat prov.: Çiğdemli (Gökiniş village), Denizli prov.: Acıpayam (Köse village) (Özdikmen & Hasbenli, 2004); Manisa prov.: Turgutlu Çardağı (Aysekisi hill), Osmaniye prov.: Zorkun plateau road (Ürün plateau), Yarpuz road (Karataş place), entry of Yarpuz (Cebel), Çulhalı village and Yeşil village (Hasanbeyli), Kahramanmaraş prov.: Türkoğlu (Kaledibi village) (Özdikmen & Demirel, 2005); Ankara prov.: Sincan (Mülk, Ayaş Mt.) (Özdikmen & Demir, 2006); Ankara prov.: Kızılcahamam (Soğuksu National Park), Konya prov.: Kulu, Niğde prov.: Bor-Altunhisar and Bor (Üstünkaya) (Özdikmen, 2006).

So this species was reported from 14 different provinces in Turkey. These are: in W Turkey (Aegean region: İzmir, Denizli, Manisa provinces), in C Turkey (Central Anatolian region: Ankara, Yozgat, Konya, Niğde provinces), in S Turkey (Mediterranean region: Antalya, Burdur, Osmaniye, Kahramanmaraş provinces), in NE Turkey (East Anatolian region: Erzurum, Erzincan provinces) and in SE Turkey (Southeastern Anatolian region: Adıyaman province). Namely, *Phytoecia* (*Blepisanis*) *vittipennis* widely distributes in Turkey. This species occurs also in E Europe (Greece, Bulgaria) and Syria.

*Phytoecia* (*Blepisanis*) *vittipennis prawei* (Plavilstshikov, 1926) was only reported by Danilevsky & Miroshnikov (1985) for Turkey without exact locality. Also Danilevsky (personal communication, December, 2007) stated that “*Plavilstshikov recorded his prawei for Armenian part of Arax valley! So, it is definitely represented in Turkey*”. So if it is present in Turkey, it occurs only in NE Turkey.

*Phytoecia* (*Blepisanis*) *vittipennis* is variable. M. L. Ganglbauer (1885) has already been described a variety in which a great part of elytra is black colored with only shoulders spotted more or less long distinct spots, under the name var. *leuthneri*. Then, a new variety, var. *inhumeralis*, was described by Pic (1900) based on examples that have more black colored elytra. In these samples, humeral spots are more or less obliterated, indistinct or even entirely disappeared. Another variety, var. *pallidior* was described by Pic (1901) from Anatolia. Elytral coloration of this variety is clearer than the type form and presutural band is not dark. A great part of legs is testaceous and at least tarsi and bases of femora are dark. Finally, var. *tokatensis* was described by Pic

(1933) from Tokat province in N Turkey. In this variety, elytra testaceous with narrow and thin black margins. At the first sight, it resembles var. *pallidior* Pic, 1901 by the absence of a dark spot at the end of elytra.

In this study, 29 specimens were collected by the authors from Ankara, Konya, İçel, Kayseri and Osmaniye provinces in the years 1991, 1997, 2001, 2006 and are examined in detail with their genitalia. According to the key provided by Breuning (1951), all specimens would be determined as *Phytoecia (Blepisanis) vittipennis*. Finally, we decided that there are three different taxa among the specimens by comparing specimens of *Phytoecia (Blepisanis) vittipennis* from northern and central Anatolia. These are: the nominotypical form of *Phytoecia (Blepisanis) vittipennis* Reiche, 1877 as a nominative subspecies (5 specimens from Ankara, Konya and Niğde provinces), *Phytoecia (Blepisanis) vittipennis inhumeralis* (Pic, 1900) as an another subspecies (2 specimens from İçel and Kayseri provinces) and a new species *Phytoecia (Blepisanis) samai* sp. n. (22 specimens from Osmaniye province).

***Phytoecia (Blepisanis) vittipennis inhumeralis* (Pic, 1900)  
stat. n.**

The specimens are the color form of *Phytoecia (Blepisanis) vittipennis* Reiche, 1877. They have completely black colored elytra. They definitely belong to *Phytoecia (Blepisanis) vittipennis* according to male genitalia (Fig. 2. b).

Same specimens were described by Pic (1900) as var. *inhumeralis*. Pic's original description is "la var. nouvelle *inhumeralis* designera les exemplaires à coloration élytrale noire encore plus étendue, ce qui fait que tache humérale claire est plus ou moins oblitérée, indistincte ou même complètement nulle".

Such specimens are only known from two specimens in Muséum National d'Histoire Naturelle (MNHN) in Paris now. Until the present work, any specimen like these has not been collected.

According to M. L. Danilevsky (personal communication, 2007), "Yes, I was in Paris and saw a female identified as *Obereina vittipennis* var. *inhumeralis* Pic without geographical label designated as type. Another black specimen of *P. (Blepisanis)* is a male from Kizil-Dash". Then, we obtained photo of the locality label of Pic's type specimen by Dr. G. Tavakilian (MNHN-Paris). It is clear that true locality of male specimen is "Kizil Dagh" not "Kizil-Dash". So, we absolutely sure that Kizil Dagh is Kızıldağ in Karaisalı of Adana province in S Turkey now. Kızıldağ is in NW Adana.

So *Phytoecia (Blepisanis) vittipennis* var. *inhumeralis* (Pic, 1900) is raised to subspecies rank. This subspecies occurs only in a local area in S Turkey. The distribution area of this subspecies is limited northwards by Central Taurus Mountains (Bolkar Mountains and Ala Mountains). It is distributed in a rather narrow area located between southern slopes of

Central Taurus Mountains (northern border) and Adana province (southern border).

Please see the discussion part of *Phytoecia (Blepisanis) samai* sp. n. for more remarks related with this subspecies.

**Material examined:** Kayseri prov.: Yahyalı, Kapuzbaşı, Between Büyükçayır and Yeşilköy, 680 m., 26.06.1997, 1 male; İçel prov.: Çamlıyayla (=Namrun), turn of Çamalan, 725 m., 24.06.2001, 1 female. The specimens are deposited in Gazi University.

**Type locality and specimens:** without locality label, 1 female, leg. Pic; Adana prov.: Kizil Dagħ (original writing) (= Kızıldağ), 1 male, leg. Pic. The specimens are deposited in MNHN in Paris (Fig. 4 and 5).

### ***Phytoecia (Blepisanis) samai* sp. n.**

**Type locality:** S Turkey: Osmaniye province: Küllü village env., Amanos Mountains.

**Type specimens:** Holotype 1 male: Osmaniye prov.: Küllü village, Amanos Mountains, 1707 m., 25.06.2006, 36 57 N 36 24 E; Paratypes: 12 males and 9 females: Osmaniye prov.: Küllü village, Amanos Mountains, 1707 m., 25.06.2006, 36 57 N 36 24 E, 3 males and 4 females; Osmaniye prov.: Zorkun-Karınca-Hassa road, Küllü plateau, Amanos Mountains, 1603 m., 25.06.2006, 36 57 N 36 21 E, 9 males and 5 females. The specimens are deposited in Gazi University.

### **Description:**

Body length: 8.3 mm. (from frons to elytral apex), 9.2 mm. (from frons to apex of pygidium); Length of pronotum: 1.5 mm.; Width of pronotum: 1.6 mm., Length of elytra: 6 mm., Width of elytra: 2.2 mm.

First of all, the new species is close to *Phytoecia (Blepisanis) vittipennis* Reiche, 1877 except the elytral coloration especially.

Body predominantly black and elongated. Head and pronotum black with fine punctuation. Head with very dense, recumbent, whitish-yellow hairs except vertex and also in part between inner ridges of eyes with more sparse, erect, long, blackish-brown hairs. Antennae entirely black, extend slightly beyond the body; 1 st segment with long erect, black hairs, segments 2-7 sparsely fringed beneath gradually reduced towards antennal apex. Pronotum shining with long, mostly erect and partly semierect, whitish hairs. The hairs condensed as a median line on disc of pronotum. Length of pronotum slightly less than its width. Scutellum covered with very dense, long, recumbent, whitish hairs. Elytra completely black with larger punctuation than pronotum. The elytral

points formed sporadic longitudinal rows (especially near carinae). Each elytron with a distinct longitudinal sharp carina extended from almost shoulder to near elytral apex (from shoulder to 5/6 length of elytron). Elytra covered with two different types of hairs. First type short, fine, recumbent, greyish-white background hairs that formed a narrow dense strip along the elytral suture. Second type more sparse than background hairs, long, brownish hairs that are erect in the basal half of elytra and semierect in apical half of elytra. Even near the apex the hairs are recumbent. Elytral width as long as 1/3 of its length. Epipleurae black with very dense, long, recumbent, whitish hairs near humerus. Ventral side of the body black. Legs red except coxae, trochanters, the base of femora, the apex of tibiae and tarsi.

Etymology: The species name “*samai*” is dedicated to well known coleopterist Gianfranco Sama (Italy).

## Discussion:

According to the key provided by Breuning (1951), the new species would be determined as *Phytoecia* (*Blepisanis*) *vittipennis*, but, if compared to specimens of *Phytoecia* (*Blepisanis*) *vittipennis* from northern and central Anatolia it may be easily distinguished through the characteristics listed above. By its coloration, the twenty two specimens are evidently more similar to *Phytoecia* (*Blepisanis*) *vittipennis inhumeralis* (Pic, 1900). It differs from *Phytoecia* (*Blepisanis*) *vittipennis inhumeralis* (Pic, 1900) by male genitalia (Fig. 1. b, c, d and Fig. 2. b, c, d).

Typically, although aedeagus curved upward as fig. 2. a, b in *Phytoecia* (*Blepisanis*) *vittipennis vittipennis* Reiche, 1877 and *Phytoecia* (*Blepisanis*) *vittipennis inhumeralis* (Pic, 1900), aedeagus curved toward the front as fig. 2. c, d in the new species *Phytoecia* (*Blepisanis*) *samai* sp. n. Also, lobes of paramers extend parallel along their inner margins as fig. 1. a, b in *Phytoecia* (*Blepisanis*) *vittipennis vittipennis* Reiche, 1877 and *Phytoecia* (*Blepisanis*) *vittipennis inhumeralis* (Pic, 1900), lobes of paramers do not extend almost parallel along their inner margins as fig. 1. c, d in the new species *Phytoecia* (*Blepisanis*) *samai* sp. Furthermore, paramers are distinctly protruded almost in the median parts as fig. 1. d in the new species *Phytoecia* (*Blepisanis*) *samai* sp. Moreover, interval at the base of paramers as fig. 1. a, b in *Phytoecia* (*Blepisanis*) *vittipennis vittipennis* Reiche, 1877 and *Phytoecia* (*Blepisanis*) *vittipennis inhumeralis* (Pic, 1900) is distinctly narrower than that of the new species *Phytoecia* (*Blepisanis*) *samai* sp. n. as fig. 1. c, d. Namely, the base of paramers in *Phytoecia* (*Blepisanis*) *vittipennis vittipennis* Reiche, 1877 and *Phytoecia* (*Blepisanis*) *vittipennis inhumeralis* (Pic, 1900) is more sharp than that of the new species.

Probably, we think that the new species is located only in Southeastern Taurus Mountains (Amanos Mountains). This is a local species in Amanos Mountains like some of the others.

This paper is a result of our examinations of many Turkish specimens. It's clear that there are three different taxa in Turkey according to their body coloration and genitalia.

At a first view, *P. (B.) vittipennis* can be often totally black in the south east part of her area. This fact can be regarded as enough for the separation of a group of SE populations in a separate subspecies *P. (B.) vittipennis* ssp. *inhumeralis* (Pic, 1900). Because, the type locality of new species is rather close to the locality (Kizil-Dagh) of Pic's specimens, but they are in two different geographical zones. The type locality of new species is in Amanos Mountains. Amanos Mountains is a special area in S Turkey. As known that the well known old locality Akbes is in Amanos Mountains. Akbes is in Turkey not Syria.

We examined almost all male specimens from Küllü village for genitalia and saw that all genitalia are the same and stable. As seen in this paper the genitalia absolutely differ from the others (especially lateral view of aedeagus).

In terms of zoogeography, Kizil-Dagh (Adana prov.: Karaisalı, Kızıldağ) and Küllü villages are in two different areas. But they are close to one another. So the localities of specimens from Kayseri and İçel are in the same zoogeographical area with Kizil-Dagh (Adana prov.). In general, they are in the S slopes of Central Taurus Mountains. Thus, the black female specimen from İçel should be belong to the same taxon with specimens from Kayseri and Adana as *P. (B.) vittipennis* ssp. *inhumeralis* (Pic, 1900).

Unfortunately, we do not know about genital structures of Pic's black specimens. The specimens from Kayseri (male) and İçel (female) are black too. We examined genital structures of specimens from Kayseri and İçel. It is clear that they are belong to *P. (B.) vittipennis* (black form like Pic's specimens). So we decided that all black forms that are in the same zoogeographical area are *P. (B.) vittipennis* ssp. *inhumeralis* (Pic, 1900) without examining genitalia of Pic's specimens (it is not seen as an obligation but it is better to examine them. Unfortunately, it is impossible for us now).

Consequently, *P. (B.) samai* sp. n. is a real species. Since, genitalia of specimen from Kayseri is the same as *P. (B.) vittipennis*. So it is a color form of its (ssp. *inhumeralis*). And genitalia of the specimens from Küllü village are clearly different from *P. (B.) vittipennis*. So it is a new taxon. Moreover, Osmaniye record of Rejzek et al. (2001) is Hasanbeyli that is in Amanos Mountains. Also Osmaniye records of Özdikmen & Demirel (2005) are much close the record of Rejzek et al. (2001). They are also in Amanos Mountains. And all above records are absolutely nominotypical form of *P. (B.) vittipennis*. Interestingly, "TWO SUBSPECIES CAN NOT BE REPRESENTED INSIDE ONE AREA" theoretically. However, the type locality of new species *P. (B.) samai* is very close to all above records.

So the specimens from Küllü village must be a new species not subspecies.

In addition to this, Niğde records of Özdikmen (2006) definitely belong to the nominotypical form. In first view, the records are very close to black specimen (ssp. *inhumeralis*) from İçel, but please consider that the records of nominotypical subspecies from Niğde are in the N slopes of Central Taurus Mts. and the record of ssp. *inhumeralis* from İçel is in the S slopes of Central Taurus Mts. like the record of Kayseri.

**Variations:** In some specimens, basal half of femora and apical half of tibiae can be black. For only one male specimen, last abdominal sternite has a large red spot.

### A very short key of Turkish *Blepisanis* Pascoe, 1866

1. Aedeagus curved toward the front as fig. 2. c, d.....**samai sp. n.**  
 -. Aedeagus curved upward as fig. 2. a, b..... 2
2. Elytra black or at least humeral part of elytra largely black.....  
 .....**ssp. *inhumeralis* (Pic, 1900)**  
 -. At least humeral part of elytra testaceous.....  
 .....**ssp. *vittipennis* Reiche, 1877**

### ACKNOWLEDGEMENTS

Special thanks to M. L. Danilevsky (Russia) for providing some references and information about type specimens of *Phytoecia* (*Blepisanis*) *vittipennis inhumeralis* (Pic, 1900) in MNHN and to Dr. G. Tavakilian (France) for providing photos of Pic's type specimens. This study was supported by a BAP Project of Gazi University (06/32).

### LITERATURE CITED

- Adlbauer, K.** 1992. Zur Faunistik und Taxonomie der Bockkäferfauna der Türkei II (Coleoptera, Cerambycidae). Entomofauna, 13 (30): 485-509.
- Breuning, S.** 1951. Revision du genre *Phytoecia* Muls. (Coleoptera Cerambycidae). Entom. Arbeiten aus dem Museum G. Frey, Bd. 2: 1-103, 353-460.
- Breuning, S.** 1966. Catalogue des Lamières du Monde (Col., Céramb.). Verlag des Museums G. Frey, Volume 9, 756-762.
- Breuning, S. & Villiers, A.** 1967. Cérambycides de Turquie (2. note). L' Entomologiste, 23 (3): 59-63.
- Danilevsky, M. L.** 2007. Systematic list of Longicorn Beetles (Cerambycoidea) of the territory of the former USSR. Last updated 01.11.2007. Available from: <http://www.cerambycidae.narod.ru/ussr.htm>
- Danilevsky, M. L. & Miroshnikov A. I.** 1985. Timber-Beetles of Caucasus (Coleoptera, Cerambycidae). The Key. Krasnodar, 419 pp.

**Demelt, C. V.** 1963. Beitrag zur Kenntnis der Cerambycidenfauna Kleinasiens und 13. Beitrag zur Biologie palaearkt. Cerambyciden, sowie Beschreibung einer neuen Oberea-Art. Entomologische Blätter, 59 (3) : 132-151.

**Demelt, C. V. & Alkan, B.** 1962. Short information of Cerambycidae Fauna of Turkey. Bitki Koruma Bülteni, 2 (10): 49-56.

**Lodos, N.** 1998. Entomology of Turkey VI (General, Applied and Faunistic). Ege Ü. Ziraat Fak. Yayınları No: 529, E. Ü. Faculty of Agriculture Press, İzmir, 300 pp.

**Ohbayashi, N. & Niisato, T.** 2007. Longicorn beetles of Japan. Tokai University Press, Kanagawa, Japan. 880pp.

**Öymen, T.** 1987. The Forest Cerambycidae of Turkey. İ. Ü. Forest Faculty, İstanbul, 146 pp.

**Özdikmen, H.** 2006. Contribution to the knowledge of Turkish longicorn beetles fauna (Coleoptera: Cerambycidae). *Munis Entomology & Zoology*, 1 (1): 71-90.

**Özdikmen, H. & Demir, H.** 2006. Notes on longicorn beetles fauna of Turkey (Coleoptera: Cerambycidae). *Munis Entomology & Zoology*, 1 (1): 157-166.

**Özdikmen, H. & Demirel, E.** 2005. Additional Notes to the Knowledge of Longhorned Beetle Collection from Zoological Museum of Gazi University, Ankara, Turkey (GUZM) for Turkish Fauna (Coleoptera, Cerambycidae). *J. Ent. Res. Soc.*, 7 (3): 13-38.

**Özdikmen, H. & Hasbenli, A.** 2004a. Contribution to the knowledge of longhorned beetles (Coleoptera, Cerambycidae) from Turkey, Subfamily Lamiinae. *J. Ent. Res. Soc.*, 6 (2): 25-49.

**Pic, M.** 1900. Notes diverses. Matériaux pour servir a l'étude des Longicornes, 3 (1): 6-7.

**Pic, M.** 1901. Notes diverses et diagnoses [7e article] L'Échange, Revue Linnéenne 17 (201): 65-68.

**Pic, M.** 1933. Notes diverses, nouveauté (Suite.). L'Echange, Revue Linnéenne, v. 49, N453: 9-11.

**Rejzek, M. & Hoskovec, M.** 1999. Cerambycidae of Nemrut Dağı National Park (Anatolia, South-East Turkey). *Biocosme Mésogéen*, Nice, 15 (4): 257-272.

**Rejzek, M., Sama, G. & Alziar, G.** 2001. Host Plants of Several Herb-Feeding Cerambycidae Mainly from East Mediterranean Region (Coleoptera : Cerambycidae). *Biocosme Mésogéen*, Nice, 17(4): 263-294.

**Sama, G., Rapuzzi, P. & Rejzek, M.** 2007. New or interesting Phytoeciini from the Middle East, especially from Iran (Coleoptera: Cerambycidae). *Folia Heyrovskyana*, 14 (4): 163-179.

**Sama, G. & Rapuzzi, P.** 2000. Note Preliminaire pour une faune des Cerambycidae du Liban (Coleoptera, Cerambycidae). *Lambillionea*, 100 (1): 7-23.

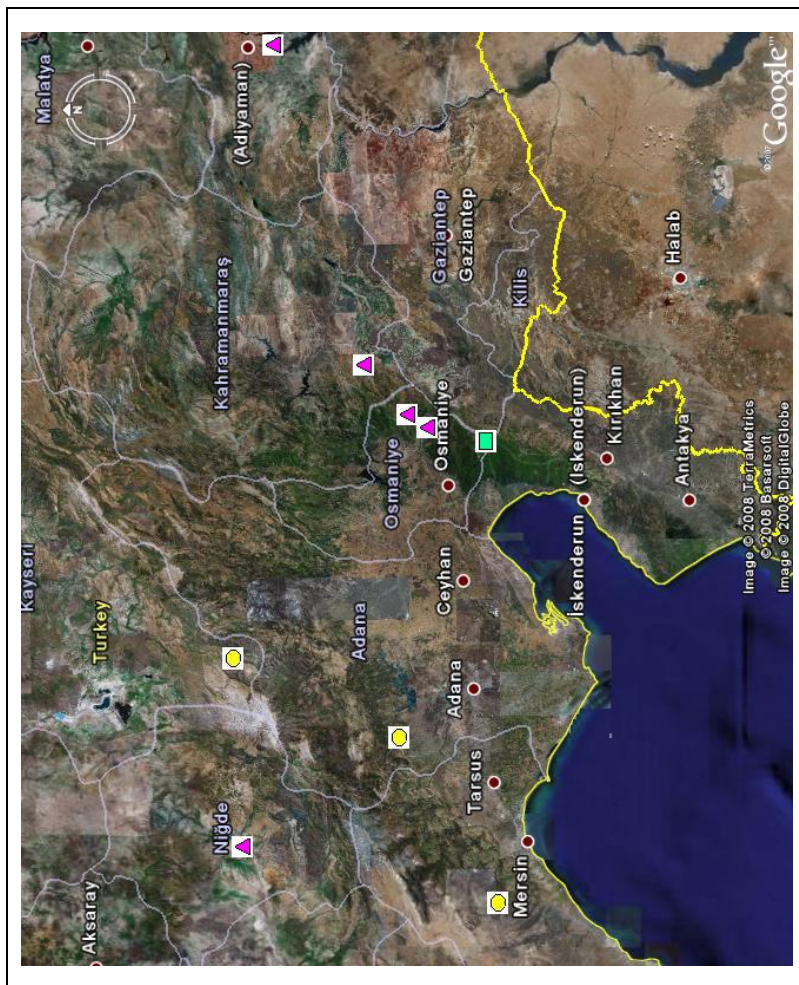
**Sudre, J.** 2000. Notes synonymiques sur quelques Phytoeciini palaerctiques (Coleoptera Cerambycidae). *Bulletin Mensuel de la Societe Linneenne de Lyon*, 69 (8): 199-200.




**Tozlu, G., Rejzek, M. & Özbek, H.** 2003. A Contribution to the Knowledge of Cerambycidae (Coleoptera) Fauna of Turkey Part II : Subfamily Lamiinae. *Biocosme Mésogéen*, Nice, 19 (3): 95-110.



**Vitali, F.** 2007. Biolib.cz. Saperdini. Available from: <http://www.biolib.cz/cz/taxon/id11391>

**Winkler, A.** 1924-1932. Catalogus Coleopterorum regionis palaearcticae. Verlag von Albert Winkler, 1135-1226.



Map 1. Distributional data of *Phytoecia* (*Blepisanis*) in S Turkey.  *Phytoecia* (*Blepisanis*) *vittipennis vittipennis* Reiche, 1877;  *Phytoecia* (*Blepisanis*) *vittipennis inhumeralis* (Pic, 1900);  *Phytoecia* (*Blepisanis*) *samai* sp. n. (the map from Google Earth).

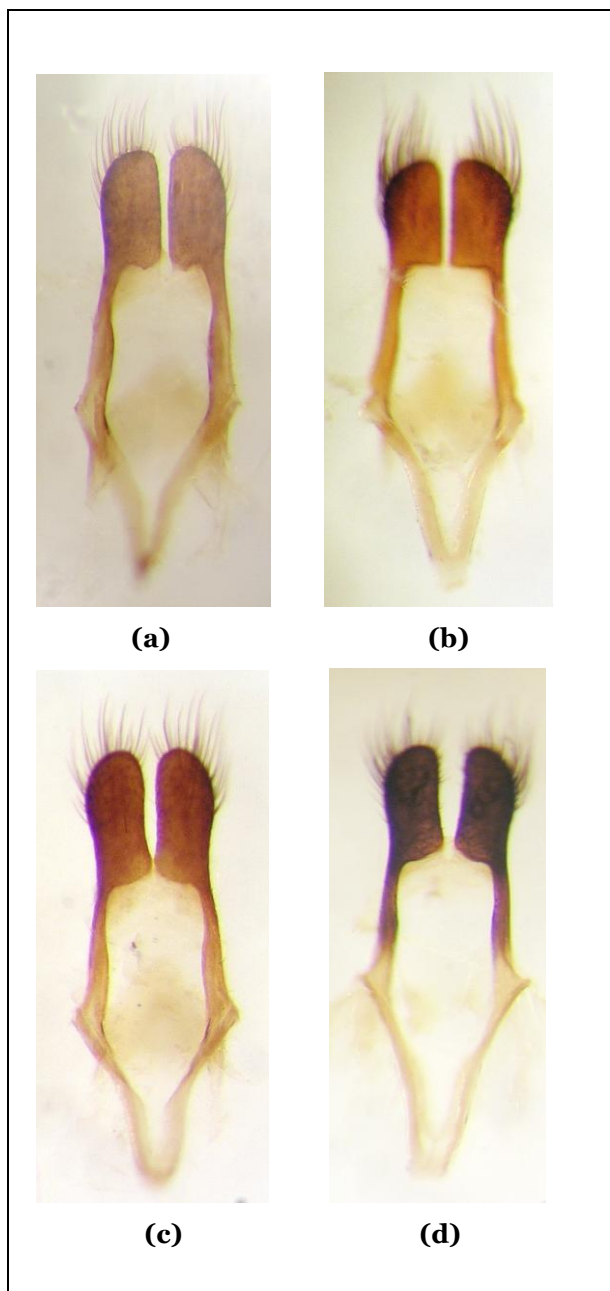


Figure 1. Paramer of (a) *P. (B.) vittipennis vittipennis* Reiche, 1877 (b) *P. (B.) vittipennis inhumeralis* (Pic, 1900) (c) *P. (B.) samai* sp. n. (paratype) (d) *P. (B.) samai* sp. n. (holotype).

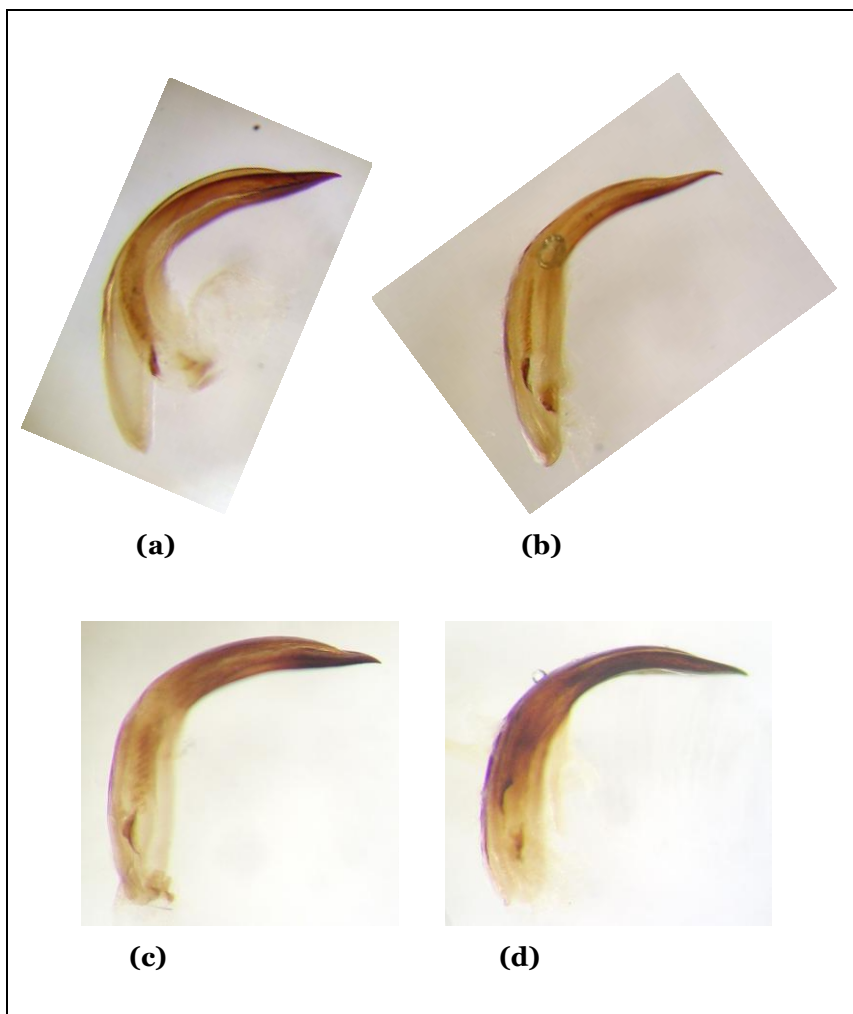


Figure 2. Aedeagus of (a) *P. (B.) vittipennis vittipennis* Reiche, 1877 (b) *P. (B.) vittipennis inhumeralis* (Pic, 1900) (c) *P. (B.) samai* sp. n. (paratype) (d) *P. (B.) samai* sp. n. (holotype).



Figure 3. Holotype of *Phytoecia (Blepisanis) samai* sp. n.

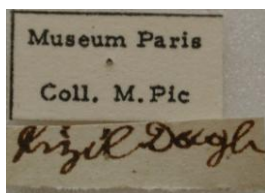


Figure 4. The locality label of Pic's male specimen in MNHN (*Phytoecia (Blepisanis) vitiipennis inhumeralis*) from Dr. Tavakilian.



Figure 5. The holotype of *Phytoecia (Blepisanis) vitiipennis inhumeralis* (Pic, 1900) from Dr. Tavakilian.

## **DYTISCIDAE SPECIES (COLEOPTERA) IN ARTVIN AND RİZE PROVINCES OF NORTHEASTERN TURKEY**

**Ö. Köksal Erman\* and Orhan Erman\*\***

\*Atatürk University, Science and Art Faculty, Biology Department, 25240 Erzurum-TURKEY. e-mails: okerman1@hotmail.com, okerman@atauni.edu.tr

\*\*Fırat University, Science and Art Faculty, Biology Department, Elazığ, Turkey.

**[Erman, Ö. K. & Erman, O. 2008. Dytiscidae species (Coleoptera) in Artvin and Rize provinces of Northeastern Turkey. Munis Entomology & Zoology 3 (2): 582-593]**

**ABSTRACT:** This study was carried out in order to identify Dytiscidae species in the Artvin and Rize provinces in 2000 and 2001. A total of 24 species and 4 subspecies from 14 genera were identified at the localities including the centre of Artvin, Rize and their environs.

**KEY WORDS:** Coleoptera, Dytiscidae, Fauna, Artvin, Rize, Turkey.

The Dytiscidae is a moderate-sized family of aquatic beetles and commonly called predaceous diving beetles. Dytiscids range in size from 1 to 47 mm. The antennae are filiform and 11-segmented. The head has prognathous mouthparts. The eyes are entire, flush with the side of the head. The pronotum is broadest at its base, with sharp lateral margins. The elytra have few or no striae, and completely cover the abdomen. The legs have the metacoxae greatly enlarged and invading the metasternum, reaching to the elytra. The metatarsi are tapering, often fringed with swimming hairs. The abdomen has the first visible sternite divided by metacoxae: the first 3 segments are connate. The tarsal formula is usually 5-5-5, sometimes 4-4-5 (Booth et al., 1990). The males of some species have peculiar front tarsi that bear large suction discs; these discs are used to hold the smooth elytra of the female during mating (Borror et al., 1981). Some dytiscids have expanded fore and mid tarsi, with smaller suction hairs, in both sexes.

Most dytiscids are excellent swimmers with compact, flattened, streamlined bodies. The flattened oar-like mid and hind legs often bear fringes of long swimming hairs. Adults and larvae of dytiscids occur together and have adapted to almost all aquatic habitats imaginable. Most dytiscids occur in lentic habitats such as shallow, weedy lakes, ponds, ditches, stock ponds, and springs while some occur in more specialized habitats (Spangler, 1981).

Both adults and larvae are aquatic and predaceous, feeding not only on a wide range of invertebrates such as molluscs, annelids, and insect larvae, but also on vertebrates such as fish fry and small amphibians (Booth et al., 1990). Most dytiscids occur in shallow waters to about 1 metre in depth because most have to rise to the surface periodically to renew their air supply (Spangler, 1981). Generally, densely vegetated waters have a more diverse dytiscid fauna than barren ones (Nilsson & Holmen, 1995).

The family Dytiscidae is the second largest family assigned to the suborder Adephaga (Spangler, 1981). It includes 3,892 species and 177 genera. Nine hundred and twenty one species have been recorded from the Palaearctic region. The number of Palaearctic genera is currently 66 (Nilsson, 2001, 2003, 2004, 2005). There have been a lot studies about Turkish Fauna (Balfour-Browne, 1963; Guéorguiev, 1968, 1981; Zaitzev, 1972; Uygar & Önder, 1988; Wewalka, 1992; Fery & Nilsson, 1993; Fery & Brancucci, 1997; Fery & Hosseinie, 1998; Erman, 2000; Erman & Fery, 2000; Fery et al. 2001; Erman & Erman, 2002; Fery, 2003; Erman & Erman, 2004; Shaverdo, 2004; Erman, 2005; Erman et al., 2005; Hájek et al., 2005).

### ABBREVIATIONS AND GENERAL NOTES

Since many older literature records refer to geographical units that correspond to more than one of the currently recognized Turkish provinces, the names of all provinces included in a particular unit are given in brackets as potentially part of the distribution in Turkey of each species.

The geographical unit Toros Dağları (Toros Mountains) is situated in the Mediterranean and extends from the province of Isparta to Mersin (Isparta, Antalya, Konya, Karaman, Mersin, Adana).

Some species were also recorded by ZAITZEV (1927) in Erzurum. The names of localities he used were probably based on Russian transcriptions of Armenian names. That's why we couldn't find exactly places although we research on two Turkish works (T. C. DAHİLİYE VEKALETİ, 1928; T. C. İÇİŞLERİ BAKANLIĞI, 1971). However we try to present some localities approximately when we give the species recorded by ZAITZEV (1927). Also we were unable to find some localities given on some works in the distribution in Turkey of species.

Countries have been coded as follows, as in NILSSON (2003, 2005).

**E - Europe:** AB Azerbaijan, AL Albania, AN Andorra, AR Armenia, AU Austria, AZ Azores, BE Belgium, BH Bosnia Herzegovina, BU Bulgaria, BY Byelorussia, CR Croatia, CT Russia: Central European Territory, CZ Czech Republic, DE Denmark, EN Estonia, FA Faeroe Islands, FI Finland, FR France (incl. Corsica, Monaco), GB Great Britain (incl. Channel Islands), GE Germany, GG Georgia, GR Greece (incl. Crete), HU Hungary, IC Iceland, IR Ireland, IT Italy (incl. Sardinia, Sicily, San Marino), KZ Kazakhstan, LA Latvia, LS Liechtenstein, LT Lithuania, LU Luxembourg, MA Malta, MC Macedonia, MD Moldavia, NL The Netherlands, NR Norway, NT Russia: North European Territory, PL Poland, PT Portugal, RO Roumania, RU Russia, SK Slovakia, SL Slovenia, SP Spain, SR Svalbard (Spitzbergen), ST Russia: South European Territory, SV Sweden, SZ Switzerland, TR Turkey, UK Ukraine, YU Yugoslavia (Serbia, Montenegro).

**N - North Africa:** AG Algeria, CI Canary Islands, EG Egypt, LB Libya, MO Morocco (incl. Western Sahara), MR Madeira Archipelago, TU Tunisia.

**A - Asia:** AE Arab Emirates, AF Afghanistan, AP Arunachal Pradesh, BA Bahrain, BT Bhutan, CH China, [CE Central Territory: ANH Anhui (Anhui), HUB Hubei (Hupei), HUN Hunan, JIA Jiangsu (Kiangsu), JIX Jiangxi (Kiangsi), SHG Shanghai, ZHE Zhejiang



(Chekiang), NE Northeastern Territory (HEI Heilongjiang (Heilungkiang), JIL Jilin (Kirin), LIA Liaoning), NO Northern Territory (BEI Beijing (Peking or Peiping), GAN Gansu (Kansu), HEB Hebei (Hopeh), HEN Henan (Honana), NIN Ningxia (Ningsia), NMO Nei Mongol (Inner Mongolia), SHA Shaanxi (Shensi), SHN Shandong (Shantung), SHX Shanxi (Shansi), TIA Tianjin (Tsiensin), NW Northwestern Territory (GAN Gansu (Kansu), NMO Nei Mongol (Inner Mongolia), XIN Xinjiang (Sinkiang), SE Southeastern Territory (FUJ Fujian (Fukien), GUA Guangdong (Kwantung), GUX Guangxi (Kwangsi), HAI Hainan, HKG Hong Kong, MAC Macao, TAI Taiwan (Formosa), SW Southwestern Territory (GUI Guizhou (Kweichow), SCH Sichuan (Szechwan), YUN Yunnan), WP Western Plateau (QIN Qinghai (Tsinghai), XIZ Xizang Tibet)], CY Cyprus, ES Russia: East Siberia, FE Russia: Far East, HP Himachal Pradesh, IN Iran, IQ Iraq, IS Israel, JA Japan, JO Jordan, KA Kashmir (India), KI Kyrgyzstan, KU Kuwait, KZ Kazakhstan, LE Lebanon, MG Mongolia, NC North Korea, NE China: Northeast Territory, NP Nepal, NO China: Northern Territory, NW China: Northwest Territory, OM Oman, PA Pakistan, QA Qatar (incl. United Arab Emirates), RU Russia, SA Saudi Arabia, SC South Korea, SD Sikkim, Darjeeling (India), Darjeeling, SE China: Southeastern Territory (incl. Macao, Hongkong), SI Egypt: Sinai, SW China: Southwestern Territory, SY Syria, TD Tadzhikistan, TM Turkmenistan, TR Turkey, UP Uttar Pradesh (India), UZ Uzbekistan, WP China: Western Plateau, WS Russia: West Siberia, YE Yemen (incl. Socotra) .

**AFR** Afrotropical region, **AUR** Australian region, **NAR** Nearctic region, **NTR** Neotropical region, **ORR** Oriental region.

## MATERIAL AND METHODS

The samples were collected by means of a sieve, ladle and net having a mesh diameter of 0.5 mm. The beetles were killed with ethyl acetate or in 70% alcohol solution and then the muddy substance on their surfaces was brushed off with a small paint brush in the laboratory. Genitalia were dissected under the microscope. The illustrations of genitalia and some taxonomic characters were prepared using a Nikkon type SMZ-U stereo microscope.

**Family DYTISCIDAE** Leach, 1815  
**Subfamily Agabinae** Thomson, 1867

**Genus *Agabus*** Leach, 1817  
***Agabus biguttatus*** (Olivier, 1795)

*Dytiscus biguttatus* Olivier, 1795, Entom. 3: 26.

**Examined material:** Artvin: Borçka: Çiftelipinar village, 3 males, 7 females, 02.07.2001; Hopa: Baykanlar brook, 1 male, 1 female, 26.07.2001; Sundura brook, 1 female, 26.07.2001; Çamlıköy, 1 female, 26.07.2001; Şavşat: Ciritdüzü village-Karagöl way, 3 males, 7 females, 03.07.2001. Rize: İkizdere: Cimil plateau way, 3 females, 29.07.2001; Gölyayla, 9 males, 3 females, 01.09.2001; Rüzgarlı village, 2 males, 8 females, 30.07.2001; Sivrikaya village, 10 males, 5 females, 29.06.2001.

**Distribution in Turkey:** Akmilar (?), Aksaray, Beynam (Ankara), Bilecik, Bolkar Dağları (Mersin or Karaman), Bulgharmaden (?), Bursa, Bürücek-Toros (Mersin), Çankırı, Çay (This locality is in 5 provinces: Afyon, Ağrı, Antalya, Bingöl, Isparta), Gyaurlar Dağları (may be Gavur Dağları, Erzurum), Ephesus (İzmir), Erzurum, Horoz Dağları (Horoz Dağları, Gümüşhane or Trabzon), Isparta-Salur (Isparta), Karaboğaz Dağı (Elazığ or Bingöl), Karaköy (Bilecik), Karsu (Hatay), Kastamonu, Kilikia-Taurus (Toros Dağları), Sadagh (most probability Sadak, Gümüşhane), Sapanca (Sakarya), Sultan Dağı (Afyon), Toros Dağları, Trabzon, Torut (may be Toruk: Adana or Sirt), Yamanlar Dağı (İzmir), Yeniköy-Toros (Mersin or Adana), Yozgat (Guéorguiev, 1968, 1981; Erman, 2000; Darılmaz and Kiyak, 2006).



**Distribution in the world:** E: AB AL AR AU BE BH BU BY CR CZ FR GB GE GG GR HU IR IT LS LU MC NL PL PT RO RU (CT ST) SK SL SP SZ UK YU N: AG CI EG LB MO TU A: AF CH (SCH XIN) CY HP IN IQ IS JO KA KI LE PA RU (WS) SA SI SY TM TR UZ.

***Agabus bipustulatus* (Linnaeus, 1767)**

*Dytiscus bipustulatus* Linnaeus, 1767, Syst. Nat. (12) 1(2):666.

**Examined material:** Artvin: Borçka: Karagöl, 3 males, 9 females, 02.07.2001; Çiftepınar village, 2 males, 1 female, 02.07.2001; Hopa: Çamlıköy, 1 female, 26.07.2001; Şavşat: Aşağı Koyunlu village, 1 male, 04.07.2001; Ciritdüzü village-Karagöl way, 2 females, 03.07.2001; Kirazlı village, 4 males, 2 females, 24.07.2001; Şavşat-Artvin way 20. km, 9 males, 15 females, 03.07.2001. Rize: Çayeli-Pazar way, 2 females, 01.07.2001; Pazar-Ayder crossroads, 1 male, 1 female, 01.07.2001; İkizdere: Anzer village, 1 female, 29.06.2001; Anzer village plateau, 7 males, 2 females, 29.07.2001; Cimil plateau, 15 males, 35 females, 29.07.2001; Gölyayla, 11 males, 15 females, 01.09.2001; Rüzgarlı village, 5 males, 6 females, 30.07.2001; Sivrikaya village, 2 males, 2 females, 29.06.2001.

**Distribution in Turkey:** Alemdağı (most probability İstanbul), Başkale (Van), Boz Dağ (a geographical unit covering the following provinces: Ağrı, Bilecik, Eskişehir, Konya, Manisa, Muğla, Van), Bozburun Dağı (Antalya), Derbent (Konya), Efes (İzmir), Erciyes Dağı (Kayseri), Ereğli (Konya or Zonguldak), Erzurum, Ilgaz Dağları (Kastamonu or Çankırı), İnegöl (Bursa), Kayoli Dağı (Uşak), Kızılviran (a geographical unit covering the following provinces: Çorum, Erzurum, Konya, Kars, Afyon, Ankara, Kayseri, Niğde), Kozik (Erzurum ?), Manastır (a geographical unit covering the following provinces: Konya, Denizli, Bayburt, Gümüşhane, Giresun, İzmir, Mersin, Giresun), Mollafeneri (Kocaeli), Muğla, Sadagh (most probability Sadak, Gümüşhane), Sarıkamış (Kars), Toros Dağları, Trabzon, Uludağ (Bursa), Van Gölü (Van) (Guéorguiev, 1981; Erman, 2000; Kiyak et al., 2007).

**Distribution in the world:** E: AB AL AN AR AU AZ BE BH BU BY CR CZ DE EN FA FI FR GB GE GG GR HU IC IR IT LA LS LT LU MC NL NR PL PT RO RU (CT NT ST) SK SL SP SV SZ TR UK YU N: AG LB MO TU A: AF CH (XIN) CY IN IS KI KZ LE RU (WS) SY TD TR UZ "Manchuria" AFR.

***Agabus glacialis* Hochhuth, 1846**

*Agabus glacialis* Hochhuth, 1846, in Chaudoir & Hochhuth, Enum. Carab. Hydroc. Cauc. 218.

**Examined material:** Artvin: Borçka: Karagöl, 2 males, 2 females, 25.07.2001; Şavşat: Şavşat-Artvin way 20. km, 11 males, 11 females, 03.07.2001. Rize: İkizdere: Anzer village plateau, 1 male, 30.06.2001; Cimil plateau, 15 males, 22 females, 29.07.2001; Rüzgarlı village, 2 males, 6 females, 30.07.2001; Sivrikaya village, 1 male, 7 females, 29.06.2001; 1 male, 4 females, 29.06.2001; Pazar: Pazar-Ayder crossroads, 6 males, 5 females, 01.07.2001.

**Distribution in Turkey:** Ardahan, Artvin, Erzurum, Horoz Dağları (Horoz Dağları, Gümüşhane or Trabzon), İkizdere (Rize), Sadagh (most probability Sadak, Gümüşhane), Trabzon, Ulu Dağ (Bursa) (Zaitzev, 1972; Guéorguiev, 1968, 1981; Erman, 2000).

**Distribution in the world:** E: AB AR GG RU (ST) A: IN TR.

***Agabus paludosus* (Fabricius, 1801)**

*Dytiscus paludosus* Fabricius, 1801, Syst. Eleuth. 1: 266.

**Examined material:** Artvin: Şavşat: Aşağı Koyunlu village, 1 female, 04.07.2001. Rize: İkizdere: Anzer village plateau, 1 female, 29.07.2001.

**Distribution in Turkey:** Çamlıdere-Işık Dağı (Ankara or Çankırı), Pashaki (Güllüce village, Erzurum) (Zaitzev, 1927; Guéorguiev, 1981; Erman, 2000).

**Distribution in the world:** E: AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LT LU NL NR PL PT RU (CT NT ST) SK SL SP SV SZ UK YU A: RU (WS) TR.

**Genus *Ilybius* Erichson, 1832**

***Ilybius fuliginosus fuliginosus* (Fabricius, 1792)**

*Dytiscus fuliginosus* Fabricius, 1792, Ent. Syst. 1(1): 191.

**Examined material:** Artvin: Şavşat: Yukarı Koyunlu village, 6 males, 5 females, 04.07.2001. Rize: İkizdere: Gölyayla, 2 males, 2 females, 01.09.2001; Pazar-Ayder crossroads, 3 males, 2 females, 01.07.2001.

**Distribution in Turkey:** Erzurum, Isparta, Karaboğa Dağı (Elazığ or Bingöl), Konya, Kilek (Adana), Sarıkamış (Kars) (Guéorguiev, 1981; Erman, 2000; Kiyak et al., 2007).

**Distribution in the world:** E: AB AN AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LT LU MC MD NL NR PL PT RU (CT NT ST) SK SL SP SV SZ UK YU N: MO A: IN KZ MG RU (WS) TR.

***Ilybius satunini* (Zaitzev, 1913)**

*Agabus satunini* Zaitzev, 1913, Mitt. Kaukas. Mus. 7: 196.

**Examined material:** Artvin: Şavşat: Meşeli village, 1 male, 1 female, 03.07.2001.

**Distribution in Turkey:** Erzurum, Kars (Fery and Nilsson, 1993).

**Note:** This species was recorded by Zaitzev (1927) in Erzurum. The localities: Tsaban, Kurt darası. In Turkish: Tsaban:?, Kurt Deresi. We couldn't find Tsaban in Turkish Works (T. C. Dahiliye Vekaleti, 1928; T. C. İçişleri Bakanlığı, 1971).

**Distribution in the world:** E: GG RU (ST) A: RU (WS) TR.

**Genus *Platambus* Thomson, 1859**

***Platambus lunulatus* (Fischer von Waldheim, 1829)**

*Colymbetes lunulatus* Fischer von Waldheim, 1829, Mus. Hist. Nat. Univ. Mosq. 2: 26.

**Examined material:** Artvin: Borçka: Karagöl, 1 female, 25.07.2001; Hopa: Baykanlar brook, 3 males, 4 females, 26.07.2001; Şavşat: Aşağı Koyunlu village, 4 males, 7 females, 04.07.2001; Ciritdüzü village-Karagöl way, 3 males, 5 females, 03.07.2001. Rize: İkizdere: Cimil plateau, 6 males, 6 females, 29.07.2001; Rüzgarlı village, 1 female, 30.07.2001.

**Distribution in Turkey:** Erzurum, Giresun, Horos Dağları (most probability Horoz Dağları, Gümüşhane or Trabzon), Sadagh (most probability Sadak, Gümüşhane), Tunceli, Uludağ (Bursa) (Guéorguiev, 1981; Erman, 2000).

**Distribution in the world:** E: AB AR GG GR RU (ST) TR N: EG A: IN LE TR.

**Subfamily Colymbetinae Erichson, 1837**

**Genus *Rhantus* Dejean, 1833**

***Rhantus suturalis* (W. S. Macleay, 1825)**

*Colymbetes suturalis* W. S. Macleay, 1825, Annul. Javan. 1: 31.

**Examined material:** Rize: Pazar-Ayder crossroads, 2 females, 01.07.2001.

**Distribution in Turkey:** Aksaray, Erzurum, Konya, Manisa, Marmara Gölü (Manisa), Trabzon, (Guéorguiev, 1981; Erman, 2000; Darılmaz and Kiyak, 2006).

**Distribution in the world:** E: AB AR AU AZ BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LT LU MA MC NL NR PL PT RU (CT ST) SK SL SP SV SZ UK YU N: EG LB MO A: AF CH (BEI FUJ GAN GUA GUI GUX HEB HEI HUB JIA JIL LIA MAC NMO QIN SCH SHN SHX TAI XIZ YUN ZHE) CY HP IN IQ IS JA KA KI KU KZ MG NC NP PA RU (ES FE WS) SA SC SD SI TD TM TR UZ **AUR ORR.**

**Subfamily Dytiscinae Leach, 1815**

**Genus *Acilius* Leach, 1817**

***Acilius sulcatus* Linnaeus, 1758**

*Dytiscus sulcatus* Linnaeus, 1758, Syst. Nat. (10) 1: 412.

**Examined material:** Artvin: Borçka: Karagöl, 1 male, 02.07.2001; Şavşat: Aşağı Koyunlu village, 3 females, 04.07.2001.

**Distribution in Turkey:** Erciyes Dağı (Kayseri), Erzurum, Ilgaz Dağları (Kastomonu or Çankırı) (Guéorguiev, 1981; Erman, 2000).

**Distribution in the world:** E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG HU IR IT LA LS LT LU NL NR PL PT RU (CT NT ST) SK SL SP SV SZ UK YU N: AG A: KZ RU (ES FE WS) TR.

**Subfamily Hydroporinae Aubé, 1836**

**Genus *Hydroglyphus* Motschulsky, 1853**

***Hydroglyphus geminus* (Fabricius, 1792)**

*Dytiscus geminus* Fabricius, 1792, Ent. Syst. 1(1): 199.

**Examined material:** Artvin: Borçka: Karagöl, 16 males, 28 females, 02.07.2001; Çiftepınar village, 4 males, 6 females, 02.07.2001; Hopa: Sundura brook, 7 males, 7 females, 26.07.2001; Hopa-Borçka way, 4 males, 7 females, 02.07.2001; Şavşat: Ciritdüzü village-Karagöl way, 1 male, 1 female, 03.07.2001; Karagöl, 1 male, 03.07.2001; Yukarı Koyunlu village, 1 male, 04.07.2001. Rize: Çayeli-Pazar way, 2 males, 3 females, 01.07.2001; Pazar-Ayder crossroads, 2 males, 6 females, 01.07.2001; İkizdere: Anzer village plateau, 1 male, 29.07.2001; Sivrikaya village, 1 female, 29.06.2001.

**Distribution in Turkey:** Acı Göl (Afyon, Denizli or Nevşehir), Adana, Akçaabat (Trabzon), Aksaray, Aydın, Ayvalık (Balıkesir), Beyşehir Gölü (Konya), Ceyhan (Adana), Edirne, Eğirdir (Isparta), Erdemli (Mersin), Erzurum, Finike (Antalya), Gerede (Bolu), İnegöl (Bursa), Kelkit (Gümüşhane), Kızılören (a geographical unit covering the following provinces: Çorum, Erzurum, Konya, Kars, Afyon, Ankara, Kayseri, Niğde), Kilis, Konya, Manisa, Marmara Gölü (Manisa), Menemen (İzmir), Mogan Gölü (Ankara), Muğla, Sivrihisar (Eskişehir), Tosya (Kastamonu), Tuz Gölü (Aksaray or Konya), Yeniköy- Toros Dağları (Kahramanmaraş or Hatay) (Guéorguiev, 1981; Erman, 2000; Darılmaz and Kiyak, 2006; Kiyak et al., 2007).

**Distribution in world:** E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IT LA LS LT LU MC MD NL NR PL PT RO RU (CT NT ST) SK SL SP SV SZ UK YU N: AG CI EG LB MO TU A: AF BT CH (GUI GUX HEI HEN JIL LIA SCH YUN) CY HP IN IQ IS KA KI KZ LE MG NC NP PA RU (ES) SA SI SY TD TM TR UP UZ **ORR.**

#### **Genus *Deronectes* Sharp, 1882**

##### ***Deronectes doriae* Sharp, 1882**

*Deronectes doriae* Sharp, 1882, Sci. Trans. R. Dublin Soc. (2) 2: 421.

**Examined material:** Artvin: Şavşat: Meşeli village, 1 male, 03.07.2001.

**Distribution in Turkey:** Artvin, Erzurum Karaköy (Bilecik), Kızılcahamam (Ankara), Köse (Gümüşhane), Muğla, Sarıkamış (Kars), Uludağ (Bursa) (Guéorguiev, 1981; Fery and Brancucci, 1997; Erman, 2000; Fery et al., 2001).

**Distribution in world:** E: Caucasus A: AR TR.

#### **Genus *Hydroporus* Clairville, 1806**

##### ***Hydroporus discretus discretus* Fairmaire & Brisout, 1859**

*Hydroporus discretus* Fairmaire and Brisout, 1859, in Fairmaire, Annls Soc. Ent. Fr. (3) 7: 28.

**Examined material:** Artvin: Borçka: Çiftepınar village, 1 male, 2 female, 02.07.2001; Şavşat: Aşağı Koyunlu village, 1 male, 04.07.2001; Ciritdüzü village-Karagöl way, 1 male, 1 female, 03.07.2001; Meşeli village, 1 male, 2 females, 03.07.2001; Şavşat-Artvin way 20. km, 1 male, 1 female, 03.07.2001. Rize: İkizdere: Cimil plateau, 5 males, 8 females, 29.07.2001; Gölyayla, 1 female, 01.09.2001; Ortaköy-Başköy way, 1 male, 29.07.2001; Rüzgarlı village, 1 male, 3 females, 30.07.2001; Sivrikaya village, 2 males, 1 female, 29.06.2001.

**Distribution in Turkey:** Artvin, Bayburt, Erzurum, Iğdır, Kesalar (Erzurum ?) (Zaitzev, 1927; Guéorguiev, 1981; Erman, 2000).

**Distribution in world:** E: AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LU MC NL NR PL PT RU (CT NT ST) SK SL SP SV SZ UK YU N: MO A: AF CH (XIN) CY ES IN KA NP PA TR.

##### ***Hydroporus kozlovskii* Zaitzev, 1927**

*Hydroporus kozlovskii* Zaitzev, 1927, Trav. Stat. Biol. Cauc. Nord 2: 15.

**Examined material:** Rize: İkizdere: Anzer village plateau, 1 male, 3 females, 29.07.2001.

**Distribution in Turkey:** Antalya, Artvin, Bingöl, Erzurum, Gümüşhane, Hakkari, Kars, Muş Rize (Zaitzev, 1927; Guéorguiev, 1981; Erman, 2000; Shaverdo, 2004).

**Distribution in world:** E: AR GG RU(ST) A: LE TR.

##### ***Hydroporus nigellus* Mannerheim, 1853**

*Hydroporus nigellus* Mannerheim, 1853, Bull. Soc. Imp. Nat. Moscou 26: 163.

**Examined material:** Rize: İkizdere: Anzer village plateau, 2 males, 4 females, 29.07.2001; 9 males, 8 females, 30.06.2001; Ortaköy-Başköy way, 1 female, 29.07.2001.

**Distribution in Turkey:** Erzurum (Erman et al. 2005).

**Distribution in world:** E: AN AR AU BU DE FI FR GE GG IT NR PL RU (CT) SP SV SZ  
A: IN KZ RU (FE WS) TR **NAR.**

***Hydroporus palustris* (Linnaeus, 1761)**

*Dytiscus palustris* Linnaeus, 1761, Fauna Suecica (2), 216.

**Examined material:** Artvin: Şavşat: Karagöl, 2 males, 2 females, 03.07.2001; Yukarı Koyunlu village, 11 female, 04.07.2001. Rize: İkizdere: Ortaköy-Başköy way, 4 males, 6 females, 29.07.2001.

**Distribution in Turkey:** Asie Mineur, Erzurum (Guéorguiev, 1981; Erman, 2000)

**Note:** Guéorguiev (1981) didn't give detailed locality data in his work.

**Distribution in world:** E: AB AN AR AU BE BH BU BY CR CZ DE EN FA FI FR GB GE GG GR HU IR IT LA LS LT LU MC NL NR PL RU (CT NT ST) SK SL SP SV SZ UK YU A: IN RU (ES WS) TR.

***Hydroporus planus* (Fabricius, 1782)**

*Dytiscus planus* Fabricius, 1782, Spec. Ins. 2: 501.

**Examined material:** Artvin: Borçka: Karagöl, 1 male, 25.07.2001; Şavşat: Meşeli village, 1 female, 03.07.2001. Rize: Pazar-Ayder crossroads, 1 female, 01.07.2001; İkizdere: Anzer village plateau, 3 males, 1 female, 30.06.2001.

**Distribution in Turkey:** Antalya, Ayvalık (Balıkesir), Beykoz (İstanbul), Bursa, Erzurum, Keşiş Dağları (Esence Dağları, Erzincan), Manastır (a geographical unit covering the following provinces: Konya, Denizli, Bayburt, Gümüşhane, Giresun, İzmir, Mersin, Giresun), Sarıkamış (Kars), Toros Dağları (Guéorguiev, 1981; Erman, 2000).

**Distribution in world:** E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LT LU MC NL NR PL PT RU (CT NT ST) SK SL SP SV SZ TR UK YU  
N: AG MO A: IN IQ KZ LE RU (WS) TM TR.

***Hydroporus pubescens* (Gyllenhal, 1808)**

*Hyphydrus pubescens* Gyllenhal, 1808, Ins. Suecica 1(1): 536.

**Examined material:** Artvin: Şavşat: Kirazlı village, 4 females, 24.07.2001; Rize: İkizdere: Anzer village plateau, 1 male, 6 females, 29.07.2001; Çimil plateau, 15 males, 22 females, 29.07.2001; Çayeli-Pazar way, 2 females, 01.07.2001; Gölyayla, 3 males, 6 females, 01.09.2001; Ortaköy-Başköy way, 6 males, 50 females, 29.07.2001.

**Distribution in Turkey:** Adapazarı, Adatepe (a geographical unit covering the following provinces: Çanakkale, Sakarya, Samsun, Sivas, Zonguldak), Aksaray, Baba Dağı (Denizli, Muğla or Zonguldak), Bolkar Dağları (Mersin, Karaman), Bozburun Dağı (Antalya), Bursa, Efes (İzmir), Erzurum, Karaköy (Bilecik), Keşiş Dağları (Esence Dağları, Erzincan), Manastır (a geographical unit covering the following provinces: Konya, Denizli, Bayburt, Gümüşhane, Giresun, İzmir, Mersin, Giresun), Manisa, Ordu, Sadagh (most probability Sadak, Gümüşhane), Trabzon, Ulukışla (Niğde) (Guéorguiev, 1981; Erman, 2000; Darılmaz and Kıyak, 2006).

**Distribution in world:** E: AB AL AU BE BH BU CR CZ DE EN FA FI FR GB GE GG GR IR IT LA LU MC NL NR PL PT RU (CT NT ST) SK SL SP SV SZ TR UK YU N: AG LB MO TU  
A: CY IN IS JO LE SY TR.

***Hydroporus thracicus* Guéorguiev, 1966**

*Hydroporus thracicus* Guéorguiev, 1966, Fauna Trakija 3: 71.

**Examined material:** Artvin: Şavşat: Ciritdüzü-Karagöl way, 1 female, 03.07.2001; Kirazlı village, 1 female, 24.07.2001; Meşeli village, 1 male, 03.07.2001. Rize: İkizdere: Ortaköy-Başköy way, 3 males, 1 female, 29.07.2001.

**Distribution in Turkey:** Ankara, Artvin, Erzurum, Kars, Kastamonu, Rize (Shaverdo, 2004; Erman, 2000).

**Note:** This species was recorded as *H. nivalis* on Erman (2000).

**Distribution in world:** E: GR BU AR GG RU A: TR (Shaverdo, 2004).

**Genus *Nebrioporus* Régimbart, 1906**

***Nebrioporus airumulus* (Kolenati, 1845)**

*Hydroporus airumulus* Kolenati, 1845, Melet. Entom. 1: 85.

**Examined material:** Artvin: Şavşat: Meşeliköy; 5 females, 03.07.2001.

**Distribution in Turkey:** Bergr (?), Erzurum, Kala (?), Kelkit (Gümüşhane), Sadagh (most probability Sadak, Gümüşhane), Sarıkamış (Kars), Van Gölü (Van) (Guéorguiev, 1981; Erman, 2000).

**Distribution in world:** E: AB AR GG PL RU (ST) UK A: AF CH (BEI GAN GUI HEB HEI HEN JIA LIA NMO SCH SHA SHN SHX XIN YUN) HP IN IS KA KI KZ MG PA RU (ES) TD TM TR UZ.

***Nebrioporus turca* (Seidlitz, 1887)**

*Deronectes turca* Seidlitz, 1887, Verhandl. Naturforsch. Ver. Brünn 25: 55.

**Examined material:** Artvin: Hopa: Çamlıköy, 1 female, 26.07.2001; Şavşat: Ciritdüzü village-Karagöl way, 3 males, 11 females, 03.07.2001; Meşeli village, 25 males, 15 females, 03.07.2001.

**Distribution in Turkey:** Antalya, Baba Dağı (Denizli, Muğla or Zonguldak), Bolkar Dağları (Mersin or Karaman), Cilicia (most probability Mersin), Elazığ, Erzurum, Isparta, İzmir, Konya, Trabzon (Guéorguiev, 1981; Erman, 2000; Kiyak et al., 2007).

**Distribution in world:** E: AR N: EG A: IN IS LE SY TR.

**Genus *Oreodytes* Seidlitz, 1887**

***Oreodytes davisii davisii* (Curtis, 1831)**

*Hydroporus davisii* Curtis, 1831, Brit. Ent. 8: 343.

**Examined material:** Artvin: Borçka: Karagöl, 14 males, 8 females, 02.07.2001; Şavşat: Ciritdüzü village-Karagöl way, 1 male, 1 female, 03.07.2001. Rize: İkizdere: Anzer village plateau, 1 female, 29.07.2001; 3 males, 4 females, 30.06.2001; Ortaköy-Başköy way, 3 males, 2 females, 29.07.2001.

**Distribution in Turkey:** Antalya, Erzurum (Erman & Erman, 2002; Kiyak et al., 2007).

**Distribution in world:** E: AL AR AU BH BU CR CZ FR GB GE GG GR IR IT PL SK SL SP SZ UK A: TR (Erman & Erman, 2002; Nilsson, 2005).

**Genus *Scarodytes* Gozis, 1914**

***Scarodytes halensis halensis* (Fabricius, 1787)**

*Dytiscus halensis* Fabricius, 1787, Mantissa Ins. 1: 192.

**Examined material:** Artvin: Şavşat: Aşağı Koyunlu village, 1 male, 04.07.2001; Ciritdüzü village-Karagöl way, 5 males, 16 females, 03.07.2001.

**Distribution in Turkey:** Akdağmadeni (Yozgat), Aksaray, Antalya, Bala (Ankara), Başköy (There are twenty seven provinces including the name of this locality), Çağiran [may be Çağırkan (Denizli), Çağırkan (Çanakkale) or Çağırkan Kaya (Rize)], Eğirdir (Isparta), Erciyes Dağı (Kayseri), Erzurum, İnegöl (Bursa), İzmir, Kesalar (Erzurum ?), Köse (Gümüşhane), Mersin, Sivrihisar (Eskişehir), Van Gölü (Van) (Zaitzev, 1927; Guéorguiev, 1981; Erman, 2000; Darılmaz and Kiyak, 2006; Kiyak et al., 2007).

**Distribution in world:** E: AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IT LA LT LU MC MD NL NR PL PT RO RU (CT NT ST) SK SL SP SV SZ UK YU N: AG EG MO TU A: IN IS LE SI SY TR.

**Genus *Stictotarsus* Zimmermann, 1919**

***Stictotarsus griseostriatus* (De Geer, 1774)**

*Dytiscus griseostriatus* De Geer, 1774, Mém. Hist. Ins. 4: 403.

**Examined material:** Rize: İkizdere: Anzer village, 1 female, 29.06.2001

**Distribution in Turkey:** Erzurum, Van Gölü (Van) (Guéorguiev, 1981; Erman, 2000).

**Distribution in world:** E: AR AU BH BU EN FI FR GE GG GR IT NR PT RU (NT) SL SP SV SZ YU N: MO A: KA MG PA TR NAR.

**Genus *Hygrotus* Stephens, 1828**

***Hygrotus armeniacus* (Zaitzev, 1927)**

*Coelambus armeniacus* Zaitzev, 1927, Trav. Stat. Biol. Cauc. Nord 2: 5.

**Examined material:** Artvin: Şavşat: Karagöl, 1 male, 1 female, 03.07.2001.

**Distribution in Turkey:** Erzurum, Karasu (a geographical unit covering the following provinces: Sakarya, Ağrı, Bartın, Bursa, Rize, Şanlıurfa, Sinop, Bitlis, Hatay, Kilis, Gaziantep, Kahramanmaraş, Erzincan, Erzurum, Muş), Sarıkamış (Kars), Tashashla (Erzurum ?) (Zaitzev, 1927; Guéorguiev, 1981; Erman, 2000).

**Distribution in world:** E: AR GG A: TR.

***Hygrotus inaequalis*** (Fabricius, 1777)

*Dytiscus inaequalis* Fabricius, 1777, Gen. Ins. 239.

**Examined material:** Artvin: Şavşat: Yukarı Koyunlu village, 1 female, 04.07.2001.

**Distribution in Turkey:** Abant Gölü (Bolu), Acı Göl (Afyon, Denizli or Nevşehir), Beyşehir Gölü (Konya), Eğirdir (Isparta), Erzurum, Gerede (Bolu), Manisa Dağı-Marmara Gölü (Manisa) (Guéorguiev, 1981; Erman, 2000).

**Distribution in world:** E: AB AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LS LT LU MC MD NL NR PL PT RU (CT NT ST) SK SL SP SV SZ UK YU N: AG MO A: CH (HEI JIL LIA NMO SHA) IN IS JA KZ MG RU (ES FE WS) SY TR.

**Subfamily Laccophilinae** Gistel, 1856

**Genus *Laccophilus*** Leach, 1815

***Laccophilus hyalinus*** (De Geer, 1774)

*Dytiscus hyalinus* De Geer, 1774, Mém. Hist. Ins. 4: 406.

**Examined material:** Artvin: Şavşat: Yukarı Koyunlu village, 14 males, 22 females, 04.07.2001.

**Distribution in Turkey:** Abant Gölü (Bolu), Adana, Antalya, Aydın, Başköy (There are twenty seven provinces including the name of this locality), Burdur, Bolkar Dağları (Mersin or Karaman), Boz Dağ-Gölçuk (Boz Dağ, a geographical unit covering the following provinces: Ağrı, Bilecik, Eskişehir, Konya, Manisa, Muğla, Van. Gölçuk may be Gölçük. There are twenty four provinces including the name of this locality), Eğirdir (Isparta), Erzurum, İzmir, Karasu (a geographical unit covering the following provinces: Sakarya, Ağrı, Bartın, Bursa, Rize, Şanlıurfa, Sinop, Bitlis, Hatay, Kilis, Gaziantep, Kahramanmaraş, Erzincan, Erzurum, Muş), Kırşehir, Kilis, Konya, Kozluk (Erzurum ?), Manisa Dağı-Marmara Gölü (Manisa), Sarıkamış (Kars), Suluhan-Toros Dağları (Adana), Tashashla (Erzurum ?) (Zaitzev, 1927; Guéorguiev, 1981; Erman, 2000; Darılmaz and Kıyak, 2006; Kıyak et al., 2007).

**Distribution in world:** E: AB AR AU BE BH BU BY CZ DE EN FI FR GB GE GG GR HU IR IT LA LT LU MC MD NL NR PL RU (NT) SK SL SV SZ UK YU A: CY IN IQ IS LE RU (ES WS) SY TM TR UZ.

***Laccophilus minutus*** (Linnaeus, 1758)

*Dytiscus minutus* Linnaeus, 1758, Syst. Nat. (10) 1: 412.

**Examined material:** Artvin: Borçka: Karagöl, 2 males, 2 females, 02.07.2001; Şavşat: Karagöl, 3 males, 3 females, 03.07.2001. Rize: Çayeli-Pazar way, 3 females, 01.07.2001; Pazar-Ayder crossroads, 1 male, 6 females, 01.07.2001.

**Distribution in Turkey:** Abant Gölü (Bolu), Akçaabat (Trabzon), Aksaray, Antalya, Aydın, Ayvalık (Balıkesir), Burdur, Boz Dağ-Gölçuk (Boz Dağ, a geographical unit covering the following provinces: Ağrı, Bilecik, Eskişehir, Konya, Manisa, Muğla, Van. Gölçuk may be Gölçük. There are twenty four provinces including the name of this locality), Derbent (a geographical unit covering the following provinces: Afyon, Amasya, Bartın, Çorum, Denizli, Kahramanmaraş, Kocaeli, Konya, Kütahya, Manisa, Mardin, Rize, Sivas, Tokat, Uşak, Yozgat), Denizli, Eğirdir (Isparta), Erzurum, Gerede (Bolu), İnegöl (Bursa), İsaklı (Afyon, Denizli or Tekirdağ), Kızılören (a geographical unit covering the following provinces: Afyon, Ankara, Çorum, Erzurum, Kars, Kayseri, Konya, Niğde), Konya, Manastır (a geographical unit covering the following provinces: Konya, Denizli, Bayburt, Gümüşhane, Giresun, İzmir, Mersin, Giresun), Manisa Dağı-Marmara Gölü (Manisa), Menemen (İzmir), Mogan Gölü (Ankara), Sadagh (most probability Sadak, Gümüşhane), Sinop Burun (Sinop), Sivas, Toros Dağları, Trabzon (Guéorguiev, 1981; Erman, 2000; Darılmaz and Kıyak, 2006; Kıyak et al., 2007).

