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New and rare *Hedychridium* species from Italy and Mediterranean islands (Hymenoptera, Chrysididae)

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ABSTRACT

Two new species of *Hedychridium* (Hymenoptera, Chrysididae) are described (*H. tyrrhenicum* n. sp. and *H. etruscum* n. sp.) and the synonymy between *H. wolfi* Linsenmaier, 1959, from Sardinia, and *H. perraudini* Linsenmaier, 1968, from Corsica, is established. The geographical distribution of these species is discussed, showing that *H. tyrrhenicum* is an ancient species of many central Mediterranean islands, while *H. wolfi* is endemic to the Corso-Sardinian block (including the small islands of Asinara, Capraia, Elba, and Montecristo), and *H. etruscum* is known only from the Tuscany and Latium coasts and the islands of Elba, Giglio, Gorgona, and Pianosa. In addition, *H. etruscum* and *H. wolfi* are the only Chrysididae species known from Montecristo. The geographical ranges of the new species are distinct; *H. tyrrhenicum* appears to be dominant, in its range, with respect to the widespread *H. monochroum*, as is *H. etruscum* on Elba, while the contrary is the case on the Tuscany Mainland; *H. wolfi* coexists with *H. tyrrhenicum* and *H. etruscum* on the Monte Capanne on Elba. The presence of *H. carmelitanum* Mercet, 1918, in Sicily is confirmed. A key is given for the identification of the Italian species of the *H. monochroum* group, namely *carmelitanum, etruscum, monochroum,* and *tyrrhenicum.*

KEY WORDS: Hymenoptera - Chrysididae - *Hedychridium* - Taxonomy - Western Mediterranean

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INTRODUCTION

Hedychridium Abeille, 1878, is the second largest genus of the Hymenoptera family Chrysididae, which includes many species from all regions, with the exception of Australia and Indonesia (Strumia, 1994, 1999). A further subdivision into subgenera proves difficult and unsatisfactory, since several species have intermediate characters. For practical purposes, the genus *Hedychridium* was tentatively divided into species groups by Linsenmaier (1968, 1987, 1997), Bohart & Kimsey (1978), Kimsey & Bohart (1990), and Strumia (1999), but this task is not yet completed and further studies are needed.

The species of the original Linsenmaier (1968) *monochroum* group were described as "Sehr klein, Punktierung sehr fein und meist dicht. Meta-Thorax-Zähne klein, Mesopleuren abgerundet, Kopf dick. Von der *ardens* Gruppe nicht scharf geschieden". Kimsey & Bohart (1990) added further useful characters: "brow is large and bulging, scapal basin is very short and cross-ridged with large lateral punctures, flagellum long, slender, and tapering apically, F-I is long, medial vein straight, and T-III somewhat rolled under laterally". Additional useful characters are unmodified fore femora, posterior tibiae without pit on internal side, second tarsomere of hind legs not shorter than third, Rs longer than stigma, TFC absent (Linsenmaier, 1999, and Strumia, 1999).

By using the above characters, a group of similar species, possibly monophyletic, can be isolated. In the Palearctic Region the *monochroum* group presently includes: *adventicium* Zimmermann, 1961, *atratum* Linsenmaier, 1968, *breviceps* Semenov, 1954, *carmelitanum* Mercet, 1915, *fulvago* Semenov and Nikol'skaya, 1954, *minutissimum* Mercet, 1915, *monochroum* Buysson, 1888, *rhodojanthinum* Enslin, 1939, *tenerifense* Linsenmaier, 1968, and *zelleri* Dahlbom, 1845. Recently Linsenmaier (1999) transferred *parkanense* Balthasar, 1946, and *dismorphum* Linsenmaier, 1959 to the *coriaceum* group. All the above species have restricted geographical ranges, only *monochroum* being widespread, ranging from southern and eastern Europe, North Africa, and Asia Minor to Pakistan, India, Burma, and Thailand (Strumia, 1999).

In 1981, I tentatively identified (Strumia, 1981) three female individuals of a small and completely red-bronze *Hedychridium* from the Maltese islands as *H. dismorphum,* even if the abdomen shape in top view does not correspond to Linsenmaier's original drawing. In fact, those individuals and the additional eight that I was able to study afterwards, belong to a new species of the *monochroum* group. In the following years, several additional specimens of this new red-bronze species were found in other Mediterranean islands, namely Sardinia, Corsica, Asinara, Capraia, Montecristo, Ustica, and Sicily. This remarkable geographical distribution overlaps only partially that of *monochroum.*

A second new *Hedychridium* species, also closely re-

lated to *monochroum*, but completely non-metallic black in colour, was found along the Tuscan and Latium mainland and on the islands of Elba, Giglio, Gorgona, and Pianosa, thus showing a disjunct distribution with respect to the red-bronze one and partially overlapping that of *monochroum*.

In the present paper, these two new species are described; in addition the presence of *H. carmelitanum* in Sicily is confirmed and the synonymy between *Hedychridium wolfi* Linsenmaier, 1959, and *H. perraudini* Linsenmaier, 1968, is established. *H. wolfi* was originally described from southern Sardinia and *perraudini* from Corsica. I collected and studied several additional specimens from Sardinia, Corsica, and the smaller islands of Asinara, Capraia, Elba and Montecristo. The interesting geographical distribution of these species is discussed and explained in the frame of the plate tectonic history of the western Mediterranean Basin.

