Acarologia is proudly non-profit, with no page charges and free open access

Please help us maintain this system by encouraging your institutes to subscribe to the print version of the journal and by sending us your high quality research on the Acari.

Subscriptions: Year 2020 (Volume 60): 450 €
http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2018): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France
ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d’avenir » programme (Labex Agro: ANR-10-LABX-0001-01)

Acarologia is under free license and distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.
IRANIAN MACROCHELIDS II SHORT DESCRIPTION OF FOUR NEW SPECIES
WHAT ABOUT THE GENUS MACROCHELES?

BY M. SEIFOORI1, GLIDA H. 2, SABOORI A. 3 & BERTRAND M. 4
(Accepted January 2008)

MACROCHELES IRAN

SUMMARY: Four new species are described new species. The Iranian macrochelid fauna is rich in number of species collected, and provides new data for the knowledge of this ecological group associated with dung pads and coprophilous insects: one of these new species (M. similiscutatus n. sp.) is without claw on tarsi II; M. minutum, paucipunctatum and simplex are three new species from soil and dung samplings.

This article completes some data on macrochelids from Islamic Republic of Iran. Three new species belonging to Macrocheles genus were described (GLIDA et al., 2003). The new data revealed some specimens that cannot be named by the catalogue of the known Iranian fauna (KAMALI et al. 2001). Notwithstanding only few individuals per species were collected, four new species are described, based on female description and named in this note. Consideration on current knowledge of macrochelids, especially on the genus Macrocheles is discussed

MATERIAL AND METHODS

By a survey (soil and dung cores) 37 specimens were collected and mounted as macrochelids in Islamic Azad University of Arak. Determination was confirmed in Montpellier, and some specimens were cleared in hot lactic acid, dissected and studied. Several species were noted as new for science. Four of them were chosen, mounted in lactic acid or Hoyer’s medium. Measures were made by software Motic Image.

1. Department of Entomology, College of Agriculture, Islamic Azad University of Arak, Arak, Iran
2. Ecole Agronomie El Kef, Tunisie
3. Department of Plant Protection, college of Agriculture, University of Tehran, Karaj, Iran
4. Université Montpellier III UMR5175 CNRS CEFE Montpellier, France

RESULTS

New data on Iranian species: common species M. glaber, scutatus, merdarius and robustulus were identified from soil and dung. In some localities (three from soil samples: Hossein Abaj, Baghdadi, Nare Satan, and one from dung: Malekabad) several new species were identified.

Measures are given in the Table 1. Ventrianal and dorsal length and width are the maximal value measured on dissected specimen. Width of dorsal shield was measure between r2 setae; width of sternal shield is the minimal value at the level of coxae II.

<table>
<thead>
<tr>
<th>Shields</th>
<th>DORSAL</th>
<th>VENTRIANAL</th>
<th>STERNAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species:</td>
<td>Length</td>
<td>Width</td>
<td>Length</td>
</tr>
<tr>
<td>M. similiscutatus</td>
<td>560</td>
<td>302</td>
<td>155</td>
</tr>
<tr>
<td>M. paucipunctatum</td>
<td>510</td>
<td>300</td>
<td>182</td>
</tr>
<tr>
<td>M. minutum</td>
<td>643</td>
<td>310</td>
<td>169</td>
</tr>
<tr>
<td>M. simplex</td>
<td>625</td>
<td>380</td>
<td>202</td>
</tr>
</tbody>
</table>

**Macrocheles similiscutatus n. sp.**

This species is characterized by the lack of the ambulacra on the PII on the material examined. By general morphology this species can be considered as close to the scutatus subgroup, notably by the following characters: the dorsal shield is divided (glaber group) by procurved line (convexo between the setae z6), reticular pattern sub pentagonal, smooth setae. (ii) ciliated distally; sternal shield: the median transverse line tends to be obsolete and hidden, fused in part with the oblique posterior linea. This ornamentation draws an arched design. Chelicerae: large pyramidal tooth on fixed digit, the “double” tooth on the mobile article is adapted to bite, a curved line delimiting a dimple on the opposite digit. Spermatheca: glaber like. Epistome with reduced median process, glabrous. Large epigynial plate, posterior ends tending to overlap frontal edge of ventrianal plate. Usual setae on ventrianal shield. Locus typicus: Hossein Abaj Ira M.S. col., from soil and dung)