**Distribution in world:** E: AB AL AR AU BE BH BU BY CR CZ DE EN FI FR GB GE GG GR HU IR IT LA LT LU MA MC MD NL NR PL PT RU (NT ST) SK SL SP SV SZ UK YU N: AG MO TU A: AF CH (XIN YUN) IN IQ IS JO KA KI KZ MG PA RU (ES WS) SY TM TR UZ ORR.

***Laccophilus poecilus* Klug, 1834**

*Laccophilus poecilus* Klug, 1834, Symb. Phys. 3: pl. xxxiii/8.

**Examined material:** Rize: Pazar-Ayder crossroads, 1 female, 01.07.2001.

**Distribution in Turkey:** Acı Göl (Afyon, Denizli or Nevşehir), Antalya, Adana, Aydın, Ceyhan (Adana), Eğirdir (Isparta), Erzurum, Finike (Antalya), Gerede (Bolu), Isparta, İzmir, Konya, Manisa Dağı-Marmara Gölü (Manisa), Menemen (İzmir), Toros Dağları - Pamuk (Mersin) (Guéorguiev, 1981, Uygur & Önder, 1988; Erman, 2000).

**Distribution in world:** E: AB AL AR AU BE BH BU CR CZ EN FR GB GE GG GR HU IT LA LS LT LU MC NL NR PL RU (ST) SK SL SP SV SZ UK YU N: AG EG MO A: AF CH (XIN) IN IQ IS KI KU KZ SA SI SY TD TM TR UZ.

**ACKNOWLEDGEMENTS**

The authors want to express their sincere thanks to Dr. Hans Fery (Berlin, GERMANY) for helping and to Prof. Garth Foster (Scotland, UK) for checking the manuscript for the use of English. This study was supported by the research fund of Atatürk University (2000-32).

**LITERATURE CITED**

**Balfour-Browne, F.** 1963. Haliplidae, Noteridae and Dytiscidae. Bulletin de Institut Royal des Sciences. Naturelles de Belgique, 39 (17), 1-3.

**Booth, R. G., Cox, M. L. & Madge, R. B.** 1990. II E Guides to Insects of Importance to Man. 3. Coleoptera. The University Press, Cambridge 396 pp.

**Borror, D. J., Delong, D. M. & Triplehorn, C. A.** 1981. An Introduction to the Study of Insects. Hold, Rinehard and Winston, USA, 827 pp.

**Darılmaz, M. and Kıyak, S.** 2006. A contribution to the knowledge of the Turkish water beetles fauna (Coleoptera). Munis Entomology and Zoology 1(1), 129-144.

**Erman, Ö. K.** 2000. Erzurum İli Dytiscidae (Coleoptera) Türleri Üzerine Sistematik Araştırmalar. Doktora Tezi. Atatürk Üniversitesi, Fen Bilimleri Enstitüsü.

**Erman, Ö. K. & Fery, H.** 2000. *Hydroporus erzurumensis* sp. n. (Insecta: Coleoptera: Dytiscidae) from north-eastern Turkey. Annalen des Naturhistorischen Museums in Wien, 102 B: 171-176.

**Erman, Ö. K. & Erman, O.** 2002. First records of *Oreodytes* Seidlitz, 1887 (Dytiscidae, Coleoptera) from Turkey: *Oreodytes septentrionalis* (Gyllenhel, 1826) and *Oreodytes davisii* (Curtis, 1831). Turkish Journal of Zoology, 26 (3): 295-299.

**Erman, Ö. K. & Erman, O.** 2004. First record of *Graptodytes bilineatus* (Sturm, 1835) (Coleoptera, Dytiscidae) from Turkey. Turkish Journal of Zoology, 28 (1):87-90.

**Erman, Ö. K.** 2005. First record of female of *Ilybius wewalkai* (Fery & Nilsson, 1993) (Coleoptera, Dytiscidae) from Turkey. Animal Biology, 55 (2): 141-145.

**Erman, Ö. K., Kasapoğlu, A. & Erman, O.** 2005. First record of four Dytiscidae (Coleoptera) from Turkey: *Bidessus unistriatus* (Goeze, 1777), *Hydroporus nigellus* Mannerheim, 1853, *Agabus bergi* Zaitzev, 1913, and *Agabus lapponicus* (Thomson, 1867). Entomologische Zeitschrift, 115 (4): 188-189.

- Fery, H. & Brancucci, M.** 1997. A taxonomic revision of *Deronectes* Sharp, 1882 (Insecta: Coleoptera: Dytiscidae) (part I). Annalen des Naturhistorischen Museums in Wien, 99 B: 217-302.
- Fery, H. & Nilsson, A. N.** 1993. A revision of the *Agabus chalconatus*- and *erichsoni*-groups (Coleoptera: Dytiscidae), with a proposed phylogeny. Entomologica Scandinavica, 24, 79-108.
- Fery, H. & Hosseine, S.** 1998. A taxonomic revision of *Deronectes* Sharp, 1882 (Insecta: Coleoptera: Dytiscidae) (part II). Annalen des Naturhistorischen Museums in Wien, 100B: 219-290.
- Fery, H., Erman, Ö. K. & Hosseine, S.** 2001. Two new *Deronectes* Sharp, 1882 (Insecta: Coleoptera: Dytiscidae) and notes on other species of the genus. Annalen des Naturhistorischen Museums in Wien, 103 B: 341-351.
- Guéorguiev, V. B.** 1968. Notes sur les Coleopteres Hydrocanthares (Haliplidae et Dytiscidae) de Yougoslavie, de Grece de Turquie asiatique. Bulletin De L'Institut De Zoologie Et Musee, 27, 31-39.
- Guéorguiev, V. B.** 1981. Résultat de l'expédition zoologique du Musée National de Prague en Turquie. Coleoptera : Haliplidae, Dytiscidae, Gyrinidae. Acta Entomologica Musei Nationalis Pragae, 40, 399-424.
- Hájek, J., Fery, H. & Erman, Ö. K.** 2005. *Hygrotus (Coelambus) ahmeti* sp. nov. (Coleoptera: Dytiscidae) from north-eastern Turkey. Aquatic Insects, 27 (4): 261-268.
- Kıyak, S., Darılmaz M., Salur A., Canbulat, S.** 2007. Diving beetles (Coleoptera: Dytiscidae, Noteridae) of the southwestern Anatolian region of Turkey. Munis Entomology and Zoology 2(1), 103-114.
- Nilsson, A. N. & Holmen, M.** 1995. The Aquatic Adephaga (Coleoptera) of Fennoscandia and Denmark. II. Dytiscidae. Fauna Ent. Scand. 32. E. J. Brill, Leiden, 192 pp.
- Nilsson, A. N.** 2001. World Catalogue of Insects. Volume 3. Dytiscidae (Coleoptera). Apollo Books, Stenstrup, 395 pp.
- Nilsson, A. N.** 2003. Family Dytiscidae. In: Löbl, I. & Smetana, A. (Eds), Catalogue of Palaearctic Coleoptera. Volume 1. Archostemata–Myxophaga–Adephaga. Apollo Books, Stenstrup, 35-78 pp.
- Nilsson, A. N.** 2004. World Catalogue of Dytiscidae-corrections and additions, 2 (Coleoptera: Dytiscidae). Koleopterologische Rundschau, 74, 157-174.
- Nilsson, A. N.** 2005. Catalogue of Palaearctic Coleoptera: Noteridae and Dytiscidae. Version 12.11.2006. [http://www.emg.umu.se/biginst/andersn/Cat\\_main.htm](http://www.emg.umu.se/biginst/andersn/Cat_main.htm)
- Shaverdo, H.** 2004. Revision of the *nigrita*-group of *Hydroporus* Clairville, 1806 (Insecta: Coleoptera: Dytiscidae). Annalen des Naturhistorischen Museums in Wien, 105B: 217- 263.
- Spangler, P. J.** 1981. Aquatic Biota of Tropical South America. Part 1: Arthropoda. San Diego State University, San Diego, California, 323 pp.
- T. C. Dahiliye Vekaleti.** 1928. Son Teşkilatı Mülkiyede Köylerimizin Adları. Nüfus Müdüriyeti Umumiyesi Neşriyatından, Adet: 3, Hilal Matbaası, İstanbul, 1066 pp.
- T. C. İçişleri Bakanlığı.** 1971. Türkiye Mülki İdare Bölümleri ve Bunlara Bağlı Köyler, Belediyeler 1 Haziran 1970 Durumu. İller İdaresi Genel Müdürlüğü. Seri II, Sayı: 4, Başbakanlık Basımevi, Ankara, 924 pp.



**Uygar, Ö. & Önder, F.** 1988. Sultan Sazlığı (Kayseri)'nin sucul Heteroptera ve Coleoptera Türleri Üzerine Faunistik Bir Çalışma. IX. Ulusal Biyoloji Kongresi. Sivas, Cilt 2, 177-185.

**Wewalka, G.** 1992. Revisional notes on Palearctic species of the *Hydroporus planus* group (Coleoptera: Dytiscidae). Koleopterologische Rundschau, 62, 47-60.

**Zaitzev, F. A.** 1927. Die Dytiscidenfauna von Kaukasusländern. Travaux de la station biologique du Caucase du Nord, 2(1): 1-42 [in Russian, German title].

**Zaitzev, F. A.** 1972. Fauna of the USSR. Coleoptera: Amphizoidae, Hygrobiidae, Haliplidae, Dytiscidae, Gyrinidae. Israel Progr. Sci. Transl., Jerusalem, 401 pp.

**NEW FAMILY AND GENUS NAMES, WADEMIDAE  
NOM. NOV. AND WADEMA NOM. NOV., FOR  
GEORGINIDAE AND *GEORGINA* WADE, 1977  
(MOLLUSCA: CEPHALOPODA)**

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mails: ozdikmen@gazi.edu.tr

[**Özdikmen, H.** 2008. New family and genus names, Wademidae nom. nov. and *Wadema* nom. nov., for GeorGINidae and *Georgina* Wade, 1977 (Mollusca: Cephalopoda). Munis Entomology & Zoology 3 (2): 594-595]

**ABSTRACT:** A junior homonym was detected among the cephalopod genus group names and the following replacement name is proposed: *Wadema* nom. nov. for *Georgina* Wade, 1977. Accordingly, new combinations are herein proposed for the species currently included in this genus. *Wadema dwyeri* (Wade, 1977) comb. nov.; *Wadema linda* (Wade, 1977) comb. nov. and *Wadema roylori* (Wade, 1977) comb. nov.. In addition, I propose the replacement name Wademidae new name for the family name GeorGINidae.

**KEY WORDS:** nomenclatural change, homonymy, replacement name, GeorGINidae, *Georgina*.

**Remarks on nomenclatural change**

Firstly, the genus name *Georgina* was proposed by Key (1976) with the type species *Georgina syllophica* Key, 1976 by original designation from Australia, Queensland: S. of Boulia, NNE of Breadalbane HS in Insecta (Orthoptera: Caelifera: Eumastacoidea: Morabidae: Morabinae: Warramungini).

Subsequently, the ordovician actinoceroid fossil genus *Georgina* was described by Wade (1977) with the type species *Georgina roylori* Wade, 1977 by original designation from Australia in Mollusca (Cephalopoda: Actinoceratoidea: Actinocerida: GeorGINidae). The name is currently used as a valid generic name in Actinocerida as the type genus of the family GeorGINidae Wade, 1977.

However, the name *Georgina* Wade, 1977 is invalid under the rule of homonymy, being a junior homonym of *Georgina* Key, 1977. Under the International Code of Zoological Nomenclature (ICZN 1999) it must be rejected and replaced. In accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (1999), I propose to substitute the junior homonym *Georgina* Wade, 1977 for the nomen novum *Wadema*. As a result of this, *Georgina* Wade, 1977 is replaced with *Wadema* new name. The following new combination is established: *Wadema roylori* (Wade, 1977) new combination, along with two other new combinations for all three valid species currently included in *Georgina* Wade, 1977.

In addition to this, I herein propose the replacement name Wademidae new name for the family name GeorGINidae because its type

genus *Georgina* Wade, 1977 is invalid and the type genus of a family-group name must be valid.

## SYSTEMATICS

Order Actinocerida

Family **Wademidae** new name

Georginidae Wade, 1977

**Type genus.**— *Wadema* new name.

**Remarks.**—The name *Georgina* has been used in Actinocerida as a stem for a family-group name, and should be automatically replaced with the new name.

Genus **Wadema** new name

*Georgina* Wade, 1977, junior homonym of *Georgina* Key, 1976.

*Georgina* Wade, 1977. Mem. Qd. Mus. 18: 7. (Mollusca: Cephalopoda: Actinoceratoidea: Actinocerida: Georginidae). Preoccupied by *Georgina* Key, 1976. Aust. J. Zool. (Suppl.) No.37: 55. (Insecta: Orthoptera: Caelifera: Eumastacoidea: Morabidae: Morabinae: Warramungini).

**Type species.**— *Georgina roylori* Wade, 1977 by original designation.

**Etymology.**— from Mary Wade (Australia) who is current author name of the preexisting genus *Georgina*.

**Species account and distribution.** — Three species; known from Australia.

The following new combinations are proposed and the species is removed from *Georgina*:

*Wadema dwyeri* (Wade, 1977) **new combination**

Syn.: *Georgina dwyeri* Wade, 1977

*Wadema linda* (Wade, 1977) **new combination**

Syn.: *Georgina linda* Wade, 1977

*Wadema roylori* (Wade, 1977) **new combination**

Syn.: *Georgina roylori* Wade, 1977

## LITERATURE CITED

**International Commission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Key, K. H. L.** 1976. A generic and supergeneric classification of the Morabinae (Orthoptera: Eumastacidae), with description of the type species and a bibliography of the subfamily. Australian Journal of Zoology 37 (Suppl.): 1-185.

**Wade, M.** 1977a. Georginidae, new family of actinoceratoid cephalopods, Middle Ordovician, Australia. Memoirs of the Queensland Museum 18: 1-15.

**Wade, M.** 1977b. The siphuncle in Georginidae and other Ordovician actinoceroid cephalopods. Lethaia 10: 303-315.

## A NEW *CORTODERA* SPECIES FOR TURKEY (COLEOPTERA: CERAMBYCIDAE: LEPTURINAE)

Hüseyin Özdikmen\* and Semra Turgut\*

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / Türkiye. E-mails: ozdikmen@gazi.edu.tr and semraturgut@mynet.com

[Özdikmen, H. & Turgut, S. 2008. A new *Cortodera* species for Turkey (Coleoptera: Cerambycidae: Lepturinae). Munis Entomology & Zoology 3 (2): 596-605]

ABSTRACT: *Cortodera differens* Pic, 1898 stat. n. is given as a new record for Turkey from Ankara prov.: Kızılcahamam and Antalya and Konya provinces: near Gevne valley. Distinguishing characters, photo of adult are also given in the text. It is compared with related species, *Cortodera discolor* Fairmaire, 1866 and *Cortodera colchica* Reitter, 1890. On the other side, it is discussed in terms of taxonomical status under the Code (1999). So it is raised to species rank.

KEY WORDS: new record, *Cortodera differens* stat. n., *Cortodera*, Lepturinae, Cerambycidae, Turkey.

### Subfamily LEPTURINAE Latreille, 1802

- = Lepturetae Latreille, 1802
- = Lepturida Leach, 1815
- = Lepturidae Stephens, 1831
- = Lepturetae Audinet-Serville, 1835
- = Lepturites Newman, 1835
- = Dérécéphalides Mulsant, 1839
- = Lepturides Mulsant, 1863
- = Lepturadae Samouelle, 1919

The subfamily currently includes at least 10 tribes as Desmocerini Blanchard, 1845; Encyclopini Le Conte, 1873; Enoploderini Danilevsky, 1997; Eroschemini Lacordaire, 1869; Holopterini Lacordaire, 1869; Lepturini Latreille, 1804; Oxymirini Danilevsky, 1997; Rhagiini Kirby, 1837; Rhamnusiini Danilevsky, 1997 and Xylosteini Reitter, 1913. Danilevsky (2007a) stated that “the tribal system of Lepturinae (with Rhamnusiini, Oxymirini, Enoploderini, Sachalinobiini and so on) is more or less agree with P. Svacha’s (1989 in Svacha, Danilevsky, 1989) divisions, though P. Svacha joined Rhamnusium and Enoploderes in one tribe. Encyclopini is here regarded of similar evolution level as Xylosteini, as well as Enoploderini. According to P. Svacha: “There is no need for the tribe Encyclopini...”, as Encyclops is “no doubt related to the Fallacia-Pidonia group,...”. Several tribes (Rhamnusiini, Oxymirini, Enoploderini) were named by Danilevsky in “A Check-list ...” (Althoff and Danilevsky, 1997). Sachalinobiini was never published”.

### Tribe RHAGIINI Kirby, 1837

- = Rhagiadae Kirby in Richardson, 1837
- = Toxotaires Mulsant, 1839
- = Stenocoritae Thomson, 1860
- = Toxotides Lacordaire, 1869

- = *Stenocorides* Lacordaire, 1869
- = *Rhagii* Boppe, 1914
- = *Toxotini* Boppe, 1914
- = *Pacytaires* Planet, 1924
- = *Rhagiaires* Planet, 1924
- = *Sachalinobiini* Danilevsky nomen nudum

The tribe includes currently 35 genera as *Acmaeops* LeConte, 1850; *Acmaeopsoides* Linsley & Chemsak, 1976; *Akimerus* Audinet-Serville, 1836; *Anthophylax* LeConte, 1850; *Brachysomida* Casey, 1913; *Brachyta* Fairmaire in Jacquelin du Val, 1864; *Comacmaeops* Linsley & Chemsak, 1972; *Cortodera* Mulsant, 1863; *Dinoptera* Mulsant, 1863; *Evodinus* LeConte, 1850; *Fallacia* Mulsant et Rey, 1863; *Gaurotes* LeConte, 1850; *Gaurotina* Ganglbauer, 1889; *Grammoptera* Audinet-Serville, 1835; *Hefferia* Vives, 2001; *Lemula* Bates, 1884; *Macropidonia* Pic, 1901; *Metacmaeops* Linsley & Chemsak, 1972; *Neanthophylax* Linsley & Chemsak, 1972; *Pachypidonia* Gressitt, 1935; *Pachyta* Dejean, 1821; *Pachytella* Heyrovský, 1969; *Pidonia* Mulsant, 1863; *Piodes* LeConte, 1850; *Pseudogaurotina* Plavilshchikov, 1958; *Pseudosieversia* Pic, 1902; *Rhagium* Fabricius, 1775; *Rhondia* Gahan, 1906; *Sachalinobia* Jacobson, 1899; *Sivana* Strand, 1942; *Stenocorus* Geoffroy, 1762; *Tomentgaurotes* Podaný, 1962; *Toxotinus* Bates, 1884; *Xenoleptura* Danilevsky, Lobanov et Murzin, 1981 and *Xenophyrama* Bates, 1884. However, *Cortodera* Mulsant, 1863 and *Grammoptera* Audinet-Serville, 1835 was placed by Villiers (1978) and Vitali (2007) in the tribe Lepturini.

### **Genus *CORTODERA* Mulsant, 1863**

- = *Grammoptera* Thomson, 1864 partim
- = *Acmaeopsilla* Casey, 1913
- = *Leptacmaeops* Casey, 1913

**Type species:** *Grammoptera spinosula* Mulsant, 1839 = *Leptura humeralis* Schaller, 1783

Now, we think that the genus *Cortodera* Mulsant, 1863 is in the tribe Rhagiini Kirby, 1837. So Svacha & Danilevsky (1989)'s systematic is here adopted. According to Svacha & Danilevsky (1989), the genus *Cortodera* Mulsant, 1863 is in the tribe Rhagiini Kirby, 1837 together with the genera *Grammoptera* Serville, 1835 and *Pidonia* Mulsant, 1863.

*Cortodera* Mulsant, 1863 is a very variable and problematic group. For this reason, this group needs revision especially at the specific and subspecific ranks.

Until now, the Turkish *Cortodera* species and subspecies have been given by Özdikmen (2003 a, b). Totally, he has given 20 species and 25 taxa of the species group (with subspecies) for Turkish fauna in his two works. In the present paper, *Cortodera differens* Pic, 1898 is given as a new record for Turkey. It can be supposed that number of Turkish *Cortodera* will be much more than now.

***Cortodera differens* Pic, 1898 stat. n.****Synonyms:***Cortodera discolor* var. *differens* Pic, 1898*Cortodera discolor* Auctorum nec Fairmaire, 1866*Cortodera steineri* Sama, 1996

The taxon was described by Pic (1898a) as a variety of *Cortodera discolor* Fairmaire, 1866 (*Cortodera discolor* var. *differens* Pic, 1898). The same taxon was recently redescribed by Sama (1996) as a new species, *Cortodera steineri* Sama, 1996. Sama gave wrongly a new name to this taxon and indicated *Cortodera discolor* var. *differens* Pic, 1898 as a synonym of *Cortodera steineri* in his work. He stated that M. Pic mentioned "J'ai donné le nom *differens* aux individus à élytres d'un rouge acajou, indiquée breièment par Fairmaire et qui ne me paraissent pas différer spécifiquement de la race représentant la forme type". So Sama believed that *Cortodera discolor* var. *differens* Pic, 1898 is an infrasubspecific name under the article 45.6.1 of the CODE (1999). According to Sama (1996), *Cortodera discolor* var. *differens* Pic, 1898 was expressly given by Pic at infrasubspecific rank. However, according to Danilevsky (2007a), "G. Sama (1996) wrongly believed the name as infrasubspecific. In fact M. Pic rejected only specific level of his name, without any opinion on its subspecific level (typical situation for all his variations)". Danilevsky (2007a) also stated that "Same year this name was mentioned by M. Pic (1898b) in the key for *Cortodera* as: "... avec les élytres plus ou moins d'un rouge acajou ... (v. *differens*) ... . ... *discolor* Frm." and placed in *Cortodera* catalogue at the end of same publication:

*"Discolor* Frm. Orient.*v. differens* Pic. Orient*v. testaceipes* Pic. Orient.*?v. variipes* Gglb. Asiae-Mineure"

Consequently, we decide conclusively that *Cortodera discolor* var. *differens* Pic, 1898 is a name at subspecific rank not infrasubspecific rank according to original description under the articles 45.5 and 45.6.4 of the CODE (1999). Since, first of all, it is a trinomen. So it is an available name for subspecific rank. We also agree with the approach of Danilevsky (2007a). M. Pic (1898) rejected only specific level not subspecific level of his name. Moreover, Pic (1898b) was also cited the name *Cortodera discolor* var. *differens* Pic, 1898 in two parts. In this case, the name *Cortodera discolor* var. *differens* Pic, 1898 must be regarded as available. Thus the recent name *Cortodera steineri* Sama, 1996 should be a synonym of *Cortodera differens* Pic, 1898.

In addition to this, a problem remains on this subject. "Is *Cortodera discolor* var. *differens* Pic, 1898 a species or subspecies now? Mainly, this problem was solved by Sama (1996). He gave it as a species and

mentioned that the new species, *C. steineri* is close to *C. discolor* Fairmaire, 1866 which was described from Bozdağ (SW Anatolia: İzmir prov.: Ödemiş). He also gave the original description of *C. discolor* Fairmaire, 1866. He stated that the new species clearly differs from *C. discolor* Fairmaire, 1966 by the black pubescence which covers the pronotum and the elytra (grayish in *C. discolor*) and by the form of pronotum which is hardly narrowed ahead.

However, Sama (1996) decided this taxon is a separate species from *C. discolor* Fairmaire, 1866 by using only the morphological characters. He is right in his opinion. Our records are important because of supporting the approach of Sama (1996). As known that two subspecies can not be represented inside one area. So the records indicate that *C. discolor* Fairmaire, 1866 and *C. differens* Pic, 1898 distributes in a partly overlapping geographical area (see Map 1).

Danilevsky (2007b) stated that “all records of *Cortodera discolor* Fairm. for Greece were connected with *C. differens* Pic, 1898”. For this reason, he gave *C. discolor* Fairmaire, 1866 only for Bulgaria and ?European Turkey with the remarks “*Cortodera discolor* from SE Bulgaria [1 female: Karapelit w., Dobritsch, 11.5.2001, Bringmann; 1 female: 30km SE Burgas, Veselie, 16.5.2002, L.Schmidt; 2 males, 2 females: Vesseli bei Sozop, 16.5.2002, Bringmann; 9 males, 2 females: Slanchev Brjag, Emineberge, auf Centaurea-blute, 28.4.2001, G.Siering (including 4 black males); 1 male, Slanchev Brjag, auf Centaurea, 8.5.2000, G.Siering] looks really conspecific with *C. discolor* from its type locality (Turkey, Bosz-Dagh). I’ve studied one female in good condition with the label “Bosdagh” (Hungarian Museum of Natural History, Budapest). The species is undoubtedly represented in European Turkey. *Cortodera discolor* could be conspecific with *Cortodera colchica* (on the level of subspecies). At least Bulgarien *Cortodera discolor* is also connected with *Centaurea*”. *Cortodera discolor* Fairmaire, 1866 was recorded by Lodos (1998) from Turkey without any exact locality, by Adlbauer (1992) from Ankara province and by Özdikmen (2003 a,b) from Aksaray, İçel, Konya and Niğde provinces for Turkey. Some Turkish records of *C. discolor* were reported by Fuchs & Breuning (1971) wrongly. Holzschuh (1980) corrected the records of Fuchs & Breuning (1971) as *C. colchica*. So *C. discolor* Fairmaire, 1866 has the E-Mediterranean chorotype according to Taglianti (1999) (see Map 1).

Danilevsky (2007b) also mentioned *C. differens* Pic, 1898 for only Greece. So our records from Turkey are the first record for Turkey. *C. differens* Pic, 1898 has the E-Mediterranean chorotype according to Taglianti (1999) (see Map 1).

We agree with the approach concerning *C. colchica* of Danilevsky (2007b). We also think *C. discolor* could be conspecific with *C. colchica*. The species, *C. colchica* distributes rather widely in Turkey. It is represented by two subspecies in Turkey. These are: *C. colchica rutilipes* Reitter, 1890 occurs only in Northeastern Turkey (from Erzurum prov. to Kars prov.) and the nominotypical subspecies *C. colchica colchica* Reitter,

1890 occurs in the other parts of Turkey. Known other subspecies *C. colchica danczenkoi* Danilevsky, 1985 and *C. colchica kalashiani* Danilevsky, 2000 occur only in Caucasus. This species has been recorded by many authors from Turkey. Distributional patterns in Turkey of this species were given by Özdikmen (2007) (see Map 3). Consequently *C. colchica* Reitter, 1890 has the SW-Asiatic chorotype according to Taglianti (1999) as apart from other two species.

In this study, 14 specimens were collected by the authors from Ankara, Antalya, Aksaray, Konya, İçel and Niğde provinces in the years of 1997, 2001 and 2007 are examined in detail. According to their identification, 4 specimens from Ankara and Antalya provinces clearly belong to *Cortodera differens* Pic, 1898; 5 specimens from Aksaray, İçel, Konya and Niğde provinces clearly belong to *Cortodera discolor* Fairmaire, 1866 and 5 specimens from Ankara and Aksaray provinces clearly belong to *Cortodera colchica* Reitter, 1890. The specimens except 4 specimens from Ankara and Antalya provinces of *Cortodera differens* Pic, 1898 were published by Özdikmen (2003 a,b).

**Material examined:** Ankara prov.: Kızılcahamam (Güvem village), 01.05.2007, 2 specimens; Antalya prov.: Gevne valley (Karapınar), 1704 m, 36 41 N 32 27 E, 13.05.2007, 1 specimen; Konya prov.: Hadim-Beyreli road 3<sup>rd</sup> km, Gevne valley env. 1866 m, 36 56 N 32 23 E, 13.06.2007, 1 specimen.

#### **Published comparison materials by Özdikmen (2003 a,b):**

As *C. discolor* Fairmaire, 1866;

İçel prov.: Exit of Kirobası 2. km, 1335 m, 01.06.2001, 1 specimen; Aksaray prov.: Nevşehir-Enter of Aksaray, 20.05.1997, 2 specimens; Konya prov.: Kulu, Tavşançalı, 1000 m, 17.05.1997, 1 specimen; Niğde prov.: Ulukışla (Central), 1400 m, 23.06.1997, 1 specimen.

As *C. colchica* Reitter, 1890;

Aksaray prov.: Nevşehir-Enter of Aksaray, 20.05.1997, 4 specimens; Ankara prov.: Kızılcahamam (Yukarı Çanlı), 1540m, 14.06.1997, 1 specimen.

Finally, a simple key for the specimens with light colored elytra of these three species are presented as follows:

1. Elytral suture with a black strip at least distinctly broadened scutellar region in general.....***colchica* Reitter, 1890** (fig. 1. 3)
- Elytral suture without black strip entirely (fig. 1. 1 and 2) or at least in a great part .....2
2. Elytra with black pubescence.....***differens* Pic, 1898** (fig. 2. 1)
- Elytra with grayish-white pubescence.....
- .....***discolor* Fairmaire, 1866** (fig. 2. 2)



\* This study was supported by a TUBITAK Project (105T329).

## LITERATURE CITED

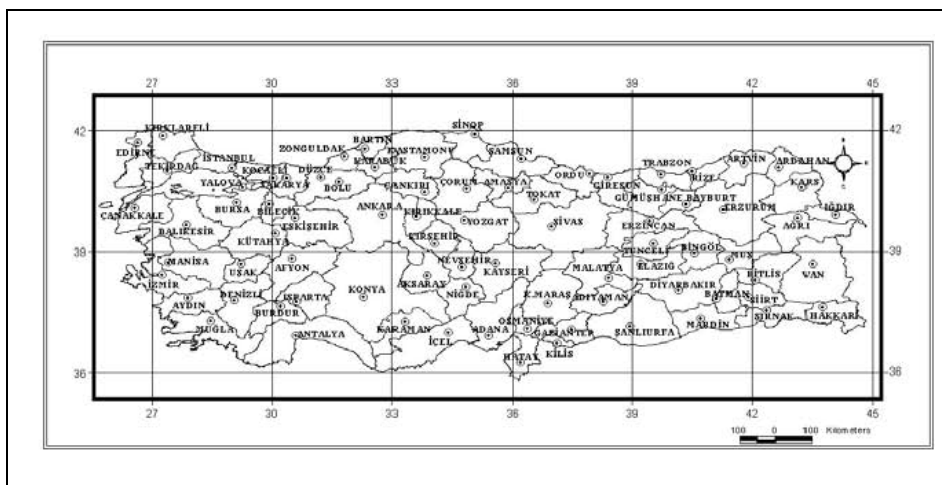
- Adlbauer, K.** 1992. Zur Faunistik und Taxonomie der Bockkäferfauna der Türkei II (Coleoptera, Cerambycidae). *Entomofauna*, 13 (30): 485-509.
- Althoff, J. & Danilevsky, M. L.** 1997. A Check-List of Longicorn Beetles (Coleoptera, Cerambycoidea) of Europe. Slovensko Entomološko Društvo Štefana Michielija. Ljubljana, 64 pp.
- Danilevsky, M. L.** 2007a. Systematic list of Longicorn Beetles (Cerambycoidea) of the territory of the former USSR. Last updated 01.11.2007. Available from: <http://www.cerambycidae.narod.ru/ussr.htm>
- Danilevsky, M. L.** 2007b. A check-list of Longicorn Beetles (Coleoptera, Cerambycoidea) of Europe. Last updated 01.11.2007. Available from: <http://www.cerambycidae.narod.ru/europe.htm>.
- Fairmaire, L.** 1866. Notice sur les Coléoptères récoltés par M. J. Léderer sur le Bosz-Dagh (Asie Mineure). *Ann. Soc. Ent. Fr.* 4 (6): 268-279.
- Fuchs, E. & Breuning, S.** 1971. Die Cerambycidenausbeute der Anatolienexpedition 1966-67 des Naturhistorischen Museums, Wien. *Annalen Naturhistorischen Museum Wien*, 75: 435-439.
- Holzschuh, C.** 1980. Revision einer Cerambycidenausbeute des Naturhistorischen Museums Wien (Coleoptera). *Annalen des Naturhistorischen Museums in Wien*, 83: 573-574.
- International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.
- Lodos, N.** 1998. Entomology of Turkey VI (General, Aplied and Faunistic). Ege Ü. Ziraat Fak. Yayınları No: 529, E. Ü. Faculty of Agriculture Press, İzmir, 300 pp.
- Özdikmen, H.** 2003a. The Genus Cortodera Mulsant, 1863 (Cerambycidae: Coleoptera) in Turkey. *Phytoparasitica*, 31 (5): 433-441.
- Özdikmen, H.** 2003b. Check-list of the genus Cortodera Mulsant, 1863 (Coleoptera: Cerambycidae) in Turkey with two new records. *Acta Entomologica Slovenica*, 11 (2): 183-188.
- Özdikmen, H.** 2007. The Longicorn Beetles of Turkey (Coleoptera: Cerambycidae) Part I - Black Sea Region. *Munis Entomology & Zoology* 2 (2): 179-422.
- Pic, M.** 1898a. Notes sur le genre Cortodera Muls. *Materiaux pour servir a l'Etude des Longicornes*, 2em cahier: 48-50.
- Pic, M.** 1898b. Etude synoptique sur les Coleopteres Longicornes du genre Cortodera Muls. *La Feuille des Jeunes Naturalistes. Revue mensuelle d'histoire naturelle*, 28: 77-80, 110-117.
- Sama, G.** 1996. Note preliminaire pour une revision du genre Cortodera Mulsant, 1863 (Coleoptera - Cerambycidae), avec la description de deux especes nouvelles. *Biocosme Mésogéen*, Nice, 13 (4): 107-114.

**Svacha, P. & Danilevsky, M. L.** 1989. Cerambycoid Larvae of Europe and Soviet Union (Coleoptera, Cerambycoidea), Part III. Acta Universitatis Carolinae – Biologica, 32: 1-205.

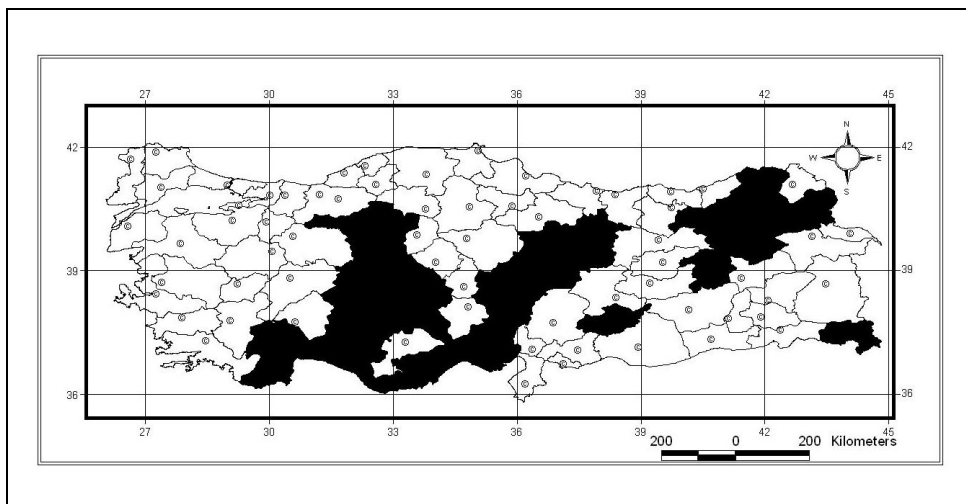
**Taglianti, A. V., Audisio, P. A., Biondi, M., Bologna, M. A., Carpaneto, G. M., De Biase, A., Fattorini, S., Piattella, E., Sindaco, R., Venchi, A. & Zapparoli, M.** 1999. A proposal for a chorotype classification of the Near East fauna, in the framework of the Western Palaearctic Region. Biogeographia 20: 31-59.

**Villiers, A.** 1978. Faune des Coleopteres de France, 1. Cerambycidae. Paris, 636 pp.

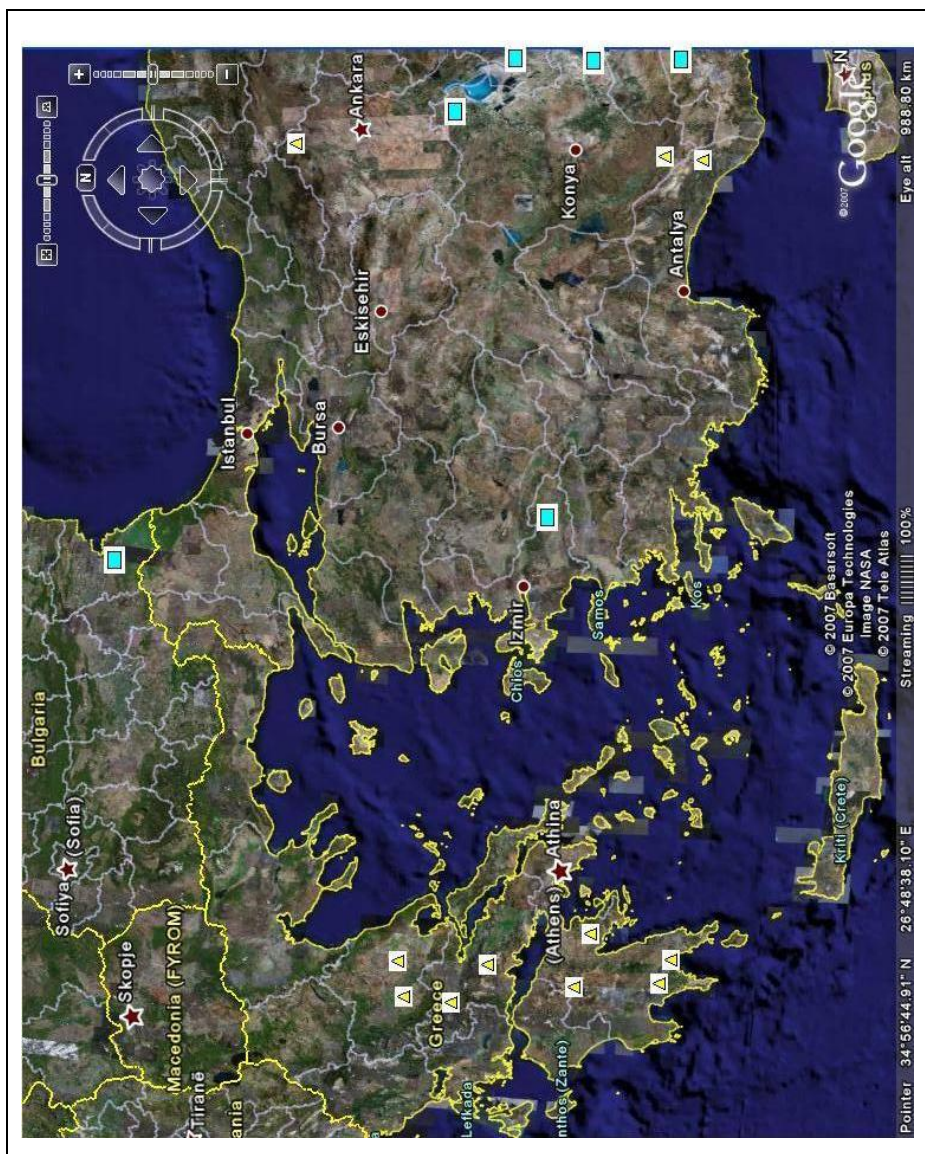
**Vitali, F.** 2007. Biolib.cz. Lepturini. Available from: <http://www.biolib.cz/cz/taxon/id11219/>



Map 2. The provinces of Turkey



Map 3. Distribution patterns in Turkey of *Cortodera colchica* Reitter, 1890



Map 1. Distributional patterns of *Cortodera differens* Pic, 1898 and *Cortodera discolor* Fairmaire, 1866 (the map from Google Earth).

- ▲ *Cortodera differens* Pic, 1898
- *Cortodera discolor* Fairmaire, 1866

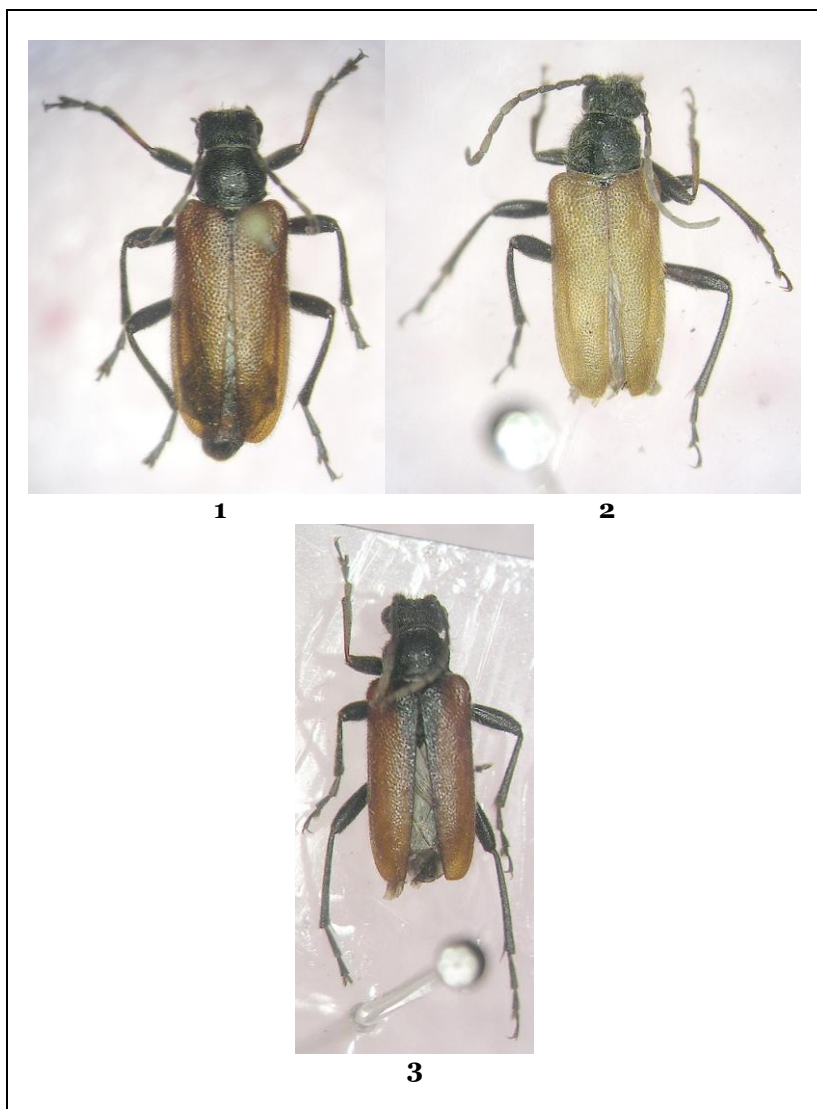


Figure 1. Habitus of 1. *Cortodera differens* Pic, 1898 2. *Cortodera discolor* Fairmaire, 1866 3. *Cortodera colchica* Reitter, 1890.

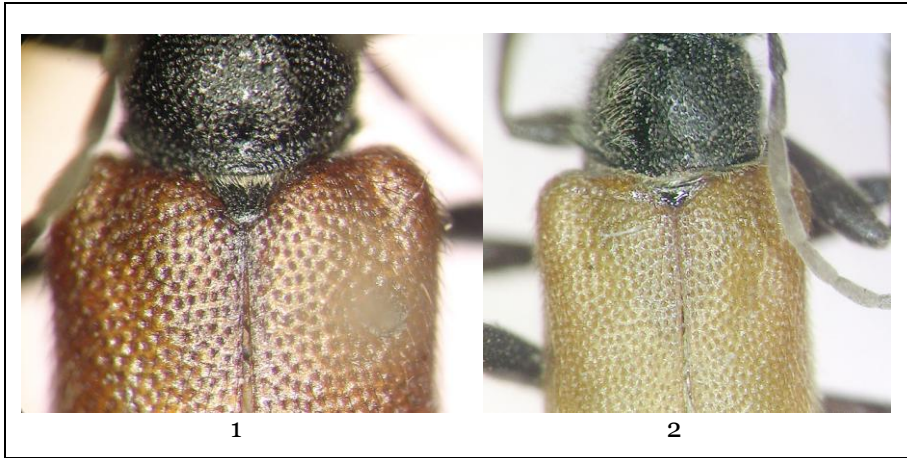


Figure 2. The pubescence of 1. *Cortodera differens* Pic, 1898 2. *Cortodera discolor* Fairmaire, 1866.

## INVESTIGATIONS OF THE ASSOCIATED BETWEEN APHIDS AND ANTS ON WILD PLANTS IN ANKARA PROVINCE (TURKEY)

**İşıl Özdemir\*, Nihat Aktaş\*\*, Seval Toros\*\*\*,  
Neşet Kılınçer\*\*\* and M. Oktay Gürkan\*\*\***

\*Ankara Plant Protection Central Research Institute, 06172 Ankara / TURKEY. e-mail: isil\_ozdemir@hotmail.com

\*\*Trakya University, Faculty of Science and Letters, Department of Biology, Edirne / TURKEY, e-mail: nihata@trakya.edu.tr

\*\*\*Ankara University, Faculty of Agriculture, Department of Plant Protection, Ankara / TURKEY, email: kilincer@agri.ankara.edu.tr

**[Özdemir, I., Aktaş, N., Toros, S., Kılınçer, N. & Gürkan, M. O. 2008.**  
Investigations of the associated between aphids and ants on wild plants in Ankara province

(Turkey). Munis Entomology & Zoology 3 (2): 606-613]

**ABSTRACT:** Differences in feeding position consequently affect the benefits of myrmecophily for different aphid species. Tending also seems to be associated with differences in the honeydew quality and quantity of the aphids. This study yielded 16 ant species associated with 19 aphid species. The most encountered ant species that associated with many aphid species were *Camponotus aethiops* (Latreille), *Camponotus piceus* (Leach), *Formica glauca* Ruzsky, *Lasius paralienus* Seifert, *Crematogaster sordidula* (Nylander). On the other hand, the ant species that associated with only 1 aphid species were *Aphis chloris* Koch, *Aphis euphorbiae* Kaltenbach, *Aphis fabae* ssp. *circiicanthoides* Scopoli, *Aphis gossypii* Glover, *Aphis nasturtii* Kaltenbach, *Aphis verbasci* Schrank, *Brachcaudus helicyris* (Kaltenbach), *Hyadaphis foeniculi* (Passerini), *Hydaphias hofmanni* Börner and *Protaphis terricola* Rondani. The results indicated that the ant-aphid interaction is important on biological control.

**KEY WORDS:** Ants, aphids, associated, wild plant, Ankara

### INTRODUCTION

Many insects develop symbiotic relationships with other organisms to help defend them in their environment. These relationships are mainly mutualistic. Many ant species cultivate herds of greenfly, coccids (Ulgenturk, 2001) and aphids, either above ground on young plant stems or underground on roots. An example of this type of relationship is between aphids and several ant species. Aphid-ant relationships are easy to manipulate and an ideal system for defining the driving forces in the ecology and evolution of antagonistic/mutualistic relationships.

Aphids and ants have many species relationships where both the ants and aphids benefit. Aphids secrete honeydew through their anus. The ants eat or store the honeydew. The ants sometimes incorporate the aphid territory into their own territory, which allows easier access to the aphids and affords the aphids protection by a greater number of ants (Holldobler and Wilson, 1990a). However, Aphids are soft bodied and have little

defense against natural enemies other than avoidance. Therefore, it is likely that a major benefit of ant attendance for aphids is protection.

There are known about 4000 species of aphids worldwide (Eastop, 1973; Remaudière and Remaudière, 1997; Blackman and Eastop, 2000), and 410 species in Turkey (Remaudière et al., 2006).

Ants live practically everywhere but are most abundant in temperate climates. There are about 10,000 species, of ants. Within each species there are usually many different types. Ants are social insects that live in colonies and are some of the most successful insects (Hölldobler and Wilson, 1990b).

Aphids have to process very large quantities of phloem sap to sustain their very high growth rates, so honeydew is often likely to be abundant and available for fueling ant foraging. However, because phloem sap contains very little amino nitrogen and aphids are very good at assimilating most of it, honeydew is unlikely to be a source of N for ants (Stadler and Dixon, 2005).

For aphids, the present study is the first to follow single individuals throughout their life, both in the presence and the absence of tending ants. In the field, recently founded aphid colonies often consist of a few or more individuals.

The association of ants and homopters which is a very common phenomenon in plants has not been extensively studied in Turkey (Ulgenturk, 2001; Elmalı and Toros, 1996). Although Aphididae and Formicidae are the largest families among insects in terms of number of species, studies carried out in Turkey to determine the relation between aphid-ants are not we known completely.

Aphis species on wild plants in Ankara province had been determined by Özdemir et al. (2006) and the ants living together with aphis species also have been collected during this study.

Therefore the aim of this study was to determine aphid-ants and their range of habitats in the Ankara province of Turkey.

## METHODS

To determine the mutualistic interaction between ants and aphids on wild plants from Ankara province of Turkey, specimens were collected at random from live aphids on different wild plants. Each sample of aphids, ants and wild plants were placed separately in a plastic bag and then brought to the laboratory for identifying the species. The preserving techniques mainly based on the method of Hille Ris Lambers (1950). Host plants were identified according to Davis (1965–1985) and Davis et al. (1988) by Dr. Ayşegül Yıldırım (Plant Protection Central Research Institute, Head of Department of Herbology).

The ants and aphid species collected have been considered in alphabetical order.

Aphid slides of the species have been deposited in the Department of Taxonomy and Plant Protection Museum, Plant Protection Central

Research Institute, Ministry of Agriculture, Ankara, Turkey and ant specimens at the Department of Biology, Faculty of Science and Letters, Tirakya University, Edirne, Turkey.

## RESULTS AND DISCUSSION

Sixteen species of ants (Figure 1) from 19 aphid species were determined in the Ankara province. The results were considered as two parts, which the first part consists of ant species determined, the host plant and the collection date of the aphids they were collected together with altitude values. In the second part, the list of aphid species visited by different ant species was given.

### Ants and Aphid species collected together

#### *Camponotus aethiops* (Latreille, 1798)

Material examined: -Kalecik: Çandır, 14.VI.2001, Unknown species on Compositae – Nallıhan: Bozyaka, 20.VI.2001, 350m., from Unknown species on Unknown plant. – Nallıhan: Bozyaka, 20.VI.2001, 350m., from *Brachycaudus* (*Acaudus*) *cardui* Linnaeus on *Carduus pycnocephalus* – Akyurt, 25.VI.2001, 1124m., from *Ammiaphis sii* (Koch) on *Falcaria vulgaris*. –Bala: Küre dağı, 02.VII.2001, 1350m., *Aphis brotericola* Mordvilko on *Euphorbia* sp. – Kalecik: Tekebeli, 03.VII.2001, 1145m., from *Aphis salviae* Walker on *Salvia* sp. and from *Brachycaudus helicyrsi* (Kaltenbach) on Compositae.

#### *Camponotus piceus* (Leach, 1825)

Material examined: - Kalecik: Aktepe, 14.VI.2001, from *Aphis euphorbiae* Kaltenbach on *Euphorbia* sp. – Haymana: Karahoca, 14.VI.2001, from *Aphis craccivora* Koch on *Anthemis* sp. – Bala: Küre dağı, 02.VII.2001, 1350m., from *Aphis brotericola* Mier Durante on *Euphorbia* sp. – Kalecik: Tekebeli, 03.VII.2001, from *Aphis salviae* Walker on *Salvia* sp. – Akyurt, 03.VII.2001, 1124m., from *Aphis fabae* Scopoli and *Hydaphias hofmanni* Börner on *Galium verum* – Ayaş, 10.VII.2001, 656m., from Unknown species on *Alhagi pseudoalhagi* – Çubuk, 12.VII.2001, 1600m., from *Aphis chloris* Koch on *Hypericum* sp. – Elmadag, 24.VII.2001, 747m., from *Aphis craccivora* Koch on *Alhagi pseudoalhagi*.

#### *Cataglyphis aenescens* (Nylander, 1849)

Material examined: - Polatlı, 31.05.2001, 740m., from *Aphis craccivora* Koch on *Crepis* sp.

#### *Crematogaster sordidula* (Nylander, 1848)

Material examined: - Kalecik: Aktepe, 14.06.2001, from *Aphis* sp. on Labiatae, - Bala: Küre dağı, 02.07.2001, 1074m., from Unknown species on Labiatae, - Bala: Küre dağı, 03.07.2001, 1074m., from *Brachycaudus* (*Acaudus*) *cardui* Linnaeus on *Anchusa leptophylla*, - Ayaş, 10.07.2001, 675m., from *Brachycaudus* (*Acaudus*) *cardui* Linnaeus on *Onopordium* sp.

#### *Formica cunicularia* Latreille, 1798

Material examined: - Elmadag, 24.07.2001, 1190m., from *Aphis craccivora* Koch on *Alhagi pseudoalhagi*.



***Formica glauca* Ruzsky, 1895**

Material examined: - Polatlı, 31.05.2001, 740m., from *Brachycaudus* (*Appelia*) *tragopogonis* (Kaltenbach) on *Tragopogon* sp. – Haymana, 31.05.2001, 1022m., from *Aphis fabae* ssp. *circiicanthoidis* Scopoli on *Cirsium arvense*, - Kızılcahamam: Salin, 19.06.2001, 1110m., from *Aphis* sp. on *Anthemis* sp., - Kızılcahamam: Doğanözü, 19.06.2001, 1102m., from *Aphis craccivora* Koch on *Urtica urens*, - Kızılcahamam: Salin, 19.06.2001, 1110m., from *Brachycaudus* (*Acaudus*) *cardui* Linnaeus on *Carduus pycnocephalus*, - Beypazarı: İnözü, 10.07.2001, 1203m., from *Aphis galliiscabri* Schrank on *Rubia tinctorum*.

***Formica rufibarbis* Fabricius, 1793**

Material examined: - Kazan, 30.05.2001, 1050m., from *Aphis* sp. on *Tragopogon* sp.

***Lasius alienus* Emery (Emery, 1878)**

Material examined: - Beypazarı: Akkaya, 21.06.2001, 563m., from *Aphis galliiscabri* Schrank on *Galium* sp. - Çubuk: Karagöl, 12.07.2001, 1668m., from *Brachycaudus* (*Appelia*) *tragopogonis* (Kaltenbach) on *Tragopogon* sp. – Güdül: Sorgun, 07.08.2001, from *Capitophorus hippophaes* (Walker) on Polygonaceae.

***Lasius paralienus* Seifert, 1992**

Material examined: - Çamlıdere: Alakoç, 30.05.2001, 1360m., from *Aphis fabae* Scopoli on *Rumex* sp., - Polatlı: Central, 31.05.2001, 740m., from *Brachycaudus* (*Acaudus*) *cardui* Linnaeus and *Aphis* sp. on *Carduus pycnocephalus*, - Kızılcahamam: Salin, 19.06.2001, 1110m., from *Aphis craccivora* Koch on *Vicia* sp., - Kızılcahamam: Salin, 19.06.2001, 1110m., from *Aphis craccivora* Koch on *Crepis foetida* – Kızılcahamam: Salin, 19.06.2001, 1110m., from *Aphis galliiscabri* Schrank on *Galium* sp., - Beypazarı: Haydarlar, 21.06.2001, 1245m., from *Aphis fabae* Scopoli on *Galium* sp., and from *Aphis gossypii* on Unknown host plant, - Bala, Buglecik, 02.07.2001, 1078m, from *Brachycaudus* (*Acaudus*) *cardui* Linnaeus on *Cirsium* sp. – Ayaş, 27.08.2001, 906m., from *Aphis fabae* Scopoli on *Chenopodium album*.

***Lasius turcicus* Santschi, 1921**

Material examined: - Kızılcahamam: Yukarıçanlı, 19.06.2001, 1039m., from *Aphis fabae* Scopoli on *Rumex* sp., - Çubuk: Kışlacık, 12.07.2001, 1215m., from *Protaphis terricola* Rondani on *Centaurea iberica*.

***Myrmica ruginodis* (Brian, 1985)**

Material examined: - Unknown species, from on *Galium* sp., Nallıhan: Göynük border, 20.06.2001, 670m.,

***Plagiolepis pallescens* Forel, 1889**

Material examined: - Kalecik: Çandır, 14.06.2001, from *Brachycaudus* (*Appelia*) *tragopogonis* (Kaltenbach), on *Tragopogon* sp., - Haymana: Karahoca, 27.06.2001, from *Staegeriella necopinata* Börner, on *Galium verum*, - Sincan: Central, 16.07.2001, from on *Onopordium* sp., - Elmadag: Hasanoğlu, 24.07.2001, 747m., from *Aphis craccivora* Koch on *Dipsacus laciniatus*.

### *Plagiolepis vindobonensis* (Lomnicki, 1925)

Material examined: - Haymana: Karahoca, 27.06.2001, from *Staegeriella necopinata* Börner on *Galium verum*, - Şereflikoçhisar: Central, 09.08.2001, from Unknown species on *Daucus carota*.

### *Tapinoma erraticum* (Latreille, 1798)

Material examined: - Çubuk: Karagöl, 12.07.2001, 1668m., from Unknown species on *Urtica* sp.

### *Tetramorium forte* (Forel, 1904)

Material examined: - Gölbaşı: Central, 23.05.2001, 983m., from *Aphis craccivora* Koch on *Crepis* sp., - Haymana: Central: 31.05.2001, 1033m., from *Aphis craccivora* Koch on *Crepis foetida*, - Nallıhan, 20.06.2001, 663m., from *Aphis rumicis* Linnaeus on *Rumex* sp.

### *Tetramorium chefteki* Forel, 1911

Material examined: - Kazan, 30.05.2001, 1035m., from *Aphis rumicis* Linnaeus on *Rumex* sp. Polatlı: Central, 31.05.2001, 740m., from *Aphis craccivora* Koch on *Crepis* sp., - Çubuk: Kışlacık, 27.05.2003, 1215m., from on *Senecio* sp.

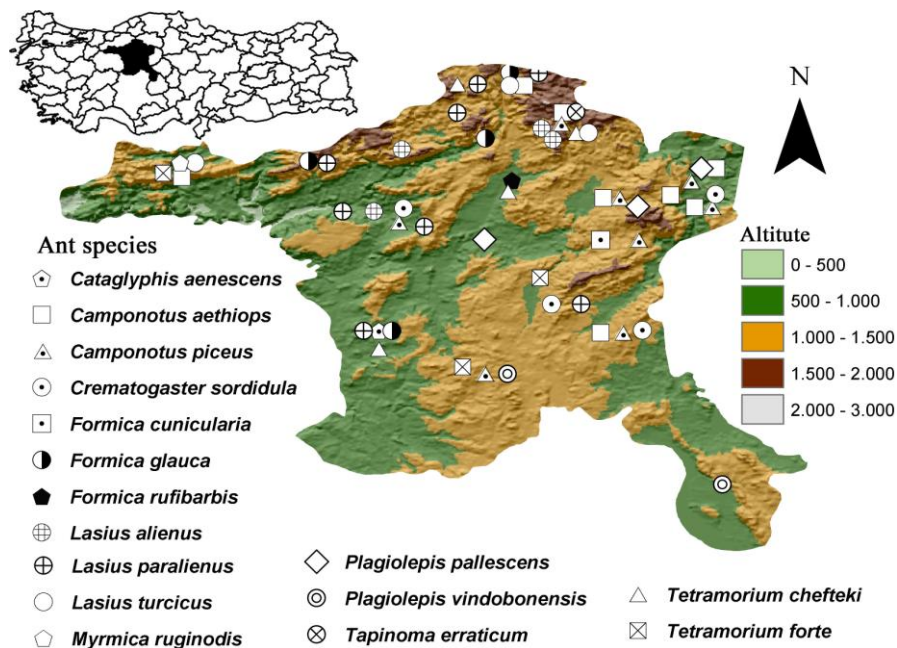


Figure 1. Ants from Aphididae in Ankara province

**APHIDS AND ANTS LIST**

- Aphis brotericola*** Mier Durante, 1978a  
*Camponotus aethiops* (Latreille, 1798)  
*Camponotus piceus* (Leach, 1825)
- Aphis chloris*** Koch, 1854  
*Camponotus piceus* (Leach, 1825)
- Aphis craccivora*** Koch, 1854  
*Tetramorium forte* (Forel, 1904)  
*Tetramorium chefteki* Forel, 1911  
*Cataglyphis aenescens* (Nylander, 1849)  
*Lasius paralienus* Seifert, 1992  
*Formica glauca* Ruzsky, 1895  
*Camponotus piceus* (Leach, 1825)  
*Formica cunicularia* Latreille, 1798  
*Plagiolepis pallescens* Forel, 1889
- Aphis euphorbiae*** Kaltenbach, 1843  
*Camponotus piceus* (Leach, 1825)
- Aphis fabae*** Scopoli, 1763  
*Lasius paralienus* Seifert, 1992  
*Camponotus piceus* (Leach, 1825)
- Aphis fabae* ssp. *circiiananthoidis*** Scopoli, 1763  
*Formica glauca* Ruzsky, 1895
- Aphis galliiscabri*** Schrank, 1801  
*Lasius paralienus* Seifert, 1992  
*Lasius alienus* Emery (Emery, 1878)  
*Formica glauca* Ruzsky, 1895
- Aphis gossypii*** Glover, 1877  
*Lasius paralienus* Seifert, 1992
- Aphis nasturtii*** Kaltenbach, 1843  
*Lasius alienus* Emery (Emery, 1878)
- Aphis rumicis*** Linnaeus, 1758  
*Tetramorium chefteki* Forel, 1911  
*Lasius paralienus* Seifert, 1992  
*Tetramorium forte* (Forel, 1904)
- Aphis salviae*** Walker, 1852  
*Camponotus aethiops* (Latreille, 1798)  
*Camponotus piceus* (Leach, 1825)
- Aphis verbasci*** Schrank, 1801  
*Lasius alienus* Emery (Emery, 1878)
- Brachycaudus (Acaudus) cardui*** (Linnaeus, 1758)  
*Lasius paralienus* Seifert, 1992  
*Camponotus aethiops* (Latreille, 1798)  
*Formica glauca* Ruzsky, 1895  
*Crematogaster sordidula* (Nylander, 1848)
- Brachycaudus heliocrisi*** (Kaltenbach, 1843)

- Camponotus aethiops* (Latreille, 1798)  
***Brachycaudus (Appelia) tragopogonis*** (Kaltenbach, 1843)  
*Formica glauca* Ruzsky, 1895  
*Plagiolepis pallescens* Forel, 1889  
*Lasius alienus* Emery (Emery, 1878)  
***Capitophorus hippophaes*** (Walker, 1852)  
*Lasius alienus* Emery (Emery, 1878)  
***Hyadaphis foeniculi*** (Passerini, 1860)  
*Lasius paralienus* Seifert, 1992  
***Hyadaphis hofmanni*** Börner, 1950  
*Camponotus piceus* (Leach, 1825)  
***Protaphis terricola*** Rondani, 1847  
*Lasius turcicus* Santschi, 1921  
***Staegeriella necopinata*** Börner, 1939  
*Plagiolepis vindobonensis* (Lomnicki, 1925)  
*Camponotus piceus* (Leach, 1825)

Despite the widespread recognition that ants provide a reliable indication of ecological change associated with land-use, their cost-effectiveness is as indicators compared with more familiar groups such as vascular plants, birds and aphids. It is clear that the number of ant species could be much more overall the country. The presence of ants in aphid colony effects natural enemy visit. And also it is known that the ants show aggressive behaviors against natural enemies. So the ant-aphid interaction is important on biological control.

### ACKNOWLEDGEMENTS

We would like to thank Dr. Georges Remaudière (INRA–France) for the aphid identification and Dr. Aysegül Yıldırım for plant identifications, also thanks to Dr. Mustafa Özdemir for mapping support (Ministry of Agriculture, Plant Protection Central Research Institute) and thanks to Dr. Selma Ülgentürk (Ankara University, Faculty of Agriculture, Department of Plant Protection) for help. This work was supported by the Ministry of Agriculture.

### LITERATURE CITED

- Bernhard, S. & Dixon, A. F.G.** 2005. Ecology and Evolution of Aphid-Ant Interactions, *Annu. Rev. Ecol. Evol. Syst.* 36: 345-372.
- Blackman, R. L. & Eastop, V. F.** 2000. Aphids on The World's Crops: An Identification guide. Second Edition. A Wiley. Interscience Publication, pp:414.
- Davis, P. H.** 1965–1985. Flora of Turkey and the East Aegean Islands. Vol. 1–9, Edinburgh Univ. Press, Edinburgh.
- Davis, P. H., Mill, R. & Tan, K.** 1988. Flora of Turkey and the East Aegean Islands. Vol.10, Edinburgh Univ. Press, Edinburgh.

- Eastop, V. F.** 1973. Deductions from the present day host plants of aphids and related insects. In *Insect/Plant Relationships*, ed.H.F. Emden, pp 157–78. London: 6th Symp. R. Entomol. Soc. London.
- Elmalı, M. & Toros, S.** 1996. The Aphidoidea species on wheat and their occurrences in Konya province. *Ank. Uni. Fac. of Agr. Publication Number*: 1454, 802, pp: 40.
- Hölldobler, B. & Wilson, E. O.** 1990a. The Behavior of Ants, <http://biology.arizona.edu/sciconn/lessons2/lessons.html>.
- Hölldobler, B. & Wilson, E. O.** 1990b. *The Ants*. Cambridge, MA: Harvard Univ. Press. 732 pp.
- Hille Ris Lambers, D.** 1950. On Mounting Aphids and other Softskinned Insects. *Entomologische Berichten XIII*, 55–58.
- Özdemir, I., Toros, S., Kilincer A. N. & Gürkan M. O.** 2006. A Survey of Aphididae (Homoptera) on wild plants in Ankara, Turkey. *Ekoloji*, No.: 58, 38-41, İzmir.
- Remaudière, G. & Remaudière, M.** 1997. *Catalogue of the World's Aphididae*. Paris: Institut National de la Recherche Agronomique. 473 pp.
- Remaudière, G., Toros, S. & Özdemir, I.** 2006. New Contribution To The Turkish Aphid Fauna (Hemiptera, Aphidoidea), *Revue française d'Entomologie (N.S.)* 28 (2): 75-96.
- Ülgentürk, S.** 2001. Ants (Hymenoptera: Formicidae) Associated with Soft Scale Insects in Turkey: A Preliminary List. *Acta Phytopathologica et Entomologica Hungarica*, 36 (3-4). pp. 405-409.

## A NOMENCLATURAL ACT FOR CADDIS FLIES (TRICHOPTERA)

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mail: ozdikmen@gazi.edu.tr

**[Özdikmen, H. 2008. A nomenclatural act for caddis flies (Trichoptera). Munis Entomology & Zoology 3 (2): 614-616]**

**ABSTRACT:** Two junior homonyms were detected among the genus group names of Trichoptera and the following replacement names are proposed: *Fusuna* nom. nov. for *Adelomyia* Ulmer, 1912 and *Ochrotrichia* (*Angrisanoia*) nom. nov. for *Ochrotrichia* (*Paratrachia*) Angrisano, 1995. Accordingly, new combinations are herein proposed for the species currently included in these genus group names respectively: *Fusuna exularis* (Ulmer, 1912) comb. nov. and *Ochrotrichia* (*Angrisanoia*) *cebolleti* Angrisano, 1995 comb. nov.

**KEY WORDS:** nomenclatural changes, homonymy, replacement names, Trichoptera.

Two proposed genus group names in the order Trichoptera are nomenclaturally invalid, as the genus group names have already been used by different authors in other animal groups (Aves and Insecta). In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these names.

### Order TRICHOPTERA Superfamily SEROCOSTOMATOIDEA Family HELICHOPSYCHIDAE Genus *FUSUNA* nom. nov.

*Adelomyia* Ulmer, 1912. Beitr. Naturk. Preussen, 10, 331. (Insecta: Trichoptera: Serocostomatoidea: Helichopsychidae). Preoccupied by *Adelomyia* Bonaparte, 1854. Rev. Mag. Zool., (2) 6, 253. (Aves: Trochiliformes: Trochilidae: Trochilinae).

**Remarks on nomenclatural change:** The name *Adelomyia* was initially introduced by Bonaparte, 1854 for a genus of the bird family Trochilidae (with the type species *Adelomyia melanogenys* (Fraser, 1840) in Aves. It is still used as a valid generic name. It has only one species with 8 subspecies.

Subsequently, Ulmer, 1912 described a fossil caddis fly genus from Baltic amber under the same generic name (with the type species *Adelomyia exularis* Ulmer, 1912 by original designation and monotypy). It is still used as a valid genus name. Thus, the genus group name *Adelomyia* Ulmer, 1912 is a junior homonym of the genus *Adelomyia* Bonaparte, 1854. So I propose a new replacement name *Fusuna* nom. nov. for the genus name *Adelomyia* Ulmer, 1912.

**Etymology:** This genus is dedicated to the well known Turkish trichopterologist Prof. Dr. Füsun Sipahiler (Turkey).

Summary of nomenclatural changes:

*Fusuna* **nom. nov.**

pro *Adelomyia* Ulmer, 1912 (non Bonaparte, 1854)

*Fusuna exularis* (Ulmer, 1912) **comb. nov.**

from *Adelomyia exularis* Ulmer, 1912

### Superfamily HYDROPTILOIDEA

#### Family HYDROPTILIDAE

#### Genus *OCHROTRICHIA* Mosely, 1934

#### Subgenus *ANGRISANOIA* **nom. nov.**

*Paratrachia* Angrisano, 1995. Rev. Bras. Entomol. 39 (3): 507. (Insecta: Trichoptera: Hydroptiloidea: Hydroptilidae: Ochrotrichiinae: *Ochrotrichia*). Preoccupied by *Paratrachia* Kelsey, 1969. Bull. U. S. natn. Mus. No. 277: 320. (Insecta: Diptera: Scenopinidae).

**Remarks on nomenclatural change:** Recently, Angrisano (1995) described a caddis fly subgenus *Paratrachia* for the genus *Ochrotrichia* Mosely, 1934 with the type species *Ochrotrichia* (*Paratrachia*) *cebolleti* Angrisano, 1995 by original designation in Trichoptera. It is still used as a valid generic name.

Unfortunately, the generic name was already preoccupied by Kelsey (1969), who had proposed the genus name *Paratrachia* with the type species *Paratrachia lobosa* Kelsey, 1969 by original designation in the fly family Scenopinidae. It is still used as a valid genus name (e.g. Kelsey, 1996). It includes three species as *Paratrachia lobosa* Kelsey, 1969; *Paratrachia spicata* Kelsey, 1975 and *Paratrachia westralica* Paramonov, 1955. The genus is endemic to Australia.