The present revision was made possible by loans of specimens from institutions and individuals. The abbreviations used are as follows: LEIM, National Natuurhistorisch Museum (Leiden); MRSNT, Museo Regionale di Storia Naturale (Torino); MCSNG, Museo Civico di Storia Naturale "G. Doria", Genova; NMF, Naturmuseum Senckenberg, Frankfurt am Main; MSNT, Museo di Storia Naturale e del Territorio, Calci (Pisa); WLC, Walther Linsenmaier collection, Ebikon (CH); FSP, Author's collection, Pisa; MPC, Maurizio Pavesi collection, Milano; PRC, Paolo Rosa collection, Bernareggio (MI).

MATERIALS AND METHODS

The species of the *monochroum* group are considered uncommon and few individuals are present in the museum collections. On the contrary, several individuals can be found by use of proper techniques, and the new species *H. etruscum* proved far and away the most common chrysidid of Elba. I never observed these species on flowers, but on the ground or on dead twigs, moving fast in search of host nests. Thus both Malaise and Pan traps work very well, while netting on the ground is relatively easy, but much more difficult for the individuals moving inside bushes. The large number of *etruscum* individuals from Elba was collected in Malaise Traps; only one female was netted on the ground.

The following abbreviations are used: F, flagellomere; IOA, interocellar angle between the middle ocellus and the lateral ones; IOD, interocellar distance measured between lateral ocelli; MOD, midocellus diameter; OOD, ocellocular distance measured from lateral ocellus to compound eye; P, pedicel; PD, puncture diameter; PS, punctures separation; S, gastral sternum; T, gastral tergum; Te, tegulae; TFC, frons transverse carina; m, male; f, female. The facial width to height ratio (Facial W/H) is the ratio of the width, measured between the external margins of eyes, to the height, measured in frontal view from the occiput to the clypeus distal margin.

The tegumental sculpture is taxonomically important in the Chrysididae family. Here the following terms are used: the tegumental sculpture is said to be "reticulate" when the punctures are touching so that punctures cannot be round but appear to be polygonal; "close" is a sculpture with on average PD/PS = 0.5; "sparse" when 0.5 < PD/PS = 2.0; "smooth" when PD/PS > 2.0. The punctures are "simple" when of about the same size, "double" when there is a clear mixture of two different sizes and the PD of the smallest punctures is less than 0.5 that of the largest one. The punctures are said to be "uniform" when they have approximately the same size all over a given anatomical part; on the contrary they are said to be "uneven" when the size changes.

TAXONOMIC ACCOUNT

Hedychridium etruscum n. sp.

Material

Holotype female: Punta delle Cannelle, Elba, Malaise trap (42°46.61' N 10°25.72' E), 2/16-VIII-2000, length 3.2 mm.

Material studied: Holotype female and 74 paratypes: 1) from Elba: 1 m, 42 f: "Punta delle Cannelle", Porto Azzurro, Malaise trap (42°46.61' N 10°25.72' E), from 08-VI/26-VIII-2002; 1f La Biodola, 23-VIII-1962, legit A. Mochi; 3 f Marciana, Malaise trap (42°47.22' N 10°10.00' E), 24-V/16-VIII-2002; 1 f Marciana, 21-VI-2002; 2) from Giglio: 3 f VIII-1901 and 1902, legit G. Doria; 3) from Gorgona: 1m 9 f, Malaise trap (43°25.90' N 9°54.01' E), 11-VI/27-VIII-2002; 4) from Pianosa: 2 f, Malaise trap (43°25.90' N 9°54.01' E), 26-VII-26-VIII-2001; 5) from the Tuscan and Latium mainland 11 individuals: 4 m San Piero (Pisa), Pan traps, 01-VII/20-VIII-1994/1997; 1 m San Rossore (Pisa), Pan trap, 08-VII-1995; 1 m Vecchiano (Pisa), Pan trap 10-VI-1990; 1 m Santa Maria del Giudice (Lucca), 09-VII-1995; 1 m Case Ferri, Fauglia (Pisa), 04-VIII-1996; 2 m Laiatico, (Pisa), Pan trap, 15/21-VII-1995; 1 m Orciatico (Pisa), Pan trap, 30-VI-1994; 1 m Capena (Roma), 27-VII-1994.

Holotype and paratypes in FSC, paratypes in MRSNT (1 f from Elba), MSNT (4 f from Elba), MCSNG (2 f from Giglio), LEIM (1 f from Elba), NMF (1 f from Elba), WLC (1 m from San Piero), PRC (1 f from Elba) and MPC (1 f from Elba).

Description

Color: head, thorax, legs and abdomen black without evidence of metallic color; S-II black without metallic dot, tarsi brown (Fig. 1). Antennae normal, not expanded; scape, pedicel and flagellum black; F-I l/w = 3.2; length ratio F-I/P = 1.6; length ratio F-I/F-II = 1.8; flagellomere from F-IV on l/w > 1.

