ROBERTO BATTISTON e BRUNO MASSA

THE MANTIDS OF CAUCASUS
(Insecta Mantodea)

ABSTRACT - BATTISTON R. e MASSA B., 2008 - The Mantids of Caucasus (Insecta Mantodea).

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A summary of the actual knowledge on the Mantodea of Caucasus is presented, with new morphological and morphometrical data on not well known species from this region. The male of *Hierodula transcaucasica* is redescribed here. The external morphology and shape of genitalia are analysed. A comparison with previous data and some biogeographical considerations on *Paramantini* are given.

KEY WORDS - Mantodea, *Hierodula transcaucasica*, *Paramantini*, Morphology, Caucasus, Biogeography.

RIASSUNTO - BATTISTON R. e MASSA B., 2008 - Le Mantidi del Caucaso (Insecta Mantodea).

Vengono qui riassunte le conoscenze attuali sui Mantodei del Caucaso, con nuovi dati morfologici e morfometrici su alcune specie poco note di questa regione. Viene ridescritto il maschio di *Hierodula transcaucasica*. Sono analizzate la morfologia esterna e la forma dei genitali. Vengono fornite una comparazione con dati precedenti e alcune considerazioni biogeografiche sui *Paramantini*.

PAROLE CHIAVE - Mantodea, *Hierodula transcaucasica*, *Paramantini*, Morfologia, Caucaso, Biogeografia.

INTRODUCTION

Caucasus is a quite large region including three different countries, Georgia, Armenia, Azerbaijan and a small part of Southern Russia, and it is very rich in terms of different kinds of landscape; there are desert and semi-desert areas, mountain steppes, forests and scrublands, alpine and sub-alpine meadows, within a range of altitudes from 375 to 2500

m a.s.l. From the biological and landscape diversity point of view, Caucasus is one of the richest palearctic areas; in particular it holds many endemic taxa and represents the geographic limit of South or North distribution of a lot of species. Fauna of Caucasian countries is rather known, but some arthropods still need a better survey; among them we may comprise Mantodea.

Despite this biological richness the order of Mantodea currently counts in this region only 8 Genera and 10 species without any endemism. This could be probably explained by the extremely poor records available in literature and Museum collections and by absence of any comprehensive work on it. With the exception of single species descriptions, only HARZ & KALTENBACK (1976) reported some data on the easternmost European mantids, citing only *Hierodula transcaucasica* Brunner von Wattenwyl, 1878 from the Southern part of European Russia, and RAMME (1951) recorded some data on *Empusa pennicornis* from the Southern Europe and Middle East. Aims of this work are to present the results of our studies to contribute to the knowledge of Caucasian areas of priority importance, to improve the knowledge of these and other not well known species of this region, summarizing also what it is known from literature.

MATERIALS AND METHODS

The specimens analyzed are preserved dry and in good conditions. External measurements were taken with a digital camera, a ruler, and processed with JMICROVISION V1.11 (copyright © 2002-2005 Nicolas Roduit). Male genitalia were extracted from the abdomen and clarified in KOH 10%, washed in H_2O, Alcohol, Eugenol $C_{10}H_{12}O_2$ (as described in BATTISTON, 2006), then mounted on a slide and photographed. External characters and genitalia, which were not clear in the photos, are depicted in drawings. Nomenclature of genitalia follows HARZ & KALTENBACH (1976). To elaborate a model of the hypothetical ancestor of Paramantini and to quantify the closeness of *H. transcaucasica* with it, Fourier analysis was performed on the processed images of genitalia with software SHAPE V1.2 (copyright 2001© Hiroyoshi Iwata). We compared the shape of the genitalia, in particular the distal process of ventral phallomere (hypophallus), between *H. transcaucasica* and two close relatives, like the African widespread genus of *Sphodromantis* and the Asiatic *Rhombodera*, with the Fourier analysis, to establish the evolutionary distance between these taxa.

The analysis calculates a mean shape of all the specimens considered and places them near or far from it in dependence of principal components of their shapes (Fig. 7, Fig. 8, Fig. 9). The mean model obtained in the output was considered here as an «*Ancestor species*», as a species that shares all the common characters with the others.

RESULTS

List of genera and species of Caucasian mantids

Genus and species	Distribution in Caucasus
Ameles cf. persa	Armenia
Bolivaria brachyptera	Armenia, Georgia
Empusa fasciata	Armenia
Empusa pennicornis pennicornis	Armenia, Georgia, Azerbaijan
Eremiaphila genei	Armenia
Eremiaphila persica persica	Azerbaijan
Hierodula transcaucasica	Armenia, Georgia
Iris polystictica polystictica	Azerbaijan, Georgia, Armenia
Mantis religiosa	Armenia
Rivetina caucasica caucasica	Georgia

1	Pronotum square, both sexes brachypterous. 6th abdominal sternite of the female with two spines. (*EREMIAPHILIDAE)*	**2**
	Pronotum elongated, clearly longer than wide, wings short or normally developed.	**3**
2	Pronotum covered by evident tubercles.	***Eremiaphila genei***
	Pronotum smooth or with small granules.	***Eremiaphila persica***
3	Ventromedial spines of anterior femur arranged with long spines separated by 3 or 4 short spines. Vertex prolonged into a more or less conical protuberance, divided at the apex. Antennae of male pectinate. (*EMPUSIDAE)*	**4**
	Ventromedial spines of anterior femur arranged with long spines alternating with short spines (or equal in length). Antennae of male never pectinate. (*MANTIDAE)*	**5**
4	Medium coxae with an evident rounded lobe.	***Empusa fasciata***

continue

	Medium coxae without or with not well developed lobes.	*Empusa pennicornis*
5	Fore femora with 4 external spines. Frontal shield without round knobs.	**6**
	Fore femora with 5 external spines. Frontal sclerite with 2 small round knobs.	*Iris polystictica*
6	Small size mantis (< 3cm)	*Ameles persa*
	Medium to big size mantis (>3cm)	**7**
7	Tegmina and wings of both sexes short, long one or two times the pronotum never reaching the end of abdomen.	**8**
	Tegmina and wings of both sexes normally developed, reaching or passing a little the apex of abdomen.	**9**
8	Frontal sclerite much broader than high. Knee of the mid and hind femora without spines. Medial face of the fore coxae with a sub-basal black or white, black-ringed spot.	*Mantis religiosa*
	Frontal sclerite almost as high as broad. Knee of the mid and hind femora with a small spine. Medial face of the fore coxae without a black spot.	*Hierodula transcaucasica*
9	Wings of the male about twice as long as the pronotum. Apex of the tegmina truncated. Supra anal plate elongated, sub genital plate of the female with two ventral spines.	*Rivetina caucasica*
	Wings in both sexes about of the length of the pronotum or a little longer. Apex of the tegmina more or less pointed. Supra anal plate short, sub genital plate of the female without spines.	*Bolivaria brachyptera*

Tab. 1. Key to the families and species of the mantids of Caucasus.

