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A CONTRIBUTION TO THE KNOWLEDGE OF THE  
GENUS *AMELES* BURMEISTER, 1838, WITH THE  
DESCRIPTION OF A NEW SPECIES FROM JORDAN  
(Insecta Mantodea)

SUMMARY - Battiston R. & Fontana P., 2005 - A contribution to the knowledge of the genus *Ameles* Burmeister, 1838, with the description of a new species from Jordan (Insecta Mantodea).

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Studies on external morphometry and on the morphology of internal male genitalia of the mantids genus *Ameles* Burmeister, 1838 confirm the necessity of a combined internal and external analysis for the identification. Some characters, used by previous Authors, shown to be inadequate in identifying correctly some species: further ones have been here presented and the most interesting is the internal male genitalia. In her systematic revision of the genus, AGABITI (2001-2002) well characterized the identity of the species of the genus and solved some relevant synonymies. In this study the results obtained by the examination of on new material, preserved in some Italian collections, are presented. A total number of 100 specimens were examined and identified as follows: *Ameles decolor* (42), *Ameles spallanzania* (37), *Ameles heldreichi* (7), *Ameles picteti* (5), *Ameles dumonti* (2), *Ameles modesta* (2) and *Ameles massai* sp. n. (5). For each species we present a synthetic synonymy, the list of the material, a description of the discriminative characters with morphometrical data of the males and when possible of the females, and a description of the shape of the male genitalia. A comparison between the specimens previously identified as *Ameles africana* and *Ameles spallanzania* and data suggesting their synonymy are also presented. The presence of *Ameles picteti* in Sicily is confirmed and *Ameles massai* n. sp. from Jordan is described, on the basis of male genitalia and external morphometry.

KEY WORDS - Mantodea, *Ameles*, Taxonomy.

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RIASSUNTO - BATTISTON R. & FONTANA P., 2005 - Contributo alla conoscenza del genere *Ameles* Burmeister, 1838, con descrizione di una nuova specie della Giordania (Insecta Mantodea).

Studi condotti sulla morfometria e sulla morfologia dell'armatura genitale dei maschi delle mantidi del genere *Ameles* Burmeister, 1838 hanno confermato l'utilità, al fine di una corretta identificazione, di un'analisi combinata della morfologia esterna e di quella interna, relativa ai genitali maschili. Alcuni caratteri finora usati in letteratura hanno mostrato i loro limiti: altri caratteri vengono presentati e quello maggiormente interessante è dato dai genitali interni maschili. Nel suo recente lavoro revisionale AGABITI (2001-2002) ha ben caratterizzato l'identità delle specie del genere ed ha risolto alcune importanti sinonimie. In questo studio vengono esposti i risultati relativi a materiale inedito, proveniente da collezioni italiane. Sono stati esaminati 100 nuovi esemplari, identificati come segue: *Ameles decolor* (42), *Ameles spallanzania* (37), *Ameles heldreichi* (7), *Ameles picteti* (5), *Ameles dumonti* (2), *Ameles modesta* (2) e *Ameles massai* sp. n. (5). Per ciascuna specie in esame vengono presentati una lista sinonimica sintetica, il materiale esaminato, la descrizione dei caratteri discriminanti assieme a dati morfometrici relativi ai maschi e, se possibile, alle femmine ed una descrizione dei genitali maschili. Viene effettuato un confronto tra gli esemplari in passato identificati come *Ameles africana* e *Ameles spallanzania* e vengono esposti i dati confermantici la loro sinonimia. Si conferma la presenza in Sicilia di *Ameles picteti* e viene descritta *Ameles massai* n. sp. della Giordania, sulla base delle differenze nella morfologia interna dei genitali maschili e nella morfometria esterna.

PAROLE CHIAVE - Mantodea, *Ameles*, Tassonomia.

## INTRODUCTION

The species of the genus *Ameles* Burmeister, 1838 are small mantids (Fig. 1 a-b), typical of the Mediterranean area, but well distributed from the Canary Islands to Afghanistan, from the north coast of Africa to the southern part of Europe as far as to Middle East (AGABITI, 2001-2002). Despite their wide distribution these insects are not well known and both systematics and ecology are unknown for most of the species. This genus currently amounts to 24 species (EHRMANN, 2002) distributed in some regions in groups of species, but in most cases localized in small areas, where some endemic taxa evolved. Recent works of HARZ & KALTENBACH, (1976) and AGABITI (2001-2002) have made more reliable male identification, thank to their study of genitalia. In particular in her systematic revision of the genus, AGABITI (2001-2002) well characterized the identity of the species of the genus and solved some relevant synonymies. Our work is based on the exam on new unpublished material, preserved in Italian museums and private collections, previously not examined on the basis of internal morphology (genitalia).



Fig. 1 (a-b). *Ameles decolor* male (a) and female (b), Italy, Abruzzo region, Popoli, Sorgenti del Pescara, 24-VIII-97. Photos by P. Fontana.

## MATERIALS AND METHODS

One hundred and three specimens were examined, most from the Italian peninsula and surrounding islands, others from Dalmatian coasts, Aegean Is., North Africa (Tunisia to Maroc) and Jordan. Morphometrical measurements of 17 characters (Fig. 2) on the head, pronotum, legs and tegmina and measurements of mounted male genitalia have been taken with a stereomicroscope (Leika, Wild M3B) micrometric ocular (Wild). Male genitalia, after relaxing the dried specimens, have been separated and clarified in KOH (10%); then they have been dehydrated in alcohol (from 70% to 95%) and at the end in glove oil. Clarified and dehydrated genitalia have been mounted on a slide with Canadian balm (as described in FONTANA *et al.*, 2002). Male genitalia have been examined focusing on the shape and relative size of their main parts (Fig. 3) and in particular on the relative length of the inner fold of the right epiphallus, the shape of the distal apical margin of the hypophallus and the wideness of the angle between its two apical spines. The nomenclature of the male genitalia morphology follows HARZ & KALTENBACH (1976).

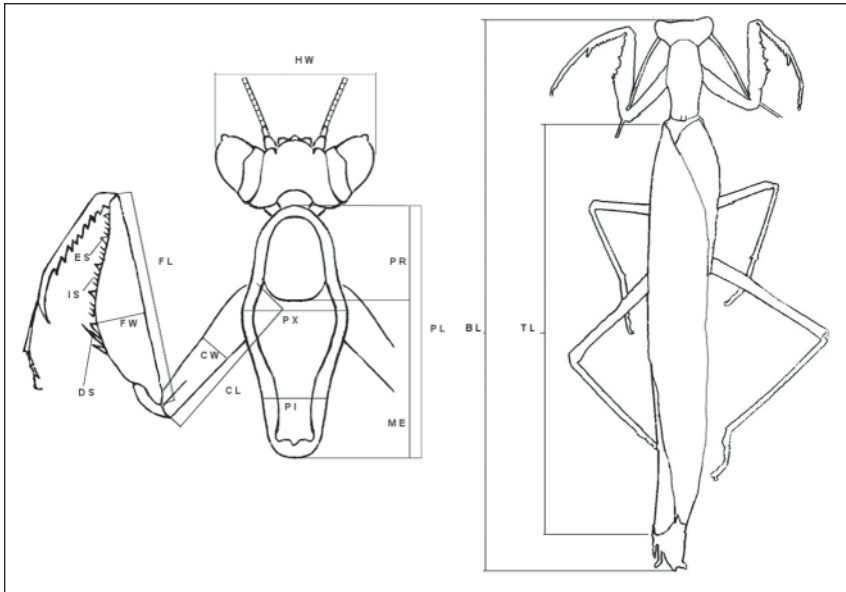


Fig. 2. Characters used in the present study for the external measurement: BL = body length; CL = coxal max length; CW = coxal maximum width; DS = discoidal spines; ES = external spines; FL = femora max length; FW = femora max width; HW = head width; IS = internal spines; ME = metazone length; PI = pronotum minimum width; PL = pronotum length; PR = pronotum length; PX = pronotum maximum width ; TL = tegmina length.