Face oval in shape in frontal view, facial W/H = 1.5; punctures on frons and vertex reticulate PD = 0.4 MOD, TFC absent. Scapal basin coarsely punctuate laterally (PD = 0.4 MOD) with a few coarse striae in the middle. Clypeus short, 0.9 MOD; malar space short (0.8 MOD) and strongly converging; mandible dark, brown at center, with two additional teeth. IOA smaller than 90° (average 84.9°, standard deviation 1.7°); IOD smaller than OOD. Vertex with occipital angles rounded.

Pronotum slightly converging on anterior border; punctures on pronotum, mesonotum and scutellum reticulate to close (PD = 0.4 MOD), uniform; notauli slightly diverging frontally. Metanotum punctures reticulate, uniform PD = 0.5-0.6 MOD, metanotum as long as scutellum; mesopleuron rounded ventrally, with punctures simple, close, uniform (PD = 0.3-0.4 MOD), lateral pro-

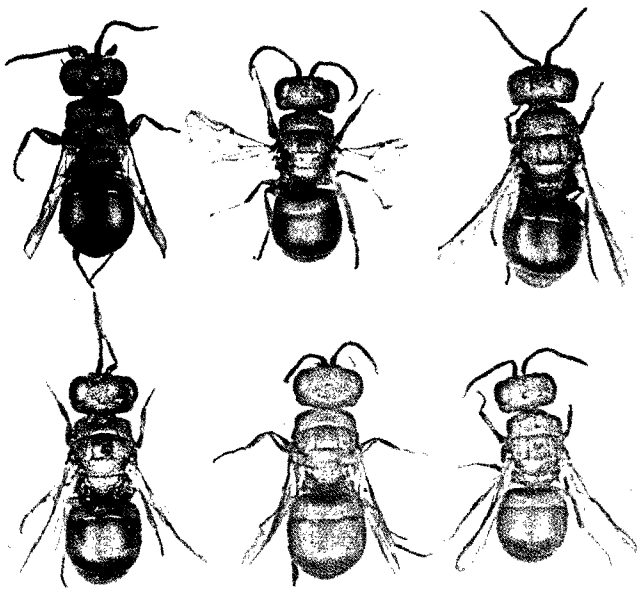

Fig. 1 - *Hedychridium etruscum* n. sp.: top left holotype, female from Elba Island, 02/16-VIII-2000. *Hedychridium monochroum* Buysson: top center Tuscany, Lugnano (Pisa); top right Sicily, Selinunte (Trapani); bottom left Tuscany, Filettole (Pisa). *Hedychridium tyrrhenicum* n. sp.: bottom center female from Montecristo, 25-VIII-1999; bottom right female from Selinunte (Trapani), 12-VI-1983.

podeal angle acute and pointing outwards. Pronotum to scutellum length ratio 1.1; head to pronotum width ratio 1.16. Anterior femora simple, without a ventral longitudinal carina.

Wings light brown, veins brown; tegulae non-metallic black; median vein M nearly straight; Rs = 1.5 times stigma length; Cu not sclerotized; posterior wings with 5-6 hamuli. Abdomen strongly convex, short (l/w = 1.1), without longitudinal or transverse carina, punctures simple, uniform, close to reticulate, PD = 0.2-0.3 MOD, posterior margin of T-III round, smooth and canaliculate. The punctures on S-II are numerous, sparse and deep, PD = 0.2 MOD. Pubescence on all body white and short, less than 1 MOD in length. Sexual dimorphism absent, only the male posterior margin of T-III more round and S-IV less visible. The male genital capsule similar to that of *monochroum*. Body length 3.0 - 3.5 mm.

Hedychridium tyrrhenicum n. sp.

Material

Holotype female: Moltifao near the bridge on the Asco river, Corsica (F), 14-VI-1997, length 3.0 mm.

Material studied: Holotype and 142 paratypes: 1) from Maltese islands, 11 specimens: 1 f St. Marija Bay, Comino, 13-VII-1976; 2 f St. Thomas Bay, Malta, 26-VII-1977; 1 m and 2 f Wied Mistra, 13-VIII-1997, Malta; 1 m Ghasti Wied Lunzjata, 20-VIII-1996, Malta; 4 f Marsalforn, 27/28-IX-1980, Gozo; 2) from Sardinia, 21 specimens: 5 f Elmas (Cagliari), 01/02- IX-1993; 2 m Quartu St. Elena (Cagliari), 01-IX-1993; 2m 1 f Geremeas (Cagliari), 01-IX-1993; 1 f Stintino (Sassari), 08-IX-1993; 1 f Berchidda, 490 m. a.s.l., (Sassari), summer 2000 and 16 f 04-VI/30-VIII-2002, Malaise trap (40° 47.49' N 9° 08.87' E); 1 f Luras, 450 m. a.s.l., (Sassari), Malaise trap (40°56.84' N 9°09.65' E), 17/31-VIII-2000; 3) from Asinara: 1 m 5 f, VIII-1903, legit S. Folchini; 2 m and 11 f Fornelli Malaise trap (40°59.48' N 8°14.73' E) 11-VI/09-X-2002; 4) from Corsica, 29 specimens: 2 m 6 f, Moltifao near the bridge on the Asco river, Pan trap, 08/10-VII-1998; 1 m La Marana, Casone, Pan trap, 01/04-VII-1997; 1 m Piana, River Tartagine, 09-VI-1997; Castirla, River Golo, Malaise trap (42°22.91' N 9°09.08' E), 1 m and 7 f 11-VI/16-VIII-1999; 5 f 24-VI/24-VII-2000, 2 f 05-VI/01-VIII-2002, 5 f Cuttoli, Malaise trap (41°57.85' N 8°50.83' E), 15-VII/15-VIII-2001; 5) from Montecristo, Malaise trap: 2 f 25-VII/25-VIII-1999, 1 f 30-VI/15-VII-2000, 1 f 1/15-VII-2001; 6) from Capraia, Malaise trap, 25 specimens: 1 f 30-VI/31-VII-2000; 1 f 03/15-VII-1999 (I Pollai: 43°02.17' N 9°50.02' E), 1 m and 8 f 06/22-VI-2002, 8 f 22-VI/08-VII-2002, 6 f 08/23-VII-2002 (San Rocco: 43°02.63' N 9°50.54' E); 7) from Sicily 18 specimens: 1 f Selinunte (Trapani), 12-VI-1983; 2 m and 15 f, Foce del Modione, Selinunte (Trapani), 10-VIII-1985; 8) from Ustica: 2 f, 17 and 18-VII-1984.