Museums Abbreviations. MNHN: Museé National d'Hisoire Naturelle, Paris; MNMS Museo Nacional de Ciencias Naturales, Madrid, Spain; NHMW: Naturhistorisches Museum, Wien; SMNK: Staatliches Museum fur Naturkunde, Karlsruhe; UZIU: Universitets Zoologiska Institut, Uppsala; ZMAS: Leningrad University, St. Petersburg; ZMB: Museum fur Naturkunde der Humboldt-Universitat, Berlin.

Ameles cf. persa Bolivar, 1911

Ameles persa Bolivar, 1911
Typus: Holotypus male MNMS, Allotypus female MNMS
Locus typicus: Iran
Distribution: Afghanistan, Armenia, Iran

Examined material

1 male, Armenia (Syunik), E Meghri, Artsvakar gorge, 650m, N 38° 55' E 46° 16', 08-VI-2007, leg. M. Kalashian (coll. R. Battiston).

Remarks

We were able to examine only one male specimen and it well showed main characters of the *A. persa*-group such as eyes, pronotum and legs.

However, the taxonomy of this group, that includes *A. persa*, *A. arabica* and *A. crassinervis*, presently seems to be not very clear. In absence of good series of specimens of all the above listed species, we decided to identify this specimen as *A.*cf. *persa*, but further investigations need to be done.

For the genus *Ameles*, we must cite also the possible presence in Caucasus of *A. heldreichi* as supposed by AGABITI (2002).

Bolivaria brachyptera Pallas, 1773 (Fig. 1, Fig. 10)

Mantis brachyptera Pallas, 1773
Mantis brachyptera Goeze, 1778
Mantis brachyptera Olivier, 1792
Mantis brachyptera Fischer-Waldheim, 1846
Mantis brachyptera Kittary, 1849
Mantis commutata Fieber, 1853
Mantis brachyptera in Eversmann, 1859
Iris pallasii Saussure, 1869
Iris [Mantis] brachyptera Saussure, 1871
Fischeria [Mantis] brachyptera Saussure, 1874
Typus: Typus male: ZMB (Alcohol).
Locus typicus: Middle East: Iaikum.
Distribution: Afghanistan, Armenia, Crete, Iran, Mongolia, Palestine, Turkey.

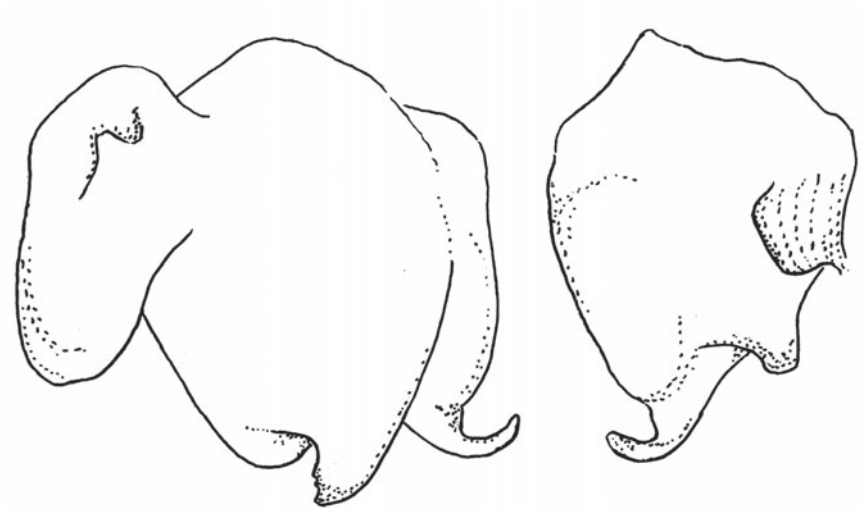

Fig. 1. *Bolivaria brachyptera*: on the left ventral view of male genitalia, on the right dorsal view of the left epiphallus complex. Drawings by R. Battiston.

Examined material

1 male, 1 juv., Armenia, Ararat prov., 2km N Surenavan, 12-13-VII-07, legit M. Kalashian (coll. B. Massa, Palermo University); 2 males, Georgia Shirakis vabe Vashlovanis Res. 262m, 25Km SE of Kvemo kedi, border Georgia-Azerbaijan end of Pantishara Canyon, 02-VII-03, N 41° 12' 31.6'', E 46° 21' 26.9'', legit F.M. Buzzetti, A. Carapezza, P. Fontana, B. Massa (coll. B. Massa, Palermo University); 1 male, Georgia Garejis David Gareja, Lavra, 693m, 3-VI-03, N41° 26' 53.2'', E 45° 22' 34.0'', legit F.M. Buzzetti, A. Carapezza, P. Fontana, B. Massa (coll. B. Massa, Palermo University), 1 female, Armenia, Aragotsotn prov. Aragats Mt. 2600m, 8Km N of Antarut, N 40° 25' 68", E 44° 14' 55", 14-IX-2008, legit M. Kalashian (coll. B. Massa, Palermo University).

Body: Long, colour ochre to brown. Body length: 47.44mm-54.16mm

Head: Eyes rounded, large, ocelli not well developed. Frontal shield transverse, apical margin rounded, sub-linear. Head width: 6.69mm – 6.98mm.

Pronotum: Edges with small evidently denticulated, supra coxal dilatation rhomboidal, well marked. Pronotum length: 14.54mm- 16.08mm; prozona: 5.75mm-5.37mm; metazona: 8.70mm-10.97mm.

Legs: Front coxae with 5-7 spines on the front side, apical lobes divergent. Front coxae: 11.6mm-13.92mm; front femora: 20.27mm-21.29mm.

Tegmina and wings: Tegmina short, sub-opaque, jugal field with a triangular dark spot, opaque in the costal field and a small reddish area just adjacent, costal edge white. Wings sub-hyaline, edge of the anal field smoked. Flight organs short, never reaching the end of the abdomen. Tegmen length: 20.56mm-20.00mm.