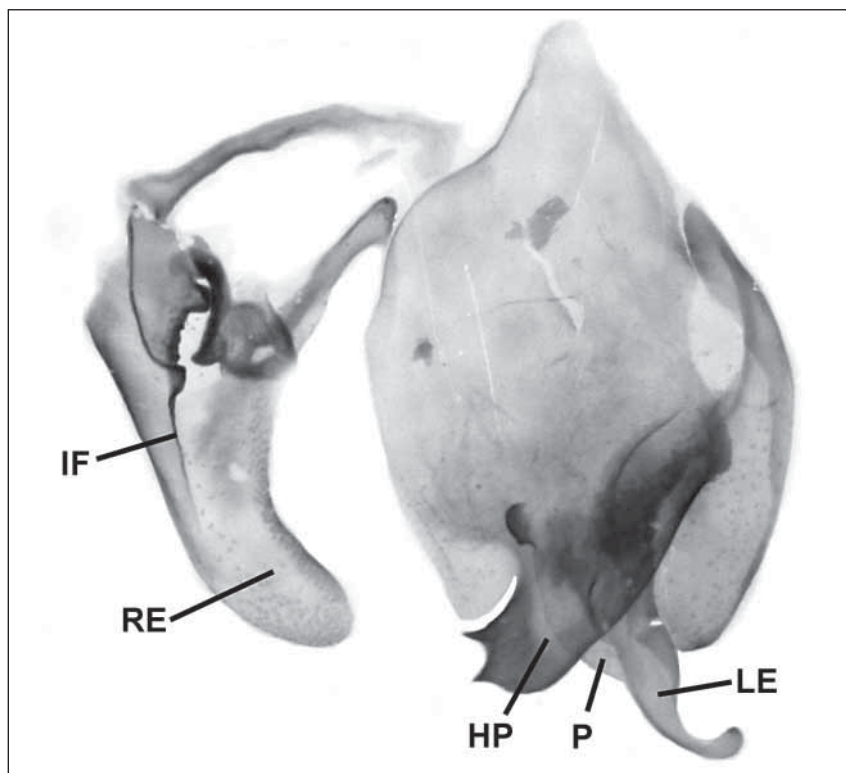


Fig. 3. Male genitalia (*Ameles decolor*): characters used in internal measurements. IF = Inner fold; HP = Hypophallus; LE = Left epiphallus; P = Pseudophallus ; RE = Right Epiphallus.

## RESULTS

### *Ameles decolor* (Charpentier, 1825)

*Mantis decolor* Charpentier, 1825: 90-91.

*Ameles decolor*, Harz & Kaltenbach, 1976: 146-149

*Ameles decolor*, Fontana *et alii*, 2002: 148, 149, 211, 238

*Ameles decolor*, Ehrmann, 2000: 59

*Ameles decolor*, Agabiti, 2001-2002

*Mantis abjecta* Cyrillo, 1787: 6

*Examined material*: 42 specimens (29 males & 13 females).

ITALY: Genova, IX-40, 2 males, coll. Mus. St. Nat. VR; Firenze, 5-IX-86, 1 male, leg. Callegari, coll. P. Fontana (PF); Firenze, 29-IX-01,

Toscana, 1 female, leg. F. Buzzetti (FB), coll. FB; Toscana, VIII-98, 1 male, leg. Biondi, coll. PF; Alberese, 09-IX-97, 1 female, leg. PF, coll. PF; Terni, 1 male, 1 female, leg. Gottardo, coll. PF; Perugia, 28VIII-77, 1 male, leg. Aliguò, coll. Mus. St. Nat. VR; Popoli, 24-VIII-97, 3 males 1 female, leg. PF, coll. PF; L'Aquila, 15-IX-97, 1 male, leg. Celi, coll. PF; Lazio, 20-X-37, 1 males, leg. Castelli, coll. FB; Puglia, 1 male, coll. B. Massa (BM); Gargano, 20-VIII-97, 2 males, 1 female, leg. PF, coll. PF; Acquarica, 10-VIII-77, 1 male, coll. Mus. St. Nat. VR; Lecce, 29-VIII-80, 1 male, coll. Mus. St. Nat. VR; 1 male, coll. Mus. St. Nat. VR, ex coll. della Beffa; Puglia, 23-IX-91, 3 males, 1 female, coll. PF, leg. Beretta; Siniscola, 31-VII-99, 3 males, 2 females, leg. PF, coll. PF; Catania, Sicilia, 10-IX-98, 1 female, coll. PF, leg. PF.

CORSICA: (no other locality information) 1929, 1 male, leg. Alberti, coll. Mus. St. Nat. VR.

CROATIA: Hvar, 1 km E Velo Grablje, 15-VIII-96 leg. R. Kleukers (RK) coll. PF, 1 male; Hvar, 1 km SW Starigrad, 11-VIII-96, 1 males, leg. RK coll. PF; S Pitve, 13-VIII-96, 2 males; Vrana, Isola Kres, 11-IX-98, 1 male, leg. Tescari coll. PF.

#### *General Description*

Small mantis (Figs. 1, 4 and 13): males from 20.48 to 30.22 mm and females from 20.45 to 25.05 mm, colour ochre, gracile appearance, abdomen always kept straight. Similar to *A. heldreichi* with which it overlaps distribution in the eastern Mediterranean; however, it shows more globular eyes without the apical tubercle, and different genitalia shape. It could be confused also with Jordanian *A. massai* sp.n., which has a shorter pronotum, longer tegmina and distinct genitalia.

#### *Characters of the females:*

*Head:* average length: 4.05 mm; head width/pronotum length ratio: 0.83; globular eyes; clypeus with an evident vertical keel in the inferior half, sometimes also with a horizontal keel crossing with the vertical one.

*Pronotum:* average length: 4.85 mm; prozone: 1.65 mm; metazone: 3.20 mm; prozone and metazone ratio: 0.52; max average width: 2.51 mm; max average width: 1.58 mm; max length and width ratio: 1.93. Smooth edges.

*Protoracic legs:* coxal width/length average ratio: 0.26; femoral max width/length average ratio: 0.29.

#### *Characters of the males:*

*Head:* average length: 3.24 mm; pronotum width/length ratio: 0.73;

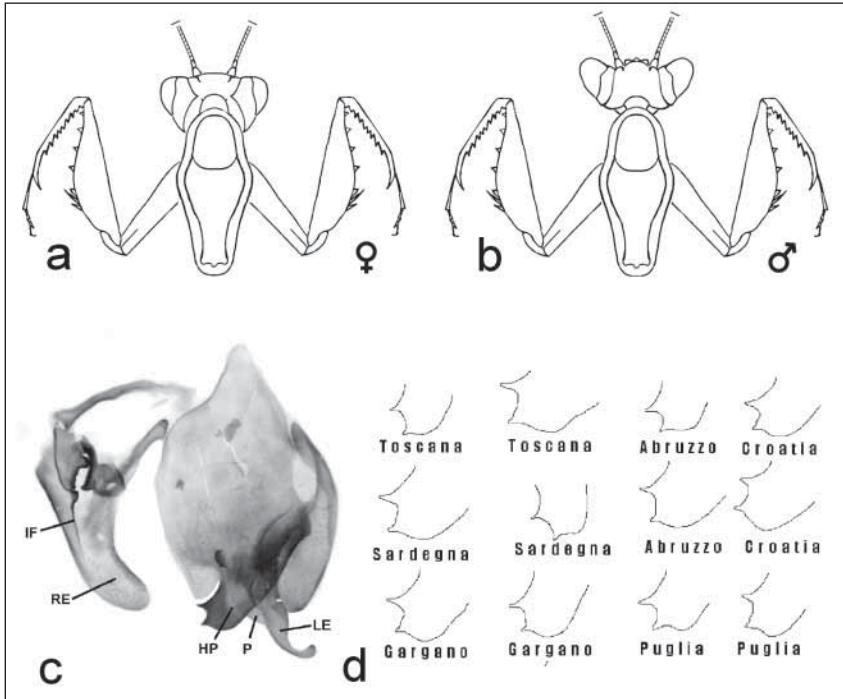


Fig. 4 (a-d). *Ameles decolor*: a) female; b) male; c) male genitalia, ventral view (Abruzzo, Italy). IF Inner Fold, RE Right Epiphallus, HP Hypophallus, P Pseudophallus, LE Left Epiphallus; d) comparison of different shapes of the hypophallus of males from various localities. Drawings and photo by R. Battiston.

globular eyes. Clypeus with an evident vertical keel in the inferior half, sometimes also with a horizontal keel crossing with the vertical one.

