

This handbook is a clear and detailed tool for the study and identification of the 127 species of Mantids living in the Euro-Mediterranean area. The first part describes the appearance of Mantids in human folklore and scientific aspects; their biology, the question of the sexual cannibalism, morphology, colouration and their life-cycles are all extensively treated. For amateurs as well as specialists, detailed descriptions of the most common techniques of rearing, preparation and study of external and internal morphology are presented. The second part includes a large section on the taxonomy of all the species living from the Caucasian Mountains to the Canary Islands. Original drawings and several colour photographs ranging from extremely rare endemic species to the most common ones are given, with keys to their identification and bibliographical references with new and updated synonymies. The book also contains an updated checklist of the Euro-Mediterranean Mantids and, in order to contribute positively to the preservation of these extraordinary and uncommon insects, a red-list of the most threatened species.



Mantids of the Euro-Mediterranean Area

# Mantids

of the Euro-Mediterranean Area



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WBA HANDBOOKS 2

# Mantids

## of the Euro-Mediterranean Area



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PAOLO FONTANA, JUDITH MARSHALL

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# Forewords

The countdown to stop biodiversity loss within 2010, started in 2002 at the Johannesburg World Summit on Sustainable Development, failed miserably. The necessary actions to oppose the excessive exploitation of the biological resources of our planet have been till now inadequate and insufficient. On the contrary, the numbers of extinct and threatened species are continually increasing, largely because of the tropical forest destruction.

To translate words into actions, since its foundation in 2004, the World Biodiversity Association has two formal objectives: to contribute to the planetary biological inventory through scientific expeditions to the world's biodiversity hotspots, and to promote environmental education, in particular among the young: teaching diversity, tolerance, the right to life for all organisms and the respect of ecosystems. In this context, an important role can be played by editorial activity. In particular, the series WBA Handbooks wants to contribute directly to the Project "Conservation by Education". This WBA Project is aimed at educating and training both young and adults in the study and conservation of biodiversity, assisted by means of scientific manuals.

It is an honour for me to present this second volume of the series WBA Handbooks dedicated to Mantids, especially in 2010, declared by the United Nations as the "International Year of Biodiversity". Our hope is that many people, especially the young, by means of this manual can discover answers to their curiosity about these wonderful insects.

For amateurs as well as for specialists, this handbook presents a clear and detailed key to identify and study the Euro-Mediterranean Mantids. The book includes the taxonomy and an updated check-list of the 127 species of Mantids living from the Caucasian mountains to the Canary Islands. Moreover, in order to contribute positively to the preservation of these extraordinary and uncommon insects, a red-list of the most threatened or extinction-risk species of the Euro-Mediterranean area is proposed.

I'm grateful to the authors for their excellent work and congratulate them on their achievements. Thanks also to the members of the WBA Scientific Committee (Editorial Board), and to the supporting Institutions, in particular to the Regione del Veneto.

*It is only by knowing and respecting the beauty of natural environments that we can hope to save the incredible biological richness of our planet.  
Love Nature and the Diversity of Life!*

**Gianfranco Caoduro**  
Chairman of the World Biodiversity Association

Il grave fenomeno di distruzione degli ambienti naturali che si sta verificando negli ultimi decenni e che è causa di estinzione di specie animali e vegetali, ha messo in grande fermento il mondo accademico e consapevoli di ciò le Nazioni Unite hanno dichiarato il 2010 Anno Internazionale della Biodiversità. Si tratta, com'è noto, di una iniziativa che si propone di aumentare la consapevolezza del ruolo fondamentale che la biodiversità svolge nell'assicurare la vita sulla Terra; pertanto conoscere le specie che ancor oggi sono presenti in determinati territori risulta di fondamentale importanza.

Gli Autori con questo volume, dedicato al popolamento a mantidi dell'area mediterranea, hanno centrato tale obiettivo e colmato una vecchia lacuna; infatti un lavoro di insieme, a tutt'oggi, non esisteva, sebbene in passato numerosi studiosi, le cui opere sono state esaurientemente menzionate in questo volume, avessero rivolto la loro attenzione allo studio dei Mantodei del Mediterraneo.

Grazie agli Autori abbiamo, adesso, a disposizione un'opera completa e con diverse sfaccettature; il loro sforzo coordinato, non solo ha aggiornato i dati esistenti sulla consistenza delle specie di mantidi di questa regione geografica ma ha saputo coniugare il rigore scientifico con la divulgazione. Essi hanno così realizzato un'opera ricca d'iconografie e di informazioni dettagliate riguardanti aspetti divulgativi quali le antiche e le moderne leggende, la storia dei personaggi più illustri che hanno contribuito alla conoscenza dei Mantodei e aspetti rigorosamente scientifici quali la biologia e l'eto-ecologia, la storia biogeografica, la tassonomia, la sistematica e le moderne teorie riguardanti la filogenesi dei Mantodei, non ultimo i metodi di raccolta e preparazione degli insetti in laboratorio. Ritengo che questo volume possa essere utile non solo ai sistematici ma anche a tutti coloro che si occupano, con qualsiasi intento e finalità, degli esseri viventi in un dato territorio. Sono certo che la fatica degli Autori troverà benevola accoglienza tra gli studiosi e potrà essere un punto di partenza per i tanti giovani che si avvicinano a questo interessante ordine di Insetti, ancora così poco noto, con la voglia di osservare, capire e approfondire.