Thus, the genus group name *Paratrachia* Angrisano, 1995 is a junior homonym of the genus name *Paratrachia* Kelsey, 1969. So I propose a new replacement name *Angrisanoia* **nom. nov.** for *Paratrachia* Angrisano, 1995.

**Etymology:** This subgenus is named after the current author of *Paratrachia*, Angrisano, 1995.

Summary of nomenclatural changes:

Genus *Ochrotrichia* Mosely, 1934

Subgenus *Angrisanoia* **nom. nov.**

pro *Paratrachia* Angrisano, 1995 (non Kelsey, 1969)

*Ochrotrichia* (*Angrisanoia*) *cebolleti* Angrisano, 1995 **comb. nov.**

from *Ochrotrichia* (*Paratrachia*) *cebolleti* Angrisano, 1995

## LITERATURE CITED

**Angrisano, E. B.** 1995. Contribución al conocimiento de los Trichoptera del Uruguay II. Familia Hydroptilidae. *Rev. bras. Entomol.* 39 (3): 501-516.

**Bonaparte, C. L.** 1854. Conspectus Trochilorum. *Revue et Magasin de Zoologie* (Second series) 6: 249-257.

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Kelsey, L. P.** 1969. A revision of the Scenopinidae (Diptera) of the world. *Bulletin of the United States National Museum* 277: 1-336.

**Kelsey, L. P.** 1996. Family Scenopinidae. In: Evenhuis, N.L. (ed.), *Catalog of the Diptera of the Australasian and Oceanian Regions*. (online version). Available at: <http://hbs.bishopmuseum.org/aocat/sceno.html>. Last accessed: 01.04.2008.

**Ulmer, G.** 1912. Die Trichopteren des baltischen Bernsteins. *Beitr. Naturk. Preußens, Phys.-ökon. Ges. Königsberg*, 10: 1-380.



**A NEW SUBSPECIES OF *CARABUS*  
(*MORPHOCARABUS*) *VENUSTUS* MORAWITZ, 1862  
(COLEOPTERA, CARABIDAE)  
FROM FURUGELMA ISLAND**

**Dmitry Obydov\***

\* Timiryazev's State Museum of Biology, 123242, Malaya Gruzinskaya str. 15, Moscow, Russia. E-mail : obydozd@mtu-net.ru

**[Obydov, D. 2008. A new subspecies of *Carabus (Morphocarabus) venustus* Morawitz, 1862 (Coleoptera: Carabidae) from Furugelma Island. Munis Entomology & Zoology, 3 (2): 617-620]**

**ABSTRACT:** A new subspecies of *Carabus (Morphocarabus) venustus*: *Carabus (Morphocarabus) venustus furugelmensis* ssp. n. is described from Furugelma Island (South Ussuri). Diagnostic data are given. The collections in which holotypes of taxa described by me earlier was deposited are specified.

**KEY WORDS:** Coleoptera, Carabidae, *Carabus (Morphocarabus) venustus*, new subspecies, South Ussuri, Furugelma Island.

*Carabus (Morphocarabus) venustus* Morawitz, 1862 has been described from Eastern Siberia, Amur Region: Bureinsky Mt. Ridge. The species is distributed in Southern Amur Region, southern Khabarovsk Region, South Ussuri, North Korea and north-eastern China. The beetles occur in the forested area.

Population of *Carabus venustus* from Furugelma Island (South Ussuri) is rather peculiar morphologically, not connected with a continental population and are represented by separate subspecies.

The descriptions of *Carabus (Morphocarabus) venustus furugelmensis* ssp. n. is given below.

**DESCRIPTION**

***Carabus (Morphocarabus) venustus furugelmensis* ssp. n.**  
(Figs 1,2).

Holotype: male with label: "Furugelma Island, June 1968, Nikolaev"

Paratypes: male and 3 females, same data and same locality.

The holotype and paratypes are preserved in the collection of the State Museum of Biology (Moscow, Russia).

Body length in males is 19.0 - 22.2 mm (including mandibles), width 6.7 - 7.5 mm; body length in females is 21.0 - 22.5 mm, width 7.2 - 8.0 mm.

Head not thickened, ratio width of pronotum/width of head 1.94; eyes strongly convex; mandibles relatively broad, strongly incurved; terebral tooth of the right and left mandibles bi-dentate, strongly prominent; retinaculum of the left mandible small, retinaculum of the right mandible bigger, more prominent; surface of mandibles smooth. Frontal furrows shallow, inside with coarse wrinkles. Frons, vertex and neck with coarse wrinkles and punctures. Labrum wider than clypeus, moderately notched, without lateral setae. Antenna long, protruding beyond the base of pronotum by 4-5 apical segments; palpi slightly dilated; penultimate segment of the maxillary palpi longer than the last segment; penultimate segment of the labial palpi with 2 setae. Mentum tooth triangular, small, much shorter than lateral lobes; submentum with 2 setiferous pores.

Prothorax transverse, cordiform, broadest at about middle; ratio width/length 1.29. Pronotum with dense coarse punctures and wrinkles. Median longitudinal line distinct; basal foveae very small, inside coarsely-wrinkled. Sides of pronotum narrowly margined; lobes of hind angles evenly rounded, relatively short. Lateral margin with 2 setiferous pores: one pore at about middle and one pore near hind angle.

Elytrae oblong-oval, slightly convex, widest at about middle; shoulders slightly prominent; sides of elytrae narrowly margined. Ratio length/width 1.71; ratio width of elytrae/width of pronotum 1.48. Elytral sculpture pentaploid, homodynamous; all elytral interspaces slightly convex, about equally developed. Primary foveoles big, not deep; striae coarsely punctured.

Metepisternum smooth, not longer than its width. Abdominal sternites smooth; sternal sulci absent.

Legs long; fore male tarsi with four dilated segments bearing hairy pads.

Shape of aedeagus and endophallic structure in general is characteristic for the species.

Coloration black; elytrae with weak bronze lustre.

**Differential diagnosis.** The new subspecies differs from *C. venustus venustus* by the following features: sculpture of head and pronotum more rough; prothorax less cordiform; elytrae narrower, less convex; elytral sculpture homodynamous, all elytral interspaces slightly convex, about equally developed (in *C. venustus venustus* elytral sculpture more rough, tertiaries elytral interspaces usually less convex). Coloration of elytrae of the new subspecies black, dim; legs black (in *C. venustus venustus* elytrae usually bright bronze, legs often reddish-brown).

**Distribution.** South Ussuri, Furugelma Island.

**Habitat.** Probably the beetles were collected in the forested area.

## ACKNOWLEDGEMENTS

I wish to express my hearty gratitude to Dr. Mikhail L. Danilevsky who kindly loaned material for study.

**Remarks.** The holotypes of taxa described by me earlier are deposited in the following collections: *Carabus (Morphocarabus) regalis eltoni* ssp. n. and *Carabus (Carabus) arvensis klitini* ssp. n. are deposited in the collection of Zoological Museum of Moscow Lomonosov State University (Moscow, Russia); the holotypes of *Carabus (Carabulus) obovatus taizhensis* ssp. n., *Carabus (Ainocarabus) kolbei urupiensis* ssp. n., *Carabus (Morphocarabus) hummeli biamensis* ssp. n., *Carabus (Morphocarabus) hummeli vladobydovi* ssp. n., *Carabus (Diocarabus) bargusinensis* sp. n., *Carabus (Carabus) billbergi siolinicus* ssp. n. and *Carabus (Carabus) arvensis kargiensis* ssp. n. are deposited in the collection of the State Museum of Biology (Moscow, Russia).

## LITERATURE CITED

**Morawitz, A.** 1862. Vorläufige Diagnosen neuer Coleopteren aus Südost-Sibirien. Mélang. Biol., Bull. Acad. Sci. St. Pétersbourg., 4: 180-228.

**Obydov, D.** 2006. A new subspecies of *Carabus (Carabulus) obovatus* Fischer von Waldheim, 1828 from Kuznetzk Alatau (Coleoptera, Carabidae). Lambillionea, CVI, 2: 269-272.

**Obydov, D.** 2006. A new subspecies of *Carabus (Morphocarabus) regalis* Fischer von Waldheim, 1822 from European Russia (Coleoptera, Carabidae). Lambillionea, CVI, 4: 652-654.

**Obydov, D.** 2007. A new subspecies of *Carabus (Carabus) arvensis* Herbst, 1784 from South Kuril Islands (Coleoptera, Carabidae). Lambillionea, CVII, 2: 282-284.

**Obydov, D.** 2007. Review of the Subgenus *Ainocarabus* Mandl, 1973 of Russian Far East (Coleoptera: Carabidae) Acta Entomologica Slovenica, Vol.15, št.2: 171-184.

**Obydov, D.** 2007. Two new subspecies of *Carabus (Morphocarabus) hummeli* Fischer von Waldheim, 1823 from Ussuri Land (Coleoptera, Carabidae). Lambillionea, CVII, 4: 623-626.

**Obydov, D.** 2008. New taxa of the genus *Carabus* (Coleoptera, Carabidae) from Siberia and North China. Munis Entomology & Zoology, Vol.3, No.1: 153-158.



Figures 1. *Carabus (Morphocarabus) venustus furugelmensis* ssp. n. (Holotype) 2. *Carabus (Morphocarabus) venustus furugelmensis* ssp. n. (Paratype).

**THE GENUS *TETROPS* STEPHENS, 1829  
WITH A NEW SUBSPECIES, *TETROPS PRAEUSTUS*  
*ANATOLICUS* SSP. N. FROM TURKEY  
(COLEOPTERA: CERAMBYCIDAE: LAMIINAE)**

**Hüseyin Özdikmen\* and Semra Turgut\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / Türkiye. E-mails: ozdikmen@gazi.edu.tr and semraturgut@myynet.com

**[Özdikmen, H. & Turgut, S. 2008. The genus *Tetrops* Stephens, 1829 with a new subspecies, *Tetrops praeustus anatolicus* ssp. n. from Turkey (Coleoptera: Cerambycidae: Lamiinae). Munis Entomology & Zoology 3 (2): 621-635]**

**ABSTRACT:** All taxa of the genus *Tetrops* in the whole world are evaluated. A new subspecies, *Tetrops praeustus anatolicus* ssp. n. is described from S Turkey. Distinguishing characters, photo of adult are also given in the text. It is compared with related taxa. On the other side, a replacement name, *T. hauseri kostini* nom. nov. proposed for the homonym species group name *T. hauseri nigra* Kostin, 1973 or *T. hauseri niger* Kostin, 1973 (not *T. nigra* Kraatz, 1859). The genus is also discussed in detail.

**KEY WORDS:** new subspecies, replacement name, *Tetrops*, Lamiinae, Cerambycidae.

**Subfamily LAMIINAE Latreille, 1825**

**Tribe TETRAOPINI Thomson, 1860**

= Tetropini Thomson, 1860

= Astathini Thomson, 1864

The tribe includes currently 14 genera as *Astathes* Newman, 1842; *Bacchisa* Pascoe, 1866; *Chreomisis* Breuning, 1956; *Eustathes* Newman, 1842; *Hecphora* Thomson, 1857; *Hispasthathes* Breuning, 1956; *Mecasoma* Chemsak & Linsley, 1974; *Ochrocesis* Pascoe, 1867; *Parastathes* Breuning, 1956; *Paratragon* Teocchi, 2002; *Phaea* Newman, 1840; *Tetraopes* Dalman in Schoenherr, 1817; *Tetrops* Kirby, 1826 and *Tropimetopa* J. Thomson, 1864. This genus was placed in Tetropini by some authors. Since Tetropini were separated by Planet (1924) and supported by Namkhaidorzh (1976) and Danilevsky & Miroshnikov (1985) according to Danilevsky (2007b).

**Genus *TETROPS* Stephens, 1829**

= *Polyopsia* Mulsant, 1839

= *Oberopa* Haldeman, 1873

**Type species: *Leptura praeusta* Linnaeus, 1758**

The generic name *Tetraopes* was introduced by Dalman in Schönherr, 1817 without a type species and Thomson (1864) subsequently designated *Lamia tornator* Fabricius, 1775 as a type species of *Tetraopes* Dalman in Schönherr, 1817. Later, the genus name *Tetrops* was used by Kirby, 1826

with the type species *Lamia tornator* Fabricius, 1775 that is a junior synonym of *Cerambyx tetrophthalmus* Förster, 1771. At present, *Tetraopes* Dalman in Schönherr, 1817 is still used as a valid generic name in Cerambycidae (Lamiinae: Tetraopini). Vives (2000) also stated that “Kirby (1826, In: Kirby and Spence, *Introd. Entomol.*, 3: 498) uses a genre *Tetrops* in combination with the specific name *tornator* and in the following volume of the same work (1826, In: Kirby and Spence, *Introd. Entomol.*, 4: 619) introduces the genre *Tetraopes* in replacement of his previous *Tetrops*. It is a question of a later use of the genre of Schönherr because his *Tetrops* is a mistake or a deliberate proposition of a new name”. So *Tetrops* Kirby, 1826 is a junior objective synonym of *Tetraopes* Dalman in Schönherr, 1817. On the other hand, the genus name *Tetrops* was used by Stephens, 1829 and also Stephens, 1831 with the type species *Leptura praeusta* Linnaeus, 1758. Vives & Zarazaga in Vives (2000) used *Tetrops* Stephens, 1829 as valid genus name and mentioned in their appendix that the authors will request the commission for the suppression of *Tetrops* Kirby, 1826. Apparently, *Tetrops* Stephens, 1829 has at least two synonyms as *Polyopsia* Mulsant, 1839 and *Oberopa* Haldeman, 1873. However, the name *Tetrops* Stephens, 1829 must be conserved as a valid name. Also according to Vives (2000), the name *Tetrops* is masculine in gender not feminine.

This chiefly Palaearctic genus is represented by 9 species in the whole world. In Turkey, it is represented by only 2 species as *T. praeustus* (Linnaeus, 1758) and *T. warncke*i Holzschuh, 1977. All taxa of this genus are presented as follows:

***eleagni*** Plavilstshikov, 1954

Other names. *plavilstshikovi* Kostin, 1973

According to Danilevsky (2007b), *T. plavilstshikovi* Kostin, 1973 is a synonym of *T. eleagni* Plavilstshikov, 1954. He stated that “the statement of Kostin (1973), that in Ily valley two *Tetrops* species: “*T. plavilstshikovi*” (= *eleagni*) and *T. formosa songarica* live together is wrong. According to his materials in Zoological Museum (S.-Petersburg), he identified less pubescent *T. elaeagni* from Ily valley as *T. formosa songarica*. *T. elaeagni* was recorded for Russia by G.V. Lindemann (1971: Pallasovka distr. Vishnevka and Elton). I’ve got two specimens from Dzhanlybek, which is situated exactly on Russia–Kazakhstan border. The species is also known from Amu-Darja River Valley in Turkmenia (see Kostin, 1973: 207)”.

DISTRIBUTION: S European Russia, Kazakhstan, Uzbekistan, Turkmenia

CHOROTYPE: Central Asiatic

**formosus** Baeckmann, 1903  
ssp. **formosus** Baeckmann, 1903  
ssp. **bivittulatus** Jankowski, 1934  
ssp. **songaricus** Kostin, 1973

Other names. *bivittulata* Plavilstshikov, 1954

This species has at least 3 subspecies in the world. The nominative subspecies occurs in Central Asia (Kirgizia) and China. The other subspecies, *T. formosus bivittulatus* Jankowski, 1934 and *T. formosus songaricus* Kostin, 1973 occur only in Kazakhstan. Danilevsky (2007b) stated that “*Tetrops formosa* was described from Issyk-Kul (Kirgizia). It has red elytra and totally red antennae and pronotum. I treat as nominative my two specimens from near Merke (Kazakhstan at the border with Kirgizia). *Tetrops formosa bivittulata* Jankowski, 1934, described from Zailiysky Alatau (Alma-Ata) as a variation differs from the nominative subspecies by dark general colour and specially by usual presence of elongated elytral black spots. It was regarded as a subspecies distributed in Zailiysky Alatau by Kostin (1973: 206) under the name “*T. formosa bivittulata* Plav.” Wrong attribution of the name to Plavilstshikov was repeated by Lobanov et al. (1981: 790-791) in the wrong synonymization: “*Tetrops formosa formosa* Baeckm., 1903 = *T. formosa bivittulata* Plav., 1954 (sensu Kostin, 1973)”. *T. f. bivittulata* has usually black elongated spot on each elytron and black two basal antennal joints, but sometimes elytra and antennae are totally red. *T. f. songarica* (Dzhungarsky Alatau near Lepsinsk – Chernaia Rechka) is similarly red as the nominative subspecies, but pronotum is always partly black, sometimes elytra are with dark spots. O. Mehl reared a series of *Tetrops formosa* ssp. n. from Malus twigs collected (1991) near Arslan-Bob in Fergansky Ridge (Kirgizia). Specimens are darker than *T. f. formosa*, but in general lighter than *T. f. bivittulata*, though black elytral stripes are often present, as well as only two basal antennal joints are black. Another new subspecies of *T. formosa* must be distributed in Kirgizia near At-Bashi, according to my single specimen, which is coloured similar to *T. f. songarica*, but pronotum with very dense recumbent pubescens among erect setae. The species attribution of *T. hauseri nigra* (unknown to me) from Tekes River valley near Narynkol in Kazakhstan is doubtful. It can be a form of *T. formosa*. *T. f. songarica* is distributed only in Dzhungarsky Alatau and absent in Ily River valley”.

DISTRIBUTION: Kirgizia, Kazakhstan, China  
CHOROTYPE: Central Asiatic

**gilvipes** Faldermann, 1837

Other names. *nigra* Kraatz, 1859; *muehlfeldi* Mulsant, 1863

The European *Tetrops* Stephens, 1829 was revised by Holzschuh (1981). According to him, *T. gilvipes* must be regarded as a subspecies of *T. praeustus*, from which it differs only by the punctuation, dark coloration of elytra and entirely light legs. Sama (2002) gave *T. nigra* Kraatz, 1859 as a synonym of *T. praeustus*. According to Danilevsky (2007a), we include west Europe in the area of *Tetrops gilvipes* following P. Berger (1985), though the distribution of this species in Europe rests unclear. C. Pesarini and A. Sabbadini (1994) regard that *Tetrops gilvipes* (described from Transcaucasie) absent in West Europe, and black *Tetrops* with pale legs from West Europe can be a separate species *T. nigra* or a dark form of *T. praeustus*. Danilevsky (2007b) also stated that "*Tetrops praeustus* and *T. gilvipes* can be definitely distinguished only with larvae (Danilevsky, Miroshnikov, 1985). A taxon with "gilvipes-like larvae" is very common in West Europe, but its adults are very similar to *T. praeustus* (Svacha, *Die Larven der Kafer Mitteleuropas*, Band 6)! So possibly a yellow form of *T. gilvipes* was described from Europe as *T. praeustus*. In that case black beetles from Caucasus are *T. praeustus* ssp. *gilvipes*. And a taxon with "praeustus-like" larvae (sensu Danilevsky and Miroshnikov, 1985) needs another name. Any way the stable black colour of Caucasian (and Turkmenian) *T. gilvipes* makes impossible its synonymisation with *T. praeustus*, proposed by Sama (1988) and accepted by Bense (1995). But if *T. praeustus* has "praeustus-like larvae", then European taxon with "gilvipes-like" larvae (usually yellow, but sometimes black) can be named *T. gilvipes* ssp. *nigra* Kraatz, 1859". So we think that possibly there are two different species in Europe. Since, they have two separate larvae as "praeustus-like larvae" and "gilvipes-like larvae". These are *T. praeustus* and *T. gilvipes* not *T. nigra*. Because both *gilvipes* and *T. nigra* were described from Caucasus and Western Europe based on the specimens with black colored elytra. In this case, *T. nigra* is merely the named populations of *T. gilvipes* in mainly Western Europe. Anyway, Sama (2002) also mentioned that "*specimens with brown or black elytra, at various times referred to T. nigra, T. gilvipes or even T. starkii, have often been reared from the same locality and the same trees (probably Padus)*". However, we think that Sama believed wrongly that *T. nigra* in Europe is a transitional form between *T. praeustus* and *T. gilvipes*. Moreover, the observation in copula of black and light specimens of Sturani (1981) as mentioned by Sama (2002), is not more important than finding two different larvae in Europe. The observation of Sturani (1981) does not prove that these are the same taxon and it can be explained by various ways. For example, it may be an explanation for this case, density of the populations of these taxa in observation areas or on plants etc. Even as we known an unusual event that the copulation can occur between two different species among animal taxa. Furthermore, according to Starzyk & Lessaer (1978), the male genitalia of *T. gilvipes* and *T. praeustus* are clearly different from each other (fig. 3). Finally, for



us, *T. gilvipes* and *T. praeustus* are separate species and *T. nigra* is a synonym of *T. gilvipes* not *T. praeustus* now.

DISTRIBUTION: Europe (?France, ?Italy, ?Romania, ?Hungary, ?Czechia, ?Slovakia, Crimea, S European Russia), Caucasus (Georgia, Armenia, Azerbaijan), Central Asia (Turkmenia), Iran

CHOROTYPE: Turano-European

**hauseri** Reitter, 1897

spp. **hauseri** Reitter, 1897

spp. **kostini** nom. nov.

Other names. *bicoloricornis* Plavilstshikov, 1954

This species has 2 subspecies in the world. The nominative subspecies occurs in Kirgizia and Uzbekistan. The other subspecies, *T. hauseri kostini* nom. nov. occurs in Kazakhstan and China. Danilevsky (2007b) stated that “*T. hauseri hauseri* up to now seems to be known only from Sary-Chelek. According to a series of *Tetrops hauseri hauseri*, collected by me in Sary-Chelek (2004), it can be with only two basal antennal joints black (that is why *Tetrops formosa* m. *bicoloricornis* Plav., 1959 was described from Saery-Chelek) and with rather red elytra (with only small black elongated spots). So the colour patterns of *T. hauseri* and *T. formosa* can be same. Both species can be easily distinguished by the character of pronotal punctuation, which is very fine in *T. hauseri*. The species attribution of *T. hauseri nigra* (unknown to me) from Tekes River valley near Narynkol in Kazakhstan is doubtful. It can be a form of *T. formosa*”.

In addition to this, *T. hauseri nigra* Kostin, 1973 or *T. hauseri niger* Kostin, 1973 is a homonym name of *T. nigra* Kraatz, 1859. Also Danilevsky (2007b) mentioned this status. It must be replaced under the articles 57-60 of the zoological code (ICZN, 1999). So we propose the replacement name *kostini* nom. nov. for the homonym name *T. hauseri nigra* Kostin, 1973. The replacement name is dedicated to I. A. Kostin who is current author name of the taxon. It is masculine in sex.

DISTRIBUTION: Kirgizia, Uzbekistan, Kazakhstan, China

CHOROTYPE: Central Asiatic

**mongolicus** Murzin, 1977

Danilevsky (2007c) stated that “one male of *Tetrops mongolicus* from Russia is preserved in the collection of Moscow Pedagogical State University: Buriatija, Selenga river valley, 5km NE Dzhida, 4-9.6.2001, A. Anishchenko leg”.

DISTRIBUTION: Mongolia, Russia (East Siberia)

CHOROTYPE: Siberian

***praeustus*** Linnaeus, 1758

ssp. ***praeustus*** Linnaeus, 1758

ssp. ***algiricus*** Chobaut, 1893

ssp. ***anatolicus*** ssp. n.

Other names. *iocustus* Voet, 1778; *pilosa* Geoffroy, 1785; *ustulata* Hagenbach, 1822; *praecesta* Dufour, 1843; *inapicalis* Pic, 1891; *angorensis* Pic, 1918.

This species is represented by three subspecies (including new subspecies) in the world. The subspecies, *T. praeustus algiricus* Chaubaut, 1893 occurs only in North Africa (Algeria). New subspecies, *T. praeustus anatolicus* ssp. n. occurs only in South Turkey.

In Turkey, it is represented by two subspecies as *T. praeustus praeustus* (Linnaeus, 1758) and *T. praeustus anatolicus* ssp. n.

Records from Turkey:

For nominative subspecies: Sakarya prov.: Sapanca, Niğde prov.: Çamardı, Antalya prov.: Toros Mountains (Bodemeyer, 1900); Asia Minor: Ankara prov. as *T. praeustus* v. *angorensis* (Winkler, 1924-1932); İstanbul prov.: Polonez village (Demelt, 1963); Çorum prov.: İskilip as *Tetrops praeustus angorensis* (Breuning et Villiers, 1967); Ankara prov.: Kızılcahamam (Gfeller, 1972); Sinop prov.: Dranaz Mt. (Sama, 1982); Turkey (Danilevsky & Miroshnikov, 1985; Lodos, 1998; Sama, 2002); Çorum prov.: İskilip (Öymen, 1987); Bilecik prov. (Adlbauer, 1988); European Turkey (Althoff & Danilevsky, 1997); Samsun prov., İçel prov. (Özdikmen et al., 2005); Ankara prov.: between Sereflikoçhisar-Evren (Özdikmen, 2006).

For the new subspecies, *T. praeustus anatolicus*: Antalya prov.: Alanya-Taşkent and between Karapınar and Sarımut, Konya prov.: near Beyreli, Hadim, Bozkır, Sorkun, Beyşehir-Akseki road and Dere, Osmaniye prov.: Zorkun.

However, the old İçel record of Özdikmen et al., 2005 belongs to the new subspecies, *T. praeustus anatolicus* and probably the old Antalya record of Bodemeyer (1900) should be the new subspecies.

DISTRIBUTION: Europe (Portugal, Spain, France, Corsica, Italy, Sicily, Sardinia, Malta, Albania, Slovenia, Croatia, Bosnia-Herzegovina, Serbia, Macedonia, Greece, Crete, Bulgaria, European Turkey, Romania, Hungary, Austria, Switzerland, Belgium, Netherlands, Denmark,

Germany, Luxembourg, Great Britain, Ireland, Czechia, Slovakia, Norway, Poland, Sweden, Finland, Estonia, Latvia, Lithuania, Belorussia, Ukraine, Crimea, Moldavia, European Russia, European Kazakhstan), Siberia, Mongolia, Caucasus, Transcaucasia, Turkey, Syria, Iran, North Africa (Algeria), North America (Canada)

CHOROTYPE: Palearctic

***Tetrops praeustus anatolicus* ssp. n.**

**Material examined:** Holotype male: Konya province: Hadim, Küçükklü village env., 13.05.2007, 1300 m, N 36 45 E 32 27 and Paratypes: Antalya province: Alanya-Taşkent, exit of Karapınar village, 16.05.2006, 1100 m, N 36 36 E 32 24, 1 specimen; Konya province: near Beyreli, 16.05.2006, 1096 m, N 36 46 E 32 26, 8 specimens; Antalya province: between Karapınar and Sarımut, 13.05.2007, 1100 m, N 36 36 E 32 24, 1 specimen; Konya province: Hadim, Küçükklü village env., 13.05.2007, 1300 m, N 36 45 E 32 27, 47 specimens; Konya province: Bozkır, Üçpınar village, 15.05.2007, 1471 m, N 37 08 E 32 15, 10 specimens; Konya province: Sorkun, 15.05.2007, 1281 m, N 37 09 E 32 08, 14 specimens; Konya province: Beyşehir-Akseki road, S of Beyşehir, 11.06.2007, 1410 m, N 37 28 E 31 37, 1 specimen; Konya province: Dere, 13.06.2007, 1252 m, N 37 10 E 32 09, 4 specimens; Osmaniye province: Zorkun, Fenk plateau, 04.06.2007, 1049 m, N 36 59 E 36 20, 6 specimens.

**Differential diagnosis:** Mainly, the new subspecies *T. praeustus anatolicus* is a color form of *T. praeustus praeustus* like *T. praeustus algiricus*. This new taxon resembles *T. praeustus praeustus* and *T. praeustus algiricus* in terms of colour of elytra and colour of legs respectively.

The new subspecies, *T. praeustus anatolicus* can be easily distinguished from *Tetrops praeustus praeustus* (Linnaeus, 1758), which is widely distributed in Palaearctic region by following feature: Fore legs are not light entirely. They are black or dark at least in basal half (sometimes nearly complete) of femora (fig. 1b). Elytral punctuation of the new subspecies is more or less stronger than the nominative subspecies (fig. 2b).

Also the new subspecies, *T. praeustus anatolicus* can be easily distinguished from *Tetrops praeustus algiricus* Chobaut, 1893, which is only distributed in North Africa (Algeria) by following feature: Elytra have a dark spot apically (fig. 1a).

The new subspecies probably distributes only in Southern Anatolian region (especially from Western Taurus Mountains to Amanos Mountains) of Turkey.

Sama (2002) stated that "*the true T. praeustus has fore legs entirely light and middle and hind legs entirely dark, sometimes except apices of middle femora. Specimens from southern Turkey (Çakılı pass, North of Antalya, Çamlıyayla and Yayladağı, east of Hatay) differ from those of Europe by having distinctly darker, nearly black middle and hind legs and a stronger punctuation of pronotum and elytra*". If the Sama's specimens also belong to this new taxon, so the new subspecies possibly occurs only from Antalya province to Hatay province in Mediterranean region of Turkey.

Even the old İçel record of Özdikmen et al., 2005 is belonging to the new subspecies, *T. praeustus anatolicus* and probably the old Antalya record of Bodemeyer (1900) must belong to the new subspecies.

On the other side, the variety *T. praeustus* var. *angorensis* was described by Pic, 1918 based on the specimens with totally black legs and black elytral apex from Turkey. The variety name *angorensis* was very likely dedicated to Ankara province by Pic. M. L. Danilevsky (personal communication in 30.12.2007) mentioned that "in Europe specimens with totally black legs are not often, but they exist. I have several specimens from Krasnodar region of Russia, where they are mixed with normal". In this case, Pic's variety *angorensis* is not a subspecies absolutely. As seen above, we examined many specimens of the new subspecies. And we see that above mentioned characters of the new subspecies are stable and invariable. So we decided that the examined specimens are belonging to a new taxon not var. *angorensis* Pic, 1918. The var. *angorensis* is a form of *T. praeustus praeustus*.

Variations: The new subspecies is characterized by black or dark spot on femora of fore legs chiefly. This variable spot always exist in all examined specimens. The femoral dark spots of the specimens from Amanos Mountains are smaller than the specimens from Western Taurus Mountains. In addition to this, while middle and hind tibiae and tarsi are entirely black in the specimens from Western Taurus Mountains, are not completely in the specimens from Amanos Mountains. These last specimens have distinctly dark, nearly black middle and hind legs, as it was mentioned by Sama (2002). For this reason, Sama's specimens mentioned in 2002 from S Turkey are also belonging to the new subspecies very likely.

Etymology: The new name "*anatolicus*" derived from the word "Anadolu" (meaning Anatolia in English).

### A short key for related taxa

1. Elytra dark colored mostly and legs light colored entirely.....*gilvipes* Faldermann, 1837 (= *nigra* Kraatz, 1859)  
- Elytra light colored at least a great part and but legs not light colored entirely .....2
2. Fore legs light colored entirely.....*praeustus praeustus* Linnaeus, 1758  
- Fore legs not light colored entirely.....3
3. Elytra with an apical dark spot.....*praeustus anatolicus* ssp. n.  
- Elytra without an apical dark spot.....*praeustus algiricus* Chobaut, 1893

#### **rosarum** Tsherepanov, 1975

Danilevsky (2007d) stated that “*Tetrops rosarum* was recorded for Mongolia by Tsherepanov (1985) and O. Krivolutzkaia (in: Tsherepanov, 1996) without special comments. Most probably the records were based on *Tetrops mongolicus* Murzin, 1977”.

DISTRIBUTION: Russia (Far East Russia), ?Mongolia

CHOROTYPE: Siberian

#### **starkii** Chevrolat, 1859

Other names: *pseudopraeusta* Müller, 1927; *vicina* Pic, 1928; ? *mesmini* Pic, 1928.

Holzschuh (1981) mentioned that the variety *vicina* Pic, 1928 belongs to *T. starkii* and the variety *mesmini* Pic, 1928 should be *T. starkii*.

DISTRIBUTION: Europe (Spain, France, Italy, Slovenia, Croatia & Bosnia Herzegovina, Serbia, Moldova, Greece, Bulgaria, Romania, Hungary, Austria, Germany, Great Britain, Czechia, Slovakia, Poland, Netherland, Denmark, Norway, Sweden, Latvia, Lithuania, Belorussiya, Ukraine, ?Crimea, European Russia), Caucasus (Georgia)

CHOROTYPE: European

#### **warnckeï** Holzschuh, 1977

This species is endemic to Turkey.

Records from Turkey: Antalya prov.: Taurus, Akseki as the type locality (Holzschuh, 1977).

DISTRIBUTION: S Turkey

CHOROTYPE: S Anatolian

\* This study was supported by a TUBITAK Project (105T329).

## LITERATURE CITED

**Adlbauer, K.** 1988. Neues zur Taxonomie und Faunistik der Bockkäferfauna der Türkei (Coleoptera, Cerambycidae). *Entomofauna*, 9 (12): 257-297.

**Althoff, J. & Danilevsky, M. L.** 1997. A Check-List of Longicorn Beetles (Coleoptera, Cerambycoidea) of Europe. Slovensko Entomološko Društvo Štefana Michielija. Ljubljana, 64 pp.

**Bodemeyer, H. E. V.** 1900. Quer durch Klein Asien, in den Bulghar Daghs; Eine Naturwissenschaftliche Studien-Reise. *Coleopterologisches*, 196 pp.

**Breuning, S. & Villiers, A.** 1967. *Cerambycides* de Turquie (2. note). *L'Entomologiste*, 23 (3): 59-63.

**Danilevsky, M. L.** 2007a. A check-list of Longicorn Beetles (Coleoptera, Cerambycoidea) of Europe. Last updated 01.11.2007. Available from: <http://www.cerambycidae.narod.ru/europe.htm>.

**Danilevsky, M. L.** 2007b. Systematic list of Longicorn Beetles (Cerambycoidea) of the territory of the former USSR. Last updated 20.12.2007. Available from: <http://www.cerambycidae.narod.ru/ussr.htm>

**Danilevsky, M. L.** 2007c. Systematic list of Mongolian Cerambycoidea. Last updated 01.11.2007. Available from: <http://www.cerambycidae.narod.ru/mongolia.htm>

**Danilevsky, M. L.** 2007d. A check list of the longicorn beetles (Cerambycidae) of Russia, Ukraine, Moldova, Transcaucasia, Central Asia, Kazakhstan and Mongolia. Last updated 20.12.2007. Available from: <http://www.cerambycidae.narod.ru/russia.htm>

**Danilevsky, M. L. & Miroshnikov A. I.** 1985. Timber-Beetles of Caucasus (Coleoptera, Cerambycidae). *The Key*. Krasnodar, 419 pp.

**Demelt, C. V.** 1963. Beitrag zur Kenntnis der Cerambycidenfauna Kleinasien und 13. Beitrag zur Biologie palaearkt. Cerambyciden, sowie Beschreibung einer neuen Oberea-Art. *Entomologische Blätter*, 59 (3) : 132-151.

**Gfeller, W.** 1972. Cerambycidae (Coleoptera) der Türkei-Persienexpedition 1970 der Herren Dr. H. c. W. Wittmer und U. v. Botmer. *Mitteilungen der Entomologischen Gesellschaft Basel*, 22 (1): 1-8.

**Holzschuh, C.** 1977. Neue Bockkäufer aus Anatolien und Iran (Coleoptera, Cerambycidae). *Koleopterologische Rundschau*, 53: 127-136.

**Holzschuh, C.** 1981. Beitrag zur Kenntnis der europäischen Tetraps-Arten (Cerambycidae, Coleoptera). *Koleopterologische Rundschau*, 55: 77-89.

**International Commission of Zoological Nomenclature.** 1999. *International Code of Zoological Nomenclature*. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Kostin, I. A.** 1973. The Dendrophagus Beetles of Kazakhstan (Buprestidae, Cerambycidae, Ipidae). Alma-Ata: 288pp.

**Lodos, N.** 1998. *Entomology of Turkey VI (General, Applied and Faunistic)*. Ege Ü. Ziraat Fak. Yayınları No: 529, E. Ü. Faculty of Agriculture Press, İzmir, 300 pp.

- Öymen, T.** 1987. The Forest Cerambycidae of Turkey. İ. Ü. Forest Faculty, İstanbul, 146 pp.
- Özdikmen, H.** 2006. Contribution to the knowledge of Turkish longicorn beetles fauna (Coleoptera: Cerambycidae). *Munis Entomology & Zoology*, 1 (1): 71-90.
- Özdikmen, H., Özdemir, Y. & Turgut, S.** 2005. Longhorned Beetles Collection of the Nazife Tuatay Plant Protection Museum, Ankara, Turkey (Coleoptera, Cerambycidae). *J. Ent. Res. Soc.*, 7 (2): 1-33.
- Sama, G.** 1982. Contributo allo studio dei coleotteri Cerambycidae di Grecia e Asia Minore. *Fragmenta Entomologica*, Roma, 16 (2): 205-227.
- Sama, G.** 2002. Atlas of the Cerambycidae of Europe and the Mediterranean Area. Vol.1. Nakladatelstvi Kabourek. Zlin: 173 pp.
- Starzyk, J. R. & Lessaer, M.** 1978. Studies on the distribution, morphology and biology of *Tetrops starki* Chev. (Col. Cerambycidae). *Z. angew. Ent.* 86: 35-46.
- Vives, E.** 2000. Coleoptera, Cerambycidae. Fauna Iberica, Vol. 12. Museo Nacional de Ciencias naturales. CSIC. Madrid: 715pp.
- Winkler, A.** 1924-1932. Catalogus Coleopterorum regionis palaearticae. Verlag von Albert Winkler, 1135-1226.

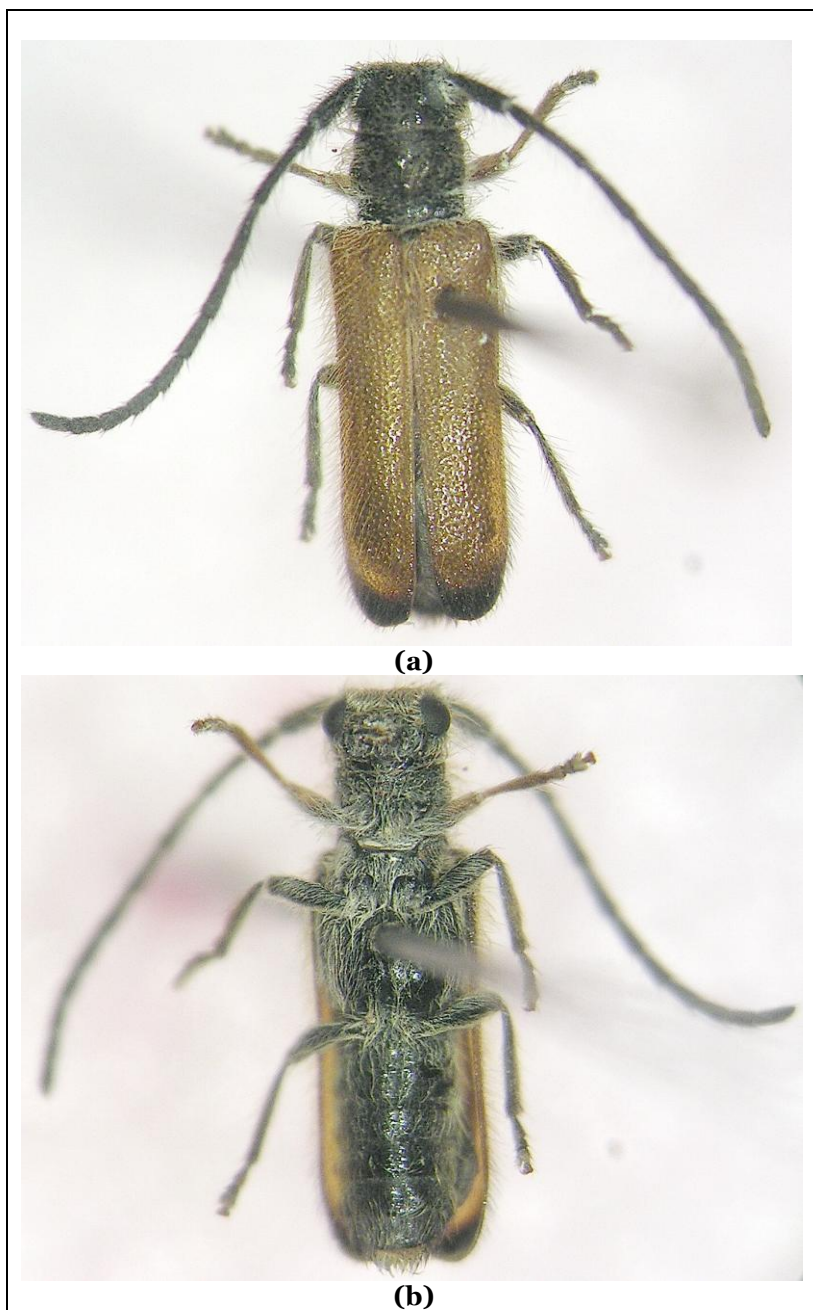


Figure 1. (a) Dorsal view and (b) Ventral view of holotype of *T. praeustus anatolicus* ssp. n.



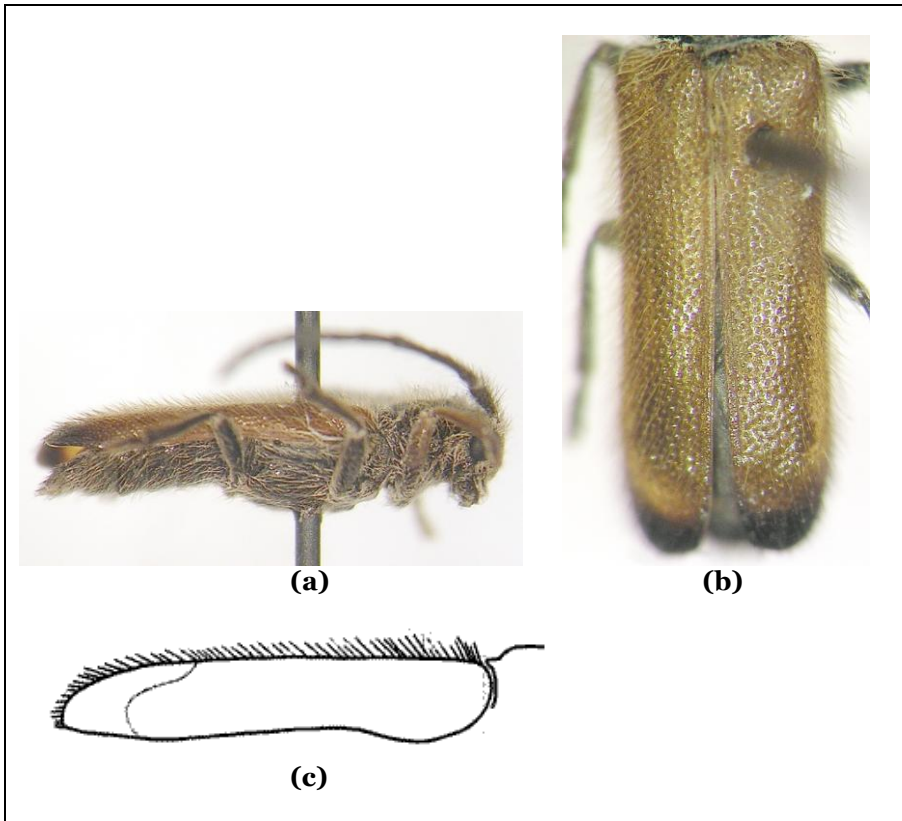


Figure 2. (a) Lateral view and (b) Elytral punctuation and pubescence of holotype of *T. praeustus anatolicus* ssp. n. (c) Elytral pubescence of *T. praeustus* (from Starzyk & Lessaer, 1978)

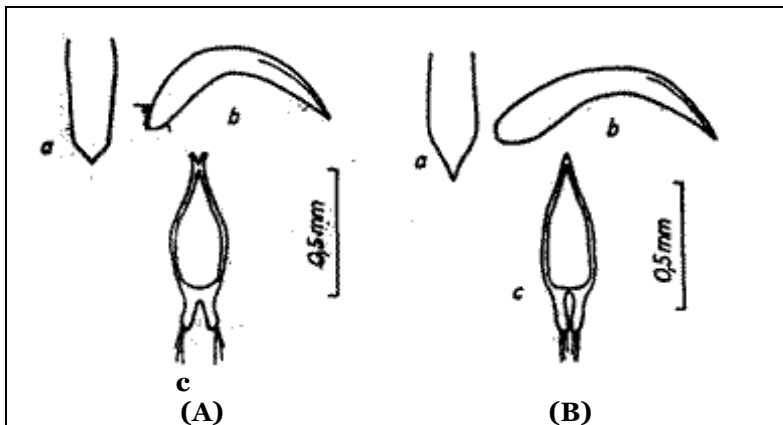
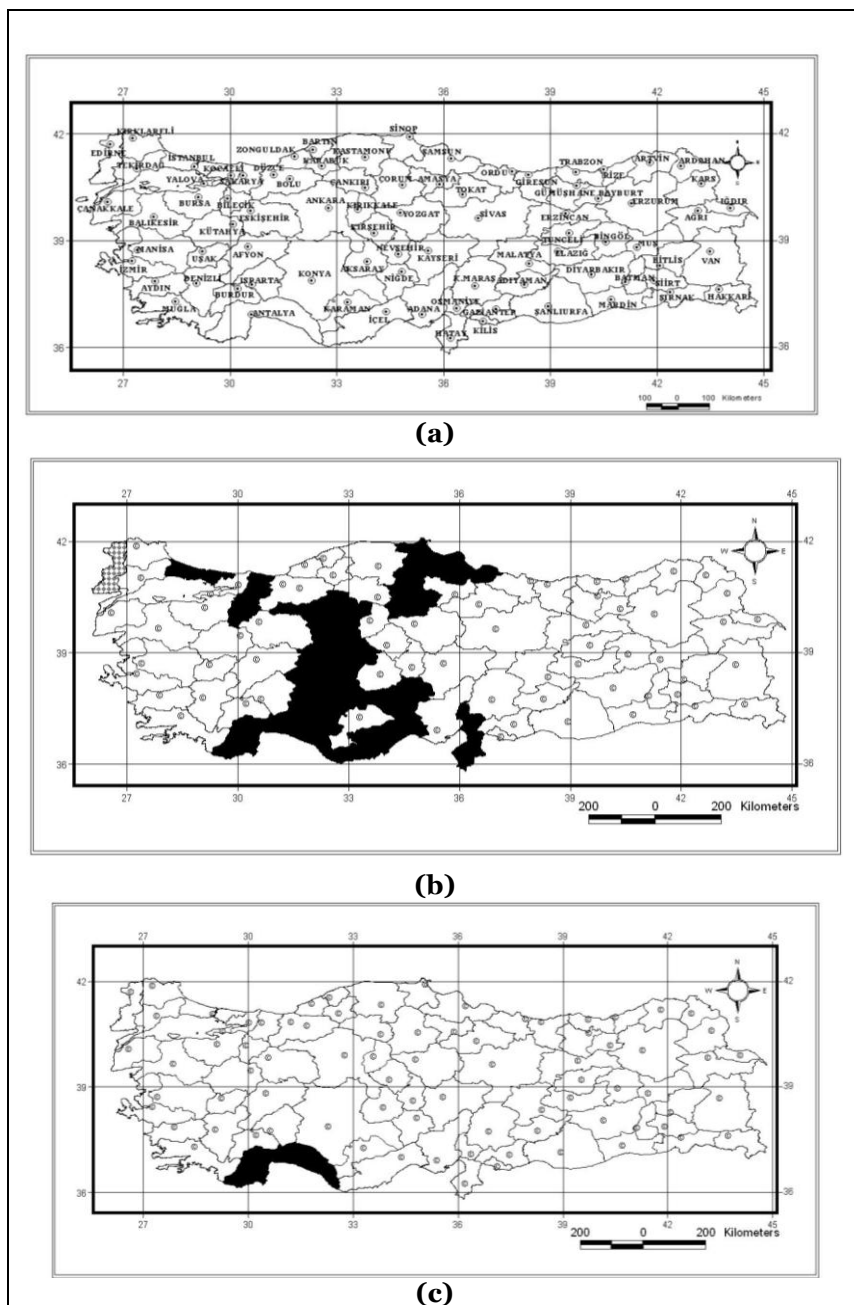


Figure 3. a: aedeagus (top view), b: aedeagus (side view), c: paramerae (top view), Paramerae (top view) (A) *T. gilvipes* (B) *T. praeustus* (from Starzyk & Lessaer, 1978)



Map 1. (a) The provinces of Turkey (b) Distributional patterns of *T. praeustus* (Linnaeus, 1758) in Turkey (c) Distributional patterns of *T. warnckeii* Holzschuh, 1977 in Turkey.



Map 2. Objective distributional patterns (●) in S Turkey of *T. praeustus anatolicus* ssp. n. (the map from Google Earth).

## A CONTRIBUTION TO NEW RECORDS OF IRANIAN BUPRESTIDAE (COLEOPTERA)

**Hassan Ghahari<sup>\*</sup>, Charles L. Bellamy<sup>\*\*</sup>,  
Hamid Sakenin<sup>\*\*\*</sup> and Roger Pettersson<sup>\*\*\*\*</sup>**

<sup>\*</sup> Department of Agriculture, Shahr-e-Rey Islamic Azad University, Tehran, Iran; E-mail: h\_ghahari@yahoo.com

<sup>\*\*</sup> Plant Pest Diagnostic Lab, California Department of Food & Agriculture, 3294 Meadowview Road, Sacramento, California, 95832, U.S.A; E-mail: cbellamy@cdfa.ca.gov

<sup>\*\*\*</sup> Ghaemshahr Islamic Azad University, Mazandaran, Iran; E-mail: hchelave@yahoo.com

<sup>\*\*\*\*</sup> Department of Animal Ecology, Swedish University of Agricultural Sciences, S-901 83 Umea, Sweden; E-mail: roger.pettersson@szooek.slu.se

**[Ghahari, H., Bellamy, C. L., Sakenin, H. & Pettersson, R. 2008. A contribution to new records of Iranian Buprestidae (Coleoptera). Munis Entomology & Zoology, 3 (2): 636-642]**

**ABSTRACT:** A total of 10 species in 5 genera were collected from different regions of Iran and represent new country records. In addition to the host trees of the beetle species, the synonymy and extra-Iranian distributional data are given in the paper.

**KEY WORDS:** Buprestidae, fauna, host plant, new records, Iran.

### INTRODUCTION

Forests form an integral part of life on earth, providing a range of benefits at local, national and global levels, covering approximately 40% of the world's total land mass (FAO 1995). Forest ecosystems are distinct, coherent communities comprised of a variety of life forms and a physical environment with which they interact (Slocombe, 1993). Integral to this concept is that the system should have sufficient diversity and complexity and an inherent capacity to be self-sustaining in the absence of catastrophic disturbances. A sustainable ecosystem has the capacity across the landscape for renewal, for recovery from a wide range of disturbances, and for retention of its ecological resiliency, while meeting the current and future needs of people for desired levels of values, uses, products and services (Werner, 1996). Biotic and abiotic forest disturbances, such as outbreaks of native insects are natural influences in forest ecosystems. Many forest insects play important roles in forest succession by selectively killing or retarding the growth of certain tree species while leaving others untouched (Castello et al., 1995).

One of the important pests groups in forest trees of almost all regions are the jewel beetles or metallic wood-boring beetles (Coleoptera: Buprestidae) (Bílý, 2003). The family Buprestidae is among the largest of the beetle families, with nearly 15,000 species known in 511 genera. As the latter common names suggest, these insects are wood-boring as larvae, with the immature forms slowly tunnelling through a variety of woody tissues of many tree and shrub species. However, a large percentage of the family is instead stem- or leaf-mining, many having

been erroneously combined taxonomically due to misperceptions about convergent adult morphologies. From studies of larvae, pupae and host associations, it is becoming clear that leaf-mining may be a derived strategy that has evolved independently at or near the apex of several widely separated buprestid lineages (Bellamy, 2002; Sakalian, 2003). The wood-boring types generally favor dying or dead branches on otherwise-healthy trees, while a few types attack green wood; some of these are serious pests capable of killing trees and causing major economic damage (Bílý, 1999; Bellamy, 2006). Two of the largest genera, *Agrilus* Curtis, 1825 (one of the largest genera in the world with nearly 3,000 described spp.) and *Chrysobothris* Eschscholtz, 1829 are cosmopolitan; two others, *Anthaxia* Eschscholtz, 1829 and *Acmaeodera* Eschscholtz, 1829 found on all continents except Australia; *Sphenoptera* Dejean, 1833 with more than 1,000 species found only in the Palaearctic, Afrotropical and Oriental regions (Bellamy, 1985; Niehuis & Tezcan, 1993).

The fauna of Iranian Buprestidae was previously well studied, e.g. 216 species were listed in the checklist of Modarres Awal (1997); but Iran includes diverse forest habitats with a proportional diversity of tree and shrub flora and therefore hosts diverse forest pests. The research that was conducted and has yielded this paper was necessary prior to completing a faunal survey of the entire Iranian Buprestidae.

## MATERIALS AND METHODS

The materials were collected from different provinces of Iran through 1998 - 2000. For collecting the specimens, plant parts, stems, branches and shoots infested with xylophagous species were picked and placed in plastic bags once a month. Samples were taken to the laboratory in an ice chest, then transferred to a cage consisting of a wooden frame (40 x 30 x 55 cm), covered with insect-proof gauze and held at  $25 \pm 2$  °C and  $65 \pm 5$  %RH. Thus, immature insects in the wood tissue were allowed to reach the adult stage and emerged into the respective cages. Monthly observations were made to determine the numbers of adult insects from each collection site and date. In addition to rearing of many specimens, the preserved specimens in the collections of Ghamshahr, Shahr-e-Rey and Tehran Islamic Azad universities were studied.

In addition to the checklist of Modarres Awal (1997), the current taxonomy was checked against the recent *Catalogue of Palaearctic Coleoptera* (e.g. Bílý, 2006; Jendek, 2006; Kubán, 2006; Volkovitsh, 2006; Volkovitsh & Kalashian, 2006) to verify all Palaearctic species that have been previously recorded to occur in Iran.

## SPECIES LIST

A total of 10 species in 5 genera including, *Acmaeodera* (2 species), *Acmaeoderella* (2 species), *Agrilus* (1 species), *Anthaxia* (4 species), and *Sphenoptera* (1 species) have been identified as the new records for the

Iranian fauna. The species list with synonymy, extra-Iranian distributional data, and host plants is below.

***Acmaeodera babatauensis* Obenberger, 1935**

synonyms: *Acmaeodera babatauensis* Obenberger, 1935: 207.

*Acmaeodera gussakovskii* Stepanov, 1958: 114.

Specimens examined: Semnan province: Semnan; April 2000 (2 specimens) on almond, *Amygdalus communis* L. (Rosaceae).

Distribution: Kirghizia, Tadzhikistan, Turkmenistan, Uzbekistan.

***Acmaeodera quadrizonata* Abeille de Perrin, 1891**

synonyms: *Acmaeodera quadrizonata* Abeille de Perrin, 1891: 269.

Specimens examined: West Azerbaijan province: Maco; July 2000 (2 specimens) on cherry, *Cerasus avium* (L.) (Rosaceae).

Distribution: Bulgaria, Cyprus, Greece, Israel, Jordan, Lebanon, Macedonia, Syria, Turkey.

***Acmaeoderella glasunovi* (Semenov-Tian-Shanskij, 1895)**

synonyms: *Acmaeoderella glasunovi* (Semenov-Tian-Shanskij), 1895a: 265 (*Acmaeodera*).

*Acmaeodera judinae* Stepanov, 1954: 1307.

*Acmaeodera varsobica* Stepanov, 1958: 112.

Specimens examined: Golestan province: National Park; May 2000 (1 specimen) on juniper, *Juniperus communis* (Cupressaceae).

Distribution: Kazakhstan, Kirghizia, Tadzhikistan, Turkmenistan, Uzbekistan.

***Acmaeoderella turanica* (Reitter, 1890)**

synonyms: *Acmaeoderella turanica* (Reitter), 1890: 340 (*Acmaeodera*, variety of *caspica*).

*Acmaeodera sogdiana* Semenov-Tian-Shanskij, 1895b: 264.

*Acmaeodera deminuta* Semenov-Tian-Shanskij, 1895b: 265 (variety of *sogdiana*).

*Acmaeodera warentzoffi* Théry, 1895b: clviii.

Specimens examined: Kerman province: Kerman; September 2000 (1 specimen) on *Acacia armata* (Leguminosae).

Distribution: Afghanistan, Kazakhstan, Tadzhikistan, Turkmenistan, Uzbekistan.

***Agrilus pecirkai* Obenberger, 1916**

synonyms: *Agrilus pecirkai* Obenberger, 1916: 273.

Specimens examined: Khorasan province: Torbat-Jam; August 1999 (3 specimens) on oak, *Quercus rotundifolia* (Fagaceae).

Distribution: Kirghizia, Tadzhikistan, Turkmenistan, Uzbekistan.

***Anthaxia (Cratomerus) iliensis* Obenberger, 1914**

synonyms: *Anthaxia iliensis* Obenberger, 1914: 115.

Specimens examined: Mazandaran province: Savadkooh; June 2000 (1 specimen) on elm, *Ulmus campestris* (Ulmaceae).

Distribution: China: Northwest Territory, Kazakhstan, Kirghizia, Uzbekistan.

***Anthaxia (Haplanthaxia) olympica* Kiesenwetter, 1880**

synonyms: *Anthaxia olympica* Kiesenwetter, *in* Kiesenwetter & Kirsch 1880: 131.

*Anthaxia smyrnensis* Obenberger 1924f: 27.

Specimens examined: East Azerbaijan province: Arasbaran; July 2000 (3 specimens) on Tree of Chastity, *Ailanthus altissima* (Mill.).

Distribution: Albania, Armenia, Austria, Belorussia, Bosnia-Herzegovina, Bulgaria, Croatia, Czechia, Georgia, Greece, Hungary, Israel, Macedonia, Moldavia, Romania, Russia: South European Territory, Slovakia, Slovenia, Syria, Turkey, Ukraine, Yugoslavia.

***Anthaxia (Haplanthaxia) umbellatarum* (Fabricius, 1787)**

synonyms: *Anthaxia umbellatarum* (Fabricius), 1787: 183 (*Buprestis*).

*Anthaxia inculta* (Germar), 1817: 217 (*Buprestis*).

*Anthaxia aerea* Rey, 1891: 4 (variety of *inculta*).

Specimens examined: West Azerbaijan province: Mahabad; July 1999 (2 specimens) on fig tree, *Ficus carica* (Moraceae).

Distribution: Albania, Algeria, Armenia, Belorussia, Bosnia-Herzegovina, Bulgaria, Croatia, France, Germany, Greece, Crete, Hungary, Iraq, Italy Libya, Malta, Macedonia, Moldavia, Montenegro, Morocco, Portugal, Romania, Russia: South European Territory, Slovenia, Spain, Switzerland, Syria, Tunisia, Turkey, Ukraine, Yugoslavia.

***Anthaxia (Melanthaxia) conradti* Semenov-Tian-Shanskij, 1891**

synonyms: *Anthaxia conradti* Semenov-Tian-Shanskij, 1891: 335.

*Anthaxia strangulata* Abeille de Perrin, 1900: 9.

*Anthaxia bucharica* Obenberger, 1913e: 66.

*Anthaxia musartensis* Obenberger, 1938d: 229 (variety of *canifrons*).

*Anthaxia thoracangula* Obenberger, 1938d: 229 (variety of *canifrons*).

*Anthaxia namanganensis* Obenberger, 1938d: 229 (variety of *canifrons*).

*Anthaxia semirjetshica* Obenberger, 1938d: 230 (variety of *canifrons*).

*Anthaxia issykkulensis* Obenberger, 1938d: 230 (variety of *canifrons*).

*Anthaxia ferghanensis* Obenberger, 1938d: 230 (variety of *canifrons*).

*Anthaxia tadjika* Obenberger, 1938d: 230 (variety of *canifrons*).

*Anthaxia euthorax* Obenberger, 1938d: 230 (variety of *canifrons*).

Specimens examined: Khorasan province: Birjand; September 2000 (1 specimen) on pear, *Pyrus boissieriana* (Rosaceae).

Distribution: China: Xizang, Kazakhstan, Kirghizia, Tadzhikistan, Turkmenistan.

***Sphenoptera* (s. str.) *lia* Jakovlev, 1901**

synonyms: *Sphenoptera lia* Jakovlev, 1901: 168.

Specimens examined: Golestan province: National Park; August 2004 (2 specimens) on mountain almond, *Amygdalis scoparia* Spash (Rosaceae).

Distribution: Turkmenistan, Uzbekistan.

**DISCUSSION**

In the present research, 10 species of Buprestidae are new species records for Iran. Since the list of Iranian Buprestidae included 216 species (Modarres Awal, 1997) and another 13 species added from the recent *Catalogue of Palaearctic Coleoptera* (e.g. Bílý, 2006; Jendek, 2006; Kubán, 2006; Volkovitsh, 2006; Volkovitsh & Kalashian, 2006), therefore the total number of species is 239. Iran is a large country incorporating various geographical regions and climates and we expect that a large number of species remain to be discovered. To find new species and distributional records, more studies should be conducted on this important insect group in Iran.

**ACKNOWLEDGEMENTS**

The authors are indebted to Dr. Hadi Ostovan (Fars Science and Research Branch), Dr. Hassan Barimani (Mazandaran Agriculture and Natural Resources Researches Institute), Eng. Mehrdad Tabari (Iran Rice Research Institute) and Eng. Mohammad Havaskary (Tehran Islamic

Azad University) for loaning many specimens. We are also thank to Dr. Svatoopluk Bily (National Museum, 148 00 Praha 4, Czech Republic) for editing the manuscript. The research was supported by Shahr-e-Rey Islamic Azad University.

### LITERATURE CITED

**Abeille de Perrin, E.** 1891. Contributions aux Buprestides paléarctiques (Coleoptera). *Revue d'Entomologie*, 10: 257-288.

**Abeille de Perrin, E.** 1900. Diagnoses de Coléoptères prèsumés nouveaux. *Bulletin de l'Académie de Marseille*, 27: 1-23.

**Bellamy, C. L.** 1985. A catalogue of the higher taxa of the family Buprestidae (Coleoptera). *Navorsinge van die Nasionale Museum, Bloemfontein*, 4 (15): 405-472.

**Bellamy, C. L.** 2002. Coleoptera: Buprestoidea. In: Houston, K. W. W. (Ed.). *Zoological Catalogue of Australia*, Volume 29.5. Melbourne: CSIRO Publishing, Australia, xii + 492 pp.

**Bellamy, C. L.** 2006. Insecta Coleoptera Buprestidae de Madagascar et des îles voisines, catalogue annoté. [Insecta Coleoptera Buprestidae of Madagascar and adjacent islands, an annotated catalogue]. *Faune de Madagascar*, 263 pp.

**Bílý, S.** 1999. Larvae of Buprestid beetles: (Coleoptera: Buprestidae) of Central Europe. *Acta Ent. Musei Nat. Pragae, Supplementum* 9, pp. 1-45 + 33 tables.

**Bílý, S.** 2003. Summary of the bionomy of the buprestid beetles of Central Europe (Coleoptera: Buprestidae). *Acta Entomologica Musei Nationalis Pragae, Supplementum* 10, 104 pp, 16 color plates.

**Bílý, S.** 2006. New nomenclatorial and taxonomic acts, and comments. Buprestidae: Anthaxiini. pp. 58-60. Catalogue. Buprestidae: Chrysochroinae: Paratassini. p. 350; Buprestinae: Anthaxiini. pp. 369-381. In: I. Löbl & A. Smetana (Eds): *Catalogue of Palaearctic Coleoptera. Volume 3. Scarabaeoidea - Scirtoidea - Dascilloidea - Buprestoidea - Byrrhoidea*. Apollo Books, Stenstrup, 690 pp.

**Castello, J. D., Leopold, D. J. & Smallidge, P. J.** 1995. Pathogens, patterns, and processes in forest ecosystems. *BioScience*, 45 (1): 16-24.

**Fabricius, J. C.** 1787. *Mantissa insectorum sistens eorum species nuper detectas adiectis characteribus genericis, differentiis specificis, emendationibus, observationibus*, Volume 1, 348 pp; Volume 2, C. G. Proft, Hafniae, 382 pp.

**FAO.** 1995. The challenge of sustainable forest management: what future for world's forests. FAO, Rome, 128 pp.

**Germar, E. F.** 1817. *Reise nach Dalmatien und in das Gebiet von Ragusa*. Bd. 2. Brockhaus, Leipzig, 323 pp., 9 plates.

**Jakovlev, B. E.** 1901. Étude sur les espèces du genre *Sphenoptera* Sol. (Coleoptera, Buprestidae). *V. Horae Societatis Entomologicae Rossicae*, 35: 168-184.

**Jendek, E.** 2006. New nomenclatorial and taxonomic acts, and comments. Buprestidae: Agrilus. p. 60. Catalogue. Buprestidae: Agrilinae: Agrilini: Agrilina: Agrilus. pp. 388-403. In: I. Löbl & A. Smetana (Eds): *Catalogue of Palaearctic Coleoptera. Volume 3. Scarabaeoidea - Scirtoidea - Dascilloidea - Buprestoidea - Byrrhoidea*. Apollo Books, Stenstrup, 690 pp.



**Kiesenwetter, E. A. H. von. & Kirsch, T.** 1880. Neue Anthaxia-Arten. Entomologische Monatsblätter, 19: 129-133.

**Kubán, V.** 2006. New nomenclatorial and taxonomic acts, and comments. Buprestidae: various groups. pp. 40-52. Catalogue. Buprestidae: Chrysochroinae: Chrysochroini, Chalcophorini, Dicerini, Poecilnotini. pp. 342-352. Buprestinae: Actenodini. p. 369; Buprestini, Chrysobothrini, Coomaniellini, Kisanthobiini, Melanophilini, Thomassetiini. pp. 381-388; Agrilinae: Agrilini: (without genus Agrilus), Aphanisticini (& M. Y. Kalashian), Coraebini, Trachysini. pp. 403-421. In: I. Löbl & A. Smetana (Eds): Catalogue of Palearctic Coleoptera. Volume 3. Scarabaeoidea - Scirtoidea - Dascilloidea - Buprestoidea - Byrrhoidea. Apollo Books, Stenstrup, 690 pp.

**Modarres Awal, M.** 1997. Buprestidae (Coleoptera), pp. 131-140. In: Modarres Awal, M. (Ed.) List of agricultural pests and their natural enemies in Iran. Ferdowsi University Press, 428 pp.

**Niehuis, M. & Tezcan, S.** 1993. Beitrag zur Kenntnis der Agrilus-Arten der Türkei (Coleoptera: Buprestidae). Mitteilungen des Internationalen Entomologischen Vereins, 18: 1-74.

**Obenberger, J.** 1913. Vorläufige Diagnosen einiger neuen Anthaxien (Buprestidae). Coleopterologische Rundschau, 2: 62-69.

**Obenberger, J.** 1914. Neue Anthaxiaarten (Col. Buprest.) aus den Sammlungen des Wiener Hofmuseums. Wiener Entomologische Zeitung, 33: 113-116.

**Obenberger, J.** 1916. Studien über paläarktische Buprestiden. I. Teil. Wiener Entomologische Zeitung, 35: 235-278.

**Obenberger, J.** 1924. Symbolae ad specierum regionis Palaearcticae Buprestidarum cognitionem. Jubilejní Sborník československé Společnosti Entomologické, 1924: 6-59.

**Obenberger, J.** 1935. Nový krasec z Buchary (Col. Bupr.). [New Buprestid beetle from Bukhara]. Acta Societatis Entomologicae Cechosloveniae, 32: 207.

**Obenberger, J.** 1938. Studie o družích rodu Anthaxia Eschsch. (Col. Bupr.). Etudes sur les espèces du genre Anthaxia Eschsch. (Col. Bupr.). Acta Entomologica Musaei Nationalis Pragae 1 B, Number II (Zool., Number, 4): 171-249.

**Reitter, E.** 1890. Uebersicht der mir bekannten Arten der Coleopteren, Gattung Acmæodera Eschsch. aus Europa und den angrenzenden Ländern. Entomologische Nachrichten, 16 (22): 335-347.

**Rey, C.** 1891. Remarques en passant. Buprestides (Suite). L'Échange, Revue Linnéenne, 7 (73): 4-5.

**Sakalian, V. P.** 2003. A catalogue of the jewel beetles of Bulgaria (Coleoptera: Buprestidae). Zoocartographia Balcanica No. 2, Pensoft Series Faunistica No 30, 246 pp.

**Semenov-Tian-Shanskij, A.** 1891. Diagnoses Coleopterorum novorum ex Asia Centrali et Orientali. III. Trudy Russkago Ėntomologičeskogo obščestva, 25 (1890-1891): 262-382.

**Semenov-Tian-Shanskij, A.** 1895a. Coleoptera Asiatica nova. III. Trudy Russkago Ėntomologičeskogo obščestva, 29: 125-144.

**Semenov-Tian-Shanskij, A.** 1895b. Coleoptera nova Rossiae Europaeae Caucasique. Trudy Russkago Ėntomologičeskogo obščestva 29: 242-250, 303-327.

**Slocombe, D. S.** 1993. Implementing ecosystem-based management. *BioScience*, 43: 612-622.

**Stepanov, V. N.** 1954. Novye dlya fauny SSSR vidy zlatok s fistashki (*Pistacia vera* L.) iz Turkmenii (Coleoptera, Buprestidae). [Species of Coleoptera, Buprestidae, new to the fauna of the USSR found on *Pistacia vera* L. from Turkmenistan]. *Zoologicheskii Zhurnal*, 33(6): 1307-1311. [in Russian]

**Stepanov, V. N.** 1958. Materialy k faune zlatok Tadzhikistana i sopredel'nykh raionov Srednei Azii (Coleoptera, Buprestidae) (Soobshcheniye I). [Materials to the buprestid-fauna of Tadzhikistan and adjacent regions of the Middle Asia (Coleoptera, Buprestidae) (1st Report)]. In: S. M. Ablayev. (Ed.). *Sbornik, posvyashchennyi pamyati B. V. Lototskogo. Trudy Instituta zoologii i parazitologii Akademii Nauk Tadzhikskoi SSR*, 89: 111-121. [in Russian with Tadjic summary]

**Théry, A.** 1895. Descriptions de quelques Buprestides nouveaux (Col.). *Bulletin des Séances et Bulletin Bibliographique de la Société entomologique de France*, 64: clvii-clix.