Holotype and paratypes in FSC, paratypes in MRSNT (1 f from Capraia), MSNT (5 f from Asinara, 2 f from Berchidda, 1 f from Castirla), MCSNG (5 f from Asinara), LEIM (4 f from Gozo), NMF (1 f from Capraia), WLC (1 f from Elmas), MPC (1 m 8 f from Sicily, 1 f from Ustica), PRC (3 f from Elmas, 1 m from Geremeas, 1 f from Stintino).

Description

Color: pronotum bronze-red without black dot or central and transverse stripe (over 95% of individuals), head vertex, mesonotum and scutellum bronze-red to pink-red, central part of mesonotum often partially black, facial cavity green or golden green, rarely bronze-red, metanotum green-gold to bronze-red; mesopleuron from bronze-red to green-gold; femora and tibiae from bronze-red to bronze-green, tarsi brown. T-I color ranges from bronze-red to golden-green without trace of black stripe or dots near the posterior margin. T-II of the same color as T-I but with a large central black dot starting from the anterior margin but not reaching the posterior one. T-III variable in color from bronze-red to green with red or gold shining, sternum mostly metallic bronze to bronze-green (Fig. 1, 2). Antennae normal, not expanded; scape metallic bronze; pedicel and flagellum black; F-I l/w = 3.0; length ratio F-I/P = 1.4; length ratio F-I/F-II = 1.5 to 1.7; flagellomere from F-IV on l/w > 1.

Face oval in shape in frontal view, facial W/H = 1.45; punctures on frons and vertex reticulate PD = 0.4 MOD, TFC absent. Scapal basin with coarse punctures laterally (PD = 0.4 MOD), and a few coarse and transverse striae in the middle, Clypeus short, 0.9 MOD; malar space

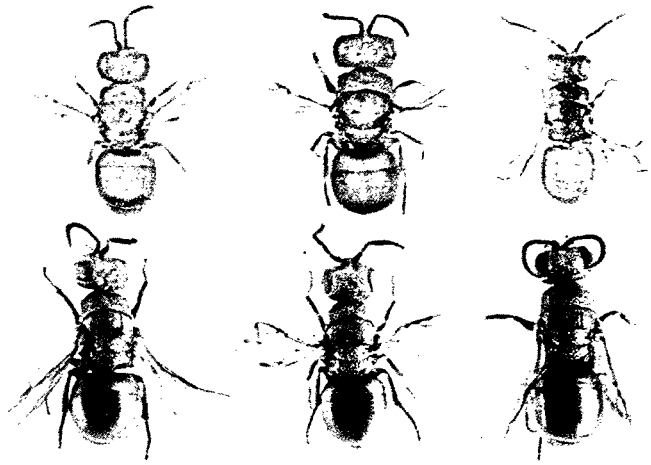

Fig. 2 - *Hedychridium tyrrhenicum* n. sp.: top left female from Malta, St. Thomas Bay, 26-VIII-1976; top center holotype, female from Moltifao, Corsica, 14-VI-1997. *Hedychridium carmelitanum*: top right female from Sicily, Selinunte (Trapani). *Hedychridium wolfi* (= *perraudini*): bottom left Corsica, Moltifao; bottom center Sardinia, Porto Torres; bottom right Montecristo.

short (1.0 MOD) and strongly converging. Mandible dark, brown at center, with two additional teeth. IOA smaller than 90° (for 54 Corso-Sardinian individuals the average is IOA = 84.6°, SD = 1.7°, for the 11 Maltese islands specimens IOA = 85.7°, SD = 1.1°; for the 18 Sicilian specimens IOA = 87.3°, SD = 2.3°). IOD smaller than OOD, and vertex with the occipital angles rounded.

Pronotum slightly converging on anterior border; punctures on pronotum, mesonotum and scutellum reticulate to close (PD = 0.4 MOD), uniform; notauli parallel. Metanotum punctures reticulate, uniform PD = 0.5 MOD, metanotum as long as scutellum; mesopleuron rounded ventrally, with punctures simple, close to reticulate, uniform, PD = 0.3-0.4 MOD. Lateral propodeal angle acute and pointing outward. Pronotum to scutellum length ratio 1.1; head to pronotum width ratio 1.2; anterior femora simple, without ventral longitudinal carina.