Ringrazio, quindi, gli Autori del volume per l'eccellente lavoro svolto e per avermi dato l'opportunità di presentare l'opera.

**Prof. Francesco Lombardo**

Dipartimento di Biologia Animale  
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Les mantes sont de ces insectes qui ne laissent personne indifférent, à cause de leurs proportions inhabituelles, de leur attitude qui fait penser à une prière, de la mobilité et de l'expression de leur tête qui semble regarder intelligemment. Dans toutes les langues et cela depuis l'Antiquité on leur fait une place à part et on leur prête des sentiments religieux, des pensées mystiques, la possibilité de prédire l'avenir. Toutefois elles semblent n'avoir aucun scrupule à dévorer leur partenaire, surtout les femelles en général plus robustes et ayant besoin de beaucoup de nourriture pour élaborer leurs volumineuses oothèques; mais le contraire a été sporadiquement signalé dans la littérature, et j'ai moi-même observé un cas où par un capricieux renversement des rôles un mâle en pleine forme n'a pas hésité à manger une femelle quelque peu fatiguée.

La région étudiée est parmi celles les plus anciennement prospectées, mais elle est relativement pauvre en espèces, les mantes étant surtout diversifiées dans les régions tropicales humides. Néanmoins plus de cent-vingt espèces sont ici passées en revue, ce qui représente environ 5% du nombre mondial actuellement connu. Pourtant l'inventaire pour la région n'est manifestement pas définitif et exhaustif, il y a sûrement encore des espèces à découvrir, à séparer ou au contraire à regrouper, mais essentiellement des limites de répartition à préciser et des données biologiques originales à découvrir, d'où l'importance de ce travail qui constituera sûrement une base essentielle pour des progrès dans la connaissance de la région.

**Dr. Roger Roy**

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## Introduction

When you ask somebody if he or she knows “what is a mantis?”, you probably can get a rather good answer: a mantis is an insect, a sort of locust with two spiny fore legs that it uses to capture the prey and usually the female cannibalizes the partner during the mating. This short description is quite good and widely known from adults to children, and this knowledge is very qualitative if compared with other taxa. Most people probably cannot even describe what is a *Collembola* or a *Trichoptera*, even if you place a photo in front of them.

But when you ask: “and then?”

Silence.

That short description is probably a sort of “Curse of the Mantis”: this is about all which is known about mantids by most people, and what is *needed* to be known. All the wide spread knowledge about this amazing and fascinating insect that even a child can recognize in a field, is reduced to not more than two text lines.

This problem with mantids is probably related to their incredible success in fascinating people: the *idea* of a mantis has become greater than the *mantis* itself. In our minds a mantis is probably closer to a mythological monster of the fields than to an arthropod, a relative of cockroaches and termites, and that is all you need to know.

Probably many students starting to collect some scientific information about this insect have found a lot of obstacles. Libraries are generally not well furnished with field-guides on mantids (as occurs, for example, with birds or butterflies) that help to identify local species, to understand their habitats and their ecology.



Fig. 01 - *Empusa pennata*, female. Photo by R. Battiston.

## The Euro-Mediterranean Area

The region considered in this book is called the “Euro-Mediterranean Area” and includes many different and heterogeneous environments. We started with the concept of ‘Chorotype’, meaning the existence of groups of species with significantly similar distribution patterns. Many scientists have identified different chorotypical regions based on plant, bird, mammal and insect distribution with the purpose of helping biogeographical studies. We followed the classification proposed by Vigna Taglianti *et al.* 1999 and have chosen the term Europeo-Mediterranean Chorotype. Then we adapted it to our aim, since it was based on some amphibians, reptiles, chilopods and especially on Coleoptera distribution, including to the east the western part of the Turanic Region up to the north west side of the Caspian Sea, south the Sinai peninsula, and south-west the Canary Islands. To simplify, at the present time we can recognize at least a single biogeographic region that covers all the warm lands bordered by the waters of the Mediterranean Sea, with an homogeneous vegetation complex, and another one located in the colder Central-Northern part of Europe with a different vegetation and climate.

The reason why we chose this area to describe a group of mantids coming from different and heterogeneous countries from different taxa and with sometimes diverse evolutionary roots, comes from its natural history. The movements of the Earth sur-



Fig. 11 - The Euro-Mediterranean area considered in this book.



Fig. 14 – Some typical habitats used by mantids in the Euro Mediterranean Area: a) European xerothermic grassland (Solagna, Italy); b) Mediterranean maquis (San Rabano, Italy); c) garigue (Tolentino, Italy); d) desert (Matmata, Tunisia); e) coast, (Vieste, Italy).



## Ecology and Ethology



Fig. 19 - Female of *Mantis religiosa* eating a male. Photo by R. Battiston.

### On the Problem of Cannibalism

What made this insect so famous and interesting to the masses was probably the sexual cannibalism, a behaviour that scientists are still trying to explain from an adaptive point of view. While some of them name it as deviant behaviour, induced through artificial conditions by the observer and not meaningful in nature, and interpret it in a non adaptive point of view (Gould, 1984), its existence in the behavioural range of these insects is not in discussion.