**Volkovitsh, M. G.** 2006. New nomenclatorial and taxonomic acts, and comments. Buprestidae: Polycestinae and Buprestinae. pp. 56-8; Catalogue. Buprestidae: Polycestinae. pp. 330-342. In: I. Löbl & A. Smetana (Eds): *Catalogue of Palaearctic Coleoptera. Volume 3. Scarabaeoidea - Scirtoidea - Dascilloidea - Buprestoidea - Byrrhoidea*. Apollo Books, Stenstrup, 690 pp.

**Volkovitsh, M. G. & Kalashian, M. Y.** 2006. New nomenclatorial and taxonomic acts, and comments. Buprestidae: Chrysochroinae: Sphenopterini. pp. 53-56; Catalogue. Buprestidae: Chrysochroinae: Sphenopterini. pp. 352-369. In: I. Löbl & A. Smetana (Eds): *Catalogue of Palaearctic Coleoptera. Volume 3. Scarabaeoidea - Scirtoidea - Dascilloidea - Buprestoidea - Byrrhoidea*. Apollo Books, Stenstrup, 690 pp.

**Werner, R. A.** 1996. Forest health in boreal ecosystems of Alaska. *For. Chron.*, 72: 43-46.

# SUBSTITUTE NAMES FOR SOME PREOCCUPIED LEAF BEETLES GENUS GROUP NAMES DESCRIBED BY L. N. MEDVEDEV (COLEOPTERA: CHRYSOMELIDAE)

Hüseyin Özdikmen\*

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mail: ozdikmen@gazi.edu.tr

[Özdikmen, H. 2008. Substitute names for some preoccupied leaf beetles genus group names described by L. N. Medvedev (Coleoptera: Chrysomelidae). Munis Entomology & Zoology 3 (2): 643-647]

**ABSTRACT:** Recently six junior homonym genus group names were detected among the leaf beetle genus group names. All names were described by L. N. Medvedev (Russia). So, the following replacement names are herein proposed: *Medvedevella* nom. nov. for *Smaragdinella* Medvedev, 1971; *Medvedevlevna* nom. nov. for *Jacobsonia* Medvedev, 1970; *Levna* nom. nov. for *Martinella* Medvedev, 2000; *Novascuta* nom. nov. for *Ascuta* Medvedev, 1997; *Neoblepharella* nom. nov. for *Blepharella* Medvedev, 1999 and *Euplatysphaera* nom. nov. for *Platysphaera* Medvedev, 2001.

**KEY WORDS:** nomenclatural change, homonymy, replacement name, Chrysomelidae, Clytrinae, Chrysomelinae, Galerucinae, Alticinae.

## Family CHRYSOMELIDAE

### Subfamily CLYTRINAE

#### Genus *SMARAGDINA* Chevrolat, 1837 Subgenus *MEDVEDEVELLA* nom. nov.

*Smaragdinella* Medvedev, 1971. Zool. Zh. 50: 693. (Insecta: Coleoptera: Chrysomeloidea: Chrysomelidae: Clytrinae). Preoccupied by *Smaragdinella* Adams & Reeve, 1848. Voy. "Samarang," 475. (Mollusca: Gastropoda: Opisthobranchia: Cephalaspidea: Acteonoidea: Smaragdinellidae).

**Remarks on nomenclatural change:** The genus *Smaragdinella* was erected by Adams & Reeve, 1848 with the type species *Smaragdinella calyculata* (Broderip & Sowerby, 1829) in Gastropoda. The genus is still used as a type genus of the family Smaragdinellidae. Later, the leaf beetle subgenus name *Smaragdinella* was proposed by Medvedev, 1971 for the genus *Smaragdina* Chevrolat, 1837 in the subfamily Clytrinae. However, the genus group name *Smaragdinella* Medvedev, 1971 is invalid under the law of homonymy, being a junior homonym of the genus *Smaragdinella* Adams & Reeve, 1848. So I propose to substitute the junior homonym name *Smaragdinella* Medvedev, 1971 for the name *Medvedevella* nom. nov.

**Etymology:** The subgenus is named after the author of *Smaragdinella*, Dr. Lev N. Medvedev (Russia).

Summary of nomenclatural changes:

Genus *Smaragdina* Chevrolat, 1837

Subgenus *Medvedevella* **nom. nov.**

pro *Smaragdina* Medvedev, 1971 (non Adams & Reeve, 1848)

### Subfamily CHRYSOMELINAE

**Genus *CHRYSOLINA* Motschulsky, 1860**

**Subgenus *MEDVEDEVLEVNA* nom. nov.**

*Jacobsonia* Medvedev, 1970. Trudy biol.-pochvenn.Inst., Vladivostok No. 1: 162. (Insecta: Coleoptera: Chrysomeloidea: Chrysomelidae: Chrysomelinae). Preoccupied by *Jacobsonia* Berlese, 1910. Redia, 6, 373. (Acari: Mesostigmata: Dermanyssoidea: Laelapidae: Iphiopsinae).

**Remarks on nomenclatural change:** The generic name *Jacobsonia* Berlese, 1910 was proposed for a genus of mite family Laelapidae with the type species *Iphiopsis submollis* Berlese, 1910. Subsequently, the genus group name *Jacobsonia* Medvedev, 1970 was introduced for a new leaf beetle subgenus (with the type species *Chrysolina pudica* Medvedev, 1970). Thus, the subgenus *Jacobsonia* Medvedev, 1970 is a junior homonym of the generic name *Jacobsonia* Berlese, 1910. So I propose for the subgenus name *Jacobsonia* Medvedev, 1970 the new replacement name *Medvedevlevna* nom. nov.

Etymology: The subgenus is named after the author of *Jacobsonia*, Dr. Lev N. Medvedev (Russia).

Summary of nomenclatural changes:

Genus *Chrysolina* Motschulsky, 1860

Subgenus *Medvedevlevna* **nom. nov.**

pro *Jacobsonia* Medvedev, 1970 (non Berlese, 1910; nec Koschantschikov, 1912; nec Cameron, 1936)

### Subfamily GALERUCINAE

**Genus *LEVNMA* NOM. NOV.**

*Martinella* Medvedev, 2000. Ann. Hist-Nat. Mus. Natl. Hung. 92: 166. (Insecta: Coleoptera: Chrysomeloidea: Galerucinae). Preoccupied by *Martinella* Jousseaume, 1887. Bull. Soc. zool. France, 12, 173. (Mollusca: Gastropoda: Stylommatophora: Streptaxidae).

**Remarks on nomenclatural change:** The flea beetle *Martinella* Medvedev, 2000 was established for a genus of the family Galerucinae. Nevertheless the name *Martinella* is already occupied. Jousseaume

(1887) proposed the gastropod genus name *Martinella* with the type species *Martinella martinella* Jousseaume, 1887 for Gastropoda. Thus the flea beetle genus *Martinella* Medvedev, 2000 is a junior homonym of *Martinella* Jousseaume, 1887 (Gastropoda). I suggest here that the name *Levnma* should be erected as a replacement name for *Martinella* Medvedev, 2000.

Etymology: The genus is named after the author of *Martinella*, Dr. Lev N. Medvedev (Russia).

Summary of nomenclatural changes:

*Levnma* **nom. nov.**

pro *Martinella* Medvedev, 2000 (non Jousseaume, 1887; nec Cockerell, 1903; nec Sicard, 1907; nec Bolivar, 1909; nec Artigas & Papavero, 1995).

### Subfamily ALTICINAE

#### Genus *NOVASCUTA* **nom. nov.**

*Ascuta* Medvedev, 1997. Zool. Zh. 76 (10), 1219. (Insecta: Coleoptera: Chrysomeloidea: Chrysomelidae: Alticinae). Preoccupied by *Ascuta* Forster, 1956. Rec. Canterbury Mus. 7: 101. (Arachnida: Araneae: Araneomorpha: Dysderoidea: Orsolobidae).

**Remarks on nomenclatural change:** Medvedev (1997) described a flea beetle genus *Ascuta* in the subfamily Alticinae. Unfortunately, the generic name was already preoccupied by Forster (1956), who had described the spider genus *Ascuta* (with the type species *Ascuta media* Forster, 1956 in the family Orsolobidae. The genus *Ascuta* Forster, 1956 is still used as a valid genus name in Araneae. According to Platnick (2007), it is a rather rich genus and includes fourteen species. Thus, the genus group name *Ascuta* Medvedev, 1997 is a junior homonym of the generic name *Ascuta* Forster, 1956. So we propose a new replacement name *Novascuta* **nom. nov.** for *Ascuta* Medvedev, 1997.

Etymology: from the Latin word “nova” (meaning “new” in English) + current genus name.

Summary of nomenclatural changes:

*Novascuta* **nom. nov.**

pro *Ascuta* Medvedev, 1997 (non Forster, 1956)

#### Genus *NEOBLEPHARELLA* **NOM. NOV.**

*Blepharella* Medvedev, 1999. Russ Entomol J 8 (3), September: 176. (Insecta: Coleoptera: Chrysomeloidea: Chrysomelidae: Alticinae). Preoccupied by *Blepharella* Macquart, 1851. Dipt. exot., Suppl. 4, 203. (Insecta: Diptera: Oestroidea: Tachinidae: Goniinae).

**Remarks on nomenclatural change:** The name *Blepharella* was initially introduced by Macquart, 1851 for a genus of the fly family Tachinidae (with the type species *Blepharella lateralis* Macquart, 1851 by original designation and monotypy). *Blepharella* Macquart, 1851 is still used as a valid genus name in Tachinidae (Diptera). According to Cantrell & Crosskey (2007), it includes only one species as the type. Subsequently, Medvedev, 1999 described an flea beetle genus *Blepharella* under the same generic name. Thus, the genus group name *Blepharella* Medvedev, 1999 is a junior homonym of the genus *Blepharella* Macquart, 1851. So I propose a new replacement name *Neoblepharella* nom. nov. for the genus name *Blepharella* Medvedev, 1999.

Etymology: from the Latin prefix “-neo” (meaning “new” in English) + current genus name.

Summary of nomenclatural changes:

*Neoblepharella* **nom. nov.**

pro *Blepharella* Medvedev, 1999 (non Macquart, 1851)

### **Genus EUPLATYSphaera NOM. NOV.**

*Platysphaera* Medvedev, 2001. Entomol. Basil. 23, 1, 188. (Insecta: Coleoptera: Chrysomeloidea: Chrysomelidae: Alticinae). Preoccupied by *Platysphaera* Holdich & Harrison, 1981. Record Aust. Mus. 33 (12): 637. (Crustacea: Malacostraca: Isopoda: Sphaeromatoidea: Sphaeromatidae).

**Remarks on nomenclatural change:** The flea beetle *Platysphaera* Medvedev, 2001 was established for a genus of the family Alticinae. Nevertheless the name *Platysphaera* is already occupied. Holdich & Harrison (1981) proposed the isopod genus group name *Platysphaera* with the type species *Platysphaera membranata* Holdich & Harrison, 1981 for Crustacea. The genus group name is still used as a valid name in Isopoda. Thus the flea beetle genus *Platysphaera* Medvedev, 2001 is a junior homonym of *Platysphaera* Holdich & Harrison, 1981 (Crustacea: Isopoda). I suggest here that the name *Euplatysphaera* should be erected as a replacement name for *Platysphaera* Medvedev, 2001.

Etymology: from the Latin prefix “-eu” (meaning “real” in English) + current genus name.

Summary of nomenclatural changes:

*Euplatysphaera* **nom. nov.**

pro *Platysphaera* Medvedev, 2001 (non Holdich & Harrison, 1981).

NOTE: As far as I know, Dr. Lev N. Medvedev (Russia) is still alive. I found two different e-mails of Dr. Medvedev but I could not reach him even though all my efforts.

### LITERATURE CITED

**Adams, A. & Reeve, L.** 1848–1850. Mollusca. In "The Zoology of the Voyage of H. M. S. Samarang: Under the Command of Captain Sir Edward Belcher, London, p. 475.

**Berlese, A.** 1910. Brevi diagnosi di generi e specie nuovi di Acari. Redia 6: 346–388.

**Cantrell, B. K. & Crosskey, R. W.** 2007. Family Tachinidae. Catalog of the Diptera of the Australasian and Oceanian Regions (online version). Edited by Neal L. Evenhuis. Last revised 2 June 2007. Available from: <http://hbs.bishopmuseum.org/aocat/tachinidae.html>

**Forster, R. R.** 1956. New Zealand spiders of the family Oonopidae. Rec. Canterbury Mus. 7: 89–169.

**Holdich, D. M. & Harrison, K.** 1981. Platybranch sphaeromatids (Crustacea: Isopoda) from the Australian region with description of a new genus. Records of the Australian Museum 33 (12):617–43.

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Jousseume, F.** 1887. Mollusques nouveaux de la République de l'Equateur. Bull. Soc. Zool. France 12: 165–186.

**Macquart, J.** 1851. Diptères exotiques nouveaux ou peu connus. Suite du 4.e supplément publié dans les mémoires de 1849. Mém. Soc. R. Sci. Agric. Arts, Lille 4: 134–294.

**Medvedev, L. N.** 1970. To the knowledge of genus *Chrysolina* Motsch. (Chrysomelidae) from the Far East and adjacent regions. In: "Entomological investigation on the Far East ". Vladivostok, 1: 159–162.

**Medvedev, L. N.** 1971. New forms of Clytrinae (Coleoptera, Chrysomelidae) from the USSR and adjacent countries. Zool. Journ. 50 (5): 686–695.

**Medvedev, L. N.** 1997. A new aberrant genus of Alticinae (Coleoptera: Chrysomelidae) as a representative of humicole ecological group. Zoologicheskij Zhurnal 76 (10): 1218–1220.

**Medvedev, L. N.** 1999. A revision of the group Blepharidini (Chrysomelidae: Alticinae) from the Oriental region. Russian Entomol. J. 8 (3): 175–184.

**Medvedev, L. N.** 2000. Chrysomelidae (Coleoptera) of Laos from the collection of the Hungarian Natural History Museum. Ann. Mus. hist. -nat. Hung. 92: 161–182.

**Medvedev, L. N.** 2001. Chrysomelidae of southern Asia. Entomol. Basiliensia 23 (1): 159–191.

**Platnick, N. I.** 2007. The World Spider Catalog, Version 8.5. Fam. Orsolobidae. Last updated June 19, 2007. Available from: <http://research.amnh.org/entomology/spiders/catalog/ORSOLOBIDAE.html>

**A NEW SUBSPECIES OF *CARABUS (MESOCARABUS)*  
*PROBLEMATICUS* HERBST, 1786  
(COLEOPTERA, CARABIDAE)  
FROM NORTHERN EUROPEAN RUSSIA**

**Dmitry Obydov\***

\* Timiryazev's State Museum of Biology, 123242, Malaya Gruzinskaya str. 15, Moscow, Russia. E-mail : obydozd@mtu-net.ru

**[Obydov, D. 2008. A new subspecies of *Carabus (Mesocarabus) problematicus* Herbst, 1786 (Coleoptera: Carabidae) from northern European Russia. Munis Entomology & Zoology, 3 (2): 648-650]**

**ABSTRACT:** A new subspecies of *Carabus (Mesocarabus) problematicus*: *Carabus (Mesocarabus) problematicus kolskianus* ssp. n. is described from northern European Russia. Diagnostic data are given.

**KEY WORDS:** Coleoptera, Carabidae, *Carabus (Mesocarabus) problematicus*, new subspecies, northern European Russia.

*Carabus (Mesocarabus) problematicus* occurs in Europe from Finland to southern France, including the British Isles. Belgium is situated near the centre of its geographical distribution area. The most northern subspecies *C. (Mesocarabus) problematicus strandi* Born, 1926 has been described from northern Norway. The beetles inhabit mostly the forested area. The species is the typical representative of the European fauna. From territory of Russia the species was not known till now.

In 2008 I have found a small series of this species in the collections of the Zoological Museum of Moscow Lomonosov State University (male and female) and in the collection of the State Museum of Biology (female). These specimens have been collected in the northern European Russia (Kolsky Peninsula, Murman environs). The specimens is rather peculiar morphologically and is distributed very far from the area of other subspecies of *Carabus (Mesocarabus) problematicus*, probably not linked by intermediate populations and are represented by separate subspecies.

The descriptions of *Carabus (Mesocarabus) problematicus kolskianus* ssp. n. is given below.

**DESCRIPTION**

***Carabus (Mesocarabus) problematicus kolskianus* ssp. n.** (Figs 1,2).

Holotype: male with label: "Murman, Alexandrovsk, L. Zenkevitch"

Papatypes: 2 females: female, same data and same locality; female with label: "Murman, Alexandrovsk env., 1914, L. Zenkevitch".



The holotype and one paratype are preserved in the collection of the Zoological Museum of Moscow Lomonosov State University (Moscow, Russia). One paratype is preserved in the collection of the State Museum of Biology (Moscow, Russia).

Body length in male is 20.5 mm (including mandibles), width 7.6 mm ; body length in females is 21.6 -23.0 mm, width 9.0 - 9.4 mm.

Head thickened or slightly thickened, ratio width of pronotum/width of head 1.84; eyes strongly convex; mandibles long, narrow, strongly incurved ; terebral tooth of the right and left mandibles slightly prominent; retinaculum of the left mandible indistinct, retinaculum of the right mandible slightly prominent; surface of mandibles smooth. Frontal furrows shallow, inside smooth. Frons, vertex and neck smooth, sometimes vertex and neck with few shallow wrinkles. Labrum slightly wider than clypeus, strongly notched, with 2 lateral setae. Antenna protruding beyond the base of pronotum by 3 apical segments; palpi moderately dilated; penultimate segment of the maxillary palpi equal to the last segment; penultimate segment of the labial palpi with 5-7 setae. Mentum tooth triangular, narrow, shorter than lateral lobes ; submentum with 2 setiferous pores.

Prothorax transverse, broadest at about middle; ratio width/length 1.55. Pronotum with coarse punctures and wrinkles; pronotal sculpture more rough and dense laterally. Median longitudinal line distinct; basal foveae small, deep, inside coarsely-wrinkled. Sides of pronotum broadly margined, its margin broader posteriorly; lobes of hind angles very long, triangular, slightly bent downwards. Lateral margin with 2 setiferous pores: one pore at about middle and one pore near hind angle.

Elytrae oval, convex, widest at about middle; shoulders prominent; sides of elytrae broadly margined. Ratio length/width 1.55; ratio width of elytrae/width of pronotum 1.38. Elytral sculpture triploid, homodynamous; all elytral interspaces slightly convex, about equally developed, interrupted into short links. Primary foveoles indistinct; striae coarsely punctured.

Metepisternum with shallow wrinkles, not longer than its width. Abdominal sternites smooth; sternal sulci deep.

Legs of normal length; fore male tarsi with four dilated segments bearing hairy pads.

Shape of aedeagus and endophallic structure in general is characteristic for the species.

Head, antenna, palpi, pronotum and legs black; elytrae brown, elytral margins black.

**Differential diagnosis.** The new subspecies differs from *C. problematicus strandi* (the area of this subspecies is located most close to an area of the new subspecies) by the following features: sculpture of head and pronotum less rough; elytrae more convex; elytral sculpture homodynamous, all elytral interspaces slightly convex, about equally developed, interrupted into short links (in *C. problematicus strandi*

elytral sculpture more rough, primary elytral interspaces more convex, interrupted into longer links). Head and pronotum of the new subspecies black, elytrae brown (in *C. problematicus strandi* head, pronotum and elytrae dark blue).

**Distribution.** Northern European Russia, Kolsky Peninsula, Murman environs. Up to now only one population is known.

**Habitat.** Probably the beetles were collected in the forest.

### ACKNOWLEDGEMENTS

I wish to express my hearty gratitude to Dr. Nikolay B. Nikitsky (Zoological Museum of Moscow Lomonosov State University, Moscow) who kindly loaned material for study.

### LITERATURE CITED

**Herbst, J. F. M.** 1786. Kritische Verzeichniss meiner Insecten-Sammlung. Fuessly Arch. Insectengesch. 5: 1-151.

**Born, P.** 1926. Weiterer Beitrag zur Kenntnis der Caraben. Entomologische Mitteilungen 13(2): 159-161.



Figures 1. *Carabus (Mesocarabus) problematicus kolskianus* ssp. n. (Holotype) 2. *Carabus (Mesocarabus) problematicus kolskianus* ssp. n. (Paratype).

## REPLACEMENT NAMES FOR THREE PREOCCUPIED MAYFLIES GENUS GROUP NAMES (EPHEMEROPTERA)

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mail: ozdikmen@gazi.edu.tr

**[Özdikmen, H. 2008.** Replacement names for three preoccupied mayflies genus group names (Ephemeroptera). Munis Entomology & Zoology 3 (2): 651-653]

**ABSTRACT:** Three junior homonym genus group names were detected among the mayflies genus group names and so, the following replacement names are herein proposed: *Novokivua* nom. nov. for *Kivua* Lugo-Ortiz & McCafferty, 1997; *Mccaffertya* nom. nov. for *Callistina* Sun & McCafferty, 2001 and *Ninadsa* nom. nov. for *Leptoneta* Sinitshenkova, 1989. Accordingly, new combinations are herein proposed for the species currently included in these genus group names. *Novokivua elouardi* (Gillies, 1989) comb. nov. and *Novokivua insuetum* (Kopelke, 1980) comb. nov. from *Kivua* Lugo-Ortiz & McCafferty, 1997; *Mccaffertya panda* (Sun & McCafferty, 2001) comb. nov. from *Callistina* Sun & McCafferty, 2001 and *Ninadsa calyptata* (Sinitshenkova, 1989) comb. nov. from *Leptoneta* Sinitshenkova, 1989.

**KEY WORDS:** nomenclatural change, homonymy, replacement name, Coleoptera, Cerambycidae.

Three previously proposed genus group names in the mayflies order Ephemeroptera is nomenclaturally invalid, as the genus group names have already been used by a different authors in Hymenoptera, Bivalvia and Araneae. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these genus names.

### **Family BAETIDAE** **Genus *NOVOKIVUA* nom. nov.**

*Kivua* Lugo-Ortiz & McCafferty, 1997. Trans. Am. Entomol. Soc. (Phila) 122 (4), December: 182. (Insecta: Ephemeroptera: Siphonuroidea: Baetidae). Preoccupied by *Kivua* Forsius, 1934. Rev. Zool. Bot. afr., 25, 398. (Insecta: Hymenoptera: Tenthredinoidea: Tenthredinidae: Blennocampinae).

**Remarks on nomenclatural change:** The African mayfly genus *Kivua* Lugo-Ortiz & McCafferty, 1997 was proposed with the type species *Cloeon insuetum* Kopelke, 1980 in Ephemeroptera. Nevertheless the name *Kivua* is already occupied. Forsius (1934) described a hymenopteran genus *Kivua* with the type species *Kivua seydeli* Forsius, 1934 by original designation. Thus the mayfly genus *Kivua* Lugo-Ortiz & McCafferty, 1997 is a junior homonym of *Kivua* Forsius, 1934. So I suggest here that *Kivua* Lugo-Ortiz & McCafferty, 1997 should be replaced with the new name *Novokivua*, as a replacement name.

**Etymology:** from the Latin word “nova” (meaning “new” in English).

## Summary of nomenclatural changes:

*Novokivua* **nom. nov.**pro *Kivua* Lugo-Ortiz & McCafferty, 1997 (non Forsius, 1934)*Novokivua elouardi* (Gillies, 1989) **comb. nov.**from *Kivua elouardi* (Gillies, 1989)= *Rhithrocloeon elouardi* Gillies, 1989

Distr.: Afrotropical.

*Novokivua insuetum* (Kopelke, 1980) **comb. nov.**from *Kivua insuetum* (Kopelke, 1980)= *Cloeon insuetum* Kopelke, 1980

Distr.: Afrotropical.

## Family CAENIDAE

Genus *MCCAFFERTYA* **nom. nov.**

*Callistina* Sun & McCafferty, 2001. Bull. Soc. Hist. Nat. Toulouse 137: 8 (Insecta: Ephemeroptera: Caenoidea: Caenidae). Preoccupied by *Callistina* Jukes-Browne, 1908. Proc. malac. Soc. London, 8: 156. (Mollusca: Bivalvia: Veneroida: Veneroidea: Veneridae: Pitarinae).

**Remarks on nomenclatural change:** The name *Callistina* was initially introduced by Jukes-Browne, 1908 for an fossil bivalve genus of Bivalvia. It is extant. It was assigned to Pterinae by Vokes (1980). Recently, Sun & McCafferty, 2001 described an madagascaran mayflies genus under the same generic name (with the type species *Callistina panda* Sun & McCafferty, 2001 by original designation and monotypy. Thus, the genus group name *Callistina* Sun & McCafferty, 2001 is a junior homonym of the genus *Callistina* Jukes-Browne, 1908. So I propose a new replacement name *Mccaffertya* **nom. nov.** for the genus name *Callistina* Sun & McCafferty, 2001.

Etymology: This genus is named after the second author of *Callistina*, W. P. McCafferty (USA).

## Summary of nomenclatural changes:

*Mccaffertya* **nom. nov.**pro *Callistina* Sun & McCafferty, 2001 (non Jukes-Browne, 1908)*Mccaffertya panda* (Sun & McCafferty, 2001) **comb. nov.**from *Callistina panda* Sun & McCafferty, 2001

Distr.: Madagascar

## Family LEPTOPHLEBIIDAE

Genus *NINADSA* **nom. nov.**

*Leptoneta* Sinitshenkova, 1989. Paleontol. Zh. 23 (3): 35. (Insecta: Ephemeroptera: Leptophlebiidae). Preoccupied by *Leptoneta* Simon, 1872. Ann. Soc. ent. France, (5) 2, 477. (Arachnidae: Araneae: Leptonetidae).

**Remarks on nomenclatural change:** The name *Leptoneta* was proposed by Simon (1872) for a spider genus with the type species *Leptoneta convexa* Simon, 1872 in Araneae. This rich genus is the type genus of the family Leptonetidae (Araneae). Subsequently, the Mesozoic fossil mayfly genus *Leptoneta* was described by Sinitshenkova (1989) with the type species *Leptoneta calyptrata* Sinitshenkova, 1989 by original designation. It is already occupied. Thus the mayfly genus *Leptoneta* Sinitshenkova, 1989 is a junior homonym of *Leptoneta* Simon, 1872. I propose a new replacement name *Neoleptoneta* nom. nov. for the genus name *Ninadsa* Sinitshenkova, 1989.

**Etymology:** This genus is named after the current author of *Leptoneta*, Nina D. Sinitshenkova (Russia).

**Summary of nomenclatural changes:**

*Ninadsa* **nom. nov.**

pro *Leptoneta* Sinitshenkova, 1989 (non Simon, 1872)

*Ninadsa calyptrata* (Sinitshenkova, 1989) **comb. nov.**

from *Leptoneta calyptrata* Sinitshenkova, 1989

Distr.: Mongolia.

## LITERATURE CITED

**Forsius, R.** 1934. On some Tenthredinoidea from the Belgian. Congo Museum at Tervuren. – Revue de Zoologie et de Botanique Africaine 25: 389–406.

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Jukes-Browne, A. J.** 1908. Genera of Veneridae in Cretac. and Old Tert., Proc. Malac. Soc. 8: 148–177.

**Lugo-Ortiz, C. R. & McCafferty, W. P.** 1997. The Bugelliesia complex of African Baetidae (Ephemeroptera). Transactions of the American Entomological Society 122: 175–197.

**Simon, E.** 1872. Notice complémentaire sur les arachnides cavernicoles et hypogés. Ann. Soc. ent. Fr. (5) 2: 473–488.

**Sinitshenkova, N. D.** 1989. New Mesozoic mayflies (Ephemera) from Mongolia. Paleontol. J. 23 (3): 26–37.

**Sun, L. & McCafferty, W. P.** 2001. Callistina panda, a striking new genus and species of Caeninae (Insecta : Ephemeroptera : Caenidae) from Madagascar. Bull. Soc. Hist. Nat. Toulouse 137: 7–15.

**Vokes, H. E.** 1980. Genera of the Bivalvia: A Systematic and Bibliographic Catalog (Revised and Updated). Paleontological Research Institution. Ithaca NY. 307 pp.

## NEW FAUNISTIC RECORDS FOR THE TURKISH HARVESTMEN FAUNA (ARACHNIDA: OPILIONES)

**Kemal Kurt\*, Ayvaz Babaşoğlu\*, Osman Seyyar\*\*\*, Hakan Demir\*\* and Aydın Topçu\***

\* Department of Biology, Faculty of Science and Arts, Niğde University, 51200 Niğde / TURKEY

\*\* Department of Biology, Faculty of Science and Arts, Gazi University, 06500 Ankara / TURKEY

\*\*\* Department of Biology, Faculty of Science and Arts, Erciyes University, 38039 Kayseri / TURKEY. e-mail: osmanseyyar@hotmail.com

**[Kurt, K., Babaşoğlu, A., Seyyar, O., Demir, H. & Topçu, A. 2008. New faunistic records for the Turkish harvestmen fauna (Arachnida: Opiliones). Munis Entomology & Zoology, 3 (2): 654-660]**

**ABSTRACT:** In this study, 31 Opiliones samples were collected from the Niğde province, between 2002 and 2004. Consequently 7 species belonging to 6 genera of 3 families were determined and evaluated faunistically. Among them; 4 species are new for the Turkish harvestman fauna: *Leiobunum rotundum* (Latreille, 1798), *L. rupestre* (Herbst, 1799), *Mitopus morio* (Fabricius, 1779) and *Ischyropsalis helwigii* (Panzer, 1794). The characteristic features, world distributions and some ecological datas regarding all species are also given

**KEY WORDS:** Arachnida, Opiliones, Turkey, Niğde, new record.

Arachnological studies of Turkey began towards the end of the 19th century. Both Turkish and foreign research made important contributions to the Turkish harvestmen fauna. 6125 species of Opiliones have been described so far in 1638 genera (Hallan, 2005), with only 29 species bring recorded from Turkey (Kulczynski, 1903; Nosek, 1905; Roewer, 1952; Gruber, 1968, 1969, 1976, 1979, 1998; Chevrizov, 1979; Bayram, 1994; Snegovaya, 1999; Bayram et al. 2005; Bayram & Çorak, 2007; Çorak & Bayram, 2007). Nevertheless, it is impossible to say that the fauna of Turkey is fully investigated. It needs to be studied more comprehensively.

### METHODS

The studies were carried out in different periods between April and September 2002-2004 in Niğde. Samples were collected with pens and aspirator. Specimens were put into jars, preserved in 70% alcohol. All the specimens were deposited in Arachnology Museum of Nigde University (NUAM). All illustrations were made with a Nikon SMZ-U stereomicroscope with drawing tube. Identification references consulted are: Chevrizov (1979) and Babaşoğlu (1999). All measurements are in millimetres.

Niğde province is surrounded on three sides by ranges of the Taurus Mountains, including Mount Hasan and the Melendiz mountains (Fig. 15). Surrounded by mountains and at a fairly high altitude the area has a dry and chilly climate and is exposed to snows brought by cold north

winds in winter. Therefore the hillsides are more or less bare of vegetation, with some forest at the higher altitudes.

## RESULTS

### *Leiobunum rotundum* (Latreille, 1798) (Figs. 1-2)

**Materials:** Niğde: 1 male, Pınarbaşı, 37° 52' N, 35° 60' E, 18.05.2003; 1 male, Altunhisar, 37° 59' N, 34° 22' E, 17.06.2003.

**Description.** Male. Dorsal scutum: carapace length 1.3 abdominal portion length 1.9; Chelicera: basal segment 0.5, distal segment 0.7. Lengths of palp [total length (femur+patella+tibia+tarsus)]: 5.7 (0.6+3.3+0.7+4.1); Lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 32.4 (7.9+1.0+6.1+7.3+10.1), II 57.0 (13.5+1.1+11.5+9.9+21), III 32.0 (6.7+0.9+6.0+7.9+10.5), IV 45.1 (10.2+1.0+8.3+11.2+14.4).

**Habitat and distribution:** The specimens were collected from stony places of grassland. Norway, Denmark, Sweden, Belgium, Germany, Switzerland, Austria, Czech Republic, Hungaria, Slovakia, Poland, Slovenia, Canary Islands (Blick & Komposch, 2004; Hallan, 2005; Stol, 2007); Turkey (**New record**).

### *Leiobunum rupestre* (Herbst, 1799) (Fig. 3)

**Materials:** Niğde: 2 females, Sazlıca, 37° 54' N, 34° 37' E, 20.07.2003, 2 females, Ferteke, Özbekde, 37° 58' N, 34° 39' E, 22.08.2003.

**Description.** Female. Dorsal scutum: carapace length 1.4 abdominal portion length 2.7; Chelicera: basal segment 0.5, distal segment 1.1. Lengths of palp [total length (femur+patella+tibia+tarsus)]: 3.2 (1.0+0.3+0.5+1.4); Lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 34.8 (8.5+1.2+6.5+8.1+10.5), II 63.2 (13.7+1.4+12.5+11.6+24), III 33.2 (8.0+1.1+6.0+8.0+10.1), IV 46.7 (11.0+1.3+8.4+11.5+14.5).

**Habitat and distribution:** The specimens were collected under stones. Norway, Denmark, Sweden, Finland, Germany, Switzerland, Austria, Czech Republic, Hungaria, Poland, Slovenia (Blick & Komposch, 2004; Hallan, 2005; Stol, 2007); Turkey (**New record**).

### *Mitopus morio* (Fabricius, 1779) (Figs. 4-5)

**Materials:** Niğde: 1 female, Gümüşler, 37° 59' N, 34° 46' E, 22.05.2003; 1 female, Ferteke, 37° 58' N, 34° 40' E, 20.07.2003; 2 females, Kayaardı, 37° 58' N, 34° 37' E, 13.03.1996; 2 females, Bor, 37° 53' N, 34° 33' E, 18.07.2003.

**Description.** Female. Dorsal scutum: carapace length 1.9 abdominal portion length 6.4; Chelicera: basal segment 0.7, distal segment 2.1. Lengths of palp [total length (femur+patella+tibia+tarsus)]: 7.1 (2.4+0.8+1.2+2.7); Lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 17.2 (3.0+0.9+2.9+3.5+6.9), II 28.2 (5.1+1.4+4.4+5.1+12.2), III 20.1 (3.4+1.0+3.0+4.8+7.9), IV 27.9 (5.0+1.3+4.0+7.1+10.5).

**Habitat and distribution:** The specimens were collected from orchard and meadow places. Norway, Denmark, Sweden, Finland, Belgium, Netherlands, Germany, Switzerland, Austria, Czech Republic, Hungaria, Slovakia, Poland, Slovenia, The Faroe Islands, Iceland (Blick & Komposch, 2004; Hallan, 2005; Stol, 2007); Turkey (**New record**).

### *Opilio saxatilis* C.L. Koch, 1839 (Figs. 6-7)

**Materials:** Niğde: 2 males, Pınarbaşı, 37° 52' N, 35° 63' E, 13.10.2003; 2 males, Uluağaç village, 38° 25' N, 34° 50' E, 18.09.2003; 3 males, Kemerhisar, 37° 49' N, 34° 34' E, 15.08.2003.

**Description.** Male. Dorsal scutum: carapace length 1.8 abdominal portion length 3.9; Chelicera: basal segment 0.8, distal segment 1.9. Lengths of palp [total length (femur+patella+tibia+tarsus)]: 3.9 (1.1+0.5+0.7+1.6); Lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 22.4 (4.2+1.2+4.0+4.4+8.6), II 30.7 (6.2+1.6+4.7+6.4+11.8), III 22.6 (4.1+1.1+3.9+4.8+8.7), IV 30.1 (6.1+1.5+4.6+6.3+11.6).

**Habitat and distribution:** The specimens were collected from stony and meadow places. Denmark, Sweden, Belgium, Netherlands, Germany, Switzerland, Austria, Czech Republic, Hungaria, Slovakia, Poland, Slovenia, Turkey (Blick & Komposch, 2004; Stol, 2007).

***Phalangium opilio* Linnaeus, 1761 (Figs. 8-9)**

**Materials:** Niğde: 2 females, Uluğaç village, 38° 25' N, 34° 50' E, 20.05.2003; 2 females, Ferteke, 37° 58' N, 34° 37' E, 24.05.2003; 1 female, Koyunlu, 37° 58' N, 34° 35' E, 25.06.2003; 3 females, Çamardı, 37° 49' N, 34° 59' E, 29.08.2003; 2 females, Ulukışla, 37° 33' N, 34° 28' E, 29.05.2003.

**Description.** Female. Dorsal scutum: carapace length 3.0 abdominal portion length 6.1; Chelicera: basal segment 1.7, distal segment 3.4. Lengths of palp [total length (femur+patella+tibia+tarsus)]: 17.8 (6.4+1.4+3.4+6.6); Lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 24.4 (5.4+1.3+4.7+5.5+7.5), II 35.2 (6.9+1.4+6.2+7.2+13.5), III 25.1 (4.2+1.2+4.2+6.7+8.8), IV 32.6 (6.1+1.5+5.2+9.0+10.8).

**Habitat and distribution:** The specimens were collected from meadow, stones and tree trunk. Norway, Denmark, Sweden, Finland, Belgium, Netherlands, Germany, Switzerland, Austria, Czech Republic, Hungaria, Slovakia, Poland, Slovenia, Turkey (Blick & Komposch, 2004; Hallan, 2005; Stol, 2007).

***Zacheus crista* (Brulle, 1832) (Figs. 10-12)**

**Materials:** Niğde: 1 male, Gümüşler, 37° 59' N, 34° 46' E, 18.06.2003.

**Description.** Male. Dorsal scutum: carapace length 2.5 abdominal portion length 8.4; Chelicera: basal segment 0.8, distal segment 2.2. Lengths of palp [total length (femur+patella+tibia+tarsus)]: 4.3 (1.3+0.6+0.8+1.6); Lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 11.7 (2.2+1.0+1.8+2.4+4.3), II 17.5 (3.5+1.2+2.5+3.0+7.3), III 12.2 (2.6+1.0+1.5+2.5+4.6), IV 18.8 (4.0+1.3+2.4+4.6+6.5).

**Habitat and distribution:** The specimens were collected from stony places. Azerbaijan, Belgium, Netherlands, Denmark, Norway, Sweden, Germany, Switzerland, Austria, Czech Republic, Hungaria, Slovakia, Poland, Slovenia, Turkey (Snegovaya, 1999; Blick & Komposch, 2004; Hallan, 2005).

***Ischyropsalis helwigii* (Panzer, 1794) (Figs. 13-14)**

**Materials:** Niğde: 1 male, Ferteke, 37° 58' N, 34° 37' E, 01.07.2003.

**Description.** Male. Dorsal scutum: carapace length 3.3 abdominal portion length 4.0; Chelicera: basal segment 3.2, distal segment 6.5. Lengths of palp [total length (femur+patella+tibia+tarsus)]: 8.8 (2.5+1.2+1.5+3.6); Lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 22.2 (5.0+2.2+3.0+4.6+7.4), II 33.2 (6.3+2.1+5.5+5.8+13.5), III 23.9 (4.0+1.8+3.7+5.6+8.8), IV 34.3 (6.1+1.9+5.0+8.5+12.8).

**Habitat and distribution:** The specimens were collected from soil zone. Alps, Germany, Austria, Czech Republic, Pyrenees, Netherlands, Hungaria, Slovenia, Poland (Blick & Komposch, 2004; Hallan, 2005); Turkey (**New record**).

## LITERATURE CITED

Babaşoğlu, A. 1999. Örümcekçiller (Arachnida). Kültür Kitabevi. Niğde. 371s.

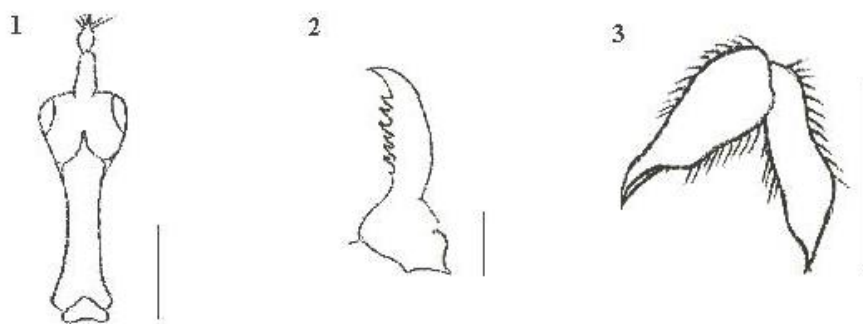
Bayram, A. 1994. Tarla kenarlarında yer alan ot kümelerinin arthropod faunası. Yüziüncü Yıl Üniversitesi, Ziraat Fakültesi Dergisi 4: 139-149.

Bayram, A., Danişman, T., Çorak, İ. & Yeşilyurt, F. 2005. Kırkkale ilinin araneo-faunası üzerine (Arthropoda: Arachnida). Ekoloji Çevre Dergisi, 14, 56, 1-8.

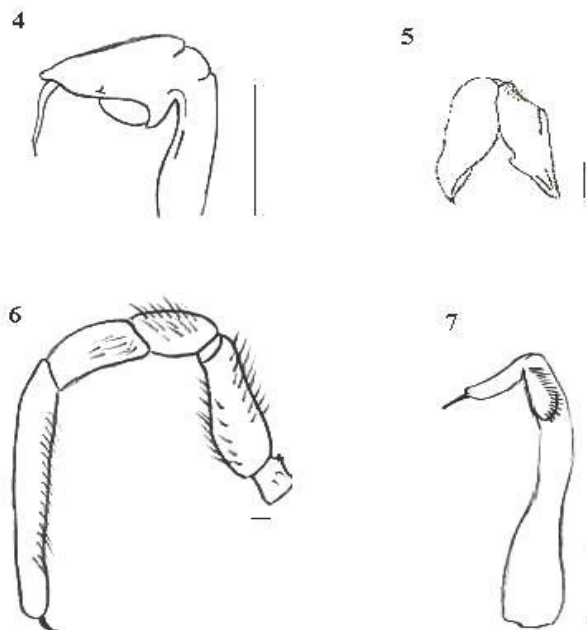
Bayram, A. & Çorak, İ. 2007. A new record for the harvest spider fauna of Turkey: *Dicranolasma giljaro*vi Silhavy 1966 (Opilionida, Dicranolasmatidae). Turkish Journal of Zoology, 31: 9-12.



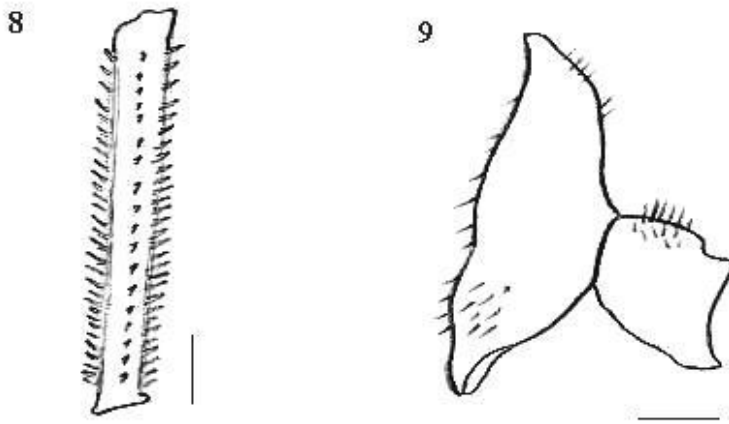
- Blick, T. & Komposch, C.** 2004. Checkliste der Weberknechte Mittel- und Nordeuropas. Checklist of the harvestmen of Central and Northern Europa (Arachnida: Opiliones). Version 27.12.2004. Available from: [http://www.AraGes.de/checklist.html#2004\\_Opiliones](http://www.AraGes.de/checklist.html#2004_Opiliones)
- Chevrizov, B. P.** 1979. A brief key to the harvest spiders (Opiliones) of the European territory of the USSR. Trudy Zool. Inst. AN SSSR, Leningrad, t. 85, pp 4- 27.
- Çorak İ. & Bayram A.** 2007. Harvestmen Fauna of Soğuksu National Park, Ankara (Ordo: Opiliones). Mun. Ent. Zool. Vol. 2, No.2, 455-460.
- Gruber, J.** 1968. Ergebnisse zoologischer Sammelreisen in der Türkei: *Calathoractus beieri*, ein neuer Trogluide aus Anatolien (Opiliones, Arachnida). Ann. Naturhistor. Mus. Wien. 72, 435-441.
- Gruber, J.** 1969. Weberknechte der Familien Sironidae und Trogluidae aus der Türkei (Opiliones, Arachnida). Rev. Fac. Sci. Univ. Istanbul, t. 34, pp. 75-88.
- Gruber, J.** 1976. Ergebnisse zoologischer Sammelreisen in der Türkei Zwei neue Nemastomatidenarten mit Stridulationsorganen, nebst Anmerkungen zur systematischen Gliederung der Familie (Opiliones, Arachnida). Ann. Naturhistor. Mus. Wien 80, 781-801.
- Gruber, J.** 1979. Ergebnisse zoologischer Sammelreisen in der Türkei. Über Nemastomatiden- Arten aus der Verwandtschaft von *Pyza* aus Südwestasien und Südosteuropa (Opiliones, Arachnida). Ann. Natur. Mus. Wien 82: 559-577.
- Gruber, J.** 1998. Beiträge zur Systematik der Gattung *Dicranolasma* (Arachnida: Opiliones, Dicranolasmatidae). I. *Dicranolasma thracium* Starega und verwandte Formen aus Südosteuropa und Südwestasien. Ann. Naturhist. Mus. Wien, 100 B, 489-537.
- Hallan, J.** 2005. Synopsis of the described Opiliones of the world. <http://insects.tamu.edu/research/collection/hallan/acari/Opiliones1.htm>.
- Kulczynski, W.** 1903. Arachnoidea in Asia Minore et ad Constantinopolim a Dre F. Werner collecta. Sitz.-ber. Akad. Wiss. Wien, 112: 627-680.
- Nosek, A.** 1905. Araneiden, Opilionen und Chernetiden. In Penther, A. und E. Zederbauer, Ergebnisse einer naturwissenschaftlichen Reise zum Erdschias-Dagh (Kleinasien). Ann. naturh. Hofmus. Wien, 20: 114-154.
- Roewer, C. F.** 1952. Die Araneae. Solifuga und Opiliones der Sammlungen des Herrn Dr. K. Lindberg aus Griechenland, Creta, Anatolien, Iran und Indien. *Medd. Göteborgs Mus. Zool. Avdel. 129, Ser. B Band 8*, 4, 1-47.
- Snegovaya, N.** 1999. Contribution to the harvest spider (Arachnida, Opiliones) Fauna of the caucasus. Tr. J. Zool. 23: 453-459.
- Stol, I.** 2007. Checklist of Nordic Opiliones. Norw. J. Entomol. 54, 23-26.



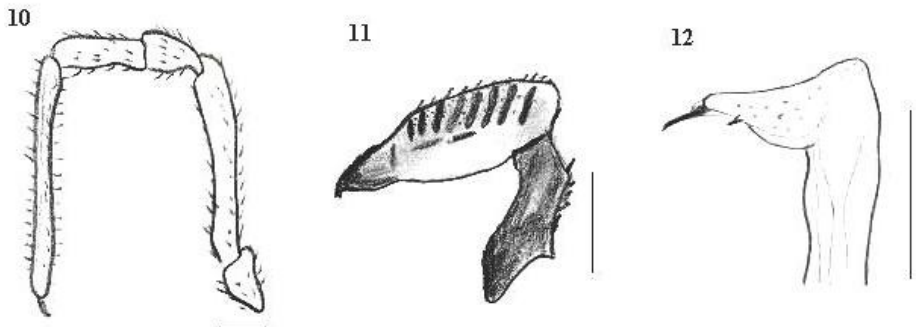
**Figs. 1-3.** *Leiobunum rotundum* (♂). (1. penis, 2. pedipalp). *L. rupestre* (♀). (3. chelicera). Scales: 0.5 mm.



**Figs. 4-7.** *Mitopus morio* (♀). (4. penis, 5. chelicera.) *Opilio saxatilis* (♂). (6. pedipalp, 7. penis). Scales: 0.2 mm.

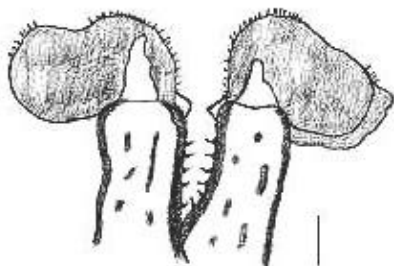


**Figs. 8-9.** *Phalangium opilio* (♀). (8. Leg I, 9. chelicera). Scales: 1 mm.

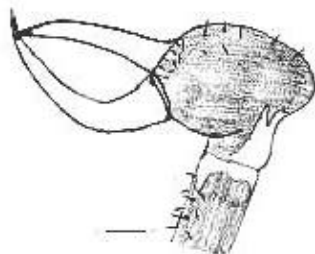


**Figs. 10-12.** *Zacheus crista* (♂). (10. pedipalp, 11. chelicera, 12. penis). Scales: 0.5 mm.

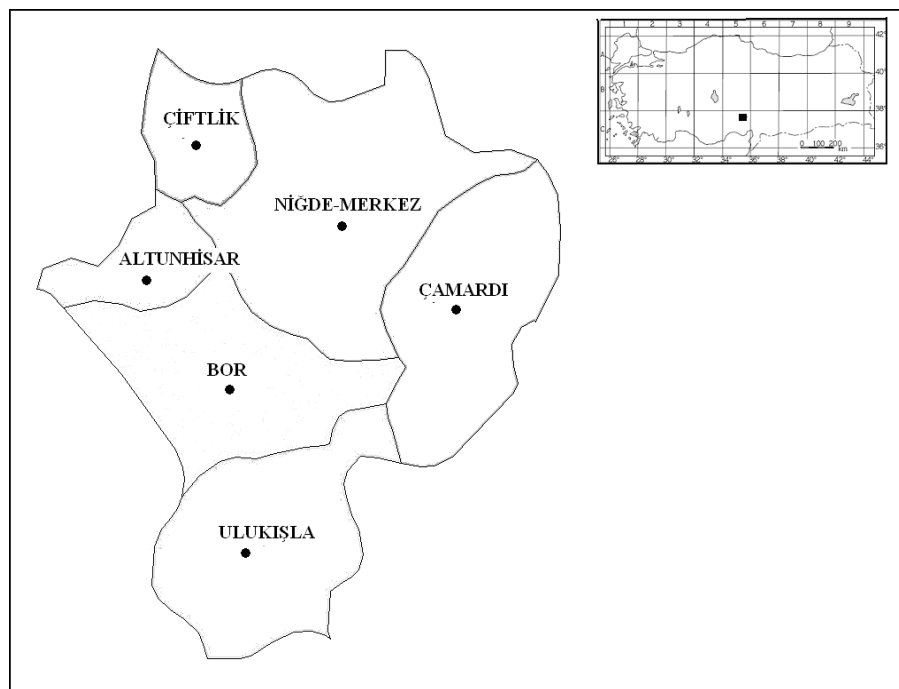
13



14



**Figs. 13-14.** *Ischyropsalis helwigii* (Panzer, 1794) (♂). (chelicera, 13. dorsal view, 14. lateral view). Scales: 1 mm.



**Fig. 15.** Distribution of Nigde Province

**SUBSTITUTE NAMES FOR TWO PREOCCUPIED  
LONGHORNED BEETLES GENUS GROUP NAMES DESCRIBED  
BY J. THOMSON (COLEOPTERA: CERAMBYCIDAE)**

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mail: ozdikmen@gazi.edu.tr

[Özdikmen, H. 2008. Substitute names for two preoccupied longhorned beetles genus group names described by J. Thomson (Coleoptera: Cerambycidae). Munis Entomology & Zoology 3 (2): 661-664]

**ABSTRACT:** Two junior homonym genus group names were detected among the longhorned beetle genus group names. All names were described by J. Thomson. So, the following replacement names are herein proposed: *Zehra* nom. nov. for *Sibylla* Thomson, 1857 and *Leptocometes* Bates, 1881 for *Tithonus* Thomson, 1864. Accordingly, new combinations are herein proposed for the species currently included in these genus group names. *Zehra coemeterii* (Thomson, 1856) comb. nov.; *Zehra flavosignata* (Fairmaire & Germain, 1859) comb. nov.; *Zehra integra* (Fairmaire & Germain, 1859) comb. nov.; *Zehra krahmeri* (Cerdá, 1973) comb. nov.; *Zehra livida* (Germain, 1900) comb. nov. from *Sibylla* Thomson, 1857 and from *Tithonus* Thomson, 1864 and *Leptocometes acutispinis* (Bates, 1863) comb. nov.; *Leptocometes barbiscapus* (Bates, 1872) comb. nov.; *Leptocometes luneli* (Chalumeau & Touroult, 2005) comb. nov.; *Leptocometes nubilus* (Melzer, 1934) comb. nov.; *Leptocometes obscurus* (Monné, 1990) comb. nov.; *Leptocometes pallidus* (Melzer, 1934) comb. nov.; *Leptocometes penicillatus* (Monné, 1990) comb. nov.; *Leptocometes spitzi* (Melzer, 1934) comb. nov.; *Leptocometes umbrosus* (Thomson, 1864) comb. nov.; *Leptocometes umbrosus* (Thomson, 1864) comb. nov.; *Leptocometes virescens* (Melzer, 1931) comb. nov.; *Leptocometes volxemi* (Lameere, 1884) comb. nov. and *Leptocometes zikani* (Martins & Monné, 1974) comb. nov. from *Tithonus* Thomson, 1864.

**KEY WORDS:** nomenclatural change, homonymy, replacement name, Coleoptera, Cerambycidae.

Two previously proposed genus group names in the beetle family Cerambycidae are nomenclaturally invalid, as the genus group names have already been used by a different authors in Mantodea and Curculionidae. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these genus names.

**Family CERAMBYCIDAE  
Subfamily CERAMBYCINAE  
Genus ZEHRA nom. nov.**

*Sibylla* Thomson, 1857. Arch. ent. Paris, 1, 406. (Insecta: Coleoptera: Cerambycidae: Cerambycinae: Bimiini). Preoccupied by *Sibylla* Stål, 1856. Ofvers. VetenskAkad. Förh. Stockholm, 13, 168. (Mantodea: Silyllidae: Silyllinae).

**Remarks on nomenclatural change:** The name *Sibylla* was initially introduced by Stål, 1856 for an African genus of Mantodea (with the type species *Sibylla pretiosa* Stål, 1856 by monotypy. Later Thomson, 1857 described an neotropical longhorned beetle genus under the same generic

name (with the type species *Phoedinus coemeterii* Thomson, 1856). *Sibylla* Thomson, 1857 is still used as a valid genus name in Cerambycidae. Thus, the genus group name *Sibylla* Thomson, 1857 is a junior homonym of the genus *Sibylla* Stål, 1856. So I propose a new replacement name *Zehra* nom. nov. for the genus name *Sibylla* Thomson, 1857.

Etymology: This genus name is dedicated to Zehra Özdikmen.

Summary of nomenclatural changes:

*Zehra* **nom. nov.**

pro *Sibylla* Thomson, 1857 (non Stål, 1856)

= *Sybilla* Thomson, 1864

*Zehra coemeterii* (Thomson, 1856) **comb. nov.**

from *Sibylla coemeterii* (Thomson, 1856)

= *Phoedinus coemeterii* Thomson, 1856

Distr.: Chile, C Argentina

*Zehra flavosignata* (Fairmaire & Germain, 1859) **comb. nov.**

from *Sibylla flavosignata* Fairmaire & Germain, 1859

Distr.: Chile

*Zehra integra* (Fairmaire & Germain, 1859) **comb. nov.**

from *Sibylla integra* Fairmaire & Germain, 1859

Distr.: Chile, W Argentina

*Zehra krahmeri* (Cerde, 1973) **comb. nov.**

from *Sibylla krahmeri* Cerde, 1973

Distr.: Chile

*Zehra livida* (Germain, 1900) **comb. nov.**

from *Sibylla livida* Germain, 1900

Distr.: Chile

### **Subfamily LAMIINAE** **Genus *LEPTOCOMETES* Bates, 1881**

*Tithonus* Thomson, 1864. Syst. Cerambycid., 24. (Insecta: Coleoptera: Cerambycidae: Lamiinae: Acanthocinini). Preoccupied by *Tithonus* Germar, 1824. Spec. Ins. nov., 1, 355. (Insecta: Coleoptera: Curculionidae: Entiminae: *Otiorhynchus*).

**Remarks on nomenclatural change:** The longhorned beetle *Tithonus* Thomson, 1864 was established for a genus with the type species *Tithonus umbrosus* Thomson, 1864 in the family Cerambycidae. Nevertheless the name *Tithonus* is already occupied. Germar (1824) proposed a beetle subgenus name *Tithonus* for the genus *Otiorhynchus* Germar, 1822 of Curculionidae. Thus the longhorned beetle genus *Tithonus* Thomson, 1864 is a junior homonym of *Tithonus* Germar, 1824. *Tithonus* Thomson, 1864 has three junior synonyms as *Leptocometes* Bates, 1881; *Lophopoedes* Gilmour, 1957 and *Lathrozineus* Gilmour, 1959. So I suggest here that *Tithonus* Thomson, 1864 should be replaced

with the senior synonym name *Leptocometes* Bates, 1881 as a replacement name.

### Summary of nomenclatural changes:

*Leptocometes* Bates, 1881 **new substitute name**

pro *Tithonus* Thomson, 1864 (non Germar, 1824)

= *Lophopoedes* Gilmour, 1957

= *Lathrozineus* Gilmour, 1959

*Leptocometes acutispinis* (Bates, 1863) **comb. nov.**

from *Tithonus acutispinis* (Bates, 1863)

= *Lophopoeum acutispine* Bates, 1863

= *Lathrozineus volcanensis* Gilmour, 1959

Distr.: Mexico, Panama-C Brasil, Ecuador, Fr Guiana, Bolivia

*Leptocometes barbiscapus* (Bates, 1872) **comb. nov.**

from *Tithonus barbiscapus* (Bates, 1872)

= *Lophopoeum barbiscapus* Bates, 1872

Distr.: Honduras, Guatemala-Panama

*Leptocometes hispidus* Bates, 1881

from *Tithonus hispidus* (Bates, 1881)

Distr.: E Mexico-Costa Rica

*Leptocometes luneli* (Chalumeau & Touroult, 2005) **comb. nov.**

from *Tithonus luneli* Chalumeau & Touroult, 2005

Distr.: St. Vincent, Antilles

*Leptocometes nubilus* (Melzer, 1934) **comb. nov.**

from *Tithonus nubilus* (Melzer, 1934)

= *Lophopoeum nubilus* Melzer, 1934

Distr.: SE Brasil

*Leptocometes obscurus* (Monné, 1990) **comb. nov.**

from *Tithonus obscurus* Monné, 1990

Distr.: Colombia

*Leptocometes pallidus* (Melzer, 1934) **comb. nov.**

from *Tithonus pallidus* (Melzer, 1934)

= *Lophopoeum pallidus* Melzer, 1934

Distr.: E Brasil

*Leptocometes penicillatus* (Monné, 1990) **comb. nov.**

from *Tithonus penicillatus* Monné, 1990

Distr.: Colombia, Ecuador

*Leptocometes spinipennis* Bates, 1885

from *Tithonus spinipennis* (Bates, 1885)

= *Lophopoeum spinipenne* Bates, 1885

Distr.: Panama

*Leptocometes spitzi* (Melzer, 1934) **comb. nov.**

from *Tithonus spitzi* (Melzer, 1934)

= *Lophopoeum spitzi* Melzer, 1934

Distr.: SE Brasil, Fr Guiana

*Leptocometes umbrosus* (Thomson, 1864) **comb. nov.**

from *Tithonus umbrosus* Thomson, 1864

= sp. *glaucus* Melzer, 1934

Distr.: SE Brasil, Paraguay, Argentina

*Leptocometes virescens* (Melzer, 1931) **comb. nov.**

from *Tithonus virescens* (Melzer, 1931)

= *Lophopoeum virescens* Melzer, 1931

Distr.: S Brasil, Uruguay

*Leptocometes volxemi* (Lameere, 1884) **comb. nov.**

from *Tithonus volxemi* (Lameere, 1884)

= *Lophopoeum volxemi* Lameere, 1884

Distr.: SE Brasil

*Leptocometes zikani* (Martins & Monné, 1974) **comb. nov.**

from *Tithonus zikani* (Martins & Monné, 1974)

= *Lophopoeus zikani* Martins & Monné, 1974

Distr.: SE Brasil

## LITERATURE CITED

**Germar, E.F.** 1824. Insectorum species novae aut minus cognitae, descriptionibus illustratae. Volumen primum. Coleoptera. [facing title page is one with title: Coleopterorum species. J.C. Hendelii et filii, Halae. 624 pp.

**International Commission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Stål, C.** 1856. Öfversigt af Kongl. Vetenskaps-Akademiens Förhandlingar Stockholm. 13: p. 168.

**Thomson, J.** 1857. Archives Entomologiques, 1: 514 pp. [p. 406].

**Thomson, J.** 1864. Systema cerambycidarum ou exposé de tous les genres compris dans la famille des cérambycides et familles limitrophes. Mémoires de la Société Royale des sciences de Liège, Paris, 19: 1-540.



## FAUNISTIC STUDIES ON PAEDERINAE (COLEOPTERA: STAPHYLINIDAE) IN MANİSA PROVINCE, TURKEY\*

Sinan Anlaş\* and I. Ethem Çevik\*\*

\*Department of Biology, Faculty of Science, University of Ege, 35100 Bornova, Izmir/TURKEY. E-mail: sinan.anlas@gmail.com

\*\*Department of Biology, Faculty of Science, University of Ege, 35100 Bornova, Izmir/TURKEY. E-mail: ethem.cevik@ege.edu.tr

[Anlaş, S. & Çevik, I. E. 2008. Faunistic studies on Paederinae (Coleoptera: Staphylinidae) in Manisa province, Turkey. *Munis Entomology & Zoology* 3 (2): 665-674]

**ABSTRACT:** In this study, fauna of Paederinae from Manisa province of Turkey were studied and 35 species belonging to 16 genera were recorded. *Achenium depressum* (Gravenhorst, 1802) and *Pseudolathra tennenbaumi* (Bernhauer, 1932) are recorded from Turkey for the first time. *Leptobium bozdaghense* Assing, 2006; *Scopaeus alaniensis* Coiffait, 1969 and *Sunius pinnatus* Assing, 2006 represented the first record since the description of the species. All species except for *Medon fuscus* (Mannerheim, 1830), *Sunius pinnatus* Assing, 2006 and *Scopaeus cameroni* Coiffait, 1968 were recorded for the first time in Manisa.

**KEY WORDS:** Paederinae, Staphylinidae, new records, fauna, Manisa, Turkey.

Staphylinidae comprises 3845 genera and 45.707 species worldwide, 1520 of which occur in Turkey (Herman, 2001; Anlaş, 2007). Paederinae is one of the biggest subfamilies of Staphylinidae. A total of 5962 species to 225 genera were recorded in the world (Herman, 2001). Approximately 200 species are currently known from Turkish territory. The subfamily is distributed worldwide and is found in practically all types of ecosystems. Most species appear to be predators.

The fauna of Paederinae of Manisa has been poorly studied. Four species of Paederinae have been recorded from the studied region in the following published works: Frisch (2002), Assing (2004, 2006c).

The aim of this study was to make a contribution to fauna of Paederinae of Manisa and Turkey.

### MATERIAL AND METHODS

The material for this study was collected by the first author from different localities in Manisa province (Map 1) between the dates of 2005, March and 2007, August. Materials have been deposited in the Ege University Zoological Museum (=ZDEU-Ent) İzmir, Turkey.

Classification and nomenclature of the subfamily Paederinae suggested by Löbl & Smetana (2004) have been followed in this study.

Countries have been coded as follows after Löbl & Smetana (2004):

**E - Europe:** AB Azerbaijan, AL Albania, AN Andorra, AR Armenia, AU Austria, AZ Azores, BE Belgium, BH Bosnia Hercegovina, BU Bulgaria, BY Byelorussia, CR Croatia, CZ Czech Republic, DE Denmark, EN Estonia, FA Faeroe Islands, FI Finland, FR France, GB Great Britain, GE Germany, GG Georgia, GR Greece, HU Hungary, IC Iceland, IR Ireland, IT Italy,

KZ Kazakhstan, LA Latvia, LS Liechtenstein, LT Lithuania, LU Luxembourg, MA Malta, MC Macedonia, MD Moldavia, NL The Netherlands, NR Norway, PL Poland, PO Portugal, RO Romania, RU Russia (CT Central European Territory, NT North European Territory, ST South European Territory), SK Slovakia, SL Slovenia, SP Spain, SR Svalbard, SV Sweden, SZ Switzerland, TR Turkey, UK Ukraine, YU Yugoslavia.

**N - North Africa:** AG Algeria, CI Canary Islands, EG Egypt (except Sinai), LB Libya, MO Morocco, MR Madeira Archipelago, TU Tunisia.

**A - Asia:** AE Arab Emirates, AF Afghanistan, AP Arunachal Pradesh, BA Bahrain, BT Bhutan, CH China [CE Central Territory (ANH Anhui, HUB Hubei, HUN Hunan, JIA Jiangsu, JIX Jiangxi, SHG Shanghai, ZHE Zhejiang), NE Northeastern Territory (HEI Heilongjiang, JIL Jilin, LIA Liaoning), NO Northern Territory (BEI Beijing, GAN Gansu, HEB Hebei, HEN Henan, NIN Ningxia, NMO Nei Mongol, SHA Shaanxi, SHN Shandong, SHX Shanxi, TIA Tianjin), NW Northwestern Territory (GAN Gansu, NMO Nei Mongol, XIN Xinjiang), SE Southeastern Territory (FUJ Fujian, GUA Guangdong, GUX Guangxi, HAI Hainan, HKG Hong Kong, MAC Macao, TAI Taiwan), SW Southwestern Territory (GUI Guizhou, SCH Sichuan, YUN Yunnan), WP Western Plateau (QIN Qinghai, XIZ Xizang)], CY Cyprus, HP Himachal Pradesh, IN Iran, IQ Iraq, IS Israel, JA Japan, JO Jordan, KA Kashmir, KI Kyrgyzstan, KU Kuwait, KZ Kazakhstan, LE Lebanon, MG Mongolia, NP Nepal, NC North Korea, OM Oman, PA Pakistan, QA Qatar, RU Russia (ES East Siberia, FE Far East, WS West Siberia), SA Saudi Arabia, SC South Korea, SD Sikkim, Darjeeling, SI Sinai (Egyptian part), SY Syria, TD Tadzhikistan, TM Turkmenistan, TR Turkey, UP Uttar Pradesh, UZ Uzbekistan, YE Yemen.

**AFR** Afrotropical region, **AUR** Australian region, **NAR** Nearctic region, **NTR** Neotropical region, **ORR** Oriental region.

## RESULTS

In this study, fauna of Paederinae from Manisa Province of Turkey were studied and 35 species belonging to 16 genera were recorded.

### Tribe Paederini Fleming, 1821

#### Subtribe Astenina Hatch, 1957

#### Genus *Astenus* Dejean, 1833

##### *Astenus lyonessius* (Joy, 1908)

**Material examined:** Ahmetli: Yeniköy, 1 ex., 15.IV.2006. **Merkez:** Sakallı, 3 km S, 1 ex., 22.IV.2005. **Distribution in the world:** E: AZ BE CZ DE FI FR GB GE GR HU IR IT LT MA PL SK SP ST SV SZ N: AG MO MR A: TR (Löbl & Smetana, 2004). **Distribution in Turkey:** No locality cited.

##### *Astenus melanurus* (Küster, 1853)

**Material examined:** **Merkez:** Gökçeler, 1 ex., 08.II.2007. **Salihli:** Karaağaç, 2 exs., 04.VII.2006. **Sarıgöl:** Yeniköy, 1 ex., 12.VI.2005. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 08.I.2007; same data, 1 ex., 10.I.2007. **Distribution in the world:** E: CR FR GR IT MA PT SK SP N: AG EG LB MO TU A: CY IN TR UP **AFR ORR** (Löbl & Smetana, 2004). **Distribution in Turkey:** No locality cited.

##### *Astenus procerus* (Gravenhorst, 1806)

**Material examined:** **Demirci:** Irişler, 3 km SE, Büyükkır Tepesi, 1700 m, 1 ex., 15.IV.2006. **Distribution in the world:** E: AB AU BE BH BU CR CT CZ DE FI FR GB GG GR HU IT LA LT MA MC NL NR PL PT RO SK SL ST SV SZ UK YU N: AG EG MO A: CY LE TD TR UZ (Löbl & Smetana, 2004). **Distribution in Turkey:** Izmir (Sahlberg, 1913).

***Astenus thoracicus* (Baudi di Selve, 1857)**

**Material examined:** Ahmetli: Çaypınar, 1 ex., 14.IV.2006. Akhisar: Morahılar, 3 km SW, 1 ex., 05.IX.2005. Demirci: Bardakçı, Türkmen Dağı, 1700 m, 2 exs., 15.IV.2006. Köprübaşı: Yenice, 1 km NW, 1 ex., 11.VI.2005. Kula: Çarıkmahmutlu, 1 ex., 15.IX.2006; Eroğlu, 2 km S, 1 ex., 15.IX.2006. Merkez: Gökçeler, 1 ex., 08.II.2007; Karakoca, 1 ex., 23.XII.2006; Spil Dağı, 38° 33' 44"N, 27° 23' 10"E, 1100 m, 4 exs., 24.VI.2006; same data, 1 ex., 30.IX.2006; Yenice, 1 ex., 09.X.2005. Salihli: Bektaşlar, 1 ex., 22.X.2006. Selendi: Çortak, 2 exs., 06.I.2007. Turgutlu: Baktırlı, 1 ex., 08.VI.2006; Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 20.III.2006. **Distribution in the world:** E: AB GG GR IT A: CY SY TR UZ (Löbl & Smetana, 2004). **Distribution in Turkey:** Izmir (Sahlberg, 1913).

**Subtribe Cryptobiina Casey, 1905****Genus *Ochtheophilum* Stephens, 1829*****Ochtheophilum fracticorne* (Paykull, 1800)**

**Material examined:** Turgutlu: Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 31.VII.2007. **Distribution in the world:** E: AL AU BE BU CR CT CZ DE EN FI FR GB GE GR HU IR IT LA LT NL NR NT PL SK SL SP ST SV SZ UK YU N: AG LB TU A: CY ES FE IN KZ SY TR UZ WS NAR (Löbl & Smetana, 2004). **Distribution in Turkey:** Izmir (Tezcan & Amiryman, 2003).

