

ARTÍCULO:

Synonymy of *Mesochelifer insignis* Callaini, 1986 with *Mesochelifer fradei* Vachon, 1940 (Pseudoscorpiones: Cheliferidae). with remarks on the biology of the genus *Mesochelifer* Vachon

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Synonymy of *Mesochelifer insignis* Callaini, 1986 with *Mesochelifer fradei* Vachon, 1940 (Pseudoscorpiones: Cheliferidae). with remarks on the biology of the genus *Mesochelifer* Vachon

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Abstract:

Additional descriptive data are provided for *Mesochelifer fradei* Vachon, 1940, based on type material from Portugal and additional samples from Spain (provinces of Cádiz and Huelva) and Morocco. *Mesochelifer insignis* Callaini, 1986 is shown to be a junior subjective synonym of *M. fradei*, based on an examination of paratype specimens from Algeria.

Key words: Pseudoscorpiones, Cheliferidae, *Mesochelifer*, *Mesochelifer fradei*, *Mesochelifer insignis*, synonymy.

Taxonomy: *Mesochelifer fradei* Vachon, 1940; *Mesochelifer insignis* Callaini, 1986, new synonymy.

Sinonimia de *Mesochelifer insignis* Callaini, 1986, con *Mesochelifer fradei* Vachon, 1940 (Pseudoscorpiones: Cheliferidae), con observaciones sobre la biología del género *Mesochelifer* Vachon

Resumen:

Se ofrecen datos descriptivos adicionales para *Mesochelifer fradei* Vachon, 1940, basados en material tipo de Portugal y muestras adicionales de España (provincias de Cádiz y Huelva) y Marruecos. Se demuestra que *Mesochelifer insignis* Callaini, 1986 es un sinónimo subjetivo junior de *M. fradei*, basándose en el examen de ejemplares paratipo de Argelia.

Palabras clave: Pseudoscorpiones, Cheliferidae, *Mesochelifer*, *Mesochelifer fradei*, *Mesochelifer insignis*, sinonimia.

Taxonomía: *Mesochelifer fradei* Vachon, 1940; *Mesochelifer insignis* Callaini, 1986, new synonymy.

Introduction

The examination of specimens of *Mesochelifer fradei* Vachon, 1940, collected from the Spanish provinces of Cádiz and Huelva during a study of the phoretic behaviour of this species (Domínguez *et al.*, 2008), revealed variability in a diagnostically important character of the species, namely the presence of an additional tooth on the claws of all four legs. Because this is the main characteristic separating have also examined type specimens of *M. fradei* from the locus typicus in Portugal and paratype specimens of *Mesochelifer insignis* Callaini, 1986, a close species from Algeria (Callaini, 1986) and Morocco (Callaini, 1988). One specimen of the genus from a new record in Morocco completes the study.

The phoretic behaviour of the genus *Mesochelifer* Vachon is suggested to be the most important dispersal method for widespread species as *M. fradei* and *Mesochelifer resslis* Mahnert, 1981.

Material and Methods

Alcohol-preserved specimens were examined as temporary glycerine mounts in cavity slides and returned to 70% ethanol after study. Microscopical examination was carried out with a Zeiss Axiolab light microscope, which was also used for the measurements. SEM photographs were taken with HITACHI S-3000N and JEOL JSM-840 microscopes. The terminology in general follows Chamberlin (1931) and Harvey (1992); the cheliceral setal terminology follows Gabbutt (1970). The length of the chela and its hand include the pedicel; measurements are in millimetres. The ratio of each article is its length/width; when compared two articles, the ratio is the length/length index.

Abbreviations:

DEUA: Departamento de Ecología, Universidad de Alicante. GGG: Giulio Gardini collection, Genoa, Italy. L: length. MHNG: Muséum d'Histoire naturelle de la Ville de Genève. MNHNP: Muséum national d'Histoire naturelle, Paris. TS: tactile setae. W: width

Results

Taxonomy

Family Cheliferidae Risso

Genus *Mesochelifer* Vachon

Mesochelifer fradei Vachon, 1940

Mesochelifer fradei Vachon: Vachon, 1940: 155-159, figs 22-27.

Hysterochelifer (Mesochelifer) fradei (Vachon): Beier, 1956: 308.

Mesochelifer fradei Vachon: Beier, 1963: 286.

Mesochelifer insignis Callaini, 1986: 1-7, figs 1a-g, plates 1-8. New synonymy.