Abdomen of the male: supra anal plate small, narrowed near the apex, lateral edges concave. Cerci barely longer than the sub genital plate.

Male genitalia: hypophallus barely longer than wide, apical margin of distal process triangular. Anterior process of the left epiphallus long and curved. Right epiphallus short and fat. Basal curls not well developed.

Empusa fasciata Brullé, 1832 (Fig. 2)

Empusa longicollis Ramme, 1951
Typus: Typus? MNHN (Synonym: *E. longicollis*. Holotypus male, allotypus female and paratypi 1 male and 2 females: ZMB).
Locus typicus: Jerusalem. Synonym: *E. longicollis*. Jerusalem (male), Adana (female).
Distribution: Algeria, Armenia, Bosnia, Crete, Dalmatia, Egypt, Greece, India, Iran, Israel, Jordan, Macedonia, Middle East, Palestine, Romania, Syria, Turkey, Cyprus, Italy.

Examined material

1 female: Armenia 26-VII-03, Vayotsdzov, 3Km E Areni, legit M. Kalashian (coll. B. Massa, Palermo University); 1 male, Cyprus 08-IV-04, Kedares.

Body: Long, colour green and brown. Body length: female: 72.06mm

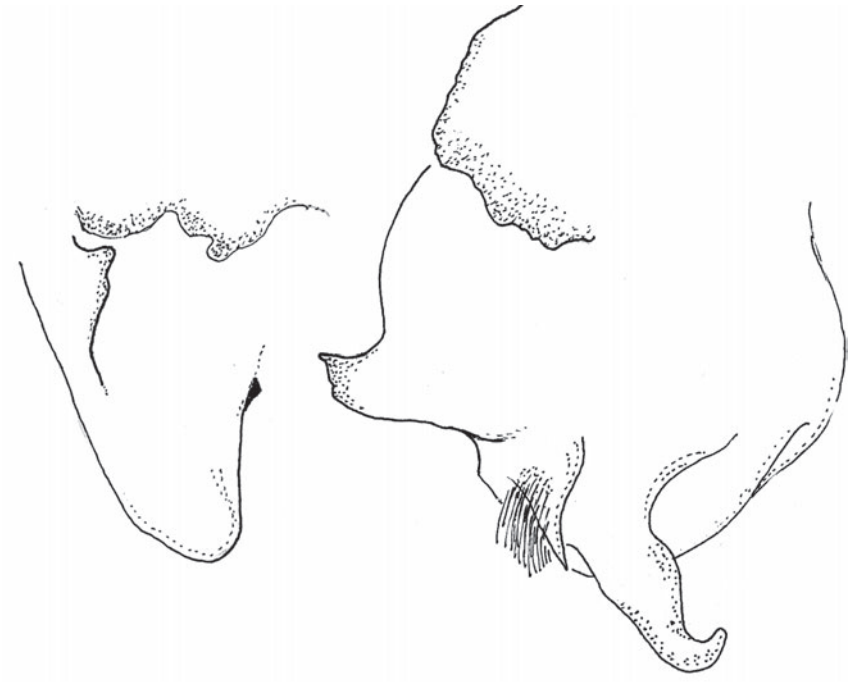

Fig. 2. *Empusa fasciata:* ventral view of male genitalia, from the left: right epiphallus, hypophallus, pseudophallus and left epiphallus. Drawings by R. Battiston.

Head: Eyes rounded, large, ocelli well developed. Vertex long, with a straight apex, with small lateral lobes. Head width: female: 4.88mm

Pronotum: Supra coxal dilatation rhomboidal, well marked, edges finely denticulated. Pronotum length: female: 29.16mm; prozona: female: 4.65mm; metazona: female: 24.76mm.

Legs: Front coxae with few small spines on the upper side, apical lobes not divergent. Front coxa: female: 14.60mm; front femora: female: 15.76mm.

Tegmina and wings: Tegmina hyaline, opaque in the costal field. Wings hyaline, reddish near the distal edges. Flight organs covering the end of the abdomen. Tegmen length: female: 37.76mm.

Male genitalia: hypophallus wider than long, distal process well sclerotized. Left epiphallus moderately long and well sclerotized. Right

epiphallus short, with small curls near the base. Pseudophallus covered with a bristle of long hairs and ending with a single spine.

Remarks

Within the genus *Empusa*, this species probably covers the widest distribution, from the Mediterranean basin to Middle East. This is the first record from Caucasus and confirms the extraordinary ability of this species to live in different kinds of habitats.

Empusa pennicornis pennicornis (Pallas, 1773) (Fig. 3, Fig. 11)

Mantis pennicornis Pallas, 1773
Mantis pennicornis Goeze, 1778
Mantis pennicornis Gamelin-Linnè, 1790
Mantis pallasiana Olivier, 1792
Mantis pectinicornis Lichtenstein, 1802
Mantis pennicornis Stoll, 1813
Gongylus marginatus Thunberg, 1815
Empusa (Empusa) orientalis Burmeister, 1838
Empusa orientalis Fischer Waldheim, 1846
Empusa [Mantis] pauperata Kittary, 1849
Empusa orientalis Fischer, 1853
Empusa stollii Saussure, 1871
Empusa attenuata Ramme, 1951
Typus: Holotypus male and allotypus female: ZMAS.
Locus typicus: Syria (Caspium).
Distribution: Afghanistan, China, Georgia, Iran, Iraq, Kazakhstan, Russia, Syria, Turkey, Tajikistan, Turkmenistan, Ukraine, Uzbekistan.