**Subtribe Dolicaonina Casey, 1905****Genus *Leptobium* Casey, 1905*****Leptobium assingi* Bordon, 1994**

**Material examined:** Gölarmara: Beyler, 4 exs., 18.XI.2006. Gördes: Korubaşı, 5 exs., 18.XI.2006. **Distribution in the world:** TR (Löbl & Smetana, 2004; Assing, 2005d). **Distribution in Turkey:** Antakya, Antalya, Gaziantep, Kahramanmaraş (Assing, 2005d).

***Leptobium bozdaghense* Assing, 2006**

**Material examined:** Ahmetli: Yeniköy, 2 exs., 14.IV.2006. Turgutlu: Baktırlı, 3 exs., 11.III.2007; Bozkır, 3 exs., 02.II.2007; Çıkrıkçı, 38° 28'N, 27° 49'E, 300 m, 1 ex., 20.II.2006; 3 exs., 26.II.2007; Ovacık Yaylası, 2 km W, 38° 21'N, 27° 51'E, 1000 m, 1 ex., 11.III.2007; Sivrice, 1 ex., 04.III.2006. **Distribution in the world:** TR (Assing, 2006a). **Distribution in Turkey:** Izmir (Assing, 2006a). **Remarks:** Previously, only the holotype of this recently described species was known.

***Leptobium gracile* (Gravenhorst, 1802)**

**Material examined:** Demirci: Bardakçı, Türkmen Dağı, 1700 m, 25 exs., 15.IV.2006. Soma: Hamidiye, 39° 16' 39"N, 27° 45' 50"E, 827 m, 29 exs., 08.IV.2007. **Distribution in the world:** E: AL AU BH BU CR CT CZ FR GE GG GR HU IT PL PT RO SK SL SP ST TR UK YU N: AG MO TU A: CY IN IS TR UZ (Löbl & Smetana, 2004; Assing, 2005d). **Distribution in Turkey:** Adana, Adıyaman, Ankara, Antalya, Balıkesir, Bilecik, Burdur, Bursa, Çankırı, Diyarbakır, Erzincan, Erzurum, Eskişehir, Giresun, Gümüşhane, Hakkari, Isparta, İstanbul, İzmir, Kayseri, Konya, Malatya, Muğla, Samsun, Sivas, Van (Assing, 2005d).

**Subtribe Lathrobiina Laporte, 1835****Genus *Achenium* Leach, 1819*****Achenium depressum* (Gravenhorst, 1802)**

**Material examined:** Demirci: Bardakçı, Türkmen Dağı, 1700 m, 7 exs., 15.IV.2006. **Distribution in the world:** E: AU BE FR GB GE LU NL PL PT RO SP SZ UK (Löbl &

Smetana, 2004). **Remarks:** This species is widely distributed in Europe, but had not been reported from Turkey (Löbl & Smetana, 2004).

### *Achenium scimbaloides* Koch, 1937

**Material examined:** Soma: Hamidiye, 39° 16' 39"N, 27° 45' 50"E, 827 m, 9 exs., 08.IV.2007. **Distribution in the world:** E: BU GR A: TR (Löbl & Smetana, 2004). **Distribution in Turkey:** Adana, Çanakkale (Koch, 1937; Coiffait, 1984).

### Genus *Domene* Fauvel, 1873

#### *Domene stilicina* (Erichson, 1840)

**Material examined:** Merkez: Bağyolu, 1 ex., 09.X.2005. **Salihli:** Allahdiyen, 1 ex., 27.I.2007. **Selendi:** Pınarlar, 1 ex., 20.V.2007. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 02.I.2006; Ovacık Yaylası, 38° 21' 49"N, 27° 51' 00"E, 1025 m, 1 ex., 04.III.2006. **Distribution in the world:** E: AL GR IT MA N: EG LB TU A: CY IS JO LE SY TR (Löbl & Smetana, 2004). **Distribution in Turkey:** No locality cited.

### Genus *Lobrathium* Mulsant & Rey, 1878

#### *Lobrathium rugipenne* (Hochhuth, 1851)

**Material examined:** Akhisar: Gökçeler, 1,5 km SE, 1 ex., 04.IX.2005; Yeğenoba, 3 exs., 16.XII.2006. **Alaşehir:** Karadağ-Bozdağlar, 1 ex., 01.IV.2006; Kestanederesi, 4 exs., 21.X.2006. **Demirci:** Ören, 1 ex., 16.IV.2006. **Merkez:** Bağyolu, 1 ex., 09.X.2005; Spil Dağı, 38° 33' 44"N, 27° 23' 10"E, 1100 m, 3 exs., 24.IV.2006. **Selendi:** Eskin, 1 ex., 20.V.2006; Pınarlar, 2 exs., 20.V.2006. **Soma:** Yağcılı, 2 exs., 08.IV.2007. **Turgutlu:** Baktırlı, 4 exs., 08.VI.2006; Çatalköprü, 1 ex., 05.VIII.2005; Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 03.V.2005; same data, 1 ex., 12.V.2005; 3 exs., 24.V.2005; 6 exs., 02.VI.2005; 1 ex., 14.VI.2005; 1 ex., 26.VI.2005; 1 ex., 12.X.2005; 1 ex., 12.IV.2006; 4 exs., 25.IV.2006; Ovacık Yaylası, 38° 21' 49"N, 27° 51' 00"E, 1025 m, 3 exs., 14.VII.2007. **Distribution in the world:** E: AL AR BU GG GR ST YU A: TR (Löbl & Smetana, 2004). **Distribution in Turkey:** Adana, Afyonkarahisar, Antakya, Antalya, Artvin, Burdur, Erzurum, Gümüşhane, İzmir, Muğla, Rize, Zonguldak (Assing, 2007).

### Genus *Pseudobium* Mulsant & Rey, 1878

#### *Pseudobium anatolicum* Assing, 2006

**Material examined:** Alaşehir: Hacıembelli, Alkan çayı, 1 ex., 20.VIII.2007. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 12.V.2005; same data, 1 ex., 24.VII.2005. **Distribution in the world:** TR (Assing, 2006b). **Distribution in Turkey:** Antalya, Muğla (Assing, 2006b).

### Genus *Pseudolathra* Casey, 1905

#### *Pseudolathra tennenbaumi* (Bernhauer, 1932)

**Material examined:** Turgutlu: Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 10.IV.2006. **Distribution in the world:** IS (Löbl & Smetana, 2004). **Remarks:** The species is here reported from Turkey for the first time.

### Genus *Scymbalium* Erichson, 1839

#### *Scymbalium anale* (Nordmann, 1837)

**Material examined:** Soma: Hamidiye, 39° 16' 39"N, 27° 45' 50"E, 827 m, 28 exs., 08.IV.2007. **Distribution in the world:** E: AR AU BH BU CR FR GR HU IT PL RO SK ST SZ UK N: AG A: IQ SY TM TR (Löbl & Smetana, 2004). **Distribution in Turkey:** No locality cited.

**Subtribe Medonina Casey, 1905****Genus *Medon* Stephens, 1833*****Medon fuscus* (Mannerheim, 1830)**

**Material examined:** Turgutlu: Çatalköprü, 3 exs., 05.VIII.2005. **Merkez:** Spil Dağı, 38° 32' 35"N, 27° 27' 52"E, 1100 m, 1 ex., 24.IV.2006. **Distribution in the world:** E: AB AL AR AU BE BH BU CR CZ FR GB GE GG GR HU IT LT NL NR PL PT RO SK SL SP ST SV SZ TR UK YU A: CH CY IS LE SY TR (Assing, 2004a, b; Löbl & Smetana, 2004). **Distribution in Turkey:** Adana, Adıyaman, Amasya, Ankara, Antakya, Antalya, Bitlis, Bingöl, Bolu, Denizli, Isparta, İstanbul, Kahramanmaraş, Kastamonu, Kocaeli, Konya, Mersin, Muğla, Ordu, Osmaniye, Sinop, Tokat, Zonguldak (Assing, 2004a, b).

***Medon lydicus* Bordoni, 1980**

**Material examined:** Turgutlu: Çatalköprü, 2 exs., 05.VIII.2005. **Distribution in the world:** E: BU A: TR (Assing, 2004a; Löbl & Smetana, 2004). **Distribution in Turkey:** İzmir, Muğla (Assing, 2004a).

***Medon pythonissa* (Saulcy, 1864)**

**Material examined:** Kırkağaç: Karakurt, 1 ex., 10.III.2007. **Turgutlu:** Çıkırıkçı creek, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 02.III.2006. **Distribution in the world:** E: AR BU GR MC ST UK A: CY IS LE SY TR (Assing, 2004a, b; Löbl & Smetana, 2004). **Distribution in Turkey:** Ankara, Antalya, Antakya, Aydın, Balıkesir, Denizli, İstanbul, İzmir, Kahramanmaraş, Konya, Manisa, Mersin, Muğla, Niğde (Assing, 2004a, b).

***Medon semiobscurus* (Fauvel, 1875)**

**Material examined:** Salihli: Bektaşlar, 1 ex., 22.X.2006. **Turgutlu:** Çatalköprü, 1 ex., 05.VIII.2005. **Distribution in the world:** E: GR A: IS LE SY TR (Assing, 2004a). **Distribution in Turkey:** Adana, Antakya, Antalya, Bitlis, Bursa, Denizli, Diyarbakır, Isparta, İzmir, Mersin, Muğla, Osmaniye (Assing, 2004a, b).

**Genus *Pseudomedon* Mulsant & Rey, 1878*****Pseudomedon obsoletus* (Nordmann, 1837)**

**Material examined:** Ahmetli: Yeniköy, 1 ex., 15.IV.2006. **Selendi:** Eskin, 1 ex., 20.V.2006. **Turgutlu:** Çıkırıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 29.IV.2005; same data, 1 ex., 08.VIII.2005; 1 ex., 12.IV.2006; 1 ex., 14.IV.2006; 1 ex., 01.V.2006; Güney, 1 ex., 22.II.2007. **Distribution in the world:** E: AB AL AU AZ BE BH BU CR CT CZ DE EN FI FR GB GE GG GR HU IR IT LA NL NT PL PT RO SK SL SP ST SV SZ UK YU N: AG EG MO TU A: IN SY TR AFR AUR NAR (Löbl & Smetana, 2004). **Distribution in Turkey:** No locality cited.

**Genus *Sunius* Stephens, 1829*****Sunius anatolicus* Assing, 1995**

**Material examined:** Soma: Hamidiye, 39° 16' 39"N, 27° 45' 50"E, 827 m., 1 ex., 08.IV.2007. **Distribution in the world:** TR (Löbl & Smetana, 2004). **Distribution in Turkey:** Antalya, Muğla (Assing, 2001a; 2005a, b, c).

***Sunius melanocephalus* (Fabricius, 1793)**

**Material examined:** Demirci: Bardakçı, Türkmen Dağı, 6 exs., 15.IV.2006; Irişler, Büyükkır Tepesi, 1800 m, 2 exs., 16.IV.2006; Minnetler, 2 exs., 16.IV.2006. **Merkez:** Spil Dağı, 38° 33' 44"N, 27° 23' 10"E, 1100 m, 4 exs., 24.IV.2006. **Turgutlu:** Ovacık Yaylası, 38° 21' 49"N, 27° 51' 00"E, 1025 m, 4 exs., 01.V.2007. **Distribution in the world:** E: AU BE BH BU CR CT CZ DE FR GB GE GG GR HU IR IT LA NL PL RO SK SP ST SV SZ UK YU A: CH IN TR NAR (Löbl & Smetana, 2004). **Distribution in Turkey:** Artvin, Bolu,

Burdur, Erzincan, Istanbul, Kars, Kastamonu, Muğla, Samsun, Sinop, Zonguldak (Assing, 2001a; 2005a, b, c).

### ***Sunius pinnatus* Assing, 2006**

**Material examined:** Merkez: Spil Dağı, 38° 33' 20"N, 27° 23' 17"E, 1200 m, 3 exs., 29.III.2007. **Distribution in the world:** TR (Assing, 2006c). **Distribution in Turkey:** Manisa (Assing, 2006c). **Remarks:** This species represented the first record since the description of the species.

### **Subtribe Paederina Fleming, 1821**

### **Genus *Paederidus* Mulsant & Rey, 1878**

#### ***Paederidus rubrothoracicus* (Goeze, 1777)**

**Material examined:** Kula: Dereköy, Gediz river, 1 ex., 11.VIII.2006. **Soma:** Dualar 2 km N, Bakırçay river, 10 exs., 23.VII.2005. **Distribution in the world:** E: AB AL AR AU BH BU CR CZ FR GB GE GG GR HU IT MC NL PL PT RO SK SL SP ST SZ UK YU A: TR (Löbl & Smetana, 2004). **Distribution in Turkey:** Konya, Trabzon (Scheerpeltz, 1957; Fagel, 1963).

### **Genus *Paederus* Fabricius, 1775**

#### ***Paederus fuscipes* Curtis, 1826**

**Material examined:** Akhisar: Gökçeler 1,5 km SE, 3 exs., 04.IX.2005. **Kula:** Dereköy, Gediz river, 1 ex., 15.IX.2006. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 01.V.2006. **Distribution in the world:** E: AB AL AR AU BE BU CR CT CZ DE EN FI FR GB GE GG GR HU IR IT LA LT MC NL NR PL PT RO SK SL SP ST SV SZ UK YU N: AG EG TU A: AF BT ES FUJ HEB HKG HP IN IQ IS JA JO KA KI KZ NC NP PA SC SCH SD SHA SY TAI TD TM TR UP UZ YUN WS **AFR AUR ORR** (Löbl & Smetana, 2004). **Distribution in Turkey:** Izmir, Trabzon (Fagel, 1963; Tezcan & Amiryman, 2003).

### **Subtribe Scopaeina Mulsant & Rey 1878**

### **Genus *Scopaeus* Erichson, 1839**

#### ***Scopaeus alaniensis* Coiffait, 1969**

**Material examined:** Salihli: Şirinyer, 1 ex., 26.III.2005. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 12.V.2005, same data 1 ex., 23.V.2005; 1 ex., 10.VI.2007. **Distribution in the world:** TR (Löbl & Smetana, 2004). **Distribution in Turkey:** Antalya (Coiffait, 1969; Frisch et al., 2002). **Remarks:** Previously, only the type material of this species from Southern Anatolia had become known, the above specimens represent the first record from western Anatolia.

#### ***Scopaeus bicolor* Baudi di Selve, 1848**

**Material examined:** Alaşehir: Azıtepe, 1 ex., 19.XI.2005. **Demirci:** Köpüler, 2 exs., 16.IV.2006. **Gölmarmara:** Ozanca, 1 ex., 09.VI.2007. **Gördes:** Çağlayan, 1,5 km SW, Gördes creek, 2 exs., 09.VI.2007. **Kırkağaç:** Karakurt, 1 km NW, 1 ex., 10.III.2007. **Kula:** Eroğlu, 2 exs., 22.IV.2007. **Salihli:** Ortaköy, Dibek Dağı, 1 ex., 19.VII.2006. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 20.IV.2005; same data 1 ex., 28.IV.2005; 1 ex., 29.IV.2005; 1 ex., 23.V.2005; 2 exs., 26.V.2005; 7 exs., 02.VI.2005; 1 ex., 25.VIII.2006. **Distribution in the world:** E: AB AL AU BH BU CR CZ GG GR HU IT MC RO SK A: TR (Löbl & Smetana, 2004). **Distribution in Turkey:** Trabzon (Korge, 1971).

#### ***Scopaeus cameroni* Coiffait, 1968**

**Material examined:** Gördes: Çiçekli, 3 km NE, 1 ex., 11.VI.2006. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 26.V.2005; same data, 1 ex., 02.VI.2005; 2 exs., 26.VI.2005; Çatalköprü, 2 exs., 30.VI.2005; same data 4 exs., 05.VIII.2005. **Distribution**

**in the world:** E: BU GR RO TR UK A: TR (Löbl & Smetana, 2004). **Distribution in Turkey:** Afyon, Ankara, Antalya, Aydın, Bolu, Burdur, Bursa, Çankırı, Çorum, Denizli, Erzurum, Gümüşhane, İstanbul İzmir, Kastamonu, Konya, Kütahya, Manisa, Muğla, Sinop, Zonguldak (Frisch, 1997; 2002).

### *Scopaeus cariensis* Frisch, 2002

**Material examined:** Turgutlu: Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 07.VIII.2005; same data, 1 ex., 10.VI.2007. Çatalköprü, 3 exs., 05.VIII.2005. **Distribution in the world:** TR (Frisch, 2002; Löbl & Smetana, 2004). **Distribution in Turkey:** İzmir, Muğla (Frisch, 2002).

### *Scopaeus debilis* Hochhuth, 1851

**Material examined:** Turgutlu: Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 07.VIII.2005; same data 1 ex., 10.VI.2007. **Sarıgöl:** Beyharmanı, 1 ex., 17.II.2007. **Distribution in the world:** E: AB AL AR AU BH BU CR CZ FR GG GR HU IT MA PT RO SL SP ST SZ UK N: AG MO TU A: AF CY IN IQ IS KZ LE SY TD TM TR (Frisch, 1999; Frisch et al., 2002; Löbl & Smetana, 2004). **Distribution in Turkey:** Adana, Ankara, Antalya, Aydın, Hakkari, İstanbul, İzmir, Kocaeli, Mardin, Mersin, Muğla, Yozgat (Frisch, 1999).

### *Scopaeus gracilis* (Sperk, 1835)

**Material examined:** Demirci: Köpüler, 2 exs., 16.IV.2006; Büyükkır Tepesi, 1 ex., 16.IV.2006. **Kırkağaç:** Söğütalan, 4 exs., 10.III.2007. **Salihli:** Ortaköy, Dibek Dağı, 1 ex., 04.VII.2006; Poyraz, 1 ex., 04.VII.2006. **Sarıgöl:** Hacıhaliller, 1 km E, 2 exs., 18.XII.2005. **Saruhanlı:** Seyitoba, 1 ex., 08.V.2005. **Soma:** Yağcılı, 4 exs., 08.IV.2007. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 29.IV.2005; same data, 3 exs., 23.V.2005; 4 exs., 26.V.2005; 2 exs., 02.VI.2005; 2 exs., 14.VI.2005; 3 exs., 12.IV.2006; 2 exs., 14.IV.2006; 3 exs., 07.VIII.2006; 1 ex., 24.XI.2006. **Distribution in the world:** E: AB AL AU BE BH BU CR CT CZ FR GB GE GG GR HU IR IT MA MC NL PL PT RO SK SL SP ST SZ UK YU N: AG LB MO TU A: AF CY IN SY TR UZ AFR (Frisch, 1998; Frisch et al., 2002; Löbl & Smetana, 2004). **Distribution in Turkey:** Adana, Antalya, Denizli, Giresun, Hatay, İzmir, Kastamonu, Kayseri, Sivas, Trabzon (Sahlberg, 1913; Frisch, 1998).

### *Scopaeus laevigatus* (Gyllenhal, 1827)

**Material examined:** Gördes: Karaağaç, 2 km SW, 1 ex., 25.VII.2007. **Selendi:** Eskin, 2 exs., 17.VII.2007. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 26.V.2005; same data, 1 ex., 12.IV.2006; 1 ex., 14.IV.2006; 3 exs., 10.VI.2007. **Distribution in the world:** E: AB AL AU BE BH BU CR CT CZ DE EN FI FR GB GE GG GR HU IT LA LT MC MD NL NR NT PL PT RO SK SL SP ST SV SZ UK YU A: AF CH FE KI KZ TD TM TR UZ WS (Frisch et al., 2002; Löbl & Smetana, 2004). **Distribution in Turkey:** Northern, southern and eastern Anatolia, not locality cited (Frisch, (2006a).

### *Scopaeus minutoides* Coiffait, 1969

**Material examined:** Merkez: Spil Dağı, 38° 33' 20"N, 27° 23' 17"E, 1200 m, 3 exs., 29.III.2007. **Distribution in the world:** TR (Löbl & Smetana, 2004; Frisch, 2006b). **Distribution in Turkey:** Antalya, Burdur, İstanbul, İzmir, Muğla (Frisch, 1998; 2006b).

### Subtribe Stilicana Casey, 1905

### Genus *Rugilus* Leach, 1819

### *Rugilus angustatus* (Geoffroy, 1785)

**Material examined:** Alaşehir: Karadağ-Bozdağlar, 2 exs., 01.IV.2006. **Distribution in the world:** E: AR AU BE BH BU CT CZ FI FR GB GE GG GR HU IT LA NL NT PL RO SK SP ST SV SZ UK A: CY TR NAR (Löbl & Smetana, 2004). **Distribution in Turkey:** Samsun (Rougemon, 1988).

***Rugilus orbiculatus* (Paykull, 1789)**

**Material examined:** **Merkez:** Gökçeler, 1 ex., 08.II.2007. **Turgutlu:** Çıkrıkçı, 38° 28' 24"N, 27° 49' 30"E, 134 m, 1 ex., 28.XI.2006. **Distribution in the world:** **E:** AB AL AR AU AZ BE BH BU CR CT CZ DE EN FI FR GB GE GG GR HU IR IT LA LT MA MC NL NR NT PL PT RO SK SL SP ST SV SZ TR UK YU **N:** AG MO MR TU **A:** CH CY IN IS KI SY TD TR **AUR NAR** (Löbl & Smetana, 2004). **Distribution in Turkey:** Istanbul, Izmir (Rougemont, 1988).

\* This study is prepared from a Doctorate Thesis approved by the Institute of Natural Sciences of Ege University on December 2007.

**ACKNOWLEDGEMENTS**

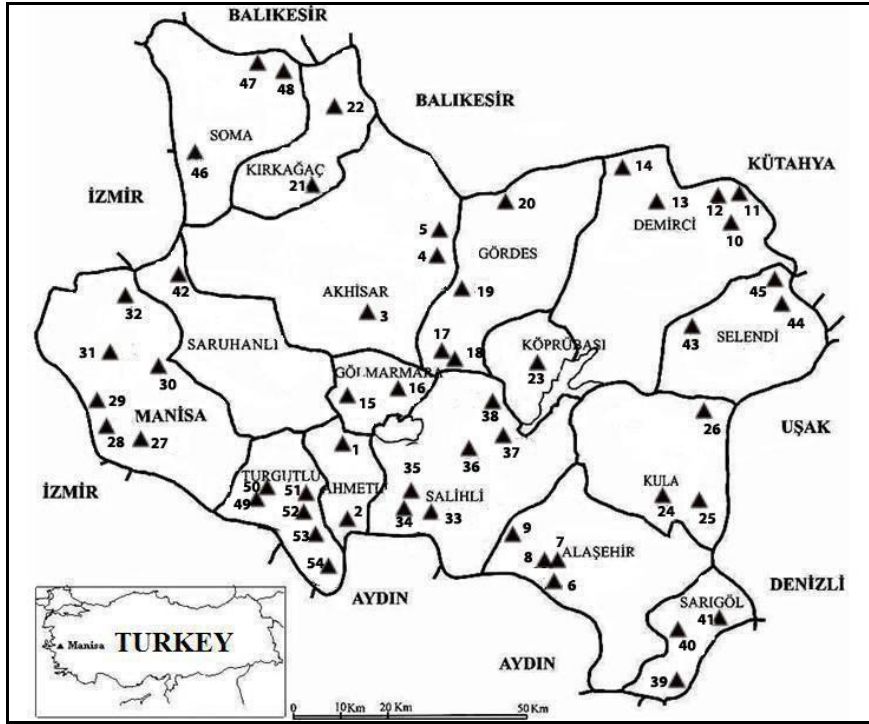
We are most grateful to Dr. Johannes Frisch (Berlin) and Volker Assing (Hannover) for their contributions. The preparation of this study was partly supported by a grant of Ege University, FEN-2006/024.

**LITERATURE CITED**

- Anlaş, S.** 2007. The present situation of the Staphylinidae fauna of Turkey (Coleoptera). Linzer Biol. Beitr. 39: 5-9.
- Assing, V.** 2001a. On the Turkish species *Sunius* Curtis, 1829 (Coleoptera: Staphylinidae, Paederinae). Linzer Biol. Beitr. 33: 195-210.
- Assing, V.** 2004a. A revision of the *Medon* species of the Eastern Mediterranean and adjacent regions (Insecta: Coleoptera, Staphylinidae, Paederinae). Bonner zool. Beitr. 52: 33-82.
- Assing, V.** 2004b. A revision of Western Palaearctic *Medon* Stephens (Coleoptera: Staphylinidae, Paederinae). Supplement I. Linzer biol. Beitr. 36: 655-662.
- Assing, V.** 2005a. On the Turkish species of *Sunius* IV. New micropterous species from southwestern Anatolia and additional records (Coleoptera: Staphylinidae, Paederinae). Linzer biol. Beitr. 37: 415-423.
- Assing, V.** 2005b. On the Turkish species of *Sunius* V. New species, additional records, a new synonymy, and an updated key to species (Coleoptera: Staphylinidae, Paederinae). Beiträge zur Entomologie, Keltern 55: 109-121.
- Assing, V.** 2005c. On the Turkish species of *Sunius* VI. New micropterous species from central southern Anatolia and additional records (Coleoptera: Staphylinidae, Paederinae). Beiträge zur Entomologie, Keltern 55: 289-298.
- Assing, V.** 2005d. A revision of the genus *Leptobium* Casey (Coleoptera: Staphylinidae, Paederinae). Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie), 673: 1-182.
- Assing, V.** 2006a. A revision of *Leptobium* Casey. Supplement I (Coleoptera: Staphylinidae, Paederinae). Linzer biol. Beitr. 38: 381-384.
- Assing, V.** 2006b. New species and record of *Pseudobium* Mulsant & Rey (Coleoptera: Staphylinidae, Paederinae). Linzer biol. Beitr. 38: 385-391.
- Assing, V.** 2006c. On the Turkish species of *Sunius* VII. Five new micropterous species from western Anatolia and additional records (Coleoptera: Staphylinidae, Paederinae). Beiträge zur Entomologie, Keltern 56: 297-315.
- Assing, V.** 2007. A revision of Palaearctic *Lobrathium* Mulsant & Rey. III. New species, new synonyms and additional records (Coleoptera: Staphylinidae: Paederinae). Linzer biol. Beitr. 39: 731-755.



- Coiffait, H.** 1969. *Scopaeus* d'Anatolie méridionale. Bulletin de la Société d'Histoire Naturelle de Toulouse 105: 33-37.
- Coiffait, H.** 1984. Coléoptères Staphylinidae de la région paléarctique occidentale. V. Sous famille Paederinae Tribu Paederini 2, Sous famille Euaesthetinae. Nouvelle Revue d'Entomologie 13: 1-424.
- Fagel, G. A.** 1963. Contribution a la connaissance des Staphylinidae. LXXXVI. Sur quelques Staphylinidae d'Anatolie. Bulletin et Annales de la société Royale d'Entomologique de Belgique 99: 426-430.
- Frisch, J.** 1997. A revision of some west Palaearctic species of *Scopaeus* Erichson (Staphylinidae: Paederinae). Revue Suisse de Zoologie 104: 523-557.
- Frisch, J.** 1998. A revision of some west Palaearctic species of *Scopaeus* Erichson (Staphylinidae: Paederinae). Revue Suisse de Zoologie 105: 89-124.
- Frisch, J.** 1999. A revision of the *Scopaeus debilis* species group, with description of a new species from Madagascar (Staphylinidae: Paederinae). Revue Suisse de Zoologie 106: 361-383.
- Frisch, J.** 2002. New species of *Scopaeus elegans* group from Turkey, with distributional notes on Anatolian *Scopaeus* species (Coleoptera: Staphylinidae, Paederinae). Mitt. Mus. Nat. kd. Berl., Dtsch. Entomol. Z. 49: 3-21.
- Frisch, J.** 2006a. The genus *Scopaeus* (Coleoptera: Staphylinidae, Paederinae) in Iran, with description of new species from Zagros Mountains. Mitt. Mus. Nat. kd. Berl., Dtsch. Entomol. Z. 53: 5-22.
- Frisch, J.** 2006b. *Scopaeus hyrcanus* sp. n. from Elburz and Talish Mountain in Iran (Coleoptera: Staphylinidae, Paederinae). Mitt. Mus. Nat. kd. Berl., Dtsch. Entomol. Z. 53: 264-270.
- Herman, L. H.** 2001. Catalog of the Staphylinidae (Insecta: Coleoptera). 1758 to the end of the second millennium. Volumes I-VII. Bulletin of the American Museum of Natural History 265: 1-4218.
- Koch, C.** 1937. Beitrag zur systematic und geographischen Verbreitung der *Achenium*-Arten (Coleoptera, Staphylinidae). Pubblicazioni del Museo Entomologico "Pietro Rossi" (Duino) 2: 51-187.
- Korge, H.** 1971. Beitrage zur kenntnis der Koleopterenfauna Kleinasien. Annat. Zool. Bot. 67: 1-68.
- Löbl, I. & Smetana, A.** 2004. Catalogue of Palaearctic Coleoptera. II. Hydrophiloidea-Histeroidea-Staphylinoidea. Apollo books, Stenstrup, 924 pp.
- Rougemont, G. M.** 1988. Notes on some palearctic *Stilicis* species with special reference to Turkey (Staphylinidae: Paederinae). Revue Suisse de Zoologie 95: 513-520.
- Sahlberg, J.** 1913. Coleoptera mediterranea orientalia, quae in Aegypto, Palaestina, Syria, Caramanis atque in Anatolia occidentali anno 1904 collegierunt John Sahlberg et Unio Saalas. Öfersigt af Finska Vetenskaps-Societetens Förhandlingar (A) 55 [1912-1913] (19): 1-281.
- Scheerpeltz, O.** 1957. Vorläufige Diagnosen einiger neuen paläarktischen Arten und Formen der Gattungen *Paederidus* Muls. Rey, *Paederus* Fabr. (mit den neuen Untergattungen *Eopaederus*, *Paederus* s. str. nov., *Heteropaederus*, *Dioncopaederus* und *Oeopaederus*), *Parameropaederus* nov. gen., *Lobopaederus* nov. gen. und *Megalopaederus* nov. gen. Memorie del Museo di Storia Naturale della Venezia Tridentina 11: 447-475.
- Tezcan, S. & Amiryan, J.** 2003. The rove beetles (Coleoptera, Staphylinidae) of the ecologically managed cherry orchards of western Turkey. Materials of the IV. Republican youth scientific conference, Urban ecology issues, 83-92, Armenia.



**Map 1. Localities of research area:** Ahmetli: 1. Çaypınar, 2. Yeniköy. Akhisar: 3. Morahılar, 4. Yeğenoba, 5. Gökçeler. Alaşehir: 6. Kestanederesi, 7. Azıtepe, 8. Hacıembelli, 9. Karadağ. Demirci: 10. Köpüler, 11. Minnetler, 12. İrişler, 13. Ören, 14. Bardakçı. Gölmarmara: 15. Ozanca, 16. Beyler, Gördes: 17. Çağlayan, 18. Korubaşı, 19. Karaağaç, 20. Çiçekli. Kırkağaç: 21. Karakurt, 22. Söğütalan, Köprübaşı: 23. Yenice. Kula: 24. Çarıkmağmutlu, 25. Eroğlu, 26. Dereköy. Merkez: 27. Spil Dağı, 28. Gökçeler, 29. Karakoca, 30. Yenice, 31. Bağyolu, 32. Sakallı. Salihli: 33. Allahdiyen, 34. Şirinyer, 35. Karaağaç, 36. Bektaşlar, 37. Poyraz, 38. Ortaköy. Sarıgöl: 39. Beyharmanı, 40. Hacıhaliller, 41. Yeniköy. Saruhanlı: 42. Seyitoba. Selendi: 43. Çortak, 44. Eskin, 45. Pınarlar. Soma: 46. Dualar, 47. Yağcılı, 48. Hamidiye. Turgutlu: 49. Bozkır, 50. Çataköprü, 51. Çıkırıkçı, 52. Güney, 53. Baktırlı, 54. Ovacık Yaylası.

## NEW FAMILY GROUP AND GENUS GROUP NAMES FOR EUCNEMIDAE (COLEOPTERA)

Hüseyin Özdikmen\*

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mails: ozdikmen@gazi.edu.tr

[Özdikmen, H. 2008. New family group and genus group names for Eucnemidae (Coleoptera). Munis Entomology & Zoology 3 (2): 675-676]

**ABSTRACT:** A junior homonym was detected among the eucnemid beetle genus group names and the following replacement name is proposed: *Muonaja* nom. nov. for *Yanga* Muona, 1993. Accordingly, new combination is herein proposed for the species currently included in this genus. *Muonaja yonde* (Muona, 1993) comb. nov.. In addition to this, I propose the replacement name Muonajini new name for the tribe name Yangini Muona, 1993.

**KEY WORDS:** nomenclatural change, homonymy, replacement name, Yangini, Muonajini, *Yanga*, *Muonaja*, Eucnemidae.

### Remarks on nomenclatural change

Muona (1993) proposed the Australian beetle genus *Yanga* with the type species *Yanga yonde* Muona, 1993 by original designation in Eucnemidae. The genus name is currently used as a valid generic name in Coleoptera as the type genus of the tribe Yangini Muona, 1993 (Insecta: Coleoptera: Elateroidea: Eucnemidae: Eucneminae: Yangini).

Unfortunately, the generic name was already preoccupied by Distant (1904), who had described the cicades genus *Yanga*. The genus is only distributed in Madagascar (Insecta: Hemiptera: Cicadomorpha: Cicadoidea: Cicadidae).

So the name *Yanga* Muona, 1993 is invalid under the rule of homonymy, being a junior homonym of *Yanga* Distant, 1904. Under the International Code of Zoological Nomenclature (ICZN 1999) it must be rejected and replaced. In accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (1999), I propose to substitute the junior homonym *Yanga* Muona, 1993 for the nomen novum *Muonaja*. As a result of this, *Yanga* Muona, 1993 is replaced with *Muonaja* as a new name.

In addition to this, I herein propose the replacement name Muonajini new name for the family group name Yangini because its type genus *Yanga* Muona, 1993 is invalid and the type genus of a family-group name must be valid.

**SYSTEMATICS**

Order Coleoptera  
Family Eucnemidae  
Subfamily Eucneminae  
Tribe **Muonajini** new name

Yangini Muona, 1993

**Type genus.**— *Muonaja* new name.

**Remarks.**—The name *Yanga* has been used in Coleoptera as a stem for a family-group name, and should be automatically replaced with the new name.

Genus ***Muonaja*** new name

*Yanga* Muona, 1993, junior homonym of *Yanga* Distant, 1904.

*Yanga* Muona, 1993. Entomologica Scandinavica Supplement 44: 25. (Insecta: Coleoptera: Elateroidea: Eucnemidae: Eucneminae: Yangini). Preoccupied by *Yanga* Distant, 1904. Ann. Mag. nat. Hist., (7) 14, 297. (Insecta: Hemiptera: Cicadomorpha: Cicadoidea: Cicadidae).

**Type species.**— *Yanga yonde* Muona, 1993 by original designation.

**Etymology.**— The genus name is dedicated to J. Muona who is the current author of the preexisting genus *Yanga*.

**Species account and distribution.** — One species as known as the type species; known from Australia.

The following new combination is proposed and the species is removed from *Yanga*:

*Muonaja yonde* (Muona, 1993) **new combination**  
Syn.: *Yanga yonde* Muona, 1993

**LITERATURE CITED**

**Distant, W. L.** 1904. Rhynchotal notes. XXVI. Annals and Magazine of Natural History (7) 14: 293-303.

**International Commission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Muona, J.** 1993. Review of the phylogeny, classification and biology of the family Eucnemidae (Coleoptera). Entomol. Scand. Suppl. 44: 1-133 [25].

**SUBSTITUTE NAMES FOR SOME PREOCCUPIED  
LONGHORNED BEETLES GENUS GROUP NAMES DESCRIBED  
BY S. BREUNING (COLEOPTERA: CERAMBYCIDAE)**

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mail: ozdikmen@gazi.edu.tr

[Özdikmen, H. 2008. Substitute names for some preoccupied longhorned beetles genus group names described by S. Breuning (Coleoptera: Cerambycidae). Munis Entomology & Zoology 3 (2): 677-681]

**ABSTRACT:** Six junior homonym genus group names were detected among the longhorned beetle genus group names. All names were described by S. Breuning. So, the following replacement names are herein proposed: *Mindanaona* nom. nov. for *Brachyelasma* Breuning, 1958; *Novorondonia* nom. nov. for *Rondonia* Breuning, 1962; *Papuanomenyllus* nom. nov. for *Paramenyllus* Breuning, 1978; *Hefferniella* nom. nov. for *Parazelota* Breuning, 1938; *Mustafaia* nom. nov. for *Shelfordia* Breuning, 1954 and *Zambiana* nom. nov. for *Trichexocentroides* Breuning, 1979.

**KEY WORDS:** nomenclatural change, homonymy, replacement name, Coleoptera, Cerambycidae, Lamiinae.

**Family CERAMBYCIDAE  
Subfamily LAMIINAE  
Genus *MINDANAONA* nom. nov.**

*Brachyelasma* Breuning, 1958. Bull. Inst. r. Sci. nat. Belg. 34 no. 22: 19. (Insecta: Coleoptera: Cerambycidae: Lamiinae). Preoccupied by *Brachyelasma* Lang, Smith & Thomas, 1940. Index of Palaeozoic Coral Genera, 28. (Cnidaria: Anthozoa: Rugosa: Stauriida: Streptelasmataceae: Streptelasmatinae).

**Remarks on nomenclatural change:** Breuning (1958) described a longhorned beetle genus *Brachyelasma* with the type species *Brachyelasma mindanaonis* Breuning, 1958 in the subfamily Lamiinae. Unfortunately, the generic name was already preoccupied by Lang, Smith & Thomas (1940), who had described the fossil coral genus *Brachyelasma* in Anthozoa. It is still used as a valid genus name. Thus, the genus group name *Brachyelasma* Breuning, 1958 is a junior homonym of the generic name *Brachyelasma* Lang, Smith & Thomas, 1940. So I propose a new replacement name *Mindanaona* nom. nov. for *Brachyelasma* Breuning, 1958.

**Etymology:** from the name of Mindanao Island in Philippines.

Summary of nomenclatural changes:

*Mindanaona* **nom. nov.**

pro *Brachyelasma* Breuning, 1958 (non Lang, Smith & Thomas, 1940)

*Mindanaona mindanaonis* (Breuning, 1958) **comb. nov.**

from *Brachyelasma mindanaonis* Breuning, 1958

**Genus *NOVORONDONIA* nom. nov.**

*Rondonia* Breuning, 1962. Bull. Soc. r. Sci. nat. Laos No. 3: 7. (Insecta: Coleoptera: Cerambycidae: Lamiinae). Preoccupied by *Rondonia* Travassos, 1920. Rev. vet. zootech. Rio de Janeiro, 1919, 62. (Nematoda: Atractidae).

**Remarks on nomenclatural change:** The genus *Rondonia* was erected by Travassos, 1920 with the type species *Rondonia rondoni* Travassos, 1920 in Nematoda. The genus is still used as a valid name in the family Atractidae. Later, the longhorned beetle genus name *Rondonia* was proposed by Breuning, 1962 with the type species *Rondonia ropicoides* Breuning, 1962 in the family Cerambycidae. However, the genus group name *Rondonia* Breuning, 1962 is invalid under the law of homonymy, being a junior homonym of the genus *Rondonia* Travassos, 1920. So I propose to substitute the junior homonym name *Rondonia* Breuning, 1962 for the name *Novorondonia* nom. nov.

Etymology: from the Latin word “nova” (meaning “new” in English) + current genus name.

Summary of nomenclatural changes:

*Novorondonia* **nom. nov.**

pro *Rondonia* Breuning, 1962 (non Travassos, 1920)

*Novorondonia ropicoides* (Breuning, 1962) **comb. nov.**

from *Rondonia ropicoides* Breuning, 1962

*Novorondonia bisignata* (Hayashi, 1976) **comb. nov.**

from *Rondonia bisignata* Hayashi, 1976

**Genus *MIMOMENYLLUS* Breuning, 1973  
Subgenus *PAPUANOMENYLLUS* nom. nov.**

*Paramenyllus* Breuning, 1978. Miscelanea zool. Barcelona 4 (2): 135. (Insecta: Coleoptera: Cerambycidae: Lamiinae). Preoccupied by *Paramenyllus* Breuning, 1938. Festschr. E. Strand, 4, 360. (Insecta: Coleoptera: Cerambycidae: Lamiinae).

**Remarks on nomenclatural change:** The generic name *Paramenyllus* Breuning, 1938 was proposed for a genus of longhorned beetle family Cerambycidae with the type species *Paramenyllus albolateralis* Breuning, 1938. Subsequently, the genus group name *Paramenyllus* Breuning, 1978 was introduced for a new longhorned beetle subgenus (with the type species *Mimomenyillus* (*Paramenyllus*) *ochreithorax* Breuning, 1978 by original designation and monotypy). Thus, the subgenus *Paramenyllus* Breuning, 1978 is a junior homonym of the generic name *Paramenyllus* Breuning, 1938. So I propose for the subgenus name *Paramenyllus* Breuning, 1978 the new replacement name *Papuanomenyillus* nom. nov.

Etymology: from Papua New Guinea that is the distributional area of the subgenus *Paramenyllus* Breuning, 1978.

Summary of nomenclatural changes:

Genus *Mimomenyillus* Breuning, 1973

Subgenus *Papuanomenyillus* **nom. nov.**

pro *Paramenyllus* Breuning, 1978 (non Breuning, 1938)

*Mimomenyillus* (*Papuanomenyillus*) *ochreithorax* (Breuning, 1978) **comb. nov.**  
from *Mimomenyillus* (*Paramenyllus*) *ochreithorax* Breuning, 1978

### **Genus *PSEUDOZELOTA* Breuning, 1936** **Subgenus *HEFFERNIELLA* nom. nov.**

*Parazelota* Breuning, 1938. Festschr. E. Strand, 4, 208. (Insecta: Coleoptera: Cerambycidae: Lamiinae). Preoccupied by *Parazelota* Meyrick, 1913. Ann. Transvaal Mus., 3, 319. (Insecta: Lepidoptera: Yponomeutidae: Yponomeutinae).

**Remarks on nomenclatural change:** The longhorned beetle *Parazelota* Breuning, 1938 was established for a subgenus of the genus *Pseudozelota* Breuning, 1936 with the type species *Acanthocacia punctipennis* Schwarzer, 1930 in the family Cerambycidae. Nevertheless the name *Parazelota* is already occupied. Meyrick (1913) proposed a moth genus name *Parazelota* with the type species *Parazelota dryotoma* Meyrick, 1913 by monotypy for Lepidoptera. Thus the longhorned beetle subgenus *Parazelota* Breuning, 1938 is a junior homonym of *Parazelota* Meyrick, 1913 (Lep.: Yponomeutidae). I suggest here that the name *Hefferniella* should be erected as a replacement name for *Parazelota* Breuning, 1938.

Etymology: The subgenus name is dedicated to Daniel J. Heffern (USA).

Summary of nomenclatural changes:

Genus *Pseudozelota* Breuning, 1936

Subgenus *Hefferniella* **nom. nov.**

pro *Parazelota* Breuning, 1938 (non Meyrick, 1913)

*Pseudozelota* (*Hefferniella*) *mima* (Breuning, 1938) **comb. nov.**  
from *Pseudozelota* (*Parazelota*) *mima* Breuning, 1938  
= *Parazelota mima* Breuning, 1938

*Pseudozelota* (*Hefferniella*) *punctipennis* (Schwarzer, 1930) **comb. nov.**  
from *Pseudozelota* (*Parazelota*) *punctipennis* (Schwarzer, 1930)  
= *Acanthocacia punctipennis* Schwarzer, 1930

**Genus *ENTELOPES* Guérin-Ménéville, 1844**  
**Subgenus *MUSTAFAIA* nom. nov.**

*Shelfordia* Breuning, 1954. Ent. Arb. Mus. Frey, 5, 479. (Insecta: Coleoptera: Cerambycidae: Lamiinae). Preoccupied by *Shelfordia* Cameron, 1902. J. Straits Asiat. Soc., 37, 35. (Insecta: Hymenoptera: Apocrita: Ichneumonoidea: Braconidae).

**Remarks on nomenclatural change:** The name *Shelfordia* was initially introduced by Macquart, 1851 for a genus of the bees family Braconidae. Subsequently, Breuning, 1954 described a longhorned beetle subgenus *Shelfordia* for the genus *Entelopes* Guérin-Ménéville, 1844 under the same generic name (with the type species *Entelopes shelfordi* Aurivillius, 1923). Thus, the genus group name *Shelfordia* Breuning, 1954 is a junior homonym of the genus *Shelfordia* Cameron, 1902 (Hymenoptera). So I propose a new replacement name *Mustafaia* nom. nov. for the subgenus name *Shelfordia* Breuning, 1954.

**Etymology:** The subgenus name is dedicated to Mustafa Darılmaz (Turkey).

Summary of nomenclatural changes:

Genus *Entelopes* Guérin-Ménéville, 1844

Subgenus *Mustafaia* **nom. nov.**

Pro *Shelfordia* Breuning, 1954 (non Cameron, 1902; nec Stummer-Traunfels, 1902)

*Entelopes (Mustafaia) fuscotarsalis* (Breuning, 1954) **comb. nov.**  
 from *Entelopes (Shelfordia) fuscotarsalis* Breuning, 1954  
 = *Entelopes fuscotarsalis* Breuning, 1954

*Entelopes (Mustafaia) shelfordi* (Aurivillius, 1923) **comb. nov.**  
 from *Entelopes (Shelfordia) shelfordi* (Aurivillius, 1923)  
 = *Entelopes shelfordi* Aurivillius, 1923

**Genus *ZAMBIANA* nom. nov.**

*Trichexocentroides* Breuning, 1979. Bulletin Soc. ent. Mulhouse 1979 (juillet-septembre): 46. (Insecta: Coleoptera: Cerambycidae: Lamiinae). Preoccupied by *Trichexocentroides* Breuning, 1957. Faune Madagascar 4: 236. (Insecta: Coleoptera: Cerambycidae: Lamiinae).

**Remarks on nomenclatural change:** The African longhorned beetle genus name *Trichexocentroides* was proposed by Breuning (1979) as an objective replacement name for the genus *Trichexocentrus* Breuning, 1978 in the family Cerambycidae. The type species of this monotypic genus is *Trichexocentrus usambaricus* Breuning, 1978. Nevertheless the name *Trichexocentroides* is already occupied. Since Breuning (1957) described a Madagascan subgenus with the name *Trichexocentroides*, for the genus *Exocentroides* Breuning, 1957 with the type species *Exocentroides (Trichexocentroides) flavipennis* Breuning, 1957 for Cerambycidae. Thus the genus name *Trichexocentroides* Breuning, 1979



is a junior homonym of *Trichexocentroides* Breuning, 1957. I suggest here that the name *Zambiana* should be erected as a replacement name for *Trichexocentroides* Breuning, 1979.

Etymology: from Zambia that is a republic in E Africa formed in 1964 by the merger of Tanganyika and Zanzibar, is distributional area of the genus.

Summary of nomenclatural changes:

*Zambiana* **nom. nov.**

pro *Trichexocentroides* Breuning, 1979 (non Breuning, 1957)

*Zambiana usambaricus* (Breuning, 1978) **comb. nov.**

from *Trichexocentroides usambaricus* (Breuning, 1978)

= *Trichexocentrus usambaricus* Breuning, 1978

### LITERATURE CITED

**Breuning, S.** 1938. Novae species Cerambycidae VI. Festschrift zum 60. Geburtstage von Professor Dr. Embrik Strand, Riga 4: 180-392.

**Breuning, S.** 1954. Revision von 35 Gattungen aus der Gruppe der Saperdini Muls. (Col., Cerambycidae). Entomologischen Arbeiten aus dem Museum G. Frey. Tutzing, 5: 401-567.

**Breuning, S.** 1957. Coleopteres Cerambycides Lamiinae. Faune de Madagascar, 4: 1-401.

**Breuning, S.** 1958. Nouvelles formes de lamiaires (Dixième partie). Bulletin de Institut Royal des Sciences Naturelles de Belgique. Bruxelles 34 (22) : 1-47.

**Breuning, S.** 1962. Contribution à la connaissance des Lamiens du Laos, 2ème partie Bulletin de la Société Royale des Sciences Naturelles du Laos 3: 7-10.

**Breuning, S.** 1978. Nouvelles espèces de Lamiinae (Cerambycidae) de la coll. Vives. Miscellanea Zoologica, Barcelona 4 (2): 131-136.

**Breuning, S.** 1979. Quelques rectifications systématiques sur les Lamiaires (Col. Cérambycidae). Bulletin de la Société Entomologique de Mulhouse [Juillet-septembre 1979]: 46-47.

**Cameron, P.** 1902. On the Hymenoptera collected by Mr. Robert Shelford at Sarawak, and on the Hymenoptera of the Sarawak Museum. J. Straits Brch Asiat. Soc. 37: 29-131.

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Lang, W. D., Smith, S. & Thomas, H. D.** 1940. Index of Palaeozoic coral genera. Brit. Mus. Natur. Hist., London, 231 pp.

**Meyrick, E.** 1913. Description of South African Micro-Lepidoptera. Annals of the Transvaal Museum 3: 319.

**Travassos, L.** 1920. Esboço de uma chave geral dos nematodeos parasitos. Rev. Vet. Zoot. 10 (2) : 59-70.

## THE CAVE DWELLING ARTHROPODS OF DIM CAVE (TURKEY: ANTALYA: ALANYA)

**Kadir Boğaç Kunt\*, Ersen Aydın Yağmur\*\*  
and Mert Elverici\*\*\***

\* Turkish Arachnological Society, Eserköy Sitesi 9/A Blok No:7 TR-06530 Ümitköy Ankara TURKEY. e-mail: kbkunt@gmail.com

\*\* Ege University, Science Faculty, Biology Department, Zoology Section, TR-35100 İzmir TURKEY.

\*\*\* Ankara University, Science Faculty, Biology Department, TR-06610 Tandoğan Ankara TURKEY.

[Kunt, K. B., Yağmur, E. A. & Elverici, M. 2008. The cave dwelling arthropods of Dim cave (Turkey: Antalya: Alanya). *Munis Entomology & Zoology* 3 (2): 682-690]

**ABSTRACT:** This study was carried out in order to determine the speleofauna of Dim cave. As a result of the study, totally 25 taxa were determined. All the taxa determined were firstly reported for this Dim cave; among them, *Meta menardi* and *Neobisium (Ommatoblothrus) epirensis* are new for Turkish fauna.

**KEY WORDS:** Arthropoda, Biospeleology, Dim Cave, Fauna

### INTRODUCTION

The geological formation and variation of Turkey contributes to its own biodiversity. According to the data from MTA (General Directorate of Mineral Research & Exploration), karstic systems that covers 2/5 of the country and caves (thousands of them exist) present a lot of species that passed to underground during the past geological periods and over time have become isolated from the surface.

The first study concerning the fauna of caves of Turkey was made at Yarımburgaz cave (İstanbul) by the Hungarian scientist Colonel Dr. Abdullah Bey, during the year 1865, and these findings were published in 1867 in France (Erguvanlı, 1965).

During the 20th century, studies by foreign scientists were particularly plentiful, however, these studies were not based on a systematic, purposeful sampling; instead of, identification of the samples by foreign experts that were collected and taken abroad.

The most striking ones amongst them are; French entomologist René Jeannel (1933, 1934, 1947a, 1947b, 1955a, 1955b and 1957) and Italian entomologist Augusto Vigna Taglianti's (1973, 1977, 1978a, 1978b and 1980) on Coleoptera (Insecta), Italian arachnologist Paolo Marcello Brignoli's (1968, 1971, 1972, 1978a, 1978b and 1979) on Araneae (Arachnida); Strouhal (1953a, 1953b, 1963 and 1971), Vandel (1957) and Verhoeff (1936)'s studies on the terrestrial isopods all sampled from Turkish caves.

Cave ecosystems are extremely sensitive ecosystems; and it is well known that the settled fauna of caves that have opened to tourism suffer serious damage (Pulido-Bosch et al., 1997).

The aim of this study is to lead the studies on determining the cave dwelling arthropods of Dim Cave which, in 1996 were hired from the government and in 1998 have opened to the public by the private sector, and ever since is under heavy antropogen effect.

## MATERIALS AND METHODS

Dim Cave is at a distance of 145 km. from the city Antalya and 11 km. from the Alanya. The Cave is at a height of 232 metres above sea level and is on the western slope of 1691 metres high Cebel Reis mountain. Dim Cave is a natural and karstic cave. It was formed by the carbonic acid rich rain and snow waters running through the faults and joints dissolving the limestone rocks. Dim Cave is 360 metres long and approximately 10-15 metres in width and height. The interior of the cave is covered by many kinds of dripstone (stalagmites and stalagmites) formations and at present the dripstone formation continues from place to place. At the end of the Cave there is a small lake which is 17 metres deep then the entrance level and approximately 200 m<sup>2</sup> at the surface. Occurance of the lake depends to the shist level (impermeable) which takes place at the buttom (**fig. 1**).

The sampling studies were made between 2006 June and 2007 September. Directly collected samples from the environment were put into tubes that have 70% ethanol inside, labeled at that moment and then way taken to the laboratory. Samples of soil taken from the cave were put into cloth sacks and carried to the laboratory and transfered into selection mechanism made up of Berlese funnels (**fig. 2**).

During the determination of the specimens; for Araneae (Arthropoda; Arachnida) Brignoli (1968, 1971, 1972, 1978a, 1978b and 1979), Deeleman-Reinhold & Deeleman (1988), Roewer (1959 and 1962); for Pseudoscorpionida (Arthropoda; Arachnida), Manhert (1979), El-Hennawy (1988), Harvey (1990), Henderickx & Vets (2000), Sezek (2003); for Isopoda (Crustaceae; Isopoda) Strouhal (1953a, 1953b, 1963 and 1971); for Chilopoda Zapparoli (1989 and 1994); for Gryllidae and Rhaphidophoridae (Insecta; Orthoptera) Popov (1974), Us (1975) and Rampini & di Russo (2003) were taken as reference. The specimens were deposited in the Arachnology Museum of Turkish Arachnological Society (MTAS).

## RESULTS

Kingdom: Animalia  
Phylum: Arthropoda  
Subphylum: Chelicerata  
Classis: Arachnida  
Ordo: Araneae

Familia: Filistatidae Ausserer, 1867

*Filistata insidiatrix* (Forskål, 1775)

General Distribution : Mediterranean

Distribution in Turkey: Hatay: Antakya, Suadiye, Mağaracık (Roewer, 1959)

Familia: Leptonetidae Simon, 1890

*Cataleptoneta aesculapii* (Brignoli, 1968)

General Distribution: Turkey

Distribution in Turkey: Antalya: Alanya, Damlataş Cave (Brignoli 1968, 1978)

Familia: Pholcidae C. L. Koch, 1851

*Hoplopholcus patrizii* (Roewer, 1962)

General Distribution: Turkey

Distribution in Turkey: Antalya: Dağ Cave (Roewer, 1962)

*Pholcus phalangioides* (Fuesslin, 1775)

General Distribution: Cosmopolitan

Distribution in Turkey: Hatay: Samandağ, Mağaracık, Büyük Cave; Diyarbakır: Lice, Korkha Cave (Roewer, 1959)

Familia: Dysderidae C. L. Koch, 1837

*Dysdera* sp. Latreille, 1804

*Harpactea agnolettii* Brignoli, 1978

General Distribution: Turkey

Distribution in Turkey: Isparta: İnönü Cave (Brignoli, 1978)

*Harpactocrates troglophilus* Brignoli, 1978

General Distribution: Turkey

Distribution in Turkey: Isparta: Anamas, Zindan Cave (Brignoli, 1978)

Familia: Nesticidae Simon, 1894

*Nesticus* cfr. *cellulanus* (Clerck, 1757)

General Distribution: Holarctic

Distribution in Turkey: Hatay: Antakya, Narlıca Cave; Zonguldak: Ereğli, İlkısu Cave; Elazığ: Harput, Buzluk Cave; Bitlis: Ahlat, Sultan Seyit Cave (Roewer, 1959)

Familia: Linyphiidae Blackwall, 1859

*Troglohyphantes pisidicus* Brignoli, 1971

General Distribution: Turkey

Distribution in Turkey: Konya: Beyşehir Lake, Island of Hacı Akif, Hacı Akif Cave (Brignoli, 1971)

Familia: Tetragnathidae Menge, 1866

*Meta bourneti* Simon, 1922

General Distribution: Europe, Georgia and North Africa

Distribution in Turkey: Yalova: 1. and 2. Soğucak Cave; Bursa: İnkaya köyü, Suini Cave (Roewer, 1959)

*Meta menardi* (Latreille, 1804)

General Distribution: From Europe to Korea

Distribution in Turkey: New record for Turkish fauna

Familia: Agelenidae C. L. Koch, 1837

*Agelescape affinis* (Kulczyński, 1911)

General Distribution: Turkey, Syria

Distribution in Turkey: Hatay: Harbiye, Büyük Cave; Bitlis: Ahlat, Sultan Seyit Cave (Roewer, 1959)

*Tegenaria percuriosa* Brignoli, 1972

General Distribution: Turkey

Distribution in Turkey: Isparta: Anamas, Zindan Cave (Brignoli, 1972, 1978); Isparta: Barla, Barla Cave; Konya: Beyşehir Lake, Island of Hacı Akif, Hacı Akif Cave; Isparta: Anamas, Zindan Cave (Gasparo, 2007)

Familia: Phyxelididae Lehtinen, 1967

*Phyxelida anatolica* Griswold, 1990

General Distribution: Turkey, Cyprus

Distribution in Turkey: Hatay: Samandağ, Mağaracık, Büyük Cave (Roewer, 1959)

Familia: Salticidae Blackwall, 1841  
*Hasarius adansoni* (Audouin, 1825)  
General Distribution: Cosmopolitan  
Distribution in Turkey: First observation from Turkish caves

Ordo: Pseudoscorpionida  
Subordo: Iocheirata  
Superfamilia: Neobisioidea J.C. Chamberlin, 1930  
Familia: Neobisiidae J.C. Chamberlin, 1930  
*Neobisium (Ommatoblothrus) epirensis* Henderickx & Vets, 2000  
General Distribution: Epirus (Greece)  
Distribution in Turkey: New record for Turkish fauna  
*Neobisium hians* (Mahnert, 1979)  
General Distribution: Turkey  
Distribution in Turkey: Antalya: Döşemealtı, İndağı Cave (Mahnert, 1979)  
*Neobisium kossuigi* (Beier, 1949)  
General Distribution: Turkey  
Distribution in Turkey: Konya: Beyşehir Lake, Island of Hacı Akif, Hacı Akif Cave (Beier, 1949); Isparta: Kuruçaova, İnönüini Cave, Asarini Cave (Mahnert, 1979)

Subphylum: Myriapoda  
Classis: Chilopoda  
Ordo: Lithobiomorpha  
Familia: Lithobiidae Newport, 1844  
*Lithobius agilis* C. L. Koch, 1847  
General Distribution: Europe  
Distribution in Turkey: Antalya: Döşemealtı, İndağı Cave (Zapparoli, 1994)  
*Lithobius erythrocephalus* CL Koch, 1847  
General Distribution: Macaronesia, Europe, North Africa and Caucasus  
Distribution in Turkey: Konya: Beyşehir Lake, Island of Hacı Akif, Hacı Akif Cave; Seydişehir, Ferzene Cave (Zapparoli, 1994)

Subphylum: Crustacea  
Classis: Malacostraca  
Ordo: Isopoda  
Suborder: Oniscidea Latreille, 1802  
Familia: Philosciidae Kinahan, 1857  
*Chaetophiloscia sp.* Verhoeff, 1908

Familia: Trichoniscidae Sars, 1899  
*Trichonethes kossuigi* Strouhal, 1953  
General Distribution: Turkey  
Distribution in Turkey: Denizli: Acipayam, Dodurga Village, Dodurgalar Cave (Strouhal, 1953)  
*Trichoniscus sp.* Brandt, 1833  
Subphylum: Hexapoda

Classis: Insecta  
Ordo: Orthoptera  
Familia: Gryllidae Bolívar, 1878  
*Discoptila beroni* Popov, 1974  
General Distribution: Turkey  
Distribution in Turkey: Mersin: Gülnar, a cave which located near to Karatepe village; Antalya: Alanya, Damlataş Cave (Popov, 1974)

Familia: Raphidophoridae Brunner von Wattenwyl, 1888  
*Troglophilus bicakcii* Rampini & di Russo 2003  
General Distribution: Turkey

Distribution in Turkey: Konya: Beyşehir, Derebucak, Bıçakçı Cave; Çamlık, Dalayman, Balatini Cave; Antalya: Cevizli, Kuyucak, Subaşı Cave (Rampini & di Russo, 2003).

## DISCUSSION

As a result of the systematic evaluation of the arthropoda samples collected from Dim Cave, a total of 25 taxa have been determined. Due to the fact that some of the samples characters for identification have not been developed yet or the absence of one-other sex as a sample, some of the specimens could not identified, these are expressed at the genus category. Among the 21 species, *Meta menardi* (Latreille, 1804) (Araneae; Tetragnathidae) and *Neobisium (Ommatoblothrus) epirensis* Henderickx & Vets, 2000 (Pseudoscorpionida; Neobisiidae) are new for Turkish fauna.

*M. menardi* is a troglophyle species, is a common dweller of the cave ecosystems that prefers to be found in the twilight zone of the caves. (Beron et al., 2004; Smithers 2005). From Europe to the southeast Asia, this species shows a wide distribution. Why this species could not be determined until now, is a result of the rarity of faunistic studies on the habitats that this species prefer (caves, tunnels etc.).

*Ommatoblothrus* Beier, 1956; composed as a subgenus by Beier (1956) that includes the species of *Neobisium*, that shows the common troglobite characteristics such as longer extremities, pigment loss, absence of eyes or having smaller eyes.

In 1963, only 5 species from this subgenus was known, however today, by the increase of the biospeleological investigations, this number rose to 18 (Henderickx & Vets, 2000). Before, there was not any record of this subgenus from Turkey, *N. (O.) epirensis* is a new record for Turkish fauna.

To understand if this species also shows “Phoresie” for dispersal, as it is very common in Pseudoscorpionida order, more advanced observations are required. Type the location for this species is Epirus (Greece).

*Cataleptoneta aesculapii* (Brignoli, 1968) (Araneae; Leptonetidae) and *Discoptila beroni* Popov, 1974 (Orthoptera; Gryllidae) are two endemic species that were recorded from Damlatas Cave (Alanya; Antalya) (Brignoli 1968, 1978; Popov 1974). During our field trips in Damlatas Cave, it was not possible to find these two species'. The reason is, probably, use of insecticides by the municipality to eradicate the cockroach existence that is a disturbance factor for the public patients who use the cave for the purpose of speleotherapy. If it is considered that the type location of *C. aesculapii* is Damlatas Cave, our determination of this species from Dim Cave, is a pleasing fact considering that the species has not disappeared yet. It is known that, when organisms adapted to the cave life are compared with the surface organisms, as a result of their limited biogeographical distribution, they show high levels of endemism (Porter, 2007). As a matter of fact, among the determined species', *C. aesculapii*, *H. patrizii*, *H. agnolettii*, *H. troglophilus*, *T. pisidicus*, *T.*

*percuriosa*, *Neobisium hians*, *N. kosswigi*, *T. kosswigi* and *D. beroni* are only known from the caves of Turkey.

In his article "Türkiye Kara Isopod'ları Hakkında", Verhoeff (1949), mentions that "The members of family Trichoniscidae are very common in Turkish caves". Thus, two different genus of this family determined from the cave, especially large numbers of *T. kosswigi* observed on the walls of the cave.

Among the 25 taxon, species' like *T. pisidicus*, *C. aesculapii*, *N. (O.) epirensis*, *Trichoniscus sp.*, are troglobiont; eyes are totally disappeared or reduced, evident depigmentation on the surface of the body has been occurred.

Just as every cave ecosystem, troglomen species are also observed in Dim Cave (*H. adansonii*). These species are found in caves by chance or in order to hunt over cave animals (Vandel, 1966).

Because there is no study of the fauna of the cave before, we could not have the chance to compare our results with any data that belongs to the period of the cave before it was opened to tourism. By this study, as one of the counted cave rich countries of the world, it is necessary to attract attention to Turkey's speleofauna and it is stressed that speleofauna of our touristic caves is under serious threat originating from antropogenic effects. By the increase of the studies on determining the speleofauna of our caves, we believe that many other species will be added to Turkish fauna and the findings will provide a better understanding concerning Anatolian zoogeographical past.

## ACKNOWLEDGMENTS

We are extremely indebted to Mr. Juan Antonio Zaragoza (Spain), Dr. Christo Deltshev (Bulgaria), Dr. Spyros Sfenthourakis (Greece), Dr. Marzio Zapparoli (Italy), Dr. Alexi Popov (Bulgaria), Dr. Mauro Rampini (Italy) and Dr. Nuri Güldalı (Mağtur A.Ş.) for their valuable help.

## LITERATURE CITED

- Beier, M.** 1949. Türkische Pseudoscorpione. Revue de la Faculté des Sciences de l'Université d'Istanbul. Série B. 1, 1-20.
- Beier, M.** 1956. Weiteres zur Kenntnis der Höhlenpseudoscorpione Sardiniens. Fragmenta Entomologica 2, 131-135.
- Beron, P., Petrov, B. & Stoev, P.** 2004. The Invertebrate Cave Fauna of the Eastern Rhodopes (Bulgaria and Greece). Biodiversity of Bulgaria. 2. Biodiversity of Eastern Rhodopes (Bulgaria and Greece). Pensoft & National Museum Natural History
- Brignoli, P. M.** 1968. Due nuove *Paraleptoneta* cavernicole dell'Asia Minore (Araneae, Leptonetidae). Fragmenta Entomologica 6, 23-37.
- Brignoli, P. M.** 1971. Un nuovo *Troglohyphantes* cavernicolo ed anoftalmo dell'Asia Minore. Fragmenta Entomologica 7, 73-77.

**Brignoli, P. M.** 1972. Terzo contributo alla conoscenza dei ragni cavernicola di Turchia (Araneae). *Fragmenta Entomologica* 8, 161-190.

**Brignoli, P. M.** 1978a. Ragni di Turchia V. Specie nuove o interessanti, cavernicole ed epigee, di varie famiglie (Araneae). *Revue Suisse Zoologie* 85, 461-541.

**Brignoli, P. M.** 1978b. Ragni di Turchia IV. Leptonetidae, Dysderidae ed Agelenidae nuovi o interessanti di grotte della Turchia meridionale (Araneae). *Quad. Speleol. Circ. Speleol. Rom.* 3, 37-54.

**Brignoli, P. M.** 1979. Considerations zoogeographiques sur les araignees cavernicoles de Grece. *Biologica Gallo-Hellenica* 8, 223-236.

**Deeleman-Reinhold, C. L. & Deeleman, P. R.** 1988. Revision Des Dysderinae (Araneae, Dysderidae). Les Especies Mediterraneennes Occidentales Exceptees. *Tijdschrift Entomology* 131, 141-269.

**El-Hennawy, H.** 1988. Key to Pseudoscorpionid Families. *Serket* 1, 3, 1-8.

**Erguvanli, K.** 1975. Türkiye'de Miralay Dr. Abdullah Bey'in jeoloji öğretiminde ve araştırmalarında öncülüğü. *Türk Mikrobiyoloji Cemiyeti Dergisi* 5, 19-28.

**Gasparo, F.** 2007. Note Su *Tegenaria percuriosa* Brignoli, 1972, Con Descrizione Del Maschio (Araneae, Agelenidae). *Atti e Memorie della Commissione Grotte* 41, 95-103.

**Harvey, M.** 1990. Catalogue of the Pseudoscorpionida. Manchester University Press.

**Henderickx, H. & Vets, V.** 2000. *Neobisium (Ommatoblothrus) epirensis* sp. nov., a new troglobiotic pseudoscorpion from Epirus (Arachnida: Pseudoscorpiones: Neobisiidae). *Phegea* 28 (3), 83-86.

**Jeannel, R.** 1933. Diagnoses préliminaires de deux Coléoptères cavernicoles de l'Asie Mineure. *Bulletin Société Entomologique de France* 2, 20-21.

**Jeannel, R.** 1934. Coléoptères cavernicoles de la grotte de Fersine en Asie Mineure. *Annales de la Société Entomologique de France* 103: 159-174 ou 345-346.

**Jeannel, R.** 1947a. Coléoptères cavernicoles de l'Anatolie recueillis par M. C. Kosswig. *Notes Biospéologiques* 1, 9-15.

**Jeannel, R.** 1947b. Coléoptères cavernicoles de l'Anatolie recueillis par M. C. Kosswig. *Revue de la Faculté des Sciences de l'Université d'Istanbul. Série B.* XII (12), 2, 81-88.

**Jeannel, R.** 1955a. Mission de H. Coiffait en Anatolie. 1 - Les Bathysciites cavernicoles. 2. - Les Carabiques troglobies de la grotte d'Eregli. *Notes Biospéologiques* 10, 1, 3-10.

**Jeannel, R.** 1955b. Un *Bathysciite* (ou *Bathysciola*) cavernicole nouveau de Turquie (Col.). *Notes Biospéologiques* 10, 2: 117-120.

**Jeannel, R.** 1957. Un *Bathysciola* cavernicole nouveau de l'Arménie Turquie (Col. Bathysc.). *Notes Biospéologiques* 12, 1: 23-24.

**Manhert, V.** 1979. Pseudoskorpione (Arachnida) aus höhlen der Türkei und des Kaukasus. *Revue Suisse Zoologie* 86, 1, 259-266.

**Popov, A.** 1974. Eine neue *Discoptila* aus Anatolischen höhlen (Orthoptera, Gryllidae). *Internationaal Journal of Speleology* 6, 4, 353-358.



**Porter, M. L.** 2007. Subterranean biogeography: what have we learned from molecular techniques? *Journal of Cave and Karst Studies* 69,1, 179-186.

**Pulido-Bosch, A., Martín-Rosales, W., López-Chicano, M., Rodríguez-Navarro, C.M. & Vallejos, A.** 1997. Human impact in a tourist karstic cave (Aracena, Spain). *Environmental Geology* 31, 3-4, 142-149.

**Rampini, M. & di Russo, C.** 2003. Una nuova specie di *Troglophilus* di Turchia (Orthoptera, Rhaphidophoridae). *Fragmenta Entomologica*, 34 (2):235-247.