TYPE MATERIAL. SYNTYPES of *Mesochelifer fradei* Vachon: Portugal, Ferreira do Alentejo, F. Frade leg., 3 females, (MNHNP, in ethanol); 1 male (MNHNP, mounted on five slides). PARATYPES of *Mesochelifer insignis* Callaini: ALGERIA, *Great Kabylia*, Azeffoun, under *Eucalyptus* bark, 1 November 1984, F. Bernini and F. Giusti leg., 1 male and 1 female (MHNG, in ethanol).

NON-TYPE MATERIAL. Morocco: *Souss-Massa-Draâ region*: Anergui, Pista Taguelçt, 09 July 2005, 1 female, F. Fadrique leg.. SPAIN: *Province of Cádiz*: Las Canillas, Puerto de Galiz, 10/27 July 1979, 1 male, preserved in ethanol, A. Vigna leg., (GGG). Dehesa Picado, San José del Valle, under barks of *Quercus faginea* Lam., 09 March 2003, 1 female, (DEUA); under barks of *Q. faginea*, 09 April 2004, 2 males (DEUA); 10 January 2007:

1 tritonymph (DEUA); all the specimens I. Sánchez leg. *Province of Huelva*: Almonte, collected phoretic on *Cerambyx welensii* (Küster, 1846), 10 July 2007, 2 females (DEUA); 21 July 2007, 1 male (DEUA); collected phoretic on *Prinobius myardi* (Mulsant, 1842), 31 July 2007 (DEUA), 1 male; collected in a cage for *C. welensii*, 20 July 2007, 1 female (DEUA); 30 July 2007, 1 female (DEUA); all the specimens S. Malia leg.; en *Quercus suber* L., 09 November 2007, 2 males, 2 females (DEUA), L. Domínguez leg.

SUPPLEMENTARY DESCRIPTION. *Specimens from Morocco and Spain.* Most of the characteristics given by Vachon (1940) that coincide with these specimens are omitted. Measurements and ratios are given in Table 1. Carapace and the palp granulated, in addition with prominent and pointed setiferous tubercles (except on chela), as described by Vachon (1940). Anterior setal row of the carapace with 4 setae, posterior margin with 12-18 setae and with elongated lateral keels in the males.

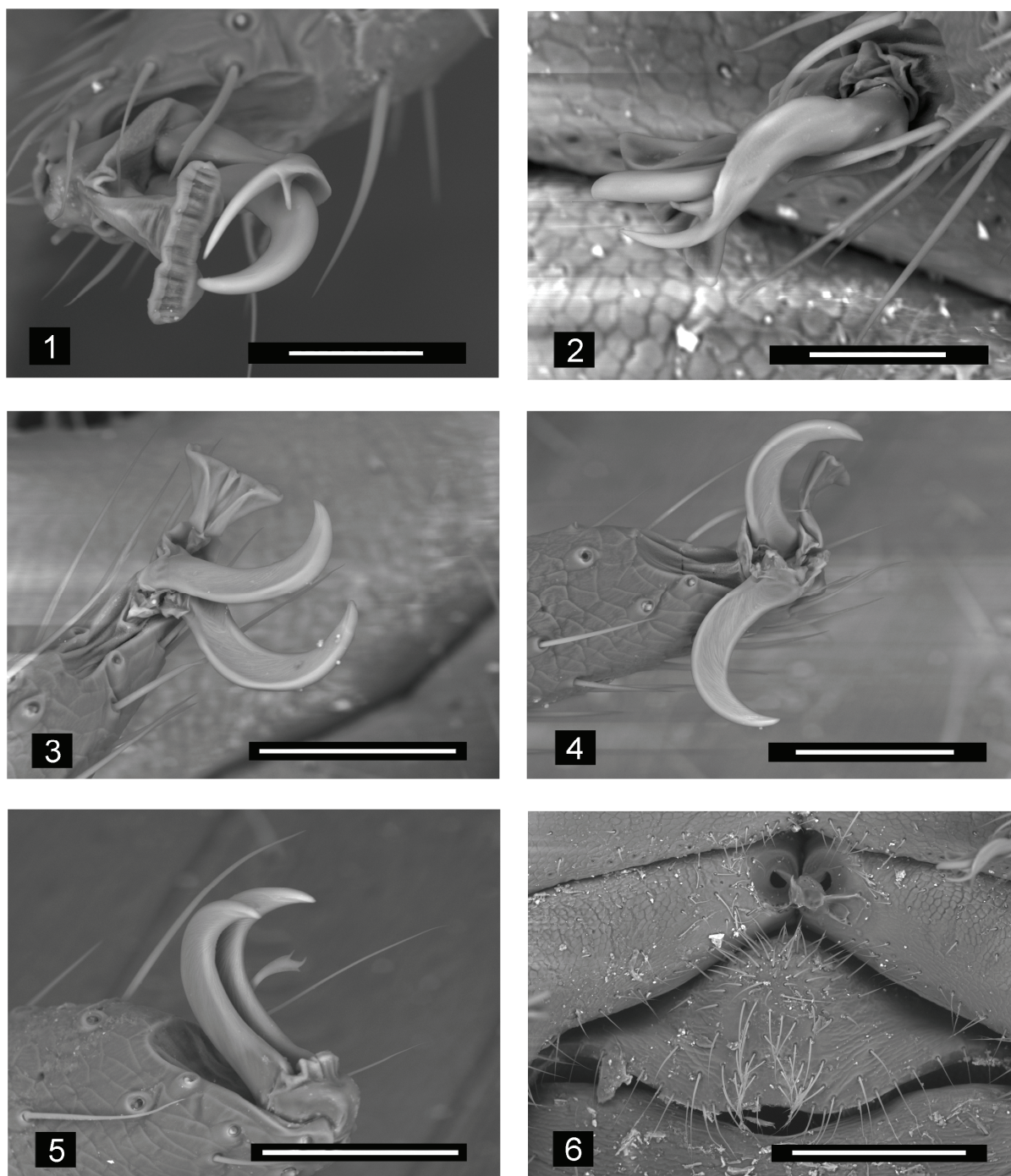
Tergites I and II partially divided in the males, XI in both sexes. Posterior margin of tergites I-VIII with elongated lateral keels in the males, weakly pronounced on tergite VIII of some specimens. Chaetotaxy of hemitergites I-XI: 7-9:8-10:8-11:10-12:10-12:10-12:10-13:10-13:09-11:8-12:7-8(1 TS). Male genital area with numerous setae (fig. 6); female genital area with 6-7 medial setae and 17-22 setae along the anterior genital plate, posterior plate with a row of 13-15 setae. Sternite IV undivided, with 14-16 setae; chaetotaxy V-XI: 8-10:8-10:8-10:8-10:8-10:7-10(1 TS):5-8(1 TS); sternites IV-IX with numerous, ovoid microlyrifissures.

