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Range re-evaluation and morphological recognition in two West Palaearctic species of *Myrmilla* WESMAEL, 1851 (Insecta: Hymenoptera: Mutillidae)

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Abstract

A critical examination, including the study of type material and lectotype designation of *Myrmilla caucasica* (KOLENATI, 1846), resulted in the following range changes in *M. caucasica* and *M. erythrocephala* (LATREILLE, 1792): *M. caucasica* has been found to occur in the extreme southeast of the mainland in Croatia, western and southern Romania, northern Serbia, southern Macedonia, Bulgaria, Greece, central and southern Ukraine, central Georgia, Azerbaijan, western Caspian Basin of Russia, Cyprus, Turkey, western Syria, and northwestern Iran; the range of *M. erythrocephala* is much more restricted than indicated by previous authors, extending from southeastern France (including Corsica Island) via Italy (including Sicily) to southern Croatia, Montenegro and Bosnia & Herzegovina, almost strictly confined to the coastal belt. The taxonomic values of the clypeal structure, the inner hindcoxal apex in the female, and the male genitalia are indicated. No dependable means have been found for satisfactory division of *M. erythrocephala* into subspecies or species when the intraspecific variety within *M. caucasica* and *M. erythrocephala* is considered. As a result, *Mutilla bison* A. COSTA, 1887 is assumed to be a junior synonym of *M. erythrocephala*. The male of *Myrmilla mutica* (ER. ANDRÉ, 1903) and the previously unknown male of *M. corniculata* (SICHEL & RADOSZKOWSKI, 1869) are distinguished morphologically from the male of *M. caucasica*. Notes on the distribution of *M. corniculata* and *M. mutica* are presented.

Key words: Hymenoptera, lectotype designation, Mutillidae, *Myrmilla*, *M. caucasica, M. erythrocephala*, Palaearctic, taxonomy.

Zusammenfassung

Eine kritische Untersuchung einschließlich des Typusmaterials und der Lectotypen-Designation von *Myrmilla caucasica* (KOLENATI, 1846) ergab folgende Änderungen im Verbreitungsgebiet von *M. caucasica* und *M. erythrocephala* (LATREILLE, 1792): *M. caucasica* kommt im äußersten Südwesten des kroatischen Festlandes, im westlichen und südlichen Rumänien, nördlichen Serbien, südlichen Mazedonien, Bulgarien, Griechenland, der zentralen und südlichen Ukraine, Zentral-Georgien, Aserbaidschan, dem westlichen kaspischen Becken Russlands, Zypern, der Türkei, dem westlichen Syrien, und dem nordwestlichen Iran; das Verbreitungsgebiet von *erythrocephala* ist deutlich begrenzter als von früheren Autoren beschrieben und erstreckt sich vom südöstlichen Frankreich (einschließlich Korsika) über Italien (einschließlich Sizilien) bis ins südliche Kroatien, Montenegro und Bosnien-Herzegowina – es beschränkt sich fast ausschließlich auf die Küstenregionen. Die taxonomische Bedeutung der Clypeus-Struktur, des Apex der inneren Hintercoxa beim Weibchen und der männlichen Genitalien wird hervorgehoben. Unter Berücksichtigung der intraspezifischen Variabilität von *M. caucasica* und *M. erythrocephala* konnten keine zuverlässigen Merkmale für eine zufriedenstellende Unterteilung von *M. erythrocephala* in Unterarten gefunden werden. Folglich wird *Mutilla bison* A. COSTA, 1887 als ein jüngeres Synonym von *M. erythrocephala* angesehen. Das Männchen von *Myrmilla mutica* (ER. ANDRÉ, 1903) und das vorher unbekannte Männchen von *M. corniculata* (SICHEL & RADOSZKOWSKI, 1869) werden morphologisch vom Männchen von *M. caucasica* unterschieden, und Bemerkungen zur Verbreitung von *M. corniculata* und *M. mutica* werden abgegeben.

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Introduction

The species of *Myrmilla* WESMAEL, 1851 fall into three subgenera currently known by both sexes. In addition to the nominotypical subgenus, the genus also includes *Pseudomutilla* A. COSTA, 1859 and *Eurygnathilla* SKORIKOV, 1927. From 1775 to 2006 more than eighty species-group names have been assigned to 50 recently valid species in the genus (LELEJ 2002; LELEJ & al. 2003a; LELEJ 2005; LELEJ & VAN HARTEN 2006). *Myrmilla* was largely revised by the Ukrainian hydrobiologist and entomologist Alexander SKORIKOV (1927a). The nominotypical subgenus is the largest and the least known. It includes a complex of closely related forms, which do not present clear-cut specific characters. The 25 currently recognized extant species of *Myrmilla* s. str. occur mainly in the Northern Mediterranean area. It is rather ironic that two of the most frequently met and largest in size, viz., *M. erythrocephala* (LATREILLE, 1792) and *M. caucasica* (KOLENATI, 1846) have not been interpreted correctly up to now. Upon examination of the mutillid collection at the National Museum of Natural History in Sofia, Bulgaria it was discovered that all material on which the faunistical reports of *Myrmilla erythrocephala* from Bulgaria were based actually belongs to *M. caucasica*. Additional investigation of materials collected in Albania, Austria, Hungary, Czech Republic, and Romania revealed that *M. erythrocephala* has been misinterpreted in much broader sense by many authors in the past and present days.

Material and methods

The present study is based on examination of 662 specimens of *Myrmilla bilobicornis* SKORIKOV, 1927, *M. caucasica*, *M. corniculata* (SICHEL & RADOSZKOWSKI, 1869), *M. erythrocephala*, *M. mutica* (ER. ANDRÉ, 1903), and *M. rostriformis* LELEJ, 1980 from the collections of the "Grigore Antipa" National Museum of Natural History, Bucharest (MGAB, Cristina Ban-Calefariu), Guido Pagliano, Torino (GP, personal collection), the Ilia State University, Tbilisi (ISU, George Japoshvili), the Institute of Biodiversity and Ecosystem Research, Sofia (IBER, Toshko Ljubomirov), Jan Smit, Duvien (JS, personal collection), Lisa & Klaus Standfuss, Dortmund (LKS, personal collection), the Magyar Természettudományi Múseum, Budapest (TMB, Sandor Csősz), Maximilian Schwarz, Linz (MS, personal collection), the Moravian Museum, Brno (MMB, Igor Malenovský), the Museo Civico di Storia Naturale, Milano (MCSN, Maurizio Pavesi), the Museo Civico di Zoologia di Roma (MCZR, Alberto Zilli), the Museo Nacional de Ciencias Naturales, Madrid (MNCN, Isabel Izquierdo Moya), the Museo di Scienze Naturali e Ambientali di Mentana, Roma (MSNAM, Enrico Migliaccio), the Muséum National d'Histoire Naturelle, Paris (MNHN, Claire Villemant), the Nationaal Natuurhistorisch Museum Naturalis, Leiden (RMNH, Kees van Achterberg), the National Museum of Natural History, Sofia (NMNHS, Alexi Popov), the Naturhistorisches Museum, Wien (NHMW, late Stefan Schödl), the Oberösterreichisches Landesmuseum, Linz (OÖLM, Fritz Gusenleitner), Petr Bogusch, Praha (PB, personal collection), the Universitá degli Studi di Napoli Federico II. Museo Zoologico, Napoli (MZN, Nicola Maio), the Zoölogisch Museum Amsterdam (ZMAN, Willem Hogenes), the Zoologisches Museum an der Humboldt-Universität zu Berlin, Berlin (ZMHU, Frank Koch). Additional material interpreted by some previous authors as "*Mutilla erythrocephala* FABRICIUS" or "*Mutilla*

erythrocephala LUCAS" was borrowed or examined from the collection of the Muséum d`Histoire Naturelle, Genève (MHNG, Bernhard Merz) and the Universitá degli Studi di Napoli Federico II. Museo Zoologico, Napoli (MZN, Nicola Maio).

Part of the material was relaxed in a humidifier, removed from the mounting pin, and dewaxed by soaking in isopropanole. This material was further prepared on new pins. Re-preparation aimed to provide adequate observation in some structural details that were difficult to observe viz. the free clypeal margin and inner mandibular edge. For detailed study, the genital capsules were cleared by boiling for 10 minutes in 20% KOH, washed in distilled water and transferred to glycerin. The storage of the genital capsule was made in a transparent plastic tube (diameter, 2 mm; length, 20 mm) filled with "heavy" glycerin (glycerin/glucose ratio of 1/1) and pinned under the corresponding specimen.

The specimens were examined under Technival® stereo microscope operated at magnifications of 25x and 50x. Drawings were made by using camera lucida under a Zeiss®, MMX stereo microscope. The pencil drafts were inked and scanned; the final illustrations were made in Adobe Illustrator® version 10. Measurements were carried out using magnification 100x (ocular 25x, objective 4x) with a linear scale in one of the oculars; one division of the scale corresponded to 15 μm on the object, and the decimal was estimated by eye. The measurement of length of supraantennal tubercles was made with the following adjustment of the specimen: the head was viewed dorsally under strong, soft light coming from the anterior direction; the dorsal view was fixed in the position where the contour of the compound eyes touched the mandibular base; the actual tubercle length was measured as the distance between the bottom of the arc formed by the two supraantennal tubercles and the tip of the longer tuberculum (in cases where the tubercles were different in size). Measurement of the height of the median process of first metasomal sternum was made in lateral view as the distance between the flat sternal surface and the tip of the process, thus including more or less formed carina basally to the process.

Some body parts (head and hind coxa) were illustrated by scanning electron photomicrographs. These parts were removed from the relevant relaxed specimen, washed in chloroform and dried. The cleaned parts were then passed through a graded series of alcohols to absolute. They were fastened to a scanning electron microsocopy stub using conductive paste LEIT-C™, placed in a vacuum chamber for several hours and then gold coated before photography. Philips® scanning electron microscope, model SEM-515 was used to take the photographs.

The morphological terms used in this work were mostly taken from HUBNER & SHARKEY (1993) and definitions of these terms can be found there. In addition, terminology for genitalia was taken from SNODGRASS (1941) and O'TOLLE (1975). Several terms (condylar ridge, disc (of body sclerite), episcrobal area, pronotal collar, setae of reflective type) follow PULAWSKI & PRENTICE (2008). The following morphological terms are new: inner preapical mandibular notch (in male), for the semicircular notch of the inner edge of the apical fourth of the mandible; inner preapical tooth (or teeth), for one or two teeth of the inner edge of the apical fourth of the mandibula (in male and female).

The following abbreviations are used in the text and the figures: pd, puncture diameter; w_{pdcl}, maximal pedicellar width; I_{sat}, supraantennal tubercle index (the ratio between

the length of the supraantennal tubercle and maximal pedicellar width); I_{stp}, index of the process of first metasomal sternum (the ratio between the height of the process of the first metasomal sternum and maximal pedicellar width); Od, diameter of the middle ocellus measured transversely; OOL, shortest distance between hind ocellus and compound eye; POL, shortest distance between hind ocelli.

The records of the examined material are in the **List of material**. In order to elucidate the range extension of the species treated herein, the localities are presented with account of the modern names of the settlements and geographic terms rather than by copying the museum labels. Although in similar kind of works the latter is a common practice, I find the former preferential to facilitate contemporary users.

Results and discussion

Recognition of *Myrmilla caucasica* (KOLENATI, 1846)

The type material of *M. caucasica* has hitherto been regarded as probably lost (LELEJ 2002: 33; LELEJ & al. 2003b: 305). From the original description of *M. caucasica* given by KOLENATI (1846: 121–122) it appears that his type material consisted of more than one specimen. This can be confirmed by parts of KOLENATI's description of *M. caucasica*: "Longitudo: 0,009 vel 0,010 … Habitat in locis aridis, arenosis …" viz., "Length: 0,009 or 0,010 … Inhabits dry, sandy places …". Thus, the material of *M. caucasica* is considered to comprise a syntype series rather than a single type (holotype). One female which agrees both with KOLENATI's description and LELEJ`s recent re-description of *M. caucasica* (LELEJ 1985: 99–100) was found in the collection of NHMW. It is labelled: "Tiflis/Kolenati/*Mutilla caucasica* Kolenati/Type!". In order to ensure the identity of *M. caucasica* this female specimen, the only syntype traceable at the moment, **is hereby designated as Lectotype** (ICZN, Article 74.1, 74.2, and 74.7), and so labelled.

Redescription of the female lectotype:

Sculpture. Clypeus finely granulate, its median portion smooth, shiny and fine microsculptured, surrounded dorsolaterally by obtusely raised, semicircular carina each lateral branch of which protrudes at the level of the fore margin in form of small blunt denticle; similar denticle can be observed approximately in the middle of each lateral branch of the carina; free clypeal margin almost straight over its entire length. Supraantennal tubercles well developed, conical, bluntly pointed at the apex, their length 2.0 × w_{pdcl}; the distance between tubercles equal to the distance from the tubercle to the corresponding ocular orbit. Frons, vertex and gennae shiny, covered by dense punctures (pd 0.3–0.5 × w_{pdcl}, punctures separated by 0.2–0.5 × their own diameter). Eye separated from the posterior margin of the head by 0.7 × eye length in dorsal view. Mandible with inner margin bearing blunt triangle sub-basal tooth and with two well-developed inner preapical teeth (proximal one is larger, sharp, and directed at a right angle to the inner mandibular margin).

Mesosomal width at the level of the fore spiracles equal to width at the level of the propodeal spiracles; propodeal sides in dorsal view diverge slightly and evenly after spiracles. Mesosomal dorsum sculptured as vertex but punctures slightly larger (pd 0.7 × w_{pdcl}); mesosomal declivity with bigger punctures caused by decreasing of the spaces between them, thus the sculpture appears largely reticulated, medially over its entire length with straight, sharp carina; in lower part of the declivity the reticulate sculpturing is weaker. Meso- and metapleurae in its upper part somewhat punctuated and superficially longitudinally striated. Propodeal sides covered with coarse punctures which provide somewhat reticulate sculpture orientated in vague longitudinal folds; just behind propodeal spiracles with smooth, shiny area surrounded by carina (highest in its ventral portion).

First metasomal tergum evenly convex in profile; its dorsal surface uniformly punctuated (pd 0.05 × w_{pdcl}, punctures separated by 0.5–1.5 × their own diameter). Second metasomal tergum with comparatively regular punctures (pd 0.1 × w_{pdcl}, punctures separated by 0.1–0.2 × their own diameter) mixed with few larger, weakly printed punctures. Third to sixth metasomal terga sculptured as the second but the punctures covering their basal parts are slightly smaller and sparser; sixth tergum has smooth, shiny medial strip for its entire length. First metasomal sternum flat, practically without longitudinal carina medially, its medial process 1.6 × w_{pdcl} in length; hind margin of the sternum straight, with deeply impressed transverse preapical furrow which reaches up laterally the sternal margin; sternal surface shiny, unevenly sculptured, the sculpture appears somewhat as punctuation. Second metasomal sternum in profile with anterior half flat, evenly turning into merely weakly convex posterior half; sternal surface smooth and shiny, at the middle in front, laterally, and in the hind third with punctures of the same size as those on the relevant tergum; punctures separated by 1.0–3.0 × their own diameter. Third to fifth metasomal sterna with smooth basal half and with sparsely punctuated apical one (pd 0.1 × w_{pdcl}, punctures separated by 0.5–1.0 × their own diameter). Sixth metasomal sternum punctuated as the apical half of the fifth except the triangular smooth and shiny area basomedially.

Vestiture (hairs poorly preserved). Head covered with reflective, curved, semi-erect setae with length 1.5–2.0 × w_{pdcl}; on frons setae are directed dorsally, on the fore part of the vertex almost straight, on the hind part of the vertex and on the genae directed backward; setae covering the lateral carina of the median clypeal portion, the outer mandibular surface, and lateroventral parts of the clypeus are longer and somewhat thickened (their length 6.0–6.2 × w_{pdcl}), setae from the lateroventral clypeal edges are darkened; frons and vertex with few dark, erected setae in length equal almost to 6.0 × w_{pdcl}. Mesosomal dorsum covered with sparse, semi erect yellowish reflective setae directed backward (length 5.0–6.0 × w_{pdcl}) mixed by few dark erected and somewhat thickened ones with length 6.0–6.5 × w_{pdcl}; pronotum covered with short decumbent pubescence (hair length 1.0 × w_{pdcl}); the hairs are directed backward on the dorsal pronotal surface and dorsally on the lateral pronotal parts.

Legs covered with long, decumbent white hairs (length equal to 1.2–2.5 × w_{pdcl}) directed apically except on the ventral surface of the femora where hairs are erected. Fore tibia with one, mid- and hind tibia with two yellowish-transparent spurs respectively. Outer midtibial surface with four spines situated equidistantly along the tibia

(their length is 0.6–0.7 times the maximal tibial width) and with two apical spines of the same size. Outer hindtibial surface bearing a row of three spines situated equidistantly along the tibia (their length 0.5–0.8 times the maximal tibial width) and with two apical spines.

Coloration. Head and its appendages (excluding the black tip of the mandibles) as well as dorsal surface of the mesosoma red. Legs brown-reddish (coxae darkened). Remainder of the body black with reddish reflections. Length: 8.6 mm.

The females of the nominotypical subgenus of *Myrmilla* are rather alike morphologically and it is difficult to associate the sexes with satisfactory certainty based only on similarities in morphology. Identification of sexes in *M. caucasica* has not been confirmed by mating observations and has been based only on similarities in distribution (LELEJ 1985: 100). Relative to other Mutillidae *Myrmilla* males are not conspicuously larger than their known conspecific females. The similar weight of the two sexes is not likely to allow the male to carry the female in flight during the copulation (at least for a longer time period) but it does not preclude a brief copulation flight. This could be the reason why phoretic copulation among the members of the genus has not been recorded yet. Even though the observations on *M. erythrocephala* in captivity indicate that the male does not carry the female in flight during the copulation (MONASTRA 1990) it is possible that under natural conditions there is a copulation flight in *Myrmilla*. Support for this idea comes from the presence of heavily sclerotized teeth on the opposable surfaces of digitus and paracuspis in male genitalia. Presumably, the tooth surfaces in these two complementary zones play a role in stiff grasping of the edge of the apical sternite in the female, a grasp firm enough to allow the male to carry the female suspended from its genitalia for a short time period. Support for the correct sex association in *M. caucasica* in the present work is provided by the finding of a male and a female specimen in a single Malaise trap sample (Bulgaria, Tcherni Lom river valley, 27.VII.–10.VIII.2004), presumably caught in copulo. Both specimens correspond to the present morphological treatment for this species. The forementioned male from Tcherni Lom valley is here redescribed.

Redescription of male:

Sculpture. Clypeus with uneven tegument, shiny and having scattered micropunctures (pd 1/15 Od) and few macropunctures (pd 0.2–0.3 Od) which occupy lateral portions and laterodorsal margins of the middle portion; the disc of the middle portion flat not delimited laterodorsally by carina, its ventral part adjacent to the free margin without punctures, slightly microwaved and shiny; free clypeal margin in front of the middle portion truncate, with a minute emargination in the middle, laterally delimited by small triangle tooth (distance between the lateral teeth equal to the distance between the tooth and the nearer clypeal lateral corner); free clypeal margin in front of the lateral clypeal portions sinuate. Labrum semimembranous, protruding beyond free clypeal margin between lateral teeth of the middle portion, triangulary expanded in the middle. Frons, vertex and gennae shiny, without clear-cut micropunctures and with dense and comparatively regularly situated macropunctures (pd 0.4–0.5 Od, punctures separated by 0.1–0.3 × their own diameter) being sparser in the middle of the frons and in the area between

the ocelli, and denser in laterodorsal parts of gennae where the puncture shape appears slightly elongated dorsoventrally thus the sculpture appears irregularly reticulate-rugose; frons medially in front of midocellus with tiny shallow sulcus ending ventrally at a distance of 3 × Od from midocellar margin; hind margins of hind ocelli are at the same level with hind ocular margins; OOL : POL = 1.5. Mandibles slightly curved, in frontal view their width at the base almost equal to the width at the proximal corner of the inner preapical notch; inner preapical notch semicircular, deep as half of the mandibular width; inner preapical teeth two, the proximal tooth is widely truncated, the distal one is slightly pointed, its length is equal to the depth of the inner preapical notch; outer mandibular surface in its basal half with uneven longitudinal wrinkles and ill-defined macropunctures; condylar ridge almost straight.

Antennae: scape evenly slightly arcuate, with sharp carina along its ventral surface; pedicel equal in width and length; dorsal length of flagellomeres I to IV three times their apical width; subsequent flagellomeres becoming gradually shorter toward the antennal tip; last flagellomere two times longer than pedicellum.

Mesosoma: pronotum in front of pronotal collar shiny, separated from the later by vague delimited carina, pronotal collar densely macropunctuated (pd 0.7 × Od, punctures separated by 0.1 × their own diameter), pronotal hind margin strongly concave in an acute parabolic curve; mesoscutum with shiny, uneven tegument and large and dense punctures (pd 0.3 × Od, punctures separated by 0.3–0.5 × their own diameter), punctures are denser and smaller anteromedially on the disc near admedian lines; parapsidal lines deep and sharply delimited, appearing anteriorly on the discal surface until the middle of the mesoscutal length; mesoscutellum sculptured as mesoscutum, its transverse anterior groove as wide as 0.4 × Od, comparatively deep, with smooth and shiny bottom; lateral mesopleural surface with large and dense punctures approximately the same size as those of mesoscutum but close one to another forming largely reticulate rugose sculpture, area adjacent to metapleuron with irregular longitudinal wrinkles, ventral mesopleural surface in front of midcoxal cavities with shiny and uneven tegument and ill-defined punctures, strongly depressed at the middle on whole its length; metanotal disc length 1.2 × Od, unevenly sculptured, concave at the middle; metapleuron less shiny, covered by ill-defined punctures (pd 0.1–0.2 × Od, punctures separated by 1–2 × their own diameter), area behind mid- and above hindcoxa longitudinally wrinkled; propodeal surfaces with shiny and uneven tegument, with reticulate sculpture (diameter of the formed cells about 2 × Od), only median third of the hind surface polished and provided with slightly sinuate longitudinal carina.

Wings. Nervulus slightly postfurcal, middle of cross vein 2r-m with appendix, fore margin of marginal cell twice longer than pterostigma.

Legs. Coxae with clear-cut, deep, sparse punctures (pd 0.2 × Od, punctures separated by 1–3 × their own diameter) over shiny, glabrous tegument; inner side of hind coxae without carina; forefemural anteroventral surface flat, shiny, with longitudinal minute wrinkles; midfemoral posteroventral surface shiny in its apical half, without macropunctures and with barely marked, sparse micropunctures.

Metasoma. First metasomal tergum shiny, having a declivity covered by nebulous longitudinal wrinkles and very short dorsal surface which is uniformly punctuated (pd 0.2–0.3 × Od, punctures separated by 0.8–1.1 × their own diameter), its lateral parts

beyond spiracles with deep, longitudinally expanded macropunctures (pd 0.4–0.5 × Od, punctures separated by 0.2–0.5 × their own diameter); second metasomal tergum shiny, covered by almost uniform, clear-cut macropunctures (pd 0.4–0.5 × Od, punctures separated by 0.2–0.5 × their own diameter), the punctures denser and smaller apically and larger and longitudinally expanded laterally around the felt lines, tergal surface slightly transversally convex preapicolaterally; third to sixth metasomal terga covered by dense, and uniform macropunctures (pd 0.3 × Od, punctures separated by 0.2–0.3 × their own diameter) over shiny tegument; seventh metasomal tergum with coarse punctures thus appearing irregularly rugose rather than punctuated, medially along its whole length with smooth and shiny strip (the strip being enlarged at the middle of the tergal length), tergal surface preapicolaterally raised into a form of carina, its apical margin straight; first metasomal sternum with sharp carina over its entire length medially, the sternal surface strongly wrinkled over granulate tegument, wrinkles almost missing apicolaterally; second metasomal sternum in profile with anterior half slightly concave, evenly turning into merely weakly convex posterior half, its sternal surface smooth and shiny without punctures in the anterior concaved part and with well defined, deep punctures elsewhere (pd 0.5 × Od, punctures separated by 0.5–1.5 × their own diameter); third to sixth metasomal sterna with uniform macropunctures (pd 0.4 × Od, punctures separated by 0.6–1.3 × their own diameter) over shiny, uneven tegument; seventh metasomal sternum with two strong longitudinal carinae delimiting median flat and coarsely granulated part; lateral parts matt and finely granulate; median part apically truncated having its terminal surface in the shape of smooth and shiny vertical semicircle; hind rim of the sternum beyond truncation expanded dorsally into transparent, deeply emarginated lip.