*Pronotum*: average length: 4.45 mm; prozone: 1.68 mm; metazone: 2.77 mm; prozone/metazone ratio: 0.61; max average width: 2.02 mm; min average width: 1.32 mm; max length/width ratio: 2.20. Smooth edges.

*Protoracic legs*: coxal width and length average ratio: 0.22; femoral max width/length average ratio: 0.27.

*Tegmina*: average length: 19.50 mm; pronotum length/tegmina length ratio: 0.23.

*Genitalia* (Fig. 4): Right epiphallus with an inner fold weakly developed or not exceeding in length (basal curls excluded) the average width of the organ. Hypophallus with apical border obtuse or rounded.

*Ameles dumonti* Chopard, 1943*Ameles dumonti* Chopard, 1943: 70-71.*Ameles dumonti*, Agabiti, 2001-2002.*Examined material*: 2 specimens (males).

TUNISIA: Djerba, 6-V-76, 2 males, leg. E. Moltoni, coll. PF.

*General Description*

Small mantis (Figs. 5 and 13): males from 31.06 to 31.36 mm, colour yellow-ochre, gracile appearance, similar to *Ameles decolor* but with more conical eyes and distinct genital structure. Similar to *A. heldreichi* but with distinct genital structure.

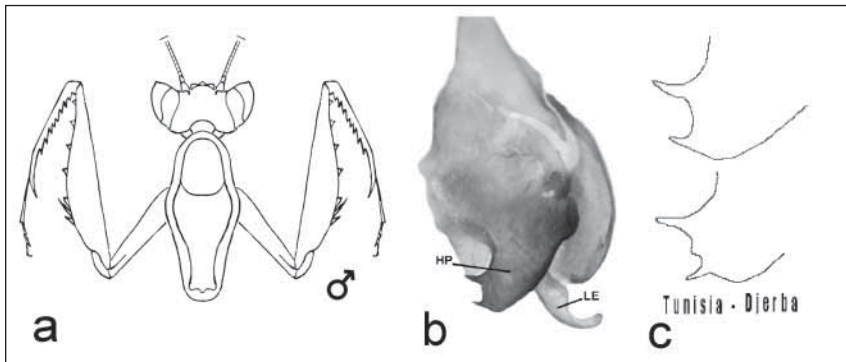


Fig. 5 (a-c). *Ameles dumonti*: a) male head and pronotum; b) male genitalia, ventral view (Djerba TU). HP Hypophallus, LE Left Epiphallus; c) comparison of different shapes of the hypophallus of *A. dumonti* from Djerba (Tunisia). Drawings and photo by R. Battiston.

*Characters of the males*

*Head*: average width: 3.37 mm; head width/pronotum length ratio: 0.78; conical eyes with a tubercle more or less developed. Keels of clypeus not well developed.

*Pronotum*: average length: 4.28 mm; prozone: 1.61 mm; metazone: 2.68 mm; prozone/metazone ratio: 0.60; max average width: 2.14 mm; min average width: 1.22 mm; max length/width ratio: 2.00. Smooth edges.

*Protoracic legs*: coxal width/length average ratio: 0.25; femoral max width/length average ratio: 0.22.



*Tegmina*: average length: 23.33 mm; pronotum length/tegmina length ratio: 0.18.

*Genitalia* (Fig. 5): hypophallus with apical border obtuse or flat with the proximal spine longer than distal one.

### *Ameles heldreichi* Brunner von Wattenwyl, 1882

*Ameles heldreichi* Brunner von Wattenwyl, 1882: 67

*Parameles heldreichi*, G. G. Jacobson & Bianchi, 1902: 147-148

*Ameles decolor*, Harz & Kaltenbach, 1976: 145-146

*Ameles heldreichi*, Ehrmann, 2002: 59

*Ameles heldreichi*, Agabiti, 2001-2002

*Parameles picteti*, Giglio-Tos, 1914: 2

*Examined material*: 7 specimens (5 males, 2 females).

GREECE: Crete, 27-IX-93, 1 male, coll. B. Massa (BM), 2 females; Rhodos, 6-VII-81, 1 male, coll. PF; Thasos, 2-VIII-83, 1 male, leg. Susini, coll. PF; Samotracia, 13-VI-96, 1 male, coll. PF, leg. Etonti.

JORDAN: Dehbeen, 17-V-196, 1 male 4, leg. Klapperich, coll. PF.

#### *General Description*

Small mantis (Figs. 6 and 13): from 25.24 to 29.22 mm, colour ochre, gracile appearance similar to *Ameles decolor* but with an evident apical tubercle on conical eyes and distinct genital structure.

*Head*: average length: 3.90 mm; head width/pronotum length ratio: 0.86; conical eyes; clypeus with a not very evident horizontal keel.

*Pronotum*: average length: 4.51 mm; prozone: 1.76 mm; metazone: 2.75 mm; prozone/metazone ratio: 0.64; max average width: 2.37 mm; min average width: 1.45 mm; max length/width ratio: 2.03.

#### *Characters of the males*:

*Head*: average width: 3.37 mm; head width/pronotum length ratio: 0.73; conical eyes with an apical tubercle; clypeus with not very marked horizontal keel.

*Pronotum*: average length: 4.59 mm; prozone: 1.80 mm; metazone: 2.79 mm; prozone/metazone ratio: 0.64; max average width: 2.29 mm; min average width: 1.45 mm; max length/width ratio: 2.00. Smooth edges.

*Protoracic legs*: coxal width/length average ratio: 0.20; femoral max width/length average ratio: 0.29.

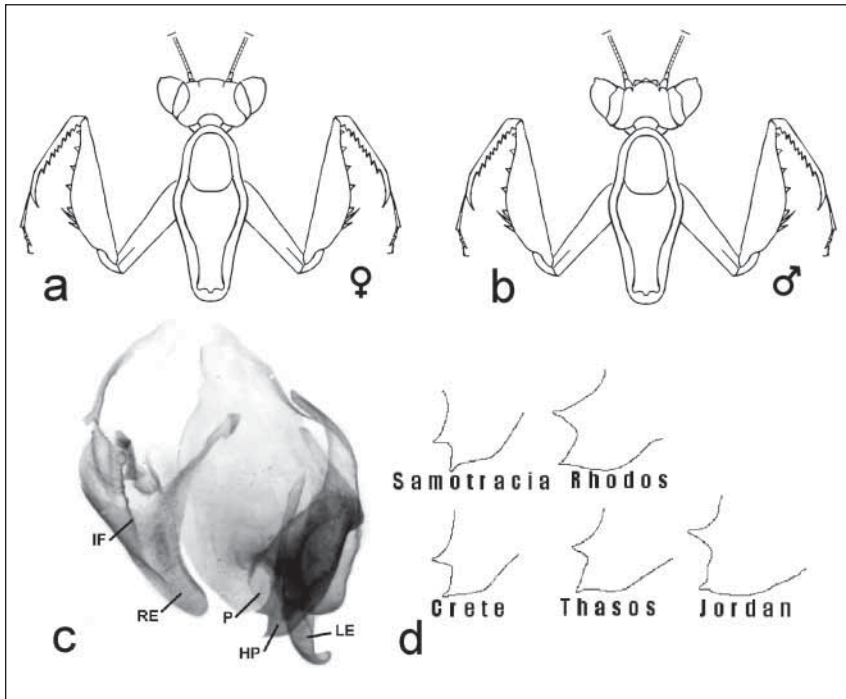


Fig. 6 (a-d). *Ameles heldreichi*: a) female; b) male; c) male genitalia, ventral view (Crete, GR). IF Inner Fold, RE Right Epiphallus, HP Hypophallus, P Pseudophallus, LE Left Epiphallus; d) comparison of different shapes of the hypophallus of *A. heldreichi* from various localities. Drawings and photo by R. Battiston.