Wings light brown, veins brown; tegulae metallic bronze; median vein M nearly straight; Rs = 1.2 times stigma length; Cu not sclerotized; posterior wings with 5-6 hamuli. Abdomen markedly convex, short, l/w = 1.05, without longitudinal or transverse carinae, punctures simple, uniform, close to reticulate, PD = 0.2-0.3 MOD, posterior margin of T-III round, smooth and canaliculated. The punctures on S-II are numerous, sparse and deep, PD = 0.2 MOD. Pubescence on all body white and short, less than 1 MOD in length. Sexual dimorphism absent, only the male posterior margin of T-III more round and S-IV less visible.

The male genital capsule is similar to that of *monochroum*, but the males from the Corso-Sardinian region have a different paramere internal margin as shown in Figure 3. The individuals from this region (including Asinara, Capraia, and Montecristo) appear to be a uniform group with facial cavity, mesopleuron and metanotum prevalently golden green to green.

Individuals from the Maltese islands are more or less entirely red-bronze in color, including the central part of mesonotum, that is, on the contrary, stained more or less black in the Corso-Sardinian individuals. Such differences are possible evidence of two distinct subspecies. The individuals from Sicily are unfortunately known only from a single locality near Selinunte and show a color range from pink-red, close to those from the Maltese islands, to more greenish where only the scutellum is bronze-red in color, the remainder being a mixture of bronze and green. In the same locality, the only known to me from Sicily, also 8 specimens of *H. monochroum* were found. Two additional individuals showed mixed characters and the presence of hybrids cannot be ruled out.

Hedychridium monochroum Buysson, 1888

Material

Material studied: about 300 individuals from the Italian mainland; 2 from Corsica: 1 m, Moltifao near the Asco river, 08-VII-1988; 1 m, Tarcu, 28-V-2000; 1 f from Elba: Punta delle Cannelle, Malaise trap (42°46.61' N 10°25.72' E), 12/27-VII-2001; 3 m and 5 f from Selinunte (Sicily), Foce del Modione (Trapani), 10-VIII-1985; 1 f from Ustica, 18-VII-1984; a few individuals from Spain, Portugal, Cyprus, Syria, India, and Burma.

Remarks

Hedychridium monochroum is a southwestern Palearctic species found all around the Mediterranean Sea, in southern and south-eastern Europe, and Yemen (Lin-

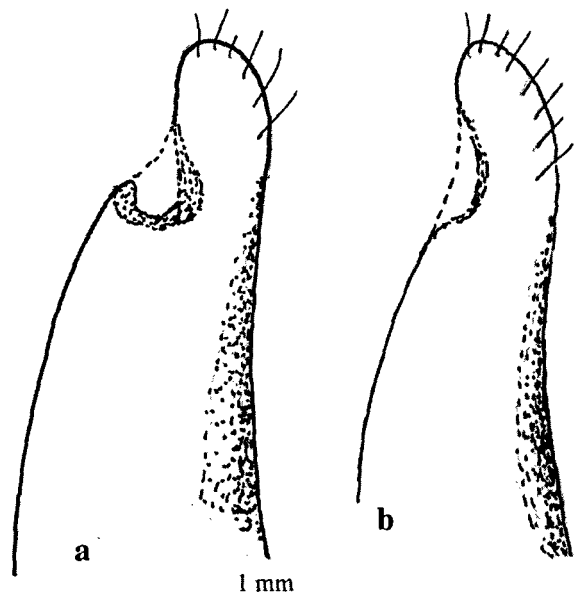

Fig. 3 - Male genitalia right paramere in top view: a, *Hedychridium monochroum*, from Tuscany, Fauglia (Pisa) 20-VIII-1994; b, *Hedychridium tyrrhenicum*, from Sardinia, Quartu (Cagliari), 01-IX-1993.

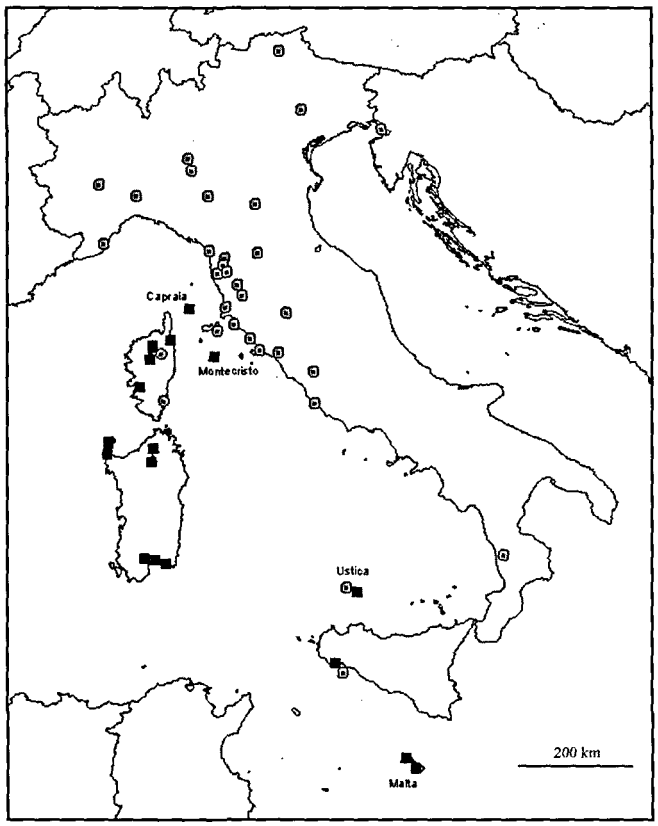

Fig. 4 - Geographical distribution in Italy and Corsica of *H. monochroum* (open squares) and *H. tyrrhenicum* (black squares).