Vestiture. Fore and ventral mandibular surface, clypeus, scape, ventral part of the frons below level of upper rims of toruli, gena, occipital part of the head, mesopleuron, coxae, trochanters, femora and tibiae of all legs, propodeum, first to fourth metasomal terga, lateral parts of the fifth metasomal tergum, and first to sixth metasomal sterna covered with pale, reflective erect setae with length 1.5–3.5 × Od; in addition to this pubescence, upper half of the frons, vertex, dorsal part of pronotal collar, mesoscutal disc, mesoscutellar disc, metanotum, middle part of the fifth metasomal, sixth and seventh metasomal terga, and central part of the seventh metasomal sternum covered with sparse almost straight long dark brown, nonreflective setae (setal length 3.5–4.5 × Od); appressed, reflective, relatively short setae appear on gena, lateral pronotal surface, apical parts of first to fifth metasomal terga and second to sixth metasomal sterna (on metasomal terga and sterna the setae are denser forming unclear stripes); both dorsal and ventral surfaces of forewing membrane covered by semierect, dark hairs with length 0.5 × Od, directed apically, surfaces of the hindwing membrane with the same type of pubescence but the hairs are 0.2–0.3 × Od in length, posterior hindwing margin along the length of the submedial cell with fringe of long, reflective setae (setal length 1.0–1.2 × Od); foretibia with one, yellowish-transparent apical spur with length 0.6 × of the length of the relevant metatarsus; mid- and hind tibia with two, yellowish-transparent, pointed at the tip spurs with length 0.4–0.5 × of the length of the corresponding metatarsus. Outer midtibial and hindtibial surface with four light brown spines situated equidistantly along the tibia (their length is 0.5 times of maximal tibial width).

Coloration. Body and appendages predominantly black; the following parts are dark orange to rusty red: labrum (apically transparent), preapical mandibular spots, vertex (in

front medially to the level of posterior rim of hind ocellus and laterally to the level of anterior rim of middle ocellus), large spot on gena (almost as large as ocular surface), pronotal collar, mesoscutum, mesoscutellum, episcrobal area of mesopleuron, metapleuron above upper metapleural pit, dorsal and posterior propodeal surface, postero-dorsal half of propodeal side, apical third of seventh metasomal tergum and same sternum, apical fourth of first tarsal segment in all legs, second to fifth tarsal segments of all legs; wing veins brown. Genital capsule (Fig. 7). Paramera preapically expanded; apices of digitus, paracuspis and lateral aedeagal plate pointing at one level; distal part of the digitus and paracuspis with teeth on their opposable surfaces; apex of digitus with straight, apically directed setae with length about 1/3 of the digital length; apicoventral lobe of cuspis pointed, its tip reaching far beyond the tip of lateral aedeagal plate and far shorter than the parameral apex; dorsal surface of cuspis with long hairs directed apicomedially; apical half of paramera with few scarced setae directed laterally to lateroapically, volselar basis about twice longer than digitus and about 1.5 times longer than cuspis. Length: 8.7 mm.

Variation:

When studying the available 23 males and 152 females of *M. caucasica*, I found relatively low intraspecific variation.

The **male** varies in sculpture of frons, position of nervulus and in coloration of head and mesopleuron.

Sculpture of frons: there is a well-developed median groove from the middle ocellus extending down to the upper rims of toruli in the majority of the specimens (material from: Melnik, Nessebur, Tabatchka village, Trubatch village in Bulgaria; Oradea in Romania); the median groove is weakly printed in one specimen from Plovdiv (Bulgaria).

Punctuation of the upper half of the frons close to ocellar area: in most specimens the punctures are separated by 0.3–0.4 × their own diameter (material from the forementioned places); punctures are separated by 0.5–0.8 × their own diameter in one specimen from Plovdiv (Bulgaria).

Position of nervulus: interstitial in most specimens (material from the forementioned places and Plovdiv); postfurcal in few specimens from Muglizh, Nessebur, Tabatchka village, Trubatch village (Bulgaria).

Coloration of vertex: red behind and lateral of the ocellar triangle in most specimens (material from: Melnik, Nessebur, Muglizh, Tabatchka village, Trubatch village in Bulgaria); red only behind the ocellar triangle (material from: Nessebur, Tabatchka village, Trubatch village in Bulgaria); the red may replace black on the frons down to the upper rims of toruli in one specimen from Plovdiv (Bulgaria); red behind and lateral of the ocellar triangle and on gena (material from: Nessebur, Tabatchka village in Bulgaria; Bucharest, Oradea, Valului Traian in Romania).

Coloration of mesopleuron: red in entire episcrobal area of most specimens (material from: Melnik, Nessebur, Muglizh, Tabatchka village, Trubatch village in Bulgaria; Oradea in Romania); red in hind half of episcrobal area and on the area below it (material from: Gorna Breznitsa village, Nessebur, Tabatchka village, Trubatch village in Bul-

garia; Bucharest, Valului Traian in Romania); red coloration occupies whole episcrobal area and part of mesopleuron ventrally to it in one specimen from Plovdiv (Bulgaria).

In some males the apex of digitus is situated slightly before or beyond the apex of lateral aedeagal plate.

The **female** varies in form of median process of first metasomal sternum and in coloration of head.

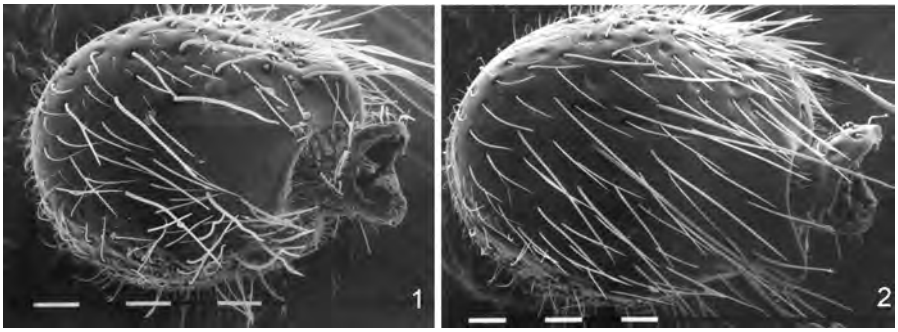
Form of median process of first metasomal sternum: slightly compressed, pointed at the apex, carina at the sternal surface absent in the majority of the specimens (material from: Bourgas, Gorna Breznitsa village, Grivitsa village, Ikhtiman, Ivaylovgrad, Kamenitsa village, Klokotnisa village, Kokalyane village, Madzharovo, Pancharevo village, Passarell village, Plana Mountain, Pleven, Roupite village, Sreburna reserve, Usstrem village, Vitosha Mountain in Bulgaria); slightly compressed, pointed at the apex, carina at the sternal surface present in few specimens (material from: Grivitsa village, Kamenitsa village, Madzharovo, Muglizh, Shabla cape in Bulgaria; Bilecik in Turkey); conical, pointed at the apex, without carina at the sternal surface in some specimens (material from: Gorna Breznitsa village, Grivitsa village, Ikhtiman, Klokotnitsa village, Kokalyane village, Lilyanovo village, Madzharovo, Novi Isskar, Passarell village, Polska Skakavitsa village, Vitosha Mountain in Bulgaria; Kalámata in Greece; Istanbul, Yumurtalık in Turkey); slightly compressed, truncated to widely rounded at the apex, carina at the sternal surface present in some specimens (material from: Gorna Breznitsa village, Ilyov Vruh peak, Madzharovo, Tabatchaka village in Bulgaria; Antalya in Turkey).

Spreading of dark coloration (black to dark brown) over the head: spread on the lower half of the frons between supraantennal tubercles and ocular orbit in shape of triangular spot reaching dorsally up to the middle of the internal ocular orbit (material from: Ikhtiman, Ivaylovgrad, Passarell village in Bulgaria;Yumurtalık in Turkey); spread on the lower half of the frons between supraantennal tubercles and ocular orbit in shape of triangular spot reaching dorsally up to the middle of the internal ocular orbit and on posteroventral half of gena in some specimens from Kalámata (Greece); spread over almost all surface of the head except for the central part of vertex in some specimens (material from: Kokalyane village, Muglizh, Passarell village in Bulgaria; Antalya in Turkey); spread on the lower half of the frons reaching dorsally to the middle of the internal ocular orbit in the majority of the specimens (material from: Bourgas, Gorna Breznitsa village, Grivitsa village, Ikhtiman, Kamenitsa village, Klokotnitsa village, Kokalyane village, Madzharovo, Novi Isskar, Pantcharevo village, Passarell village, Pleven, Polska Skakavitsa village, Roupite village, Shabla cape, Sreburna reserve, Tabatchka village, Vitosha Mountain in Bulgaria; Istanbul, Bilecik in Turkey); spread on the lower half of the frons reaching dorsally to the level of dorsal end of the internal ocular orbit (material from: Gorna Breznitsa village, Grivitsa village, Ilyov Vruh peak, Kamenitsa village, Klokotnitsa village, Lilyanovo village, Pantcharevo village, Passarell village, Pleven, Usstrem village, Vitosha Mountain in Bulgaria; Yumurtalık in Turkey). The shape of the internal end of the hind coxa in females does not vary along a west/east cline. Amongst the studied material I have not found any specimens of *caucasica* with an expanded internal hindcoxal apex. This character state is uniformly present throughout the range of this species, from the western-most locality, Orebic (Croatia) to the eastern-most locality, Tbilisi (Georgia).

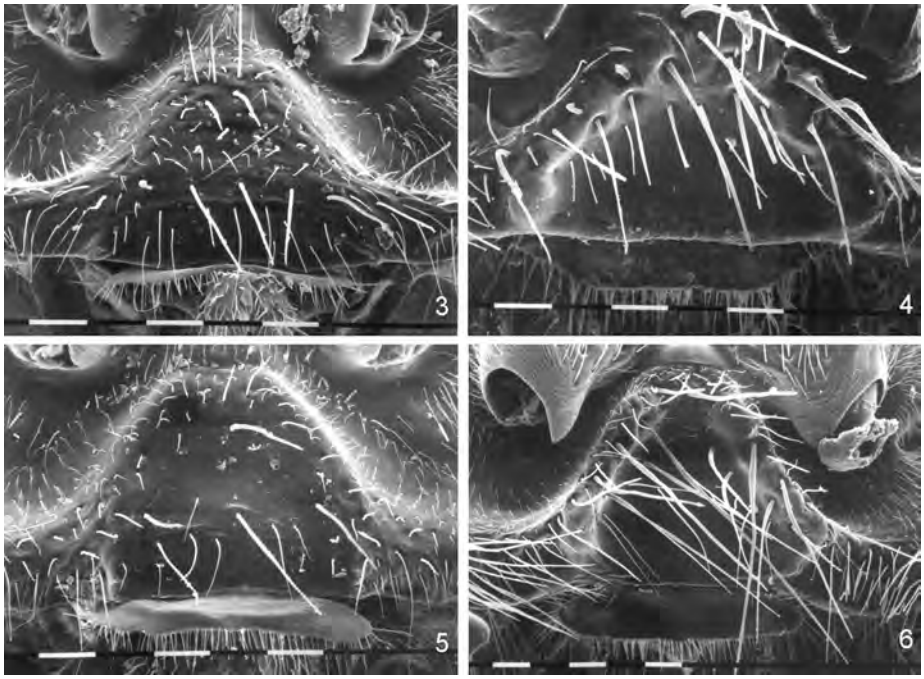
It has been assumed that in certain species of *Myrmilla* there is an extreme scarcity of males (complete absence or very low ratio of males to females) in the population (e.g. HOFFER 1938: 182). The parthenogenetic reproduction for *M. erythrocephala* and the absence of males in the northern parts of its range proposed by HOFFER (1938) are far from being correct. HOFFER`s proposal states that the parthenogenesis in *Myrmilla* in the Czech Republic and Slovakia appears as thelytoky and there are no males in many subsequent generations. The system of sex determination in the order Hymenoptera relies on parthenogenetic production of males, and in Mutillidae and their close relatives parthenogenesis theoretically appears only as arrhenotoky, which was demonstrated in a simple and unequivocable manner by PAGDEN (1932: 45-46) for the tiphiid species *Methocha articulata*. The simplest explanation of the case of spanandry in *Myrmilla* is as follows: fertilized, female-producing eggs are laid until the sperm stored in the female spermatheca is exhausted. After that, the female starts to lay unfertilized, male-producing eggs. The majority of the egg-laying females, however, die before reaching the stage of depleted sperm in their spermathecae, and their entire offspring is exclusively female. Only a minority of the females (those with exhausted sperm or those who have never been fertilized) can produce male offspring. In the northern parts of the range of *Myrmilla* where seasonal activity of the adult females is shorter, the number of males in the offspring is lower because the females do not live long enough to reach the stage of lying unfertilized eggs. The strategy to escape an extreme scarcity of males is the capability of one male to copulate with more than one (always virgin) female (see MONASTRA 1990).

How to distinguish *M. caucasica* and *M. erythrocephala*

In the past *caucasica* has undoubtedly been confused with *erythrocephala* and admittedly they are very similar. However, *caucasica* differs from *erythrocephala* mainly in the following features: hind coxae of *caucasica* female not bearing a process at the apex of their inner side rather than bearing well-developed spine like projection in *erythrocephala* (Figs.1, 2); the middle portion of the clypeal disc in both the male and the female of *caucasica* is relatively less concave and does not have a well-developed lateral carina (Figs. 3–6).



Figs. 1–2: Hind coxa, (scale = 0.1 mm), female of (1) *Myrmilla caucasica* from Vitosha Mountain (Bulgaria), ventral view, (2) *Myrmilla erythrocephala* from Ortovero (Italy), inner view.

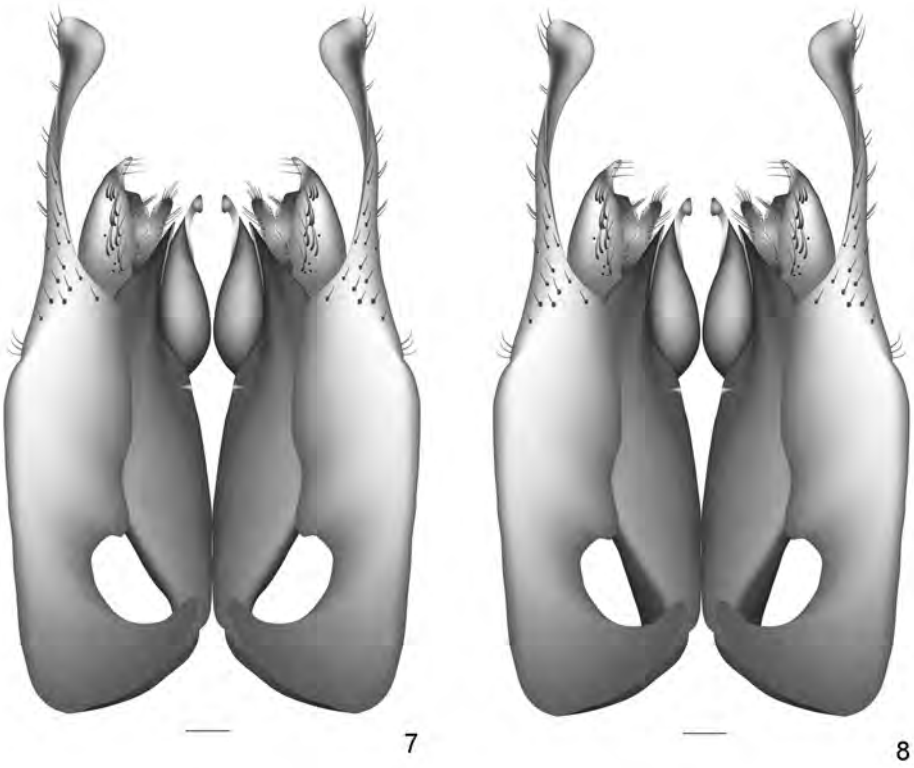


Figs. 3–6: Clypeus, frontal view, (scale = 0.1 mm); (3–4) male of (3) *Myrmilla caucasica* from Maleshevska Planina Mountain (Bulgaria), (4) *Myrmilla erythrocephala* from Pisa – Fauglia (Italy); (5–6) female of (5) *Myrmilla caucasica* from Plana Mountain (Bulgaria), (6) *Myrmilla erythrocephala* from Ortovero (Italy).

The male genitalia of *M. caucasica*, *M. erythrocephala*, and *M. mutica* show a very close similarity and thus are of little value in distinguishing between the species. The only consistent difference in the male genitalia of *M. caucasica* and *M. erythrocephala* is as follows: in the former species the base of the parapenial lobe (dorsal view) is more constricted (Fig. 7), whereas in the later it is somewhat widened (Fig. 8). Ratio a/b (where a is the shortest distance between median and lateral margin of the parapenial lobe at the base, and b – the greatest distance between median and lateral margin at the middle of the parapenial lobe length) does not exceed 0.40 in *caucasica* in contrast to *erythrocephala* where it is no less than 0.44 (see Tab. 1). The comment and drawings of RADOSZKOWSKI (1885: 34, figures 53a, 53b, and 53c on plate VIII) resemble the genitalia of *caucasica*. Even though the inner basal margin of the parapenial lobe is not finished to a complete contour (figure 53a), its basal constriction typical for *M. caucasica* is easily observed.

The following four *Myrmilla* species have been misinterpreted by some authors and erroneously determined either as *caucasica* or as *erythrocephala*: *bilobicornis* SKORIKOV, 1927, *corniculata* (SICHEL & RADOSZKOWSKI, 1869), *mutica* (ER. ANDRÉ, 1903), and *rostriformis* LELEJ, 1980. These four species have their own unique features as follows:

***M. bilobicornis*.** The female is characterized by having a dorso-ventrally flattened process of the first metasomal sternum, which is emarginated at the apex. Male is not known so far.



Figs. 7–8: Genital capsule, dorsal view (scale = 0.1 mm), male of (7) *Myrmilla caucasica* from Tcherni Lom valley (Bulgaria), (8) *Myrmilla erythrocephala* from Bonifacio (Corsica, France).

M. corniculata. The female of this species differs from the female of *M. caucasica* by the length of supraantennal tubercles and by the length of the process of the first metasomal sternum. *M. caucasica* has the supraantennal tubercles more or less well defined in the form of denticle or horn, whereas in *corniculata* they are essentially obliterate, forming at most ill-defined protuberances. Conversely, the first metasomal sternum in *caucasica* has a shorter process (even though it is always well defined), whereas in *corniculata* it is longer, backward curved, sometimes laterally flattened or having square-shaped cross-section. Using these diagnostic characters for identification on the species level is rather ineffective as many of them show some variation in their states and in some cases overlap in both *caucasica* and *corniculata* females. As has been noted previously, the morphological identification of *caucasica* and *corniculata* by females is not certain (LELEJ & al. 2003a: 125). Concurrent use of the two forementioned characters, however, is more successful. This correlative treatment is shown in Figure 9 where the indices I_{sat} and I_{stp} are compared. In general, these two mensural variables covary inversely – as one of them increases, the other variable tends to decrease. Figure 9 shows that *caucasica* includes females with higher I_{sat} (better developed supraantennal tubercle) and at the same time with lower I_{stp} (shorter median process of the first metasomal sternum), contrary to the females of *corniculata* which are assembled in the area of lower I_{sat} (almost scar-like to very short supraantennal tubercle) and rather high I_{stp}

Table 1: Ratio a : b in *M. caucasica* and *M. erythrocephala*

species	a	b	a/b	locality
M. caucasica	4	14	0.29	Bulgaria: Sveti Vlass
M. caucasica	4	15	0.27	Bulgaria: village of Tabatchka
M. caucasica	5	13	0.38	Bulgaria: village of Trubatch
M. caucasica	5	15	0.33	Bulgaria: Maglizh surroundings
M. caucasica	5	15	0.33	Bulgaria: village of Tabatchka
M. caucasica	5	15	0.33	Bulgaria: Sveti Vlass
M. caucasica	5	15	0.33	Bulgaria: Sveti Vlass
M. caucasica	5	16	0.31	Bulgaria: Sveti Vlass
M. caucasica	5	16	0.31	Bulgaria: Melnik
M. caucasica	5	17	0.29	Bulgaria: village of Trubatch
M. caucasica	5	16	0.31	Bulgaria: Plovdiv
M. caucasica	5	16	0.31	Romania: Valului Traian
M. caucasica	5	18	0.28	Bulgaria: village of Tabatchka
M. caucasica	5	21	0.24	Bulgaria: village of Tabatchka
M. caucasica	6	15	0.40	Bulgaria: Sveti Vlass
M. caucasica	6	15	0.40	Romania: Bucharest surroundings
M. caucasica	6	18	0.33	Bulgaria: village of Tabatchka
M. caucasica	6	19	0.32	Bulgaria: village of Gorna Breznitsa
M. caucasica	6	19	0.32	Bulgaria: Melnik
M. caucasica	6	19	0.32	Bulgaria: village of Trubatch
M. caucasica	6	19	0.32	Bulgaria: Sveti Vlass
M. caucasica	7	18	0.39	Bulgaria: Melnik
main 0.32; range 0.27 – 0.40; number 22				
M. erythrocephala	6	11	0.55	France: Morières-lès-Avignon
M. erythrocephala	6	13	0.46	France: Pignans
M. erythrocephala	7	15	0.47	France: Corse: Calvi
M. erythrocephala	7	15	0.47	France: unspecified locality
M. erythrocephala	7	16	0.44	France: Draguignan
M. erythrocephala	7	16	0.44	France: Morières-lès-Avignon
M. erythrocephala	7	16	0.44	Italy: Ortovero
M. erythrocephala	8	17	0.47	France: Morières-lès-Avignon
M. erythrocephala	8	17	0.47	France: Corse
M. erythrocephala	8	18	0.44	France: Morières-lès-Avignon
M. erythrocephala	8	18	0.44	France: Corse: Asco
M. erythrocephala	8	18	0.44	Italy: Spotorno
M. erythrocephala	9	15	0.60	Italy: village of San Benedetto Belbo
M. erythrocephala	9	19	0.47	France: Draguignan
M. erythrocephala	9	19	0.47	Italy: Fauglia surroundings
M. erythrocephala	9	20	0.45	Italy: Coldirodi
main 0.47; range 0.44 – 0.60; number 16				

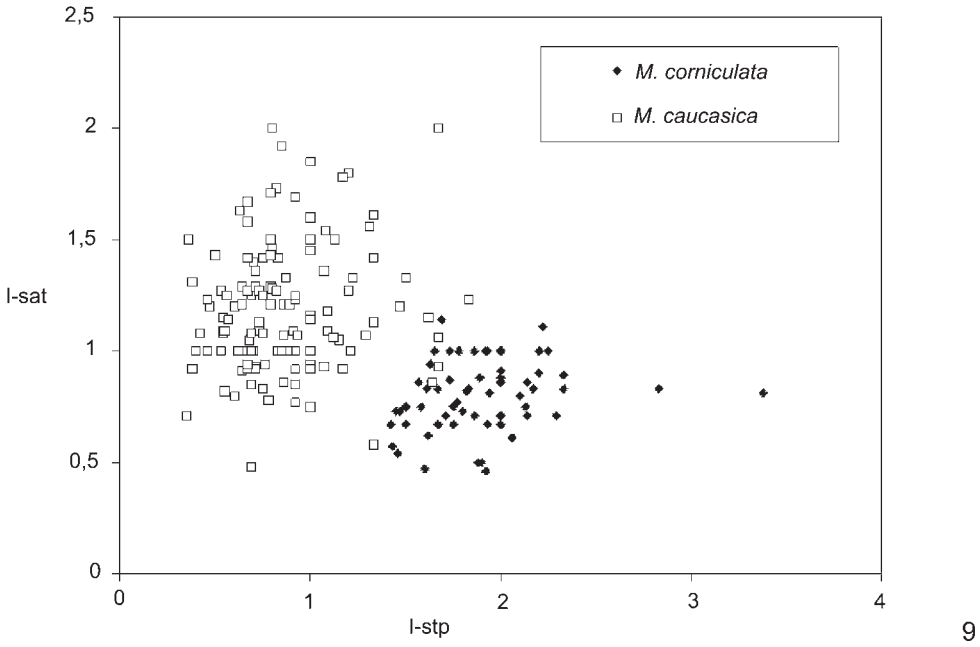


Fig. 9: Supraantennal tubercle index and index of the median process of first metasomal sternum values in *Myrmilla caucasica* and *M. corniculata*.