But if natural or sexual selection has preserved it during the natural history of this insect, and if, as most biologists seem now to agree, it has an adaptive meaning, what kind of benefits are there in killing the mate? What induces these insects to risk their parental investments and their reproductive fitness? Are these benefits more than the costs for both sexes?

Sexual cannibalism is a rare behaviour in the world of animals, but mantids are not the only cannibals. This behaviour is fairly common in spiders and scorpions (Polis, 1981) and was observed also in a few other groups of insects, in Opisthobranchs (Paine, 1965), amphipods (Dick, 1995), gastropods and copepods (Elgar, 1992), and in three insect orders (Roeder, 1935; Downes, 1987).

In Mantodea, most of the species are known to practise cannibalism and it can



Fig. 23 - Oothecae: a- *Ameles decolor*; b- *Ameles spallanzania*; c- *Empusa fasciata*; d- *Iris oratoria*; e- *Mantis religiosa*; f- *Sphodromantis viridis*. Photos by R. Battiston.

tunnel to one opening on the dorsal prominence. In this case the disposition of the openings on the surface permits species identification even on a very old ootheca.

The mantids that hatch from an egg are not real nymphs but proto-nymphs with a worm-like shape adapted to dig their way through the solid ootheca, clearly different from the adult insect. The first moult occurs on the surface of the ootheca just after the hatch and this is a critical moment for the nymph that could be trapped inside it if the humidity of the environment or its ability is not adequate. From this second stage the nymphs, as a true paurometabolus insect, have the normal shape of small and wingless adults and start to show cannibalistic behaviour (even if in a reduced rate during the early stages), and normally, in nature, start to disperse to decrease the risk of meeting a hungry sibling (Hurd in Prete *et al.*, 1999).

3- Remove the genitalia from KOH and wash them with  $H_2O$ , then put them in alcohol 95% and leave it there for 5 minutes. If you have time to for a more precise work put them again it in alcohol 85% for other 5 minutes and then in alcohol 75% for other 5 minutes, or do only the first step (alcohol 95%) if you need a fast slide, it is enough to obtain a good slide for most of the species.

4- Remove the genitalia from alcohol and put them in Ethanol ( $C_2H_5OH$ ), for another 5-10 minutes.

5- Prepare the slide (glass or transparent and inert plastic) and put a drop of Canada Balsam on it. Dry the genitalia putting them for a moment on a piece of



Fig. 35 - a) forcing apart the genital and anal plates with a small pin; b) grabbing the genitalia with forceps and pulling them out; c) removing the genitalia; d) washing them in KOH; e) accelerating the process on a flame; f) washing in  $H_2O$ , than in Alcohol; g) washing in Ethanol; h) preparing the slide with a drop of Canada Balsam; i) relaxing the balsam with a small drop of Ethanol;

## MORPHOLOGY

The mantids are generally quite large and more or less elongated. Their size (usually measured from the top of the head to the bottom of the last abdominal segment) can vary from about 1cm, e.g., *Mantoida tenuis* from South America up to 17cm e.g. *Ischnomantis gigas* from Western Africa. In the Euro-Mediterranean region sizes vary between 1-2cm of *Eremiaphila* and *Perlamantis* to about 13cm of large females of *Eremoplana infelix*.