*Tegmina*: average length: 21.88 mm; pronotum length/tegmina length ratio: 0.21.

*Genitalia* (Fig. 6): right ephiphallus with an inner fold weakly developed that usually do not reach the apex of the organ. Hypophallus with apical border square or weakly obtuse.

### *Ameles modesta* (Bolivar, 1943)

*Parameles modesta* Bolivar, 1914: 178-179

*Ameles decolor*, Ehrmann, 2002: 59

*Ameles decolor*, Agabiti, 2001-2002 (partim)

*Examined material*: 2 specimens (males).

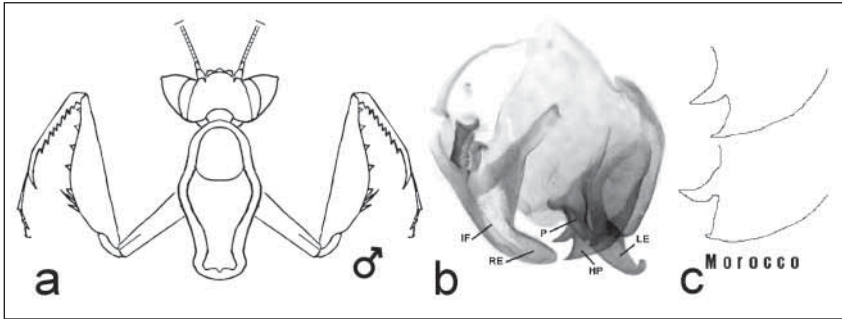


Fig. 7 (a-c). *Ameles modesta*: a) male head and pronotum; b) male genitalia, ventral view (Morocco) IF Inner Fold, RE Right Epiphallus, HP Hypophallus, P Pseudophallus, LE Left Epiphallus; c) Comparison of different shapes of the hypophallus of *A. modesta* from Morocco. Drawings and photo by R. Battiston.

MAROC: Haut Atlas, Tizi n'Test 26-V-81, 1 male, leg. Sama, coll. PF; Moyen Atlas, Tizi n'Test, 25-V-85, 1 male, leg. Sama, coll. PF.

#### General Description

Small mantis (Figs. 7 and 13): males from 23.25 to 24.33 mm, colour ochre, gracile appearance, similar to *Ameles spallanzania*, but with a shorter and squatter body, with an evident apical tubercle on conical eyes.

#### Characters of the males:

*Head*: average width: 3.29 mm; head width/pronotum length ratio: 0.72; conical eyes with an apical tubercle more or less developed; clypeus without evident keels.

*Pronotum*: average length: 4.59 mm; prozone: 1.84 mm; metazone: 2.68 mm; prozone/metazone ratio: 0.69; max average width: 2.45 mm; min average width: 1.45 mm; max length/width ratio: 1.87. Smooth edges.

*Protoracic legs*: coxal width/length average ratio: 0.24; femoral max width/length average ratio: 0.29.

*Tegmina*: average length: 17.75 mm; pronotum length/tegmina length ratio: 0.26.

*Genitalia* (Fig. 7): right epiphallus with an inner fold usually exceeding in length (basal curls excluded) the average width of the organ but never reaching the apex of the organ. Hypophallus with apical border acute and a little rounded, with a reversed hawk beak shape.

*Ameles picteti* Saussure, 1869

*Ameles picteti* Saussure, 1869: 72

*Ameles picteti*, Harz & Kaltenbach, 1976: 142-144, 148-149

*Ameles picteti*, Ehrmann, 2002: 60

*Ameles picteti*, Agabiti, 2001-2002

*Mantis nana* Charpentier, 1825 in: Rambur, 1838: 22-23, Taf. 1

*Examined material*: 5 specimens (2 males, 3 females).

ITALY: S. Stefano di Quisquina (AG), 2 females, 19-X-92, coll. BM; Agrigento, 5-VI-92, coll. BM, , 1 male, 1 female; Lampedusa, 2-V-91, coll PF, leg. Osella, 1 male.

*General Description*

Small mantis (Figs. 8 and 13): males from 21.11 to 30.04 mm and females from 24.38 to 26.41 mm, colour ochre, gracile appearance, similar to *Ameles decolor* and *Ameles heldreichi* but with more conical eyes, a more triangular head (more evident in females) and a distinct genital structure.

*Characters of the females*

*Head*: average length: 3.90 mm; head width/pronotum length ratio: 0.68; conical eyes; clypeus with an evident vertical and a small horizontal keel crossed in a «T» shape.

*Pronotum*: average length: 5.74 mm; prozone: 2.29 mm; metazone: 3.44 mm; prozone/metazone ratio: 0.67; max average width: 2.29 mm; min average width: 1.76 mm; max length/width ratio: 2.51. Smooth edges.

*Protoracic legs*: femoral max width/length average ratio: 0.28.

*Characters of the males*

*Head*: average length: 3.36 mm; pronotum width/length ratio: 0.88; conical eyes with a tubercle more or less developed.

*Pronotum*: average length: 3.80 mm; prozone: 1.60 mm; metazone: 2.22 mm; prozone/metazone ratio: 0.72; max average width: 1.99 mm; min average width: 1.22 mm; max length/width ratio: 1.91. Smooth edges

*Protoracic legs*: coxal width/length average ratio: 0.24; femoral max width/length average ratio: 0.19.

*Tegmina*: average length: 20.81 mm; pronotum length/tegmina length ratio: 0.18.

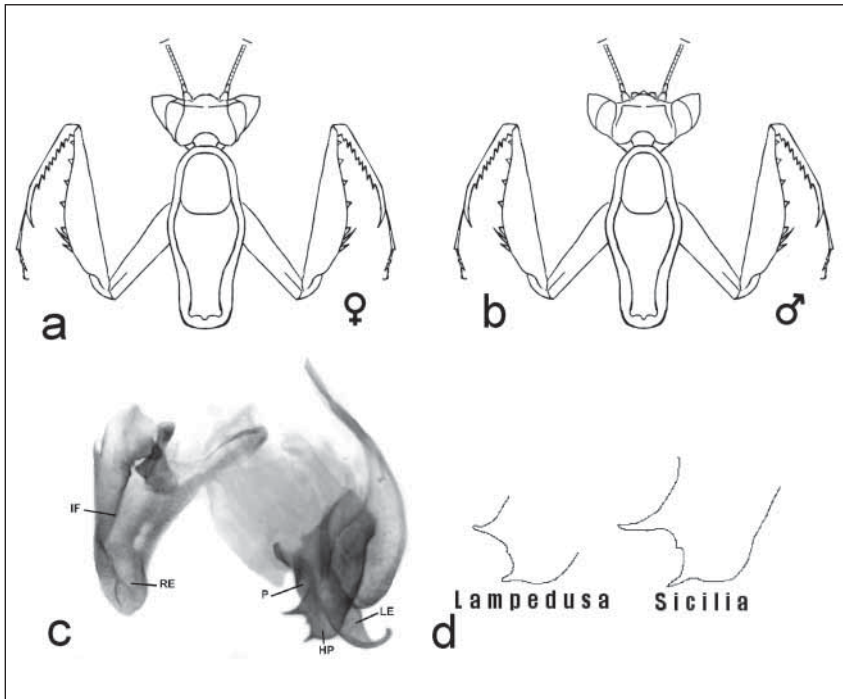


Fig. 8 (a-d). *Ameles picteti*: a) female; b) male; c) male genitalia, ventral view (Sicilia), IF Inner Fold, RE Right Epiphallus, HP Hypophallus, P Pseudophallus, LE Left Epiphallus; d) comparison of different shapes of the hypophallus of *A. picteti* from various localities. Drawings and photo by R. Battiston.