(longer median process of the first metasomal sternum). There is no apparent relationship between the values of the two indices, the body size of the animal, or the relevant collecting locality. In some isolated cases, however, the variation in length of the median process of the first metasomal sternum is partly allometric both in *caucasica* and *corniculata*, the length of the process increasing with larger body size. In regard to the collecting localities, it is clear that the females of *caucasica* and *corniculata* can be distinguished morphologically using I_{sat} and I_{stp} even in areas where their ranges overlap (for example continental Greece). The step-like variations in the values of I_{sat}, I_{stp} and general body size in some specimens are probably due to teratological reasons. In addition, the females of *corniculata* and *mutica* can be distinguished from the females of *caucasica* and *erythrocephala* in having backward directed, semi-erect setae on the posterior half of the vertex (in *caucasica* and *erythrocephala* the posterior half of the vertex has no such coverage).

The male of *corniculata* has been mentioned in the scientific literature only once (LELEJ & al. 2003b: 306) and was found to be morphologically very close to the male of *caucasica*, including the structure of the genital capsule. The nine *corniculata* males counted by LELEJ & al. (2003b: 306) are actually females (print error). I was able to study one male collected on 14 September 2004 "jumping among the leaves of a bush near the ground surface" (Lisa Standfuss pers. comm.) in the vicinity of Vólos (Greece) – a place where only females of *corniculata* have been found to occur. I find this male morphologically very close to the *caucasica* male, as did LELEJ (LELEJ & al. 2003a: 125). Comparing it to 22 examined males of *caucasica* from Bulgaria and Romania I have been able

to find only a single diagnostic difference, based on the structure of the preapical part of the inner mandibular edge. The preapical tooth situated immediately apically of the semicircular notch is single in *corniculata* whereas there are two teeth in the corresponding area in all examined males of *caucasica*, with the proximal tooth always wider than the apical one. The ratio a/b in the genital capsule of the male of *corniculata* is rather low – 0.16 (the lowest in *caucasica* is 0.24); however, measuring only a single specimen is not sufficient to draw any conclusions about species differences.

M. mutica has been interpreted in the past as a variety or subspecies of *erythrocephala* (e. g. ANDRÉ 1903: 434; ANDRÉ 1908: 38; BISCHOFF 1920: 57; INVREA 1954: 64). SKORIKOV (1927a) was the first to treat *mutica* as a separate species, recognizing it as a new species (*Myrmilla ecornuta*). The lack of supraantennal tubercles seems to the only truly reliable feature separating the females of *M. mutica* from those of *M. erythrocephala* and *M. caucasica*, respectively. Hitherto the male of *M. mutica* has been interpreted incorrectly. NAGY (1968: 69) believed he had found the male of *mutica* and gave its description. Supported only by LELEJ (1985: 100), NAGY's interpretation has been ignored by later authors except for NONVEILLER & al. (1998: 17) who simply reminded that Nagy had dealt with the description of the male of *mutica*. Although the male described by Nagy is very similar to that of *mutica* (in the sense of the present work), it actually belongs to *caucasica*. One specimen in the TMB collection was found to be the apparent basis for this description. It is labeled: Romaia/Oradea//Paratypus ♂/*Myrmilla*/*mutica* André/teste: C.Nagy-1966//Paratypus (terminal metasomal segments absent). By the rules of ICZN, the type status of this specimen as a paratype is invalid. It is not surprising that NAGY confused males of *mutica* in *caucasica* because he tried to compare his *mutica* male with the male of *erythrocephala*. I have examined seven males from Austria and Hungary where actually are records for the females of *mutica* only. Comparing them with the males from Bulgaria and Romania, I found the following four major differences:

1. *M. mutica* has the middle portion of the clypeal disc bordered dorsolaterally by somewhat sharply arisen carina; in *M. caucasica* the upper half of middle portion of the clypeal disc is almost flat, without carina dorsolaterally (see Fig. 3).

2. *M. mutica* has the second submarginal cell without appendix in the middle of cross vein 2r-m; in *M. caucasica,* the second submarginal cell bears weakly developed longitudinal vein in the middle of 2r-m.

3. *M. mutica* has the base of the second metasomal sternum more abruptly sloping anteriorly in lateral view.

4. *M. mutica* has the first metasomal sternum bearing weakly developed carina over the rough basic sculpture; in *M. caucasica* the first metasomal sternum bears well-developed medial carina over the rough basic sculpture.

Another, less reliable diagnostic difference is the position of the cross vein cu-a in the forewing. In all examined males of *mutica* (n=7) the cross vein cu-a takes clear postfurcal position whereas in the vast majority of *caucasica* males it is intersticial (n = 22), having postfurcal position only in five cases.

I failed to find reliable diagnostic differences in the structure of the genital capsule in *mutica*, *caucasica*, and *erythrocephala*. Details regarding structure of the genital cap-

sule of *mutica* are scarce and incomplete. The figures of the male genitalia by IUGA & SCOBIOLA (1962: 166, figures 21–24) for their "*Myrmilla erythrocephala mutica*" have been considered as correctly corresponding to *mutica* (NAGY 1968: 69; LELEJ 1985: 100). However, they are far from accurate because they do not show enough details in the distivollselar part, and the acute apex of the volsellar cuspis is seen as almost reaching the parameral apex. In all genital capsules of *mutica*, *caucasica*, and *erythrocephala* that I have examined, the apex of the volsellar cuspis is situated far before the parameral apex (see Figs. 7, 8). The complementation of both sexes in *M. mutica*, however can be proved only by catching material in copulo.

Worthy of remark is the fact that in areas where the ranges of *M. caucasica* and *M. erythrocephala* overlap the range of *M. mutica*, the later species is almost always found at higher altitude than the former two. For example, NONVEILLER & al. (1998: 17) recorded *M. mutica* from Velbet ridge at altitude 520 m, while at the same time they found *M. erythrocephala* relatively close to Neretva river mouth at not more than 50 m above sea level. In Croatia in particular, *M. mutica* is recorded from many locations with high altitude: Paklenica, Kosovo at Knin, and Mosor Mountain, while *M. erythrocephala* is found at the seashore and the islands (INVREA 1954: 144, 145). Areas with lower altitude in the south-western part of the range of *M. mutica* such as Hvar Island (MNHN), Omiš (INVREA 1954: 145), Pola (NHMW), and Senj (ERLANDSON 1974: 29) are exceptions which do not invalidate the forementioned general inference that this species tends to be geographically separated from *M. erythrocephala*. In eastern direction, besides in isolated areas, *M. mutica* occurs in near-seashore environments such as Bar in Montenegro (INVREA 1954: 145) and Durrës in Albania (MAIDL 1922: 41), and also on islands situated relatively close to the mainland such as Crete, Kefallinía, Kérkira (see list of material) and Naxos (BISCHOFF 1934: 65). The easternmost areas where *M. mutica* is known are the Crimean peninsula (Ukraine) and Hatay province (Turkey) (NHMW). In the northern part of its range where *M. mutica* cohabits with *M. caucasica*, the two species are also recorded from localities of different altitude. In the present work *M. mutica* was found for the first time to inhabit Hungary, Albania, and the Ukraine. In addition, its range includes Italy, Croatia, Bosnia & Herzegovina, Romania, Serbia, Montenegro, Macedonia, Greece, and Egypt (LELEJ & al. 2003a: 125).

M. rostriformis is known only from Afghanistan, and so far solely as females. It can be easily distinguished from both *caucasica* and *erythrocephala* by the presence of a frontal tubercle above the supraantennal tubercles. Twelve females of this species in the collection of NHMW have been identified as *M. erythrocephala* (LATREILLE) by Karl Hammer but apparently have never been published.

Interpretation of "*Mutilla erythrocephala*" by the older authors and nomenclature problems

The identity and the nomenclatural history of "*Mutilla erythrocephala*" have been largely discussed in the past (MORAWITZ 1865; DE DALLA TORRE 1888; KRIECHBAUMER 1896; ANDRÉ 1896; BISCHOFF 1931). In the expositions of these authors all efforts were focused on clarifying the taxa described or mentioned under that name by FABRICIUS (1793, 1804), JURINE (1807), and LUCAS (1849), which at present belong to three other

genera than *Myrmilla*: *Cystomutilla* ER. ANDRÉ, *Sigilla* SKORIKOV, and *Trogaspidia* ASHMEAD. Although FABRICIAN`s JURINE`s and LUCAS`s interpretations could be considered solved from nomenclatural point of view, I will reintroduce once again the interpretations of the older authors with reference to the nomenclatural problems concerning only *Mutilla erythrocephala* of LATREILLE.

In the description of his *Mutilla erythrocephala* LATREILLE (1792: 8) incorrectly latinized the specific epithet "*erithrocephala*", which is not considered an inadvertent error; thus his original spelling must not be corrected grammatically as it is not deemed to be an incorrect original spelling (ICZN, Article 32.5.1). The next author dealing with the taxon *Myrmilla erythrocephala* sensu LATREILLE, 1792 appeared to be COQUEBERT (1801: 69) who presented in his work both French and Latin diagnoses of LATREILLE (1792) verbatim but changed the original spelling of the specific epithet to "*erythrocephala*" thus creating the subsequent spelling, later as an unjustified emendation according to the Code (ICZN, Articles 32.2.2, 33.2.3). Since the spelling "*erithrocephala*" has not been in use for the forementioned species after 1801, the grammatical correction of COQUEBERT must be considered a justified emendation (ICZN, Article 33.2.3.1) and the correct specific name spelling remains "*erythrocephala*". Prior to COQUEBERT, FABRICIUS used the name "*erythrocephala*" (FABRICIUS 1793: 371) but the name he proposed is not applicable in this case because FABRICIUS dealt with a completely different taxon (BISCHOFF 1931: 92).

Before 1801 MEYER (1794: 264,265) translated the expanded diagnosis of LATREILLE from French to Latin but proposed new name, *latreillei* for *erithrocephala* of LATREILLE. Later FABRICIUS (1804: 438) mentioned the name *Mutilla erythrocephala* again in the sense of the species described by him in 1793 which has nothing to do with *M. erythrocephala* LATREILLE. Describing *Mutilla erythrocephala* in 1805, LATREILLE (1805: 264) definitely dealt with a species other than the one he described in 1792. There are two reasons why the description from 1805 is unlikely to refer to the correct *Myrmilla erythrocephala*. First, it seems unlikely that LATREILLE had found the complementary male of *M. erythrocephala* to be *Mutilla ruficollis* of FABRICIUS (now *Smicromyrme ruficollis*), which is always much smaller in size than the female of the species described in 1792 (in the later description LATREILLE compared his species to average in size "*Mutilla maura*" and "*Mutilla europaea*"). The male of *S. ruficollis* in general corresponds in size to the female of *Cystomutilla ruficeps* (F. SMITH) rather than to the female of *Myrmilla erythrocephala*. The second reason for rejecting the notion that the descriptions from 1792 and 1805 refer to one and the same species is the comment made by LATREILLE (1805: 264) at the end of his diagnosis, "dans les arbres", indicating the females is to be found in the trees rather than on the ground. There are no further published data which can confirm that *M. erythrocephala* was found inhabiting trees. Instead, *C. ruficeps* females can be seen on trees, where this species has been observed to parasitize the branch-nesting crabronid wasps *Ectemnius rubicola* (DUFOUR & PERRIS, 1840) and *Pemphredon rugifer* (DAHLBOM, 1844) by BORRIES (1892) and by FERTON (1908) respectively. Furthermore, one female of *C. ruficeps* was found in a sample from a pan trap hanged up on a tree in Shiptchenska Planina Mountain (Bulgaria). Thus, it appears likely that LATREILLE had *C. ruficeps* in his hands for the description from 1805.

The sex association of *Mutilla erythrocephala* and *Mutilla ruficollis* proposed by LATREILLE has not been mentioned by any of the later authors. Louis JURINE (1807: 267) understood *Mutilla erythrocephala* in the sense of FABRICIUS 1804 and therefore did not deal with the taxon of LATREILLE. Without doubt, the work of Guillaume-Antoine OLIVIER (1811) is of the greatest value in assessing the errors and confusion around *Mutilla erythrocephala* LATREILLE. In his description, LATREILLE (1792: 8) said that the material on which this species is based is deposited in the collection of Olivier, a friend and teacher of Latreille, and this material was therefore far from being omitted by Olivier himself in describing another species, *Mutilla cornuta*. Furthermore, Olivier undoubtedly was quite familiar with *Mutilla erythrocephala* of LATREILLE because he put the latter into the synonymy of his *cornuta* (OLIVIER 1811: 64a). It is not clear why Olivier preserved the name *Mutilla erythrocephala* of FABRICIUS, even though he was aware that the one of Latreille had priority. Most likely, the main reason for this action was the great authority carried by Fabricius as a famous entomologist at that time, whose taxa should not be doubted. If the exploration of the work of Olivier is stopped at this stage, the situation is easy to explain – the new species *cornuta* must fall into synonymy with *M. erythrocephala* LATREILLE and his treatment of *M. erythrocephala* must be attributed to *Trogaspidia intermedia* (DE SAUSSURE) and to *Cystomutilla ruficeps* (F. SMITH) (see BISCHOFF 1931 and Table 2).

However, the greatest contradiction in the treatment of the two above mentioned taxa is related to their ranges. Olivier obviously erred in the range interpretation of *M. erythrocephala* of FABRICIUS because the later author had not given any information about the origin of the material for his species in either of his works from 1793 or 1804. At the same time, the range of this species given by OLIVIER – "au midi de la France, en Italie" resembles that for the range of *Mutilla erythrocephala* LATREILLE (LATREILLE 1805: 264). Furthermore, *Mutilla cornuta* was established to occur "dans les îles de l`Archipel" (OLIVIER 1811: 64b). The latter locality indicates the Greek islands (see MORAWITZ 1865: 119 for locality treatment) where *Mutilla erythrocephala* LATREILLE does not occur, but only the closest relatives *M. corniculata* and *M. caucasica* can be found. Thus it appears that in 1811 OLIVIER re-described *erythrocephala* (LATREILLE, 1792) under the name *Mutilla cornuta* using additional material from Greece, which had not been available to LATREILLE for his description in 1792. Hence the series of specimens that served as basis for the description of *Mutilla cornuta* was heterogenic, including not only *M. erythrocephala* but also *M. caucasica*. I have not been able to locate any types for either *Mutilla cornuta* or *Mutilla erythrocephala* in MNHN, but I feel confident in suggesting that *M. corniculata* had not been available to OLIVIER for the first description of *Mutilla cornuta* because he characterized the latter species "… front brun, bituberculé" (1811: 54a) and "… fronte picea, bituberculata" (1811: 64a) and in addition gave detailed description in French on page 64b of the well-defined supraantennal tubercles, which in fact are not present in *M. corniculata*. If the types of *Mutilla cornuta* and *Mutilla erythrocephala* still exist (e.g. in the Royal Scottish Museum in Edinburgh or in Spinola collection in Museo regionale di Scienze Naturale in Torino), a lectotype designation among the type series would cause severe nomenclatural problems by resurrecting *cornuta* from the synonymy with *erythrocephala*.

If *cornuta* is established as a valid species by lectotype designated on a Greek specimen, it would automatically become senior subjective synonym of *M. caucasica*. Since *Myr-*

Table 2: Taxa listed under the name "*Mutilla erythrocephala*" and name attributions for *Myrmilla erythrocephala* (LATREILLE, 1792) from 1792 until 1896

Identity material which identity is confirmed of by direct examination is marked with an asterisk	**author[s]**	**year of publication**	**page/plate or figure**	**name (as *erythrocephala*)** **name (other than *erythrocephala*)**	**sex**
Myrmilla erythrocephala (LATREILLE, 1792)	LATREILLE	1792	8	*Mutilla erithrocephala*	f
Trogaspidia intermedia (DE SAUSSURE, 1867)	FABRICIUS	1793	371	[*Mutilla*] *erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	MEYER	1794	264	[*Mutilla*] *Erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	MEYER	1794	265	*Mutilla Latreilli*	f
Myrmilla erythrocephala (LATREILLE, 1792)	COQUEBERT	1801	69	*Mutilla erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	COQUEBERT	1801	plate XVI, figure 11a, b	*Mutilla erithrocephala*	f
Trogaspidia intermedia (DE SAUSSURE, 1867)	FABRICIUS	1804	438	[*Mutilla*] *erythrocephala*	f
Cystomutilla ruficeps (F. SMITH, 1855)	LATREILLE	1805	264	[*Mutilla*] *erythrocephala*	f
Trogaspidia intermedia (DE SAUSSURE, 1867)	JURINE	1807	267a	[*Mutilla*] *Erythrocephala*	f
Trogaspidia intermedia (DE SAUSSURE, 1867)	OLIVIER	1811	54b	*Mutille érythrocéphale*	f
Trogaspidia intermedia (DE SAUSSURE, 1867)	OLIVIER	1811	66a	*Mutilla erythrocephala*	f
Cystomutilla ruficeps (F. SMITH, 1855)	OLIVIER	1811	66a	*Mutilla erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	OLIVIER	1811	54a, 64a–64b	*Mutilla cornuta*	f
Myrmilla erythrocephala (LATREILLE, 1792)	GHILIANI	1842	24a	*M.*[*utilla*] *cornuta* (of SPINOLA, new species)*	f
Myrmilla erythrocephala (LATREILLE, 1792)	LEPELETIER	1845	607-608	*Mutilla erythrocephala*	f
Cystomutilla ruficeps (F. SMITH, 1855)	LUCAS	1849	298	*Mutilla erythrocephala*	f
Myrmilla calva (DE VILLERS, 1789), *Trogaspidia intermedia* (DE SAUSSURE, 1867)	SICHEL	1852	566	*Mutilla erythrocephala*	f
Trogaspidia intermedia (DE SAUSSURE, 1867)	SMITH	1855	5	*Mutilla erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	SMITH	1855	9	*Mutilla cornuta*	f
Myrmilla erythrocephala (LATREILLE, 1792)	COSTA	1858	8	*Rudia megacephala*	m
Myrmilla erythrocephala (LATREILLE, 1792)*	SICHEL	1861	752	*M.*[*utilla*] *cornuta* (variety or new species)	f
Cystomutilla ruficeps (F. SMITH, 1855)	VON FRAUENFELD	1861	104a	*M.*[*utilla*] *erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	GERSTAECKER	1862	423	*R.*[*udia*] *megacephala*	m

Identity material which identity is confirmed of by direct examination is marked with an asterisk	**author[s]**	**year of publication**	**page/plate or figure**	**name (as *erythrocephala*)** **name (other than *erythrocephala*)**	**sex**
Sigilla dorsata (FABRICIUS, 1798)	MORAWITZ	1865	99	*Mutilla erythrocephala*	f
Sigilla dorsata (FABRICIUS, 1798)	MORAWITZ	1865	117	*Mutilla erythrocephala*	m
Sigilla dorsata (FABRICIUS, 1798)	MORAWITZ	1865	118	*M.*[*utilla*] *erythrocephala*	m
Myrmilla erythrocephala (LATREILLE, 1792)	MORAWITZ	1865	118	*M.*[*utilla*] *cornuta*	f
Myrmilla erythrocephala (LATREILLE, 1792)	MORAWITZ	1865	120	*M.*[*utilla*] *corniculata*	m, f
Myrmilla erythrocephala (LATREILLE, 1792)	MORAWITZ	1865	120	*R.*[*udia*] *megacephala*	m, f
Myrmilla erythrocephala (LATREILLE, 1792)	KIRCHNER	1867	210a	*M.*[*utilla*] *erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	KIRCHNER	1867	210a	*M.*[*utila*] *corniculata*	m
Myrmilla erythrocephala (LATREILLE, 1792)*	SICHEL & RADOSZKOWSKI	1869	153	[*Mutilla*] *cornuta*	f
Cystomutilla ruficeps (F. SMITH, 1855)	SICHEL & RADOSZKOWSKI	1869	167	*M.*[*utilla*] *erythrocephala*	f
Cystomutilla ruficeps (F. SMITH, 1855)	SICHEL & RADOSZKOWSKI	1869	168	*M.*[*utilla*] *erythrocephala*	m
Myrmilla erythrocephala (LATREILLE, 1792)	SICHEL & RADOSZKOWSKI	1869	169, 170–171	*M.*[*utilla*] *cornuta*	m
Myrmilla erythrocephala (LATREILLE, 1792)*	SICHEL & RADOSZKOWSKI	1869	169–170	*M.*[*utilla*] *cornuta*	f
Cystomutilla ruficeps (F. SMITH, 1855)	KOHL	1880	210	*M.*[*utilla*] *erythrocephala*	f
Cystomutilla ruficeps (F. SMITH, 1855)*	KOHL	1883	683	*M.*[*utilla*] *erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	COSTA	1887a	127	*M.*[*utilla*] *cornuta*	f
Myrmilla erythrocephala (LATREILLE, 1792)	COSTA	1887a	127	*M.*[*utilla*] *cornuta* var c	f
Cystomutilla ruficeps (F. SMITH, 1855)	COSTA	1887a	133	*M.*[*utilla*] *erythrocephala*	m, f
Myrmilla erythrocephala (LATREILLE, 1792)	COSTA	1887b	243	*Mutilla bison*	f
Myrmilla erythrocephala (LATREILLE, 1792)*	GASPERINI	1887	10	*M.*[*utilla*] *cornuta*	f
Cystomutilla ruficeps (F. SMITH, 1855)	ANTIGA	1888	8b	[*Mutilla*] *erythrocephala*	f
Sigilla dorsata (FABRICIUS, 1798)	ANTIGA	1888	8b	[*Mutilla*] *erythrocephala*	m
Myrmilla erythrocephala (LATREILLE, 1792)	COSTA	1888	4	*Mutilla bison*	f
Myrmilla erythrocephala (LATREILLE, 1792)	DE DALLA TORRE	1888		*Mutilla erythrocephala*	f
Cystomutilla ruficeps (F. SMITH, 1855)	BORRIES	1892	247–248	*Mutilla erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	ANDRÉ	1893	288, 289	[*Mutilla*] [(*Myrmilla*)] *cornuta*	m, f
Myrmilla erythrocephala (LATREILLE, 1792)	KOHL	1893	42	*M.*[*utilla*] *cornuta*	f
Cystomutilla ruficeps (F. SMITH, 1855)	DE-STEFANI	1895	224a	[*Mutilla*] *erythrocephala*	f
Myrmilla erythrocephala (LATREILLE, 1792)	DE-STEFANI	1895	224a	[*Mutilla*] *bison*	f
Myrmilla erythrocephala (LATREILLE, 1792)	DE-STEFANI	1895	224a	*Mutilla cornuta*	f
Myrmilla erythrocephala (LATREILLE, 1792)	KRIECHBAUMER	1896		*Mutilla erythrocephala*	f

milla caucasica has been widely used as a valid species after 1985, the former action is not desirable even though the synonymy of *caucasica* under *cornuta* was proposed long time ago by August MORAWITZ (1865: 119) and supported by KIRCHNER (1867: 210a) and by SICHEL & RADOSZKOWSKI (1869: 169). Among other older works dealing with *Myrmilla erythrocephala*, of note is the third part of the catalogue of the fossorial wasps of the British Museum by Frederick SMITH (1855). Beside *Mutilla erythrocephala* SMITH also catalogued *Mutilla cornuta*, but surprisingly without data on its origin. This latter fact suggests that Smith has seen the material from Latreille (or Olivier's) collection. SMITH also omitted in the Catalogue the taxa described by KOLENATI in 1846, and proposed a new name, *Mutilla ruficeps* for *Mutilla erythrocephala* of LUCAS. Unfortunately, this last taxonomical action was largely neglected in the subsequent major taxonomical works (MORAWITZ 1865; SICHEL & RADOSZKOWSKI 1865; KRIECHBAUMER 1896 among others).