Examined material

1 male, Armenia Atsavan Garni, 1400m, 19-VI-02, A. Carapezza; 3 males, 2 females, Armenia, Ararat prov., 2km N Surenavan, 12-13-VII-07, legit M. Kalashian (coll. B. Massa, Palermo University); 3 males, 1 female, Georgia, Shirakis vabe Vashlovanis Res. 490m, near the main entrance, 02-VII-03, N 41° 12' 38.0'', E 46° 26' 10.6'', legit F.M. Buzzetti, A. Carapezza, P. Fontana, B. Massa (coll. B. Massa, Palermo University); 2 females, Georgia, Shirakis vabe Vashlovanis Res. 262m, 25Km SE of Kvemo kedi, border Georgia-Azerbaijan end of Pantishara Canyon, 02-

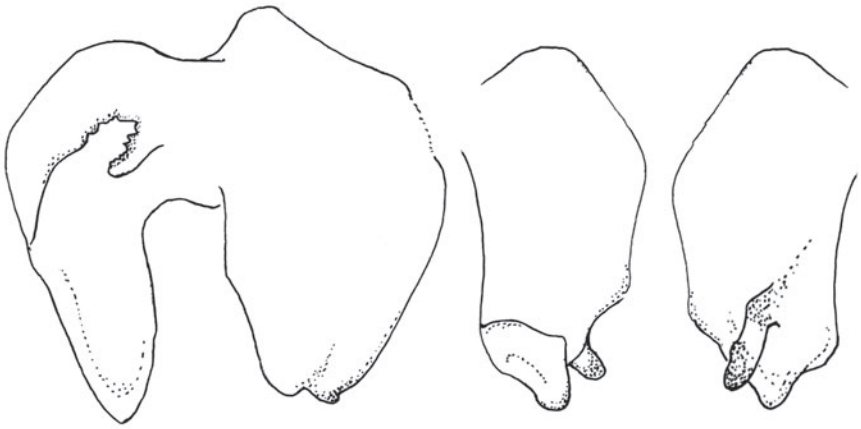

Fig. 3. *Empusa pennicornis*: on the left ventral view of male genitalia: right epiphallus and hypophallus in the middle, dorsal view of left epiphallus and pseudophallus on the right ventral view of left epiphallus and pseudophallus. Drawings by R. Battiston.

VII-03, N41° 12' 31.6'', E 46° 21' 26.9'', legit F.M. Buzzetti, A. Carapezza, P. Fontana, B. Massa (coll. B. Massa, Palermo University).

Body: Long, colour green and brown. Body length: male: 63.45mm-73.3mm, female: 64.27mm-69.1mm.

Head: Eyes rounded, large, ocelli well developed. Frontal shield pentagonal with a bulging median keel. Head width: male: 4.15mm-4.41mm, female: 3.86mm-4.3mm.

Pronotum: Edges finely denticulated, supra coxal dilatation rhomboidal, well marked. Pronotum length: male: 23.66mm-28.48mm, female: 25.84mm-29.32mm; prozona: male: 3.08mm-4.12mm, female: 3.31mm-3.56mm; male: metazona: 19.72mm-24.43mm, female: 21.87 mm-25.97mm.

Legs: Front coxae with few small spines on the upper side, apical lobes not divergent. Front coxa: male: 12.49mm-13.64mm, female: 13.89mm-14.34mm; front femora: male: 12.11mm-15.23mm; female: 13.65mm-14.45mm.

Tegmina and wings: Tegmina hyaline, opaque in the costal field. Wings hyaline, reddish near the distal edges. Flight organs covering the

end of the abdomen. Tegmen length: male 37.02mm-41.94mm; female: 27.0mm - 29.89mm.

Abdomen of the male: supra anal plate small, rounded, wider than long. Sub genital plate with an evident spine in the right side of dorsal edge. Cerci longer than the sub genital plate.

Male genitalia: hypophallus longer than wide, distal process ending in a triangular shape. Anterior process of the left epiphallus short and well sclerotized. Right epiphallus long, with small curls near the base.

Eremiaphila genei Lefebvre, 1835

Eremiaphila genei Lefebvre, 1835
Eremophila [Eremiaphila] genei Burmeister, 1838
Eremophila [Eremiaphila] zetterstedtii Burmeister, 1838
Eremiaphila burmeisteri Saussure, 1871
Eremiaphila genei var. *laevipennis* Werner, 1905
Eremiaphila hauensteini Werner, 1905
Eremiaphila burmeisteri Giglio-Tos, 1927
Typus: Holotypus male, paratypi male and female: MNHN, Allotypus female, paratypus male: MRSN, (Synonym: *Eremiaphila burmeisteri*, Holotypus female: MNHN), (Synonym: *Eremiaphila hauensteini*, Holotypus male, allotypus female, paratypi male and female: NHMW).
Locus typicus: Syria.
Distribution: Afghanistan, Arabia, Armenia, Egypt, Iran, Yemen, Jordan, Syria, Turkey.

General description (GIGLIO-TOS, 1927): Pronotum narrowed toward the base, lateral lobes dilated toward the head, tubercles of the disk small, tubercles of the basal edge not well marked. tegmina short and with a narrow net of veins barely crenulated. Wings with a large dark spot in the ventral side. Anterior tibiae long and slender, the 4 external spines long and strong. Body lenght: male and female: 2.5mm; pronotum length: male and female: 5.6mm; pronotum width: male and female: 6; tegmina length: male: 9mm, female: 7.5mm.

Eremiaphila persica persica Werner, 1905

Eremiaphila persica Werner, 1905.
Typi: Holotypus male and allotypus female: ZMAS.
Locus typicus: Iran, Province of Chorassan 130m.
Distribution: Azerbaijan, Iran, East Turkey.
General description (GIGLIO-TOS, 1927): Pronotum broader than long, narrowed behind, lateral edges smooth, anterior and posterior a little concave, the anterior angles rounded and truncated, the posterior blunt. tegmina a little longer than the head and the pronotum taken together, veins not well marked, decorated on the ventral side with one large, purple spot. Wings small and uniformly coloured. Anterior tibiae with 4 external spines. Body length: male 15mm, female 19mm. Length of the pronotum: male 3mm, female 4mm. Width of the pronotum. male 4mm, female 3mm. Length of the tegmina: male 5mm, female 7mm.

Hierodula transcaucasica Brunner von Wattenwyl, 1878
(Fig. 4, Fig. 5)

Hierodula transcaucasica Brunner von Wattenwyl, 1878
Typus: Lectotype, female, NHMW. Holotype probably lost [not examined] .
Sphodromantis [Hierodula] transcaucasica (Brunner von Wattenwyl, 1878) in Kirby, 1904
Locus typicus: North of Iran, Astrabad.
Distribution: Afghanistan, Armenia, Georgia, Iran, Central Asia.

Examined material

1 male, Armenia (Syunik), 2 km W Meghri, 20-VIII-2003, leg. M. Kalashian (coll. B. Massa, Palermo University).

Description of the male

Body: Large, strong, colour brown-yellowish. Body length: 63.30 mm.

Head: Eyes rounded, large, ocelli well developed. Tubercle between the inner edge of the eyes interior edge and the base of the antennae not evident. Frontal shield a little transverse, keels not very distinct. Head width: 7.70mm; pronotum length and head width ratio: 2.29.