*Genitalia* (Fig. 8): right epiphallus with an inner fold weakly developed or not exceeding in length (basal curls excluded) the average width of the organ. Hypophallus with apical border obtuse or rounded with the proximal spine longer than distal one.

### *Ameles spallanzania* (Rossi, 1792)

*Mantis spallanzania* Rossi, 1792: 102-103

*Ameles spallanzania*, Harz & Kaltenbach, 1976: 146-49

*Ameles spallanzania*, Failla et alii, 1994: 5

*Ameles spallanzania*, Ehrmann, 2002: 60

*Ameles spallanzania*, Fontana et alii, 2002: 148, 149, 211, 238

*Ameles spallanzania*, Agabiti, 2001-2002

*Mantis nana* Charpentier, 1825: 91

*Mantis soror* Serville, 1839: 200-201

*Ameles africana* Bolivar, 1897 in : Hermann, 1988: 147,149

*Ameles africana*, Bolivar, 1914: 178

*Ameles africana*, Harz & Kaltenbach, 1976. 146-149

*Ameles africana*, Failla et alii, 1994: 5

*Examined material*: 37 specimens (18 males, 19 females).

ITALY: Friuli Venezia Giulia, 6-VIII-96, 1 female, leg. PF, coll. PF; Padova, 8-IX-63, 1 female, coll. PF; 10-X-63, 1 females; Padova, 10-X-63, 1 female, coll. PF; Liguria, X-41, 1male, leg. Moro, coll. Mus. St. Nat. VR; Liguria, VI-1930, 1male, 1 female, leg. Mancini, coll. FB; Liguria, 1 male, leg. Capra, coll. FB; Genova, XI-25, 1 females, leg. Capra, coll. Mus. St. Nat. VR; Genova, XII-95, 1 female, coll. Mus. St. Nat. VR; Lavagna, 1 female, leg. Moro, coll. Mus. St. Nat. VR; Potenza, 1 female, leg. PF, coll. PF; Toscana, 29-IX-01, 1 female, coll. FB; Toscana, 6-IX-86, 1male, leg. Callegari coll. PF; Alberese, 1 male, leg. PF, coll. PF; Lucania, 5-VIII-77, 1male, leg. Osella coll. Mus. St. Nat. VR; Sardegna, 9-VI-50, 1 female, leg. Servadei, coll. PF; Nuoro, 12-VIII-99, 2 males, leg. PF, coll. PF; Barisardo (NU), 15-VI-81, 1 male, leg. PF, coll. PF; Sassari, 16-VI-58, 2 males, leg. Servadei, coll. PF; Catania, 27-V-98, 1male, leg. PF, coll. PF; Lecce, 1 male, leg. La Greca coll. Mus. St. Nat. VR; Otranto, coll. Mus. St. Nat. VR; Messina, 1 male, coll. Mus. St. Nat. VR; Sicilia, 16-VII-82, 1 female, leg. PF, coll. PF; Sicilia, 8-VI-01, 1male, leg. Carapezza, coll. BM; Messina, 3-IX-78 1male, leg. Carapezza, coll. BM; S.Vito lo Capo, 6-VI-92, 1male, leg. Carapezza, coll. Massa; coll. Mus. St. Nat. VR ex coll. Della Beffa; Agrigento, 21-VI-92, 1male, coll. BM; Villa Carrara, 1 male coll. Mus. St. Nat. VR.

CORSICA: (no other locality information) 1929, 2males, leg. Alberti, coll. Mus. St. Nat. VR.; 6-IX-96, 1 female, leg. dall'Ara, coll. PF.

CROATIA: Spalato, VIII-95, 1 female, leg. PF, coll. PF .

GREECE: Is. Lefkada, Karità, VIII-98, 1 female, leg. Osella, coll. PF.

TUNISIA: 4-VI-79 coll. BM, 1male.

### *General Description*

Small mantis (Figs. 9 and 13): males from 22.31 to 32.41 mm and females from 19.50 to 32.16 mm, colour ochre or green, massive appearance, abdomen large and often kept curled up in females, character preserved also in dead specimens. Males similar to *A. modesta* but a more slender body.

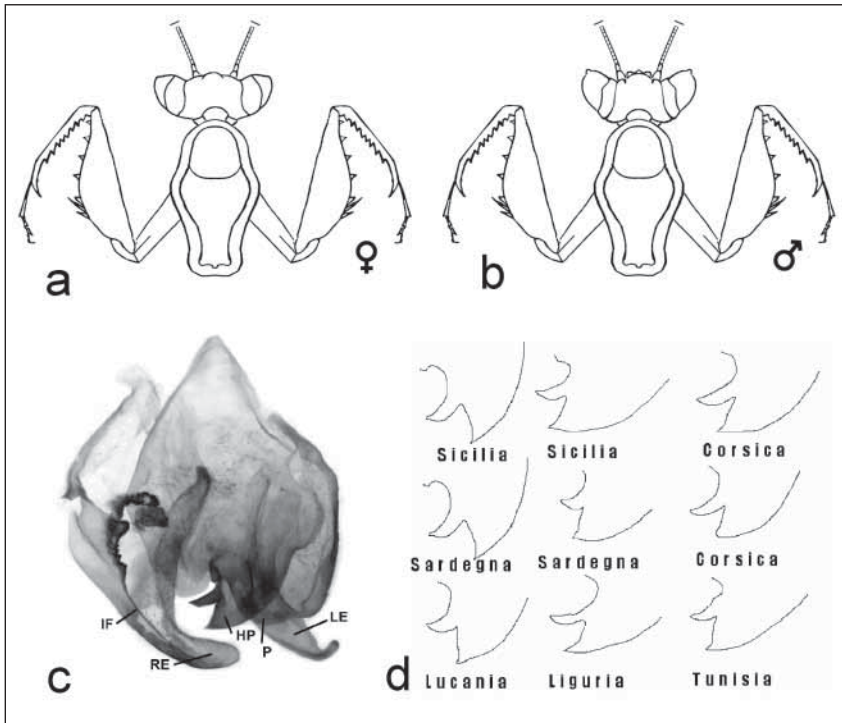


Fig. 9 (a-d). *Ameles spallanzannia*: a) female; b) male; c) male genitalia, ventral view (Sicilia, IT). IF Inner Fold, RE Right Epiphallus, HP Hypophallus, P Pseudophallus, LE Left Epiphallus; d) comparison of different shapes of the hypophallus of *A. spallanzannia* from various localities. Drawings and photo by R. Battiston.

*Characters of the females*

*Head*: average length: 4.71 mm; head width/pronotum length ratio: 0.98; moderately conical eyes with a more or less developed tubercle; clypeus with a distinct horizontal keel.

*Pronotum*: average length: 4.80 mm; prozone: 2.08 mm; metazone: 2.72 mm; metazone/prozone ratio: 0.76; max average width: 3.14 mm; min average width: 1.9 mm; max length/width ratio: 1.53. Smooth edges.

*Protoracic legs*: coxal max width/length average ratio: 0.34; femoral max width/length average ratio: 0.34.

*Characters of the males*

*Head*: average length: 3.75 mm; pronotum width/length ratio: 0.88; conical eyes with a tubercle more or less developed.

*Pronotum*: average length: 4.27 mm; prozone: 1.72 mm; metazone: 2.55 mm; prozone/metazone ratio: 0.67; max average width: 2.52 mm; min average width: 1.72 mm; max length/width ratio: 1.69. Smooth edges.

*Protoracic legs*: coxal width/length average ratio: 0.25; femoral max width/length average ratio: 0.30.

*Tegmina*: average length: 19.03 mm; pronotum length/tegmina length ratio: 0.22.