As a result, in many faunistic works published between 1855 and 1896 the name *Mutilla erythrocephala* in the authorship of FABRICIUS, LEPELETIER DE SAINT-FARGEAU or LUCAS was attributed to the species known until recently as *Cystomutilla ruficeps* (F. SMITH, 1855) (VON FRAUENFELD 1861: 104; KOHL 1880: 210; KOHL 1883: 683; BORRIES 1892: 247; CUNÝ Y MARTORELL 1897: 331). Achille COSTA (1858: 8) described for the first time the correct male of *Myrmilla erythrocephala* under the name *Rudia megacephala*. The sex association between *Mutilla erythrocephala* and *Rudia megacephala* was put in doubt by MORAWITZ (1865: 102, 117–119) who believed that the females of *M. erythrocephala* and *M. cornuta* have their complementary males wingless, and put the winged male of *Rudia megacephala* into different species group with complementary female sex *M. corniculata* sensu GERSTAECKER, 1862. The correct sex association was made little later by SICHEL & RADOSZKOWSKI (1869: 169) under the taxon they named *Mutilla cornuta*. SICHEL & RADOSZKOWSKI indicated they saw at least one type specimen of *Mutilla caucasica* KOLENATI (most likely based on material in NHMW at that time) and synonymized *Rudia megacephala* under *Mutilla cornuta* as a complementary male for the female of the latter species. Even though they obviously erred in the Latin diagnosis for the male of this species having three submarginal cells in the fore wing (page 169, "…alarum…cellulis cubitalibus tribus") in the description in French SICHEL & RADOSZKOWSKI wrote that there are only two submarginal cells (page 171, "…deux cellules cubitales et deux veines récurentes"). When they studied two males from Italy and France (Montpellier), they definitely dealt with the male of *Myrmilla erythrocephala* without confusing it with the male of *Myrmilla caucasica*.

The "validation" of *Mutilla cornuta* by SICHEL & RADOSZKOWSKI was largely accepted at that time by other authors (e.g. COSTA 1888: 5; ANDRÉ 1893: 288, 289) until KRIECHBAUMER (1896: 44) synonymized *Mutilla cornuta* under *M. erythrocephala* LATREILLE. On the contrary, DE DALLA TORRE (1897: 27–28) treated *Mutilla cornuta* as a valid species. Table 2 summarizes older records in the literature regarding the name "*Mutilla erythrocephala*", and various names which correspond to the true *Myrmilla erythrocephala* until 1896. It is worth mentioning that the correct spelling for the generic name of *Myrmilla* is *Myrmilla,* not *Myrrmilla,* as the latter is a misspelling and an unavailable name as emphasized by LELEJ & BROTHERS (2008: 36, 38). *Myrrmilla* was originally proposed as a subgenus of *Mutilla* with two species, *M. incompleta* LEPELETIER DE SAINT-FARGEAU, 1845 and *M. calva* DE VILLERS, 1789 by Constantin WESMAEL (1851:

365). In the same work on page 373 WESMAEL corrected the subgeneric name to "*Myrmilla*". According to ICZN (Article 24.2.4) WESMAEL has the right of the first reviser, thus his correction is justified. The latter spelling of this generic name has been supported by all later authors dealing with this taxon. Hans BISCHOFF (1920: 54) was the first to treat *Myrmilla* up to the generic level.

Range considerations for *Myrmilla caucasica* (KOLENATI, 1846) and *Myrmilla erythrocephala* (LATREILLE, 1792) – past and present

This section provides a critical review of the previous reports or accounts of *M. caucasica*, *M. erythrocephala*, their synonyms, and their close relatives by country. The historical and recent records are considered for each country and specific comments are made on the localities for which material was available for study.

Albania. – Records from Albania concern only the name "*Mutilla erythrocephala* LATREILLE". Franz MAIDL (1922: 41) was the first to record this name from two localities in Albania. Re-examination of the material that served as a basis for his report viz., one female from Elbasan and one female from Durrës (NHMW) showed that they have been misidentified and actually belong to *M. mutica*. Six years after MAIDL`s report Ernő CSIKI (1928: 142) recorded *Mutilla erythrocephala* from a third locality in north Albania – Nangë. This report, based on a single female (TMB, examined) also should be attributed to *M. mutica*. Subsequent reports for *M. erythrocephala* from Albania were not based on examination of any original material, but followed MAIDL`s data (INVREA 1943: 49) or both MAIDL`s and CSIKI`s data (OEHLKE 1963: 832, 834; PAGLIANO 2005: 294; PAGLIANO & STRUMIA 2007: 51). Preparing his work on Albanian Mutillidae Joachim OEHLKE apparently did not study the original museum material consisting of at least the two females from Elbasan and Durrës. If he had examined them, he would have been aware of the last pinned up label on them: „*erythrocephala*/ssp. *mutica* André/det. Hammer 51".

Algeria. – MORAWITZ (1865: 118) recorded "*M.*[*utilla*] *erythrocephala* LATR." nearby Constantine in Algeria following Lucas` published data. MORAWITZ did not pay attention to the work of SMITH (1855), where *erythrocephala* of LUCAS had received a new name – *ruficeps*. Therefore, his account in fact does not refer to the true *erythrocephala*. SICHEL & RADOSZKOWSKI (1869: 167) reported "*Mutilla erythrocephala* FABRICIUS" from Algeria. When reading the rather detailed description of this species, it becomes clear that it does not belong to the genus *Myrmilla* at all. The part of the material from the collection of Henri de Saussure that served as a basis for this report was re-examined (MHNG) and it belongs to *Cystomutilla ruficeps* (F. SMITH) which was mentioned for Algeria for the first time by SMITH (1855: 15). Therefore neither *M. caucasica* nor *M. erythrocephala* have actually been found in Algeria.

Armenia. – There are no reports in the literature indicating any specific locality in Armenia. This country is mentioned as a part of the range of *M. caucasica* in four references: LELEJ (1985: 100), ALIEV & LELEJ (1998: 44), LELEJ & al. (2003b: 305), and LELEJ & YILDIRIM (2009: 2). The latter three follow the range information given in LELEJ (1985), where Armenia is included because of *Mutilla etzchmiadzini* RADOSZKOWSKI, 1885, a taxon at that time assumed to be a synonym of *M. caucasica* (ANDRÉ 1899: 5).

Later *Myrmilla etzchmiadzini* (Radoszkowski, 1885) was considered a distinct species (Aliev & Lelej 1998: 44) but the authors most likely were not careful enough to remove Armenia from the general distribution described in the text (listed under *M. caucasica*), so the reports about this species from Armenia should be considered as uncertain at the least.

Austria. – Franz Kohl (1893: 42) reported "*Mutilla cornuta* Sichel & Radoszkowski" from Bisamberg near Vienna from a single female. I was not able to find the material that served as a basis for Kohl's report but recently Herbert Zettel (2009) stated that this material belongs to *M. mutica*. In agreement with the synonymy of *Mutilla cornuta* under *Mutilla erythrocephala* André (1901: 183) listed *M. erythrocephala* Latreille from Austria based on Kohl's report from 1893. André added Austria to the distribution of the male of *M. erythrocephala* as well (1901: 209) and was followed in later publications by Giacomo Mantero (1905: 58) and Fabio Invrea (1954: 144). Hammer (1930: 84) listed two males of *M. erythrocephala* Latreille from Hainburg and Mödling, respectively. His key aiming to separate the male of *M. erythrocephala* from that of *M. calva* is not detailed enough to distinguish *erythrocephala* from *caucasica* and/or *mutica*. I examined four males of *M. mutica* from the collection of Hammer in NHMW identified by him as *Myrmilla erythrocephala* (see list of material for males under *Myrmilla mutica*). Beside Hammer´s report *M. erythrocephala* has been listed for the Austrian fauna following the works of André and/or Hammer without an examination of the original material (Hoffer 1938: 182; Hammer 1950: 9; Invrea 1964: 63; Lelej 1985: 94; Matteini Palmerini 1992: 204; Lelej 2002: 33; Lelej & al. 2003a: 125; Lelej & Schmid-Egger 2005: 1506, 1524; Pagliano 2005: 294; Pagliano & Strumia 2007: 51). At present, I consider only *M. mutica* as inhabiting Austria, based on all original previous records and on unpublished material studied at NHMW, MMB, MNCN, and MS.

Azerbaijan. – Recently, *M. caucasica* has been listed as a ubiquitous velvet ant species throughout Azerbaijan in six references: Lelej (1985: 100), Aliev (1996: 341), Aliev & Lelej (1998: 44), Lelej (2002: 33), Lelej & al. (2003b: 306) and Lelej & Yildirim (2009: 2).

Bosnia & Herzegovina. – *M. erythrocephala* and *M. mutica* have been found along the Adriatic Sea coast and on the mainland of this country (see list of material). Sichel & Radoszkowski (1869: 169) firstly recorded "*Mutilla cornuta* Olivier" for Bosnia & Herzegovina, followed later by Nonveiller (1979: 104, 106) for "*Myrmilla erythrocephala* Latreille". Invrea (1954: 145) studied few specimens of "*Myrmilla erythrocephala* var. *mutica*" from Bar. Personally examined material from this area that is deposited in the MMB, NHMW, TMB, and ZMAN collections belongs to *M. erythrocephala* and *M. mutica*.

Bulgaria. – The first record for Bulgaria dealing with *M. caucasica* appeared in a publication by the high school teacher in Sofia Nikola Nedialkov (1914: 205). Under the name *Mutilla calva* de Villers he reported two females from Ikhtiman and Stara Zagora respectively, and noted that they are quite different from typical *M. calva* in having red heads. This material (deposited at NMNHS, examined) was found to belong to *M. caucasica*. The same material served as a basis for the report of *M. erythrocephala* made by Iwan Buresch (1924: 36). Nevertheless, the latter author did not indicate that

this material (apparently subsequently identified as *M. erythrocephala* by Bischoff) had already been published ten years earlier by NEDIALKOV (1914).

Another Bulgarian author, Neno ATANASSOV (1951: 290; 1962: 118; 1964: 152; 1972: 187) reported *M. erythrocephala* from several new localities in Bulgaria. I was able to examine all material that was the basis for the reports of ATANASSOV (eight females in NMNHS) and found out that all of them were misidentified. Thus, the male cited by ATANASSOV (1964) from the vicinity of Harmanli is a female of *Platymyrmilla quinquefasciata* (OLIVIER) while the remaining seven specimens are females of *M. caucasica*. In 1927 SKORIKOV (1927a) described *M. kiritschenkoi* and *M. jasonia* as new species with their ranges including Bulgaria. These two species were synonymized with *M. caucasica* by LELEJ (1985: 99).

In the collection of NMNHS there are two females of *M. caucasica* from Stara Planina Mountains (Botev Vruh peak and the vicinity of Troyan) labelled "*Myrmilla* ♀/*jasonia* Skor./Skorikov det." (? Skorikov`s handwriting on the first two rows). In addition, the female of *M. caucasica* from Ikhtiman treated by NEDIALKOV and BURESCH is labeled "*Myrmilla kiritschenkoi* Skor./♀//Skorikov det." (? Skorikov`s handwriting on the first two rows). One or more of the reports mentioned above caused the erroneous inclusion of *M. erythrocephala* as a member of Bulgarian fauna by INVREA (1954: 144), INVREA (1964: 63), MATTEINI PALMERINI (1992: 204), LELEJ (2002: 33), LELEJ & al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1524). The report of LELEJ & al. (2003b: 305) includes *M. caucasica* in the Bulgarian fauna without giving a specific locality. Recently, *M. caucasica* was recorded from an array of new localities in Bulgaria (LJUBOMIROV 2006: 85; GUÉORGUIEV & LJUBOMIROV 2009: 261). The record of PAGLIANO & STRUMIA (2007: 51) for *M. erythrocephala* from Bulgaria is doubtful. The present study of museum collections and literature analysis indicates that only *M. caucasica* is found to inhabit Bulgaria.

Croatia. – Riccardo GASPERINI (1887: 10) recorded "*Mutilla cornuta* OLIVIER" from Split and Hvar Island as a commonly occurring species, represented only by female specimens. I examined part of the material from these localities (NHMW) and found that it belongs to *M. erythrocephala*. Alexandro MOCSÁRY (1897: 74a) reported "*Mutilla erythrocephala*" from Rjeka, Bakar, Karlobag, and Senj. His records were cited later by BAJÁRI & MÓCZÁR (1954: 70). Except for the material from Rjeka, this material was studied by me (TMB), it belongs to *M. mutica*. Croatia was mentioned as a part of the type locality for the newly described at that time taxon *Mutilla* (*Myrmilla*) *erythrocephala* var. *mutica* (ANDRÉ 1903: 434), a taxon presently considered to be *Myrmilla mutica*. Vatroslav VOGRIN (1955: 14) reported *M. erythrocephala* and *M. cornuta* from Starigrad (a town near the Adriatic Sea coast east of Senj). Under the name "*Mutilla cornuta*" VOGRIN probably studied material from *M. erythrocephala* or *M. mutica* rather than *M. caucasica*, and his "*Mutilla erythrocephala*" is apparently *Cystomutilla ruficeps* following KOHL`s interpretation for the latter species identity. After VOGRIN`s report, only NONVEILLER & al. (1998: 17) have provided original data on *M. erythrocephala* from the Neretva river mouth (Opuzen).

Later general works follow one or more of the forementioned reports: ANDRÉ (1901: 183, 209); MANTERO (1905: 58); HAMMER (1950: 9); INVREA (1954: 144; 1964: 63), NONVEILLER (1979: 110-111), MATTEINI PALMERINI (1992: 204); LELEJ (2002: 33), LELEJ

& al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1524); PAGLIANO & STRUMIA (2007: 51). The present study of museum collections and literature analysis indicates that *M. erythrocephala*, *M. mutica* and by exception *M. caucasica* are found to inhabit Croatia.

Cyprus. – The earliest record of *Myrmilla* from Cyprus was published by SICHEL & RADOSZKOWSKI (1869: 170) for "*Mutilla cornuta*". Subsequent authors include without comments Cyprus in the section on the general distribution of *Myrmilla erythrocephala*, viz. ANDRÉ (1901: 183, 209), BERLAND (1925: 316), HOFFER (1938: 182), HAMMER (1950: 9), INVREA (1954: 144; 1964: 63), LELEJ (1985: 94), MATTEINI PALMERINI (1992: 204), LUKÁŠ (1997: 19), LELEJ (2002: 33), LELEJ & al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1524), PAGLIANO & STRUMIA (2007: 51). INVREA (1940: 119), however, provides original records for *Myrmilla* from Cyprus under the name *Myrmilla erythrocephala*. I was able to examine four females of *M. caucasica* collected in Cyprus: two from Larnaca, one from Limassol, and one from Nicosia (MNCN, NHMW, TMB) and I can conclude that only *M. caucasica* is an inhabitant of Cyprus.

Czech Republic. – Augustin HOFFER (1936a: 63; 1937: 62; 1838: 182) was the first to give original data on "*Myrmilla erythrocephala* LATREILLE" from the Czech Republic (from Pouzdřany). The report of HOFFER was followed without comments by INVREA (1964: 63), LELEJ (1985: 94), PÁDR (1989: 151a), MATTEINI PALMERINI (1992: 204), LELEJ (2002: 33), LELEJ & al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1506, 1524), PAGLIANO (2005: 294), and PAGLIANO & STRUMIA (2007: 51) without comments. Zdenek PÁDR (1995: 333) added a new record for "*Myrmilla erythrocephala* LATREILLE" from the Pálava Biosphere Reserve. Recent regional revision of *Myrmilla* material from the Czech Republic presented by Petr BOGUSCH demonstrated that only *M. mutica* has been found to inhabit that country and previous records of *M. erythrocephala* should be attributed to *M. mutica* (BOGUSCH 2006a: 124; 2006b: 2; 2007: 99). I studied original material of two females recently caught in the Pálava Biosphere Reserve (IBER, PB) and I consider the interpretation of BOGUSCH for *M. mutica* in the Czech Republic correct.

Egypt. – The first record from this country is that of *Mutilla erythrocephala* with its newly described variation, *mutica* by ANDRÉ (1903: 434). ANDRÉ's records (1903: 434; 1910: 37) were the basis for seven subsequent papers that indicate *M. erythrocephala* in Egypt: SKORIKOV (1927a: 43), INVREA (1964: 63), LELEJ (1985: 94), LELEJ (2002: 33), LELEJ & al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1524), PAGLIANO (2005: 294); PAGLIANO & STRUMIA (2007: 51). SKORIKOV`s comments (1927a) on the distribution of *M. erythrocephala* in Egypt are contradictory. In the table on page 43 he included it as a member of Egyptian fauna, but on page 45 he rejected the occurrence. ANDRÉ's rather detailed descriptions of male and female cover not only *M. erythrocephala* but also *M. caucasica* and at the same time exclude *M. mutica* and *M. corniculata*. However, ANDRÉ mentioned that based on a studied female, *M. mutica* also must occur in Egypt. I was not able to locate any specimens from Egypt in MNHN or NHMW where ANDRÉ's basic material for this record should have been deposited. Nevertheless, I consider reasonable the assumption that *M. erythrocephala* does not occur in Egypt mainly because the available material from nearby territories (e.g. Cyprus, Greece, Syria, Turkey) belongs only to *M. caucasica*. It is likely that ANDRÉ dealt with *M. caucasica* or with a new, yet undescribed species of *Myrmilla*. IUGA & SCOBIOLA (1962: 165), INVREA (1954: 144),

and MATTEINI PALMERINI (1992: 204) follow ANDRÉ's view (1910: 38) that *mutica* occurs in Egypt without going further into the matter.

France. – LATREILLE (1792: 8) described *M. erythrocephala* from Provence and was followed by OLIVIER (1811: 64b) with the species *Mutilla cornuta*. Curiously enough, LATREILLE (1805: 264) confused *M. erythrocephala*, which he had described earlier, with another, yet undescribed at that time taxon that he found to occur in central France. The majority of the early authors misinterpreted *M. erythrocephala* in the sense of LATREILLE and their accounts under that name for France should be attributed to several different taxa (see discussion in previous section). For instance OLIVIER (1811: 66a) based his description/identification of *M. erythrocephala* from central France on a heterogenic series of specimens highly variable in size. Details in the description in French of "*Mutilla erythrocephala*" and the origin of the material clearly point to *Cystomutilla ruficeps*, viz., "Les antennes sont noires, avec les deux premiers articles rouges. … L`abdomen est noire, avec le bord du premier, du second & du troisième aneau cilié de blanc [contradict with the diagnosis in Latin above, "abdomine fasciis tribus aureis"]. Les pattes sont noires, avec de la base des jambs & des cuisses d`un brun-fauve. … Elle se trouve au midi de la France, en Italie". Most likely Olivier followed LATREILLE (1805: 264) for the range of *M. erythrocephala* since FABRICIUS (1793, 1804) made no mention of the origin of *M. erythrocephala*. MORAWITZ (1865: 99, 118) who had no opportunity to study original material of LATREILLE`s *erythrocephala* listed it for Provence (following LATREILLE 1792) and Montpellier (following LEPELETIER DE SAINT-FARGEAU 1845). The later account of Montpellier was based on "*Mutilla excoriata*" of LEPELETIER DE SAINT-FARGEAU, which MORAWITZ considered to be a synonym of *erythrocephala* (as complementary male for the known female at that time). Since *Mutilla excoriata* is a junior synonym of *Sigilla dorsata* (FABRICIUS), it has nothing to do with *M. erythrocephala* and as a result the inclusion of MORAWITZ for Montpellier was false. Furthermore, in the same work (p. 119) MORAWITZ presented "*Mutilla cornuta*" of OLIVIER as a member of the French fauna but that would be correct only if it was not confused with *erythrocephala*.

In his Catalogue of European Hymenoptera KIRCHNER (1867: 210a) listed *Mutilla erythrocephala* for France. SICHEL & RADOSZKOWSKI (1869: 164) reported "*M.*[*utilla*] *corniculata* PALLAS" as occurring in southern France. Reading the diagnosis of this species on the same page, "cette espèce, très rapprochée de la *M. cornuta*, s`en distingue par … l`absence des tubercules de la tête …" it is clear that at first the authors did not confuse it with *erythrocephala*, whose female always has well developed supraantennal tubercles. However, the occurrence of *corniculata* in France has not been confirmed by any subsequent author with original faunistic data. "*M.*[*utilla*] *erythrocephala*" of SICHEL & RADOSZKOWSKI (1869: 167–168) undoubtedly is *Cystomutilla ruficeps* (F. SMITH) both for the male and the female sex, thus again the localities Montpellier and Moûtiers en Savoie cited under this name do not refer to *M. erythrocephala* LATREILLE. The diagnosis of "*M.*[*utilla*] *cornuta* OLIVIER" by SICHEL & RADOSZKOWSKI (1869: 169/ female, 170, 171/ male) reveals that the authors dealt with the true *erythrocephala* and their records for southern France (particularly from Montpellier) and Corsica Island under this name have to be attributed to the latter species. ANDRÉ (1898: 61, 81; 1901: 183, 209) included France as a part of the range of *M. erythrocephala* without presenting specific locality data. Lucien BERLAND (1922: 191; 1925: 316) listed *M. erythrocephala*

from numerous localities in southern coastal France and along the Rhone river valley. His view on the distribution "tout le littoral méditerranéen … et à quelque distance de la còte" almost completely corresponds to the current treatment of the distribution of *erythrocephala* in France with the exclusion of the westernmost areas of Mediterranean sea coast and the note that the penetration of the mainland always follows large river valleys. Original records are also provided by COULON (1925: 106) for Béziers and by MATTEINI PALMERINI (1992: 204) and PAGLIANO & STRUMIA (2007: 51) for Corsica Island. SIMON THOMAS & VEENENDAAL (1974: 2) indicate penetration of *erythrocephala* (males only) along the Garonne river valley to the south-west lowlands of France (Ares). The rest of the authors dealing with *M. erythrocephala* from France follow the data provided by André, Berland, and/or Simon Thomas & Veenendaal (MANTERO 1905: 58; SKORIKOV 1927a: 43, 45 (as *M. corniculata* and *M. erythrocephala*); HAMMER 1950: 9; INVREA 1954: 144; INVREA 1964: 63 (including Corsica Island); LELEJ 1985: 94; MATTEINI PALMERINI 1992: 204; LELEJ 2002: 33; LELEJ & al. 2003a: 125; LELEJ & SCHMID-EGGER 2005: 1524; PAGLIANO 2005: 294).