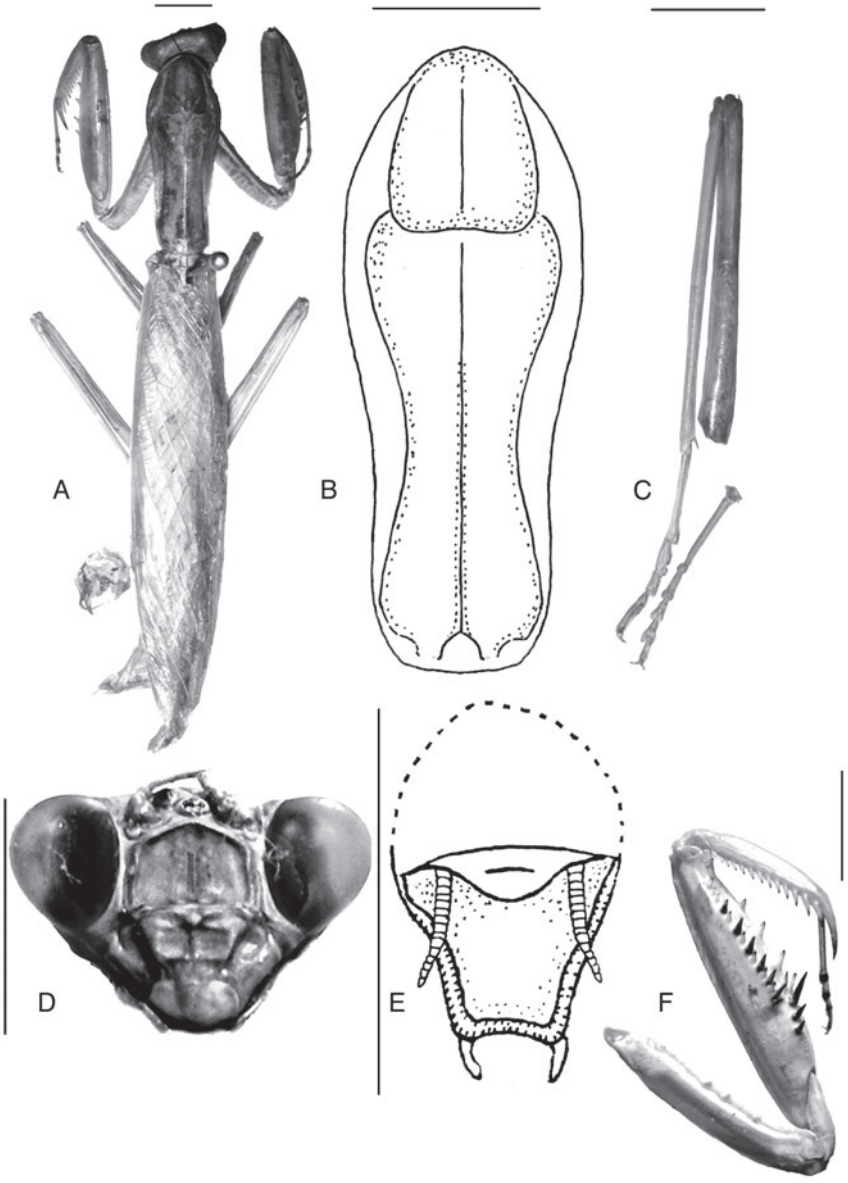

Fig. 4. Male of *Hierodula transcaucasica,* A: habitus of the male specimen, with genitalia extracted, dorsal view.; B: pronotum, top view; C: hind leg, side (left) and ventral (right) view; D: head, front view; E: supra-anal plate and sub genital plate, with genitalia removed; F: fore leg, internal side. Scale bars are 0.5cm. Drawings and photos by R. Battiston.

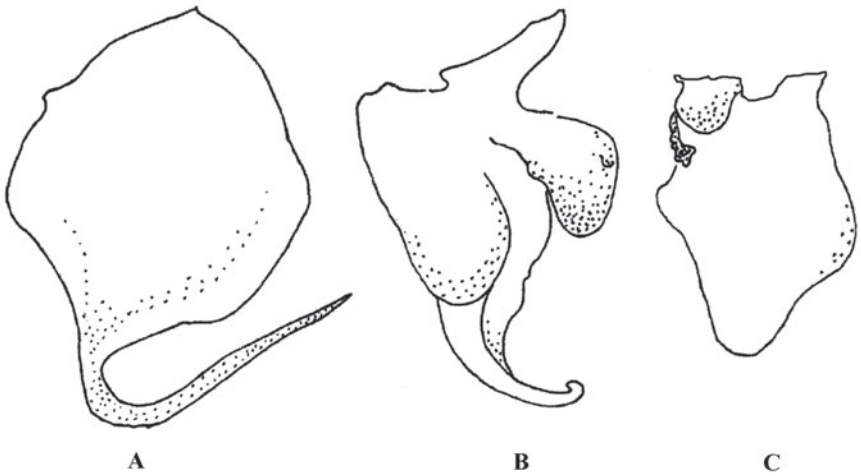

Fig. 5. Male genitalia of *Hierodula transcaucasica*, A: hypophallus, B: left epiphallus, C: right epiphallus. Drawings by R. Battiston.

Pronotum: Edges smooth, supra coxal dilatation not well marked, lateral expansion evident, starting near the base of metazona. Pronotum length: 17.6mm; prozona: 4.8mm; metazona: 12.8; metazona/prozona ratio: 2.67; supra coxal dilatation: 6.7mm; length/width ratio: 2.63.

Legs: Front coxae with 4-5 short, rounded spines, apical lobes not divergent. Front femora strong with 4 external black tipped spines, 4 discoidal spines, 1st, 2nd, 3rd black at the internal side and the 4th black only on the tip, 7 big internal spines black at the internal side, and 8 smaller spines black only on the tip , tibiae with 13 spines and the tibial claw black in the tip. Medium and hind legs with a small spine on the knees.
Discoidal spines length: 1st:0.6mm; 2nd:0.9mm; 3rd:1.7mm; 4th: 1mm
Front coxae length: 11.6mm; width 3.0mm; coxal length/width ratio: 3.9.
Front femora length: 15.3mm; width 3.5mm; coxal length/width ratio: 4.4.

Tegmina and wings: Tegmina hyaline, opaque in the costal field. Stigma not well marked, of the same colour as the rest of the body. Wings hyaline. Flight organs covering the end of the abdomen. Tegmen length: 43.3mm; tegmen length/pronotum length ratio: 2.46.