*Genitalia* (Fig. 9): right ephiphallus with an inner fold developed almost to the end of the organ, or exceeding in length (basal curls excluded) the average width of the organ. Hypophallus with apical border acute with a reversed hawk beak shape.

Both in the external morphology and in the male genital shape our data agree with Agabiti's (2002), in referring *Ameles africana* (Bolivar, 1914) as a junior synonym of *Ameles spallanzania* (Rossi, 1792). Selective characters for *A. africana*, as conical eyes with apical tubercles, angular apex of frontal shield, and inordinate brush of hairs on the base of the pseudophallus in males (HARZ & KALTENBACH, 1976) have been found in specimens recorded as both species without any correlation. The three following dispersion graphs (Fig. 10) about different characters distinct in other species of *Ameles*, correlating specimens with or without (or little evident) an apical tubercle on the eyes (the most discriminative character traditionally used to separate the two species) show well overlapped clouds of points, confirming the impossibility to separate the two species.

### *Ameles massai* sp. n.

#### *Type material*

Male holotype and 4 paratypes are preserved in Paolo Fontana collection, Italy.

#### *Examined material*

JORDAN: Shaubak, 24-V-1968, 3 males (holotype and 2 paratypes), leg. Klapperich, coll. PF; Dana Reserve 26-V-1999, 2 males (paratypes), leg. BM, coll. BM (Università di Palermo).

#### *Description (male)*

Small mantis (Figs. 11 and 13);, colour grey-ochre, small dark spot on front legs and more or less evident on pronotum and head, gracile



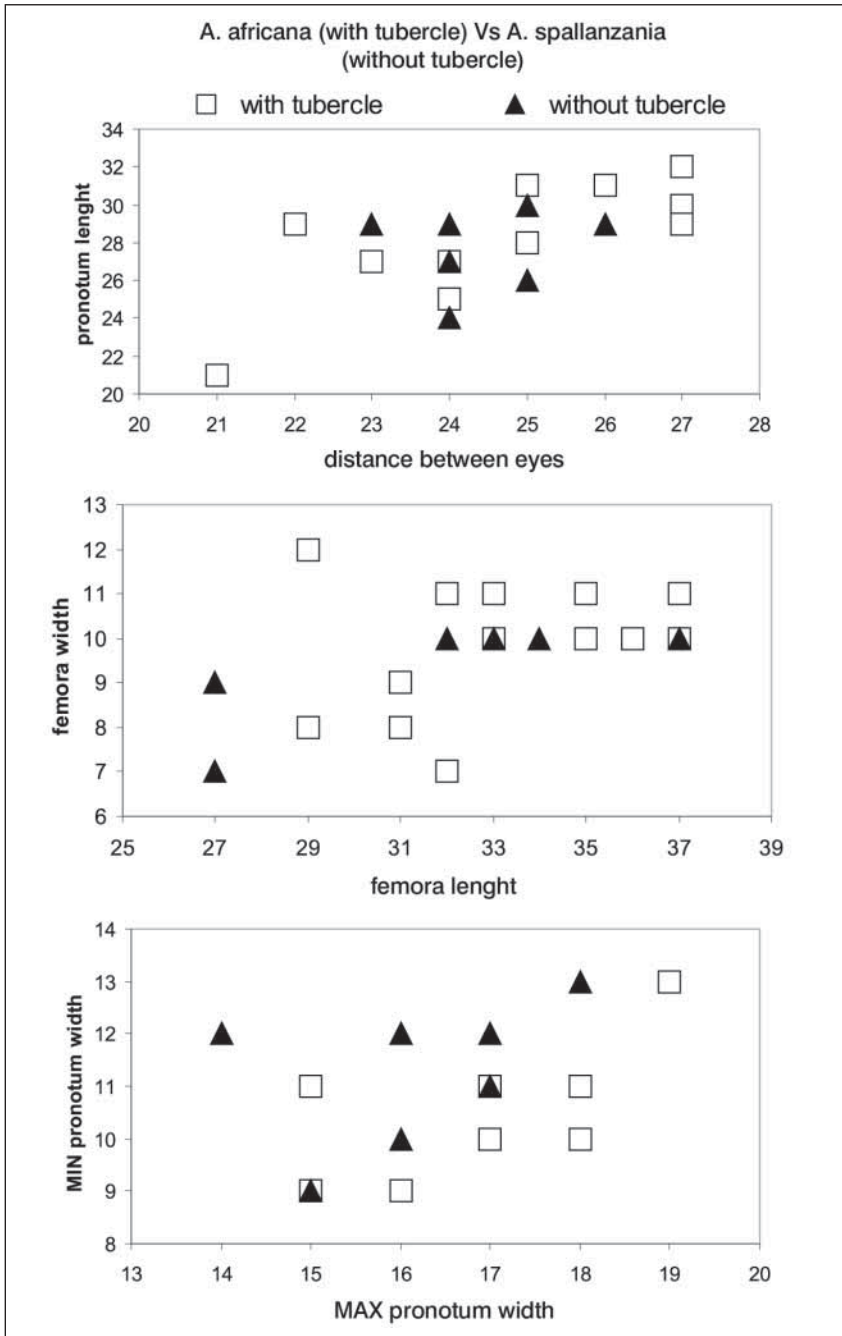


Fig. 10. Dispersion graphs about different characters of *Ameles africana* and *A. spallanzania*.

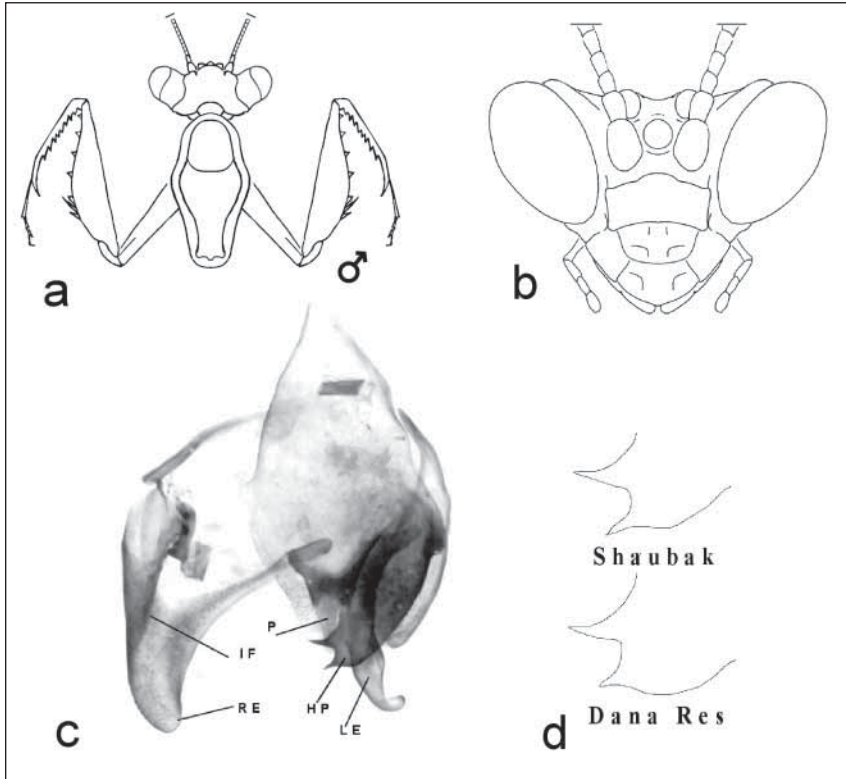


Fig. 11 (a-d). *Ameles massai* sp. n. Holotypus: a) male head and pronotum; b) male head; c) male genitalia, ventral view (Shaubak, Jordan). IF Inner Fold, RE Right Epiphallus, HP Hypophallus, P Pseudophallus, LE Left Epiphallus. d) Comparison of different shapes of the hypophallus of *A. massai* sp. n. from various localities of Jordan. Drawings and photo by R. Battiston.

appearance, similar to *Ameles decolor* but with shorter pronotum and longer tegmina, and distinct genital structure.