Georgia. – Earliest known record for *Myrmilla caucasica* from Georgia (Caucasus) is that of KOLENATI (1846: 122). The Caucasus Mountains cover a rather large area and are not confined to Georgia only. However, I assume that the material on which KOLENATI`s record is based was collected in Tbilisi or its surroundings (see lectotype designation for *Mutilla caucasica*), thus the Caucasus in regard to KOLENATI`s record of this species should be considered as reference to Georgia instead. MORAWITZ (1865: 119) considered (with doubt) *Mutilla caucasica* to be identical with *M. cornuta* and as result included the Caucasus in the range of *Mutilla cornuta* based on the data of KOLENATI (1846). The female of *M. cornuta* was later mentioned for Caucasus by SICHEL & RADOSZKOWSKI (1869: 170) and RADOSZKOWSKI (1879: 148). After synonymization of *M. cornuta* under *M. erythrocephala* in 1896 Caucasus has been included in the range of the latter species by the majority of the later authors e.g. by ANDRÉ (1899: 5, 1901: 183, 209; 1903: 434), MANTERO (1905: 58), ZAVATTARI (1910: 4), HOFFER (1938: 182), HAMMER (1950: 9), INVREA (1954: 144), IUGA & SCOBIOLA (1962: 165 – as *Myrmilla erythrocephala mutica*), INVREA (1964: 63), MATTEINI PALMERINI (1992: 204), PAGLIANO & STRUMIA (2007: 51). SKORIKOV (1927a: 43, 46) recorded *M. caucasica* from Caucasus under the name *M. corniculata*. LELEJ (1985: 100) included Georgia in the range of *M. caucasica* and he has generally been followed by ALIEV & LELEJ (1998: 44b), LELEJ (2002: 33), LELEJ & al. (2003b: 306), and LELEJ & YILDIRIM (2009: 2). Based on the material examined by me, and on the general identity interpretation of *M. erythrocephala* before 1985 I consider that only *M. caucasica* occurs in Georgia. All previous records attributed to *M. erythrocephala* from this country undoubtedly refer to *M. caucasica*.

Greece. – Apparently OLIVIER (1811: 64) in his description of *Mutilla cornuta* was the first to mention *Myrmilla caucasica* from Greece ("dans les îles de l`Archipel"). OLIVIER's *Mutilla cornuta* was catalogued for the first time by SMITH (1855: 9), surprisingly without any locality data. MORAWITZ (1865: 119) listed *M. cornuta* from "griechischen Inseln" and at the same time synonymized *Mutilla caucasica* KOLENATI under *M. cornuta*. SICHEL & RADOSZKOWSKI (1869: 164, 170) studied material from two species from Greece, *corniculata* and *cornuta*, as did ANDRÉ (1901: 183, 184, 209; 1903: 434) who recognized *corniculata* and *erythrocephala* as valid species. Following works include *erythrocephala* LATREILLE in the sense of ANDRÉ for the Greek fauna, for example MAN-

TERO (1905: 58) and BERLAND (1921: 531), who examined a single female (MNHN) that belonged to *M. caucasica*. Examination of a single female (NMNHS) by me indicates that the record of BURESCH (1924: 36) of *M. erythrocephala* from the Alexandroúpolis vicinity (Badoma) is based on misidentification of *Mutilla quinquemaculata*. BERLAND (1925: 316) in the section of general distribution of *M. erythrocephala* presented a new locality for this species – Rhodes. SKORIKOV (1927a: 43) gave no records of *M. erythrocephala* from Greece and at the same time listed *M. corniculata* and *M. corniculatina* as occurring there. His "*M. corniculata*" is most likely *M. caucasica* because this author stated in the key (SKORIKOV (1927a: 35) that it has well developed supraantennal tubercle as did LELEJ (1985: 95) too. I was able to find one *corniculata* female (ZMHU) labeled "*kiritschenkoi*/Skor." (possibly in Skorikov's handwriting) which leads to me to the opinion that SKORIKOV confused *caucasica* and *corniculata* and therefore it is not certain which species corresponds to his record for Greece.

BISCHOFF (1928: 89), INVREA (1941b: 39), and MATTEINI PALMERINI (1992: 204) gave additional new records for *M. erythrocephala* from Crete, Rhodes, and continental Greece, respectively. It is almost certain that these authors dealt with *M. caucasica* (or with small-sized *M. corniculata*). Since then the general interpretation for occurrence of *M. erythrocephala* in Greece has been followed by many authors (INVREA 1942: 113; HAMMER 1950: 9; INVREA 1954: 144; IUGA & SCOBIOLA 1962: 165 (as subspecies *mutica*); INVREA 1964: 63; LELEJ 1985: 94, 101; LELEJ 2002: 33, 35; LELEJ & al. 2003a: 125 (both for *M. erythrocephala* and *M. mutica*); LELEJ & SCHMID-EGGER 2005: 1524). More recent original records support the occurrence in Greece of *M. caucasica* (LJUBOMIROV 2006: 85), *M. corniculata* (GIACHINO & al. 2000: 101; LELEJ & al. 2003a: 124; LELEJ & al. 2003b: 306), and *M. erythrocephala* (GIACHINO & al. 2000: 101; PAGLIANO 2005: 294; PAGLIANO & STRUMIA 2007: 51). These records strongly indicate that the four species *M. caucasica*, *M. corniculata*, *M. erythrocephala* and *M. mutica* occur in Greece as mentioned by LELEJ & YILDIRIM (2009: 2, 9, 10). Assessment of the examined material from Greece in the present study supports the occurrence of the forementioned species except for *M. erythrocephala*.

Hungary. – The incompleteness and varying quality of the Mutillidae reports in the older literature, for instance between 1867 and 1918 during the existence of the Austro-Hungarian Empire, are the main difficulties in tracking the identity of the recorded material. BAJÁRI and MÓCZÁR (1954: 69–70) catalogued the mutillid fauna of Hungary and neighboring areas. Their "*Myrmilla erythrocephala* LATREILLE" was based on the previous works of MOCSÁRY (1897), CHYSER (1902), and ZILAHI KISS (1904). In addition, BAJÁRI & MÓCZÁR presented new records for "*Myrmilla erythrocephala* LATREILLE" based on the until that time unpublished museum material from Hungary. I was able to locate and to study all material on which these records were based (TMB) and found that they belong to *M. mutica*. The information presented by MOCSÁRY (1897) and summarized by BAJÁRI & MÓCZÁR (1954) became the reason Hungary was erroneously included in the general distribution of *erythrocephala* by SKORIKOV (1927a: 43), HOFFER (1938: 182), INVREA (1964: 63), LELEJ (1985: 94), LELEJ (2002: 33), LELEJ & al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1506, 1524), PAGLIANO (2005: 294) and PAGLIANO & STRUMIA (2007: 51). Indeed, all previous records of *M. erythrocephala* from Hungary should be attributed to *M. mutica*.

Iran. – RADOSZKOWSKI (1871: 198) recorded *Mutilla cornuta* from Gorgan. The material on which this report was based has not been located and examined by me but most likely it belongs to *Myrmilla caucasica*. Apart of *M. caucasica* it could also represent an undescribed at that time species, e.g. *Myrmilla etzchmiadzini* (RADOSZKOWSKI, 1885) or some of the *Myrmilla* species later described by SKORIKOV. According to SKORIKOV (1927a: 35, 46) "*Myrmilla ecornuta* GERSTAECKER" "*Myrmilla corniculata* GERSTAECKER", and "*Myrmilla corniculata* var. *bilobicornis* nov." have been found to inhabit "western Persia", "eastern Persia", and "northwestern Persia", respectively. SKORIKOV (1927a: 36, 43) also recorded "*Myrmilla jasonia*" (now junior synonym of *M. caucasica*) from "northern Persia". In general, data of SKORIKOV was followed by LELEJ (1985: 95, 99–101) who added original data for *M. caucasica* from Iran and upgraded the status of *bilobicornis* to a distinct species. The occurrence of *caucasica* and *corniculata* in Iran was also followed by authors discussing their general distribution (ALIEV & LELEJ 1998: 44b; LELEJ 2002: 33; LELEJ & al. 2003b: 306). In the present work, I consider that *M. caucasica* inhabits some of the Iranian territories but *M. erythrocephala* and *M. corniculata* do not.

Iraq. – Only Francis MORICE (1921: 818) recorded "*Mutilla* (*Myrmosa*) *erythrocephala* LATREILLE" from one locality in eastern Iraq (Khānaqīn). The taxon mentioned by MORICE was recalled by DERWISH (1965: 68). Nevertheless, this record strongly needs confirmation (at least because of the subgeneric indication). At the moment, I can conclude that none of the *Myrmilla* species mentioned in this work are found in Iraq.

Israel. – Older authors regarded *M. erythrocephala* as inhabiting the Palestine territories e.g. ANDRÉ (1901: 183, 209) and INVREA (1964: 63). Their data has been followed without questioning by recent authors (LELEJ 1985: 94; LELEJ 2002: 33; LELEJ & al. 2003a: 125; LELEJ & SCHMID-EGGER 2005: 1524; PAGLIANO 2005: 294; PAGLIANO & STRUMIA 2007: 51). The present investigation does not support the occurrence of *erythrocephala* in Israel at all. The erroneous treatment by LELEJ and his co-authors was caused by the fact that ANDRÉ and INVREA confused *erythrocephala* and *caucasica* in their publications.

Italy. – The first reference to *Myrmilla erythrocephala* from Italy, that of OLIVIER (1811: 66a), is obviously incorrect. OLIVIER added Italy to the range of *Mutilla erythrocephala* FABRICIUS based on at that time newly acquired material, which actually is *Cystomutilla ruficeps* and differs from the taxon described by FABRICIUS. OLIVIER described it to have apical hair bands on the three basal metasomal terga, white rather than golden (see discussion about the material published for France). GHILIANI (1842: 24a) was the first who actually mentioned the true *Myrmilla erythrocephala* for the Italian fauna under the name "*Mutilla cornuta* SPIN. (N. Sp.)" based on personally collected material from "P." (possibly Palermo). The material collected by Ghiliani has been in the hands of SPINOLA who labeled it as a new species, *Mutilla bicornis* but never described it (INVREA 1964: 63; CASOLARI & CASOLARI MORENO 1980: 91; PAGLIANO 2005: 295). Based on material from Apulia province, COSTA (1858: 8), soon described the male of *Myrmilla erythrocephala* as a different species, *Rudia megacephala*. COSTA`s record was cited by KIRCHNER (1867: 210a). Both males and females of *Myrmilla erythrocephala* are recognized to occur in Apulia under the names "[*Mutilla*] *cornuta*" and "[*Mutilla*] *corniculata*" (SICHEL 1861: 120) before the synonymization of *Rudia megacephala* under *Mutilla*

cornuta (SICHEL & RADOSZKOWSKI 1869). Furthermore, there are numerous confusing original records for *Mutilla bison*, *M. cornuta*, and *M. erythrocephala* in different places in Italy. According to the present interpretation of the identities of *Myrmilla erythrocephala* and *Cystomutilla ruficeps* they are as follows:

Myrmilla erythrocephala was recorded (under the names *Mutilla cornuta*, *Mutilla erythrocephala*, *Myrmilla erythrocephala*, *M. erythrocephala bison*, and *M. bison*) from:

1) Sicily by SICHEL (1861: 752) as *Mutilla cornuta* variation or new species – this record was cited by MORAWITZ (1865: 119) and by SICHEL & RADOSZKOWSKI (1869: 170) under the name *Mutilla cornuta* for both sexes;

2) Campagna, Emilia-Romagna, Liguria and Sardinia by COSTA (1887a: 127), and Sicily by COSTA (1887b: 243; 1888: 5) – these records were subsequently cited by many authors, e.g. by DE-STEFANI (1895: 224a; 1897: 80) for Sicily, by ANDRÉ (1901: 183) for Italy including Sardinia and Sicily, and by ZAVATTARI (1910: 4) for Sicily;

3) Liguria by KRIECHBAUMER (1896: 41) and by MANTERO (1899: 211);

4) Tuscany (Giglio Island) by MANTERO (1905: 59);

5) Emilia-Romagna and Lazio by GRANDI (1934: 121; 1936: 97);

6) Abruzzo, Apulia, Basilicata, Calabria, Campaina, Emilia-Romagna, Lazio, Liguria, Lombardy, Molise, Piedmont, Sardinia, Sardinia (La Maddalena Island), Sicily, Tuscany, and Veneto by INVREA (1941a: 189), INVREA (1964: 63), BORDONI (1980: 179), MONASTRA (1990: 207), MATTEINI PALMERINI (1992: 204), PAGLIANO (1997: 322a, b), LO CASCIO & al. (1997: 128), TURRISI 1999a: 123; 1999b: 331), LO CASCIO & ROMANO (2004: 230), PAGLIANO (2005: 294), PAGLIANO & STRUMIA (2007: 49), STRUMIA & al. (2007: 97, 101), STRUMIA & PAGLIANO (2007: 86).

Cystomutilla ruficeps was recorded (under the name *Mutilla erythrocephala*) from:

1) unspecified locality in Italy by SICHEL & RADOSZKOWSKI, (1869: 167);

2) three localities (Collepietra, Bolzzano and Trento) in Trentino-Alto Adige by KOHL (1880: 210);

3) Calabria, Piedmont, Sardinia, and Tuscany by COSTA (1887a: 133);

4) Friuli Venezia Giulia by BORRIES (1892: 247-248) and by GRAEFFE (1911: 62).

On the basis of the above-mentioned original records many authors include Italy or part of it in the range of *Mutilla*/*Myrmilla erythrocephala*: COBELLI (1903: 129, obviously follows KOHL (1880) thus the account should be referred to *C. ruficeps*); SKORIKOV (1927a: 43, the account should be referred to *M. erythrocephala*); HAMMER (1950: 9, follows ANDRÉ (1901) thus the account should be referred to *M. erythrocephala*); INVREA (1954: 144); PAGLIANO (1995: 4); GENERANI & al. (2001: 54, follow MANTERO (1905) thus the account should be referred to *M. erythrocephala*); LELEJ (2002: 33); LELEJ & al. (2003a: 125); LELEJ & SCHMID-EGGER (2005: 1506, 1524).

Lebanon. – Lebanon is mentioned five times in the general distribution of *M. erythrocephala* (LELEJ 2002: 33; LELEJ & al. 2003a: 125; LELEJ & SCHMID-EGGER 2005: 1524; PAGLIANO 2005: 294; PAGLIANO & STRUMIA 2007: 51). According to my investigation,

the occurrence of *erythrocephala* in Lebanon is not supported by the examined material from this country or from the neighboring areas.

Macedonia. – NONVEILLER (1979: 110) in summarizing the previous information over the records of Mutillidae from Yugoslavia stated that *M. erythrocephala* occurs in Macedonia. This conclusion, however, was not based on any previous work mentioned in his literature overview, thus this record appears to be incorrect. Since then LELEJ (2002: 33), LELEJ & al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1524), and PAGLIANO & STRUMIA (2007: 51) have listed *M. erythrocephala* from Macedonia following NONVEILLER`s data. The material from Macedonia examined by me included only *M. caucasica* (Dojran).

Monaco. – BERLAND (1925: 316) included Monaco in the range of *M. erythrocephala*. The same species was recorded from Estérel ten years later by BERNARD (1935: 54).

Montenegro. – INVREA`s (1954: 145) record of "*Myrmilla erythrocephala* var. *mutica*" from Bar is the first for this country. NONVEILLER (1979: 110) also recorded *M. mutica* from Montenegro (two females in TMB, examined). LELEJ & al. (2003a: 125) and LELEJ & SCHMID-EGGER (2005: 1524) followed INVREA (1954) in including Montenegro in the range of *M. erythrocephala*. I studied one female of *M. erythrocephala* from Kotor (TMB) and can conclude that both *M. erythrocephala* and *M. mutica* occur in the territory of Montenegro.

Portugal. – There are no records for *Myrmilla erythrocephala* from Portugal. LELEJ (2002: 33), LELEJ & al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1524), PAGLIANO (2005: 294), and PAGLIANO & STRUMIA (2007: 51) erroneously included Portugal in the range of *erythrocephala* based on INVREA`s previous account of this species from "Pen. Iberica" (INVREA 1964: 63).

Romania. – MOCSÁRY (1897: 74a) was the first author who recorded "*M.*[*utilla*] *erythrocephala*" from the territory of modern Romania. After examination of the female specimen from Turda (TMB) recorded by MOCSÁRY I can confirm that it belongs to *Myrmilla mutica*. Eight years after MOCSÁRY's record, VÁNGEL (1905: 166) gave "Tisza-Alpár" as a locality for "[*Mutilla*] *erythrocephala*" as did SZILÁDY (1914: 87) with two localities in the Alba Iulia province (Magyarbagó and Nagyenyed). New original data for *Myrmilla* species from Romania was given by COULON (1925: 106) who recorded *Myrmilla erythrocephala* from Dobrudzha and by BAJÁRI (1952: 104) who recorded two females of "*Mutilla erythrocephala* var. *bison*" from Saschîz. Actually, BAJÁRI did not mention the name of a settlement in her work from 1952 but the locality "Szászkézd" is mentioned two years later (BAJÁRI & MOCSÁR 1954: 70) under "*Mutilla erythrocephala* var. *bison*". The two females from "Szászkézd" were examined (TMB) and they belong to *M. caucasica*. IUGA & SCOBIOLA (1962: 9) mentioned the nominotypical subspecies of *Myrmilla erythrocephala* from three localities in Romania (one female from Valului Traian was examined (MGAB) and was found to be *M. caucasica*) and the subspecies *mutica* represented by three females from the vicinity of Sibiu (one female caught at fourth of August 1946 was examined (MGAB) and was found to be *M. mutica*). SCOBIOLA-PALADE (1967: 158) recorded *Myrmilla erythrocephala* from Dobrudzha and NAGY (1968: 68-69) presented *Myrmilla bison* and *M. mutica* with seven new localities in Romania. More recently SCOBIOLA-PALADE (1968: 380) reported "*Rudia erythroce-*

phala LATREILLE" with two males from the Andronache forest near Bucharest. I was able to examine one male labeled "Pra/Andronache/21.IX.1953//M./erythrocephala" (MGAB) and found it to be *caucasica*. Following the forementioned records Romania was included in the range of *Myrmilla mutica* by LELEJ (1985: 101; 2002: 35) and PAGLIANO & STRUMIA (2007: 52), and in the range of *Myrmilla erythrocephala* by PAGLIANO (2005: 294) and PAGLIANO & STRUMIA (2007: 51). According to material examined by me, *M. erythrocephala* does not occur in Romania, while *M. caucasica* and *M. mutica* do.

Russia. – ANDRÉ (1901: 183) was the first to regard *Mutilla* (*Myrmilla*) *erythrocephala* as a member of Russian fauna represented only by females and this has been accepted by later authors (MANTERO 1905: 58; HOFFER 1938: 182; INVREA 1954: 144; INVREA 1964: 63; PAGLIANO 2005: 294; PAGLIANO & STRUMIA 2007: 51). The identification of *Myrmilla caucasica* from Russia appeared for the first time under the name of *M. jasonia*, a newly described species by SKORIKOV (1927a: 36, 43) from the Caucasus without an exact locality. The same species was also recorded for Stavropol and the lower Volga river (SKORIKOV 1927b: 32; POPOV 1950: 231). LELEJ (1985: 99) indicated the exact origin of the material from which *M. jasonia* was described (Derbent, a settlement on the Caspian Sea coast in Russia), designated a lectotype, and synonymized it under *M. caucasica*. Another junior synonym of *M. caucasica*, *M. kiritschenkoi* has been found to occur in the southern parts of the Saratov and Orenburg provinces (SKORIKOV, 1927a: 42). More recent authors regard *M. caucasica* as occurring in the southern European territory of Russia (e. g. in the Astrakhan, Krasnodar and Volgograd surroundings and in Dagestan) (LELEJ, 1985: 100; ALIEV & LELEJ, 1998: 44b; LELEJ, 2002: 33; LELEJ & al. 2003b: 306; LELEJ & YILDIRIM 2009: 9).

Serbia. – NONVEILLER (1979: 110) erred in recording *Myrmilla erythrocephala* from Serbia. An examination of the literature overview in his work shows that *M. erythrocephala* had not been found anywhere in Serbia at that time. NONVEILLER`s incorrect record was followed by LELEJ (1985: 94), LELEJ (2002: 33), LELEJ & al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1524), PAGLIANO (2005: 294), and PAGLIANO & STRUMIA (2007: 51). INVREA (1954: 145) recorded "*Myrmilla erythrocephala* var. *mutica*" from the lower Sava river valley (Surcin). According to the material examined in the present work *M. erythrocephala* is not found to occur in Serbia, while *M. caucasica* has been recorded from Niš and Vranje.

Slovakia. – MOCSÁRY (1897: 74a) first recorded "*Mutilla erythrocephala*" from Slovakia (Nagyfalu, now Velična). The single female (TMB) that served as the basis for this record was examined and fully agrees with the current interpretation of *M. mutica*. Almost forty years later HOFFER (1936a: 63; 1938: 118) reported "*Myrmilla erythrocephala* LATREILLE" from seven localities in Slovakia. I have had the opportunity to examine one female (TMB) from Parkán (now Štúrovo) from his material and found that it belongs to *mutica*. In the check list of the families Methocidae, Myrmosidae, and Mutillidae of Hungary and neighboring countries BAJÁRI & MÓCZÁR (1954: 69-70) mentioned several localities in Slovakia following the data of MOCSÁRY (1897) and HOFFER (1938), as did PÁDR (1989: 151a). It appears that INVREA (1954: 144, 1964: 63) who recognized *mutica* as a form or subspecies of *erythrocephala* included Slovakia in the range of his *erythrocephala* sensu stricto following the data of HOFFER and BAJÁRI & MÓCZÁR. Later works (LELEJ 1985: 94; MATTEINI PALMERINI 1992: 204; LELEJ 2002: 33;

Lelej & al. 2003a: 125; Lelej & Schmid-Egger 2005: 1506, 1524; Pagliano 2005: 294; Pagliano & Strumia 2007: 51) follow Invrea's view on the range of *erythrocephala* thus it is not clear whether they consider the true *erythrocephala* or *mutica* to be present in Slovakia. Lukáš (1991: 86; 1997: 19) gave original records for *M. erythrocephala* for Slovakia but Bogusch (2006a: 124; 2006b: 2; 2007: 99) corrected it to *M. mutica* and attributed a number of localities in Slovakia to it, while clearly distinguishing it from *M. erythrocephala*. According to the examined material I consider only *M. mutica* to inhabit Slovakia.

Slovenia. – There are no records of *caucasica, corniculata, erythrocephala*, and *mutica* from this country. Slovenia is mentioned only by Lukáš (1997: 19) in the range occupied by *M. erythrocephala*. Range data for the four above mentioned species from the present study suggest finding *M. erythrocephala* and *M. mutica* there.