**Roewer, C. F.** 1959. Die Araneae, Solifuga und Opiliones der Sammlungen des Herrn Dr. K. Lindberg aus Griecheland, Creta, Anatolien, Iran und Indien. *Meddelanden Fraan Göteborgs Musei* 129, Ser. B, Band 8, No 4, 1-47.

**Roewer, C. F.** 1962. Ueber einige Mediterrane Arachniden. *Fragmenta Entomologica* 4, 11-18.

**Sezek, F.** 2003. Pseudoscorpionida (Chelicerata, Arachnida) Fauna of Erzurum and Erzincan Provinces (Ph. D. Thesis). Atatürk University, Graduate School of Natural and Applied Sciences, Department of Biology 193 pp.

**Smithers, P.** 2005. The diet of the cave spider *Meta menardi* (Latreille 1804) (Araneae, Tetragnathidae). *The Journal of Arachnology* 33, 243-246.

**Strouhal, H.** 1953a. Die Cylisticini (Isop. terr.) der Türkei (1. Beitrag zur Kenntnis der Türkischen Isopoden). *Revue de la Faculté des Sciences de l'Université d'Istanbul. Série B.* 18, 3-4: 353-372.

**Strouhal, H.** 1953b. Neue Trichoniscinen aus Türkischen Höhlen. (2. Beitrag zur Kenntnis der Türkischen Isopoden). *Notes Biospéologiques VIII* (8), 2: 167-183.

**Strouhal, H.** 1963. Die Haplophthalmus-Arten der Türkei (Isop. terr.) (4. Beitrag zur Kenntnis der Türkischen Isopoden). *Annales Naturhistorisches Museum Wien* 66: 385-406.

**Strouhal, H.** 1971. Die Isopoda terrestria der Höhlen von Ereğli am Scharzen Meer (5. Beitrag zur Kenntnis der Türkischen Isopoden). *International Journal of Speleology* 3, 3-4, 351-385.

**Us, P.** 1975. Cave Orthoptera (Saltatoria: Rhaphidophoridae and Gryllidae) collected by Dr. Jean Gajac in Yugoslavia, Greece and Turkey. *Entomologist's Monthly Magazine* 110, 182-192.

**Vandel, A.** 1957. Isopodes récoltés dans les grottes de la Crète par le Docteur K. Lindberg. *Notes Biospéologiques XII* (12), 2, 81-101.

**Vandel, A.** 1966. *Biospeleology : The Biology of Cavernicolous Animals*. Pergamon Press, New York.

**Verhoeff, K. W.** 1936. Ueber einige Myriapoden und einen Isopoden aus Mediterranen höhlen. *Mitteilungen über Höhlen und Karstforschung* 155-162.

**Verhoeff, K. W.** 1949. Ueber Land Isopoden aus der Türkei. III. *Revue de la Faculté des Sciences de l'Université d'Istanbul. Série B.* 14, 21-48.

**Vigna Taglianti, A.** 1973. Considerazioni sui Carabidi cavernicoli ed endogei dell'Asia Minore (Coleoptera, Carabidae). *International Journal of Speleology* 5, 3-4: 349-360.

**Vigna Taglianti, A.** 1977. Un nuovo Trechino endogeo di Turchia (Coleoptera, Carabidae). *Fragmenta Entomologica* 13, 1: 41-52.

**Vigna Taglianti, A.** 1978a. I Trechini cavernicoli di Turchia (Coleoptera, Carabidae). In "Fauna ipogea di Turchia". Quad. Speleol. Circolo Speleol. Romano 3.

**Vigna Taglianti, A.** 1978b. Gli Sfodrini cavernicoli dell'Asia Minore (Coleoptera, Carabidae). In "Fauna ipogea di Turchia". Quad. Speleol. Circolo Speleol. Romano 3.

**Vigna Taglianti, A.** 1980. Nouvelles données sur la systématique et la répartition géographique des Coléoptères Carabiques cavernicoles et endogés du Proche-Orient (Coleoptera, Carabidae). Mém. Biospéol. VII (7), 34: 163-172.

**Zapparoli, M.** 1989. Chilopodi di Turchia. II. Una nuova specie cavernicola del genere *Harpolithobius* Verhoeff, 1904 (Chilopoda, Lithobiomorpha). Fragmenta Entomologica 21, 2, 131-136.

**Zapparoli, M.** 1994. Chilopodi di Turchia. IV. Specie del genere *Lithobius* Leach, 1814 s. str. (Chilopoda, Lithobiomorpha). Fragmenta Entomologica 25, 2, 175-256.



Fig. 1. Map of Dim Cave.

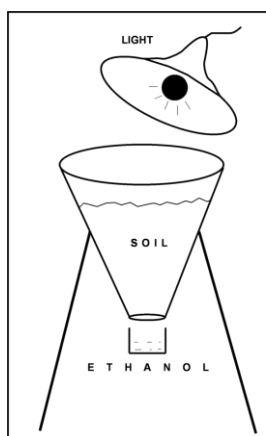


Fig. 2. Berlese Funnel.

## SOME NOMENCLATURAL CHANGES FOR ACARI (IXODIDA AND ORIBATIDA)

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mail: ozdikmen@gazi.edu.tr

**[Özdikmen, H. 2008. Some nomenclatural changes for Acari (Ixodida and Oribatida). Munis Entomology & Zoology, 3 (2): 691-698]**

**ABSTRACT:** The paper gives remarks on the nomenclatural validity of the subgenus name *Segalia* Dias, 1968 and the genus name *Hammeriella* Paschoal, 1989. In addition to this, some junior homonyms were detected among the oribatid mite genus group names and the following replacement names are proposed: *Fberninia* nom. nov. for *Berniniella* Özdikmen, 2008; *Zetorchella* Berlese, 1916 for *Chaunoproctus* Pearce, 1906 and *Salvus* nom. nov. for *Pterobates* Balogh & Mahunka, 1977. Accordingly, new combinations are herein proposed for the species currently included in these genus group names. Two family group names Zetorchellidae nom. nov. and Salvidae nom. nov. are also proposed for Chaunoproctidae Balogh, 1961 and Pterobatidae Balogh & Mahunka, 1977 respectively.

**KEY WORDS:** nomenclatural changes, homonymy, replacement names, Acari, Ixodida, Oribatida.

### Order IXODIDA Family IXODIDAE Genus *HAEMAPHYSALIS* Koch, 1844 Subgenus *SEGALIA* Dias, 1968

*Fonsecaia* Dias, 1963. Mems Estud. Mus. zool. Univ. Coimbra No. 285: 28. (Acari: Parasitiformes: Ixodida: Ixodoidea: Ixodidae: Haemaphysalinae: *Haemaphysalis*). Preoccupied by *Fonsecaia* Pinto, 1918. Brazil-Medico, 32, 233; 1922, Mem. Inst. Oswaldo Cruz, 15, 86. (Protozoa: Apicomplexa: Conoidasida: Gregarinasina: Eugregarinorida: Septatorina: Stenophoricae: Stenophoridae).

**Remarks on the validity of the subgenus name *Segalia* Dias, 1968:** Firstly, Özdikmen (2008) stated that the genus group name *Fonsecaia* Dias, 1963 (Acari) was a junior homonym of the genus *Fonsecaia* Pinto, 1918 (Protozoa). So he proposed a new replacement name *Diasjatia* Özdikmen, 2008 for the subgenus name *Fonsecaia* Dias, 1963. Unfortunately, *Diasjatia* Özdikmen, 2008 is an unnecessary replacement name. Since *Fonsecaia* Dias, 1963 has at least two synonyms as *Segalia* Dias, 1968 and *Paraphysalis* Hoogstraal, 1974. So I propose that the senior synonym name *Segalia* Dias, 1968 must be used as a valid name and a replacement name for the subgenus name *Fonsecaia* Dias, 1963 under ICZN (1999).

Summary of nomenclatural changes:

*Segalia* Dias, 1968

= *Fonsecaia* Dias, 1963 (non Pinto, 1918) [preoccupied].

= *Paraphysalis* Hoogstraal, 1974 [synonym]

= *Diasjatia* Özdikmen, 2008 [unnecessary replacement name for *Fonsecaia* Dias, 1963]

*Haemaphysalis (Segalia) montgomeryi* (Nuttall, 1912)  
= *Haemaphysalis (Fonsecaia) montgomeryi* (Nuttall, 1912).

**Order ORIBATIDA**  
**Family HAMMERIELLIDAE**  
**Genus HAMMERIELLA Paschoal, 1989**

*Hammeriella* Paschoal, 1989. Rev. Bras. Zool. 6 (1): 18. (Acari: Acariformes: Oribatida: Brachypylina: Plateremaeioidea: Hammeriellidae).

*Paschoalia* Subias, 2004 [a replacement name for *Hammeriella* Paschoal, 1989].

**Remarks on the validity of the genus name *Hammeriella* Paschoal, 1989:** Subias (2004b) proposed a replacement name *Paschoalia* Subias, 2004 for *Hammeriella* Paschoal, 1989. Since he wrongly accepted *Hammeriella* Paschoal, 1989 was a junior homonym of *Hammerella* Balogh, 1983. However, these generic names are not homonyms according to article 56.2 of the Code (ICZN, 1999). So *Paschoalia* Subias, 2004 is an unnecessary replacement name and invalid. Finally, *Hammeriella* Paschoal, 1989 must be used as a valid name under the Code.

Summary of nomenclatural changes:

*Hammeriella* Paschoal, 1989  
= *Paschoalia* Subia, 2004 [wrongly proposed unnecessary replacement name for *Hammeriella* Paschoal, 1989]

**Family ORIBATELLIDAE**  
**Genus FBERNINIA nom. nov.**

*Berniniella* Özdikmen, 2008. Munis Entomology & Zoology 3 (1): 226. (Acari: Acariformes: Oribatida: Oribatelloidea: Oribatellidae). Preoccupied by *Berniniella* Balogh, 1983. Acta zool. hung. 29 (1-3): 24. (Acari: Acariformes: Oribatida: Brachypylina: Oppioidea: Oppiidae).

**Remarks:** Özdikmen (2008) proposed a new replacement name *Berniniella* Özdikmen, 2008 for the genus name *Cavernella* Bernini, 1975. Unfortunately, the generic name was already preoccupied by Balogh (1983), who had described the genus *Berniniella* with the type species *Oppia aeoliana* Bernini, 1973 in Acari. Thus, the genus name *Berniniella* Özdikmen, 2008 is a junior homonym of the generic name *Berniniella* Balogh, 1983. So I propose a new replacement name *Fberninia* nom. nov. for *Berniniella* Özdikmen, 2008.

Etymology: The genus name “*Fberninia*” is dedicated to F. Bernini.

Summary of nomenclatural changes:

*Fberninia* **nom. nov.**  
= *Cavernella* Bernini, 1975 (non Morozova, 1974).

= *Berniniella* Özdikmen, 2008

*Fberniniella helenae* (Bernini, 1975) **comb. nov.**

= *Cavernella helenae* Bernini, 1975

= *Berniniella helenae* (Bernini, 1975)

### **Family ZETORCHELLIDAE nom. nov.**

### **Genus ZETORCHELLA Berlese, 1916**

*Chaunoproctus* Pearce, 1906. J. R. micr. Soc., 1906, 271. (Acari: Acariformes: Oribatida: Poronota: Oripodoidea : Zetorchellidae). Preoccupied by *Chaunoproctus* Bonaparte & Schlegel 1850. Mon. Loxiens, 31; 1850, Consp. Av., 1 526. (Aves: Passeriformes: Fringillidae).

**Remarks on nomenclatural change:** The monotypic fossil genus *Chaunoproctus* was described by Bonaparte & Schlegel (1850) with the type species *Chaunoproctus ferreorostris* (Vigors, 1829) in the family Fringillidae (Aves: Passeriformes). It is currently a valid generic name in Aves.

The oribatid mite genus *Chaunoproctus* was proposed by Pearce (1906) with the type species *Chaunoproctus cancellatus* Pearce, 1906 from India in Acari (Trave, 1976; Mahunka, 1992). The name is currently used as a valid generic name in Oribatida as the type genus of the family Chaunoproctidae Balogh, 1961. Subias (2004) used Caloppiidae Balogh, 1960 for this group as family name. Type genus of Caloppiidae Balogh, 1960 is *Caloppia* Balogh, 1958 (type sp. *Caloppia basilewskyi* Balogh 1958). On the other side, *Caloppia* Balogh, 1958 is a junior subjective synonym of the genus *Chaunoproctus* Pearce, 1906 now. So I think that Subias (2004a) preferred Caloppiidae instead of Chaunoproctidae as family name due to priority.

However, the name *Chaunoproctus* Pearce, 1906 is invalid under the rule of homonymy, being a junior homonym of *Chaunoproctus* Bonaparte & Schlegel, 1850. Under the International Code of Zoological Nomenclature (ICZN 1999) it must be rejected and replaced. *Chaunoproctus* Pearce, 1906 has three junior subjective synonyms as *Zetorchella* Berlese, 1916, *Caloppia* Balogh, 1958 and *Pabulozetes* Tseng, 1912. So, in accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (1999), I propose to substitute the junior homonym *Chaunoproctus* Pearce, 1906 for the senior synonym *Zetorchella* Berlese, 1916.

As a result of this, *Chaunoproctus* Pearce, 1906 is replaced with the name *Zetorchella* Berlese, 1916.

In addition to this, I herein propose the replacement name Zetorchellidae new name for the family name Chaunoproctidae because its type genus *Chaunoproctus* Pearce, 1906 is invalid and the type genus of a family-group name must be valid.

## SYSTEMATICS

## Order Oribatida

Family **Zetorchellidae** new name

= Chaunoproctidae Balogh, 1961

= Caloppiidae Balogh, 1960

**Type genus.**—*Zetorchella* Berlese, 1916.

**Remarks.**—The name *Chaunoproctus* has been used in Oribatida as a stem for a family-group name, and should be automatically replaced with the new name. According to Subias (2004), the family Zetorchellidae includes 22 species of 4 genera. These genera are *Zetorchella* Berlese, 1916 (16 species), *Stelechobates* Grandjean, 1965 (2 species); *Brassiella* Balogh, 1970 (1 species), *Chaunoproctellus* Mahunka, 1992 (3 species).

Genus **Zetorchella** Berlese, 1916

*Chaunoproctus* Pearce, 1906, junior homonym of *Chaunoproctus* Bonaparte & Schlegel, 1850.

**Type species.**—*Zetorchella pedestris* Berlese, 1916 by original designation.

**Species account and distribution:** 16 species; known from Pantropical area.

The following new combinations are proposed and the species is removed from *Chaunoproctus*:

***Zetorchella* Berlese, 1916**

= *Chaunoproctus* Pearce, 1906 [preoccupied by *Chaunoproctus* Bonaparte & Schlegel, 1850]

= *Caloppia* Balogh, 1958 [junior subjective synonym]

= *Pabulozetes* Tseng, 1982 [junior subjective synonym]

*Zetorchella abalai* (Bhaduri, Bhattacharya and Chakrabarti, 1975) **comb. nov.**

= *Chaunoproctus abalai* Bhaduri, Bhattacharya and Chakrabarti, 1975

DIST.: N India.

*Zetorchella asperulus* (Pearce, 1906) **comb. nov.**

= *Chaunoproctus asperulus* Pearce, 1906

DIST.: India (Sikkim).

*Zetorchella basilewskyi* (Balogh, 1958) **comb. nov.**

= *Caloppia basilewskyi* Balogh, 1958

= *Chaunoproctus basilewskyi* (Balogh, 1958)

DIST.: Congo.

*Zetorchella cancellatus* (Pearce, 1906) **comb. nov.**

= *Chaunoproctus cancellatus* Pearce, 1906

DIST.: India (Sikkim).

*Zetorchella deleari* (Higgins, 1966) **comb. nov.**

= *Chaunoproctus deleari* Higgins, 1966

DIST.: British Guiana [Guyana].

*Zetorchella latior* (Berlese, 1913) **comb. nov.**= *Oppia latior* Berlese, 1913= *Chaunoproctus latior* (Berlese, 1913)= *Chaunoproctus clavisetosus* Bhaduri, Bhattacharya and Chakrabarti, 1975

DIST.: Oriental.

*Zetorchella longipilosus* (Mahunka, 1974) **comb. nov.**= *Caloppia longipilosus* Mahunka, 1974= *Chaunoproctus longipilosus* (Mahunka, 1974)

DIST.: Zimbabwe.

*Zetorchella longisetosus* (Dhali and Bhaduri, 1981) **comb. nov.**= *Chaunoproctus longisetosus* Dhali and Bhaduri, 1981

DIST.: India (Sikkim).

*Zetorchella minor* (Balogh, 1958) **comb. nov.**= *Caloppia minor* Balogh, 1958= *Chaunoproctus minor* (Balogh, 1958)

DIST.: Angola to India.

*Zetorchella orbiculatus* (Wen and Zhao, 1994) **comb. nov.**= *Chaunoproctus orbiculatus* Wen and Zhao, 1994

DIST.: China.

*Zetorchella pedestris* Berlese, 1916= *Chaunoproctus pedestris* (Berlese, 1916)= *Caloppia papillata* Balogh, 1958= *Chaunoproctus crinitus* Karppinen, 1966

DIST.: Ethiopia.

*Zetorchella plumosus* (Tseng, 1982) **comb. nov.**= *Pabulozetes plumosus* Tseng, 1982= *Chaunoproctus plumosus* (Tseng, 1982)

DIST.: Taiwan [Formosa].

*Zetorchella reticulatus* (Willmann, 1933) **comb. nov.**= *Lucoppia reticulatus* Willmann, 1933= *Chaunoproctus reticulatus* (Willmann, 1933)

DISTRIBUCIÓN: Sumatra.

*Zetorchella sejugatus* (Ramani and Haq, 1997) **comb. nov.**= *Caloppia sejugatus* Ramani and Haq, 1997= *Chaunoproctus sejugatus* (Ramani and Haq, 1997)

DIST.: India (Kerala).

*Zetorchella sottoetgarciai* (Corpuz-Raros, 1979) **comb. nov.**= *Caloppia sottoetgarciai* Corpuz-Raros, 1979= *Chaunoproctus sottoetgarciai* (Corpuz-Raros, 1979)

DIST.: Philippines.

*Zetorchella vargai* (Balogh, 1959) **comb. nov.**= *Caloppia vargai* Balogh, 1959= *Chaunoproctus vargai* (Balogh, 1959)

DIST.: Tanzania.

**Family SALVIDAE nom. nov.**  
**Genus SALVUS nom. nov.**

*Pterobates* Balogh & Mahunka, 1977. Acta zool.hung. 23: 247. (Acari: Acariformes: Oribatida: Brachypylina: Cepheoidea: Pterobatidae). Preoccupied by *Pterobates* Bezzi, 1921. Bombyl. Ethiopian Reg., 273. (Insecta: Diptera: Bombyliidae).

**Remarks on nomenclatural change:** The monotypic fly genus *Pterobates* was described by Bezzi (1921) with the type species *Anthrax pennipes* Wiedemann, 1821 in the family Bombyliidae (Diptera). It is currently a valid generic name in Diptera (e.g. Evenhuis, 2007).

The monotypic oribatid mite genus *Pterobates* was proposed by Balogh & Mahunka (1977) with the type species *Pterobates incertus* Balogh & Mahunka, 1977 from Brazil in Acari. The name is currently used as a valid generic name in Oribatida as the type genus of the family Pterobatidae Balogh & Mahunka, 1977.

However, the name *Pterobates* Balogh & Mahunka, 1977 is invalid under the rule of homonymy, being a junior homonym of *Pterobates* Bezzi, 1921. Under the International Code of Zoological Nomenclature (ICZN 1999) it must be rejected and replaced. *Pterobates* Balogh & Mahunka, 1977 has no any synonym name now. So, in accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (1999), I propose to substitute the junior homonym *Pterobates* Balogh & Mahunka, 1977 for the nomen novum *Salvus*.

As a result of this, *Pterobates* Balogh & Mahunka, 1977 is replaced with the name *Salvus* nom. nov.

In addition to this, I herein propose the replacement name Salvidae new name for the family name Pterobatidae because its type genus *Pterobates* Balogh & Mahunka, 1977 is invalid and the type genus of a family-group name must be valid.

## SYSTEMATICS

### Order Oribatida

#### Family **Salvidae** new name

= Pterobatidae Balogh & Mahunka, 1977

**Type genus.**—*Salvus* nom. nov.

**Remarks.**—The name *Pterobates* has been used in Oribatida as a stem for a family-group name, and should be automatically replaced with the new name. According to Subias (2004), the family Salvidae nom. nov. includes only 1 species of 1 genera.

#### Genus **Salvus** nom. nov.

*Pterobates* Balogh & Mahunka, 1977, junior homonym of *Pterobates* Bezzi, 1921.

**Type species.**— *Pterobates incertus* Balogh & Mahunka, 1977 by original designation.



**Etymology.**—from the Latin word “salvus” meaning alive, good, original in English.

**Species account and distribution:** 1 species as the type species; known from Neotropical region.

The following new combination is proposed and the species is removed from *Pterobates*:

***Salvus* nom. nov.**

= *Pterobates* Balogh & Mahunka, 1977 (non Bezzi, 1921)

*Salvus incertus* (Balogh & Mahunka, 1977) **comb. nov.**

= *Pterobates incertus* Balogh & Mahunka, 1977

DIST.: Brazil.

## ACKNOWLEDGEMENT

I thank Karl-Heinz Schmidt (Germany) for some valuable information.

## LITERATURE CITED

**Balogh, J.** 1983. A partial revision of the Oppiidae Grandjean, 1954 (Acari: Oribatei). Acta Zoologica Academiae Scientiarum Hungaricae 29 (1-3): 1-79.

**Balogh, J. & Mahunka, S.** 1977. New data to the knowledge of the oribatid fauna of Neogaea (Acari). II. Acta zool. hung., 23 (3-4): 247-265.

**Bonaparte, C. L.** 1850. Conspectus generum avium, Lugduni Batavorum [=Leyden] E. J. Brill, 1: 526.

**Evenhuis, N. L.** 2007. Family Bombyliidae. Catalog of the Diptera of the Australasian and Oceanian Regions (online version). Last updated 03 June 2007. Available from: <http://hbs.bishopmuseum.org/aocat/bombyliidae.html>

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Mahunka, S.** 1992. New and interesting mites from the Geneva Museum LXIII. A survey of the Oribatid fauna of Senegal (Acari: Oribatida). Rev. Suisse Zool. 99 (3): 673-712.

**Özdikmen, H.** 2008. Nomenclatural changes for a family group name and twelve genus group names in Acari. Munis Entomology & Zoology 3 (1): 217-230

**Paschoal, A. D.** 1989. Description of a new genus *Hammeriella* gen.n., from South America, and a new family Hammeriellidae fam.n.(Acari:Oribatei). Revista Brasileira de Zoologia, São Paulo, 6 (1): 17-24.

**Santos Dias, J. A. T.** 1963. Contribuição para o estudo da sistemática. dos ácaros da suborden Ixodoidea Banks, 1894. Mémoires e Estudos do Museu Zoológico da Universidade da Coimbra, No. 285, 34 pp.

**Subias, L. S.** 2004a. Listado Sistemático, Sinonimico y Biogeográfico De Los Ácaros Oribátidos (Acariformes: Oribatida) Del Mundo (Excepto fósiles). Updated April 2007. Available from <http://www.ucm.es/info/zoo/Artropodos/Catalogo.pdf>.

**Subias, L. S.** 2004b. Listado sistemático, sinonímico y biogeográfico de los ácaros oribátidos (Acariformes, Oribatida) del mundo (1758-2002). Graellsia: revista de zoología, 60 (1): 3-305.

**Trave, J.** 1976. Donnees preliminaires sur la biogeographie des Oribates (Acariens) de l'Himalaya. In: Colloques Internationaux du Centre National de la Recherche Scientifique No. 268, pp. 125-128.

## A CONTRIBUTION TO THE DIPTERAN PARASITOIDS AND PREDATORS IN IRANIAN COTTON FIELDS AND SURROUNDING GRASSLANDS

**Hassan Ghahari\***, **Rüstem Hayat\*\***,  
**Chien-ming Chao\*\*\*** and **Hadi Ostovan\*\*\*\***

\* Department of Entomology; College of Agriculture; Islamic Azad University; Science and Research Branch; Tehran, Iran; email: h\_ghahhari@yahoo.com

\*\* Department of Plant Protection, Faculty of Agriculture, Atatiürk University, 25240 Erzurum, Turkey; email: rhayat@atauni.edu.tr

\*\*\* Institute of Zoology, Academia Sinica, 19; Zhongguancun Lu, Haitien, Beijing, 100080; China; email: chienmingchao@yahoo.com.cn

\*\*\*\* Department of Entomology, Islamic Azad University, Fars Science and Research Branch, Iran; email: ostovan2002@yahoo.com

**[Ghahari, H., Hayat, R., Chao, C. & Ostovan, H. 2008. A contribution to the dipteran parasitoids and predators in Iranian cotton fields and surrounding grasslands. *Munis Entomology & Zoology*, 3 (2): 699-706]**

**ABSTRACT:** Dipteran predators and parasitoids have efficient role in biological control in cotton fields. The fauna of these beneficial insects in Iranian cotton fields and surrounding grasslands is studied in this paper. In a total of 30 Diptera of three families including, Asilidae (8 species), Syrphidae (6 species) and Tachinidae (16 species) were collected. Of these, 8 tachinid species are new records for Iran.

**KEY WORDS:** Diptera, Parasitoid, Predator, Asilidae, Syrphidae, Tachinidae, Cotton field, Iran

Biological pest control is an important IPM strategy that uses beneficial organisms to reduce pest populations (Ehler, 1998). Beneficial insects play an important role in moderating the damage caused by pests. Sometimes their effect can be most dramatic and almost complete, but more often their benefit is more subtle (Miller and Aplet, 1993). Beneficial insects are important because most of our damaging pests were imported into this country without their complement of native natural enemies. Generally, beneficial insects do not occur commonly unless there is a source of food. As a result, there is usually a lapse of time between the appearance of a pest insect population and the activity of beneficial insects. This is called lag time and many factors can influence its duration (Van Driesche and Bellows, 1996). Another general but important point is that the effect of beneficial insects is usually greater when more than one species is involved. Many species of beneficial insects can be important in cotton pest management programs (Botrell et al., 1998; Synder and Wise, 1999). At least 600 different species of beneficial insects have been identified in the cotton insect community. Some of these species are very common and others are only observed on occasion. Some species are only involved with one pest species while others are involved with many pest species (Hokannen and Pimentel, 1984; Greathead, 1995). Beneficial insects can be separated into two broad groups: predators and parasitoids. Best known as predators in the

cotton fields are the larvae of syrphid flies that prey primarily on aphids. Tachinid flies commonly parasitize many types of caterpillars, especially those which are exposed during feeding. Among the hundreds of beneficial species commonly devouring cotton pests are green and brown lacewings, pirate bugs, big-eyed bugs, assassin bugs, damsel bugs, spined soldier beetles, Staphylinid rove beetles, Carabid ground beetles, Collops beetles, lady beetles, six-spotted thrips, Tachinid flies, asilid flies, Phytoseiid mites, spiders and several dozen parasitic wasp species, including *Trichogramma* (Hooks, 2000; Lockwood, 2000). The challenge for the biocontrol research and extension community therefore is to enable small and medium scale farmers to access and use the wealth of biocontrol knowledge accumulated and to make this work for them. Failure to look at pest management problems and solutions from the point of view of smallholders, compounded by poor linkages between research, extension and farmers, is one of the reasons for the limited adoption of IPM, including biological control technologies, as many authors have analyzed, e.g. NRI (1995).

The fauna of beneficial insects, especially dipteran parasitoids and predators in Iranian cotton fields has not been studied so far. In this study we collected several dipteran predators and parasitoids of the three families including, Asilidae, Syrphidae and Tachinidae from different Iranian cotton fields and surrounding grasslands. Surely the results of these faunistic works can be used for advances of IPM in cotton fields with attention to sustainable agriculture.

## MATERIALS AND METHODS

The dipteran parasitoids and predators were collected from the Iranian cotton fields and surrounding grasslands and were collected and studied for five crop seasons, 2000-2004. In order to carry out faunistic surveys on dipteran parasitoids and predators in Iranian cotton fields, firstly almost the major regions which included cotton fields were detected. Totally seven provinces including, Golestan (almost all regions), Mazandaran (eastern regions including Behshahr and Neka), Tehran (Varamin region), Semnan (Garmsar region), Fars (Darab region), Khorasan (Kashmar region) and Ardabil (Moghan region) were sampled. The materials were collected by light traps, suction traps, malaise traps, sweeping net, and also the preserved specimens in many collections. Also many tachinid parasitoids were collected by rearing the collected immature stages of Lepidoptera and Heteroptera from cotton fields and surrounding grasslands. All the specimens were collected by the first author and also some other Iranian researchers. The collected specimens were determined by the 2<sup>nd</sup> (Asilidae, Syrphidae) and 3<sup>rd</sup> (Tachinidae) authors.

## RESULTS

This faunistic survey indicated that there are diverse fauna of dipteran parasitoids and predators in Iranian cotton fields. Totally 30 species in three families including, Asilidae, Syrphidae and Tachinidae were identified. Among the collected species in this research, 8 tachinid species including, *Aplomyia confinis* (Fallén), *Blondelia nigripes* (Fallén), *Dionomelia hennigi* Kluger, *Goniophthalmus hali* Mesnil, *Heraultia albipennis* (Villeneuve), *Peleteria meridionalis* Robineau-Desoidy, *Peleteria umbratica* Zimin and *Phryxe caudata* (Rondani) are newly recorded from Iran. The list of species is below.

### Family ASILIDAE

Robber flies (Insecta: Diptera: Asilidae) comprise a large and widespread family of insects. The adults are often active flies of considerable size and readily attract attention (Geller-Grimm, 2005). Asilid adults attack insects of almost all orders, from wasps, bees, and flies to dragonflies and grasshoppers; even some spiders are eaten (Lavigne, 2001; Hayat, 1997). Shelly (1986) reported that of the nine Neotropical Asilidae species he studied, diet constituents were more than 85% composed of insects from the orders Diptera, Coleoptera, Hymenoptera, Homoptera, and Lepidoptera. Furthermore, larger species tended to consume a greater diversity of prey taxa. Some species, especially the smaller ones, do not catch their victims in flight, but await small insects which, by chance, fly within their reach. In this research totally eight asilid species were collected from Iranian cotton fields.

#### 1. *Anarolius jubatus* Loew, 1844

Material examined: Ardabil province: Moghan (2♂), July 2002. Predator of a snout moth (Lepidoptera: Pyralidae).

#### 2. *Dysmachus dasyproctus* Loew, 1871

Material examined: Khorasan province: Kashmar (1♀, 2♂), August 2000. Predator of *Evania hunteri* Mani. Mazandaran province: Behshahr, Neka (2♀, 1♂), September 2001. Predator of *Brachygaster minutus* (Olivier) (Hym.: Evaniidae).

#### 3. *Dysmachus stylifer* (Loew, 1854)

Material examined: Golestan province: Ali-Abad (2♀, 2♂), September 2001. Predator of *Liris niger* (Fabricius) (Hym.: Sphecidae).

#### 4. *Machimus rusticus* (Meigen, 1820)

Material examined: Semnan province: Garmsar (3♀), June 2001. Predator of *Systropha curvicornis* (Scopoli) (Hym.: Halictidae).

#### 5. *Stenopogon callosus* (Pallas in Wiedemann, 1818)

Material examined: Tehran province: Varamin (2♀, 1♂), July 2001. Predator of *Helicoverpa armigera* (Lep.: Noctuidae) and *Xylocopa (Copoxyia) iris* (Christ) (Hym.: Anthophoridae).

#### 6. *Stenopogon sabaudus* (Fabricius, 1794)

Material examined: Khorasan province: Kashmar (2♂), August 2002. Predator of *Palarus variegatus* Shmid & Egger (Hym.: Sphecidae).

#### 7. *Stenopogon laevigatus* (Loew, 1851)

Material examined: Golestan province: Gonbad, Ali-Abad, Gorgan (2♀, 3♂), September 2001. Predator of *Evania stenochela* Kieffer and *Zeuxevania splendidula* (Costa) (Hym.: Evaniidae).

**8. *Stenopogon xanthotrichus* (Brullé, 1832)**

Material examined: Semnan province: Garmsar (1♀, 1♂), June 2001. Predator of *Nezara viridula* L. (Het.: Pentatomidae).

**Family SYRPHIDAE**

Flower flies are a large, diverse group of insects. Many species are important pollinators of flowering plants. In addition, the immatures of numerous species are predators of destructive aphids and other plant bugs. Hoverflies can be found in every biotope but not in deserts. Each species tends to prefer a certain type of habitat and is limited to a distinct range within the country (Schneider, 1969; Vockeroth and Thompson, 1987). The fauna of Iranian Syrphidae was studied very well (Dousti and Hayat, 2006; Ghahari et al., 2008). Totally 6 syrphids were collected from Iranian cotton fields as following.

**1. *Episyrphus balteatus* (De Geer 1776)**

Material examined: Golestan province: Ali-Abad (5♀, 3♂), September 2001.

**2. *Eupeodes* sp.**

Material examined: Semnan province: Garmsar (1♀), June 2001.

**3. *Eupeodes corollae* (Fabricius, 1794)**

Material examined: Fars province: Darab (1♂), June 2003.

**4. *Scaeva albomaculata* (Macquart, 1842)**

Material examined: Khorasan province: Kashmar (1♀), August 2002.

**5. *Scaeva pyrastris* (Linnaeus, 1758)**

Material examined: Ardabil province: Moghan (1♀), July 2002. Fars province: Darab (1♂), June 2003.

**6. *Sphaerophoria scripta* (Linnaeus, 1758)**

Material examined: Golestan province: Gorgan (1♀, 1♂), July 2003.

In addition to the above mentioned syrphids, many other species were collected from the cotton fields but they do not have predatory behavior. They are mostly an inhabitant of various types of moist, decaying, vegetable matter, including cow dung and garden compost heaps or aquatic/subaquatic, found in a wide range of aqueous and semi-aqueous, organically rich, rotting materials, including cow-dung, slurry etc. (Speight, 2006) These species are as follows:

***Eristalis arbustorum* (Linnaeus, 1758)**

Material examined: Khorasan province: Kashmar (1♀, 1♂), August 2002.

***Eristalis tenax* (Linnaeus, 1758)**

Material examined: Golestan province: Gorgan (1♂), July 2003.

***Neascia podagrica* (Fabricius, 1775)**

Material examined: Golestan province: Gonbad (1♂), July 2003.

***Syrirta pipiens* (Linnaeus, 1758)**

Material examined: Mazandaran province: Behshahr (1♀, 1♂), September 2002. Fars province: Darab (1♂), June 2003.

**Family TACHINIDAE**

The Tachinidae are one of the most speciose families of Diptera, with approximately 10,000 described species worldwide (Irwin et al., 2003). One of the few traits that unites this diverse assemblage of flies is that all tachinids (with known life histories) are parasitoids of insects and other arthropods. In this respect, they are second only to the

parasitic Hymenoptera (e.g., Ichneumonoidea, Chalcidoidea) in diversity and ecological importance as insect parasitoids (Stireman et al., 2006). Because of their predominance as parasitoids of the larval stage of Lepidoptera and other major groups of insect herbivores (e.g., Heteroptera, Scarabaeidae, Chrysomelidae, Symphyta), tachinids often play significant roles in regulating herbivore populations and structuring ecological communities, both natural and managed (Tschorsnig and Richter, 1998). Of the order of 100 species have been employed in biological control programs of crop and forest pests, and many of these programs have been met with partial or complete success (Grenier, 1988). However, introduced tachinids have also been implicated in devastating effects on nontarget organisms (Boettner et al., 2000). In this study, totally 16 tachinid species were collected from different cotton fields of Iran. Of these, 8 species are newly recorded from Iran. *Aplomyia confinis* (Fallén), *Blondelia nigripes* (Fallén), *Dionomelia hennigi* Kluger, *Goniophthalmus halii* Mesnil, *Heraultia albipennis* (Villeneuve), *Peleteria meridionalis* Robineau-Desoidy, *Peleteria umbratica* Zimin and *Phryxe caudata* (Rondani)

**1. *Aplomyia confinis* (Fallén, 1820)**

Material examined: Khorasan province: Kashmar (2♀), August 2002. Reared from a lepidopteran larva (Noctuidae). New record for Iran.

**2. *Blondelia nigripes* (Fallén, 1810)**

Material examined: Mazandaran province: Behshahr (2♀, 1♂), September 2002. Reared from a lepidopteran larva (Pyralidae). New record for Iran.

**3. *Carcelia iliaca* (Ratzeburg, 1840)**

Material examined: Golestan province: Gonbad (3♀), October 2003.

**4. *Carcelia lucorum* (Meigen, 1824)**

Material examined: Tehran province: Varamin (1♀, 2♂), July 2000. Reared from a lepidopteran larva (Noctuidae).

**5. *Dionomelia hennigi* Kluger, 1978**

Material examined: Semnan province: Garmsar (1♀, 1♂), June 2001. New record for Iran.

**6. *Drino vicina* (Zetterstedt, 1849)**

Material examined: Ardabil province: Moghan (2♀), July 2002. Reared from a lepidopteran larva (Noctuidae).

**7. *Exorista fasciata* (Fallén, 1820)**

Material examined: Mazandaran province: Behshahr (2♀), September 2002. Reared from a lepidopteran larva (Noctuidae).

**8. *Exorista segregata* (Rondani, 1859)**

Material examined: Golestan province: Ali-Abad (2♀), September 2001. Reared from a heteropteran nymph (Pentatomidae).

**9. *Goniophthalmus halii* Mesnil, 1956**

Material examined: Mazandaran province: Ghaemshahr (1♀), April 2004. Reared from a lepidopteran larva (Pyralidae). New record for Iran.

**10. *Heraultia albipennis* (Villeneuve, 1920)**

Material examined: Mazandaran province: Behshahr (1♂), September 2002. New record for Iran.

**11. *Masicera sphingivora* (Robineau-Desvoidy, 1830)**

Material examined: Semnan province: Garmsar (2♀), June 2001. Reared from a lepidopteran larva (Pieridae).

**12. *Pales processionea*** (Ratzeburg, 1840)

Material examined: Fars province: Darab (1♂), June 2003. Reared from a lepidopteran larva (Hesperiidae).

**13. *Peleteria meridionalis*** Robineau-Desoidy, 1830

Material examined: Golestan province: Ali-Abad (1♀, 1♂), September 2001. New record for Iran.

**14. *Peleteria umbratica*** Zimin, 1961

Material examined: Golestan province: Kordkoy (1♀), August 2003. New record for Iran.

**15. *Phryxe caudata*** (Rondani, 1859)

Material examined: Mazandaran province: Neka (2♀, 1♂), September 2002. Reared from a lepidopteran larva (Gelechiidae). New record for Iran.

**16. *Tachina magnicornis*** (Zetterstedt, 1844)

Material examined: Ardabil province: Moghan (1♀, 2♂), July 2002. Reared from a heteropteran nymph (Pentatomidae).

Biological pest control is an important IPM strategy that uses beneficial organisms to reduce pest populations. The results of this research indicated that there are diverse fauna of dipteran parasitoids and predators in the cotton fields which must be conserved. Application of wide spectrum pesticides is the main destructive factor on these beneficial insects. Supporting the natural enemies will result in their to augmentation and in this case application of insecticides will be reduced significantly and therefore we need sustainable agriculture. The proper recognition of the many different insects found in cotton fields is essential to the efficient management and, frequently, the profitability of the crop. Although more beneficial insect species than pest species occur in cotton, pest populations can reach tremendous levels and do extensive crop damage. To maintain pest populations below economic damaging levels, by efficient management of natural enemies, chemical suppression, or other means, requires a thorough understanding of their life cycles and relationships to host crops and to other organisms. There are several general approaches to using biocontrol agents: 1. 'Classical' biocontrol targets a non-native pest with one or more species of biocontrol agents from the pest's native range; 2. the 'New Association' or 'Neoclassical' approach targets *native* pests with non-native biological control agents; 3. 'Conservation', 'Augmentation' and 'Inundation' approaches maintain or increase the abundance and impact of biocontrol agents that are already present, and in many cases native to the area. Classical biocontrol is by far the most common approach for plant pests. Conservation and augmentation approaches show great promise on their own and especially for enhancing the impacts of classical biocontrol and other weed control measures as researchers and managers focus on managing to maximize native biological diversity in invaded ecosystems (Newman et al., 1998; Strong and Pemberton, 2000).

Successful biocontrol programs usually significantly reduce the abundance of the pest, but in some cases, they simply prevent the damage



caused by the pest (e.g. by preventing it from feeding on valued crops) without reducing pest abundance (Lockwood, 2000). Biocontrol is often viewed as a progressive and environmentally friendly way to control pest organisms because it leaves behind no chemical residues that might have harmful impacts on humans or other organisms, and when successful, it can provide essentially permanent, widespread control with a very favorable cost-benefit ratio. However, some biocontrol programs have resulted in significant, irreversible harm to untargeted organisms and to ecological processes. Of course, all pest control methods have the potential to harm non-target native species, and the pests themselves can cause harm to non-target species if they are left uncontrolled. Therefore, before releasing a biocontrol agent (or using other methods), it is important to balance its potential to benefit conservation targets and management goals against its potential to cause harm (Godfray, 1994; Rosenheim, 1998).

### ACKNOWLEDGEMENTS

The authors are indebted to Prof. Pavel A. Lehr for invaluable help in determining the Asilidae and help in identifying their preys in this paper and other works. We also thank Dr. H. Sakenin (Ghaemshahr Islamic Azad University) and Eng. Z. Karimian (Iran Cotton Research Institute) for loaning many specimens. The research was supported by Tehran Islamic Azad University (Shahre Rey Branch) and Fars Science and Research Branch.

### LITERATURE CITED

- Botrell, D. G., Barbosa, P. & Gould, F.** 1998. Manipulating natural enemies by plant variety selected and modification: a realistic strategy. *Annu. Rev. Entomol.* 43: 347-367.
- Boettner, G. H., Elkinton, J. S. & Boettner, C. J.** 2000. Effects of a biological control introduction on three nontarget native species of saturniid moths. *Conserv. Biol.* 14: 1798-806.
- Dousti, A. F. & Hayat, R.** 2006. A catalogue of the Syrphidae (Insecta: Diptera) of Iran. *J. Entomol. Res. Soc.* 8(3): 5-38.
- Ehler, L. E.** 1998. Conservation biological control: past, present and future. Pp. 1-8. *In*: P. Barbosa (ed.). *Conservation biological control*. Academic Press, San Diego.
- Geller-Grimm, F.** 2005. Robber Flies (Asilidae) Database, Species, <http://www.geller-grimm.de/catalog/species.htm>, March 13, 2005.
- Ghahari, H., Hayat, R., Tabari, M. & Ostovan, H.** 2008. Hover flies (Diptera: Syrphidae) from Rice fields and around grasslands of Northern Iran. *Mun. Ent. Zool.* 3(1): 275-284.
- Godfray, H. C. J.** 1994. *Parasitoids, behavioral and evolutionary ecology*. Princeton Univ. Press, 473 pp.
- Greathead, D. J.** 1995. Benefits and risks of classical biocontrol. Pp 53-63. *In*: H.M. Hokkanen and J.M. Lynch (eds.). *Biological control: benefits and risks*. Cambridge University Press, Cambridge, U.K.
- Grenier, S.** 1988. Applied biological control with tachinid flies (Diptera, Tachinidae): a review. *Anz. Schöadling. Pfl. Umw.* 51: 49-56.

- Hayat, R.** 1997. Prey of some Robber Flies (Diptera: Asilidae) in Turkey. *Zoology in the Middle East* 15: 87-94.
- Hokannen, H. & Pimentel, D.** 1984. New approach for selecting biological control agents. *Canadian Entomologist* 116: 1109-1121.
- Hooks, C. R. R.** 2000. The impact of flora diversification on lepidopterous pests and associated natural enemies inhabiting a broccoli agroecosystem. Ph.D. Dissertation, University of Hawaii at Manoa, Honolulu, Hawaii, 234 pp.
- Irwin, M. E., Schlinger, E. I. & Thompson, F. C.** 2003. Diptera, true flies. In *The Natural History of Madagascar*, ed. S.M Goodman, J.P Benstead, pp. 692-702. Chicago/London: Univ. Chicago Press, 1728 pp.
- Lavigne, R. J.** 2001. Predator - Prey Database for the family Asilidae (Hexapoda: Diptera). [Internet - (<http://www.geller-grimm.de/catalog/lavigne.htm>)] Updated - March 2003.
- Lockwood, J. A.** 2000. Nontarget effects of biological control: what are we trying to miss? Pp. 15-30. In: P.A. Follett and J.J. Duan (eds.). *Nontarget effects of biological control*. Kluwer Academic Publishers. Boston, Massachusetts.
- Miller, M. & Aplet, G.** 1993. Biological control: a little knowledge is a dangerous thing. *Rutgers law Review* 45: 285-334.
- Newman, R. M., Thompson, D. C. & Richman, D. B.** 1998. Conservation Strategies for the biological control of weeds. Pp. 371-396. In: P. Barbosa (ed.). *Conservation biological control*. Academic Press, San Diego.
- NRI.** 1995. Taller sobre la implementacion del MIP en America del sur. *Memorias del taller* Quito, Ecuador, 1994. Chatham, UK; IPM Working Group Secretariat, NRI, 208 pp.
- Rosenheim, J. A.** 1998. Higher-order predators and the regulation of insect herbivore populations. *Annual Review of Entomology* 43: 421-447.
- Schneider, E.** 1969. Bionomics and physiology of aphidophagous Syrphidae. *Annual Review of Entomology* 14: 103-123.
- Shelly, T. E.** 1986. Rates of prey consumption by Neotropical robber flies (Diptera: Asilidae). *Biotropica* 18: 166-170.
- Speight, M. C. D.** 2006. Species accounts of European Syrphidae (Diptera), Ferrara 2006. In: Speight, M.C.D., Castella, E., Sarthou, J.-P. and Monteil, C. (eds) *Syrph the Net*, the database of European Syrphidae, vol. 54, 252 pp., Syrph the Net publications, Dublin.
- Stireman, J. O., O'Hara, J. E. & Wood, D. M.** 2006. Tachinidae: evolution, behavior, and ecology. *Annu. Rev. Entomol.* 51: 525-55.
- Strong, D. R. & Pemberton, R. W.** 2000. Biological control of invading species - risks and reform. *Science* 288: 1969-1970.
- Synder, W. E. & Wise, D. H.** 1999. Predator interference and the establishment of generalist predator populations for biocontrol. *Biological Control* 15: 283-92.
- Tschorsnig, H.-P. & Richter, V. A.** 1998. Family Tachinidae. in: Papp, L. and Darvas, B. [Eds.] *Contributions to a Manual of Palaearctic Diptera*. vol. 3, pp. 691-827. Science Herald, Budapest, Hungary.
- Van Driesche, R. G. & Bellows, T. S. Jr.** 1996. *Biological control*. Chapman and Hall, New York, 539 pp.
- Vockeroth, J. R. & Thompson, F. C.** 1987. Syrphidae. In: McAlpine, J.F. (ed.). *Manual of Nearctic Diptera*, Volume 2. Chapter 52, pp. 713-743. Research Branch, Agriculture Canada, Monograph No. 28.

## A NOMENCLATURAL ACT: SOME NOMENCLATURAL CHANGES ON PALAEARCTIC LONGHORNED BEETLES (COLEOPTERA: CERAMBYCIDAE)

Hüseyin Özdikmen\*

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE. E-mail: ozdikmen@gazi.edu.tr

[Özdikmen, H. 2008. A nomenclatural act: Some nomenclatural changes on Palaearctic Longhorned beetles (Coleoptera: Cerambycidae). *Munis Entomology & Zoology* 3 (2): 707-715]

ABSTRACT: The paper gives nomenclatural remarks on validity of the generic names *Anoplistes* Audinet-Serville, 1833 and *Callimus* Mulsant, 1846 and the tribe name Dorcasomini Lacordaire, 1869. Also a replacement name, *Phytoecia* (*Helladia*) *armeniaca holzschuhi* nom. nov., is proposed for a junior homonym name, *Phytoecia* (*Helladia*) *armeniaca iranica* Holzschuh, 1981, in the text.

KEY WORDS: replacement name, validity, Palaearctic region, Cerambycidae, Coleoptera

### Family CERAMBYCIDAE Latreille, 1802

#### Subfamily CERAMBYCINAE Latreille, 1802

#### Tribe PURPURICENINI Fairmaire, 1864

#### Genus *ANOPLISTES* Audinet-Serville, 1833 nom. rest.

= *Asias* Semenov, 1914

**Type species:** *Cerambyx halodendri* Pallas, 1776

#### Remarks on validity of the genus name *Anoplistes* Audinet-Serville, 1833:

In 1914, Semenov proposed an objective replacement name, *Asias* Semenov, 1914, for *Anoplistes* Audinet-Serville, 1833. Because he wrongly regarded *Anoplistes* Audinet-Serville, 1833 as a junior homonym of *Anoplistes* Westwood, 1831 (Diptera). However, the genus name *Anoplistes* Westwood (Diptera) is recorded by Neave (1939) in page 216 as *Anoplistes* Westwood, 1835 (not 1831). *Anoplistes* Macquart, 1835 and *Anoplistes* Westwood, 1835 are synonyms of *Gynoplistia* Macquart, 1835 in the fly family Limoniidae now (Evenhuis, 2007). According to Evenhuis (2007), *Anoplistes* Macquart, 1835 is unavailable under the CODE. The name proposed in synonymy and not made available before 1961. Also *Anoplistes* Westwood, 1835 is nomen nudum.

So *Asias* Semenov, 1914 is an unnecessary replacement name and *Anoplistes* Audinet-Serville, 1833 is a valid name. Thus, I propose that *Asias* Semenov, 1914 should be replaced with *Anoplistes* Audinet-Serville, 1833 under the priority. This status is also stated by Danilevsky (2008 a, b). However, Danilevsky (2007 a, b) still uses *Asias* Semenov, 1914 as the

genus name and gives *Anoplistes* Audinet-Serville, 1833 as a synonym name of *Asias* Semenov, 1914. In addition to this, Danilevsky (2007 and 2008 a, b) stated that "As it was written to me by G. Sama (personal communication, 2003): "Semenov (1914) introduced *Asias* a new name replacing *Anoplistes* Serville, 1833 not Westwood, 1831 (Diptera). I was able to consult Neave (*Nomenclator Zoologicus*, 1939, 1: 216); according to it, *Anoplistes* was described by Westwood only in 1835 (*Anoplistes* Westwood, 1835, London & Edinb., *Phil. Mag.*, 3(6) (34): 280). This is confirmed by Horn & Schenkling, 1929 (*Index Litteraturae Entomologicae*, series 1, band 4: 1312) where any Westwood's paper dealing with Diptera is listed in 1831, while is confirmed for 1835 the description of "*Insectorum novorum exoticorum*". *Philos. Mag.* (3), 6: 280-281" So, the name *Anoplistes* Serville, 1833 is valid".

Danilevsky (2007) stated that "According to recently published data (Namhaidorzh, 1972, 1976; Heyrovský, 1965, 1968, 1970) *Asias mongolicus* is distributed in south-west and south Mongolia from Kobd aimak to East-Gobi aimak. The species status of the taxon is doubtful. At least three *Asias* names of the group traditionally attributed to three different species are definitely synonyms: *A. amoenus* (Reitter, 1898) = *A. procerus* (Semenov, 1907) = *A. francisci* (Reymond, 1933). At the moment I prefer to regard *A. amoenus mongolicus* as a subspecies, which has the area inside Mongolian republic. The subspecies is characterized by usually dark elytra and sparse pronotal pubescence. The population in north Alashan most probably must be described as another subspecies". In these circumstances, new combinations are established as follows:

*Anoplistes agababiani* (Danilevsky, 2000) **comb. nov.**

= *Asias agababiani* Danilevsky, 2000

Distr.: Caucasus

*Anoplistes amoenus amoenus* (Reitter, 1898) **comb. nov.**

= *Asias amoenus* (Reitter, 1898)

= *Asias francisci* (Reymond, 1933)

= *Asias procerus* (Semenov, 1906)

Distr.: China, Mongolia, Vietnam

*Anoplistes amoenus mongolicus* (Ganglbauer, 1889) **comb. nov.**

= *Asias mongolicus* (Ganglbauer, 1889)

Distr.: China, Mongolia

*Anoplistes chodjii* (Holzschuh, 1974) **comb. nov.**

= *Asias chodjii* Holzschuh, 1974

Distr.: Iran

*Anoplistes diabolicus* (Reitter, 1915) **comb. nov.**

= *Asias diabolicus* (Reitter, 1915)

Distr.: Kazakhstan

*Anoplistes forticornis* (Reitter, 1901) **comb. nov.**

= *Asias forticornis* (Reitter, 1901)

Distr.: Turkestan, Kazakhstan

*Anoplistes galusoi* (Kostin, 1974) **comb. nov.**

= *Asias galusoi* Kostin, 1974

Distr.: Kazakhstan

*Anoplistes gobiensis* (Namhaidorzh, 1973) **comb. nov.**

= *Asias gobiensis* Namhaidorzh, 1973

Distr.: European Russia, Mongolia

*Anoplistes halodendri halodendri* (Pallas, 1776)

= *Asias halodendri halodendri* (Pallas, 1776)

Distr.: Bulgaria; Ukraine; Albania; Romania, Kazakhstan; Siberia;  
European Russia

*Anoplistes halodendri ephippium* (Stevens & Dalman, 1817)

= *Asias halodendri ephippium* (Stevens & Dalman, 1817)

Distr.: Siberia, European Russia

*Anoplistes halodendri heptapotamicus* (Semenov, 1923) **comb. nov.**

= *Asias halodendri heptapotamicus* Semenov, 1923

Distr.: Kazakhstan

*Anoplistes halodendri kozlovi* (Semenov & Znojko, 1934) **comb. nov.**

= *Asias halodendri kozlovi* Semenov & Znojko, 1934

= *Asias kozlovi* Semenov et Znojko, 1934

Distr.: Mongolia, China

*Anoplistes halodendri minutus* (Hammarström, 1893) **comb. nov.**

= *Asias halodendri minutus* (Hammarström, 1893)

Distr.: European Russia, Mongolia, Siberia

*Anoplistes halodendri pirus* (Arakawa, 1932) **comb. nov.**

= *Asias halodendri pirus* (Arakawa, 1932)

Distr.: European Russia, China, Korea

*Anoplistes jacobsoni* (Baeckmann, 1904) **comb. nov.**

= *Asias jacobsoni* (Baeckmann, 1904)

Distr.: Kazakhstan

*Anoplistes jomudorum* (Plavilstshikov, 1940) **comb. nov.**

= *Asias jomudorum* Plavilstshikov, 1940

Distr.: Central Asia

*Anoplistes tuvensis* (Cherepanov, 1978) **comb. nov.**

= *Asias tuvensis* Cherepanov, 1978

Distr.: European Russia, Siberia, Mongolia

**Subfamily CERAMBYCINAE Latreille, 1802**

**Tribe STENOPTERINI Fairmaire, 1864**

**Genus CALLIMUS Mulsant, 1846**

= *Lampropterus* Mulsant, 1863

= *Procallimus* Pic, 1907

= *Callimellum* Strand, 1928

= *Protocallimus* Plavilstshikov, 1940

= *Callimomimus* Jenistea, 1952

**Type species:** *Callimus bourdini* Mulsant, 1846 = *Saperda angulata* Schrank, 1789

The genus currently includes 3 subgenera as *Callimus* Mulsant, 1846; *Lampropterus* Mulsant, 1863 and *Procallimus* Pic, 1907. The subgenera are regarded as separate genera by some authors (e. g. Monné & Hovore, 2005; Özdikmen, 2007).

**Remarks on validity of the genus name *Callimus* Mulsant, 1846:**

The genus name *Callimellum* Strand, 1928 is an objective replacement name for *Callimus* Mulsant, 1846. Since, it was regarded by Strand (1928) as a junior homonym of *Callimus* Fischer von Waldheim, 1833. Danilevsky & Miroshnikov (1985) firstly proposed to replace the old name *Callimus* Mulsant, 1846 for *Callimellum* Strand, 1928. They stated *Callimus* Fischer von Waldheim, 1830 is wrong posterior spelling of *Callimenus* Fischer von Waldheim, 1830. Brustel et al. (2002) also stated that “*Callimus* Mulsant, 1846 – Nous réhabilitons *Callimus* Mulsant, 1846 au lieu de *Callimellum* Strand, 1928 comme le proposent Althoff & Danilevsky (1997) et Sama (comm. pers.). L’homonymie entre *Callimus* Mulsant, 1846 et *Callimus* Fischer-Waldheim, 1833 (Orthoptera), dénoncée par Villiers (1978) et confirmée par Sama (2002) n’est pas applicable du fait de la validité de *Callimenus* Fischer-Waldheim, 1830 (Orthoptera) selon l’article 33.3 du C.I.N.Z. (1999). *Callimus* Mulsant, 1846 redevient donc disponible”. According to Brustel et al. (2002), *Callimus* Mulsant, 1846 therefore becomes again available. However, Sama (2002) used *Callimellum* Strand, 1928 as the genus name. Since, he wrongly regarded *Callimus* Fischer von Waldheim, 1833 as a valid available name. Moreover, Danilevsky (2008 a) also stated that

"according to I. Kerzhner (personal communication, 1985), *Callimus* Muls., 1846, was not preoccupied in Orthoptera, as *Callimus* Fisch.-Wald., 1830 is wrong posterior spelling of *Callimenus* F.-W., 1830. So, *Callimellum* is not valid".

On the other side, I regard *Callimus* Fischer von Waldheim, 1833 (Orthoptera) as an available name but not valid. Since, according to Eades & Otte (2008), the subfamily Bradyporinae Burmeister, 1838 (Orthoptera: Ensifera: Tettigoniioidea: Tettigoniidae) includes 3 tribes as Bradyporini Burmeister, 1838; Ehippigerini Brunner von Wattenwyl, 1878 and Zichyini Bolivar, 1901. The genus *Bradyporus* Charpentier, 1825 that includes two species as *B. dasypus* (Illiger, 1800) and *B. macrogaster* (Lefebvre, 1831) is in the tribe Bradyporini. The genus has 3 synonym as *Callimus* Fischer von Waldheim, 1833; *Derallimus* Caudel, 1912 and *Dinarchus* Stål, 1874. *Locusta dasypus* Illiger, 1800 is the type species of the genus *Bradyporus* Charpentier, 1825. The genus *Callimenus* Fischer von Waldheim, 1830 that includes 6 species as *C. dilatatus* Stål, 1875; *C. latipes* Stål, 1875; *C. montandoni* Burr, 1898; *C. multituberculatus* (Fischer von Waldheim, 1833); *C. oniscus* Burmeister, 1838 and *C. restrictus* (Fischer von Waldheim, 1833) is in the tribe Zichyini. *Callimenus* Fischer von Waldheim, 1830 has not any synonym. *Callimus multituberculatus* Fischer von Waldheim, 1833 is the type species of the genus *Callimenus* Fischer von Waldheim, 1830 by subsequent designation by Harz., 1969.

The genus name *Callimus* Fischer von Waldheim (Orthoptera) is recorded by Neave (1939) on page 533 as *Callimus* Fischer von Waldheim, 1833 (not 1830). In fact that, *Callimus* Fischer von Waldheim, 1833 (not 1830), it's type species being *Locusta dasypus* Illiger, 1800 is only a synonym of *Bradyporus* Charpentier, 1825 (Bradyporini) not *Callimenus* Fischer von Waldheim, 1830 (Zichyini). So it is not posterior wrong spelling of *Callimenus* Fischer von Waldheim, 1830 and is an available name according to ICZN (1999). However, it is not valid.

Anyway, before Strand (1928), *Callimus* Fischer von Waldheim, 1833 was given by Kirby (1906) as a synonym of *Bradyporus* Charpentier, 1825. He also gave *Callimenus* Fischer von Waldheim, 1830 as a separate genus. So *Callimellum* Strand, 1928 for *Callimus* Mulsant, 1846 was unnecessary replacement name in time of publication.

In this case, I share the same idea of Danilevsky & Miroshnikov (1985), Brustel et al. (2002) and Danilevsky (2008 a). Finally, the genus name *Callimus* Mulsant, 1846 should be used as a valid generic name for Cerambycidae as proposed by Danilevsky & Miroshnikov (1985).

### **Subfamily LAMIINAE Latreille, 1825**

#### **Tribe PHYTOECIINI Pascoe, 1864**

#### **Genus PHYTOECIA Dejean, 1835**

**Type species :** *Saperda cylindrica* Fabricius, 1775 = *Cerambyx cylindricus* Linnaeus, 1758

**Subgenus *HELLADIA* Fairmaire, 1864****Type species:** *Saperda millefolii* Adams, 1817

*Helladia* Fairmaire, 1864 has been regarded by some authors as a separate genus.

***armeniaca*** Frivaldsky, 1878ssp. ***armeniaca*** Frivaldsky, 1878ssp. ***natali*** Lobanov, 1994ssp. ***holzschuhi* nom. nov.**

The subspecies *Helladia armeniaca iranica* Holzschuh, 1981 is a primer junior homonym of *Helladia iranica* Villiers, 1960 according to ICZN (1999). In accordance with Article 57 of the ICZN, Fourth Edition (1999), I suggest here the name *holzschuhi* as a replacement name for the subspecies name *-iranica* Holzschuh, 1981. The name is dedicated to C. Holzschuh (Austria) who current author name of preexisting name - *iranica*. It is masculine in gender.

**Remarks:** The species has three distinct subspecies in the World. In Turkey, it is represented only by nominotypical subspecies. *H. armeniaca holzschuhi* nom. nov. occurs only in Iran and *H. armeniaca natali* Lobanov, 1994 occurs only in Azerbaijan.

DISTRIBUTION: Caucasus (Armenia, Azerbaijan), Turkey, Syria, Iran

CHOROTYPE: SW-Asiatic (Anatolo-Caucasian + Irano-Caucasian + Irano-Anatolian + Syro-Anatolian)

**Subfamily DORCASOMINAE Lacordaire, 1869**

= Apatophysides Lacordaire, 1869

= Apatophysinae Lacordaire, 1869

= Apatophyseinae Lacordaire, 1869 (wrong spelling)

Dorcasominae is applied instead of Apatophysinae by Danilevsky (2007 and 2008 a). He stated that “*The tribe Apatophysides Lacordaire, 1869 was originally raised to subfamily level by Danilevsky (1979). According to a number of consultations (Svacha, personal message, 2007) the correct spelling of subfamily name is Apatophysinae. G. Sama (personal message, 2007) strongly insists on Apatophyseinae. According to P. Svacha (personal message, 2007) the name Dorcasomides Lacordaire, 1869 was published in volume 8, while Apatophysides Lacordaire, 1869 - in volume 9 - so, younger. Dorcasomus was placed inside Apatophysinae by P.Svacha (Svacha, Danilevsky, 1987). So, the name of subfamily must be changed: Dorcasominae = Apatophysinae*”. The subfamily currently includes only tribe Dorcasomini nom. rest. (=Apatophysini). Dorcasominae



(=Apatophysinae) is regarded as a tribe of the subfamily Lepturinae Latreille, 1802 by some authors.

**Tribe DORCASOMINI Lacordaire, 1869 nom. rest.**

= Apatophysini Lacordaire, 1869

The tribe name should be Dorcasomini, not Apatophysini. Since, as seen above, *Dorcasomus* Audinet-Serville, 1834 was placed inside Apatophysinae by Svacha (Svacha, Danilevsky, 1987). So, the subfamily name must be Dorcasominae (Dorcasominae = Apatophysinae) as Danilevsky (2007 and 2008 a) stated. Similarly, the tribe name must be Dorcasomini (Dorcasomini = Apatophysini) because of the priority. Since, according to Quentin & Villiers (1969 and 1970), the tribe Dorcasomini included only the genus *Dorcasomus* Audinet-Serville, 1834. Historically, in the Coleopterorum Catalogus of Junk, the tribe of Dorcasomini, created by Lacordaire, consisted of seven very disparate genera: *Desmocerus* Audinet-Serville, 1835; *Plectogaster* Waterhouse, 1881; *Neoclosterus* Heller, 1899; *Aphelogaster* Kolbe, 1897; *Megacoelus* Lacordaire, 1869; *Gahania* Distant, 1907; *Dorcasomus* Audinet-Serville, 1834. Quentin & Villiers (1970) realized a revision of the tribe Dorcasomini Lacordaire, 1869. They also denoted this status in their work. In their work, only the genus *Dorcasomus* Audinet-Serville, 1834 was given in tribe Dorcasomini. Since, Quentin & Villiers (1969) cut it up and tribe Dorcasomini was reduced to the only genus *Dorcasomus* Audinet-Serville, 1834. Since, in this work, they stated that “*the genus Lycomus Auriivillius, 1903, included by Auriivillius in Dorcasomini, is in reality Chrysomelidae (Megalopodidae), besides synonym of genus Kuilua Jacoby, 1894*”. Finally, for the present, *Desmocerus* Audinet-Serville, 1835 is in Desmocerini Blanchard, 1845 (Lepturinae), *Plectogaster* Waterhouse, 1881 and *Neoclosterus* Heller, 1899 are in Plectogasterini Quentin & Villiers, 1969 (Cerambycinae), *Aphelogaster* Kolbe, 1897 and *Megacoelus* Lacordaire, 1869 are in Megacoelini Quentin & Villiers, 1969 (Cerambycinae) and *Gahania* Distant, 1907 is in Gahaniini Quentin & Villiers, 1969 (Cerambycinae). Repeatedly, *Dorcasomus* Audinet-Serville, 1834 was placed inside Apatophysinae by Svacha (Svacha, Danilevsky, 1987).

The tribe includes currently 55 genera as *Acapnolymma* Gressitt & Rondon, 1970; *Aedoeus* Waterhouse, 1880; *Afroartelida* Vives et Adlbauer, 2005; *Anthribola* Waterhouse, 1882; *Antigenes* Pascoe, 1888; *Apatophysis* Chevrolat, 1860; *Apheledes* Fairmaire, 1893; *Apicephalus* Gahan, 1898; *Appedesis* Waterhouse, 1880; *Ariastes* Fairmaire, 1896; *Artelida* Thomson, 1864; *Barossus* Fairmaire, 1893; *Boppeus* Villiers, 1982; *Capetoxotus* Tippmann, 1959; *Capnolymma* Pascoe, 1858; *Catalanotoxotus* Vives, 2005; *Criocerinus* Fairmaire, 1894; *Dorcasomus* Audinet-Serville, 1834; *Dorcianus* Fairmaire, 1901; *Dotoramades* Villiers, 1982; *Dysmathosoma* Waterhouse, 1882; *Eccrisis* Pascoe, 1888; *Echarista* Fairmaire, 1901; *Enthymius* Waterhouse, 1878; *Gaurotinus*

Fairmaire, 1897; *Harimius* Fairmaire, 1889; *Icariotis* Pascoe, 1888; *Lepturastra* Fairmaire, 1901; *Lingoria* Fairmaire, 1901; *Logisticus* Waterhouse, 1878; *Mastododera* Thomson, 1857; *Musius* Fairmaire, 1889; *Myiodola* Fairmaire, 1900; *Otteissa* Pascoe, 1864; *Pachysticus* Fairmaire, 1889; *Paratoxotus* Fairmaire, 1901; *Phithryonius* Fairmaire, 1903; *Planisticus* Vives, 2004; *Pseudogenes* Fairmaire, 1894; *Pyllotodes* Adlbauer, 2001; *Raharizonina* Villiers, 1982; *Ramodatodes* Villiers, 1982; *Rhagiops* Fairmaire, 1898; *Sagridola* Fairmaire, 1893; *Scariates* Fairmaire, 1894; *Scopanta* Fairmaire, 1893; *Stenotsivoka* Adlbauer, 2001; *Stenoxotus* Fairmaire, 1896; *Suzelia* Villiers, 1982; *Tomobrachyta* Fairmaire, 1887; *Toxitiades* Fairmaire, 1893; *Trichroa* Fairmaire, 1894; *Tsivoka* Villiers, 1982; *Villiersicus* Vives, 2005 and *Xanthopiodus* Fairmaire, 1897.

### LITERATURE CITED

**Audinet-Serville, J. G.** 1833. Nouvelle classification de la famille des longicornes (suite). Annales de la Société Entomologique de France, Paris. (1). 2:528-573.

**Brustel, H., Berger, P. & Cocquempot, C.** 2002. Catalogue des Vesperidae et des Cerambycidae de la faune de France (Coleoptera) Ann. Soc. entomol. Fr. (n.s.), 2002, 38 (4): 443-461.

**Danilevsky, M. L.** 2007. Systematic list of Mongolian Cerambycoidea. Last updated 01.11.2007. Available from: <http://www.cerambycidae.narod.ru/mongolia.htm>

**Danilevsky, M. L.** 2008a. Systematic list of Longicorn Beetles (Cerambycoidea) of the territory of the former USSR. Last updated 22.02.2008. Available from: <http://www.cerambycidae.narod.ru/ussr.htm>

**Danilevsky, M. L.** 2008b. A check-list of Longicorn Beetles (Coleoptera, Cerambycoidea) of Europe. Last updated 22.02.2008. Available from: <http://www.cerambycidae.narod.ru/europe.htm>.

**Danilevsky, M. L. & Miroshnikov A. I.** 1985. Timber-Beetles of Caucasus (Coleoptera, Cerambycidae). The Key. Krasnodar, 419 pp.

**Eades, D. C. & Otte, D.** 2008. Orthoptera Species File Online. Version 2.0/3.3. Available from: <http://Orthoptera.SpeciesFile.org>.

**Evenhuis, N. L.** 1989. Catalog of the Diptera of the Australasian and Oceanian Regions. Bishop Museum, Honolulu and E. J. Brill, Netherlands. 1, 155 pp.

**Evenhuis, N. L.** 2007. Catalog of the Diptera of the Australasian and Oceanian Regions. Online version. Available from: <http://hbs.bishopmuseum.org/aocat/limoniidae.html>

**Fischer von Waldheim.** 1833. Conspectus Orthopterorum Rossicorum. Bull. Soc. Natur. Moscow. 6:341-390.

**Holzschuh, C.** 1981. Zwanzig neue Bockkafer aus Europa und Asien (Cerambycidae, Col.). Koleopterologische Rundschau, Wien 55: 91-112.