senmaier 1959, 1994). In the Oriental Region it was found at Quetta (Pakistan) (Nurse, 1904), at Lampun (Thailand) (Tsuneki, 1961), at New Delhi (India) (Strumia, 1999) and at Rangoon, Burma (Strumia, 1994). The studied specimens show a high level of uniformity in spite of this very broad distribution.

Hedychridium monochroum is green, blue-green or blue in color with a variable extent of black on occiput, pro- and mesonotum, T-I and T-II. In particular, in about 93% of individuals the large black spot on T-II extends to the distal part of T-I either as a continuous stripe or as two symmetric spots. A more or less clear transverse black stripe in the middle of pronotum is present on almost all individuals (Fig. 1).

Hedychridium wolfi Linsenmaier, 1959 = *Hedychridium perraudini* Linsenmaier, 1968, new synonymy

Material

Material studied: 2 paratypes of *H. perraudini* from NMF (1 female, not a male, Forêt de l'Ospedale, Corsica 650 m. a.s.l.,10-VIII-1969, leg. W. Perraudin; 1 female, not a male, Forêt de Ghisoni, Corsica 800 m. a.s.l., leg. W. Perraudin) and 86 individuals: 1) from Asinara, 14 individuals VIII-1903, leg. S. Folchini; 1 f Punta Sabina 13/28-VIII-2001, Malaise trap; 2) from Sardinia: 1 f, Porto Torres (Sassari) 09-VI-1986; 1 f, Alghero (Sassari) 08-VI- 1986; 3 f Santa Teresa di Gallura (Sassari), 02-IX-1980; 2 f Palau (Sassari), 04-IX-1980, 1 f 04-VI/08-VII-2002 Berchidda (Sassari), 490 m a.s.l., Malaise trap (40°47.49' N 9°08.87' E); 3) from Corsica: Moltifao near the Asco River, 1 f 09-VI-1997, 2 m 08-VII-1998; Pielza-Tovisanu 1 m 13-VII-1997; Castirla, River Golo, Malaise trap (42°22.91' N 9°09.08' E), 1 m and 2 f 30-VI/16-VIII-1999, 1 f 24-VII/16-VIII-2000, 6 f 03-VII/23-VIII-2002; 3 f Bavella 480 m a.s.l. (41°49.47' N 9°15.76' E) 11-VII-2002; 4) from Capraia, Malaise trap: 1 f 02/16-VIII-1999, 1 f 30-VI/31-VII-2000 (I Pollai), 1 m and 2 f 06/22-VI-2002, 4 m and 3 f 22-VI/08-VII-2002, 4 m and 2 f 08/23-VII-2002 (San Rocco); 5) from Montecristo, Malaise trap: 2 m and 3 f, 07-VII/September-1998; 1 m and 4 f 25VI/25-VIII-1999; 2 m and 1 f 15-VI/15-VIII-2000; 8 m and 3 f 15-VI/31-VII-2001; 6) from Elba: 4 f 24-V/16-VIII-2002 Marciana 380 m a.s.l., Malaise trap (42°47.22' N 10°10.00' E).

Remarks

Linsenmaier (1959, p. 234) described *Hedychridium wolfi* from a single female specimen from Sardinia (Cagliari, Poetto, Daucus, 17-VII-1959), and *H. perraudini* from a single female specimen from Corsica (Ft. l'Ospedale, VIII.1967) (Linsenmaier, 1968, p. 126). Afterwards W. Perraudin (1978) collected several additional individuals from Corsica and noted the variability of this species: "Coloration très variable, soit entièrement cuivré--rougeâtre, soit tête et thorax ver vif et abdomen cuivré, soit thorax cuivré ou bronzé avec le post-scutellum vert et scutellum rouge, soit entierment vert etc..". In addition the blue stripe at the T-I posterior border can be either clearly visible or lacking, and the central dark spot on T-II quite variable in size (Fig. 2). Nevertheless such variability is present in all populations and, in conclusion, all individuals must belong to a single species endemic to the Corso-Sardinian region, including the islands of Asinara, Capraia, Elba and Montecristo.

Hedychridium carmelitanum Mercet, 1918

Material

Material studied: 4 females from Sicily: Selinunte (Trapani), foce del Modione, 10-VIII-1985 leg. M. Pavesi; a few specimens from Spain.