Spain. – Pedro Antiga y Sunyer (1888: 8) is apparently the first to record *Myrmilla erythrocephala* from Spain in his catalogue of Hymenoptera of Cataluña. He did not indicate specific locality after the name of this species, nor sex assignment. Antiga y Sunyer´s record was cited almost ten years later by Cuní y Martorell (1897: 331). Surprisingly, in a catalogue on the same group of insects from the same area (Antiga y Sunyer & Bofill y Pichot 1904) there was no mentioning of *M. erythrocephala*. According to the interpretation of Morawitz (1865), the record of Antiga y Sunyer for *M. erythrocephala* probably dealt with the male of *Sigilla dorsata* (Fabricius) and/or with the female of *Cystomutilla ruficeps* (F. Smith). Part of the type material of *Mutilla bicornis* Spinola (=*Myrmilla erythrocephala*) is based on two females from Spain, leg. Rambur (Casolari & Casolari Moreno 1980: 91; Pagliano 2005: 295) and probably has erroneous locality information. Most likely the record of Antiga y Sunyer (1888) served as the basis for André's (1901: 183, 209) inclusion of Spain in the range of *M. erythrocephala*. Another uncertain consideration of *Myrmilla erythrocephala* as a member of Spanish fauna is that of Giner Marí (1944: 53) without a specified locality. André's (1901) data for *M. erythrocephala* from Spain was followed for granted by Mantero (1905: 58), Hammer (1950: 9), Invrea (1954: 144; 1964: 63), Cebalos (1959: 223), Lelej (1985: 94), Lelej (2002: 33), Lelej & al. (2003a: 125), Lelej & Schmid-Egger (2005: 1524), Pagliano (2005: 294), and Pagliano & Strumia (2007: 51) but the occurrence of this species needs confirmation. At present, I consider that the distribution of *M. erythrocephala* does not include Spain.

Switzerland. – The only records for Switzerland are by Kohl (1883: 683) for "*Mutilla erythrocephala* Fabricius" from Peney and Geneva. The four specimens mentioned by Kohl are deposited at MHNG (the collections of Henri Tournier and Henri de Saussure, material examined). They belong to *Cystomutilla ruficeps* (F. Smith). Thus, neither *Myrmilla erythrocephala* nor *M. caucasica* have been recorded from Switzerland.

Syria. – Until this study neither *M. caucasica* nor *M. erythrocephala* have been recorded from Syria. Based on the studied material, *M. caucasica* and *M. corniculata* occur in this country.

Tunisia. – Eduard Graeffe (1906: 457), in listing the heterogynid and vespid fauna of Tunisia included "*M.*[*utilla*] *erythrocephala* Latr." with synonym "*spinolae* Lep." made no mention that the latter species had been previously proposed as a variety of "*Myr-*

milla dorsata FABRICIUS" (now *Sigilla dorsata*) by ANDRÉ (1901: 197). Most likely Graeffe or the person dealing with the identification of its material (Kohl or Mocsáry) thought that "*Mutilla Spinolae* LEPELETIER DE SAINT-FARGEAU" is a synonym of "*Mutilla erythrocephala* LATREILLE" as has been demonstrated by MORAWITZ (1865: 118) at that time. One *M. erythrocephala* female specimen (MNHN) was examined by me. It is rather small in size and was deposited in the collection of Julie De Gaulle, which was acquired by MNHN in 1919. Later BERLAND (1925: 316) included Tunisia in the general distribution of *M. erythrocephala* and most likely he examined the female from the collection of De Gaulle. Subsequent literature records for Tunisia follow the data presented by GRAEFFE and/or BERLAND: INVREA (1964: 63), LELEJ (1985: 94), LELEJ (2002: 33), LELEJ & al. (2003a: 125), LELEJ & SCHMID-EGGER (2005: 1524), PAGLIANO (2005: 294), PAGLIANO & STRUMIA (2007: 51).

Turkey. – The earliest known record for *Myrmilla erythrocephala* from Turkey appeared in the work of ANDRÉ (1910: 37). The description of ANDRÉ for *M. erythrocephala* does not include any information about the form of the apex of the inner side of the hind coxa in the female and *M. cornuta* OLIVIER is presented as a synonym of *M. erythrocephala* on the previous page; thus the description includes *M. caucasica* as well. Furthermore, the description of the male "cellule radiale large et arrondie ou faiblement tronquée au sommet" corresponds to *M. caucasica* as well as *M. mutica* (the latter species has external end of the marginal cell truncated). FAHRINGER (1922: 171) recorded "*Mutilla cornuta*" for Toros Mountains and a short time later BURESCH (1924: 36) recorded *M. erythrocephala* from the Tekirdağ surroundings. I examined the single female that served as basis for the latter record (NMNHS) and found it to be *M. caucasica*.

Subsequent reports (SKORIKOV 1927a: 43; INVREA 1964: 63; NONVEILLER 1979: 111) followed the data of ANDRÉ or added new data under the name *M. erythrocephala* (e.g. BYTINSKI-SALZ (1956: 228) for material from Afyonkarahisar) until LELEJ (1985: 94, 100) excluded Turkey from the range of *erythrocephala* and at the same time added it to the range of *M. caucasica* based on exploration of original material. The latter point of view was followed by ALIEV & LELEJ (1998: 44b), LELEJ (2002: 33), and LELEJ & al. (2003b: 306) in contrast with several authors who continue to support the view of ANDRÉ that *M. erythrocephala* occurs in Turkey (MATTEINI PALMERINI 1992: 204; ÖZBEK & al. 1999: 22 (male only); PAGLIANO 2005: 294; PAGLIANO & STRUMIA (2007: 51)). Additional new records of *M. caucasica* in Turkey appeared in the works of ÖZBEK & al. (1999: 22), LJUBOMIROV (2006: 85), and YILDIRIM (2006: 279). Recently LELEJ & YILDIRIM (2009: 2, 9, 25) excluded *M. erythrocephala* from the Turkish mutillid fauna and included two of its close relatives, *M. caucasica* and *M. corniculata* as inhabiting the country. I cannot support the occurrence of *M. erythrocephala* in Turkey for the same reasons that applied to the previous literature reports from Egypt and Israel. The material originating from Turkey that was available to me belongs to *M. caucasica* and *M. corniculata*. One small-sized female specimen in NHMW (collecting locality Akbés) determined by Hammer as *Myrmilla erythrocephala* is rather close to *M. mutica* from Europe but probably is a teratological variation.

Ukraine. – MORAWITZ (1865: 119) and later SICHEL & RADOSZKOWSKI (1869: 170) were the first to record *M. cornuta* female from Crimea. ANDRÉ (1901: 183) included Crimea

in the range of *M. erythrocephala* following their data (*M. erythrocephala* was introduced as the valid name of the taxon at that time). Without any comments ANDRÉ (1901: 209) also included Crimea as a place where the male of *M. erythrocephala* has been found to occur and was followed by the few subsequent authors who included Ukraine in the general distribution of *M. erythrocephala* (MANTERO 1905: 58; HOFFER 1938: 182; HAMMER 1950: 9; INVREA 1954: 144). SKORIKOV (1927a: 36, 42) recognized a new species of *Myrmilla*, *M. kiritschenkoi* from south-western Ukraine, the districts of Poltava and Kharkov and (as has been indicated later by POPOV (1950: 231) and LELEJ (1985: 99) from Crimea. LELEJ (1985: 99, 100) designated the lectotype of *Myrmilla kiritschenkoi* from Belbek station of Sevastopol railways in Crimea and synonymized it under *M. caucasica*, separated *caucasica* from *M. erythrocephala*, added a new locality for it nearby Kiev and found it to inhabit a great part of the Ukraine territory from Crimea to Kiev. Later, *M. caucasica* was mentioned as a member of the Ukrainian fauna by ALIEV & LELEJ (1998: 44b), LELEJ (2002), and LELEJ & al. (2003b: 306). Besides *M. caucasica*, *M. corniculata* was mentioned three times in the older literature from Ukraine (GERSTAECKER, 1862: 423; MORAWITZ, 1865: 120; SICHEL & RADOSZKOWSKI, 1869: 164). Indeed, this species was misidentified by all of them being actually *M. caucasica*. On account of examined material and reference records, I consider only *M. caucasica* and *M. mutica* to occur in Ukraine.

The status of *Mutilla bison* A. COSTA, 1887

Mutilla bison was described by COSTA (1887b: 243) from an unspecified number of females based on material from Agrigento in Sicily. Few months later, the same author published a more expanded description (COSTA 1888: 5). *Mutilla bison* soon was confirmed as a member of the mutillid fauna of Sicily (DE-STEFANI 1895: 224a). Two years later, the same author (DE STEFANI 1897: 80, 83–84) on the basis of a larger number of specimens reassessed its species status and found it to be only a variation of "*M.*[*utilla*] *erythrocephala* LATREILLE". Indeed, DE STEFANI (1897) acted in two different ways concerning the status of *M. bison*: initially, on page 80 he gave status of *bison* as forma thus created a valid subspecific name (ICZN, Article 45.6.4); then, on pages 83-84 in a more detailed discussion he found *M. bison* to be identical with *M. erythrocephala*. In addition, the same author assumed that the material that served as basis for the description of *M. bison* included more than one specimen (DE STEFANI 1897: 83), an opinion which is difficult to accept.

I examined one female in Costa's collection labeled "Girgenti/M.˚ Zool. N. 37981/ *M.bison*/*Myrmilla*/*erythrocephala*/v. *bison* Costa" in MZN (headless, as noted by ZAVATTARI 1910: 4) but was able to find nothing concerning *Mutilla bison* in Costa's archived data under carton number 37981. It is very likely that the description of *M. bison* was based on a single specimen. Compared with an earlier described species in the same paper, *Harpactes transiens*, it can be seen that its general body length ranges from 7 to 8 mm, whereas in the description of *M. bison* the body length is given as exactly 8 mm, indicating that only one specimen may have been measured. The female of *M. erythrocephala* was found for the first time from Sicily by Spinola who noted it as undescribed species at that time, "*Mutilla bicornis*" but never published anything on it. Based

on GHILIANI`s record (1842) *M. cornuta* has been recorded with uncertainty for Sicily by SICHEL (1861: 752), MORAWITZ (1865: 119) and DE STEFANI (1897: 85). These old records share in common the view that the taxon corresponding to *M. cornuta* from Sicily is quite distinct in several morphological features and these authors felt uncomfortable in considering it identical to *M. cornuta* from mainland Europe.

The majority of the entomologists working on Mutillidae taxonomy regard *Mutilla bison* A. COSTA, 1887 as a subspecies or "forma" of *erythrocephala* (INVREA, 1964: 63; BORDONI, 1980: 179; MONASTRA, 1990: 207; PAGLIANO, 1995: 4) or as a distinct species (KRIECHBAUMER 1896: 45; MATTEINI PALMERINI 1992: 204–205; TURRISI 1999a: 123–124, 1999b: 332–333; PAGLIANO & STRUMIA 2007: 49) from Sicily where it vicariates for *M. erythrocephala*. However, the view of DE STEFANI (1897) on the status of *M. bison* has had recent support as well (LELEJ 2002: 34; LELEJ & SCHMID-EGGER 2005: 1524). Of the six characters used by COSTA (1888: 5), KRIECHBAUMER (1896: 45), ANDRÉ (1901: 184), INVREA (1964: 63), and TURRISI (1999a: 124) to distinguish the females of *bison* and *erythrocephala*, none stands up to scrutiny when larger series of specimens are examined. According to these authors the diagnostic characters of *M. bison* include: preapical part of the inner mandibular edge without outlined tooth (having small, clear-cut tooth in *erythrocephala*: TURRISI 1999a); supraantennal tubercles strongly developed and acuminate (being obtuse and smaller in *erythrocephala*: KRIECHBAUMER 1896; ANDRÉ 1901; INVREA 1964; TURRISI 1999a); dorsally and frontally black head, with the exception of a more or less expanded rusty spot on front and vertex (being red or dark red all over in *erythrocephala*: COSTA 1888; ANDRÉ 1901; INVREA 1964); process at the apex of inner side of hindcoxae prolonged into small obtuse tooth (being significantly prolonged into prominent, pointed tooth in *erythrocephala*: KRIECHBAUMER 1896; TURRISI 1999a); lateral process of first metasomal tergum in form of more or less flat, square-shaped lamella which is emarginated outside (being generally simply pointed in *erythrocephala* (COSTA 1888; ANDRÉ 1901; INVREA 1964); the median process of first metasomal sternum strongly obliterate or absent (being always prominent and conical in shape in *erythrocephala* (COSTA 1888; ANDRÉ 1901; TURRISI 1999a). Some of the forementioned authors conflict in their interpretation of these diagnostic characters.

For instance, COSTA (1888) and KRIECHBAUMER (1896) indicated that strongly developed supraantennal tubercles are characteristic for *M. bison* but did not find them pointed at all, as did TURRISI (1999a). Furthermore, both COSTA (1888) and KRIECHBAUMER (1896) found no process of first metasomal sternum contrary to INVREA (1964: 54) who did not exclude its presence in *M. bison*. I cannot support the distinct species identity of *M. bison* based on the differences in the six forementioned characters, having encountered them as individual or teratological variations. For instance, in the six females from Sambiase that I examined (where *M. erythrocephala* should be present), the median process of the first metasomal sternum is markedly reduced, as it is claimed to be in *M. bison*. Characters used to distinguish the males of *M. bison* from *M. erythrocephala* (either as a distinctive species or as a subspecies of *erythrocephala*) are as follows: coloration of head predominantly black with small semilunar spot on vertex (predominantly red with small black spot surrounding ocellar area in *erythrocephala*: MONASTRA 1990: 209), coloration of propodeum red (black in lower half of its declivity in *erythrocephala*: MONASTRA 1990: 209), median process of first metasomal sternum in

form of simple carina, not standing out as a distinctive tooth (the process in shape of expanded carina developed the middle into tooth-like tubercle in *erythrocephala*: MONASTRA 1990: 209), middle portion of clypeal disc shiny (its surface more or less longitudinally striate and superficially transversally striate over the area adjacent to the free margin in *erythrocephala*: PAGLIANO & STRUMIA 2007: 49), without setae on the inner edge of volsella (evident setae on the inner volsellar margin in *erythrocephala*: PAGLIANO & STRUMIA 2007: 49). According to the present study, all but the last one of these characters show too much variation to serve as useful diagnostic indicators.

Vicariant distribution of *M. mutica* as a distinctive species to that of *M. erythrocephala* is difficult to accept in view of the geological history of the areas that they inhabit. Since the Late Oligocene, Sicily has experienced only a relatively short isolation from the mainland, insufficient for speciation. Possible population divergence and incipient speciation for the ancestor of the two taxa in earlier times (Early Eocene, when the masses of present-days Sicily and southern Italy collided and separated from the mainland) was further interrupted by panmixis within the entire population. Current findings of *M. bison* from southern Italy outside Sicily and registration of *M. erythrocephala* from Tunisia (PAGLIANO & STRUMIA 2007: 49, 51) are further obstacles to treating *bison* as a distinctive species. There is only one record of *M. bison* from mainland Europe outside Italy. BAJÁRI `s (1952: 104) record from Saschîz in Romania (the name of the locality was actually published two years later in BAJARI & MÓCZÁR (1954: 70) as Szászkézd) is based on misidentification. I have examined two females from TMB and I consider them to belong to *M. caucasica*. NAGY (1968: 68) erroneously quoted SZILÁDY (1914) in referring to *M. bison* from Romania. The latter author has no mentioning of *M. bison* in his work.

Conclusion

The **range of *Myrmilla erythrocephala*** should be recognized as much more restricted than previously considered. The western range boundary is represented approximately by a line through the valley of the low Rhone, with the Andorra mountain chain playing the role of a barrier that prevented further expansion. Thus, *M. erythrocephala* is excluded from the fauna of Portugal and Spain. The northern limit of the range is closely confined to the northern Mediterranean coast but in some places *M. erythrocephala* penetrates along the river valleys to relatively high altitudes. This type of spreading is one reason why this species is one of the most frequently encountered *Myrmilla* in the Apennine peninsula. Eastward, *erythrocephala* reaches to isolated locations in Balkan Peninsula (e.g. Gabela along the Neretva river valley). Its expansion in north-east direction on the mainland of Europe is minute and this species is considered not to inhabit Switzerland, Austria, Hungary, Czech Republic, Slovakia, Romania, Albania, and Bulgaria. The southern boundary appears to include the localities on the Corsica and Sicily islands and Tunisia, but this species is absent on the Maltese Islands (SCHEMBRI 1983). This absence could be explained by insufficient exploration or because this species never conquest these islands. The probability for finding *erythrocephala* on the islands of the eastern Mediterranean Sea is negligible, because the species is not present on the eastern Mediterranean mainland and because of the significant differences between Sicily and

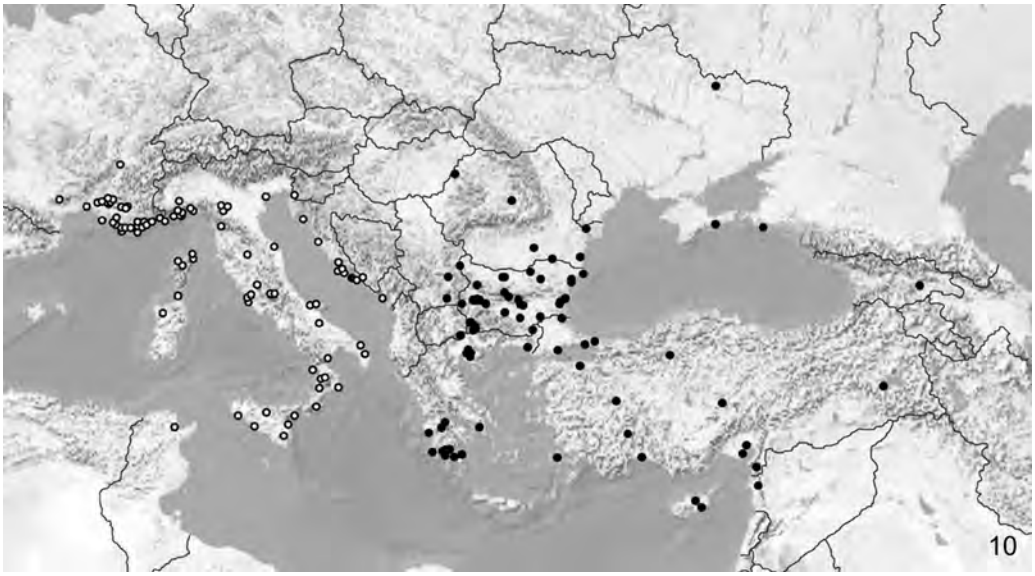


Fig. 10: Collecting localities of *Myrmilla caucasica* and *Myrmilla erythrocephala* based on examined material (○ – *M. erythrocephala*; ● – *M. caucasica*).

the island groups in the eastern Mediterranean Sea in both geological aspect and recent placement. This interpretation would explain the lack of expansion of *erythrocephala* into North Africa with the exception of a route through the Maltese Islands to Tunisia. On this basis *M. erythrocephala* is assumed to be no member of the faunas of Algeria, Egypt, Cyprus, and Lebanon, and to have not reached southwest Asia.

M. caucasica, in contrast to *erythrocephala* has a wider range, inhabiting the extreme southeast of the mainland in Croatia (Peleshtats peninsula), western and southern Romania, southeastern Macedonia, almost all lowlands and low mountain areas in Bulgaria, continental Greece, Ukraine, Turkey, Caucasus, Cyprus, eastern Black Sea coast and Syria.

It seems that *caucasica* and *erythrocephala* are allopatric. Their ranges are remarkably distinct, and are broadly separated in the mainland by the western part of the Balkan Peninsula. The island invasion by *caucasica* is presently established only for Cyprus and Kos. This expansion probably started from the mainland of southwestern Asia (figure 10). Generally, the idea that *erythrocephala* has its vicariant *caucasica* in Eastern Europe was launched by SKORIKOV (1927: 45), but has been rejected by LELEJ (1985, 2002).

M. corniculata is confined to the eastern half of the northern Mediterranean area, reaching westwards to Greece. Recently, LELEJ & al. (2003) described with certainty the range of this species as including Greece, Syria, Israel, Turkey, and Iran. Some of the material of *M. corniculata* that I have examined was previously identified as *erythrocephala* (LATREILLE) by Bischoff and Hammer (material from Greece), and as *caucasica* (KOLENATI) by Børge Petersen (material from Turkey). It appears that these two authors never published their results.

Discrepancies can be also observed in the descriptions of the ranges of *corniculata*, *mutica*, and *rostriformis*. It must be noted that the ranges of *caucasica* and *corniculata* overlap in Peloponnesus and the neighboring regions. The range of *M. mutica* is well separated from that of *caucasica* but overlaps in some places with those of *erythrocephala* and *corniculata* e.g. in Croatia and on Crete. On Crete *mutica* occurs at higher altitudes or in areas more distant from the river valleys. For example examination of the material from Crete showed that *mutica* inhabits the mountain regions (see list of material), whereas in areas with lower altitude one can find *corniculata* and another, probably undescribed species (not included in the list of material). The great longitudinal separation of the *M. rostriformis* range strongly supports its status of a distinct species.

Based on the absence of reliable morphological differences and on historical biogeography, *M. bison* is considered to represent only a population of *M. erythrocephala* on the periphery of its distribution area. It is therefore confirmed as a junior synonym of *M. erythrocephala*.

List of material

***Cystomutilla ruficeps* (F. Smith):** BULGARIA: 1 ♀, Shiptchenska Planina Mtn., N Enina village, 600m, 1, IX – 1, X, 2000, leg. M. Langourov (IBER). ITALY: 1 ♀, Calabria, Ciró, leg. A. Costa (MZN). SWITZERLAND: 1 ♀, Vaud, Peney, 15, VI, 1877, coll. H. Tournier (MHNG); 1 ♀, Vaud, Peney, 20, VII, 1890, coll. H. Tournier (MHNG); 1 ♀, Genève, coll. H. de Saussure (MHNG). UNKNOWN LOCALITY: 1 ♀, (MHNG).

***Myrmilla bilobicornis* Skorikov:** ISRAEL: 1 ♀, Jerusalem, 31, VII, 1939, leg. H. Bytinski-Salz (RMNH); 1 ♀, Jerusalem, 17, VII, 1940, leg. H. Bytinski-Salz (RMNH); 1 ♀, Jerusalem, 12 – 14, V, 1951, leg. P. Verhoeff (RMNH).