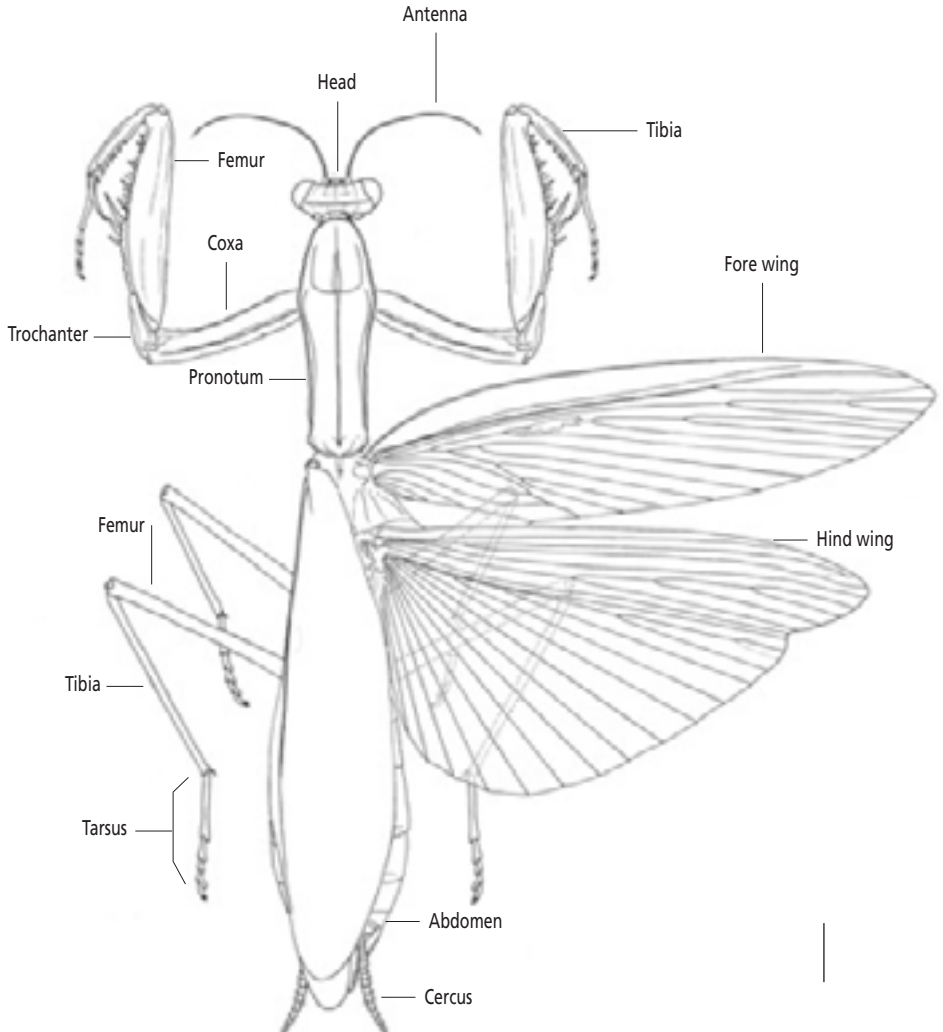


Fig. 36 - *Mantis religiosa*: habitus. Scale bar: 4mm. Drawing by L. Picciau.



# TAXONOMY

## Notes on Reading the Taxonomical Sheets

ORDER - FAMILY - SUBFAMILY - TRIBE

GENUS Author, Year



Fig. 53 - Distribution of the genus.

**Map:** represents the distribution of the genus. This is a graphical representation that summarizes literature citations and collecting records that should not be considered as absolute and exhaustive. The area in grey does not show local discontinuities but covers the area which should be considered as the average potential habitat of the genus at present time.

**General description of the genus:** contains all the characters diagnostic for the genus that are shared by all the species listed. Taxonomical problems at genera level or of some species not presented in the list are discussed here. The total number of valid species known for the genus at the present time is reported.

**Ecological notes:** when possible ecological notes on life cycle, habitat preferences or behaviour, from literature, collecting records or personal observations, are reported here.

## Key to Families

<b>1</b>	Pronotum square, or only a little longer than broad. (Fig. 106, c)	<b>2</b>
	Pronotum several times longer than broad (disregarding any lateral lobes/processes).	<b>4</b>
<b>2</b>	Fore tibiae without spines, or only with delicate spines ventromedially (Fig. 106, b).	<b>AMORPHOSCELIDAE</b>
	Fore tibiae with two rows of spines.	<b>3</b>
<b>3</b>	Fore wings of the male well developed, shorter in the female. 6 <sup>th</sup> abdominal sternite of the female simple.	<b>MANTIDAE</b> genus <i>Elaea</i>
	Both sexes brachypterous. 6 <sup>th</sup> abdominal sternite of the female with two spines (Fig. 126).	<b>EREMIAPHILIDAE</b>
<b>4</b>	Ventromedial spines of fore femora 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 (Fig. 68, a).	<b>EMPUSIDAE</b>
	Ventromedial spines of fore femora arranged with long spines alternating with short spines (or equal in length) (Fig. 90). Antennae of male never pectinate.	<b>MANTIDAE</b>

## Key to Genera

### AMORPHOSCELIDAE

*Perlamantis*

### EREMIAPHILIDAE

<b>1</b>	Medium and hind tarsi with 5 articles.	<b><i>Eremiaphila</i></b>
	Medium and hind tarsi with with 3 or 4 articles.	<b><i>Heteronutarsus</i></b>

### EMPUSIDAE

<b>1</b>	Vertex not very prolonged, sub-conical. Pronotum short.	<b><i>Blepharopsis</i></b>
	Vertex clearly prolonged, acuminate, lobed in the apex. Pronotum long.	<b>2</b>
<b>2</b>	Hind femora with lobes. Process of the vertex broad (Fig. 68, c).	<b><i>Empusa</i></b>
	Hind femora without lobes. Process of the vertex long and slender (Fig. 84, a).	<b><i>Hypsicorypha</i></b>

## Key to Mantidae

<b>1</b>	Cerci flat, foliaceous or expanded (Fig. 129, a).	<b>2</b>
	Cerci cylindrical, filiform (Fig. 44).	<b>7</b>
<b>2</b>	Dorsal margin of fore coxae with few large triangular spines.	<b><i>Heterochaeta</i></b>
	Dorsal margin of fore coxae without triangular spines.	<b>3</b>
<b>3</b>	Head about as broad as long. Vertex of the male exceeding the eyes. Frontal sclerite very arched, pentagonal (Fig. 103, b).	<b><i>Pareuthyphleps</i></b>
	Head broader than long. Vertex of the male not exceeding the eyes (Fig. 37).	<b>4</b>
<b>4</b>	Last segment of the cercus much more longer than the penultimate segment (Fig. 99, a-e).	<b><i>Oxyothespis</i></b>
	Last segment of the cercus about as long or only a little longer than the penultimate segment (Fig. 115, a-c).	<b>5</b>
<b>5</b>	Eyes prominent, with an apical tubercle.	<b><i>Severinia</i></b>
	Eyes round, without any tubercle.	<b>6</b>
<b>6</b>	Supra anal plate small, apically rounded.	<b><i>Sinaiaella</i></b>
	Supra anal plate transverse, with apex truncated.	<b><i>Paraseverinia</i></b>
<b>7</b>	Pronotum at most twice as long as broad (if a little longer: greatest width of the	<b>8</b>

## MANTODEA - MANTIDAE - AMELINAE - AMELINI

## APTEROMANTIS Werner, 1931

Fig. 58 - Distribution of the genus *Apteromantis*.