*Body*: total length from 29.8 mm to 32.60 mm.

*Head*: larger than long, average width: 3.37 mm; head width and pronotum length ratio: 0.81; globular eyes without apical tubercle, stretched laterally; scutellum semi-transverse, larger than high with apical margin acute; clypeus with a not well defined horizontal keel; ocelli well developed.

*Pronotum*: average length: 4.17 mm; prozone: 1.60 mm; metazone: 2.52 mm; prozone/metazone ratio: 0.65; max average width: 1.99 mm; min average width: 1.37 mm; max length/width ratio: 2.09. Lateral margins smooth.

*Protoracic legs*: coxal width/length average ratio: 0.21; femoral max width/length average ratio: 0.19.

*Tegmina*: average length: 24.82 mm; pronotum length/tegmina length ratio: 0.17.

*Genitalia* (Fig. 11): right ephiphallus with an inner fold weakly developed or not exceeding in length (basal curls excluded) the average width of the organ. Hypophallus with apical border acute and slightly rounded; well developed apical spines with the proximal longer than the distal one.

*Type locality ad distribution*

As of this date, this species is known only from the central part of Jordan, on arid-mountain slopes (Fig. 12): its presence in the locality of Dana, a Natural Reserve, must be outlined.



Fig. 12. Distribution of *A. massai* sp. n.

*Derivatio nominis*

We are delighted to name the new species after our dear friend Bruno Massa (University of Palermo, Italy), eminent Zoologist and Orthopterologist who collected actively in Jordan and provided us with part of the type material of the new species.

*Affinities*

The shape of the eyes and the head is similar to those of *A. decolor* but the pronotum is shorter and tegmina a bit longer. The genitalia are close to that of *A. decolor*, but spines of hypophallus are longer, different in length from each other; besides, the angle between them is more acute. Despite the high variability, especially in the shape of genitalia, observed in many species of *Ameles* (i.e. *A. decolor*) specimens of this taxon present uniformly all the characters above listed, even if coming from different places of Jordan. All the other known species, distributed in areas close to Jordan, as *A. aegyptiaca* Werner, 1913, *A. taurica* (Jakovlev, 1903), *A. syriensis* Giglio-Tos, 1915, *A. persa* Bolivar, 1911, *A. kervillei* Bolivar, 1911, according to the description of Giglio-Tos (1927) present eyes more or less conical, with an apical tubercle, not present in the specimens studied by us.

## THE NUMBER OF SPINES IN THE FEMORA OF PROTORACIC LEGS

In the examined specimens of *Ameles* the number of femoral spines was quite variable inside the same species, mainly internal ones. Often, the number of these spines was different even in the left and right legs of the same specimen. In many cases one or more spines were just developed or absent. The following three tables show the frequency of the number of spines found in each species in the three main femoral different strips of spines.

## a) External femoral spines

	3	4	5	6
<i>A. decolor</i>		100%		
<i>A. dumonti</i>		100%		
<i>A. heldreichi</i>		100%		
<i>A. modesta</i>		100%		
<i>A. picteti</i>		100%		
<i>A. spallanzania</i>		100%		
<i>A. massai</i> sp. n.		100%		

## b) Discoidal femoral spines

	3	4	5	6
<i>A. decolor</i>	3.4%	96,6%		
<i>A. dumonti</i>		100%		
<i>A. heldreichi</i>		100%		
<i>A. modesta</i>		100%		
<i>A. picteti</i>		100%		
<i>A. spallanzania</i>	11,8%	82,3%	5,9%	
<i>A. massai</i> sp. n.		100%		

## c) Internal femoral spines

	9	10	11	12	13	14
<i>A. decolor</i>		6,9%	20,7%	44,8%	27,6%	
<i>A. dumonti</i>		100%				
<i>A. heldreichi</i>			100%			
<i>A. modesta</i>				100%		
<i>A. picteti</i>	33.3%	66.7%				
<i>A. spallanzania</i>			5,9%	35,3%	52,9%	5.9%
<i>A. massai</i> sp. n.		50%	50%			

Tab. 1 (a-c). Frequency of the number of spines in front femora.

## CONCLUSIONS

The analysis of the shape of male genitalia in *Ameles* has shown its reliability to tell apart different species (i.e. *Ameles decolor* and *Ameles spallanzania*); in other cases genitalia seems to be less meaningful. In some taxa (i.e. in *Ameles decolor* and *Ameles heldreichi* or in *Ameles spallanzania* and *Ameles modesta*), especially in large series of specimens, the intraspecific variability is quite remarkable. After that, for identification many characters must be compared (Tab. 2).

		<i>decolor</i>		<i>dumonti</i>		<i>heldreichi</i>		<i>modesta</i>		<i>picteti</i>		<i>spallanzania</i>		<i>massai</i>	
		M	F	M	M	F	M	M	F	M	F	M			
HEAD	average body length *	20.45- 30.22	20.18- 25.34	31.06- 31.36	25.24- 29.22		23.25- 24.33	21.11- 30.04	24.38- 26.41	22.31- 32.41	19.50- 32.16	33.9			
	av. Widht*	3.24	4.05	3.37	3.37	3.90	3.29	3.36	3.90	3.75	4.71	3.37			
	h widht/ p length	0.73	0.83	0.78	0.73	0.86	0.72	0.88	0.68	0.88	0.98	0.81			
	eyes*	G	G	C	C+t	C+T	C+T	C+t	C+T	C+T	C+T	C+T	G		
PRONOTUM	av. length*	4.45	4.85	4.28	4.59	4.51	4.59	3.80	5.74	4.27	4.80	4.17			
	prozone*	1.68	1.65	1.61	1.80	1.76	1.84	1.60	2.29	1.72	2.08	1.60			
	metazone*	2.77	3.20	2.68	2.79	2.75	2.68	2.22	3.44	2.55	2.72	2.52			
	prozone / metazone	0.61	0.52	0.60	0.64	0.64	0.69	0.72	0.67	0.67	0.76	0.65			
	max av. width*	2.02	2.51	2.14	2.29	2.37	2.45	1.99	2.29	2.52	3.14	1.99			
	min av. width*	1.32	1.58	1.22	1.45	1.45	1.45	1.22	1.76	1.72	1.9	1.37			
LIMBS	maxlength/max width	2.20	1.93	2.00	2.00	2.03	1.87	1.91	2.51	1.69	1.53	2.09			
	coxa max lenght/ max width	0.22	0.26	0.25	0.20		0.24	0.24		0.25	0.34	0.21			
TEGMINA	femoura max lenght/ max width	0.27	0.29	0.22	0.29		0.29	0.19	0.28	0.30	0.34	0.19			
	av. length*	19.50		23.33	21.88		17.75	20.81		19.03		24.82			
	pronotum lenght/ tegmina lenght	0.23		0.18	0.21		0.26	0.18		0.22		0.17			

\*all non ratio measurements are in millimeters

C= conical eye; G= globular eye; +T= tubercle preset and evident; -T=tubercle present but not evident

Tab. 2. Comparison of the data on the main characters used in our analysis.