Abdomen: supra anal plate small, triangular, wider than long. Sub genital plate very long with the external dorsal edge large and with two series of small black teeth on the dorsal external edge. Cerci shorter than the sub genital plate composed of 12 segments.

Genitalia: Hypophallus round, barely longer than wide, distal process ending in a very long and sclerotized spine. Left epiphallus with a fat bulge at the dorsal side, anterior process long and slender, pointing dorsally, pseudophallus short, rounded, well sclerotized. Right epiphallus not very long, well sclerotized in the dorsal bulge and with small curls near the base.

Iris polystictica polystictica (Fisher-Waldheim, 1846) (Fig. 6)

Mantis polystictica Fisher-Waldheim, 1846
Iris tiflisina Giglio-Tos, 1915
Iris tiflisina Giglio-Tos, 1927
Iris polystictica mongolica Sjostedt, 1933
Typus: Holotypus male: ZMAS.
Locus typicus: trans-Baikal area.
Distribution: Afghanistan, China, Georgia, Iran, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Turkestan, Uzbekistan.

Examined material

1 female, Armenia, Ararat prov., Khasrov Res., 1300m, N 39° 58' 45", E 44° 52' 44", 12-IX-2008, legit M. Kalashian (coll. B. Massa, Palermo University).

General description (GIGLIO-TOS, 1927; HARZ & KALTENBACH, 1976): similar to *Iris oratoria*, but a little smaller, narrower tegmina, discoidal area of the wings of a green-lemon colour, almost opaque, spotted of brownish, wings of the female ochraceous with a zig zag dark spot, edge yellow-lemon. Big internal spines of anterior femora entirely black, in the inner side. Pseudophallus of the male long and pointed, with a lateral spike. Body legnth: male: 33mm, female: 36mm-38mm; pronotum length: male: 10mm, female: 10.5mm-12mm; pronotum width: male: 3mm, female: 3.6mm-4mm; tegmina: male: 26mm, female: 13mm-16mm.

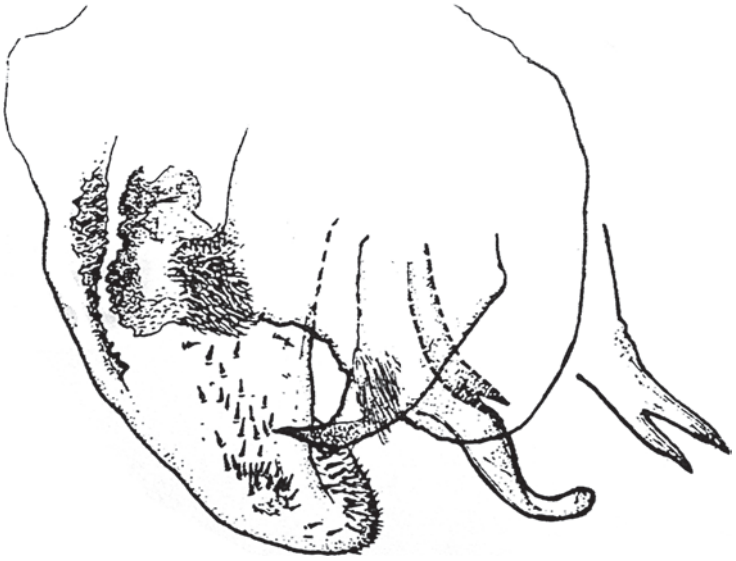

Fig. 6. *Iris polystictica*, on the left: male genitalia; on the right: apex of the pseudophallus. From HARZ & KALTENBACH, 1976.

Mantis religiosa Linné, 1758

Gryllus (Mantis) religiosus Linné, 1758
Mantis sancta Fabricius, 1787
Mantis striata Fabricius, 1793
Mantis oratoria Lichtenstein, 1802
Mantis maroccana Thunberg, 1815
Mantis pia Serville, 1839
Mantis radiata Fischer-Waldheim, 1846
Mantis capensis Saussure, 1872
Mantis capensis Stäl, 1877
Mantis prasina Stäl, 1877
Mantis pia Kirby, 1899
Mantis griveaudi Paulian, 1959
Typus: Holotypus male, female? UZIU.
Locus typicus: Africa?
Distribution: Africa, Asia, Australia, Europe, North America.

Examined material

1 male, Armenia, (Syunik) 2Km W Meghri, 20-VII-03, leg. M. Kalashian (coll. B. Massa, Palermo University); 1 female, Armenia, (Ararat) 8km NE Eraskh, 18-VIII-03, leg. M. Kalashian (coll. B. Massa, Palermo University).

Body: Long, colour ochre to brown. Body length: male: 93.19mm, female: 105.57mm.

Head: Triangular, eyes rounded, large, ocelli well developed. Frontal shield higher than wide, sub-pentagonal. Head width: male: 7.90mm-9.32mm, female: 10.18mm.

Pronotum: Edges smooth or finely crenulated, supra coxal dilatation rhomboidal, not well marked. Pronotum length: male 26.56mm-28.10mm, female: 30.5mm; prozona: male: 7.39mm-7.98mm, female: 8.74mm, metazona: male: 19.34mm-28.17mm, female: 21.71mm.

Legs: Front coxae with a dark spot with a more or less evident area white in the inner basal part. Front coxae: male: 17.64mm-20.51mm, female: 23.74mm; front femora: male: 22.12mm-26.46mm, female: 26.97mm.

Tegmina and wings: tegmina exceeding a little the tip of the abdomen, sub-opaque. Wings sub-hyaline. Tegmen length: male: 62.35mm - 68.5mm, female: 69.31mm.

Abdomen of the male: cerci conical, longer than the sub genital plate.

Remarks

This species is the most widespread within the order of Mantodea, cosmopolitan, and because of this, its actual distribution is often not well recorded. This is probably the first confirmed record for Caucasus region.