Small sized mantis. Similar to *Pseudoyersinia* Kirby 1904, but a little bigger and more robust. Frontal sclerite moderately transverse. Vertex concave. Eyes conical. Antennae longer in the male than in the female. Pronotum clearly twice as long as broad, with flatter, gradually enlarging, supra coxal dilatation. Flight organs completely missing in both sexes. Abdomen in the male slender than in the female. Fore femora with 4 discoidal and 4 external spines. Mid and hind legs moderately long, metatarsus of the hind legs barely longer than the following segments taken together. Supra anal plate triangular, not longer than broad. Cerci moderately long. 2 species known.

**Ecological notes:** very little is known about *A. bolivari* except that adults can be found on the ground in coastal areas as well as on mountains. *A. aptera* can usually be found on the ground in grasslands from late spring to the end of summer.

**Euro-Mediterranean species list**

1. *Apteromantis aptera*
2. *Apteromantis bolivari*

■ 1. *Apteromantis aptera* (Fuente, 1894)

*Ameles áptera* Fuente, 1894. Actas Soc. esp. Hist. nat. 22: 137.

*Pseudoyersinia? aptera* (Fuente, 1894). In: Kirby, 1904. Syn. Cat. Orth. 1: 231.

*Pseudoyersinia áptera* (Fuente, 1894). In: Giglio-Tos, 1927: 165.

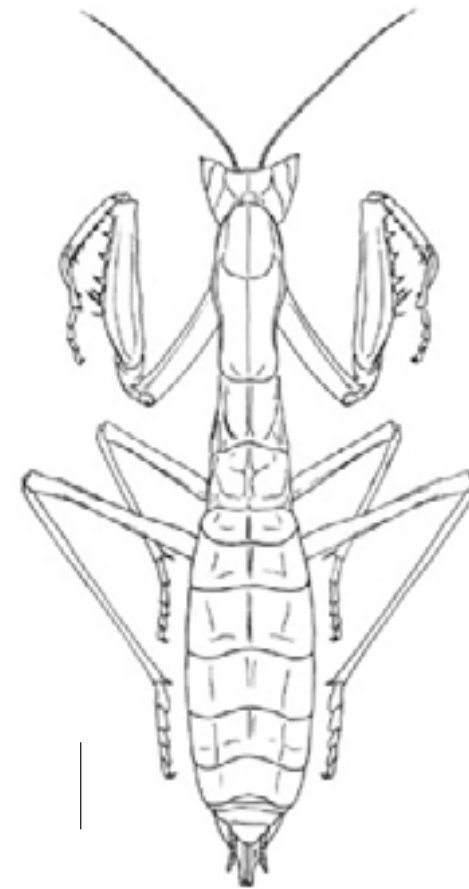
*Apteromantis aptera* (Fuente, 1894). In: Beier. 1935. Genera Insect. 203: 35.

Typus: Cotypus 2 ♂, 3 ♀, MNMS.

Locus typicus: Spain: Pozuelo de Calatrava.

**Diagnosis:** colour green, more rarely yellowish. Head approximately as broad as the length of the pronotum. Eyes conical, more strongly pointed in the male. The superior edge of the frontal sclerite blunt. Metazone of the pronotum relatively broad. Flight organs completely lacking in both sexes. Mid and hind legs long, particularly in the male. Abdomen of the male nearly straight, widened in the last third in the female. Cerci of the male flattened. Sub genital plate of the female triangular.

**Male and female morphometry:** body length: ♂: 27-28mm, ♀: 28.5-36mm; pronotum: ♂: 5.5-6mm, ♀: 6.5-8.5mm; supra coxal dilatation: ♀: 3mm.

Fig. 59 - *Apteromantis aptera*: female habitus, specimen from Spain, BMNH; drawing by L. Picciau. Scale bar: 4mm.

■ 2. *Apteromantis bolivari* (Werner, 1931)

*Pseudoyersinia bolivari* Werner, 1929. Sber. Akad. Wiss. Wien 138: 147.

Typus: Holotypus ♀ NHMW.

Locus typicus: West Algeria: Fes.

Distribution: Algeria, Morocco, Portugal?

**Diagnosis:** colour green or yellowish. Vertex strongly excavated. Frontal sclerite pentagonal, presenting three blunt tubercles. Eyes slender, conical, ending with a small spiny tubercle. Pronotum long more than twice as broad, with smooth edges. Spindle-shaped abdomen; supra anal plate triangular, with moderately sinuous edges. Cerci rather long, pointed in the apex. Sub genital plate of the male narrowed near the apex, more triangular and deeply incised near the apex in the female.

**Male and female morphometry:** body length: ♂:28-31mm, ♀: 40-44.5mm; pronotum: ♂ 6.5 mm, ♀: 7.5-10mm; supra coxal dilatation: ♂: 2.5-3mm, ♀: 4mm

**Key to the species of the genus *Apteromantis***

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1	Eyes less conical, triangular tubercle, profile of the head between eyes flat. Abdomen shorter and wider in the females.	<i>A. aptera</i>
	Eyes very conical, spiny tubercle, profile of the head between eyes concave. Abdomen clearly longer in the females.	<i>A. bolivari</i>

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male. Metazone of the pronotum barely toothed only in the front part, fore wings without spots near the stigma, the anterior edge and radial veins yellow, sometimes with a purple spot at the base of the discoidal area. Fore and hind wings a little brownish near the end, and veins of the discoidal area of the wings long and bordered with a little brown near the end, lobes of the 4 hind femora a little smaller.