**Macrocheles paucipunctatum n. sp.**

This species could be confused with the widely distributed M. robustulus but differs by general shape, smooth dorsal setae, reduced pattern on sternal shield (weaker ornamentation than in robustulus). Dorsal shield entire, setae ciliate. Genital shield longer than wide (bell-shaped) extending backward beyond the coxae IV. Metasternal plates at shorter distance from genital shield than from coxae III. Ventrianal shield: characterized by asymmetry in right and left insertion of the first, second and third pairs of ventral setae. Chelicera elongated, no pyramidal tooth on fixed digit, but a blade, bearing pilus dentilis 5 and ending proximally in a notch following a tiny tooth (this observation must be considered as what was observed on the chelicera of M. elongatum Glida et al. 2003). Is it a convergence? Two sharpened teeth on the mobile digit, the proximal being the largest. Lyriform organs visible, rather large. Spermatheca with very long sperm duct opening in a rounded receptaculum seminis (3 times longer than the sacculi width).

Locus typicus: Malekabad 1-9-2004, MS col., from soil core.

**Macrocheles minutum n. sp.**

Rather large species (more than 750 μm with first pair of legs.). Dorsal shield longer than wide, convex

5. distal position of pilus dentilis is usual in phoretic macrochelids. However subterminal position (or submedian) can be defined when pilus dentilis is far from terminal hook of a distance greater than its own length. This seems to occur rather in terrestrial species (or in species with unknown host!)
Figs 1-4. 1. *M. similiscutatus* n. sp. a.- dorsum, b.- ventral shields, c.- chelicera, d.- epistome, e.- sacculus foemineus. 2. *M. paucipunctatum* n. sp. a.- dorsum, b.- ventral shields, c.- chelicera, d.- epistome, e.- sacculus foemineus. 3. *M. minutum* n. sp. a.- dorsum, b.- ventral shields, c.- chelicera, d.- epistome, e.- sacculus foemineus. 4. *M. simplex* n. sp. a.- dorsal setae j1, b.- ventral shields, c.- chelicera, d.- epistome, e.- sacculus foemineus.
reticular pattern drawn by large points on dorsal shield attenuated in punctures in the median part. Dorsal: shield divided by a weak procured line. (J1) and (J5) pilose. Sternal shield as wide as long with weak ornamentation but main lines are visible. Genital shields rounded in shape, overlapping the ventrianal shield. Spermatheca: very short sperm duct. Receptaculum globular in shape. Chelicera: very strong digitus fixus, with large subterminal pyramidal tooth, large lyrifissures. Mobile digit with submedian teeth. Dorsal lyriform organ rather straight, vertical lyriform organ longer. Locus typicus: Nuestan, Iran 19-6-2005, MS col.

**Macrocheles simplex** n. sp. 
*(simplex* refers to the simple and acute teeth on the digits of chelicerae).

Large species characterized by long and width sternal and genital shields, shapely ventrianal shield, weakness of ornamentation, ductus of sacculus foemineus very long and thin. Chelicera is robust with on mobile digit sharpened double tooth and flattened distal tooth, and on fixed digit pilus dentilis long in sub median position on the recurrent blade ended by a sharp tooth.

Locus typicus, Baghdady, Iran, 30-10-04 MS col.

**DISCUSSION**

These four new species enlarge the knowledge of Iranian fauna. It is obvious that now this region reveals a diversified macrochelid fauna and that the future studies need a renewed consideration including the largest range of characters. The family, (and overall the genus *Macrocheles*) is cosmopolitan, in temperate, arid and hot climates. Recent descriptions from Australia, Indonesia, Sumatra, and Europe gave new data and a more and more complete knowledge of the family. Examining material from diverse part of the world, many new original data will be brought to our knowledge (Iran, Persian Gulf, Africa, uppermost North & Central Africa, South America,....) in the future (MB collections).

To replace the Iranian fauna in the general consideration of the family, some species that are well represented in Iran can be considered as the backbone of the macrochelid community. These species are widely distributed, and are cosmopolitan: i.e. *M. merdarius* and *robustulus* were collected from North Africa, Southern Europe and Middle East, Turkey and Yemen (Van HARTEN rec., original data). However some widespread species remain still unfound: *M. vernalis* in Iran (this species is present in Western Mediterranean basin and from Morocco to Yemen). The more frequent species were *robustulus*, *merdarius*, *glaber*, *scutatus*... The data from Yemen (col. Van HARTEN, leg. E.A. UECKERMANN) showed a rupture in faunal composition, spectrum being enlarged by *M. kranzti* Evans & Hyatt 1963 or *M. matrius* (Hull, 1918).