Rivetina caucasica caucasica (Saussure, 1871)

Iris (Fischeria) caucasica Saussure, 1871
Iris (Fischeria) caucasica Saussure, 1871
Fischeria [Iris (Fischeria)] caucasica Bolivar, 1899

Fischeria [Iris (Fischeria)] caucasica Uvarov, 1912
Eufischeriella [Iris (Fischeria)] caucasica Giglio-Tos, 1927
Kinzelbachia ragnari Harz, 1988
Kinzelbachia ragnari Ehrmann, 2000
Typus: Holotypus male, Allotypus female, Paratypus male: NHMW (Synonym: *Kinzelbachia ragnari*, Neotypus male, female juv.: SMNK).
Locus typicus: Caucasus.
Distribution: Iran, Caucasus, Syria, Turkey.
General description (Giglio-Tos 1927, La Greca 1982): similar to *R. baetica*, but more slender, with a longer pronotum and with more evident spines on its sides. Tegmina short, barely reaching the second abdominal segment in the female, never reaching the tip of the abdomen in the male, with a dark spot in the anal area. Wings with a black spot with a smaller white dot in the discoidal area. Anterior coxae armed with 9 strong teeth. Supra anal plate very long, bulging.
Body length: male 61mm, female 71mm. Length of the pronotum: male 16.5mm, female 22mm. Metazona: male 12mm, female 16mm. Length of the tegmina: male 32mm, female 19mm.

Discussion

Male of *H. transcaucasica* is here redescribed, because except for the original descriptions, only a few records are known, mostly of females. Giglio-Tos (1927) published few morphometrical data of one male (probably the synonymic *Sphodromantis transcaucasica*, from Kirby, 1904) and one female, from the Caucasus and Turkmenistan. Beier (1953) reported some measurements of two males and four females from Afghanistan. Harz & Kaltenbach (1976) reported the data of Giglio-Tos and some new measurements of males and females from the Crimea, Caucasus and West and Central Asia. Harz (1977) reared some nymphs from North Caucasus and reported some observations on their biology. Previous data do not provide a full description of the male and its distinctive characters, such as the shape of the genitalia or ultimate tergite and sternite. Furthermore, no information is known on the intraspecific variability of this widely distributed species.

H. transcaucasica belongs to a genus with the highest diversity within the order Mantodea, comprising 99 species (Tree of Life Web Project, 2005). It is found in Afghanistan, Iran, Caucasus and Central Asia (Ehrmann, 2002), outside the main range of the genus. *Hierodula* species are found mostly on the tropical islands between Australia and

Southeast Asia. The only other species of this genus with which the distribution partially overlaps (in Central Asia) is *H. tenuidentata tenuidentata* Saussure, 1869.

The particular distribution of *H. transcaucasica* leads to an interesting question: could *H. transcaucasica* be considered one of the key species to understand the problem of monophyly of *Hierodula* and of the distribution of Paramantini, as a close relative to their common ancestor? Or did it evolve in more recent times in Asia after westward migration?

The tribe of Paramantini includes eleven African genera and another eight genera distributed from Asia to Australia, mostly not-overlapping in distribution. Only the African *Sphodromantis trimaculata* (Saussure, 1870) reaches Iran, where also *H. transcaucasica* lives far away from the Asian group. The two geographically distinct groups seem to be very close regarding external morphology and male genitalia, and only some characters differ more between the two groups than within a single group (i.e. shape of pronotum, the distal process of the ventral phallomere in male genitalia). In a recent phylogenetic analysis of the Mantodea based on five molecular markers (SVENSON & WHITING, 2004), the Paramantini was found to be polyphyletic, with *Hierodula* and *Sphodromantis* in different clades. Except for the two species cited above and a few others, most species of both groups live in the tropical zones of Africa (Central Africa and Madagascar) and Asia (from India to Indonesia). Those tropical areas were connected only twice in the geological history: in the Triassic Pangaea, with Central Africa and India connected, and in more recent times (Cenozoic) before the post-würmian desertification started in the Middle East. Since most modern models of the Dyctiopteran history (GRIMALDI, 2003; LO *et al.*, 2003) date the radiation of the Mantodea not earlier than to Jurassic, it is likely that the Paramantini originated more recently. Quantifying the closeness of *H. transcaucasica* with the hypothetical ancestor of the two groups could give some information to solve the question on their distribution.

Compared with specimens in BEIER (1953) and HARZ & KALTENBACH (1976) the male of *H. transcaucasica* here described is a little bigger in size but similar in its proportions (Tab. 2). Their female shows a rough pronotum, with crenulated edges, instead of the smooth ones of this male.

Length	Armenian male	Male	Female
Body	63.3 mm	45-53 mm	49-62mm
Pronotum	17.6 mm	14.5-16.5 mm	16.7-21mm
Tegmina	43.3 mm	36-40 mm	37-48 mm

Tab. 2. Comparison between our measurements with data reported by BEIER (1953) and HARZ & KALTENBACH (1976).

The genus *Hierodula* with its extraordinary species richness and wide distribution, presents many taxonomic problems, which is confirmed by the high number of synonyms in *Hierodula* and many other genera in the tribe of *Paramantini* (i.e. *Rhombodera*, *Rhomboderella*, *Sphodromantis*, *Parhierdoula*, *Tismomorpha*, etc.). The taxonomic insights within tribe of *Paramantini* change constantly.

Even with a profound diversification of the shape of the genitalia, the existence of a common model of our hypothetic ancestor was confirmed by the «mean» shape calculated in the Fourier analysis, almost identical in all the principal components. This shape is well represented in *H. transcaucasica*, but it seems more evident in *Rhombodera basalis* which is placed much closer to the African group and to the *Ancestor*

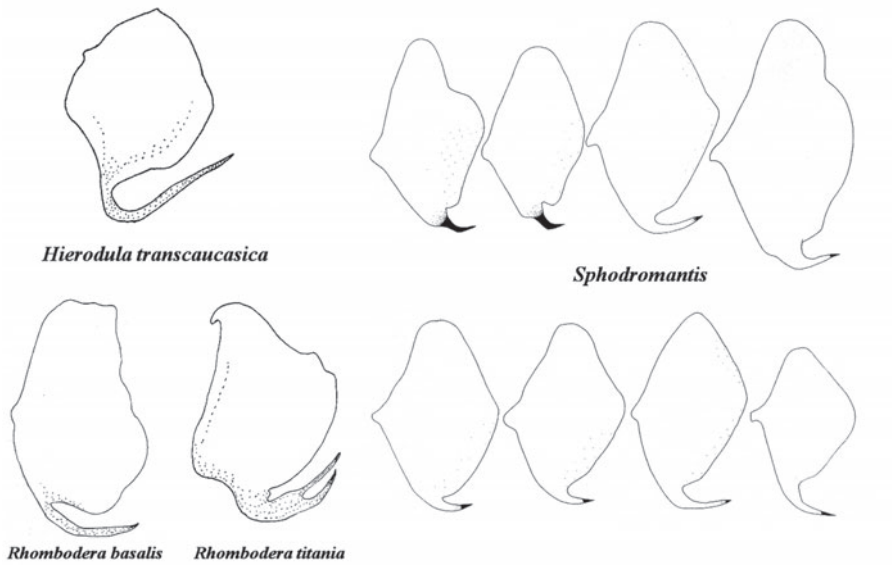

Fig. 7. Comparison of the male genitalia (ventral phallomere with distal process) of some *Paramantini*: *Hierodula transcaucasica* (Armenia), *Rhombodera titania* and *Rhombodera basalis* (Malaysia, R. Battiston collection, drawings by R. Battiston), six different species of *Sphodromantis* (East Africa, after LA GRECA, 1969).