**Male and female morphometry:** body length: ♂: 60mm, ♀: 65-72mm; pronotum: ♂: 22-25mm, ♀: 25-28mm; metazone: ♂: 20-21mm, ♀: 21-22mm; pronotum width: ♂: 4mm, ♀: 4.5-5mm; fore wings: ♂: 40-44mm, ♀ 36-40mm.

## ■ 2. *Empusa guttula* (Thunberg, 1815)

*Gongylus guttulus* Thunberg, 1815. Mem. Acad. Sci. St. Petersb. 5: 294.

*Empusa dolosa* Serville, 1839. Hist. Ins. Orth. 143.

*Empusa guttulus* (Thunberg, 1815). In: Kirby. 1904. Syn. Cat. Orth. 1: 311.

Typus: Holotypus ♂ ZMAS.

Locus typicus: unknown.

Distribution: Algeria, Angola, Burkina Faso, Cameroon, Cape Province, Chad,

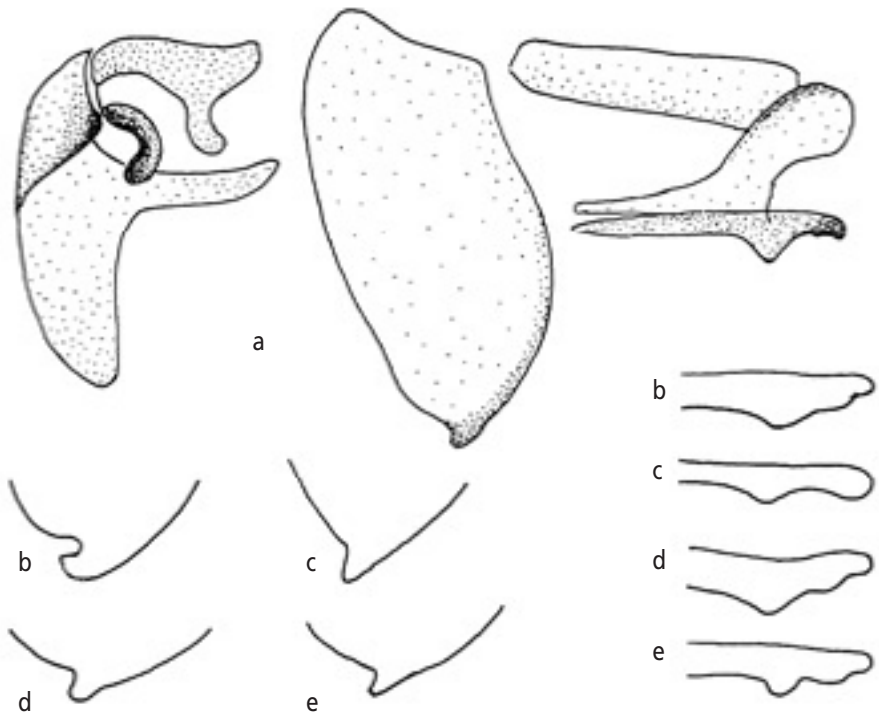


Fig. 70 - a) *Empusa pennata*: male genitalia; distal process of hypophallus and pseudophallus of: b) *E. fasciata*; c) *E. guttula*; d) *E. hedenborgii*; e) *E. pennicornis*, from Roy, 2004; modified.

■ 38. *Eremiaphila rotundipennis* Kirby, 1904

*Eremiaphila rotundipennis* Kirby, 1904. Syn. Cat. Orth. 1: 210.

Typus: Syntypus 2 ♀, 1 nymph BMNH, Syntypus? Juv. MHNG.

Locus typicus: Libya.

Distribution: North-West Egypt, India, Libya.

■ 39. *Eremiaphila rufipennis* Uvarov, 1929

*Eremiaphila rufipennis* Uvarov, 1929. Ergebn. Sinai-Exped. 1927: 92.

Typus: Holotypus ♀ BMNH, Paratypus ♀ MHNG.

Locus typicus: Egypt: Sinai Wadi Tarfa.

Distribution: Egypt.

■ 40. *Eremiaphila savignyi* Lefebvre, 1835

*Eremiaphila savignyi* Lefebvre, 1835. Annl. Soc. ent. Fr. 4: 494.

*Centromantis (Eremiaphila) savignyi* (Lefebvre, 1835). In: Werner. 1904. Anz. Akad. Wiss. Wien 27:405.

Typus: Holotypus ♀ MNHN.

Locus typicus: Egypt. Distribution: Egypt, Arabie, Libya.

■ 41. *Eremiaphila spinulosa* Krauss, 1893

*Heremiaphila spinulosa* Krauss, 1893. Jh. Ver. vaterl. Naturk. Wurttemberg 1893: 95. Typus: Holotypus ♂ SMNS.

Locus Typicus: Algeria: Oran-Mecheria.

Distribution: Algeria, North Chad.

■ 42. *Eremiaphila tuberculifera* Chopard, 1941

*Eremiaphila tuberculifera* Chopard, 1941. Annl. Soc. ent. Fr. 110: 29.