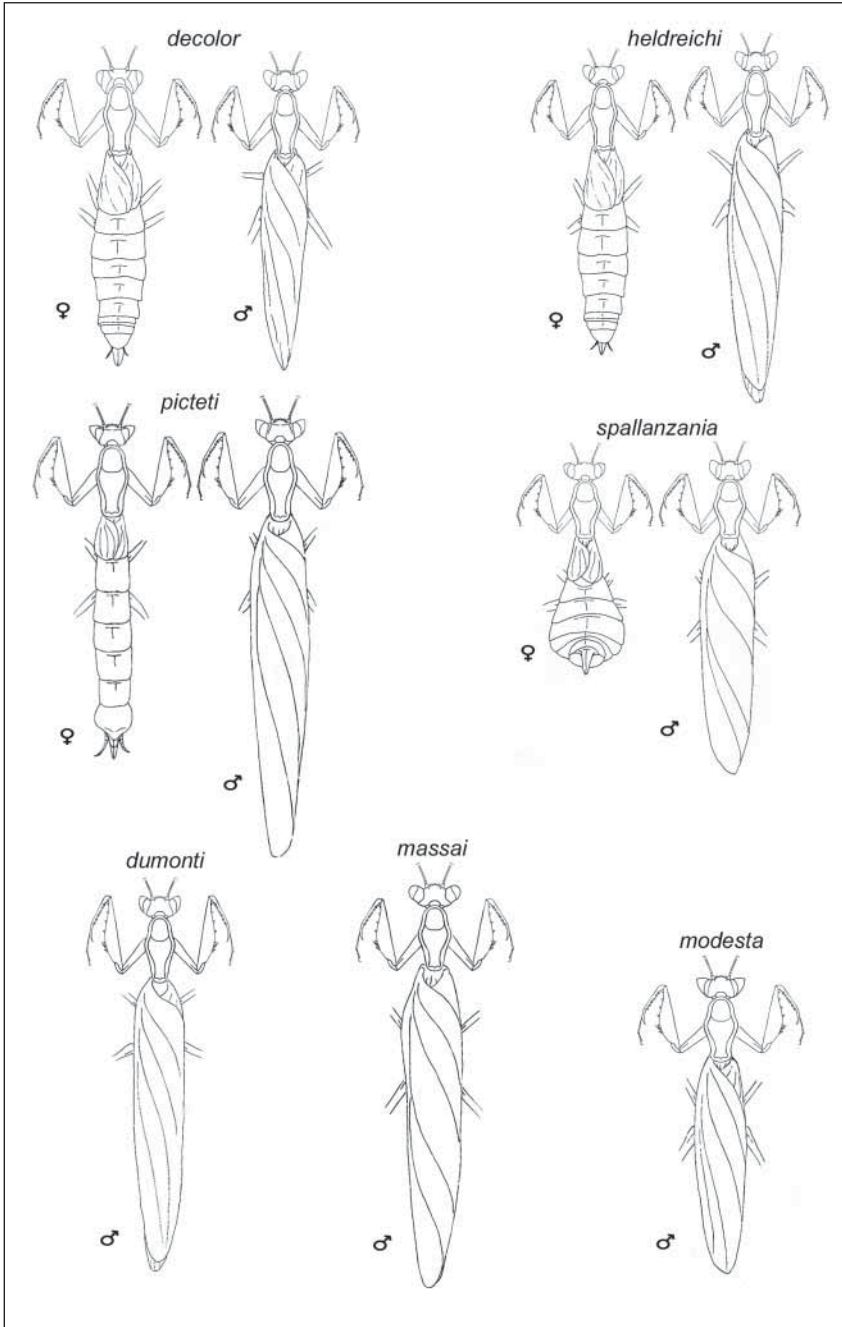


Fig. 13. Comparison of the shapes of the body of all species analyzed. Drawings by R. Battiston.

## REFERENCES

- AGABITI B., 2001-2002 - Le specie Mediterranee del genere *Ameles* Burmeister, 1838 (Insecta, Mantodea: Amelinae) con considerazioni biogeografiche e filogenetiche - Tesi di Dottorato in Biologia Evoluzionistica (Filogenesi e Sistematica), Università degli Studi di Catania, Dipartimento di Biologia Animale.
- BERNARD F., 1936 - La ponte et l'eclosion des *Ameles* - *Bull. Soc. Entom. France*, Paris, 41(2), pp. 42-44, 10 figg.
- BOLIVAR I., 1897 - Les Orthopteres de St.-Joseph's College a Trichinopoly - (Sud de l'Inde) - *Ann. Soc. Ent. France*, Paris, 66, pp. 282-316.
- BOLIVAR I., 1911 - Description de cinq especes nouvelles d'Orthoperes. (Quatre trouvees par Mr. Henri Gadeau de Kerville en Syrie et Perse) - *Bull. Soc. Rouen*, Rouen, pp. 1-3.
- BOLIVAR I., 1914 - Dermapeteros y Orthoperos de Marruecos - *Mem. R. Soc. espan. Hist. nat.*, 8, pp. 157-239.
- BRUNNER VON WATTENWYL., 1882. - Prodrum der europaischen Ortopteren - Engelmann., Leipzig, 466 pp. 8 tavv.
- CHARPENTIER VON, T., 1825 - Horae Entomologicae - Wratislaviae, 255 pp. 9 tavv.
- CHOPARD L., 1943 - Fauna de l'Empire Francais. I.- Orthopteroïdes de l'Afrique du Nord - Larose, Paris, 450 pp. 658 figg.
- CYRILLO D., 1787 - Entomologie Neapolitanae specimen primum - Napoli, pp. 1-9, 8 tavv.
- EHRMANN R., 1988 - Neue Orthopteren-Funde fur die Balearen-Insel Mallorca - *Articulata*, Steinsfeld, 3(4/VIII), pp. 147-150.
- EHRMANN R., 2002 - Mantodea Gottesanbeterinnen der Welt - NTV Wissenschaft, pp. 1-519, figg. 194, tavv. 13
- FABRE J. H., 1972 - Ricordi entomologici - Casa Editrice Sonzogno, Milano, 5, pp. 226-279.
- FAILLA M. C., LA GRECA M., LOMBARDO F., MESSINA A., SCALI V., STEFANI R., VIGNA TAGLIANTI A., 1994 - *Blattaria, Mantodea, Isoptera, Orthoptera, Phasmatodea, Dermaptera, Embioptera*. In : Minelli A., Ruffo S., La Posta S. (eds.) Checklist della fauna Italiana - Calderini, 36, 23 pp.
- FONTANA P., BUZZETTI F. M., COGO A., ODÈ B., 2002 - Guida al riconoscimento e allo studio di cavallette, grilli, mantidi e insetti affini del Veneto - Museo Naturalistico Archeologico di Vicenza, Guide Natura/1, pp. 1-592.
- GIGLIO-TOS E., 1914 - Mantidi esotici VII. Vatinae - *Boll. Mus. Zool. Anat. Comp. R. Univ. Torino*, Torino, 29 (684), pp. 1-87.
- GIGLIO-TOS E., 1915 - Mantidi esotici Generi e Specie Nuove - *Boll. Soc. ent. It.*, Firenze, 46, pp. 31-108.
- GIGLIO-TOS E., 1927 - Das Tierreich. Mantidae - Walter de Gruyter & Co., Berlin & Leipzig, pp. 707, 25 figg.
- HARZ K. & KALTENBACH A., 1976 - Die Orthopteren Europas 3 - Dr. W. Junk B.V. The Hague, pp. 1-434.



- JACOBSON & BIANCHI, 1902 - Die Orthopteren und Pseudoneuropteren des Russischen Reiches und der angrenzenden Lander, nach Tumpel's Werk - *Dewriena*, St. Petersburg, 1-7, pp. 147-148. 5 figg.
- JACOVLEV A., 1903 - Eine neue Mantodea (genus *Parameles*) - *Rev. Russe Ent.*, St. Petersburg, 3, pp. 41-43, 2 figg.
- RAMBUR J. P., 1838 - Faune entomologique de l'Anadalusie, Orthoptera-Mantodea - *Faune ent. Andalous*, Paris, pp. 21-22, 1 tavv.
- SAUSSURE H., 1869 - Essai d'un Système de Mantides - *Mitt. Schweiz. Ent. Ges.*, Shaffausen, 3 (2), 72 pp.
- SERVILLE J.G.A., 1839 - Historie naturelle des Insects Orthopteres - *Hist. Nat. Ins. Orth.*, Paris, 1-292 pp., tavv. 14.
- WERNER E., 1913 - Une nouvelle mantiden egiptienne (*Orthoptera*) - *Bull. Soc. Ent. Egypte*, Cairo, 5, pp. 23.

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