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

- Kirby, W. F.** 1906. Orthoptera Saltatoria. Part I. (Achetidae et Phasgonuridae.). A Synonymic Catalogue of Orthoptera (Orthoptera Saltatoria, Locustidae vel Acridiidae). 2:i-viii, 1-562.
- Monné, M. A. & Hovore, F. T.** 2005 Checklist of the Cerambycidae (Coleoptera) of the Western Hemisphere. Electronic version 2005. Updated through 01 January, 2006, [www.hovore.com](http://www.hovore.com).
- Mulsant, E.** 1846. Securipalpes. Histoire Naturelle des Coleopteres de France. Vol. 4. 380 pp., Paris.
- Neave S. A.** 1939. Nomenclator Zoologicus. A list of the names of genera and subgenera in Zoology from the tenth edition of Linnaeus, 1758 to the end of 1935. Vol. I (A-C). Zoological Society of London, London, 957 pp.
- Özdikmen, H.** 2007. The Longicorn Beetles of Turkey (Coleoptera: Cerambycidae) Part I - Black Sea Region. Munis Entomology & Zoology 2 (2): 179-422.
- Quentin, R. M. & Villiers, A.** 1969. Revision des Plectogastrini, nov. Trib. [Col. Cerambycidae, Cerambycinae]. Ann. Soc. Ent. Fr. (N.S.), 5(3):613-646.
- Quentin, R. M. & Villiers, A.** 1970. Revision des Dorcasomini [Col. Cerambycidae]. Ann. Soc. Ent. Fr. (N.S.), 6(1):25-34.
- Svácha, P. & Danilevsky M. L.** 1987. Cerambycoid larvae of Europe and Soviet Union (Coleoptera, Cerambycoidea). Part. I. Acta universitatis Carolinae, Biologica, 30 [1986]: 1-176.
- Svácha, P. & Danilevsky M. L.** 1988. Cerambycoid larvae of Europe and Soviet Union (Coleoptera, Cerambycoidea). Part. II. Acta universitatis Carolinae, Biologica, 31 [1987]: 121-284.
- Svácha, P. & Danilevsky M. L.** 1989. Cerambycoid larvae of Europe and Soviet Union (Coleoptera, Cerambycoidea). Part. III. Acta universitatis Carolinae, Biologica, 32 [1988]: 1-205.
- Sama, G.** 2002. Atlas of the Cerambycidae of Europe and the Mediterranean Area. Vol.1. Nakladatelstvi Kabourek. Zlin: 173 pp.
- Semenov-Tian-Shanskij A.** 1914. Analecta coleopterologica. Revue russe d'entomologie 14: 14-22.
- Strand, E.** 1928. Nomenclatorische Bemerkungen über einige Coleopteren-Gattungen. Entomologisches Nachrichtenblatt 2: 2-3.
- Westwood, J. O.** 1835. Insectorum novorum exoticorum (ex ordine Dipteriorum) descriptiones. Lond. Edinb. Philos. Mag. (3) 6: 280-81.

## EFFECT OF DIFFERENT SOYBEAN VARIETIES ON BIONOMICS OF *TETRANYCHUS URTICAE* (ACARI: TETRANYCHIDAE)

**A. Sedaratian, Y. Fathipour\*, S. Moharramipour, A. A. Talebi**

\* Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, P. O. Box 14115-336, Tehran, IRAN, E-mail: fathi@modares.ac.ir

[Sedaratian, A., Fathipour, Y., Moharramipour, S. & Talebi, A. A. 2008. Effect of different soybean varieties on bionomics of *Tetranychus urticae* (Acari: Tetranychidae). Munis Entomology & Zoology, 3 (2): 716-730]

**ABSTRACT:** Population density and spatial distribution pattern of *Tetranychus urticae* Koch on seven soybean varieties including: Williams, Tellar, Zane, Sahar, Dpx, L<sub>17</sub>, Sari and one genotype, Ks3494, were determined in Tehran region, during 2007. The mean population density of the *T. urticae* per leaf on L<sub>17</sub> variety (14.15) was significantly more than other varieties and the genotype of soybean. The lower density of the mite population was observed on Zane and Ks3494 (6.1 and 4.65 mite per leaf, respectively). Spatial distribution pattern of *T. urticae* was determined on these varieties of soybean using Index of dispersion, Regression models (Taylor and Iwao), Morisita's coefficient and Lloyd's mean crowding. The index of dispersion, Morisita's index and Lloyd's mean crowding indicated an aggregated pattern for spatial distribution of this mite in all soybean varieties and the genotype. The spatial distribution pattern of this pest using Taylor's power law and Iwao's patchiness in most cases was aggregated and in few cases random. It could be concluded that different varieties of soybean can affect bionomics of *T. urticae*. Spatial distribution parameter can be used to improve the sampling program and exact estimating the population density of this pest.

**KEY WORDS:** Two-spotted spider mite, *Tetranychus urticae*, Population density, Spatial distribution, Soybean, sampling program.

The two-spotted spider mite, *Tetranychus urticae* Koch, is an extremely polyphagous species and a serious pest of a wide range of economically important crops including soybean in many parts of the world (Granham, 1985; Rott and Ponsoby, 2000; Fikru and Leon, 2003; Ragkou *et al.*, 2004; Khanjani and Haddad Irani-Nejad, 2006). This mite infests the underside of leaves, where profuse webbing may be present. *T. urticae* feeds using a piercing-sucking process that damages plant cells and tissue. This behavior leads to the appearance of characteristic yellow chlorotic spots on leaves. Because the chloroplasts in leaves are gradually destroyed as the population of feeding mites increases, photosynthesis declines, stomata close, and transpiration decreases, leading to reduced production (Martinez-Ferrer *et al.*, 2006).

Estimating the population density of arthropods is the cornerstone of basic research on agricultural ecosystems and the principal tool for building and implementing pest management programs (Kogan and Herzog, 1980). At this estimating plan, the reliable sampling program and suitable techniques should be selected (Pedigo and Buntin, 1994; Southwood and Henderson, 2000). A sampling program can be used in binomial sampling (Binns and Bostanian, 1990), assessing crop loss (Haughes, 1996), ecological investigations (Faleiro *et al.*, 2002), studying

the population dynamics (Jarosik *et al.*, 2003) and detecting pest levels that justify control measures (Arnaldo and Torres, 2005).

The most common methods used to describe the patterns of dispersion of arthropod populations have been summarized by Southwood and Henderson (2000). Several estimates based on the dispersion coefficient,  $k$ , of the negative binomial distribution and on the relationship between variance and mean are used as indices of aggregation (Krebs, 1999; Southwood and Henderson, 2000). Sampling plans based on these indices optimize the sampling effort and sampling precision (Kuno, 1991). Sequential sampling plans are used to more efficiently identification of mean pest populations at or above the economic threshold. These plans have reduced the time required for sampling up to 50%, in relation to conventional sampling plans (Patrick *et al.*, 2003). Although the objectives of sampling of a finite population can differ, the development of a sampling procedure requires the knowledge about the spatial distribution of populations (Liu *et al.*, 2002).

There are several studies that described the spatial distribution and population density of *T. urticae*. Aggregated spatial distribution of *T. urtica* was reported in different crops such as carambola (Shih and Wang, 1996), strawberry (Greco *et al.*, 1999), bean (Ahmadi *et al.*, 2005), clementine (Martinez-Ferrer *et al.*, 2006), rose (So, 1991), apple (Slone and Croft, 1998) and peanut (Margolies *et al.*, 1984).

Despite the economic importance of this pest on soybean, little research has focused on development of an efficient sampling program, the determination of population density and the spatial distribution coefficients of this mite. To improve the management of *T. urticae* on soybean, a sampling plan to estimate population levels is needed. This plan is crucial to further develop and implement integrated pest management (IPM) strategies on this crop. As a first step toward this objective, this study examined the population density and spatial distribution of *T. urticae* on different varieties and a genotype of soybean. The results of this research can be used to optimize monitoring methods for establishing IPM strategies against this pest.

## MATERIALS AND METHODS

### Experimental protocol

The experiments were carried out in a research field of Tarbiat Modares University in the suburbs of Tehran, Iran, from August to October 2007. Seven soybean varieties including: Willams, Tellar, Zane, Sahar, Dpx, L<sub>17</sub>, Sari and a genotype , Ks3494, were planted in a randomized complete block design. A field of 638.4 m<sup>2</sup> was divided into five blocks of 100.8 m and each block consisted of eight plots of 4.2×3 m. There were not any other mite host-plants surrounding the plots.

## Sampling program

A sampling technique is a method by which information is collected from a single sample unit. Although the sample unit and sampling technique are a distinct attribute of a sampling program, both are intimately related, since the sampling technique often dictates the type of the sampling unit (Pedigo and Buntin, 1994). Different life stages of *T. urticae* usually colonize on the under-surface of leaves thus one leaf of the soybean was selected as a sampling unit. Leaves were selected randomly and different life stages of mite (immatures and adults) were counted using stereomicroscope in the laboratory, to get an unbiased estimate of the population mean.

A basic tenet of all samplings is random collection, so that the sampling units have an equal chance of being sampled. On this basis, sampling of leaves and the movement among plants were performed randomly. All counts were performed in mid-morning. The sampling was conducted twice a week from 8<sup>th</sup> August to 14<sup>th</sup> October 2007.

In order to determine sample size, primary sampling was taken in the equal number of different soybean varieties and the genotype on 8<sup>th</sup> August 2007. Relative variation (RV) is used to compare the efficiency of various sampling methods (Hillhouse and Pitre, 1974). The RV of the sampling data was calculated as follows:

$$RV = (SE/m) 100$$

where *SE* is the standard error of the mean and *m* is the mean of primary sampling data. The reliable sample size was determined using the following equation:

$$N = (ts/dm)^2$$

where *N* = sample size, *t* = *t*-student, *s* = standard deviation, *d* = desired fixed proportion of the mean and *m* = the mean of primary data (Pedigo and Buntin, 1994).

## Population density

Population density of *T. urticae* was determined in plots of different soybean varieties from 8<sup>th</sup> August to 10<sup>th</sup> October in 2007. The mean density of total life stages (immatures and adults) of *T. urticae* were statically analyzed using analysis of variance (ANOVA) and compared among soybean varieties within each sampling data and overall dates.

## Spatial distribution pattern

The spatial distribution of *T. urticae* determined by five methods: Index of dispersion, Taylor's power law, Iwao's patchiness regression, Morisita's coefficient of dispersion and Lloyd's mean crowding.

## Index of dispersion

Dispersion of a population can be classified by calculating the variance to mean ratio:  $S^2/m = 1$  random,  $<1$  regular and  $>1$  aggregated. Departure from a random distribution can be tested by calculating the index of dispersion ( $I_D$ ), where  $n$  is the number of samples:

$$I_D = (n-1) S^2/m$$

$I_D$  is approximately distributed as  $\chi^2$  with  $n-1$  degree of freedom. Values of  $I_D$  which fall outside a confidence interval bounded with  $n-1$  degree of freedom and selected probability levels of 0.95 and 0.05, for instance, would indicate a significant departure from a random distribution. This index can be tested by  $Z$  value as follows:

$$Z = \frac{\sqrt{2I_D} - \sqrt{\nu - 1}}{\sqrt{\nu - 1}}$$

$$\nu = n - 1$$

If  $1.96 \geq Z \geq -1.96$  the spatial distribution would be random but if  $Z < -1.96$  or  $Z > 1.96$  it would be uniform and aggregated, respectively (Pedigo and Buntin, 1994).

## Taylor's power law and Iwao's patchiness regression

Taylor found a function between mean and variance as:

$$S^2 = am^b$$

where  $S^2$  is the variance;  $m$  is the sample mean;  $a$  is a scaling factor related to sample size and  $b$  measures the species aggregation. If  $b = 1$ ,  $<1$  and  $>1$ , the distribution is random, regular and aggregated, respectively (Taylor, 1961).

By using a log transformation, we can estimate the coefficients with linear regression as:

$$\text{Log}(S^2) = \text{Log}(a) + b\text{Log}(m)$$

where  $a$  and  $b$  are the parameters of the model, which were estimated by linearizing the equation by a log-log transformation (Martinez-Ferrer *et al.*, 2006).

Iwao's patchiness regression method was used to quantify the relationship between mean crowding index ( $m^*$ ) and mean ( $m$ ) using the following equation:

$$m^* = \alpha + \beta m$$

where  $\alpha$  indicates the tendency to crowding (positive) or repulsion (negative) and  $\beta$  reflects the distribution of population on space and is interpreted in the same manner as  $b$  of Taylor's power law (Iwao and Kuno, 1968). Student  $t$ -test can be used to determine if the colonies are dispersed randomly.

$$\text{Test } b = 1 \quad t = (b - 1) / S_b \quad \text{and} \quad \text{Test } \beta = 1 \quad t = (\beta - 1) / S_\beta$$

where  $S_b$  and  $S_\beta$  are the standard error of the slope for the mean crowding regression. Calculated values are compared with tabulated  $t$ -values with  $n-2$  degrees of freedom. If the calculated  $t$  ( $t_c$ ) <  $t$ -table ( $t_t$ ), the null hypothesis ( $b = 1$ ) would be accepted and spatial distribution would be random. If  $t_c > t_t$ , the null hypothesis would be rejected and if  $b > 1$  and  $< 1$ , the spatial distribution would be aggregated and uniform, respectively.

### Morisita's coefficient of dispersion $I_\delta$

Morisita (1962) reported a hypothesis for testing the uneven distribution coefficient of  $I_\delta$  and is calculated by the following equation:

$$I_\delta = \frac{n \sum x_i(x_i - 1)}{N(N - 1)}$$

where  $n$  = the number of sample units,  $x_i$  = the number of individuals in each sample unit and  $N$  = total number of individuals in  $n$  samples.

To determine if the sampled population significantly differs from random, the following large sample test of significance can be used:

$$Z = \frac{I_\delta - 1}{\left(\frac{2}{nm^2}\right)^{\frac{1}{2}}}$$

If  $1.96 \geq z \geq -1.96$  the spatial distribution would be random but if  $z < -1.96$ ,  $z > 1.96$  it would be regular and aggregated, respectively (Pedigo and Buntin, 1994).

### Lloyd's mean crowding $x^*$

Mean crowding ( $x^*$ ) was proposed by Lloyd to indicate the possible effect of mutual interference or competition among individuals. Theoretically mean crowding is the mean number of other individuals per individual in the same quadrat:

$$x^* = m + \frac{S^2}{m} - 1$$

As an index, mean crowding is highly dependent upon both the degree of clumping and population density. To remove the effect of changes in density, Lloyd introduced the index of patchiness, expressed as the ratio of mean crowding to the mean. As with the variance-to-mean ratio, the index of patchiness is dependent upon quadrat size  $x^* / m = 1$  random  $< 1$  regular and  $> 1$  aggregated (Lloyd, 1967).



### Sample size model

Taylor's  $a$  and  $b$  coefficients, taken from Taylor's power law describe the relationship between variance and mean ( $S^2 = am^b$ ) for individuals distributed in a natural population. The mean and variance of sampled mites were determined for each weekly sampling date. Taylor's  $a$  and  $b$  coefficient were calculated by log-log linear transformation of the mean-variance data, where  $b$  is the slope of the transformed data and  $a$  equals the antilog of transformed intercept. An equation for estimating pest sample size was developed by Karandinos (1976). Ruesink (1980), Wilson and Room (1982) incorporated Taylor's power law into Karandinos' equation to form the sample size model used in this study (Cullen et al., 2000):

$$N = t_{\alpha/2}^2 d^{-2} am^{b-2}$$

The model contains both variable and constant factors. The variable factors are:

$N$  = Sample size,  $t_{\alpha/2}$  = Standard normal variance for a two-tailed interval,  $m$  = Mean density of mites in each sampling unit,  $d$  = the range of accuracy and  $a$ ,  $b$  = Taylor's coefficients.

## RESULT

### Sampling program

One leaf of the soybean varieties was selected as a sampling unit, due to the activity of *T. urticae*. The results from primary sampling showed that the reliable sample size of leaves with maximum variation of 20% was 50, 80, 60, 45, 65, 70, 50 and 60 for Williams, Tellar, Zane, Sahar, Dpx, Ks3494, L<sub>17</sub> and Sari, respectively. The relative variation (RV) of the primary sampling data was about 12%, 15%, 13%, 11%, 13%, 14%, 12% and 13% for above-mentioned varieties, respectively, which was very appropriate for a sampling program (Table 1).

### Population density

The population density estimated as the mean number of overall life stages of *T. urticae* (immatures and adults) per leaf on seven soybean varieties and a genotype is shown in Table 2. The results indicated that there was a significant difference ( $P < 0.01$ ) between population density of *T. urticae* on different varieties of soybean in overall dates. The highest population density of overall life stages of *T. urticae* per leaf was observed on L<sub>17</sub> variety (14.15) during sampling dates, which was significantly different from other soybean varieties. During sampling dates, the lowest population density of the mite was observed on Ks3494 genotype and

Zane variety (4.65 and 6.10 overall life stages per leaf, respectively) that was significantly different from other soybean varieties.

### Spatial distribution

The results of the variance to mean ratio ( $S^2/m$ ), coefficient of dispersion ( $I_D$ ) and  $Z$  test are presented in Table 3. The results of sampling showed that the spatial distribution in all soybean varieties and the genotype was aggregated.

In Taylor's model, the regression between  $\log S^2$  and  $\log m$  was significant for all soybean varieties ( $P < 0.01$ ) and the genotype ( $P < 0.05$ ). Taylor's slope was varied from 1.25 to 1.92 and it was significantly greater than one on all soybean varieties, whereas it was less than one on Ks3494 genotype (Table 4). The calculated  $t$  ( $t_c$ ) was greater than  $t$ -table ( $t_t$ ) for all varieties, indicating an aggregated spatial distribution of *T. urticae*, but Ks3494 genotype had a  $t_c$  less than  $t_t$ , indicating a random spatial distribution of *T. urticae*.

Iwao's model showed that there was a significant relationship between the mean crowding and the density of *T. urticae* (Table 4). Iwao's slope was varied from 1.47 to 2.11. During sampling periods, all soybean varieties had an aggregated (slope  $> 1$ ) spatial distribution of *T. urticae*, but Ks3494 genotype had a random pattern with  $t_c$  less than  $t_t$ .

Morisita's index ( $I_\delta$ ) and Lloyd's mean crowding revealed an aggregated pattern for *T. urticae* on all varieties and the genotype of soybean (Table 5 and 6). Calculated  $Z$  was significantly greater than 1.96 in 100% sampling dates. The values of  $m^*/m$  was significantly more than one.

Re-calculated sample size using Taylor's coefficient (a and b) on Williams, Tellar, Zane, Sahar, Dpx, L<sub>17</sub>, Sari varieties and Ks3494 genotype was 12.99, 49, 20.62, 18.38, 29.27, 16.3, 27.73, and 58.62, respectively. These values of sample size can help to improve sampling program of *T. urticae*.

### DISCUSSION

Several methods are available for the sampling of spider mites in row crops such as individual plant unit observation, imprint, machine brushing on to a plate, beat cloth, paper, or funnel techniques. The most precise method is direct counting of all life stages of mite on plant leaflets using a stereomicroscope (Kogan and Herzog, 1980). Regarding the life site of *T. urticae*, plant leaves were selected as sampling unit and sampling was conducted for *T. urticae* using stereomicroscope. Roy *et al.* (2005) used the stereomicroscope to count the number of spider mites on raspberry leaves. The population density of *T. urticae* was determined on carambola leaves using stereomicroscope (Shih and Wang, 1996).

In developing sampling programs for either research or management purposes, one must determine two characteristic features of any population, its density and dispersion.

In most sampling dates, the highest population density of the mite was significantly recorded on L<sub>17</sub> in comparison with the other soybean varieties and the genotype (Table 2), suggesting that the presence of dens trichomes, softness of leaf tissue and the large size of the leaves of this variety may be the most important factors for its suitability leading to increase the mite population density. The lowest population density of total life stages of the *T. urticae* was on Ks3494 genotype and Zane variety (Table 2). The absence of trichomes, waxy leaves, the small size of the leaves and short growing period of this variety and this genotype of soybean may be the most important reasons for unsuitability and decrease of the population density of the mite. Ahmadi *et al.* (2005) reported the same results with *T. urticae* on bean.

For an applied population biologist, knowledge of a population's aggregation is necessary to develop sequential, binomial or other sampling plans. A change in the aggregation of a species needs an alternation for the sampling plan to have an accurate population count (Slone and Croft, 1998).

The result from variance to mean ratio, Morisita's coefficient and Lloyd's mean crowding indicated that *T. urticae* had an aggregated distribution on all soybean varieties and the genotype (Table 3, 5 and 6), suggesting that the presence of an mite individual at one point lead to increase the probability of another individual being nearby, and habitat occupation probability have not been the same for all individuals. Aggregation distribution of *T. urticae*, is probably due to its high fecundity and its oviposition behavior in laying eggs as clumps. In addition, *T. urticae* females have limited mobility, once a female colonized on a new leaf and started producing offspring, aggregation increases. This behavior has been described for *T. urticae* on other crop systems (Kennedy and Smitley, 1985), and it implies that large samples are required to obtain density estimates at an acceptable level of precision. Aggregated spatial distribution of *T. urticae* in a carambola orchard was evaluated by Shih and Wang (1996). The high degree of patchiness created by the aggregative behavior of *T. urticae* minimizes the attack rate from the predators (Sabelis, 1981) and enhances the advantages of a complex life type, a fitness of survival and a reproductive strategy of this pest (Shin and Wang, 1996). Greco *et al.* (1999) demonstrated that spatial distribution of *T. urticae* on strawberry was aggregated. So (1991) estimated that spatial distribution of *T. urticae* on rose was non-random and follows a negative binomial distribution. Ahmadi *et al.* (2005) reported that spatial distribution pattern of *T. urticae* in bean, using index of dispersion, was aggregated. These results were similar to those found by Raworth (1986) on strawberries and Margolies *et al.* (1984) on peanut. Although some studies have used chi-square goodness of fit test to compare the observed and expected

frequency data under the negative binomial or poisson distributions, this statistical procedure is not usually recommended. Since Morisita's coefficient estimate spatial distribution of each date using the mean and variance of each sampling date separately, therefore it seems it would be more accurate than the index of dispersion.

Regression models of Taylor's power law and Iwao's patchiness were more accurate than the variance to mean ratio, since the mean and variance of each sampling date was used separately. Spatial distribution pattern of *T. urticae* using Taylor's power law and Iwao's patchiness were obtained random on Ks3494 genotype and were recorded aggregated on all soybean varieties (Table 4), suggesting that different plant varieties can affect spatial distribution of this mite. The random distribution pattern on Ks3494 genotype using Taylor's power law and Iwao's patchiness, suggesting that the different statistical methods have various results and accuracy in calculating spatial distribution of an organism. The random distribution pattern of Ks3494 genotype showed that the presence of an individual on a leaf is not affected by the presence of another individual, and all leaves had similar probabilities of being occupied by an individual. This can be due to the lower population density of *T. urticae* on this genotype. Ahmadi *et al.* (2005) reported that the spatial distribution pattern of *T. urticae* on four bean varieties, using variance to mean ratio, was aggregated but using Taylor's power law, on three varieties was aggregated, and on one variety was random. Martinez-Ferrer *et al.* (2006) determined the distribution pattern of *T. urticae* for different types of leaves and fruit of clementine's in Spain and noted that dispersion patterns generated by Taylor's power law demonstrated the occurrence of aggregated pattern ( $b > 1.21$ ) on both leaves and fruit of clementine's. Shih and Wang (1996) observed that by using Taylor's power law and Iwao's patchiness regression analysis, spatial distribution of *T. urticae* in carambola orchard was aggregated. However, the data obtained for Sari variety and Ks3494 genotype had better fit with Taylor's power law ( $r^2 = 87.6\%$  and  $70.3\%$ , respectively) in comparison with Iwao's model ( $r^2 = 75.3\%$  and  $54.6\%$ , respectively).

## CONCLUSIONS

This research demonstrated that the different soybean varieties and genotypes had significant effects on the population density and spatial distribution patterns of *T. urticae*. During growing season, population density of the mite on different varieties and one genotype of soybean was significantly different. The highest population density of the pest was seen on L<sub>17</sub> and the lowest density was obtained on Ks3494 genotype and Zane variety. Other varieties of soybean had intermediate values. The coefficients obtained from spatial distribution models can be used in developing a sampling program and evaluating the efficiency of natural enemies for controlling of *T. urticae* on different varieties of soybean.

## ACKNOWLEDGMENTS

This research was partly supported by a grant from the Center of Excellence for Integrated Pest and Diseases Management of Oil Crops of Iran, which is greatly appreciated. The authors are also grateful to Mr. Babaie (Seed and Plant Improvement Institute) for providing seeds of the soybean for our study.

## LITERATURE CITED

- Ahmadi, M., Fathipur, Y. & Kamali, K.** 2005. Population density and spatial distribution of *Tetranychus urticae* Koch (Acari: Tetranychidae) on different bean varieties in Tehran region. Iranian Journal of Agricultural Sciences, 36: 1087-1092.
- Arnaldo, P. S. & Torres, L. M.** 2005. Spatial distribution and sampling of *Thaumetopoea pityocampa* (Lep: Thaumetopoeidae) populations of *Pinus pinaster* alit. in Montesinho, N. Portugal. Forest Ecology and Management, 210: 1-7.
- Binns, M. R. & Bostanian, N. J.** 1990. Robustness in empirically based binomial decision rules of integrated pest management. Journal of Economic Entomology, 83: 420-427.
- Faleiro, J. R., Kumar, J. A. & Ranjekar, P. A.** 2002. Spatial distribution of red palm weevil *Rhynchophorus ferrugineus* Oliv. (Col: Curculionidae) in coconut plantations. Crop Protection, 21: 171-176.
- Fikru, J. H. & Leon, G. H.** 2003. Changes in soybean gas-exchange after moisture stress and spider mite injury. Environmental Entomology, 32: 433-440.
- Granham, J. E.** 1985. Hop. In: Hell, W. & Sabelis, M. W. (Eds.) Spider Mites. Their Biology, Natural Enemies and Control Vol. 1 B, Elsevier, Amsterdam, The Netherlands, 367-370.
- Greco, N. M., Liljestrom, G. G. & Sanchez, N. E.** 1999. Spatial distribution and coincidence of *Neoseiulus californicus* and *Tetranychus urticae* (Acari: Phytoseiidae, Tetranychidae) on strawberry. Journal of Experimental and Applied Acarology, 23: 567-580.
- Hillhouse, T. L. & Pitre, H. N.** 1974. Comparison of sampling techniques to obtain measurements of insect populations on soybeans. Journal of Economic Entomology, 67: 411-414.
- Hughes, G. M.** 1996. Incorporating spatial pattern of harmful organisms into crop loss models. Crop Protection, 15: 407-421.
- Iwao, S. & Kuno, E.** 1968. Use of the regression of mean crowding on mean density for estimating sample size and the transformation of data for the analysis of variance. Journal of Research Population Ecology, 10: 210.
- Jarosik, V., Honek, A. & Dixon, A. F. G.** 2003. Natural enemy ravine revisited: the importance of sample size for determining population growth. Ecological Entomology, 28: 85-91.
- Karandinos, M. G.** 1976. Optimum sample size and comments on some published formulae. Bulletin of the Entomological Society of America, 22: 417-421.

**Kennedy, G. C. & Smitley, D. R.** 1985. Dispersal. In: Helle, W. & Sabelis, M. W. [Eds.], Spider Mites: their Biology, Natural Enemies and Control. Vol. 1A. Elsevier, Amsterdam, The Netherlands, 233-242.

**Khanjani, M. & Haddad Irani-Nejad, K.** 2006. Injurious Mites of Agricultural Crops in Iran. Bu-Ali Sina University Press, 526 pp.

**Kogan, M. & Herzog, D. C.** 1980. Sampling Methods in Soybean Entomology. Springer Verlag, New York, 587 pp.

**Krebs, C. J.** 1999. Ecological Methodology, Second ed. Addison Wesley Longman Inc., New York, 620 pp.

**Kuno, E.** 1991. Sampling and analysis of insect populations. Annual Review of Entomology, 36: 285-304.

**Liu, C., Wang, G., Wang, W. & Zhou, S.** 2002. Spatial pattern of *Tetranychus urticae* population apple tree garden. Journal of Applied Ecology, 13: 993-996.

**Lloyd, M.** 1967. Mean crowding. Journal of Animal Ecology, 36: 1-30.

**Margolies, D. E., Lanpert, E. P. & Kennedy, G. C.** 1984. Sampling program for the two-spotted spider mite (Acari: Tetranychidae) in peanut. Journal of Economic Entomology, 77: 1024-1028.

**Martinez-Ferrer, M. T., Jacas, J. A., Piolles-Moles, J. L. & Aucejo-Romero, S.** 2006. Approaches for sampling the two spotted spider mite (Acari: Tetranychidae) on clementines in Spain. Journal of Economic Entomology, 99: 1490-1499.

**Morisita, M.** 1962.  $I_8$ -index a measure of dispersion of individuals. Research Population Ecology Journal, 4: 1-7.

**Patrick, K., Rourke, O. & Hutchison, W. D.** 2003. Sequential sampling plans for estimating european corn borer (Lepidoptera: Crambidae) and corn earworm (Lepidoptera: Noctuidae) larval density in sweet corn ears. Crop Protection, 22: 903-909.

**Pedigo, L. P. & Buntin, G. D.** 1994. Handbook of Sampling Methods for Arthropods in Agriculture. CRC Press, Florida, 714pp.

**Ragkou, V. S., Athanassiou, C. G. Kavallieratos, N. G. & Tomanovic, Z.** 2004. Daily consumption and predation rate of different *Stethorus punctillum* instars feeding on *Tetranychus urticae*. Phytoparasitica. 32: 154-159.

**Raworth, D. A.** 1986. Sampling statistics and a sampling scheme for the two-spotted spider mite, *Tetranychus urticae* (Acari: Tetranychidae), on strawberries. The Canadian Entomologist, 118: 807-814.

**Rott, A. S. & Ponsonby, D. J.** 2000. The effects of temperature, relative humidity and host plant on the behavior of *Stethorus punctillum* as a predator of two-spotted spider mite, *Tetranychus urticae*. Biocontrol, 45: 155-164.

**Roy, M., Brodeur, J. & Cloutier, C.** 2005. Seasonal activity of the spider mite predators *Stethorus punctillum* (Coleoptera: Coccinellidae) and *Neoseiulus fallacies* (Acarina: Phytoseiidae) in raspberry, two predators of *Tetranychus mcdanieli* (Acarina: Tetranychidae). Biological Control, 34: 47-57.

**Ruesink, W. G.** 1980. Introduction to sampling theory, In: Kogan, M. & Herzog, D. C. [Eds.], Sampling Methods in Soybean Entomology. Springer, New York. pp. 61-78.

**Sabelis, M. W.** 1981. Biological control of two-spotted spider mites using phytoseiids predators. Part 1. Modeling the predator-prey interaction at the individual level. Agriculture Research Reports 910, Pub & Doc, Wageningen, 242 pp.

**Shih, C. I., & Wang, C. J.** 1996. Spatial distribution of *Tetranychus urticae* (Acari: Tetranychidae) with special inferences from its behavior of collective egg deposition, life type and dispersal activities. Chinese Journal of Entomology, 16: 287-302.

**Slone, D. H. & Croft, B. A.** 1998. Spatial aggregation of apple mites (Acari: Phytoseiidae, Stigmaeidae, Tetranychidae) as measured by a binomial model: effects of life stage, reproduction, competition and predation. Environmental Entomology, 27: 918-925.

**So, P. M.** 1991. Distribution patterns and sampling plans for *Tetranychus urticae* Koch (Acari: Tetranychidae) on roses. Journal of Researches on Population Ecology, 33: 229-243.

**Southwood, T. R. E. & Henderson, P. A.** 2000. Ecological Methods. Third edition. Blackwell Sciences, Oxford, 592 pp.

**Taylor, L. R.** 1961. Aggregation, variance to the mean. Nature, 189: 732-735.

**Wilson, L. T. & Room, P. M.** 1982. The relative efficiency and reliability of three methods for sampling arthropods in Australian cotton fields". Journal of Australian Entomology Society, 21: 175-181.

**Table 1.** Estimated parameters by primary sampling of *T. urticae* on different soybean varieties and the genotype in 2007.

Var. and gen.	n	SE	SD	RV	m	d	N
Williams	50	1.056	7.44	12.11	8.72	0.20	50
Tellar	50	0.181	1.286	15.68	1.16	0.20	80
Zane	50	0.771	5.457	13.26	5.82	0.20	60
Sahar	50	0.149	1.059	11.70	1.28	0.20	45
Dpx	50	0.164	1.166	13.74	1.2	0.20	65
Ks3494	50	0.19	1.348	14.44	1.32	0.20	70
L <sub>17</sub>	50	2.168	15.33	12.17	17.82	0.20	50
Sari	50	0.55	3.95	13.18	4.24	0.20	60

Var and gen = Varieties and the genotype of soybean, n = Number of samples, SE = Standard error of the mean, SD = Standard deviation of the mean, RV = Relative variation, m = Mean of primary data, d = Desired fixed proportion of the mean and N = Sample size

**Table2.** Mean ( $\pm$ SE) population density of overall life stages of *T. urticae* (per leaf) on different soybean varieties and the genotype in 2007.

Date	Wil.	Tel.	Zan.	Sah.	Dpx	Ks3.	L <sub>17</sub>	Sar.
10Aug.	7.98 $\pm$ 0.96 b	1.98 $\pm$ 0.32de	5.68 $\pm$ 0.70bc	1.42 $\pm$ 0.15e	2.32 $\pm$ 0.42de	1.71 $\pm$ 0.40e	16.82 $\pm$ 1.92a	4.63 $\pm$ 0.66cd
19Aug.	16.10 $\pm$ 1.9 0b	7.99 $\pm$ 0.90c	9.17 $\pm$ 1.33c	5.71 $\pm$ 1.00c	9.23 $\pm$ 1.23c	4.90 $\pm$ 0.66c	25.34 $\pm$ 4.13a	8.45 $\pm$ 1.36c
23Aug.	13.34 $\pm$ 1.4 9b	10.96 $\pm$ 1.48b	11.17 $\pm$ 1.64bc	6.93 $\pm$ 1.40bc	11.95 $\pm$ 1.53bc	5.83 $\pm$ 0.68c	28.18 $\pm$ 4.09a	11.77 $\pm$ 1.81bc
27Aug.	10.00 $\pm$ 1.1 5bc	12.73 $\pm$ 1.33b	9.50 $\pm$ 1.36bc	7.49 $\pm$ 1.36c	24.46 $\pm$ 3.05a	6.59 $\pm$ 1.04c	29.22 $\pm$ 4.22a	15.63 $\pm$ 1.89b
31Aug.	5.00 $\pm$ 0.70 cd	11.65 $\pm$ 1.59b	4.23 $\pm$ 0.75d	9.80 $\pm$ 1.61bc	17.29 $\pm$ 1.973a	4.40 $\pm$ 0.53d	17.04 $\pm$ 1.97a	12.90 $\pm$ 1.60ab
4 Sep.	4.42 $\pm$ 0.65 d	10.68 $\pm$ 1.10b	3.38 $\pm$ 0.43d	10.37 $\pm$ 1.41bc	15.69 $\pm$ 1.52a	6.95 $\pm$ 1.23cd	13.66 $\pm$ 1.94ab	13.60 $\pm$ 1.39ab
8 Sep.	2.36 $\pm$ 0.36 c	8.27 $\pm$ 1.021b	2.60 $\pm$ 0.45c	7.82 $\pm$ 1.35b	9.10 $\pm$ 1.21ab	2.14 $\pm$ 0.47c	6.64 $\pm$ 1.37b	12.36 $\pm$ 1.78a
12 Sep.	3.66 $\pm$ 0.65 cd	8.05 $\pm$ 1.07bc	3.03 $\pm$ 0.55d	11.87 $\pm$ 1.59b	18.09 $\pm$ 2.33a	—	8.24 $\pm$ 1.38bc	11.62 $\pm$ 1.49b
16 Sep.	1.96 $\pm$ 0.42 c	6.95 $\pm$ 0.88b	—	12.62 $\pm$ 1.87a	11.13 $\pm$ 1.39ab	—	8.32 $\pm$ 1.27b	10.68 $\pm$ 1.18ab
20 Sep.	.92 $\pm$ 0.22c	5.87 $\pm$ 0.85b	—	11.28 $\pm$ 1.77a	8.41 $\pm$ 1.04ab	—	6.28 $\pm$ 1.22b	9.40 $\pm$ 1.47ab
24 Sep.	—	5.12 $\pm$ 0.59ab	—	4.35 $\pm$ 0.83b	6.21 $\pm$ 0.69ab	—	5.78 $\pm$ 1.04ab	7.50 $\pm$ 1.016a
28 Sep.	—	6.22 $\pm$ 0.83b	—	5.82 $\pm$ 1.16b	5.35 $\pm$ 0.793b	—	4.22 $\pm$ 0.85b	10.56 $\pm$ 0.85a
2 Oct.	—	6.95 $\pm$ 1.0b	—	5.60 $\pm$ 1.10b	17.74 $\pm$ 3.09a	—	—	11.57 $\pm$ 1.75ab
6 Oct.	—	5.32 $\pm$ 0.83b	—	6.71 $\pm$ 1.49b	—	—	—	12.07 $\pm$ 1.94a
10 Oct.	—	—	—	2.42 $\pm$ 0.62a	—	—	—	2.16 $\pm$ 0.47a
Overalls dates	6.57 $\pm$ 0.38 de	7.85 $\pm$ 0.29d	6.10 $\pm$ 0.38ef	6.97 $\pm$ 0.34de	12.08 $\pm$ 0.52b	4.65 $\pm$ 0.30f	14.15 $\pm$ 0.78a	10.33 $\pm$ 0.40c

\* The means followed by different letters in the same row are significantly different ( $p < 0.01$ , LSD)

\* Dashes in the columns indicate the end of sampling

Wil. = Williams, Tel. = Tellar, Zan. = Zane, Sah. = Sahar, Ks3. = Ks3494, Sar. = Sari



**Table 3.** Spatial distribution parameters (variance to mean ratio) of *T. urticae* on different soybean varieties and the genotype during 2007.

Var. and gen.	$S^2/m$	$I_D$	$Z$
Williams	10.99	5487.48	73.165
Tellar	12.259	13717.657	118.34
Zane	11.512	5514.31	74.082
Sahar	12.196	8769.117	94.523
Dpx	19.43	15455.486	134.742
Ks3494	9.711	4748.873	66.2
L <sub>17</sub>	26.215	15702.986	142.62
Sari	13.963	12552.93	116.04

Var. and Gen. = Varieties and the genotype of soybean

**Table 4.** Spatial distribution of *T. urticae* on different soybean varieties and its genotype during 2007 using Taylor's power law and Iwao's patchiness regression analysis.

Var. and gen.	Taylor						Iwao						
	$a$	$b$	$SE_b$	$r^2$	$P_{reg}$	$t_c$	$\alpha$	$\beta$	$SE_\beta$	$r^2$	$P_{reg}$	$t_c$	$t_t$
Wil.	0.437	1.44	0.07	97.4	0.00	6.10	1.71	1.47	0.05	98.6	0.00	8.10	2.30
Tel.	0.538	1.50	0.15	87	0.00	3.33	81.10	1.85	0.24	81.1	0.00	3.46	2.17
Zan.	0.326	1.74	0.18	92.5	0.00	4.11	0.47	2.11	0.18	94.9	0.00	6.03	2.44
Sah.	0.187	1.92	0.20	86.5	0.00	4.65	4.29	1.63	0.21	79.6	0.00	2.88	2.16
Dpx	0.307	1.74	0.14	92.3	0.00	5.28	-0.54	2.07	0.25	84.1	0.00	4.16	2.20
Ks3.	0.722	1.25	0.32	70.3	.011	0.78	2.34	2.08	0.72	54.6	0.03	1.48	2.57
L <sub>17</sub>	0.531	1.59	0.13	92.9	0.00	4.53	2.71	1.89	0.15	93.5	0.00	5.93	2.22
Sar.	0.563	1.51	0.15	87.6	0.00	3.40	4.15	1.69	0.255	75.3	0.00	2.70	2.16

Var. and Gen. = Varieties and the genotype of soybean, Wil. = Williams, Tel. = Tellar, Zan. = Zane, Sah. = Sahar, Ks3. = Ks3494, Sar. = Sari

**Table 5.** Parameters of Morisita's index and Z calculated of *T. urticae* on different soybean varieties and the genotype in 2007.

	Wil.		Tel.		Zan.		Sah.		Dpx		Ks3.		L <sub>17</sub>		Sar.	
Date	I <sub>s</sub>	Z	I <sub>s</sub>	Z	I <sub>s</sub>	Z	I <sub>s</sub>	Z	I <sub>s</sub>	Z	I <sub>s</sub>	Z	I <sub>s</sub>	Z	I <sub>s</sub>	Z
10Aug.	6.44	766.19	2.62	182.02	1.76	181.75	0.803	-8.97	2.7	181.82	4.38	287	1.58	348.48	2	196.82
19Aug.	1.55	315.42	1.88	400	2.14	446.62	2.18	215.84	2.03	439.92	2.29	313.35	2.26	1046.41	2.43	502.9
23Aug.	1.54	256.13	2.36	850.6	2.2	568.68	2.67	368.21	1.97	534.96	1.79	229.12	2	998.3	2.57	748.2
27Aug.	1.56	199.29	1.78	1962.5	2.11	450.2	2.34	319.83	1.95	1073.63	2.57	512.11	1.99	1023	1.88	483.2
31Aug.	1.79	139.82	2.39	932	2.66	299	2.09	342.31	1.7	617.46	1.81	177.49	1.59	360.8	1.54	315.6
4 Sep.	1.87	138.25	0.175	-499	1.7	229.64	1.72	238.01	1.54	392.35	3.01	695.25	1.92	445.2	2.14	600.7
8 Sep.	1.75	63.19	2.08	518.57	2.45	160.05	2.2	299.91	2.02	430.341	4.02	320.34	2.9	462.9	1.89	439.7
12 Sep.	2.30	169.09	2.29	616.15	2.68	216.35	1.71	268.91	2.11	880.54	-	-	2.26	368.8	2.36	514.4
16 Sep.	2.82	127.01	2.14	457.2	-	-	1.89	359.41	1.9	465.33	-	-	2.04	306.8	2.34	536.3
20 Sep.	2.84	59.93	2.51	503	-	-	1.99	358.81	1.86	279.83	-	-	2.7	379	1.95	303.8
24 Sep.	-	-	1.88	260.58	-	-	2.39	193.41	1.69	197.38	-	-	1.34	94.62	2.31	632.4
28 Sep.	-	-	2.27	456.78	-	-	2.6	297.14	2.22	301.2	-	-	2.76	263.93	2.26	621.9
2 Oct.	-	-	2.67	671.2	-	-	2.54	274.51	2.89	1545.9	-	-	-	-	2.45	744.5
6 Oct.	-	-	2.78	541.81	-	-	3.04	435.71	-	-	-	-	-	-	3.4	129.17
10 Oct.	-	-	-	-	-	-	3.57	198.61	-	-	-	-	-	-	-	-

\* Dashes in the columns indicate the end of sampling

Wil. = Williams, Tel. = Tellar, Zan. = Zane, Sah. = Sahar, Ks3. = Ks3494, Sar. = Sari

**Table 6.** Estimated parameters by Lloyd's mean crowding and Lloyd's mean crowding to mean for *T. urticae* on different varieties and the genotype of soybean in 2007.

	Wil.	Tel.	Zan.	Sah.	Dpx	Ks3.	L <sub>17</sub>	Sar.
$m^*$	16.56	19.1	16.61	18.16	30.48	13.35	39.36	2.78
$m^*/m$	2.52	2.43	2.72	2.6	2.52	2.87	23.29	2.25

Wil. = Williams, Tel. = Tellar, Zan. = Zane, Sah. = Sahar, Ks3. = Ks3494, Sar. = Sari

## NEW SUBFAMILY AND GENUS NAMES FOR FERGANIINAE GOROCHOV, 1987 AND *FERGANIA* SHAROV, 1968 (ORTHOPTERA)

Hüseyin Özdikmen\*

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mails: ozdikmen@gazi.edu.tr

[Özdikmen, H. 2008. New subfamily and genus names for Ferganiinae Gorochov, 1987 and *Fergania* Sharov, 1968 (Orthoptera). Munis Entomology & Zoology 3 (2): 731-732]

**ABSTRACT:** A junior homonym was detected among the orthopteran genus group names and the following replacement name is proposed: *Ademirsoyus* nom. nov. for *Fergania* Sharov, 1968. Accordingly, new combination is herein proposed for the species currently included in this genus. *Ademirsoyus reductus* (Sharov, 1968) comb. nov.. In addition to this, I propose the replacement name Ademirsoyinae new name for the subfamily name Ferganiinae Gorochov, 1987.

**KEY WORDS:** nomenclatural change, homonymy, replacement name, Ademirsoyinae, *Ademirsoyus*.

### Remarks on nomenclatural change

Sharov (1968) proposed the triassic fossil genus *Fergania* with the type species *Fergania reducta* Sharov, 1968 by original designation and monotypy from Asia-temperate, Middle Asia, Madygen Formation, South Fergana, Madygen in Orthoptera. This genus was described by Sharov (1968) in Vitimidae. The genus name is currently used as a valid generic name in Orthoptera as the type genus of the subfamily Ferganiinae Gorochov, 1987 (Insecta: Orthoptera: Ensifera: Oedischioidea: Proparagryllacrididae: Ferganiinae). This subfamily has two monotypic fossil genera as *Fergania* Sharov, 1968 and *Parafergania* Gorochov, 1987 now.

Unfortunately, the generic name was already preoccupied by Mandelshtam (1957), who had described the fossil genus *Fergania*. The genus *Fergania* Mandelshtam, 1957 is not extant. It was assigned to Pterioda by Sepkoski (2002) (Mollusca: Bivalvia: Autolamellibranchiata: Pteriomorpha: Pterioda).

So the name *Fergania* Sharov, 1968 is invalid under the rule of homonymy, being a junior homonym of *Fergania* Mandelshtam, 1957. Under the International Code of Zoological Nomenclature (ICZN 1999) it must be rejected and replaced. In accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (1999), I propose to substitute the junior homonym *Fergania* Sharov, 1968 for the nomen novum *Ademirsoyus*. As a result of this, *Fergania* Sharov, 1968 is replaced with *Ademirsoyus* new name.

In addition to this, I herein propose the replacement name Ademirsoyinae new name for the subfamily name Ferganiinae because its

type genus *Fergania* Sharov, 1968 is invalid and the type genus of a family-group name must be valid.

## SYSTEMATICS

Order Orthoptera

Family Proparagryllacrididae

Family **Ademirsoyinae** new name

Ferganiinae Gorochov, 1987

**Type genus.**— *Ademirsoyus* new name.

**Remarks.**—The name *Fergania* has been used in Orthoptera as a stem for a family-group name, and should be automatically replaced with the new name.

Genus **Ademirsoyus** new name

*Fergania* Sharov, 1968, junior homonym of *Fergania* Mandelshtam, 1957.

*Fergania* Sharov, 1968. Trudy paleont. Inst. 118: 167. (Insecta: Orthoptera: Ensifera: Oedischioidea: Proparagryllacrididae: Ferganiinae). Preoccupied by *Fergania* Mandelshtam, 1957. In Mandelshtam, Schneider, Kuznetzova & Katz, Ezheg. vses. paleont. Obshch. 16: 170. (Mollusca: Bivalvia: Autolamellibranchiata: Pteriomorpha: Pterioidea).

**Type species.**— *Fergania reducta* Sharov, 1968 by original designation and monotypy.

**Etymology.**— The genus name is dedicated to well known entomologist Prof. Dr. Ali Demirsoy (Turkey). It is masculine in gender.

**Species account and distribution.** — One species as known the type species; known from Asia-temperate, Middle Asia, Madygen Formation, South Fergana, Madygen.

The following new combination is proposed and the species is removed from *Fergania*:

*Ademirsoyus reductus* (Sharov, 1968) **new combination**

Syn.: *Fergania reducta* Sharov, 1968

## LITERATURE CITED

**Gorochov, A. V.** 1987. New fossil orthopterans of the families Adumbratomorphidae fam. n., Pruvostitidae and Proparagryllacrididae (Orthoptera, Ensifera) from Perm and Triassic deposits of the USSR. Vestnik Zoologii 1987 (4): 20-28.

**International Commission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Mandelshtam, M. I., Schneider, G. F., Kuznetsova, Z. V. & Katz, F. I.** 1957. New Genera in the Families Cypridae and Cytheridae. Ezheg. vses. paleont. obshch. 14: 166-193.

**Sepkoski, J. J.** 2002. A compendium of fossil marine animal genera. Bulletins of American Paleontology 363:1-560.

**Sharov, A. G.** 1968. Filogniya orthopteroidnykh nasekomykh (in Russian) [1971 English translation, Phylogeny of the Orthopteroidea]. Trudy Paleontologicheskogo Instituta, Akademii Nauk SSSR [= Transactions of the Institute of Paleontology, USSR Academy of Sciences]. 118: 1-216 [251 pp.].

## SOME PROPERTIES OF $\alpha$ -AMYLASE IN THE SALIVARY GLAND OF *EURYGASTER INTEGRICEPS* (PUT) (HET.: SCUTELLERIDAE)

Mohammad Sa'adati Bezdi\*, Reza Farshbaf Pour Abad\*,  
Hussein Sadeghi\*\* and Gholamreza Golmohammadi\*

\* Department of Plant Protection, Faculty of Agriculture, University of Tabriz, Tabriz, Iran.

\*\* Department of Plant Protection, Faculty of Agriculture, Ferdowsi university, Mashad, Iran

[Sa'adati Bezdi, M. S., Farshbaf Pur Abad, R. F. P., Sadeghi, H. & Golmohammadi, G. 2008. Some Properties of  $\alpha$ -Amylase in the salivary gland of *Eurygaster integriceps* (Put) (Het.: Scutelleridae). Munis Entomology & Zoology, 3 (2): 733-744]

**ABSTRACT:** Studying insect digestive enzyme is important for understanding the function of their digestive systems. Today, many attentions are focused on plant enzyme inhibitors and their application in producing transgenic plants. Determining the properties of all digestive enzyme is the first step that should be observed. Enzyme was active at 25 to 50°C and its considerable activities were observed at 35 to 50°C. However, the highest level of activity occurred at 45°C. So, the optimum temperature for the enzyme activity was 45°C. Optimum pH for enzyme activity was 5. The amylase activity in anterior and posterior lobes and accessory gland of the salivary glands complex were 0.578, 1.545 and 0.405 U/mg protein, respectively, and were significantly different at  $P < 0.01$ . The effects of the mineral compounds on adults'  $\alpha$ -amylase activity were significant ( $P < 0.01$ ). Copper chloride, ammonium sulfate, sodium nitrate, magnesium chloride, magnesium nitrate (all at concentrations of 1 and 3 mM) and ammonium phosphate (1 mM) significantly inhibited the  $\alpha$ -amylase activity in *E. integriceps*.

**KEY WORDS:** Digestive enzymes, Salivary gland, pH optimum,  $\alpha$ -amylase, *Eurygaster integriceps*.

### INTRODUCTION

The sunn pest, *Eurygaster integriceps* (Put.) (Het.: Scutelleridae) a serious pest of wheat and barley is distributed in the Palearctic Region, which covers The Near and Middle East, Southern Asia and North Africa (Brown Erlap, 1962). In Iran, sunn pest is a key pest that cause serious damages to wheat and barley (Amir-Maafi Parker, 2003). Because of mounting concerns about creature environmental pollution and destruction of important natural enemies by conventional insecticide, alternative strategies such as biological control by natural enemies, host plant resistance, development of transformed plants and other control methods are needed in the struggle to manage *E. integriceps*. For nearly all these strategies, it is important to have a strong understanding of the biology of feeding of the target pest. It is also important to understand the biochemical and physiological feeding adaption to help explain the ecology and evolution of heteropterous insects, which remain unclear (Zeng Cohen, 2000a). Amylase is an important member of a complex of

digestive enzymes that attack macromolecules. It converts starch to maltose, which is then hydrolyzed to glucose by an  $\alpha$ -glucosidase (Applebaum, 1985; Strobel et al., 1998). Because  $\alpha$ -amylases play a major role in carbohydrate metabolism, organisms with a starch-rich diet depend on the effectiveness of their amylases for survival (Applebaum, 1985; Barbosa Pereira et al., 1999; Carlini and Grossi-de-Sa, 2002; D'Amico et al., 2000; Franco et al., 2002; Iulek et al., 2000; Oliveira-Neto et al., 2003; Strobl et al., 1998). Several insect  $\alpha$ -amylases have already been described, some of which occur as mixture of different isozymes. For instance, in eight *Amy* strains of *Drosophila melanogaster* (Meig.) (Diptera: Drosophilidae), at least two major  $\alpha$ -amylase isozymes were found (Doane, 1969). Conversely, single molecular forms of  $\alpha$ -amylases have been reported in *Callosobruchus chinensis* (L.) (Col.: Bruchidae) (Podoler Applebaum, 1971), *Tenebrio molitor* (L.) (Col.: Tenebrionidae) (Applebaum et al., 1961), *Lygus hesperus* (Knight) (Het.: Miridae) (Zeng Cohen, 2000b), and *Lethocerus uhleri* (Montandon) (Het.: Belostomatidae) and *Belostoma lutarium* (Stal.) (Het.: Belostomatidae) (Swart et al., 2006). Digestive enzyme inhibitors are proteinacious or nonproteinacious compounds which reduce an enzyme activity through attaching to its active site and/or its substrate (Farias et al., 2006; Zeng Cohan., 2001). Nowadays, plant enzyme inhibitors are of great importance because these have considerable effects on insect digestive enzymes and as a result on their development (Ishimoto Kitamura, 1989; Silva et al., 1999).

The use of genes that encode insecticidal proteins in transgenic crops has the potential to be beneficial for agricultural crop production, the environment, and consumers (Farias et al., 2006; Bahagiawati et al., 2007; Barbosa Pereira et al., 1999).

We undertook the study of the  $\alpha$ -amylase of the sunn pest to gain a better understanding of its digestive physiology, which we hope would lead to new strategies for its control.

## MATERIALS AND METHODS

### 1. Insects

Adult insects were collected from wheat farms in around Tabriz, Iran, during the summer of 2004.

### 2. Sample Preparation

Adult insects were dissected by the method of Yazdanian et al. (2006) and starved for 24h before dissecting (Cohen, 1993). This was based on the observations which had showed that the accumulation of the enzyme in the lumen of the true bugs salivary glands lasted 24 to 48 hrs (Cohen, 1993; Baptist, 1941). Enzyme samples were prepared by the methods of Cohen (1993) and Yazdanian et al. (2006) with slight modifications. All insects were dissected under a stereomicroscope in ice-cold phosphate buffer (4 °C, pH=6.9). The salivary gland complex (SGC) (including

anterior and posterior lobes, accessory glands and principal and accessory ducts) was exposed by breaking the junction point of the prothorax and mesothorax located between the coxal bases of front and mid legs and removing it from the abdomen with fine forceps and application of gentle traction to remove the midguts (Yazdanian et al., 2006). The SGCs were separated from the insect bodies, rinsed in ice-cold phosphate buffer and 10 pairs placed in a microtube containing 1 ml of cold phosphate buffer. The SGCs were homogenized by using a homogenizer (Ultra-Turrax T8, IKA Labortechnik, Germany) immediately after dissection. The homogenates were centrifuged at 12000 rpm for 10 minutes at 4 °C. The supernatants were stored at -20 °C for later analyses. Protein concentrations of all of the enzyme samples were determined by the bicinchoninic acid (BCA) method using bovine serum albumin (BSA) as the standard (Yazdanian et al., 2006).

### 3. $\alpha$ -amylase Activity Assay

Amylase activity in the salivary gland was determined by using a diagnostic kit (Amylase kit®, Pars Azmoon Co., Iran). The substrate was ethylidene-*p*-nitrophenyl maltoheptaoside (EPS-G<sub>7</sub>). Absorbance, which is directly related to  $\alpha$ -amylase activity, was measured at 405 nm and 37 °C using an auto analyzer (Alcyon 300® Plus, Molecular Devices Corporation, Sunnyvale, CA). Before application, the auto analyzer calibrated with the control sera N and P (TrueLab N® and TrueLab P®, respectively; Pars Azmoon Co., Iran) and a calibrator solution (TrueCal U®, Pars Azmoon Co., Iran). After calibration, the auto analyzer mixes 6  $\mu$ l of enzyme sample with 300  $\mu$ l of substrate solution, automatically, and calculates the enzyme activity (IU/L) after a reaction delay of 1 minute and 36 seconds. The assays were replicated three times. Finally, the specific  $\alpha$ -amylase activity calculated as U/mg protein (Cohen, 1993).

### 4. Optimum temperature and pH

In all the determination,  $\alpha$ -amylase activity was measured using by diagnostic kit (mentioned above). For the estimation of optimum temperature, the enzyme was incubated with substrates for 30 min at various temperature at 25, 30, 35, 37, 40, 45 and 50 °C.

For the determination of the optimum pH,  $\alpha$ -amylase activities at various pH values ranging from 4.5 to 10 (adjusted by citric acid and sodium hydroxide and at 0.5 pH unit increments) were assayed to determine the optimum pH of  $\alpha$ -amylase in the salivary gland of the *E. integriceps*. Measurements were repeated three times for each pH value.

### 5. $\alpha$ -amylase activity in different parts of salivary gland

The glands extracted from adult insects were separated in the anterior lobe (AN), posterior lobe (PL) and accessory gland (AG) by using microdissecting scissor, than, 10 pairs of each them placed in a microtube containing 1mM of cold phosphate buffer.  $\alpha$ -amylase activity was assayed as mentioned in part 2.3.

## 6. Enzyme Inhibition and Activation

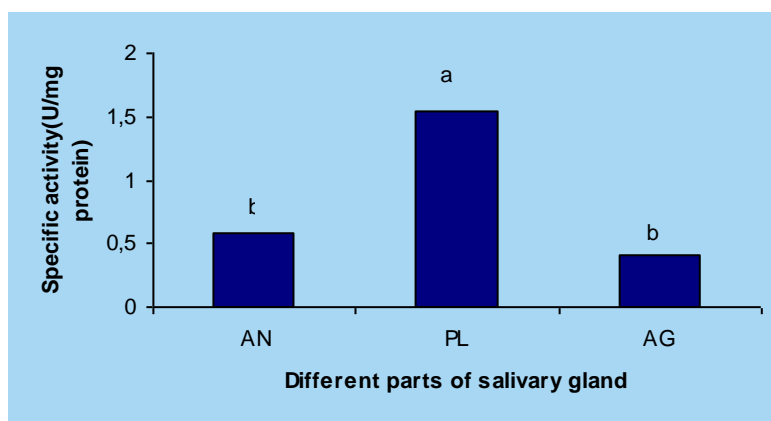
The effects of ammonium nitrate (AN), ammonium phosphate (AP), ammonium sulfate (AS), copper chloride (CC), magnesium chloride (MC), magnesium nitrate (MN), magnesium sulfate (MS), potassium nitrate (PN), sodium nitrate (SN) and sodium phosphate (SP) on salivary  $\alpha$ -amylase activity of the sunn pest were determined. Two concentrations (1 and 3 mM) of each compound were prepared. The above mentioned concentrations were prepared in distilled water, and the pH was adjusted to 7 using citric acid and sodium hydroxide. Each solution (100  $\mu$ l) was pre-incubated with 10  $\mu$ l of enzyme solution at room temperature (25- 28  $^{\circ}$ C) and the residual activities were determined after 30 minutes. The percentages of inhibition or activation were determined by comparing the enzyme activity in distilled water with its activities in the above mentioned solutions. The experiments were repeated three times, and data were analyzed by analysis of variance (ANOVA), and means of enzyme activity of *E. integriceps* in different solutions were compared by Fisher's protected least significant difference (FPLSD) (SAS Institute, 1988) at  $P = 0.01$ .

## RESULTS

### 1. Enzyme activities in the principal and accessory glands of *E.integriceps*.

The  $\alpha$ -amylase activity was detected in both lobes of the principal gland and accessory gland. The results showed that the  $\alpha$ -amylase activity in different parts of salivary gland were significant ( $P < 0.01$ ).

$\alpha$ -amylase activity in posterior lobe (1.545 U/mg protein) was higher than that in anterior lobe (0.570 U/mg protein) and accessory gland (0.405 U/mg protein) ( $P < 0.01$ ).  $\alpha$ -amylase activity was not significant between anterior lobe and accessory gland (Fig. 1).



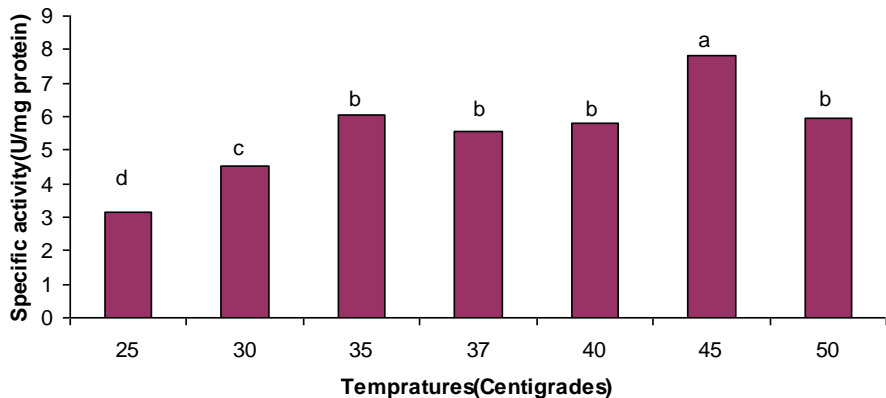
**Fig.1.**  $\alpha$ -amylase activity in different parts of salivary gland of *Eurygaster integriceps* (37 $^{\circ}$ C tempt., pH=7).



## 2. Optimum temperature of the $\alpha$ -amylase activity

Enzyme was active at 25 to 50°C and its considerable activities were observed at 35 to 50°C. However, the highest level of activity occurred at 45°C ( $P < 0.01$ ). So, the optimum temperature for the enzyme activity is 45°C (Fig.2).

The  $\alpha$ -amylase activity at 35, 37, 40 and 50°C was not significant, and was lower than that at 45°C. The lowest level of activity occurred at 25 and 30°C, respectively.



**Fig.2.** Effect of different temperatures on  $\alpha$ -amylase activity of salivary gland of *Eurygaster integriceps* (pH=7).

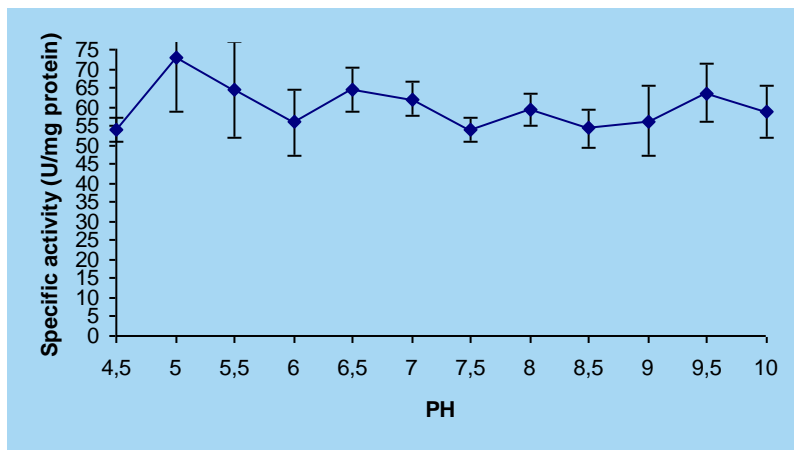
## 3. Effect of Hydrogen Ion Concentration on the Enzyme Activity

The results showed that there were considerable activities over a broad range of pH (4.5-10) for the amylase of this species. There were not significant difference at any pH value at  $P < 0.01$ . The activity of  $\alpha$ -amylase in the salivary gland of *E. integriceps* was higher at pH=5 (Fig. 3).

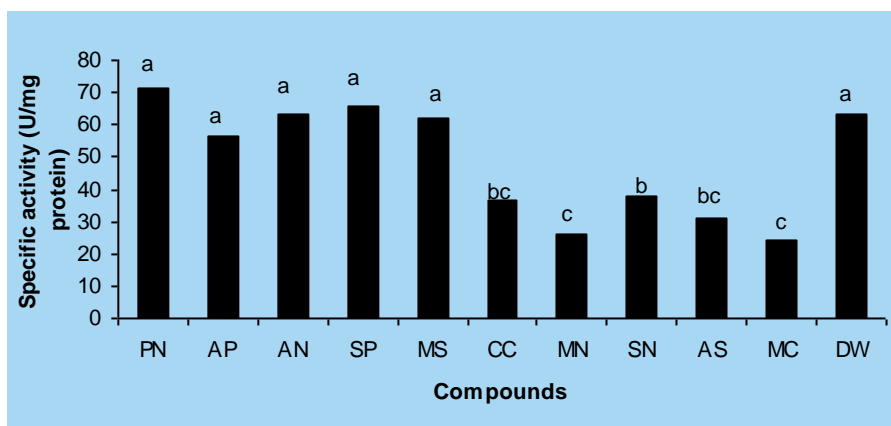
## 4. Inhibition and Activation of the $\alpha$ -amylase

The results of this study showed that some mineral compounds reduced and some others increased the salivary  $\alpha$ -amylase activity of *E. integriceps*.

As a whole,  $\alpha$ -amylase activity was inhibited by CC, MN, SN, AS and MC. MC and MN had more inhibitory effects on the enzyme activity in compare to the other compounds (Fig. 4).



**Fig.3.** Salivary  $\alpha$ -amylase activity of *E. integriceps* at different hydrogen ion concentrations (37 °C).



**Fig.4.** Total effects of some mineral compounds on salivary  $\alpha$ -amylase activity of *Eurygaster integriceps* 30 minutes after incubation (37 °C temp., pH=7).

Effects of two concentrations (1 and 3 mM) of different compounds are presented in Table 1. PN and SP at the concentration of 1 mM activated the salivary  $\alpha$ -amylase of the *E. integriceps*, significantly (Tab. 1). CC, AS, SN, MC, MN (all at the concentrations of 1 and 3 mM) and AP (1 mM) significantly inhibited the  $\alpha$ -amylase activity of *E. integriceps*. SP (3 mM), AN (1 mM), MS (1 and 3 mM), PN (3 mM) and AP (3 mM) had no effect on the  $\alpha$ -amylase activity.

Table 1. Effects of two concentrations of some mineral compounds on the  $\alpha$ -amylase activity in the salivary gland of *Eurygaster integriceps* 30 minutes after incubation.

Compound	Enzyme activity (% control)	
	1 mM	3mM
Ammonium nitrate	98.9 <sup>c</sup>	101.5 <sup>ab</sup>
Ammonium phosphate	75.1 <sup>d</sup>	103.1 <sup>ab</sup>
Ammonium sulfate	20.6 <sup>g</sup>	77.7 <sup>c</sup>
Copper chloride	81.4 <sup>d</sup>	33.8 <sup>e</sup>
Magnesium chloride	38.6 <sup>f</sup>	38.6 <sup>e</sup>
Magnesium nitrate	29.1 <sup>fg</sup>	52.9 <sup>d</sup>
Magnesium sulfate	99.4 <sup>bc</sup>	96.8 <sup>b</sup>
Potassium nitrate	119.1 <sup>a</sup>	100.6 <sup>ab</sup>
Sodium nitrate	62.9 <sup>e</sup>	57.6 <sup>d</sup>
Sodium phosphate	110.5 <sup>ab</sup>	97.3 <sup>b</sup>
Distilled water (Control)	100 <sup>bc</sup>	100 <sup>ab</sup>

## DISCUSSION

The salivary gland is divided in to two functional component ,the principal and accessory gland (Miles,1969 and 1972).

The relative size of the lobes varies in different forms but the anterior lobe is always the amaller (Baptist, 1941). Our data showed that the amylase activity in anterior and posterior lobes and accessory gland of the salivary glands complex were 0.578, 1.545 and 0.405 U/mg protein, respectively.

These results showed that the posterior lobe of the salivary gland was the major source of  $\alpha$ -amylase.

It was revealed that the enzyme activity in posterior lobe was significantly ( $P < 0.01$ ) higher than that in anterior lobe (nearly 2.6 times) and accessory gland (nearly 3.8 times).

In findings similar to ours, Hori (1972, 1975) reported that  $\alpha$ -amylase activity from *lygus disponsi* and *L.rugulipennis* was higher than that other parts of the salivary gland. Miles (1972) stated that, in Lygaeidae,

the posterior lobe of the salivary gland was the major source of  $\alpha$ -amylase activity.

The way enzymes work imposes constraints on the function (Silva et al., 2001). No single enzyme can function under all of the physical and chemical condition under which life is found (Applebaum, 1985). In fact most enzyme work well only in narrow ranges of temperature and pH (Zeng et al., 2002a).

In this study, the optimum temperature of the enzyme was found to be 45 °C. This value is lower than that of the  $\alpha$ -amylase activity in *Blatella germanica* 50°C (Applebaum, 1985) and *Bombyx mori* 60°C (Kanekatsu, 1978). On the other hand, this value is higher than that of the  $\alpha$ -amylase activity in *L. disponi* 37°C (Hori, 1970), *Dolycoris baccarum* 40°C (Hori, 1969), *Cerambyx cerdo* 35°C (Applebaum, 1985) and *Tenebrio molitor* 25°C (Barbosa Prreira et al., 1999). Increased temperature speeds reactions. However, biological reactions are catalyzed by proteinaceous enzymes, and each enzyme has a temperature above which its three dimensional structure is disrupted by heat. Therefore, biological reactions occur faster with increasing temperature up to the point of enzyme denaturation, above which temperature, enzyme activity and the rate of the reaction decreases sharply (Agblor et al., 1994; Applebaum, 1985; Zeng et al., 2002b).

Results from this study showed that  $\alpha$ -amylase activity of *E. integriceps* has a broad pH range between 4.5 to 10. Zeng & Cohen (2000) reported that optimal pH for  $\alpha$ -amylase from *L. herperus* and *L. lineolaris* was 6.5, similarly. Ferreria et al. (1994) reported the optimum pH for  $\alpha$ -amylase in *Erinnyis ello* larva as 6. The optimum pH value of  $\alpha$ -amylase from *E. integriceps* was higher compared with that of *Sitophilus oryzae*, *S. granareis*, *Rhyzopertha dominica*, *T. molitor* and *Anagasta kuhenilla*, which ranged from 3.7 to 4.5 (Buonocore et al., 1976; Baker Woo, 1985; Baker, 1987, 1989). These differences may reflect the phylogenetic relationship, or response to different food sources. Also there may be a difference attributable to the origin of the enzyme, i.e. gut or salivary glands. The pH optimum generally reflects the pH of the environment in which the enzyme normally function. One way in which pH affects reactions rates is by altering the charge state of the substrate or of the active site of the enzyme. Extremes in pH can also disrupt the hydrogen bonds that hold the enzyme in its three-dimensional structure, denaturing the protein (Da Silva et al., 2004; Zeng et al., 2002a).