Typus: Holotypus ♂ MNHN, Allotypus ♀ MNHN.

Locus typicus: Algeria: Hoggar-Tamanrasset.

Distribution: Algeria.

■ 43. *Eremiaphila turcica* Westwood, 1889

*Eremiaphila turcica* Westwood, 1889. Revis. Mantid. 29.

Typus: Syntypus 4♀ BMNH.

Locus typicus: Turkia.

Distribution: Iran, Iraq: District Arbil-Zirga Zarow Hills, Turkia.

■ 44. *Eremiaphila typhon* Lefebvre, 1835

*Eremiaphila typhon* Lefebvre, 1835. Annl. Soc. ent. Fr. 4: 499.

*Eremiaphila ebrenergi* (Burmeister, 1838) Handb. Ent., Burm. 2: 525.

Typus: Holotypus ♂ ZMB, Allotypus ♀ ZMB, Paratypus ♀ juv. MNHN.

Locus typicus: Egypt: Oasis in Bahryeh.

Distribution: Algeria, Arabia, Egypt, North Chad: Tibesti, India, Libya, North Niger, Syria.

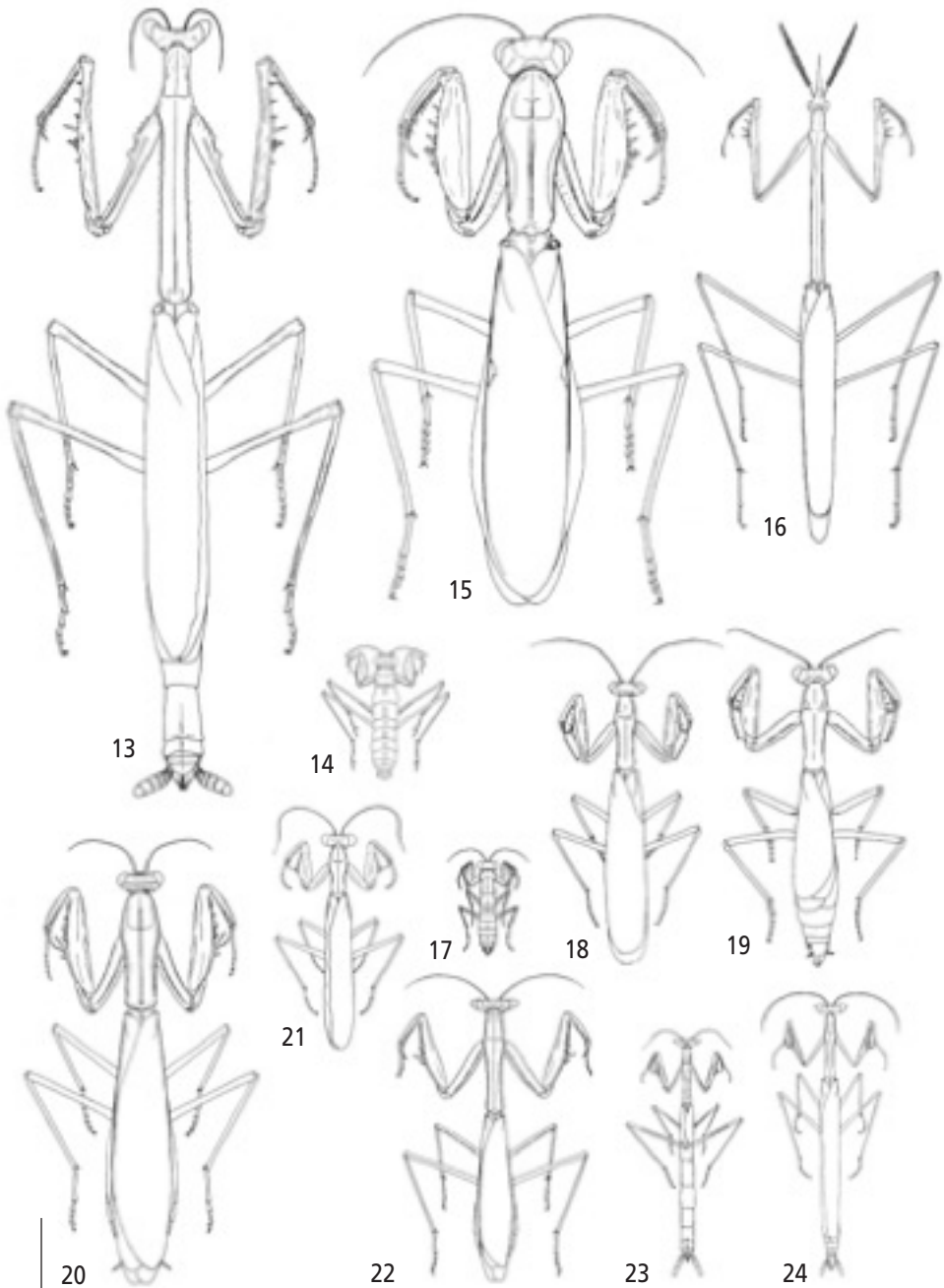


Fig. 133 - Graphic key to Euro-Mediterranean and borderline genera: 13) *Heterochaeta* ♀; 14) *Heteronutarsus* ♂; 15) *Hierodula* ♀; 16) *Hypsicorypha* ♂; 17) *Holaptilon* ♂; 18) *Iris* ♂; 19) *Iris* ♀; 20) *Mantis* ♀; 21) *Microthespis* ♂; 22) *Miomantis* ♀; 23) *Oxythespis* ♀; 24) *Oxythespis* ♂. Scale bar: 1:1.