Remarks

Originally described from the Madrid region, this species is known from central and southern Spain (Mingo, 1994), Tunisia, Morocco, and Greece (Linsenmaier, 1999). In 1995, I wrongly identified the Sicilian specimens as *H. rhodojanthinum* Enslin, 1939, an eastern--Mediterranean species. Additional comments from Linsenmaier (1997) and the comparison with *carmelitanum* specimens from Spain and *rhodojanthinum* ones

from Syria (Damascus) led to the correct identification of the Sicilian individuals of this uncommon species. In fact, one Sicilian female shows the typical non-metallic abdomen, while the remaining 3 have a partially olive-green abdomen, as described by Linsenmaier (1997) (Fig. 5). It is worth noting that in a recent (2001) visit to the Madrid Museum, I found that the supposed type of *carmelitanum* does not correspond to Mercet's original description (Mercet, 1915). The specimen labelled as the typus of *carmelitanum* is, on the contrary, a female of *H. minutissimum* Mercet, 1915, whose typus, a male in the Madrid Museum, corresponds to the original description, and is kept in the same box.

CONCLUSIVE REMARKS

Since a large number of individuals is available, the geographical distribution of *H. wolfi* and of the new species can be discussed. The distribution ranges of *H. monochroum* (in Italy) and *tyrrhenicum* are shown in Figures. 4 and 5. *H. tyrrhenicum* appears to be an ancient species belonging to the tectonic microplate that, moving eastward from Iberia, formed the Corso-Sardinian block as well as part of northern Sicily and southern Calabria (Alvarez *et al.*, 1974; Alvarez 1976; Edel *et al.*, 2001). The Maltese Islands belong to the Sicilian block and show a typical Sicilian Chrysididae fauna without North-African species (Strumia, 1981). In fact, during the glaciations the Maltese islands were joined to Sicily. The presence of *H. tyrrhenicum* on the small islands of Montecristo and Capraia is consistent with the general results of a recent statistical analysis on the affinities between the Hymenoptera population of the Tuscan Archipelogo Islands, the Corso-Sardinian block and Tuscany (Strumia *et al.*, 2003). In fact, we have obtained clear evidence that Montecristo and Capraia were populated from the Corso-Sardinian region, while the remaining islands, joined to the Tuscan mainland during the glaciations, were mainly populated from Italy mainland. Montecristo is an ancient ercinic mountain similar to Corsica; Capraia is the eastern remnant of a larger volcanic island that emerged near Corsica about 9 Ma B.P. and terminated its volcanic activity about 4.5 Ma B.P. Neither island was never submerged or in contact with the Italian mainland (Bossio *et al.*, 2000). Recently *H. wolfi* was also found on Monte Capanne (Elba) mixed with *H. etruscum.* In fact the western side of Elba is also an ancient ercinic mountain similar to Corsica and Montecristo and some affinity with the Corso-Sardinian fauna can be expected.

Hedychridium etruscum was found on the islands of Gorgona, Pianosa, Elba, Giglio, and along the coast of Tuscany and of Latium, north of Rome (Fig. 5), with maximum abundance on Elba. *Hedychridium etruscum* appears to be a localized species endemic to part of the "Arcipelago Toscano" and the nearby mainland coast, to which the same islands were connected during the Würm ice age up to a few thousand years B.P.

The geographical distribution of *H. wolfi* (= *perraudini*) is shown in Figure 6. This species is a Corso-Sardinian endemism and its presence on Capraia, Elba, and Montecristo is a further element of support for the above conclusions. Its coexistence with *tyrrhenicum* and *etruscum* suggests low or no competition, while the ranges of *tyrrhenicum* and *etruscum* appear disjunct.

TABLE I - *Identification key for the Italian species of the* Hedychridium monochroum *group.*

1 - Tergum mostly, or partially, non-metallic brown or black, legs non-metallic light brown or black
2
- Tergum metallic green-blue or bronze-red with a large black spot on T-II, femora and tibiae metallic blue-green or red
3

2 - Tergum mostly, or partially, non-metallic brown (as in the *roseum* group), legs and flagellum non-metallic light brown
carmelitanum
- Tergum entirely black, non-metallic, legs and flagellum black
etruscum

3 - Head and scutellum blue-green to green-gold. Pronotum green or blue-green often with a central and transverse black stripe. Tergum green-blue to green, the black spot on T-II extends to the distal part of T-I (93% of individuals) either as a continuous stripe or as two symmetric spots
monochroum
- Head and scutellum mostly or entirely red-bronze. Pronotum mostly red-bronze and rarely with a central and transverse black stripe. Tergum bronze-red to bronze-green, T-I without a distal black spot or stripe
tyrrhenicum

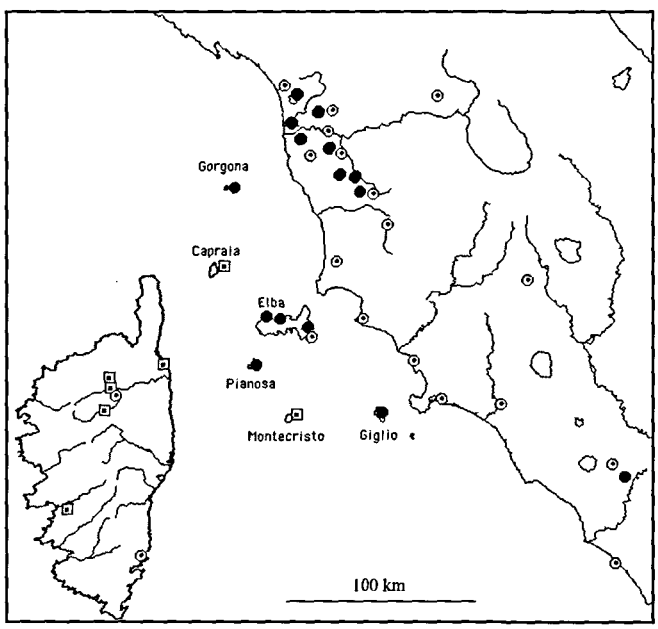

Fig. 5 - Geographical distribution in Corsica, Tuscany and Latium of *H. etruscum* (black dots), *H. tyrrhenicum* (open squares) and *H. monochroum* (open circles).