***Myrmilla caucasica* (Kolenati)** ARMENIA: 1♀, Armenia, coll. A. Schenck (MZN); BULGARIA: 1♂, Trevnenska Planina Mtn., Maglizh, 7 - 31, VII, 1995, leg. I. Stoyanov (IBER); 1♂, Pirin Mtn., Melnik, 450 m, 12, VI – 14, VII, 1998, leg. C. v. Achterberg, R. de Vries, P. Atanassova (RMNH); 1 ♂, Black Sea coast, S Nessebar, 20 m, 1 – 31, VIII, 1998, leg. C. v. Achterberg, R. de Vries, P. Atanassova (JS); 5 ♂♂, Black Sea coast, S Nessebar, 20 m, 1 – 31, VIII, 1998, leg. C. v. Achterberg, R. de Vries, P. Atanassova (RMNH); 2 ♂♂, Pirin Mtn., Melnik, 450 m, 15, VIII – 24, IX, 1998, leg. C. v. Achterberg, R. de Vries, P. Atanassova (JS); 2 ♂♂, Razgradski Vissotchini heights, Trubatch village, 8 - 22, VIII, 1999, leg. K. Ivanov (IBER); 1 ♂, Razgradski Vissotchini heights, Trubatch village, 8 - 22, VIII, 1999, leg. K. Ivanov (NMNHS); 1 ♂, Maleshevska Planina Mtn., SW Gorna Breznitsa village, 530 m, 31, VII, 2002, leg. T. Ljubomirov (IBER); 1 ♂, Maritsa valley, Plovdiv, 8 - 22, VIII, 2002, leg. S. Petrov (IBER); 1 ♂, Tcherni Lom valley, Tabatchka village, 110 m, 27, VII, - 10, VIII, 2004, leg. T. Ivanova (IBER); 3 ♂♂, Tcherni Lom valley, Tabatchka village, 110 m, 15, VIII, - 6, IX, 2004, leg. T. Ivanova (IBER); 1 ♂, Tcherni Lom valley, Tabatchka village, 110 m, 24, IX, - 20, X, 2004, leg. T. Ivanova (IBER); 1 ♀, Stara Zagora, VII, 1905, coll. N. Nedialkov (NMNHS); 1 ♀, Ikhtiman, VI, 1907, coll. N. Nedialkov (NMNHS); 1 ♀, Troyanska Planina Mtn., surroundings of Troyan, 1000 m, VII, 1908, coll. I. Buresch (NMNHS); 1 ♀, Kaloferska Planina Mtn., Botev Vruh peak, 26, V, 1924 (NMNHS); 1 ♀, Black Sea coast, VI, 1935 (ZMUH); 2 ♀♀, Black Sea coast, Varna, 7, VII, 1937, leg. P. Drensky (NMNHS); 1 ♀, Black Sea coast, Nessebur, 1 - 10, IX, 1941, leg. B. Pittioni (NHMW); 2 ♀♀, Isskar valley, Novi Isskar, 12, VI, 1951, leg. S. Botschrov (NMNHS); 1 ♀, Isskar valley, Gara Lakatnik railway station, 11, V, 1952, leg. I. Buresch (NMNHS); 1 ♀, Black Sea coast, S Bourgass, 8, VI, 1954, leg. N. Atanassov (NMNHS); 1 ♀, Stara Zagora, 4, V, 1961, leg. N. Atanassov (NMNHS); 1 ♀, Strouma valley, Kozhuh hills, 30, V, 1961, leg. N. Atanassov (NMNHS); 2 ♀♀, Strandzha Mtn., Malko Turnovo, 16, VI, 1963, leg. N. Atanassov (NMNHS); 4 ♀♀, Black Sea coast, Zlatni Pyassatsi, 24, V - 5, VI, 1964, leg. R. Löberbauer (OÖLM); 1 ♀, Stara Planina Mts., Rakovishki Manastir monastery, 5, V, 1965, leg. N. Atanassov (NMNHS); 1 ♀, Black Sea coast, Shabla cape, 1, VIII, 1966, leg. P. Beron (IBER); 1 ♀, Pirin Mtn., NW Lilyanovo village, 250 - 500 m, 11 - 14, VII, 1971, leg. P. Lauterer (MMB); 2 ♀♀, Ograzhden Mtn., Sestrino village, 650 m, 19, V, 1987, leg. J. Ganev (MCZR); 1 ♀, Strouma valley, Roupite village, 10, V, 1988, leg. M. Josifov (IBER); 1 ♀, Black Sea coast, Saint Constantine & Helena, 15, VII, 1993, leg. I. Stoyanov (IBER); 1 ♀, Danube valley, Sreburna reserve, 21, V, 1994, leg. I. Stoyanov (IBER); 1 ♀, Black Sea coast, Atanassovsko Ezero lake, 16, VIII, 1994, leg. I. Stoyanov (IBER); 1 ♀, Toundzha valley, Usstrem village, 80 m, 23, V, 1995, leg. I. Stoyanov (IBER); 2 ♀♀, Isskar valley, S Pantcharevo village, 11, VI, 1995,

leg. T. Ljubomirov (IBER); 1 ♀, Lozenska Planina Mtn., NW Passarell village, 820 m, 15, VI, 1995, leg. T. Ljubomirov (IBER); 1 ♀, Isskar valley, S Pantcharevo village, 20, VI, 1995, leg. T. Ljubomirov (IBER); 1 ♀, Trevnenska Planina Mtn., Muglizh, 380 m, 1 - 15, VII, 1995, leg. I. Stoyanov (IBER); 1 ♀, Arda valley, Madzharovo, 6, V, 1996, leg. E. Manassieva (IBER); 1 ♀, SW Pleven, 180 m, 1, VI, 1996, leg. T. Ljubomirov (IBER); 3 ♀♀, Plevenski Vissotchini heights, SE Grivitsa village, 180 m, 13, VI, 1996, leg. T. Ljubomirov (IBER); 1 ♀, Plevenski Vissotchini heights, SE Grivitsa village, 180 m, 28, VI, 1996, leg. T. Ljubomirov (IBER); 2 ♀♀, SW Pleven, 180 m, 5, VII, 1996, leg. T. Ljubomirov (IBER); 1 ♀, SW Pleven, 180 m, 11, VII, 1996, leg. T. Ljubomirov (IBER); 1 ♀, Plevenski Vissotchini heights, SE Grivitsa village, 180 m, 8, VIII, 1996, leg. T. Ljubomirov (IBER); 1 ♀, Lozenska Planina Mtn., NW Passarell village, 820 m, 21, VI, 1997, leg. T. Ljubomirov (IBER); 1 ♀, Lozenska Planina Mtn., NW Passarell village, 820 m, 21, VI, 1997, leg. T. Ljubomirov (NMNHS); 1 ♀, Ivaylovgrad, Ludzha suburb, 26, IX, 1997, leg. E. Manassieva (IBER); 1 ♀, Bulgaria, 1997, leg. E. Manassieva (IBER); 2 ♀♀, Vitosha Mtn., Matnitsa riverside, 1060 m, 28, VI, 1998, leg. T. Ljubomirov (IBER); 1 ♀, Vitosha Mtn., Shevovitsa, 1200 m, 12, IX, 1999, leg. T. Ljubomirov (IBER); 1 ♀, Vitosha Mtn., Zheleznishka Reka riverside, 1200 m, 10, VI, 2000, leg. T. Ljubomirov (IBER); 1 ♀, Vitosha Mtn., Zagortchev Doll, 1430 m, 8, VIII, 2000, leg. T. Ljubomirov (IBER); 1 ♀, Vitosha Mtn., Zagortchev Doll, 1470 m, 28, VIII, 2000, leg. T. Ljubomirov (IBER); 2 ♀♀, Ikhtimanska Kotlovina basin, NE Zhivkovo village, 590 m, 15, VI,-13, VII, 2001, leg. P. Kalushkov (IBER); 1 ♀, Razgradski Vissotchini heights, Trubatch village, 2, V, 2002, leg. K. Ivanov (NMNHS); 1 ♀, Zemenski Prolom gorge, S Polska Skakavitsa village, 730 m, 19, V, 2002, leg. T. Ljubomirov (IBER); 2 ♀♀, Maleshevska Planina Mtn., SW Gorna Breznitsa village, 630 m, 14, VI, 2002, leg. T. Ljubomirov (IBER); 2 ♀♀, Maleshevska Planina Mtn., SW Gorna Breznitsa village, 810 m, 14, VI, 2002, leg. T. Ljubomirov (IBER); 1 ♀, Maleshevska Planina Mtn., SW Gorna Breznitsa village, 630 m, 16, VI, 2002, leg. T. Ljubomirov (IBER); 1 ♀, Strouma valley, S Kamenitsa village, 170-240 m, 31, V, - 23, VI, 2002, leg. M. Langourov (IBER); 1 ♀, Maleshevska Planina Mtn., SW Gorna Breznitsa village, 830 m, 9, VII, 2002, leg. T. Ljubomirov (IBER); 1 ♀, Maleshevska Planina Mtn., E Gorna Breznitsa village, 290 m, 11, VII, 2002, leg. T. Ljubomirov (IBER); 1 ♀, Strouma valley, S Kamenitsa village, 170-240 m, 23, VI,- 8, VIII, 2002, leg. D. Chobanov (IBER); 1 ♀, Plana Mtn., Torishteto, 910 m, 8, VI, 2003, leg. T. Ljubomirov (IBER); 1 ♀, Lozenska Planina Mtn., NW Passarell village, 790 m, 11, VI, 2003, leg. T. Ljubomirov (IBER); 1 ♀, Maleshevska Planina Mtn., SW Gorna Breznitsa village, 810 m, 19, VI, 2003, leg. T. Ljubomirov (IBER); 1 ♀, Plana Mtn., SW Kokalyane village, 710 m, 12, VI, 2004, leg. T. Ljubomirov (IBER); 2 ♀♀, Plana Mtn., SW Kokalyane village, 930 m, 12, VI, 2004, leg. T. Ljubomirov (IBER); 1 ♀, Lozenska Planina Mtn., NW Passarell village, 820 m, 16, VII, 2004, leg. T. Ljubomirov (IBER); 1 ♀, Tcherni Lom valley, Tabatchka village, 110 m, 27, VII, - 10, VIII, 2004, leg. T. Ivanova (IBER); 1 ♀, Banska Reka valley, SE Klokotnitsa village, 130 m, 7, X, 2004, leg. T. Ljubomirov (IBER); 1 ♀, Banska Reka valley, SE Klokotnitsa village, 200 m, 28, IV, 2005, leg. T. Ljubomirov (IBER); 2 ♀♀, Banska Reka valley, SE Klokotnitsa village, 200 m, 21, VII, 2005, leg. T. Ljubomirov (IBER); 1 ♀, Arda valley, NE Madzharovo, 160-230 m, 4, VII, - 15, VIII, 2005, leg. D. Chobanov (IBER); 1 ♀, Arda valley, SW Madzharovo, 250 m, 15, VIII, - 7, IX, 2005, leg. M. Langourov (IBER); 1 ♀, Lozenska Planina Mtn., NW Passarell village, 820 m, 29, VI, 2006, leg. T. Ljubomirov (IBER); 1 ♀, Maleshevska Planina Mtn., E Ilyov Vruh peak, 1320 m, 4, VIII, 2006, leg. T. Ljubomirov (IBER). CROATIA: 1 ♀, Peleshtats peninsula, Orebič, VII, 1937, leg. S. Zimmermann (NHMW). CYPRUS: 1 ♀, Mediterranean Sea coast, Larnaca, 20, VII, 1900, leg. C. Glaszner (TMB); 1 ♀, Nicosia, VI, 1927, coll. K. Hammer (NHMW); 1 ♀, Limassol, 15, IV, 1953, leg. G. Mavromoustakis (MNCN); 1 ♀, Mediterranean Sea coast, Larnaca, leg. C. Glaszner (TMB). GEORGIA: 1 ♀, Tbilisi, leg. F. Kolenati (NHMW); 1 ♀, Caucasus Mts., coll. C. Reitter von Schreibers (MZN). GREECE: 1 ♀, Salonika, X, 1917, leg. R. Bresson (MNHN); 1 ♀, Évros, N Alexandroúpolis, 1, VII, 1919, leg. D. Joakimov (NMNHS); 1 ♀, Mermere, IV, 1942 (ZMHU); 1 ♀, Peloponnesus, surroundings of Aroanía village, 1800 m, 8 – 10, VI, 1960, leg. R. Löberbauer (OÖLM); 1 ♀, Peloponnesus, Kato Zachlorou village, 28, V, 1962, leg. M. Schwarz (MS); 1 ♀, Peloponnesus, Aroanía village, 2, VI, 1962, leg. M. Schwarz (MS); 1 ♀, Peloponnesus, Kalámata, 11, V, 1964, leg. M. Schwarz (MNCN); 2 ♀♀, Peloponnesus, Kalámata, 11, V, 1964, leg. M. Schwarz (MS); 1 ♀, Peloponnesus, Olympia, 16, V, 1964, leg. M. Schwarz (MS); 1 ♀, Kos Island, Kos, 12, V, 1975, leg. H. Malicky (MNCN); 1 ♀, Laconia, Kiparíssion, 16, V, 1981, leg. Polussány (TMB); 1 ♀, leg. Moll (ZMHU); 1 ♀, Peloponnesus, Kalámata, 3, VI, 1996, leg. G. Pagliano (GP); 1 ♀, Peloponnesus, SW Korifásion, 31, V, 1998, leg. H. & J. Wiering (ZMAN) 1 ♀, Peloponnesus, Artemisía village, 1, VI, 1998, leg. G. Pagliano (GP); 1 ♀, Peloponnesus, Skála village, 8, VI, 1998, leg. G. Pagliano (GP); 1 ♀, Peloponnesus, Kladhás village, 8 - 10, IV, 2005, leg. P. Bogusch & J. Skuhrovec (PB); 1 ♀, Peloponnesus, NE Kalamata, 170m, 12 - 14, IV, 2005, leg. P. Bogusch & J. Skuhrovec (PB); 1 ♀, Athens, leg. T. Krüper (TMB); 1 ♀, Mermere (ZMHU); 1 ♀, Rhodos, coll. O. Sichel (MNHN). MACEDONIA: 1 ♀, NW Dojran, 5, VII, 1917, leg. J. Fahringer (ZMHU); 1 ♀, NW Dojransko Ezero lake, 150-500 m, 9 – 10, V, 1971, leg. J. Papp & S. Horvatovich (TMB). ROMANIA: 1 ♂, Bucharești, Andronache forest, 21, IX, 1953, leg. X. Scobiola (MGAB); 1 ♂, Constanța, Valului Traian, 13, VIII, 1957, leg. X. Scobiola (MGAB); 1 ♂, Bijor, Oradea, 20, VIII, 1967, leg. C. Nagy (TMB); 1 ♀, Tulcea, Tulcea, 1865, leg. J. Mann (NHMW); 1 ♀, Constanța, Valului Traian, 11, X, 1956, leg. X. Scobiola (MGAB); 1 ♀, Constanța, Valului Traian, 12, VII, 1957, leg. X. Scobiola (MGAB); 1 ♀, Constanța, Valului Traian, 12, VIII, 1957, leg. X. Scobi-

ola (MGAB); 2 ♀♀, Mureş, Saschîz (TMB). RUSSIA: 1 ♀, Black Sea coast, Novorossiysk (TMB); 1 ♀, leg. E. Eversmann (ZMHU). SERBIA: 1 ♀, Niš, IX, 1902, leg. E. Horváth (T MB); 1 ♀, Yuzhna Morava valley, Vranje, 700 m, 29, VII, 1957, leg. G. Nonveiller (TMB). SYRIE: 1 ♀, Al Hāra (ZMHU). TURKEY: 1 ♀, Tekirdağ, surroundings of Ganos peak, 800 m, 6, V, 1913, coll. I. Buresch (NMNHS); 1 ♀, İstanbul, Bosporus, 20, VI, 1914, leg. W. Ramme (ZMHU); 2 ♀♀, Balıkesir, Karacabey, 20, VI, 1930, leg. V. Ajtai (NHMW); 1 ♀, Adana, Ceyhan, VI, 1937 (TMB); 1 ♀, İstanbul, İstanbul, 12 – 14, VIII, 1937 (TMB); 1 ♀, Hatay, Antakya, 1, VI, 1965, leg. M. Schwarz (MNCN); 1 ♀, Hatay, Antakya, 7, VI, 1965, leg. J. Gusenleitner (MNCN); 1 ♀, Ankara, Kizilcahamam, 935m, 6 - 12, V, 1966, leg. R. Löberbauer (OÖLM); 1 ♀, Van, Tatvan, 1800 m, V, 1976, leg. F. Schubert (NHMW); 1 ♀, Nevşehir, Ürgüp, 4, VI, 1978, leg. M. Schwarz (MNCN); 1 ♀, Antalya, Serik, 1400 m, 1, VI, 1990, leg. C. Jeanne (ZMAN); 1 ♀, Bilecik, Bilecik, 600 m, 15, VI, 1995, leg. E. Yildirim (IBER); 1 ♀, Adana, Yumurtalık, 5 m, 17, IV, 2007, leg. T. Ljubomirov (IBER); 1 ♀, Isparta, Gölcük Natural park, 1405 m, 11, VI, 2008, leg. B. Aslan (ISU); 1 ♀, İstanbul, İstanbul (TMB); 1 ♀, İstanbul, İstanbul, coll. C. & G. Vogt (ZMAN); 1 ♀, Hatay, leg. M. Escalera (MNCN); 1 ♀, Van, (MNCN). UKRAINE: 1 ♀, Feodosiya, 27, VI, 1886 (TMB); 1 ♀, Crimea, coll. O. Sichel (MNHN); 1 ♀, Kharkov, coll. Er. André (MNHN). UNKNOWN LOCALITIES: 1 ♀, purple label, leg. J. Erber (NHMW); 1 ♀, 24, VI (TMB); 1 ♀, (MNCN).

***Myrmilla corniculata* (Sichel & Radoszkowski)** GREECE: 1 ♂, Thessaly, Vólos, 14, IX, 2004, leg. L. Standfuss (LKS); 1 ♀, Skópelos Island, 7, V, 1927, leg. F. Werner (NHMW); 1 ♀, Peloponnesus, Mega Spileon, 960 m, 14, VI, 1958, leg. R. Löberbauer (OÖLM); 1 ♀, Peloponnesus, Korinthia, 70 m, 1, V, 1960, leg. R. Löberbauer (OÖLM); 1 ♀, Peloponnesus, Kalamae, 80 m, 5, V, 1960, leg. R. Löberbauer (OÖLM); 1 ♀, Lamía, 17 – 20, V, 1960, leg. R. Löberbauer (OÖLM); 1 ♀, Peloponnesus, Loutráki, 4, VI, 1963, leg. M. Schwarz (MNCN); 1 ♀, Peloponnesus, Corinth, 19, V, 1964, leg. M. Schwarz (MS); 1♀, Peloponnesus, Corinth, 20, V, 1964, leg. M. Schwarz (MS); 1♀, Crete Island, Erimoúpolis, 5, V, 1965 (NHMW); 1 ♀, Tinos Island, V, 1983 (NHMW); 1 ♀, Peloponnesus, Xilókastron, 5, VI, 1989, leg. M. Gijswijt (RMNH); 1 ♀, Thessaly, Vólos, 18, IV, 2001, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 19, IV, 2001, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 16, V, 2001, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 27, V, 2001, leg. K. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 14, VII, 2001, leg. K. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 21, III, 2002, leg. K. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 20, IV, 2002, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 8, V, 2002, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 11, V, 2002, leg. K. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 20, V, 2002, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 6, VI, 2002, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 15, VI, 2002, leg. K. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 26, VI, 2002, leg. K. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 26, VI, 2002, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 5, VII, 2002, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 7, VII, 2002, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 2, V, 2003, leg. K. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 8, V, 2003, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 11, V, 2003, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 15, V, 2003, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 18, V, 2003, leg. K. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 22, V, 2003, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 2, VII, 2003, leg. K. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 3, VII, 2003, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 3, VII, 2003, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 4, VII, 2003, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 4, VII, 2003, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 5, VII, 2003, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 11, VII, 2003, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 12, VII, 2003, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 18, VII, 2003, leg. K. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 18, VII, 2003, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 14, VIII, 2003, leg. K. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 28, IV, 2004, leg. K. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 28, IV, 2004, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 29, IV, 2004, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 2, V, 2004, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 8, V, 2004, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 14, V, 2004, leg. L. Standfuss (IBER); 2 ♀♀, Thessaly, Vólos, 14, V, 2004, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 15, V, 2004, leg. K. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 16, V, 2004, leg. L. Standfuss (IBER); 1 ♀, Thessaly, Vólos, 16, V, 2004, leg. L. Standfuss (LKS); 2 ♀♀, Thessaly, Vólos, 2, VI, 2004, leg. L. Standfuss (LKS); 2 ♀♀, Thessaly, Vólos, 3, VI, 2004, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 10, VI, 2004, leg. L. Standfuss (LKS); 2 ♀♀, Thessaly, Vólos, 17, VI, 2004, leg. L. Standfuss (LKS); 2 ♀♀, Thessaly, Vólos, 20, VI, 2004, leg. L. Standfuss (LKS); 1 ♀, Thessaly, Vólos, 24, VI, 2004, leg. K. Standfuss (LKS); 1♀, Thessaly, Vólos, 24, VI, 2004, leg. L. Standfuss (LKS); 1♀, Athens, leg. T. Krüper (NHMW); 1 ♀, Peloponnesus, Gythion, leg. R. Petrovitz (NHMW); 1 ♀, Athens, leg. J. Rehberg (ZMHU). SYRIA: 1 ♀, Damascus, 24, VI, 1959, coll. A. Mochi (GP); 1 ♀, leg. C. Reitter von Schreibers (TMB). TURKEY: 1 ♀, Niğde, surroundings of Niğde, 1100-1500 m, 19 - 20, VII, 1937, leg. W. Ramme (ZMHU); 2 ♀♀, Giresun, Gürün, 3, VI, 1978, leg. M. Schwarz (MS); 1 ♀, Konya, Sille, 8, VI, 1978, leg. M. Schwarz (MS); 1 ♀, Konya, Sille, 12, VI, 1978, leg. M. Schwarz (MS); 1 ♀, Ankara, 10 km S Ankara, 1100m, 8, VI, 1980, leg. M. Schwarz (MS); 1 ♀, Adana, SW Yumutalık, 2m, 20, VII, 2008, leg. T. Ljubomirov (IBER); 1 ♀, Hatay, Akbés vill., (NHMW); 1 ♀, Turkey (MNCN). UNKNOWN LOCALITY: 1 ♀, (TMB).