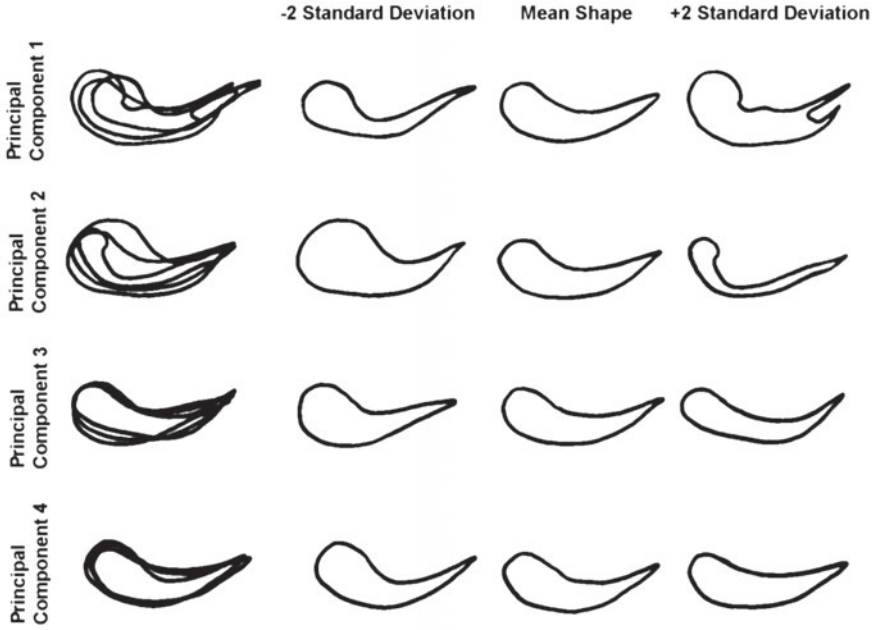

Fig. 8. Principal components calculated in the Fourier analysis for the distal process of the ventral phallomere, with the «mean» shape.

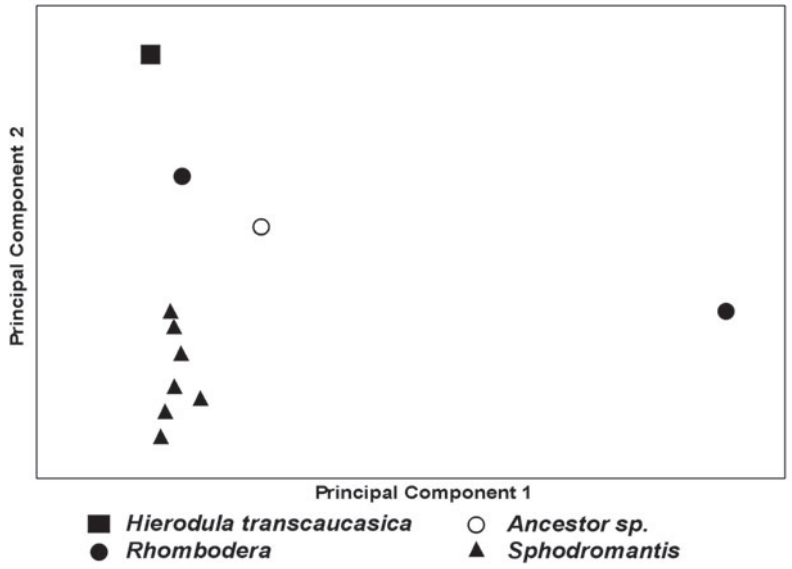

Fig. 9. Comparison between Principal Component 1 (X axis) and Principal Component 2 (Y axis) that best of all separate African (*Sphodromantis*) and Asian species (*Rhombodera, Hierodula*) in the Fourier analysis.

Fig. 10. Male of *Bolivaria brachyptera*. Photo by P. Fontana.

sp. (Fig. 7, Fig. 8, Fig. 9). This distance from the common model seems to exclude the role of ancestor for *H. transcaucasica.*

Even considering the scarcity of very old fossil records and analyzed specimens, these results suggest that *H. transcaucasica* is a well specialized insect, and maybe could be a *Paramantini* evolved recently in Asia to explore western lands.

1	Pronotum constricted abrupt behind its dilatation, metazona broad. A pointed conical tubercle between the base of the antenna and the inner margin of the eyes.	***Sphodromantis trimaculata***
	Pronotum gradually narrowed behind its dilatation, metazona broad. Only a small knob shaped nipple between the base of the antenna and the inner margin of the eyes.	**2**
2	Stigma white and evident, internal and discoidal spines black only on the tip.	***Hierodula tenuidentata***
	Stigma of the same colour of the tegmina, not evident, internal and discoidal spines entirely black on the inner side.	***Hierodula transcaucasica***

Tab. 3. Key to the *Paramantini* of West Asia.

Fig. 11. Male of *Empusa pennicornis pennicornis*. Photo by P. Fontana.

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Between 29 June and 12 July 2003 F.M. Buzzetti, A. Carapezza, P. Fontana, B. Massa carried out two weeks of researches on Orthopteroidea and Mantodea in Georgia, and in the following years B. Massa received many specimens from Armenia from Marcus Kalashian. This consented us to put together a small collection of Mantodea to have a better idea of the wide biological diversity of these countries. We thank very much our colleagues for their collaboration.

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Indirizzo degli autori:
Roberto Battiston - Museo Canal di Brenta, Palazzo Perli - Via Garibaldi 27, I-36020 Valstagna (VI), Italia; e-mail: roberto.battiston@yahoo.it
Bruno Massa - Università di Palermo - Dipartimento SENFIMIZO (Entomologia, Acarologia, Zoologia), V.le Scienze, 13, I-90128 Palermo, Italia; e-mail: zoolappl@unipa.it