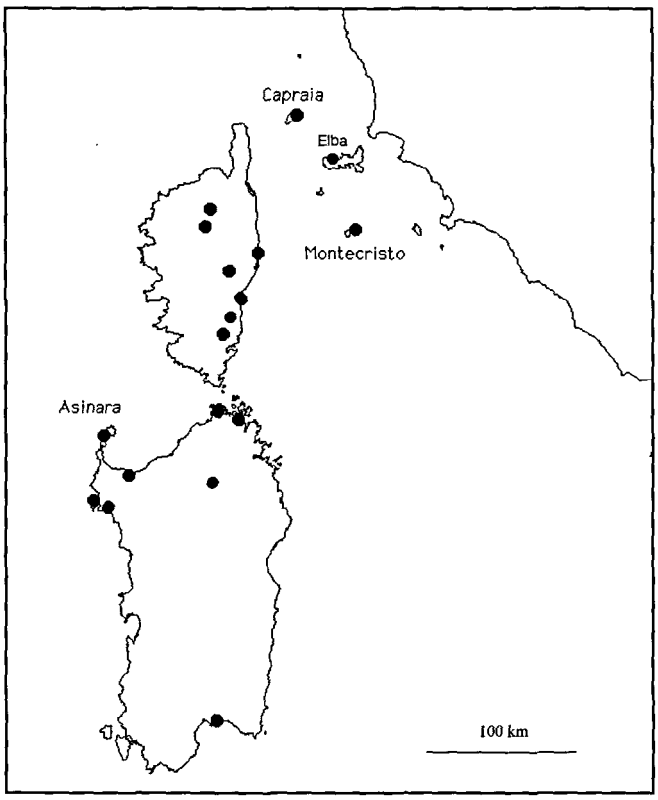

Fig. 6 - Geographical distribution of *H. wolfi* (= *perraudini*).

The geographical distribution of *H. monochroum* follows that of the Indo-Mediterranean chorotype (Vigna Taglianti *et al.*, 1992), with a further extension to Burma and Thailand (Strumia, 1999). From a recent revision (Strumia, 2002) its distribution in Italy appears to be non-uniform. As shown in Figure 4, *monochroum* is more frequent in northern Italy, Tuscany and Latium while in southern Italy it is known only from Calabria, western Sicily and Ustica. In the Tuscan Archipelago, only a single individual of *H. monochroum* is known from Elba. Species of the *monochroum*-group are rarely found on flowers and as a consequence are uncommon in the museum collections. On the contrary, individuals can be found on dead woods and twigs or near the ground rapidly moving in search of the host's nests (small Sphecidae wasps) and exploring the small holes they found. Therefore, since the behavior is similar, the relative abundance can be inferred not only from the Malaise trap catches but also from the individuals collected by netting or by Pan traps. As a result, *monochroum* is the dominant species on mainland, while *etruscum* is dominant on the archipelago islands. From Corsica *H. monochroum* is known to me only from two individuals: one found in yellow pans mixed with *tyrrhenicum* and *wolfi* individuals along the Asco river near Moltifao, the second netted on dead twigs (an unusually small and dark male, length = 2.3 mm). I could not study the *monochroum* individuals collected by Perraudin and thus do not know whether they are true *monochroum* or belong to the new species *tyrrhenicum*. In addition, *monochroum* is not known from Sardinia, Asinara and the Maltese islands. Thus in the Corso-Sardinian region *tyrrhenicum* is the dominant species, exceeding *monochroum* in spite of the latter's more widespread and already successful distribution.

In conclusion, the two species *H. tyrrhenicum* and *H. wolfi* (= *H. perraudini*) appear to be associated to the Corso-Sardinian microplate. The presence of *tyrrhenicum* in Sicily, Ustica and the Maltese islands (possibly as a different subspecies) can be explained in the frame of the fragmentation of this microplate with a separation as long ago as 18-20 Ma B.P. (Edel *et al.*, 2001). Dispersal during the Messinian salinity crisis is also possible but unlikely, because the currently known distribution is restricted to the fragments of the original microplate, apart from the Maltese islands. This picture is also in agreement with the proposed interpretations on the origin of the Corsican flora (Contandriopoulos, 1981, 1990) and entomofauna (La Greca, 1990). The new species *H. etruscum* appears distributed along the coast of Tuscany and Latium and on those islands of the Tuscan Archipelago that were in contact with the Italian mainland during the Würm ice age, thus suggesting an origin on the Tuscan mainland.

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