Chelicera with 5 setae on hand, setae *ib* and *db* apically denticulate, this characteristic sometimes is indistinguishable in the latter seta; one subgaleal seta on movable finger, male specimen from Puerto de Gáliz, Cádiz, teratological, with two subgaleal setae on one chelicera. Fixed finger with 2-3 apical denticles and 2-5 teeth; movable finger with two apical small tubercles. Galea longer in females than in males, with 4-5 apical rami in both sexes.

Leg. I in males without tarsal spur, with asymmetric claws (figs 1, 2). Legs show variability in the presence of an additional internal tooth in the claws: present on legs I and II, but sometimes absent on legs III and IV (figs 3-5, 7-12).

PARATYPES from Algeria. Both paratypes conform well to the description by Callaini (1986). The following can be added: posterior setal row of the carapace with 13-15 setae, sternites IV-IX with numerous small ovoid shaped lyrifissures. Male legs I and II with one additional tooth in the claws, female present only on leg II, legs III and IV are smooth in both sexes.

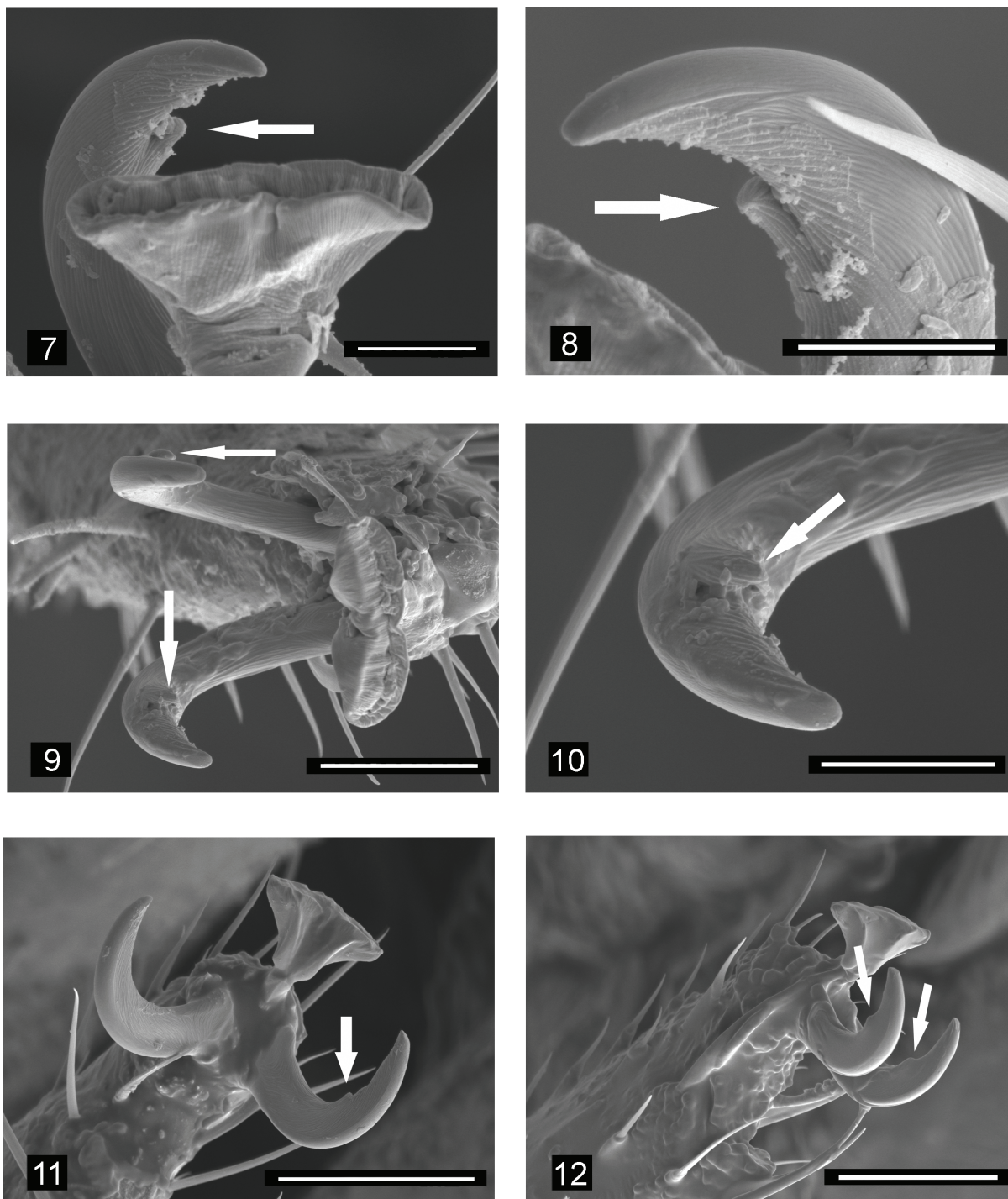
REMARKS. Measurements and data of the Spanish specimens coincide with Vachon's description of *M. fradei* and subsequently are assigned to that species. Some variability is observed in legs of the studied specimens relative to the absence/presence of an addi-



Figures 1-6. *Mesochelifer fradei* Vachon, male from San José del Valle, Cádiz, tarsal claws: **1.** leg I; **2.** leg I, from other side; **3.** leg II; **4.** leg III; **5.** leg IV; **6.** genital area. Scale bars (mm): 0.05 (figs 1-2), 0.10 (figs 3-5), 0.25 (fig. 6).

tional tooth in the claws, in comparison with the Vachon's diagnosis for the species *M. fradei*. Vachon (1940) stated that in *M. fradei* both sexes present an additional internal tooth in all the claws of the four legs of the body; examination of the Spanish material shows that in both sexes the claws of the legs I and II are toothed but it not always occurs in legs III and IV which claws can be smooth, one tooth in each of the claws of the four legs is only undoubtedly observed in two fe-