***Myrmilla erythrocephala* (Latreille)** BOSNIA & HERZEGOVINA: 1 ♀, 1893 (NHMW); 1♀, Neretva valley, Gabela, 8, VII, 1911 (TMB). CROATIA: 1 ♂, Adriatic Sea coast, Split, leg. R. Gasperini (NHMW); 1 ♀, Hvar Island, Hvar, 28,

V, 1865, coll. O. Sichel (MNHN); 1 ♀, Vrana, VI, 1891, leg. R. Sturany (NHMW); 1 ♀, Adriatic Sea coast, Split, VII, 1908, leg. L. Soós (TMB); 1 ♀, Brač Island, VII, 1912, leg. F. Raab (NHMW); 1 ♀, Split, 23, VI, 1914 (NHMW); 3 ♀♀, Hvar Island, VII, 1937, leg. S. Zimmermann (NHMW); 1 ♀, Peleshtats peninsula, Janjina, 14, V, 1938, leg. P. Novák (MNHN); 1 ♀, Brač Island, Bol, 5, VI, 1965, leg. K. Pospiškii (OÖLM); 1 ♀, Hvar Island, 9, VI, 1982, leg. J. Schmidt (OÖLM); 1 ♀, Hvar Island, 14, VI, 1982, leg. J. Schmidt (OÖLM); 1 ♀, Hvar Island, 19, VI, 1982, leg. J. Schmidt (OÖLM); 1 ♀, surroundings of Zadar, 6, VI, leg. S. Schumacher (ZMUH); 1♀, Hvar Island (NHMW); 2 ♀♀, Hvar Island, leg. Z. Jörg (ZMHU); 1 ♀, Hvar Island, leg. C. Reitter von Schreibers (TMB); 2 ♀♀, Adriatic Sea coast, Split, leg. R. Gasperini (NHMW); 2 ♀♀, Dalmatia, coll. Er. André (MNHN). FRANCE: 1 ♂, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 11, VIII, 1892, coll. A. Chobaut (MNHN); 1 ♂, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 14, IX, 1892, coll. A. Chobaut (MNHN); 1 ♂, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 19, IX, 1892, coll. A. Chobaut (MNHN); 1 ♂, Corsica Island, Bonifacio, 16, X, 1895, leg. C. Ferton (MNHN); 1 ♂, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 22, X, 1899, coll. A. Chobaut (MNHN); 1 ♂, Provence-Alpes-Côte d`Azur, Pignans, 31, VII, 1965, leg. J. Barbier (MNHN); 1 ♂, Corsica Island, Calvi, 13-27, VII, 1971, leg. H. van Oorschot & H. Coene (ZMAN); 1 ♂, Provence-Alpes-Côte d`Azur, Draguignan, 15, VIII, 1972, coll. H. Nouvel (MNHN); 1 ♂, Provence-Alpes-Côte d`Azur, Draguignan, 6, VIII, 1976, coll. Nouvel (MNHN); 1 ♂, Corsica Island, Asco, 7, VII, 1998, leg. G. Pagliano (GP); 1 ♀, Corsica Island, 1859, leg. J. Mann (NHMW); 2 ♀♀, Provence-Alpes-Côte d`Azur, Marseille (Les Caillols), 5, VI, 1877, coll. J. Lichtenstein (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Angles, 3, V, 1890, coll. A. Chobaut (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Angles, 28, VI, 1891, coll. A. Chobaut (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 19, IX, 1891, coll. A. Chobaut (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Angles, 19, X, 1891 (MNCN); 1 ♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 19, X, 1891, coll. A. Chobaut (MNHN); 2 ♀♀, Provence-Alpes-Côte d`Azur, Angles, 29, IV, 1892, coll. A. Chobaut (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 1, VI, 1892, coll. A. Chobaut (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 28, VIII, 1892, coll. A. Chobaut (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 9, IX, 1892, coll. A. Chobaut (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Simiane-la-Rotonde, 13, IX, 1892, leg. C. Ferton (MNHN); 1 ♀ Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 14, IX, 1892, coll. A. Chobaut (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 19, IX, 1892, coll. A. Chobaut (MNHN); 2 ♀♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 9, X, 1892, coll. A. Chobaut (MNHN); 2 ♀♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 18, X, 1892, coll. A. Chobaut (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 14, VII, 1893, coll. A. Chobaut (MNHN); 2 ♀♀, Provence-Alpes-Côte d`Azur, Montpellier, 10, VI, 1896 (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, 11, VII, 1896 (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, La Valentine, 23, VII, 1897 (MNHN); 1 ♀, Corsica Island, Bonifacio, 26, IX, 1899, leg. C. Ferton (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Morières-lès-Avignon, 6, VIII, 1900, coll. A. Chobaut (MNHN); 1 ♀, Corsica Island, Bonifacio, 2, V, 1903, coll. C. Ferton (MNHN); 1 ♀, Corsica Island, Bonifacio, 28, VII, 1904, coll. C. Ferton (MNHN); 1 ♀, Corsica Island, Bonifacio, 18, VI, 1905, coll. C. Ferton (MNHN); 1 ♀, Corsica Island, Bonifacio, 23, VII, 1905, coll. C. Ferton (MNHN); 1 ♀, Corsica Island, Bonifacio, 31, V, 1906, coll. C. Ferton (MNHN); 1 ♀, Corsica Island, Bonifacio, 22, V, 1907, coll. C. Ferton (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Sonary, VII, 1908, leg. G. Fagel (NHMW); 1 ♀, Provence-Alpes-Côte d`Azur, Avignon, 8, VII, 1899 (MNCN); 1 ♀, Provence-Alpes-Côte d`Azur, Montpellier, 8, V, 1912, leg. J. Lichtenstein (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Montpellier, 1, IX, 1918, leg. J. Lichtenstein (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Callian, VII, 1919, leg. R. Arlé (MNHN); 1 ♀, Corsica Island, 1931, leg. F. van Odheausden (ZMAN); 1 ♀, Provence-Alpes-Côte d`Azur, Fréjus, X, 1933, leg. F. Bernard (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Méounes-lès-Montreux, 12, VI, 1934, leg. P. Verhoeff (RMNH); 1 ♀, Provence-Alpes-Côte d`Azur, Sorgues, 30, VIII, 1936, leg. G. Granger (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, St Aygulf, VII, 1938, leg. F. Bernard (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Mandelieu-la-Napoule, V, 1941 (MNHN); 1 ♀, Corsica Island, Erbalunga, VII, 1949, leg. G. Granger (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur,Var district, 11, VI, 1951, leg. J. Barbier (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Carpentras, 30 – 31, VII, 1951, leg. P. Verhoeff (MNCN); 1 ♀, Provence-Alpes-Côte d`Azur, Carpentras, 24 – 27, V, 1952, leg. P. Verhoeff (RMNH); 1 ♀, Provence-Alpes-Côte d`Azur, Sospel, 30, V, 1952, leg. J. Post (ZMAN); 1 ♀, Provence-Alpes-Côte d`Azur, La Croix-Valmer, 29 – 31, V, 1952, leg. P. Verhoeff (RMNH); 1 ♀, Provence-Alpes-Côte d`Azur, Fenouillet, 10, V, 1953, leg. J. Barbier (MNHN); 3 ♀♀, Provence-Alpes-Côte d`Azur, Carpentras, 15 – 23, V, 1953, leg. P. Verhoeff (RMNH); 1 ♀, Provence-Alpes-Côte d`Azur, Carpentras, 15 – 23, V, 1953, leg. P. Verhoeff (ZMAN); 1 ♀, Provence-Alpes-Côte d`Azur, Remoulis, 15, VI, 1953, leg. H. Janvier (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Carpentras, 1 – 3, VIII, 1953, leg. P. Verhoeff (RMNH); 1 ♀, Provence-Alpes-Côte d`Azur, Ollioules, 7, V, 1955, leg. J. Barbier (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Var department, 29, VI, 1957, leg. J. Barbier (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Nimes, 25, VIII, 1959, coll. H. Nouvel (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Aix-en-Provence, 450m, 13, VI, 1963 (MS); 1 ♀, Provence-Alpes-Côte d`Azur, Pignans, 24, VII, 1965, leg. J. Barbier (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Pignans, 10, IX, 1966, leg. J. Barbier (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Draguignan, 10, VIII, 1967, coll. H. Nouvel (MNHN); 1 ♀,

Provence-Alpes-Côte d`Azur, Saint Paul de Vence, 21, VIII, 1971, coll. H. Nouvel (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Forcalquier, 18, VII, 1983, coll. J. Bitsch (MNHN); 1 ♀, Corsica Island, coll. R. Mercet (MNCN); 1 ♀, Corsica Island (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Marseille (MNCN); 2 ♀♀, Provence-Alpes-Côte d`Azur, Le Beausset, coll. J. Lichtenstein (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Marseille (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Montpellier, coll. O. Sichel (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Mandelieu-la-Napoule, V, 1941 (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Montredon, V (MNHN); 1 ♀, Provence-Alpes-Côte d`Azur, Fréjus, X, leg. F. Bernard (MNHN). GREECE: 1 ♀, Kerkira Island, coll. O. Sichel (MNHN) (probably erroneously labeled). ITALY: 1 ♂, Liguria, Spotorno, VIII, 1939, E. Moltoni (MCSN); 1 ♂, Liguria, Coldirodi, 5, IX, 1980, leg. P.-L. Scaramozzino (MNCN); 1 ♂, Liguria, Ortovero, 9, VII, 1996, leg. G. Pagliano (GP); 1 ♂, Tuscany, surroundings of Fauglia, 16, IX, 1997, leg. F. Strumia (IBER); 1 ♂, Piedemont, San Benedetto Belbo vill., 10, VIII, 2003, leg. G. Pagliano (GP); 1 ♂, Abruzzo, Avezanno, leg. A. Costa (MZN); 1 ♂, Apulia, Lacce (MZN); 1♀, Veneto, Brindisi, 1871, leg. J. Erber (NHMW); 1 ♀, Friuli Venezia Giulia, Trieste, 31, V, 1887, leg. A. Handlirsch (NHMW); 6 ♀♀, Calabria, Sambiase, V, 1920, leg. C. Minozzi (MNCN); 1 ♀, Marche, Senigallia, 1938, leg. A. Martelli (MCSN); 1 ♀, Calabria, Camigliatello, 26, VI – 13, VII, 1939, leg. L. Ceresa (MCSN); 1 ♀, Calabria, Crotone, 7 – 10, VII, 1939, leg. L. Ceresa (MCSN); 1 ♀, Veneto, Venezia (Castello), 20, VII, 1943, coll. S. Patrizi (MCZR); 2 ♀♀, Sicily, Taormina, 30, V, 1958, leg. R. Löberbauer (OÖLM); 1 ♀, Calabria, Camigliatello, 26, V, 1960, leg. E. Moltoni (MCSN); 1 ♀, Liguria, Noli 15, VI, 1961, leg. J. Schmidt (OÖLM); 1 ♀, Liguria, Varigotti, 18, VI, 1961, leg. J. Schmidt (OÖLM); 1 ♀, Liguria, surroundings of Vittoria, X, 1962, leg. G. Mantero (MCSN); 1 ♀, Sicily, Cassaro, 16, VII, 1974, leg. B. Massa (MNCN); 1 ♀, Lazio, Tor Vaianica, 27, VIII, 1974, leg. P. Cosimi (MSNAM); 1 ♀, Lazio, Tor Vaianica, 6, X, 1974, leg. P. Cosimi (MSNAM); 1 ♀, Liguria, Mallare, 18, VIII, 1977, leg. A. Bordoni (MNCN); 1 ♀, Sicily, Madonie Mountains, Mount Mufara, 30, V, 1985, leg. G. Pagliano (GP); 1 ♀, Sicily, Selinus, 2, VI, 1986, coll. G. van der Zanden (RMNH); 1 ♀, Piedmont, San Benedetto Belbo vill., 10, IX, 1989, leg. G. Pagliano (RMNH); 1 ♀, Sardinia, Sassari province, Ossi, 18, VI, 1990, leg. G. Pagliano (RMNH); 1 ♀, Calabria, Bonifati, 1, V, 1991, coll. W. Klein (ZMAN); 1 ♀, Apulia, Torre Mileto, 20, V, 1994, leg. G. Pagliano (GP); 1 ♀, Liguria, Ortovero, 12, VIII, 1995, leg. G. Pagliano (GP); 2 ♀♀, Liguria, Ortovero, 19, VIII, 1995, leg. G. Pagliano (GP); 1 ♀, Sicily, Piana di Catania, 20, VII, 1996, leg. G. F. Turrisi (IBER); 1 ♀, Liguria, Garlenda, 1, VIII, 1999, leg. G. Pagliano (GP); 2 ♀♀, Liguria, Ortovero, 11, VIII, 2000, leg. G. Pagliano (GP); 1 ♀, Liguria, Ortovero, 11, VIII, 2000, leg. G. Pagliano (IBER); 1 ♀, Liguria, Ortovero, 15, VIII, 2000, leg. G. Pagliano (GP); 1 ♀, Liguria, Ortovero, 21, VIII, 2001, leg. G. Pagliano (GP); 1 ♀, Liguria, Ortovero, 24, VI, 2004, leg. G. Pagliano (GP); 1 ♀, Piedmont, San Benedetto Belbo vill., 17, VII, 2004, leg. G. Pagliano (GP); 1 ♀, Apulia, Cerignola, leg. A. Costa (MZN); 1 ♀, Emilia-Romagna, Parma (MZN); 1 ♀, Calabria, Canna (MZN); 1 ♀, Calabria, Gerace, leg. G. Paganetti-Hammler (TMB); 1 ♀, Calabria (TMB); 1 ♀, Liguria (MZN); 2 ♀♀, Liguria, Castelluccio, leg. A. Baliani (MCSN); 2 ♀♀, Liguria, Molassana, leg. A. Baliani (MCSN); 1 ♀, Liguria, Genova, VIII, leg. F. Invrea (NHMW); 1 ♀, Lazio, Rome, VII, coll. E. Graeffe (NHMW); 1 ♀, Sicily, leg. V. Ghiliani (MZN); 1 ♀, Sicily Island, Agrigento (MZN); 1 ♀, Sicily, leg. E. Ragusa (NHMW); 1 ♀, Roma, Acilia, leg. L. Ceresa (MCSN); 1 ♀, Tuscany, Cortona (MCZR); 2 ♀♀, Lazio, Paggio Mirteto, leg. G. Leoni (MCZR); 1 ♀, Abruzzo, Cerchio, leg. G. Leoni (MCZR); 1 ♀, Calabria, Cosenza, leg. G. Leoni (MCZR); 1 ♀, (MCZR); 1 ♀, Coastal Italy, coll. K. Hammer (NHMW); 1 ♀, 30, V, leg. P. Zeller (RMNH). MONTENEGRO: 1 ♀, Adriatic Sea coast, Kotor, leg. C. Reitter von Schreibers (TMB). TUNISIA: 1 ♀, coll. J. de Gaulle (MNHN). UNKNOWN LOCALITIES: 1 ♂, (MZN); 1 ♂, coll. J. Lichtenstein (MNHN);1 ♀, coll. M. Kokourek (OÖLM); 1 ♀ (NHMW); 1 ♀ (MZN); 1 ♀ (OÖLM); 1 ♀, coll. G. Colas (MNHN); 1 ♀, coll. H. Nouvel (MNHN); 1 ♀, leg. F. Kohl (NHMW).

***Myrmilla mutica* (Er. André)** ALBANIA: 1 ♀, Rrethi i Durrësit, Durrës, V, 1918, leg. H. Karny (NHMW); 1 ♀, Rrethi i Elbasanit, Elbasan, 1, VI, 1918, leg. H. Karny (NHMW); 1 ♀, Rrethi i Kukësit, Nangë, 30, VII, 1918, leg. E. Csiki (TMB); 2 ♀♀, Rrethi i Vlorës, Tartarit, VI, 1932, leg. H. Bischoff (NHMW); 1 ♀, Rrethi i Vlorës, Llogara national park, VI, 1932, leg. H. Bischoff (NHMW) 1 ♀, Rrethi i Tiranës, SE Ibë, 17 – 22, VI, 1961 (GP); 1 ♀, Rrethi i Durrësit, Durrës, leg. L. Mader (NHMW). AUSTRIA: 1 ♂, Marchfeld plain, 24, VII, 1931, leg. F. Blühweiss (NHMW); 1♂, Oberweiden, 10, V, 1936, coll. K. Hammer (NHMW); 1 ♂, Oberweiden, 2. – 4. VIII. 1952, leg. R. Petrovitz (NHMW); 1 ♂, Oberweiden, coll. K. Hammer (NHMW); 1 ♀, Oberweiden, 14, VI, 1936 (MS); 1 ♀, Oberösterreich, Neufelden, 14, VII, 1953, leg. R. Petrovitz (MNCN); 1 ♀, Danube valley, Hainburg, leg. L. Mader (MMB); 1 ♀, Marchfeld plain, leg. F. Blühweiss (NHMW); 1 ♀, Parndorfer Heide field, leg. H. Jakob (NHMW); 1 ♀, surroundings of Mödling, leg. K. Hammer (NHMW); 1 ♀, Oberweiden, leg. L. Mader (NHMW); 6 ♀♀, Oberösterreich, Neufelden, leg. R. Petrovitz (NHMW); 4 ♀♀, Parndorfer Heide field, leg. R. Petrovitz (NHMW); 6 ♀♀, Marchfeld plain, Oberweiden, leg. R. Petrovitz (NHMW); 7 ♀♀, surroundings of Mödling, leg. R. Petrovitz (NHMW); 1 ♀, Wiener Wald woodland, leg. R. Petrovitz (NHMW); 1 ♀, Marchfeld plain, Oberweiden, leg. L. Mader (MMB); 4 ♀♀, Marchfeld plain, Oberweiden, coll. K. Hammer (NHMW); 2 ♀♀, surroundings of Mödling, coll. K. Hammer (NHMW); 1 ♀, Burgenland, Wiesen (NHMW); 1 ♀, leg. J. Megerle von Mühlfeld (NHMW). BOSNIA & HERZEGOVINA: 1 ♀, Bossnia valley, Zenica, 1, VII, 1911

(TMB); 1 ♀, 5, VII, 1935, leg. A. Hoffer (MMB); 1 ♀, Pobrežje, 16, VI, 1961 (ZMAN); 1 ♀, Jablanica, leg. A. Penther (NHMW). CROATIA: 1 ♀, Hvar Island, Hvar, 28, V, 1865, coll. O. Sichel (MNHN); 1 ♀, Istria, Pula, 8, VI, 1887, leg. A. Handlirsch (NHMW); 1 ♀, Adriatic Sea coast, Senj, VI, 1901 (TMB); 1♀, Adriatic Sea coast, Split, 18, VI, 1906, leg. E. Csiki (TMB); 1 ♀, Adriatic Sea coast, Karlobag, 10, VII (TMB); 1 ♀, Hvar Island, leg. C. Reitter von Schreibers (TMB); 1 ♀, Hvar Island, Hvar, coll. O. Sichel (MNHN); 1 ♀, Adriatic Sea coast, Bakar (TMB). CZECH REPUBLIC: 1 ♀, Southern Moravia, Palava protected area, 22, VI, 2005 (IBER). 1 ♀, Southern Moravia, Palava protected area, 22, VI, 2005 (PB). GREECE: 1 ♀, Kérkira Island, 15 – 20, VI, 1971, leg. P. Verhoeff, (MNCN); 1 ♀, Kérkira Island, 15 – 20, VI, 1971, leg. P. Verhoeff, (RMNH); 1 ♀, Kérkira Island, 20, V, 1973 (RMNH); 1 ♀, Kérkira Island, 25, V, 1974 (RMNH); 1 ♀, Peloponnesus, Mistrás, 10, V, 1990, leg. A. Lucas (ZMAN); 1 ♀, Kérkira Island, leg. J. Erber (RMNH); 1 ♀, Crete Island, W Ídhi Óros peak, 2200 m, leg. L. Biró (TMB); 1 ♀, Kefallinía Island, leg. G. Paganetti-Hammler (NHMW); 1 ♀, Morea (NHMW); 1 ♀, Parnassós, leg. E. von Oertzen (NHMW). HUNGARY: 1 ♂, Budapest, Guggerhegy, 1929, leg. E. Horváth (TMB); 1 ♂, Veszprém, Balatonfüred, 19, VIII, 1940 (TMB); 1 ♂, Balaton Lake, Keszthely (NHMW). 1 ♀, Borsod-Abaúj-Zemplén, Sátoraljaújhely, 25, V, 1884 (TMB); 1 ♀, Borsod-Abaúj-Zemplén, Miskolc, 16, VII, 1896, leg. E. Horváth (TMB); 1 ♀, Budapest, VIII, 1903 (TMB); 1 ♀, Budapest, Szigetszentmiklós, 12, VI, 1909, leg. L. Biró (TMB); 1 ♀, Pest, Letkés, 15, VII, 1920, leg. L. Biró (TMB); 1 ♀, Budapest, Sashegy, 18, V, 1922 (TMB); 1 ♀, Budapest, Sashegy, 25, VI, 1922, leg. E. Horváth (TMB); 1 ♀, Peleszarvad, 12, VII, 1922, leg. L. Biró (TMB); 1 ♀, Budapest, Szépvölgy, 2, VII, 1923, leg. E. Csiki (TMB); 1 ♀, Balaton Lake, Keszthely, 19, VII, 1928 (NHMW); 1 ♀, Balaton Lake, Keszthely, 25, V, 1930 (NHMW); 1 ♀, Budapest, Kecskehegy, 2, VII, 1930, leg. E. Csiki (TMB); 1 ♀, Cserszegtomaj, 28, VIII, 1930 (NHMW); 2 ♀♀, Budapest, Guggerhegy, 1930, leg. E. Horváth (TMB); 1 ♀, Pest, Galgamácsa, 10, V, 1931, leg. Ujeheli (TMB); 1 ♀, Tolna, Simontornya, 4, IX, 1933, leg. F. Pillich (TMB); 1 ♀, Tolna, Simontornya, 8, IX, 1939, leg. F. Pillich (TMB); 1 ♀, Tolna, Paks, VI, 1943, leg. E. Horváth (TMB); 2 ♀♀, Tolna, Hőgyész, 24, VI, 1946, leg. J. Erdős (TMB); 1 ♀, Fejér, Sukoró, 23 - 24, VIII, 1951, leg. E. Bajári & L. Móczár (TMB); 1 ♀, Fejér, Sukoró, 13-15, IX, 1951, leg. L. Móczár & M. Móczár (TMB); 2 ♀♀, Fejér, Sukoró, 9, VI, 1952, leg. L. Móczár & E. Bajári (TMB); 1 ♀, Fejér, Sukoró, 18, VIII, 1952, leg. E. Bajári (TMB); 1 ♀, Budapest, Sashegy, 20, VI, 1953, leg. M. Móczár (TMB); 1 ♀, Nágrád, Szécsény, VI, 1957, leg. E. Bajári (TMB); 1 ♀, Mindszentpuszta, 300 m, 9, IX, 1988, leg. Rahmé (TMB); 1 ♀, Budapest, Gallérthegy, 25, V, leg. A. Mocsáry (TMB); 1 ♀, Bács-Kiskun, Peszéri Erdő (TMB); 4 ♀♀, Balaton Lake, Keszthely (NHMW); 1 ♀, Balaton Lake, Keszthely, leg. K. Hammer (NHMW); 10 ♀♀, Balaton Lake, Keszthely, coll. K. Hammer (NHMW); 1 ♀, Budapest (TMB); 1 ♀, Budapest, Buda, leg. A. Mocsáry (TMB); 1 ♀, Budapest, Pest (TMB); 1 ♀, Fejér, Felcsút (TMB); 1 ♀, Komárom-Esztergom, Pilismarót, leg. E. Csiki (TMB); 1 ♀, Mátra Mtn., Kékes peak, 1040 m, leg. E. Zilahi Kiss (TMB); 1 ♀, Nógrád, Pásztó (TMB); 1 ♀, Pest, Csőrög, VI (TMB); 1 ♀, Veszprém, Hidegkut (TMB). ITALY: 1 ♀, Friuli Venezia Giulia, Aurisina, 10, VI, 1952 (MCSN); 6 ♀♀, Friuli Venezia Giulia, Trieste, 22-24, V, 1953, leg. F. Köller (OÖLM); 3 ♀♀, Friuli Venezia Giulia, Trieste, 1-13, VI, 1959, leg. R. Löberbauer (OÖLM). MONTENEGRO: 2 ♀♀, Adriatic Sea coast, Bar, 5, VIII, 1954, leg. G. Nonveiller (TMB). ROMANIA: 1 ♀, Cluj, Turda, 9, V, 1911 (TMB); 1 ♀, Sibiu, Sibiu, 4, VIII, 1946, leg. E. Worell (MGAB); 1 ♀, Cluj, Cluj, 12, IV, 1964, leg. E. Beoss (MNCN); 1 ♀, Cluj, Turda, (TMB); 1 ♀, Maramureş, Odeşti vill., leg. E. Zilahi Kiss (TMB); 1 ♀, Sălaj, Ileanda, leg. E. Zilahi Kiss (TMB); ♀, Bistriţa-Năsăud, Beclean, leg. E. Zilahi Kiss (TMB). SLOVAKIA: 1 ♀, Veličná, 1874 (TMB); 1 ♀, Gron valley, SW Želiezovce, 10, VII, 1936, (MMB); 1 ♀, Carpathian Mts., Kamenica, 17, VIII, 1946, leg. V. Zavadil (MMB); 1 ♀, Slana valley, Plešivec, 22, VII, 1948, coll. J. Šnoflák (MMB); 1 ♀, Danube valley, Štúrovo, coll. J. Šnoflák (MMB). UKRAINE: 1 ♀, Crimea, coll. K. Hammer (NHMW). UNKNOWN LOCALITIES: 1 ♀, golden green label (NHMW); 1 ♀, 3, VI, 1911, leg. F. Maidl (NHMW); 1 ♀, (TMB).

***Myrmilla rostriformis* LELEJ** AFGHANISTAN: 1 ♀, Nangarhar, surroundings of Kabul, 1740 m, 5, V, 1952, J. Klapperich (NHMW); 2 ♀♀, Nangarhar, surroundings of Kabul, 1740 m, 14, V, 1952, J. Klapperich (NHMW); 6 ♀♀, Nangarhar, surroundings of Kabul, 1740 m, 25, V, 1952, J. Klapperich (NHMW); 1 ♀, Parvan, Tangi Saidan near Kabul, 1750 m, 27, V, 1952, J. Klapperich (NHMW); 1 ♀, Baiman, Sarabi, 900 m, 12, VI, 1952, J. Klapperich (NHMW); 1 ♀, Parvan, surroundings of Bazarak, 2200 m, 27, VI, 1952, J. Klapperich (NHMW); 1 ♀, Nangarhar, Darun valley at the boder of river, 27.5.1969, leg. D. Povolný (MNCN).

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