# A Red List For Euro-Mediterranean Mantids

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Mantodea is an insect group that is usually barely considered in red lists of threatened species which could lead to the supposition that these animals are widespread, healthy and not in danger, but this would be a totally wrong idea. Except for local initiatives, at the present time only one species (*Apteromantis aptera*) in this order is considered as a Lower Risk/Near Threatened species in the International Union for Conservation of Nature (IUCN) database and inserted by the European Community in the annex II of directive 92/43/CEE. Due to the many taxonomic problems and the huge lack of ecological data all the other species, some which are probably at higher risk of extinction than *A. aptera*, are still not considered, and some of the ones reported in this book might already be extinct by the time it is published.

The aim of our red list is to give a preliminary analysis of distribution and the threat to each species of Mantodea in the Euro-Mediterranean area.

Since there is so little information about habitats, distribution and ecology of most species, it is very difficult to give a complete and statistically acceptable evaluation of these aspects and reach the quality level of the IUCN parameters. The red-list we present here aims only to put in evidence this conservation problem, giving a starting point for further investigations, which could probably be carried out with a major degree of accuracy with the improvement of knowledge of the different species.

## Data used and Methods

Three aspects have been considered for each species to obtain a synthesis parameter of threat: spatial distribution, trend of that area and rarity of the species.

Surface data has been analyzed by statistical methods, instead rarity has been assigned with an estimation based on collecting records.

First of all, distribution was defined for each strictly Euro-Mediterranean species and not for the borderline species (see the chapter on taxonomy): the majority of the nations and regions considered are located around the Mediterranean Sea, even if some of them include Asia and America.

To determine the suitable surface for each country, we referred to the Land Use Database of FaoStat, Statistics Division, where different data is available: Permanent meadows and Pastures was chosen as the habitat parameter.

Excluding other types of land use, which were not useful for our purpose (such as Agricultural area, Arable land, Permanent or temporary crops, Forest areas...), more detailed data is also available, but information is restricted to a few countries or a historical dataset limited to a few years, and so was not considered here.



## Mantids in Nature



*Ameles decolor* ♂ - Italy. Photo by R. Kleukers.



*Ameles decolor* ♀ - Italy. Photo by R. Battiston.



*Ameles heldreichi* ♂ - Greece. Photo by R. Kleukers.



*Ameles heldreichi* ♀ - Greece. Photo by R. Kleukers.



*Sphodromantis viridis barbara* ♂ - Tunisia.  
Photo by R. Battiston.



*Sphodromantis viridis barbara* ♀ - Tunisia.  
Photo by R. Battiston.



*Sphodromantis viridis occidentalis* ♂-♀ Morocco. Photo by J. R. Correas.

## Glossary

**Abdomen:** posterior part of the three main body divisions of an insect.

**Adaptive:** characteristic of an organism modified to fit better in its habitat.

**Anal area:** widest part of the wing connected to the mesothorax by the jugal field.

**Antenna:** filiform or pectinate structure composed of a large number of segments, receptive to chemical stimuli.

**Anus:** posterior opening of the digestive tract.

**Apophysis:** an outgrowth or protuberance of a structure, usually well distinct from it, bulging and sclerified.

**Aposematic:** of colouration, having a warning or protective function.

**Apterous:** without wings.

**Arolium:** a small pad between the claws on an insect's foot.

**Basitarsus:** first segment of the tarsus.

**Biliverdine:** intertegumentary pigment (chromoprotide) which gives the insect a green colouration.

**Biodiversity:** biological diversity in an environment, characterised by the number of different species of organisms present.

**Biogeographic region:** area of animal and plant distribution having similar or shared characteristics throughout.

**Biogeography:** study of the geographic distribution of plants and animals.

**Brachypterous:** individual with reduced wings, visible but not functional for flight.

**Camouflage:** use of biological colouration to mask location, identity and movement, providing concealment from prey and protection from predators.

**Cannibalism:** the act of eating a member of the same species

**Cercus:** (pl. cerci) filiform appendage, more or less hairy, composed of many segments; situated on the tenth tergite of the mantid's abdomen.

**Chorotype:** the geographical distribution of plants and animals.

**Chromoprotide:** coloured protein resulting from the conjunction of amino-acids and a coloured pigment.

**Cladistics:** system of biological taxonomy that defines taxa uniquely by shared characteristics not found in ancestral groups and uses inferred evolutionary relationships to arrange taxa in a branching hierarchy, such that all members of a given taxon have the same ancestors.

**Clypeus:** frontal part of the head of the insect, covering the mouth parts.

**Colleterial glands:** glands associated with the female genital apparatus which produce secretions used in egg case formation.

**Compound eyes:** eyes made up of aggregations of many visual elements or ommatidia arranged in a convex structure.

**Contra-apophysis:** secondary apophysis situated in a symmetrical position to the primary one.

**Cospecific:** member of the same species.

**Costal area:** anterior, narrow part of the fore and hind wings between the costal vein and the radial vein.

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