males and two males. The syntypes of *M. fradei* examined, also show variability in this characteristic: some claws are smooth, particularly those of legs III and IV. The female from Morocco is assigned to the species *M. fradei* because presents toothed claws on all the legs. The male and the female paratypes of *M. insignis* examined here have a tooth in each claw of the leg II (male also leg I), which is lacking on the other legs. This contradicts Callaini's original diagnosis (1986) for the spe-



Figures 7-12. *Mesochelifer fradei* Vachon, female from Almonte, Huelva, tarsal claws (white arrows indicate the tooth in the claws): **7.** leg I; **8.** leg I, from other side; **9.** leg II; **10.** leg II, magnification; **11.** leg III; **12.** leg IV. Scale bars (mm): 0.02 (figs 7-8), 0.05 (fig. 9), 0.025 (fig. 10), 0.10 (figs 11-12).

cies, in which only the claws of leg I were stated to be toothed in both sexes. As Callaini (1986) noted, the morphometric data of *M. insignis* are very close to those of *M. fradei*; and there are no other morphologic characteristics in his description to distinguish the species. Consequently, the interpretation of the above data leads to the conclusion that *M. insignis* represents a junior subjective synonym of *Mesochelifer fradei*. The genus

Mesochelifer now comprises only four species: *M. fradei* (from Algeria, Morocco, Portugal and Spain), *Mesochelifer pardo* Beier, 1956 (Morocco), *Mesochelifer thunebergi* Kaisila, 1966 (Canary Islands: Tenerife) and *Mesochelifer ressl* Mahnert, 1981 (Austria, Czech Republic, Germany, Italy, Kazakhstan, Poland, Russia, Slovakia and Switzerland; see Domínguez *et al.*, 2008).