The salivary  $\alpha$ -amylase activity proved to be activated strongly by PN in Hemiptera (Hori, 1969). The salivary  $\alpha$ -amylases of *Adelphocoris suturalis* and *Lygus disponi* were activated by PN (Hori, 1969, 1972). In agreement with observation of Hori (1969, 1972), our data showed that the salivary amylase of *E. integriceps* was activated by PN (1 mM) and not affected by PN (3 mM).

Hori (1969) stated that the polygalacturonase activity in the salivary gland of *Lygus rugulipennis* was greatly affected by salts in the incubation medium. Inhibitory salts were  $\text{CaCl}_2$ ,  $\text{FeCl}_2$ ,  $\text{FeCl}_3$  and  $\text{MgCl}_2$ . He also reported that the salivary phosphatase activity was inhibited in alkaline solution. For example, addition of 0.01 M potassium phosphate caused 50% inhibition of the enzyme activity. In the present study, the salivary amylase of *E. integriceps* was inhibited by CC, AS, SN, MC, MN (all at the concentrations of 1 and 3 mM) and AP (1 mM), strongly. It is to be supposed that the inhibiting effect of some mineral compounds on the digestive enzymes may offer an disadvantageous condition for digestion of food (Cohen, 1993; Hori, 1970).

Successful results have in the past been obtained with inhibitors that completely inhibited their target enzymes but recent results show that even partial inhibition can give substantial control of insect pests (Ishimoto Kitamura, 1989). Nevertheless, the use of nonproteinacious inhibitors for production of insect-resistant transgenic plants is much more difficult. Hence, the presence of multiple expressed transgenes would be required in order to confer protection (Baker, 1989). The primary reason for producing insect-resistance transgenic crops is to reduce the use of chemical pesticides and, thereby, the cost to the farmer and the consumer and to reduce the insecticide loads on the environment (Da Silva et al., 2004). Making insect-resistant plants requires the characterization of  $\alpha$ -amylase of the target insect and the identification of suitable inhibitors from plants or other sources (Strobl et al., 1998).

In our opinion, the purification and characterization of more insect  $\alpha$ -amylases will greatly facilitate the understanding of the mechanisms responsible for this selectivity and will help to design new and more specific strategies for insect control.

### ACKNOWLEDGEMENTS

We are grateful to Mohammad Vatankhah, Tanin Naderi and Fatemeh Zivary for technical help.

### LITERATURE CITED

- Agblor, A., Henderson, H. M. & Madrid, F. J. 1994. Characterisation of alpha-amylase and polygalacturonase from *Lygus* spp. (Heteroptera: Miridae). Food Res. Int. 27: 321-326.
- Amir-Maafi, M. & Parker, B. L. 2003. Efficiency of *Trissolcus* spp. (Hymenoptera: Scelionidae) at egg parasitoids of *Eurygaster integriceps* (Hemiptera: Scutelleridae) in Iran. Arab. J. Plan Protec. 21(1): 69-72.
- Applebaum, S. W. 1985. Biochemistry of digestion. In: G. A. Kerkut and L. L. Gilbert (eds.). Comprehensive Insect Physiology, Biochemistry and Pharmacology. Vol.4: Regulation, digestion, excretion. Pergamon Press. pp. 279-307.

**Applebaum, S. W., Jankovic, M. & Biry, Y.** 1961. Studies on the midgut amylase activity of *Tenebrio molitor*. J. Insect. Physiol. 7: 100-108.

**Bahagiawati, A., Shade, R. E., Koiwa, H., Hasegawa, P. M., Bressan, R. A., Murdock, L. L. & Zha-salzman, K.** 2007. Protease inhibitors from several classes work synergistically against *Callosobruchus maculatus*. J. Insect. Physiol. (2007), doi: 10. 1016/j. jinsphys. 2007. 03. 008.

**Baker, J. E.** 1987. Purification of isoamylase from the rice weevil, *Sitophilus oryzae* (L.) (Coleoptera: Curculionidae) by high-performance liquid chromatography and their interaction with partially-purified larval *Anagata kuhniella* (Lepidoptera: Pyralidae) purified amylase inhibitors from wheat. Insect Biochem. 17: 37-44.

**Baker, J. E.** 1989. Interaction of partially-purified amylase with amylase inhibitors from wheat. Comp. Biochem. Physiol. 93B: 239-246.

**Baker, J. E. & Woo, S. W.** 1985. Purification, partial characterization and postembryonic levels of amylases from *Sitophilus oryzae* and *S. granaries*. Arch. Insect Biochem. Physiol. 2: 415-428.

**Baptist, B. A.** 1941. The morphology and physiology of the salivary glands of Hemiptera-Heteroptera. Quart. J. Micr. Sci. 83: 91-139.

**Barbosa Pereira, P. J., Lozanov, V., Patthy, A., Huber, R., Bode, W., Pongor, S. & Strobl, S.** 1999. Specific inhibition of insect  $\alpha$ -amylases: yellow meal worm  $\alpha$ -amylase in complex with the Amaranth  $\alpha$ -amylase inhibitor at 2.0 Å resolution. Structure 7: 1079-1088.

**Brown, E. S. & Erlap, M.** 1962. The distribution of the species of *Eurygaster* Lap. (Hemiptera: Scutelleridae) in Middle East countries. Annals and Magazine of the Natural History Ser. 13. Vol. V. p. 65, February, 1962.

**Buonocore, V., Poerio, E., Silano, V. & Tomasi, M.** 1976. Physical and catalytic properties of  $\alpha$ -amylase from *Tenebrio molitor* larvae. Biochem. J. 153: 621-625.

**Carlini, C. R. & Grossi-de-Sa, M. F.** 2002. Plant toxic proteins with insecticidal properties: A review on their potentialities as bioinsecticides. Toxicon 40: 1515-1539.

**Cohen, A. C.** 1993. Organization of digestion and preliminary characterization of salivary trypsin-like enzymes in a predaceous heteropteran, *Zelus renardii*. J. Insect Physiol. 39: 823-829.

**D'Amico, S., Gerday, C. & Feller, G.** 2000. Structural similarities and evolutionary relationships in chloride-dependent  $\alpha$ -amylases. Gene, 253: 95-105.

**Da Silva, M. C. M., Mello, L. V., Coutinho, M. V., Rigden, D. J., Neshich, G., Chrispeels, M. J. & Grossi-de-Sa, M. F.** 2004. Mutants of common bean  $\alpha$ -amylase inhibitor-2 as an approach to investigate binding specificity to  $\alpha$ -amylases. Pesq. Agropec. Bras., Brasília 39: 201-208.

**Doane, W. W.** 1969. Amylase variants in *Drosophila melanogaster*: linkage studied and characterization of enzyme extract. J. Exp. Zool. 171: 321-342.

**Farias, L. R., Costa, F. T., Souza, L. A., Pelegrini, P. B., Grossi-de-Sa, M. F., Neto, S. M., Bloch jr, C., Laumann, R. A., Noronho, E. F. & Franco, O. L.** 2006. Isolation of a novel Corchia papaya  $\alpha$ -amylase inhibitor with deleterious activity toward *Callosobruchus maculatus*. Pest. Biochem. Physiol. 87: 255-260.

- Ferreira, C., Capella, A. N., Sitnik, R. & Terra, W. R.** 1994. Properties of the digestive enzymes and the permeability of the peritrophic membrane of *Spodoptera frugiperda* (Lepidoptera) larvae. *Comp. Biochem. Physiol.* 107A, 631-640.
- Franco, O. L., Rigden, D. J., Melo, F. R. & Grossi-de-Sa, M. F.** 2002. Plant  $\alpha$ -amylase inhibitors and their interaction with insect  $\alpha$ -amylases, structure, function and potential for crop protection. *Eur. J. Biochem.* 269: 397-412.
- Hori, K.** 1975. Digestive carbohydrases in the salivary gland and midgut of several phytophagous bugs. *Comp. Biochem. Physiol.* 50B: 145-151.
- Hori, K.** 1972. Comparative study of a property of salivary amylase among various heteropterous insects. *Comp. Biochem. Physiol.* 42B: 501-508.
- Hori, K.** 1970. Some properties of amylase in the salivary gland of *Lygus disponsi*. *J. Insect Physiol.* 16: 373-386.
- Hori, K.** 1969. Some properties of salivary amylases of *Adelphocoris suturalis* (Miridae), *Dolycoris baccarum* (Pentatomidae), and several other heteropteran species. *Ent. Exp. Appl.* 12: 454-466.
- Kanekatysa, U.** 1978. Studies on further properties for an alkaline amylase in the digestive juice of the silk worm, *Bombyx mori*. *J. Fac. Text. Sci. Technol.* 76: 1-21.
- Ishimoto, M. & Kitamura, K.** 1989. Growth inhibitory effects of an  $\alpha$ -amylase inhibitor from kidney bean, *Phaseolus vulgaris* (L.) on three species of bruchids (Coleoptera: Bruchidae). *Appl. Entomol. Zool.* 24: 281-286.
- Iulek, J., Franco, O. L., Silva, M., Slivinski, C. T., Bloch Jr., C., Rigden, D. J. & Grossi-de-Sa, M. F.** 2000. Purification, biochemical characterization and partial primary structure of a new  $\alpha$ -amylase inhibitor from *Secale cereale* (rye). *Int. J. Biochem. Cell Biol.* 32: 1195-1204.
- Miles, P. W.** 1969. Interaction of plant phrnols and salivary phenolases in the relationship between plants and Hemiptera. *Ent. Exp. Appl.* 12: 736-744.
- Miles, P. W.** 1972. The saliva of Hemiptera, in: J. E. Treherne, O. J. Berridge, and V. B. Wigglesworth (Eds). *Advances in Insect Physiology*. Academic Press. London & New York. Pp. 183-255.
- Oliveira-Neto, O. B., Batista, J. A. N., Rigden, D. J., Franco, O. L., Falcao, R., Fragoso, R. R., Mello, L. V., dos Santos, R. C. & Grossi-de-Sa, M. F.** 2003. Molecular cloning of  $\alpha$ -amylases from cotton boll weevil, *Anthonomus grandis* and structural relations to plant inhibitors: an approach to insect resistance. *J. protein Chem.* 22: 77-87.
- Podoler, H. & Applebaum, S. W.** 1971. The amylase of the beetle *Callosobruchus chinensis*: properties. *Biochem. J.* 121: 321-325.
- SAS Institute.** 1988. *SAS/STAT User's Guide*, Release 6.0 ed. Cary, NC :SAS Institue.
- Silva, C. P., Terra, W. R., Xavier-Filho, J., Grossi-de-Sa, M. F., Lopes, A. R. & Pontes, E. G.** 1999. Digestion in larvae of *Callosobruchus maculatus* and *Zabrotes subfasciatus* (Coleoptera: Bruchidae) with emphasis on  $\alpha$ -amylases and oligosaccharidases. *Insect Biochem. Molec. Biol.* 29: 355-366.

**Strobl, S., Maskos, K., Wiegand, G., Huber, R., Gomis-Ruth, F. X. & Glockshuber, R.** 1998. A novel strategy for inhibition of  $\alpha$ -amylases: yellow meal worm  $\alpha$ -amylase in complex with the Ragi bifunctional inhibitor at 2.5 Å resolution. *Structure* 6: 911-921.

**Swart, C. C., Deaton, L. E. & Felgenhauer, B. E.** 2006. The salivary gland and salivary enzyme of the giant water bugs (Heteroptera, Belostomatidae). *Comp. Biochem. Physiol.* 145: 114-122.

**Yazdanian, M., Farshbaf Pour Abad, R., Rashidi, M. R., Valizadeh, M. & Rashtchi Zadeh, N.** 2006.  $\alpha$ -amylase activity in the gut and salivary gland of the stripped bug, *Graphosoma lineatum* (Het, Scutelleridae). *Agric. Sci.*, 16(2): 91-106.

**Zeng, F. & Cohen, A. C.** 2000a. Comparison of  $\alpha$ -amylase and protease activities of a zoophytophagous and two phytozoophagous heteroptera. *Comp. Biochem. Physiol.* 126A: 101-106.

**Zeng, F. & Cohen, A. C.** 2000b. Partial characterization of  $\alpha$ -amylase in the salivary glands of *Lygus hesperus* and *L. Lineolaris*. *Comp. Biochem. Physiol.* 126B: 9-16.

**Zeng, F. & Cohen, A. C.** 2001. Induction of elastase in a zoophytophagous heteropteran, *Lygus hesperus* (Hemiptera: Miridae). *Ann. Ent. Soc. Am.* 94: 146-151.

**Zeng, F., Zhu, Y. & Cohen, A. C.** 2002. Molecular cloning and partial characterization of a trypsin-like protein in salivary gland of *Lygus hesperus* (Hemiptera: Miridae). *Insect. Biochem. Molec. Biol.* 32: 455-464.

**Zeng, F., Zhu, Y. & Cohen, A. C.** 2002. Partial characterization of trypsin-like protease and molecular cloning of a trypsin-like precursor cDNA in salivary glands of *Lygus lineolaris*. *Comp. Biochem. Physiol.* 131B: 453-463.



## SOME NOMENCLATURAL CHANGES FOR BLATTODEA AND DICTYONEURIDA (=PALAEODICTOPTERA)

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE,  
e-mail: ozdikmen@gazi.edu.tr

**[Özdikmen, H. 2008. Some nomenclatural changes for Blattodea and Dictyoneurida (=Palaeodictyoptera). Munis Entomology & Zoology 3 (2): 745-748]**

**ABSTRACT:** Three junior homonyms were detected among the genus group names of Blattodea (1) and Dictyoneurida (2) and the following replacement names are proposed: *Hongoblatta* nom. nov. for *Latiblatta* Hong, 2002; *Hongius* nom. nov. for *Palaeoneura* Hong, 1985 and *Mongolianus* nom. nov. for *Mongolodictya* Sinitshenkova, 1992. Accordingly, new combinations are herein proposed for the species currently included in these genus group names respectively: *Hongoblatta orientalis* (Hong, 2002) comb. nov. and *Hongoblatta spinosa* (Hong, 2002) comb. nov. from *Latiblatta* Hong, 2002; *Hongius gilgonensis* (Hong, 1985) comb. nov. from *Palaeoneura* Hong, 1985 and *Mongolianus callidus* (Sinitshenkova, 1992) comb. nov. from *Mongolodictya* Sinitshenkova, 1992. As a result of these nomenclatural changes, a family group name Mongolianidae nom. nov. is also proposed for Mongolodictyidae Sinitshenkova, 1992.

**KEY WORDS:** nomenclatural changes, homonymy, replacement names, Blattodea, Dictyoneurida.

Three proposed genus group names in the order Blattodea (1) and Dictyoneurida (2) are nomenclaturally invalid, as the genus group names have already been used by different authors in other animal groups (Insecta and Bryozoa). In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose substitute names for these names.

### Order BLATTODEA

#### Superfamily BLABEROIDEA

#### Family BLABERIDAE

#### Genus *HONGOBLATTA* NOM. NOV.

*Latiblatta* Hong, 2002. Amber insects of China. Beijing Science and Technology Press Beijing: 23 (Blattodea: Blaberidae). Preoccupied by *Latiblatta* Vishniakova, 1968. In Rohdendorf [Ed.] [Jurassic insects of the Karatau.] Nauka, Moscow: 77. (Blattodea: Mesoblattinidae).

**Remarks on nomenclatural change:** The name *Latiblatta* was initially introduced by Vishniakova, 1968 for a jurassic fossil genus of the cockroach family Mesoblattinidae (with the type species *Latiblatta lativalvata* Vishniakova, 1968 from Kazakhstan). Recently Hong, 2002 described an eocenic amber fossil cockroach genus from China under the same generic name (with the type species *Latiblatta spinosa* Hong, 2002). It is still used as a valid genus name. Thus, the genus group name *Latiblatta* Hong, 2002 is a junior homonym of the genus *Latiblatta*

Vishniakova, 1968. So I propose a new replacement name *Hongoblatta* nom. nov. for the genus name *Latiblatta* Hong, 2002.

Etymology: This genus is named after the current author of *Latiblatta*, Y. Hong.

Summary of nomenclatural changes:

*Hongoblatta* **nom. nov.**

= *Latiblatta* Hong, 2002 (non Vishniakova, 1968).

*Hongoblatta orientalis* (Hong, 2002) **comb. nov.**

= *Latiblatta orientalis* Hong, 2002 [China; amber; Fossil; Eocene]

*Hongoblatta spinosa* (Hong, 2002) **comb. nov.**

= *Latiblatta spinosa* Hong, 2002 [China; amber; Fossil; Eocene]

## **Order DICTYONEURIDA (=PALAEODICTYOPTERA)**

### **Superfamily DICTYONEUROIDEA**

#### **Family DICTYONEURIDAE**

#### **Genus *HONGIUS* NOM. NOV.**

*Palaeoneura* Hong, 1985. Entomotaxonomia 7 (2): 85. (Dictyoneurida=Palaeodictyoptera: Dictyoneuridae). Preoccupied by *Palaeoneura* Waterhouse, 1915. Trans. ent. Soc. London, 1914, 537. (Hymenoptera: Mymaridae).

**Remarks on nomenclatural change:** Hong (1985) described the monotypic fossil genus *Palaeoneura* with the type species *Palaeoneura giligonensis* Hong, 1985 in Dictyoneurida. Unfortunately, the generic name was already preoccupied by Waterhouse (1915), who had proposed the genus name *Palaeoneura* with the type species *Palaeoneura interrupta* Waterhouse, 1915 by subsequent designation in the hymenopteran family Mymaridae. The genus includes three species as *Palaeoneura evanescens* Waterhouse, 1915; *Palaeoneura interrupta* Waterhouse, 1915 and *Palaeoneura turneri* Waterhouse, 1915. Thus, the genus *Palaeoneura* Hong, 1985 is a junior homonym of the generic name *Palaeoneura* Waterhouse, 1915. So I propose a new replacement name *Hongi* nom. nov. for *Palaeoneura* Hong, 1985.

Etymology: This genus is named after the current author of *Palaeoneura*, Y. Hong.

Summary of nomenclatural changes:

*Hongi* **nom. nov.**

= *Palaeoneura* Hong, 1985 (non Waterhouse, 1915 and nec Turner, 1923).

*Hongius giligonensis* (Hong, 1985) **comb. nov.**

= *Palaeoneura giligonensis* Hong, 1985

**Superfamily CALVERTIELLOIDEA**  
**Family MONGOLIANIDAE NOM. NOV.**  
**Genus MONGOLIANUS NOM. NOV.**

*Mongolodictya* Sinitshenkova, 1992. Sovmestnaya Sovetsko-Mongol'skaya Paleontologicheskaya Ekspeditsiya Trudy 41: 99. (Dictyoneurida=Palaeodictyoptera: Mongolianidae nom. nov.). Preoccupied by *Mongolodictya* Gorjunova, 1988. Sovmestnaya Sov-Mong. Paleontol. Eksped. Tr. No. 33: 10. (Bryozoa: Cystoporida: Cystodictyonidae).

**Remarks on nomenclatural change:** The genus group name *Mongolodictya* was firstly proposed for a bryozoan fossil genus by Gorjunova (1988) with the type species *Mongolodictya insperata* Gorjunova, 1988 by original designation from Mongolia. It is currently a valid generic name in the family Cystodictyonidae. The genus includes only 1 species as the type.

Then, the Mongolian genus *Mongolodictya* was described by Sinitshenkova (1992) with the type species *Mongolodictya callida* Sinitshenkova, 1992 by original designation (Palaeodictyoptera: Mongolodictyidae). The name is currently used as a valid generic name in Palaeodictyoptera as the type genus of the family Mongolodictyidae Sinitshenkova, 1992. The family includes one genus and species as the type.

However, the name *Mongolodictya* Sinitshenkova, 1992 is invalid under the rule of homonymy, being a junior homonym of *Mongolodictya* Gorjunova, 1988. Under the International Code of Zoological Nomenclature (ICZN 1999) it must be rejected and replaced. In accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (1999), I propose to substitute the junior homonym *Mongolodictya* Sinitshenkova, 1992 for the nomen novum *Mongolianus*.

As a result of this, *Mongolodictya* Sinitshenkova, 1992 is replaced with *Mongolianus* new name. The following new combination is established: *Mongolianus callidus* (Sinitshenkova, 1992) new combination.

In addition to this, I herein propose the replacement name Mongolianidae new name for the family name Mongolodictyidae because its type genus *Mongolodictya* Sinitshenkova, 1992 is invalid and the type genus of a family-group name must be valid.

## SYSTEMATICS

Order Palaeodictyoptera  
Family **Mongolianidae** new name

Mongolodictyidae Sinitshenkova, 1992: 98

**Type genus.**— *Mongolianus* new name.

**Remarks.**—The name *Mongolodictya* has been used in Palaeodictyoptera as a stem for a family-group name, and should be automatically replaced with the new name.

Genus ***Mongolianus*** new name

*Mongolodictya* Sinitshenkova, 1992: 99, junior homonym of *Mongolodictya* Gorjunova, 1988.

**Type species.**— *Mongolodictya callida* Sinitshenkova, 1992 by original designation.

**Etymology.**— from the type locality “Mongolia”.

**Species account and distribution.** — Only one species as the type; known from Mongolia.

The following new combination is proposed and the species is removed from *Mongolodictya* Sinitshenkova, 1992:

*Mongolianus callidus* (Sinitshenkova, 1992) **new combination**

Syn.: *Mongolodictya callida* Sinitshenkova, 1992

#### LITERATURE CITED

**Gorjunova, R. V.** 1988. New Carboniferous bryozoans of the Gobi Altai. Sovmestnaya Sovetsko-Mongolskaya Paleontologicheskaya Ekspeditsiya Trudy 33: 10-23, 93.

**Hong, Y.** 1985. New fossil genera and species of Shanxi Formation in Xishan of Taiyuan. Entomotaxonomia 7 (2): 85-91.

**Hong, Y.** 2002. Amber insects of China. Beijing: Scientific and Technological Publishing House, 653 pp.

**International Commission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Sinitshenkova, N. D.** 1992. Two new insect species (Insecta: Dictyonera = Palaeodictyoptera, Perlida = Plecoptera) from the Late Permian of South Mongolia, Trudy Sovmestnaya Sovetsko-Mongol'skaya Paleontologicheskaya Ekspeditsiya, Moscow 4 (1992), pp. 98-100.

**Vishniakova, V. N.** 1968 Mesozoic blattids with external ovipositors and details of their reproduction. In Jurassic insects of Karatau (ed. B. B. Rohdendorf), Moscow: Akademiya Nauk SSSR, pp. 55-86.

**Waterhouse, C. O.** 1915. Descriptions of two new genera and new species of Mymaridae from Tasmania. Trans. Entomol. Soc. Lond. 1914: 536-539 [537].

## BEHAVIOURAL RESPONSE OF *CHILOCORUS BIPUSTULATUS* (COLEOPTERA: COCCINELLIDAE) TO VARIATION IN *UNASPIS EUNYMI* (HOMOPTERA: DIASPIDIDAE) DENSITY AT SPATIAL SCALES

Maryam Jaihoni\*, Ahad Sahragard\* and Latif Salehi\*

\* Department of Plant Protection, College of Agriculture, University of Guilan, Rasht, Guilan, Iran. e-mails: sahra1330@yahoo.com, sahragard@guilan.ac.ir

[Jaihoni, M., Sahragard, A. & Salehi, L. 2008. Behavioural response of *Chilocorus bipustulatus* (Coleoptera: Coccinellidae) to variation in *Unaspis eunymi* (Homoptera: Diaspididae) density at spatial scales. *Munis Entomology & Zoology* 3 (2): 749-760]

**ABSTRACT:** The behavioral response of *Chilocorus bipustulatus* L. to variation in eunymus scale, *Unaspis eunymi* Comstock density at different patches was examined under laboratory conditions ( $27 \pm 2^\circ\text{C}$ ,  $70 \pm 5\%$  of RH, 16L: 8D). Different densities of eunymus female scales were set on *Eunymus japonicus* leaves under a stereomicroscope and were placed in plastic containers. Plastic containers were arranged randomly equidistant from one another in the cage. The experimental procedure involved introducing different number of female predator separately in the center of the cage. The patterns of percentage of time spent on each patch, revealed a tendency for aggregation on the patches of high prey densities. Predators spent proportionately more time on high density patches than on low ones. The proportion of predators found in each patch also indicated aggregation of predators in high density patches. The values of aggregation index for 1 to 16 female predators were all greater than zero showing the concentration of the predator in patches with high prey densities. The percentage of prey eaten was variable in different prey patch densities, showing a density dependence tendency. It was found in this research that *Chilocorus bipustulatus* aggregated in high density patches of its prey, but the pattern of predation, was variable at different patch densities of the prey. Density dependent pattern of predation has been shown to suppress pest population and even contribute to population stability.

**KEY WORDS:** Aggregation, density dependent, *Chilocorus bipustulatus*, *Unaspis eunymi*

The Asian diaspidid scale insect, *Unaspis euonymi* Comstock is an important pest of woody landscape plants especially, *Eunymus japonicus* in many parts of the world. In cases of heavy outbreaks, host plants are destroyed and becomes as a real problem in landscapes (Brewer & Oliver, 1984; Driesche et al., 1998; Schmutterer, 1998; Ozyurt & Ulgenturk, 2007). The predator, *Chilocorus bipustulatus* has been recorded as an active natural enemy of the scale insects, soft scales and whiteflies (Viggiani, 1985; Stathas et al., 2003; Yigit et al., 2003).

Host populations are generally patchily distributed and parasitoids must forage between patches (Waage & Hassell, 1982; Hassell & Waage, 1984). A patch can be considered as spatial subunits of the foraging area in which aggregation of hosts occurs (Hassell & Southwood, 1978). The dimension of a patch is determined by the forager itself (Rosenheim et al., 1989). The foraging behavior of individuals is clearly related to the dynamics of the population. The proper recognition of a patch boundaries is crucially important in studying the dynamic consequences of spatial heterogeneity, and provides a good example of how the population

ecologists must rely on the study of animal behavior, as more information on the behavior of individuals provide appropriate insights into population dynamics (Hassell & May, 1985). Non random searching behavior will result in spatial heterogeneity in the pattern of predation. Lessells' (1985) review on the spatial distribution of parasitism showed that all possible responses can occur in natural and laboratory systems. Patterns of density dependence, inversely density dependence and independent of density were common among parasitoids. A similar result has also been found by Walde & Murdock (1988). It has been shown that both direct and inverse density dependent pattern of predation can contribute to population stability, and whether direct or inverse relationships have the greater effect, depends upon the characteristics of the prey's spatial distribution (Hassell, 1984, 1985; Chesson & Murdoch, 1986; Reeve et al., 1994). However, all aspects of aggregation would increase stability in the population (Godfray, 1994; Maron & Harrison, 1997; Murdoch et al., 2005).

Optimal foraging theory predicts that parasitoid or predators will search so as to maximize the rate of predation, and the optimal time allocation involves concentration of search on higher host density patches (Cook & Hubbard, 1977; Hubbard & Cook, 1978). According to Rohani et al. (1994) and Hassell (2000) sufficient strong direct or inverse density-dependent distributions of parasitoids can strongly stabilize the interactions, while insufficient parasitoid aggregation leads to local instability, if the host rate of increase is above some threshold level, a range of interesting global dynamics can occur. Different degrees of parasitoid aggregation can also have a marked effect on equilibrium levels. Parasitoids have the greatest effects in reducing host equilibria when their distribution most closely tracks that of the hosts.

An investigation on the effects of density and spatial distribution of *Aphis gossypii* Glover on feeding rate and foraging behavior of the lady beetle, *Harmonia axyridis* Pallas showed that the predators concentrated their searching activities on host plants with higher density of aphids. The consumption rate of the predator was higher in the prey high patch densities (Yasuda & Ishikawa, 1999). An aggregative behavior was also shown by the parasitoids, *Trissolcus grandis* Thomson and *T. semistriatus* Nees when parasitizing different patch densities of *Eurygaster integriceps* Put. eggs (Amir Maafi, 2000; Asgari, 2001). However, in another study done by Matsumoto et al. (2004) it was shown that parasitism by *Aphytis yanonensis* DeBach et Rosen was temporally density-dependent on the arrowhead scale (*Unaspis yanonensis* Kuwana) population density at the whole-orchard level of Satsuma mandarin orange (*Citrus unshiu* Marc.), while parasitism by *Coccobius fulvus* Compere et Annecke was not. Parasitism by *A. yanonensis* or by *C. fulvus* was rarely positively correlated to scale density at the single-tree level, and spatial density-dependence was hardly detected at all at this level. Most analyses of combined parasitism rates were similar to rates of parasitism by *C. fulvus* alone. Contrary to conventional wisdom of

biological control theory, this study demonstrates that density dependence is not necessarily detected, even in a system in which a natural enemy has long held pest density stable at low levels. This and other studies, showing that density-dependent parasitism, if they exist, are too weak to stabilize scale–parasitoid interactions, strongly suggest that density dependence is not necessarily essential to the success of classical biological control, thus supporting the view of Murdoch et al. (1984). That questioned this hypothesis and documented that density dependence was not a prerequisite for the success of biological control.

In this research the behavioral response of *Chilocorus bipustulatus*, to the spatial distribution of the eunymus scale, *Unaspis eunymi* was examined under laboratory conditions.

## MATERIALS AND METHODS

### *Insects and their densities*

Six white oblong plastic containers (1 x 8 x 10 cm) were placed in a cylindrical transparent polythene cage measuring 70 cm in diameter and 30 cm in height. Some small holes (1.5 cm in diameter) were made on the sides of the cage for aeration. The top of the cage and small holes were covered with muslin. Plastic containers were arranged randomly equidistant from one another in the cage. Densities of eunymus female scales (5, 10, 20, 30, 40 or 50 prey per patch) were set on *Eunymus japonicus* leaves under a stereomicroscope and placed in each plastic container. Each container was lined with a piece of moist sponge to provide leaf moisture. The experimental procedure involved introducing 1, 2, 4, 8 or 16 female lady beetles in the center of the cage. The lady beetles were obtained from a stock culture and were deprived of prey for 24 h prior to the start of the experiment. Each experiment was replicated five times. Each experiment lasted 24 h, then the predators were removed from the cage. The number of prey eaten in each patch was recorded. All experiments were performed in a growth chamber ( $27 \pm 2^\circ\text{C}$ ,  $70 \pm 5\%$  of RH, 16L: 8D).

### *Distribution and patch time allocation by the predator*

In order to determine the distribution and the time spent by the predator per each prey patch, observation was made at last 10 minutes of second, sixth and eighth hour from the start of each experiment using a stop watch. The data relating to the distribution of predators on different prey patches were analysed using the model of Hassell & May (1973), which involved a nonlinear technique :

$$\beta_i = C \alpha_i^\mu$$

Where  $\beta_i$  is the proportion of the predator that occurs in *i*th patch,  $\alpha_i$  is the corresponding proportion of the prey in patch *i*,  $\mu$  is an aggregation index, which measures the degree of to which predator distribution corresponds with that of the prey, and *C* is a normalisation constant. Predators are thus uniformly spread between patches where  $\mu = 0$ , and

aggregation will increase as  $\mu$  increases (if  $\mu < 0$ , the predator would be aggregating in the low density patches (an unlikely occurrence), if  $\mu = \infty$  all predators are in the patch of highest prey density leaving the remainder as refuges. SAS and Excel softwares were used for analysis of data and drawing the figures.

## RESULTS

### *Prey consumption at different prey patches*

The percentages of prey (*Unaspis eunomi*) eaten by different numbers of *Chilocorus bipustulatus* females at different prey patches were variable at different prey patch densities (Fig. 1). The percentage of prey was highly density dependent ( $R^2=0.886$ ) when two predators were introduced into prey patches and a low level of density dependence in predation at other predator densities.

### *Distribution and patch time allocation by the predator*

The percentage of the total observed time spent by the adult predator in patches of different densities are shown in Figure 2. A similar trend was observed in time allocated in each patch by the different densities of the predator. The proportion of predators found in each patch indicated aggregation of predators in high prey density patches (Fig. 3). The values of aggregation index ( $\mu$ ) for 1 to 16 female predators were all greater than zero showing the concentration of the predator in patches with high prey densities (Table 1).

## DISCUSSION

The proportion of time spent on each patch, revealed a tendency for aggregation on the patches of high prey densities. Observation showed that the predators spent proportionately more time on high density patches than on low ones. In a similar study in the laboratory, the coccinellid, *Stethorus chengi* Sasaji showed a clear aggregative response to its prey patch densities, *Panonychus citri* McGregor, as spending more total time in high-density prey patches. Density-dependent, density-independent, and inversely density-dependent predation were mainly caused by mutual interference and aggregation among the predators (Cheng et al., 1993). The relationship between the proportion of *Chilocorus bipustulatus* in each patch and the proportion of prey per patch showed aggregation of predators in high density patches. However, the pattern of predation was variable at different patch density of the prey, ranging from highly density dependent to low degree of density dependence. The forager's behaviour determines spatial distribution of parasitism and predation in host patches (Schooler et al., 1996). According to optimal foraging theory, parasitoids or predators search in a way to maximize the rate of predation, and the optimal time allocation



involves concentration of search in patches with higher host densities (Cook & Hubbard, 1977; Hubbard & Cook, 1978).

Results found in this research are similar to those obtained by Yasuda and Ishikawa (1999) when studying the effect of *A. gossypii* (Glover) spatial distribution on the aggregative behavior of the multicolored Asian lady beetle, *Harmonia axyridis* Pallas. This lady beetle consumed more aphids in high patch densities than those in low ones. Two predaceous species of Coccinellidae, *Menochilus sexmaculatus* Fabricius and *Coccinella transversalis* Fabricius, occurred abundantly in bean crops (*Vigna catjang*) infested with the aphid *Aphis craccivora* in north east India (Agarwala & Bardhanroy, 1999).

Discovery rates of egg patches of *Lobesia botrana* Denis & Schiffermuller a major pest in vineyards by *Trichogramma cacoeciae* Marchal was density dependent but the exploitation rate was always inversely density-dependent according to host density (Barnay et al., 1999). Agee et al. (1990) and Lin (1993) found that lady beetles utilize several cues to find out their prey. They aggregate where the prey odors are prevalent and spent more time searching in these areas. *Mastrus ridibundus* (Gravenhorst) adults a parasitoid of the codling moth, *Cydia pomonella* (L.) also showed a positive aggregative response to host density. In the field-release experiment, trees with naturally occurring higher host densities had greater probability of being attacked by *M. ridibundus*. The probability of attack increased while percentage of parasitism decreased in relation to host density. This suggests that despite the aggregative response of the adult parasitoids to host density there was no evidence for density-dependent aggregation of parasitism. The number of hosts attacked in relation to host density showed an asymptotic curve that was similar to that of the laboratory-based functional response for a single parasitoid (Bezemer & Mills, 2001).

An aggregation was shown by *Trissolcus grandis* Thomson and *T. semistriatus* Nees as egg parasitoids of *Eurygaster integriceps* Put, on different patch densities of host eggs. However, the percentage of parasitism resulting from this pattern of foraging was density dependent at low host densities and inversely density dependent at high patch densities (Amir Maafi, 2001; Asgari, 2002). This domed pattern of parasitism has been found to occur rarely in host–parasitoid systems. It has been suggested that constraints imposed by egg-limitation or time limitation, or imperfect information on patch quality on the foraging natural enemy are likely to produce either inversely density dependent parasitism or domed density relationships (Lessels, 1985).

It has been suggested that the aggregation of natural enemies in patches with high host densities is the crucial component in natural enemy behavior that results in successful biological control and an increase in stability (Waage & Hassell, 1982; Hassell, 1984; Hassell & May, 1988; Maron & Harrison, 1997). Maron & Harrison (1997) in a study on the spatial pattern formation in an insect-parasitoid system showed that parasitoids emerging from a population outbreak of tussock

moth, *Orgyia vetusta* Boisduval, suppressed the growth of nearby experimental populations of the moth, while experimental populations farther away were able to grow. This result explained the observed localized nature of tussock moth outbreaks and illustrated how population distributions can be regulated by dynamic spatial processes. Similar results were obtained by Murdoch et al.(2005). They elucidated the mechanisms causing stability and severe resource suppression in a consumer–resource system. The parasitoid, *Aphytis* sp. as a consumer was able to control rapidly an experimentally induced outbreak of the resource, California red scale, an agricultural pest, and imposed a low, stable pest equilibrium. However, they concluded that the resulting stability in that biologically non-diverse agricultural system was a property of the local interaction between those two species, not of spatial processes or of the larger ecological community.

It was found in this research that *Chilocorus bipustulatus* aggregated in high density patches of its prey, *Unaspis eunomi*. Despite this, the pattern of predation, however, was variable at different patch densities of the prey, ranging from highly density dependent ( a strong aggregative response) to low level of density dependence. Density dependent pattern of predation has been shown to suppress pest population and even contribute to population stability (Hassell, 1985; Chesson & Murdoch, 1986; Reeve et al., 1994; Godfray, 1994; Maron & Harrison, 1997; Murdoch et al.,2005).

Table 1. Regression analysis (non-linear) and analysis of variance for the proportion of predators (*Chilocorus bipustulatus*) found per patch described by the model of Hassell and May (1973) .

Predator Density	Normalization Constant (C)	Aggregation index ( $\mu$ )	R <sup>2</sup>	F	P
1	1.30 ± 0.75	1.18 ± 0.42	0.999	29.99	< 0.0001
2	5.67 ± 6.2	2.24 ± 0.88	0.935	21.12	< 0.0001
4	0.89 ± 0.46	0.90 ± 0.35	0.999	27.03	< 0.0001
8	0.81 ± 0.20	0.87 ± 0.16	0.999	120.16	< 0.0001
16	1.19 ± 0.24	1.12 ± 0.81	0.999	222.34	< 0.0001

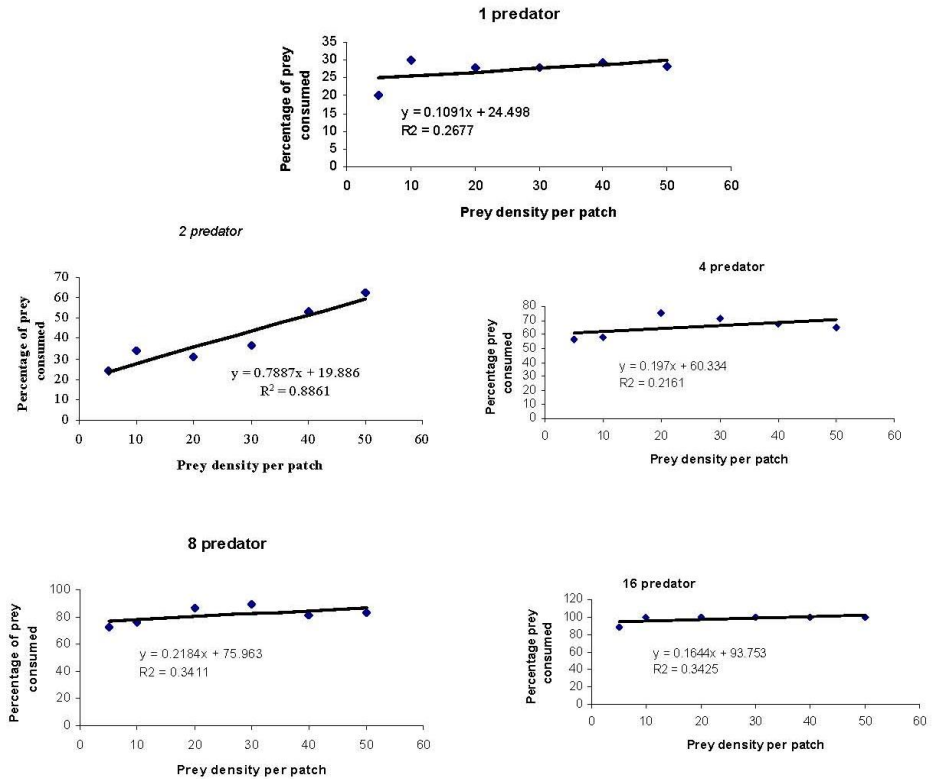


Fig.1. Percentage prey (*Unaspis eunomi*) eaten by different number of *Chilocurus bipustulatus* females at different prey patches.

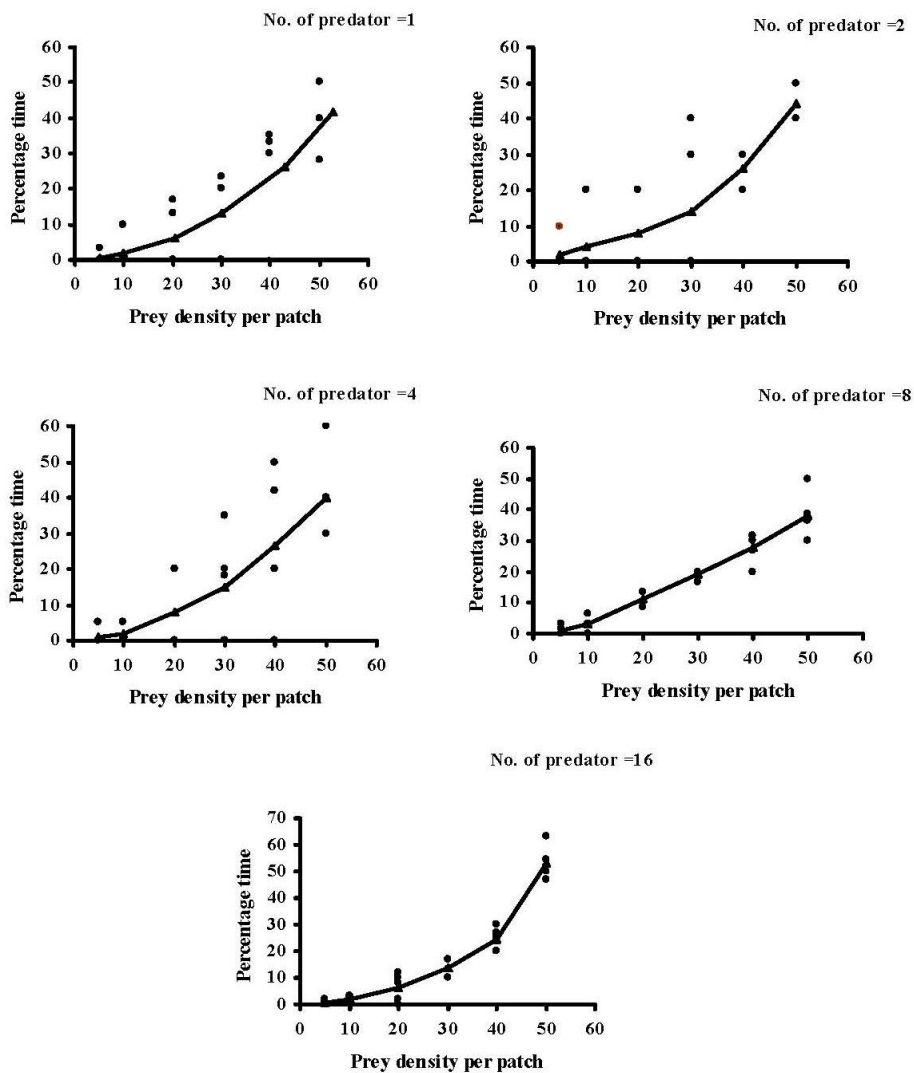


Fig. 2. Percentage time spent by different number of *Chilocurus bipustulatus* females on different prey (*Uanspis eunymi*) patches.

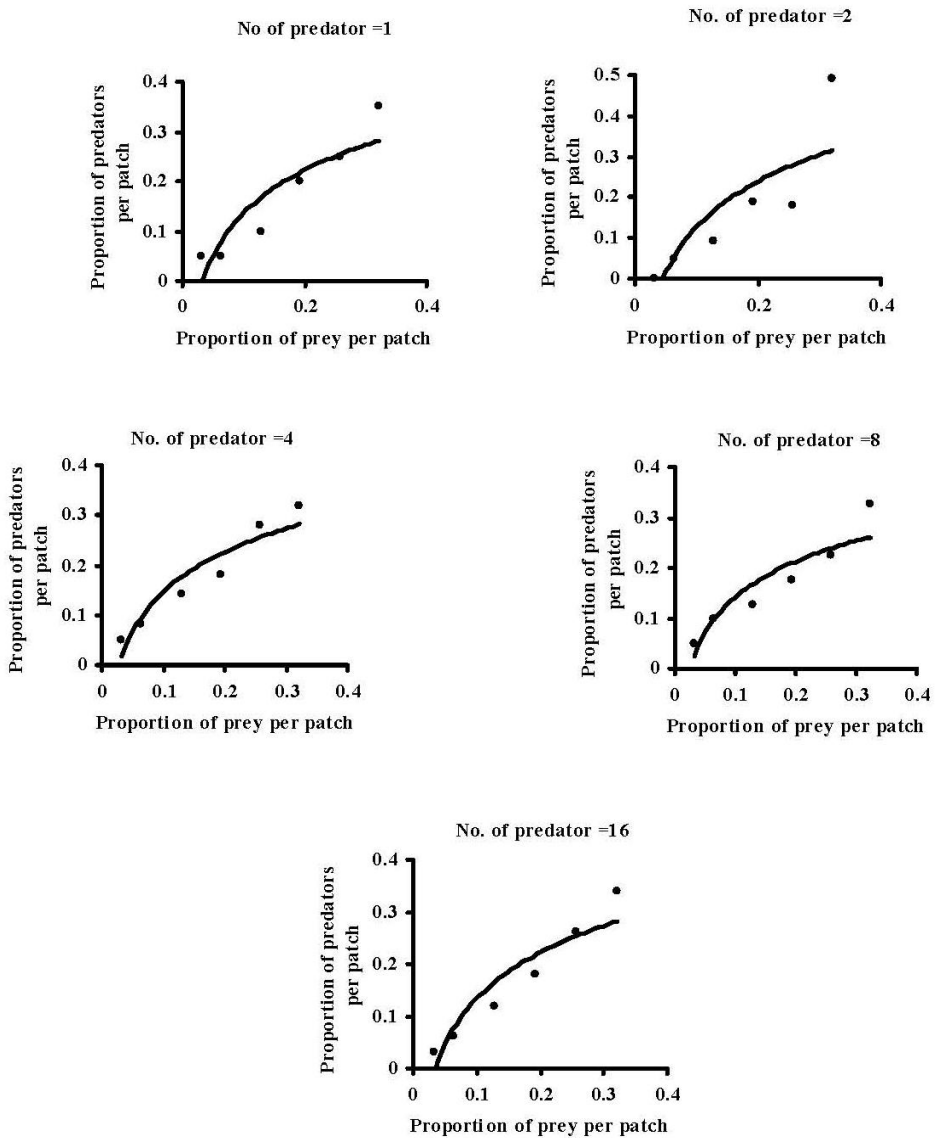


Fig. 3. The relationship between the proportion of *Chilocurus bipustulatus* females in each patch and the proportion of prey (*Uanspis eunymi*) per patch. The curves were fitted using the model given by Hassell and May (1973) involving a nonlinear technique. Results for 1 to 16 females.

## LITERATURE CITED

- Agarwala, B. K. & Bardhanroy, P.** 1999. Numerical response of ladybird beetles (Col., Coccinellidae) to aphid prey (Hom., Aphididae) in a field bean in north-east India. *Journal of Applied Entomology* 123(7): 401-405.
- Agee, H. R., Mitchell, E. R. & Flanders, R. V.** 1990. Spectral sensitivity of the compound eye of *Coccinella septempunctata* (Col., Coccinellidae). *Annals of the Entomological Society of America* 83: 817-819.
- Amir-Maafi, M.** 2000. An investigation on the host-parasitoid system between *Trissolcus grandis* Thomson (Hym., Scelionidae) and sunn pest, *Eurygaster integriceps* Put. (Het.: Scutelleridae) eggs. PhD thesis, College of Agriculture, Tehran Univ, Iran.
- Asgari, S.** 2001. Comparative fitness of eggs of *Graphosoma lineatum* (L.) (Het.: Pentatomidae) and *Eurygaster integriceps* Put. (Het.: Scutelleridae). to the egg parasitoid, *Trissolcus semistriatus* Nees (Hym.: Scelionidae). PhD thesis, Tarbiat Moddares Univ. Tehran, Iran.
- Barnay, O., Pizzol J., Gerts, C., Kienlen, J. C., Hommay, G. & Lapchin, L.** 1999. Host density dependence of discovery and exploitation rates of egg patches of *Lobesia botrana* (Lep.: Tortricidae) and *Ephestia kuehniella* (Lep.: Pyralidae) by the parasitoid, *Trichogramma cacoeciae* (Hym.: Trichogrammatidae). *Journal of Economic Entomology* 92 (6): 1311-1320.
- Bezemer, T. M. & Mills, N. J.** 2001. Host density responses of *Mastrus ridibundus*, a parasitoid of the codling moth, *Cydia pomonella*. *Biological Control* (2): 169-175.
- Brewer, B. S. & Oliver, A. D.** 1984. The euonymus scale a problem in Louisiana landscapes. *Louisiana Agriculture* 28 (1): 10-12.
- Cheng, W. L., Zai, Z. M., Zhu, W. B. & Li, L. S.** 1993. Predation behavior of *Stethorus chengi* Sasaji on patchily distributed prey. *Journal of Shanghai Agricultural College* 11 (3): 209-213.
- Chesson, P. L.** 1984. Variable predators and switching behavior. *Theoretical Population Biology*, 1-26.
- Chesson, P. L. & Murdoch, W. W.** 1986. Aggregation of risk: Relationships among host parasitoid models. *American Naturalist* 127: 96-715.
- Cook, R. M. & Hubbard, S. F.** 1977. Adaptive searching strategies in insect parasites. *Journal of Animal Ecology* 46: 115-125.
- Corley, J. C.** 1999. Host density signal in relation to aggregation in the parasitoid, *Venturia canescens*. *Netherlands Journal of Zoology* 49 (2): 97-109.
- Driesche, R. G., van Idoine, K., Rose, M. & Bryan, M.** 1998. Release, establishment and spread of Asian natural enemies of euonymus scale (Homoptera: Diaspididae) in New England. *Florida Entomologist* 81 (1): 1-9.
- Godfray, H. C. J.** 1994. Parasitoids, behavioral and evolutionary ecology. Princeton University Press, Princeton, New Jersey.
- Hassell, M. P.** 1982. Patterns of parasitism by insect parasitoid in patchy environments. *Ecological Entomology* 7: 365-377.

- Hassell, M. P.** 1984. Parasitism in patchy environments: inverse density dependence can be stabilizing. *Journal of Mathematics Applicable to Medicine and Biology* 1: 123-133.
- Hassell, M. P.** 1985. Insect natural enemies as regulating factors. *Journal of Animal Ecology* 54: 323-334.
- Hassell, M. P.** 2000. Host-parasitoid population dynamics. *Journal of Animal Ecology*, 69: 543-566.
- Hassell, M. P. & May, R. M.** 1973. Stability in insect host-parasite models. *Journal of Animal Ecology* 42: 693-726.
- Hassell, M. P. & May, R. M.** 1974. Aggregation in predators and insect parasites and its effect on stability. *Journal of Animal Ecology* 43: 567-594.
- Hassell, M. P. & May, R. M.** 1985. From individual behaviour to population dynamics. In: Sibly, B. M. & Smith, R. H. (Eds.) *Behavioural ecology, Ecological consequences of adaptive behaviour*. Oxford: Blackwell, Scientific Publications. pp. 3-32.
- Hassell, M. P. & May, R. M.** 1988. Spatial heterogeneity and the dynamics of parasitoid – host systems. *Annals of Zoologica Fennica* 25: 55-61.
- Hassell, M. P. & Southwood, T. R. E.** 1978. Foraging strategies of insects. *Annual Review of Ecology and Systematic* 9: 75-98.
- Hassell, M. P. & Waage, J. K.** 1984. Host-parasitoid population interactions. *Annual Review of Entomology* 29: 89-114.
- Hubbard, S. F. & Cook, R. M.** 1978. Optimal foraging by parasitoid wasps. *Journal of Animal Ecology* 47: 593-604.
- Jones, T. H. & Hassell, M. P.** 1988. Pattern of parasitism by *Trybliographa rapae*, a cynipid parasitoid of the cabbage rootfly, under laboratory and field conditions. *Ecological Entomology* 13: 308-317.
- Lessells, C. M.** 1985. Parasitoids foraging: Should parasitism be density dependent? *Journal of Animal Ecology* 54: 27-41.
- Lin, J. T.** 1993. Identification of photoreceptor locations in the compound eye of *Coccinella septempunctata* Linnaeus (Col.: Coccinellidae). *Journal of Insect Physiology* 39: 555-562.
- Maron, J. L. & Harrison, S.** 1997. Spatial pattern formation in an insect host-parasitoid system. *Science* 278 (5343): 1619-562.
- Matsumoto, T., Itioka, T., Nishida, T. & Inoue, T.** 2004. A test of temporal and spatial density dependence in the parasitism rates of introduced parasitoids on host, the arrowhead scale (*Unaspis uanonensis*) in stable host–parasitoids system. *Journal of Applied Entomology* 128 (4): 267–272.
- Murdoch W. W., Reeve, J. D., Huffaker, C. B. & Kennett, C. E.** 1984. Biological control of olive scale and it's relevance to ecological theory. *American Naturalist* 123: 371–392.
- Murdoch, W., Briggs, C. J. & Swarbrick, S.** 2005. Host suppression and stability in a parasitoid-host system: Experimental demonstration. *Science* 309 (5734): 610-613.
- Ozyurt, O. & Ulgenturk, S.** 2007. Biology of the euonymus scale, *Unaspis euonymi* (Hemiptera: Diaspididae) in urban areas of Ankara, Turkey. *Tarim Bilimleri Dergisi* 13 (1): 47-53.

**Reeve, J. D., Cronin, J. T. & Strong, D. R.** 1994. Parasitoid aggregation and the stabilization of a salt marsh host-parasitoid system. *Ecology* 75 (2): 288-295.

**Rohani, P., Miramontes, O. & Hassell, M. P.** 1994. Quasi periodicity and chaos in population models. *Philosophical Transactions of the Royal Society, London, Series B* 258: 17-22.

**Rosenheim, J. A., Meade, T., Powch, I. G. & Schoenging, S. E.** 1989. Aggregation by foraging insect parasitoids in response to local variations in host density: determining the dimensions of a host patch. *Journal of Animal Ecology* 58: 101-117.

**Schooler, S. S., Ives, A. R. & Harmon, J.** 1996. Hyperparasitoid aggregation in response to variation in *Aphidius ervi* host density at three spatial scales. *Ecological Entomology* 21: 249-258.

**Schmutterer, H.** 1998. The spindle-berry scale, *Unaspis euonymi* (Comst.), a new pest of ornamentals in Germany. *Nachrichtenblatt des Deutschen Pflanzenschutzdienstes* 50 (7): 170-172.

**Stathas, G. J., Eliopoulos, P. A., Bouras, S. L., Economou, L. P., Kontodimas, D. C., & BeLozzia, C.** 2003. The scale *Parthenolecanium persicae* (Fabricius) on grapes in Greece. *Bulletin OILB/SROP* 26 (8): 253-257.

**Viggiani, G.** 1985. Phenology, natural enemies and control of *Quadraspidotus ostraeformis* Curtis (Homoptera: Diaspididae) on hazel. *Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri* 42: 3-9.

**Waage, J. K. & Hassell, M. P.** 1982. Parasitoids as biological control agent: a fundamental approach. *Parasitology* 84: 241-268.

**Walde, S. J. & Murdoch, W. W.** 1988. Spatial density dependence in parasitoids. *Annual Review of Entomology* 33: 441-66.

**Yasuda, H. & Ishikawa, H.** 1999. Effect of prey density and spatial distribution of the adult predatory ladybird beetle. *Journal of Applied Entomology* 123: 585-589.

**Yigit, A., Canhilal, R. & Ekmekci, U.** 2003. Seasonal population fluctuations of *Serangium parcesetosum* (Coleoptera: Coccinellidae), a predator of citrus whitefly, *Dialeurodes citri* (Homoptera: Aleyrodidae) in Turkey's Eastern Mediterranean citrus groves. *Environmental Entomology* 32 (5): 1105-1114.



## SCIENTIFIC NOTE

**A NEW NAME FOR THE PREOCCUPIED STONEFLY GENUS  
*AUBERTIANA* ZHILTZO, 1994 (PLECOPTERA)****Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mail: ozdikmen@gazi.edu.tr

[Özdikmen, H. 2008. A new name for the preoccupied stonefly genus *Aubertiana* Zhiltzo, 1994 (Plecoptera). Munis Entomology & Zoology 3 (2): 761-762]

One proposed genus group name in the order Plecoptera is nomenclaturally invalid, as the genus group name has already been used by a different author in Hymenoptera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose a substitute name for this genus name.

**Order PLECOPTERA****Family PERLODIDAE****Genus *ZHILTZOVAIA* nom. nov.**

*Aubertiana* Zhiltzo, 1994. Zoosystematica Rossica 3(1): 45. (Insecta: Plecoptera: Perlodea: Perlodidae: Perlodinae: Perlodini). Preoccupied by *Aubertiana* Viktorov, 1970. Zool.Zh. 49: 309. (Insecta: Hymenoptera: Apocrita: Ichneumonoidea: Ichneumonidae: Anomaloniinae: Gravenhorstiini).

**Remarks on nomenclatural change:** The stonefly genus *Aubertiana* was described by Zhiltzo (1994) with the type species *Perlodes cachemirica* Aubert, 1959 by original designation and monotypy in Plecoptera. Nevertheless the name *Aubertiana* is already occupied. Since the name *Aubertiana* was proposed by Viktorov (1970) as an objective replacement name for the genus *Aubertia* Viktorov, 1968 with the type species *Aubertia unidentator* Aubert, 1964 in Hymenoptera. Thus the stonefly genus *Aubertiana* Zhiltzo, 1994 is a junior homonym of the valid genus name *Aubertiana* Viktorov, 1970. So I suggest here that *Aubertiana* Zhiltzo, 1994 should be replaced with the new name *Zhiltzovaia*, as a replacement name.

Etymology: The genus is named after the current author of *Aubertiana*, L. A. Zhiltzova (Russia).

Summary of nomenclatural changes:

*Zhiltzovaia* **nom. nov.**

pro *Aubertiana* Zhiltzo, 1994 (non Viktorov, 1970)

*Zhiltzovaia cachemirica* (Aubert, 1959) **comb. nov.**  
from *Aubertiana cachemirica* (Aubert, 1959)  
= *Perlodes cachemirica* Aubert, 1959

### LITERATURE CITED

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Viktorov, G. A.** 1970. *Aubertiana* Viktorov, a new name for *Aubertia* Viktorov (Hymenoptera, Ichneumonidae). *Zoologicheskii Zhurnal* 49: 308-309.

**Zhiltzova, L. A.** 1994. *Aubertiana* gen. n. - a new genus of stoneflies (Plecoptera: Perlodidae). *Zoosystematica Rossica* 3:45-47.

## SCIENTIFIC NOTE

**ICHNEUMONIDAE (HYMENOPTERA) COLLECTED  
FROM UNDER STONE IN EASTERN ANATOLIA  
REGION OF TURKEY****Saliha Çoruh\* and Memiş Kesdek\*\***

\*Atatürk University, Faculty of Agriculture, Department of Plant Protection, 25240, Erzurum/TURKEY. E-mail: spekel@atauni.edu.tr

\*\*Ministry of Agriculture and Village Affairs, Head of District Agriculture, Köyceğiz/Muğla/TURKEY. E-mail: mekesdek@hotmail.com

[Çoruh, S. & Kesdek, M. 2008. Ichneumonidae (Hymenoptera) collected from under stone in Eastern Anatolia Region of Turkey. Munis Entomology & Zoology, 3 (2): 763-764]

The topographic and climatic structures of Turkey give it a rich and diverse Ichneumonidae fauna. However the Ichneumonidae fauna of Turkey is not well studied. Kolarov (1995), listed in his catalogue 383 species in 179 genera occurring in the country. Together with contributions by some authors in recent times, the number increased to 744 and 262 respectively.

Ichneumonidae is a large family (Townes 1969). Most of the species ectoparasitoids on the larvae of Lepidopterous insects. Some of these species use the Symphyta, Neuroptera, Coleoptera, Diptera, Tricoptera and Arachnida as hosts. With this present study, firstly ichneumonid species collected under stone were reported in Turkey.

In this study, Ichneumonidae were collected under three stone localities of the Eastern Anatolia Region of Turkey in 2004-2005. Total six species from four subfamilies (Anomaloninae, Cryptinae, Pimplinae and Ichneumoninae), localities, zoogeographical distributions and the hosts to them are given.

The material for present study was collected from eastern Turkey (Ardahan, Erzurum, Iğdır) between 2004-2005. Specimens were collected from various habitats, using forceps or a handle. Samples were killed in ethyl esetat and in the laboratory. The materials mentioned in this study were deposited in the Entomology Museum, Erzurum, Turkey (EMET). Some specimens were identified by Dr. Janko Kolarov (Bulgaria).

**Subfamily Ichneumoninae*****Trogus lapidator* Fabricius, 1787 (Callajoppini)**

**Material examined:** Erzurum: 1 ex., Çat (Yukarıçat), 18.9.2005. **Literature records from Turkey:** Erzurum (Özbek et al., 2003).

***Diphyus montivagans* Berthoumieu, 1897 (Ichneumonini)**

**Material examined:** Erzurum: 1 ex., Teke Deresi, 1900 m, 02.7.2004. **Literature records from Turkey:** Antakya, Trabzon (Kolarov, 1995), Erzurum (Çoruh et al., 2005).

**Subfamily Cryptinae*****Meringopus cyanator* Gravenhorst, 1829 (Cryptini)**

**Material examined:** Erzurum: 1 ex., Teke Deresi, 1900 m, 02.7.2004. **Literature records from Turkey:** Erzurum (Çoruh & Özbek, 2005).

**Subfamily Pimplinae*****Pimpla rufipes* Brulle, 1846 (Pimplini)**

**Material examined:** Ardahan: 1 ex., Çamlıçatak, 1920 m, 15.10.2005. **Literature records from Turkey:** Erzurum (Çoruh, 2005). **Remarks:** New to Ardahan.

**Subfamily Anomaloninae*****Agrypon varitarsum* Wesmael, 1849 (Gravenhorstiini)**

**Material examined:** Iğdır: 1 ex., Melekli, 900 m, 30.7.2004. **Literature records from Turkey:** Kırklareli (Kolarov et al., 1994), Erzurum (Çoruh et al., 2004). **Remarks:** New to Iğdır.

***Barylypa uniguttata* Gravenhorst, 1829(Gravenhorstiini)**

**Material examined:** Erzurum: 1 ex., Şenkaya, Çakırbaba, 2450 m, 12.10.2004. **Literature records from Turkey:** Çanakkale (Kolarov et al., 1994), Erzurum, Kars, Malatya (Çoruh et al., 2004).

**ACKNOWLEDGMENTS**

I would like to express my sincere thanks to Dr. Janko Kolarov (Plovdiv University, Plovdiv, Bulgaria) for valuable help.

**LITERATURE CITED**

- Çoruh, S., Kolarov, J. & Özbek, H. 2004. New and little known Anomaloninae (Hymenoptera-Ichneumonidae) from Turkey. Linzer Biologische Beiträge, 36(2): 1199-1204.
- Çoruh, S. 2005. The faunistic, systematic, and ecological studies on Pimplinae (Hymenoptera: Ichneumonidae) in Erzurum Province and neighbouring Provinces. Atatürk University, Graduate School of Natural and Applied Sciences, unpress, PhD theses, 212 s.
- Çoruh, S. & Özbek, H. 2005. New records of Cryptinae (Hymenoptera: Ichneumonidae) from Turkey with some hosts. Turkish Journal of Entomology, 29(3): 183-186;
- Çoruh, S., Özbek, H. & Kolarov, J. 2005. A contribution to the Knowledge of Ichneumonidae (Hymenoptera ) from Turkey. Journal of the Entomological Research Society, 7 (3): 53-57.
- Kolarov J., Beyarslan, A. & Yurtcan, M. 1994. New and little known Turkish Anomaloninae (Hymenoptera-Ichneumonidae). XII. Biology Congress, 6-8 July, Edirne, Turkey, 248-251
- Kolarov, J. 1995. A catalogue of the Turkish Ichneumonidae (Hymenoptera). Entomofauna, 16 (7): 137-188.
- Özbek, H., Çoruh, S. & Kolarov, J. 2003. A contribution to Ichneumonidae (Hymenoptera) fauna of Turkey: The subfamily Ichneumoninae. Entomofauna, 24 (10): 157-164.
- Townes, H. 1969. The Genera of Ichneumonidae Part I Memoirs American Entomological Institute, 11: 1- 300.

## SCIENTIFIC NOTE

# A SUBSTITUTE NAME FOR *REHNIELLA* **LOMBARDO, 1999 (MANTODEA: MANTIDAE)**

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE,  
 e-mail: ozdikmen@gazi.edu.tr

[**Özdikmen, H.** 2008. A substitute name for *Rehniella* Lombardo, 1999 (Mantodea: Mantidae). Munis Entomology & Zoology 3 (2): 765-766]

One proposed genus group name in the order Mantodea is nomenclaturally invalid, as the genus group name has already been used by a different author in Orthoptera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose a substitute name for this genus name.

## Order MANTODEA

### Family MANTIDAE

#### Subfamily PHOTININAE

#### Genus *LOMBARDOA* NOM. NOV.

*Rehniella* Lombardo, 1999. Rev. Suisse Zool. 106 (2), Juin: 402 (Mantodea: Mantidae: Photininae: Photinini). Preoccupied by *Rehniella* Hebard, 1928. Trans. Amer. ent. Soc., 54, 31 (Orthoptera: Gryllidae: Luzarinae).

**Remarks on nomenclatural change:** The name *Rehniella* was initially introduced by Hebard, 1928 for a genus of the orthopteran family Gryllidae (with the type species *Rehniella glaphyra* Hebard, 1928 by monotypy. Recently Lombardo, 1999 described an neotropical mantid genus under the same generic name (with the type species *Metriomantis planicephala* Rehn, 1916). It is still used as a valid genus name. Thus, the genus group name *Rehniella* Lombardo, 1999 is a junior homonym of the genus *Rehniella* Hebard, 1928. So I propose a new replacement name *Lombardoa* nom. nov. for the genus name *Rehniella* Lombardo, 1999.

Etymology: This genus is named after the current author of *Rehniella*, F. Lombardo.

Summary of nomenclatural changes:

*Lombardoa* **nom. nov.**

= *Rehniella* Lombardo, 1999 (non Hebard, 1928).

*Lombardoa planicephala* (Rehn, 1916) **comb. nov.**

= *Metriomantis planicephala* Rehn, 1916

= *Rehniella planicephala* (Rehn, 1916)

### LITERATURE CITED

**Hebard, M.** 1928. The group Luzarae of the subfamily Phalangosinae (Orthoptera: Gryllidae). Transactions of the American Entomological Society 54: 1-56.

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Lombardo, F.** 1999. Remarks on the genus Metriomantis Saussure and Zehntner and description of two new species and a new genus: Rehniella gen. n. (Insecta: Mantodea). Revue Suisse de Zoologie 106 (2): 393-405.

## SCIENTIFIC NOTE

**A NEW NAME, *KILKUYRUKUS* FOR THE PREOCCUPIED  
THRIPS GENUS *SCHLECTENDALIA* BAGNALL, 1929  
(THYSANOPTERA)**

**Hüseyin Özdikmen\***

\* Gazi Üniversitesi, Fen-Edebiyat Fakültesi, Biyoloji Bölümü, 06500 Ankara / TÜRKİYE, e-mail: ozdikmen@gazi.edu.tr

[**Özdikmen, H.** 2008. A new name, *Kilkuyrukus* for the preoccupied thrips genus *Schlectendalia* Bagnall, 1929 (Thysanoptera). *Munis Entomology & Zoology* 3 (2): 767-768]

One proposed genus name in the order Thysanoptera is nomenclaturally invalid, as the genus group name has already been used by a different author in Hemiptera. In accordance with Article 60 of the International Code of Zoological Nomenclature, I propose a substitute name for this genus name.

**Order THYSANOPTERA**

**Family PHLAEOTHIRIPIDAE  
Genus *KILKUYRUKUS* nom. nov.**

*Schlectendalia* Bagnall, 1929. Ent. mon. Mag., 65, 96. (Insecta: Thysanoptera: Phlaeothripidae: Phlaeothripinae). Preoccupied by *Schlectendalia* Lichtenstein, 1883. Ent. Ztg., Stettin, 44, 240, 242. (Insecta: Hemiptera: Stenorrhyncha: Psyllina: Aphidina: Aphidoidea: Eriosomatidae: Fordinae).

**Remarks on nomenclatural change:** The chiefly oriental bug genus *Schlectendalia* was erected by Lichtenstein, (1883) with the type species *Aphis chinensis* Bell, 1848 in Hemiptera. Subsequently, the fossil genus *Schlectendalia* was described by Bagnall (1929) with the type species *Schlectendalia longituba* Bagnall, 1929 by monotypy in Thysanoptera. Thus the thrips genus *Schlectendalia* Bagnall, 1929 is a junior homonym of the valid genus name *Schlectendalia* Lichtenstein, 1883. So I propose here that *Schlectendalia* Bagnall, 1929 should be replaced with the new name *Kilkuyrukus*, as a replacement name.

**Etymology:** from Turkish word “Kilkuyruk” means thrips and Thysanoptera in English and Latin.

**Summary of nomenclatural changes:**

*Kilkuyrukus* **nom. nov.**

pro *Schlectendalia* Bagnall, 1929 (non Lichtenstein, 1883)

*Kilkuyrukus longitubus* (Bagnall, 1929) **comb. nov.**

from *Schlectendalia longituba* Bagnall, 1929

**LITERATURE CITED**

**Bagnall, R. S.** 1929. Fossil Thysanoptera V. Tubulifera Pt. I . Entomologist's monthly Magazine 65: 95–100.

**International Comission of Zoological Nomenclature.** 1999. International Code of Zoological Nomenclature. Fourth Edition. The International Trust for Zoological Nomenclature, London.

**Monzen, K.** 1954. Revision of some Japanese Hormaphidinae (Aphididae), with the descriptions of new genus and species. Annual Report of the Gakngai Faculty of the Iwate, 7 (2): 46-60.