Nowadays, ones can question on the opportunity to describe more and more species (in a philatelist-like strategy?) without bringing, stone by stone, material to build, complete the knowledge in peopling strategies followed by species, biogeography, (geneticist’s strategy) before renewing the knowledge of the systematic. Permanent question is: which could be the parameters to understand the “true” architecture of the family and especially which are the more pertinent levels? What about the groups of species? Are these divisions justified? How can we consider the superspecific rank? For future descriptions and to avoid no useful works, new approaches are needed. BERLESE (1918) divided the family with several genera (GLIDA et al. 2003) i.e. *Coprolaspis*, and “phalanxes”. Ones can keep in mind that most of studies until now was carried on **coprophilous** macrochelids, because of the applied studies for limiting flies in pasture.

However the genus *Macrocheles* is heterogeneous:

— By species ecology and behaviour: coprophilous, pholeophilous, inhabitants of soil..., or “free” species (a species is currently called “free” when it was collected “free”, but it could be linked to an “unknown host”)? Few data are available on the *Macrocheles* spp. bore by Hymenoptera (especially in hot countries), (seen but still undescribed notably African species). From a common point of view, phoresy may be the first step toward parasitism (questions: did parasitism begin when the phoretic feeds on the carrier? Can we qualify parasite *M. muscaedomesticae*...
because this species feeds on fly larvae - but non exclusively - and because the imago disperses these mated females?). Adaptation to phoresy (especially adaptation to the host, and overall specialization on one or few hosts) exerts high constraints: could these constraints modify the morphology? (Answer could be “yes”, notably by adaptation to selected sites for fixing, and because the species of this genus *Macrocheles* show gradual responses - strength of links with hosts, process for attachment- more and more adapted). If the answer is positive, could we hypothesize about the homologies and homoplasies, when characters are lacking, and because regressive evolution is enforced by the “phoretic to parasite” way of life?

It is obvious that the *sacer* group corresponds to some neighbour species, homogeneous and easily recognizable (even if it is hard to differentiate some species) by external and by internal features (large and rounded sacculus foeminaeus).

About behaviour linked to phoresy, the selectiveness may be high: it could be essential for intra and extra competition.

— By biology: daemon’s question could be: 1) Are all the species thought to be arrhenotokous really arrhenotokous? 2) If the spermatheka was not observed in some species, are these species thelytokous? 3) Which was the role played by parthenogenesis in adaptive process of adaptation to the less or more predictable environment? To get easier the phoresy? To get obsolete (or at least reduce) male-female conflicts? 4) Can we consider arrhenotoky a step to thelytoky or did the thelytokous follow a separate pathway?

— The problem of parthenogenesis is the centre of the problem: in many parthenogenetic systems (cyclic thelytoky, arrhenotoky or paternal genome elimination PGE), role of male is reduced. Arrhenotoky and PGE are haplodiploid systems. Arrhenotoky allows facultative female-biased sex ratios which are adaptively favoured under in breeding (HAMILTON 1967, NORMARK 2006). Thelytoky, cyclic or obligate, reduces the role of sex in life, (comprise when parasites have taken the control of the reproduction of their host (under control of parthenogenesis inducing bac-

eria) (NORMARK, 2006). An advantage of haplodiploidy is the reduction of conflicts between siblings, haplodiploidy increases relatedness between full sisters at the second generation. By this way, coprophilous macrochelid are engaged towards a eu-social lineage that the populations of many coprophilous species could be representative. Objection for haplodiploidy is that n individuals are thought less competitive than 2n individuals. Problem should be resolved if disadvantages are balanced by high competition: *Macrocheles*, living in ephemeral and “closed” habitat (the dung pat), compete to 1) resist to change with time environment, 2) find adequate hosts in short time.

— By any other character: the genetic distance gives us profitable acknowledgement This analyse is not easy, needs a large range of species and a long time for interpretation of the results. Then it would be suitable to cross these results with classic systematic.

An inhabitant remarked to Livingstone, “God made white men, and God made black men, but the Devil made half-castes.” The Zambezi Expedition, 1865, pp. 25, 150.

REFERENCES


6 Some species were described on females and male is still unknown.