Callaini's key (1986) for the genus *Mesochelifer* is modified as follows:

- 1 Palpal trochanter, patella and femur with prominent and pointed setiferous tubercles.....2
- Palpal trochanter, patella and femur without prominent setiferous tubercles.....3
- 2 Palpal femur slender, 5.9-6.0 times longer than broad.....*M. thunebergi* Kaisila
- Palpal femur robust, 4.0-5.0 times longer than broad.....*M. fradei* Vachon
- 3 Tergites I-VIII with elongated lateral keels at the posterior margin, chela slender, 4.2-4.5 times longer than broad.....*M. ressl* Mahnert
- Tergites I-X with elongated lateral keels at the posterior margin, chela robust, 3.5 times longer than broad.....*M. pardoi* Beier

Discussion

The genus *Mesochelifer* Vachon was created by Vachon (1940) to accommodate a large cheliferid species from the South of Portugal, *M. fradei*. The main diagnostic characteristics of the genus are the tarsus of leg I unmodified and lacking an apical spur in males, tarsal subterminal seta toothed, cheliceral palm with five setae, posterior margin of carapace and at least tergites I-VIII with lateral keels in males, female genitalia with a pair of medial cribriform plates. Beier (1956) considered *Mesochelifer* as subgenus of *Hysterochelifer* Chamberlin, but later (Beier, 1963) returned it to full generic rank. Mahnert (1981) pointed out the similarities in habitus and some morphological characters of the species *M. ressl* with *Chelifer* Geoffroy, a monospecific genus that comprises the cosmopolitan species *Chelifer cancroides* (Linnaeus, 1758) and suggested that some literature records of the latter species probably correspond to the former, at least in Middle and East Europe.

The biology of *Mesochelifer* species had been almost unknown for a long time. Mahnert (1981) confirmed that the phenological data on *C. cancroides* studied by Ressler & Beier (1958) correspond to *M. ressl* and

also suggested that the latter species shows preferences for natural environments, particularly under the bark of conifer trees, whereas *C. cancroides* is usually synanthropic. Domínguez *et al.* (2008) reported *M. fradei* from a saproxylic habitat in *Quercus* trees, with phoretic tendencies on cerambycid beetles; Hauser (1990) had previously recorded phoresy of *M. ressl* on the moth *Lymantria monacha* (Linnaeus, 1758) in Austria. On the other hand, *C. cancroides* had been reported phoretic on Opiliones, Diptera, Lepidoptera and Hymenoptera (Poinar *et al.*, 1998), but these data may be due in part to misidentifications with *Mesochelifer* species, at least in Europe.

Phoresy is evidently a normal behaviour in *Mesochelifer* and probably explains the widespread distribution of *M. ressl*, from Middle to Eastern Europe. In the case of *M. fradei*, the extended distribution of this species from the South of the Iberian Peninsula to the North of Africa can be correlated with that of the cerambycid beetle vectors *Cerambyx welensii* (Küster, 1846), distributed through Mediterranean Europe, North Africa and the Near East (Danilevsky, 2003; 2004), and *Prinobius myardi* (Mulsant, 1842), distributed through Mediterranean Europe, North Africa, the Near East and Central Asia (Danilevsky, 2003; 2004).

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Figure 13. Distribution map of the species of the genus *Mesochelifer* Vachon: **squares**, *Mesochelifer fradei* Vachon; **circle**, *Mesochelifer pardoi* Beier; **diamond**, *Mesochelifer thunebergi* Kaisila; **stars**, *Mesochelifer ressl* Mahnert.

Table I.
Mesochelifer fradei Vachon: measurements and ratios.

<i>Mesochelifer fradei</i> Vachon, 1940	Anergui (Morocco) (female)	Cádiz and Huelva (Spain) (males)	Cádiz and Huelva (Spain) (females)
Body (L)	5.46	3.30-4.68	3.76-5.34
Carapace			
Mean (L/W)	1.50/1.50	1.22-1.50/1.28-1.58	1.34-1.50/1.32-1.53
Ratio (L/W)	1.00×	0.95-1.01×	0.95-1.06×
Palp			
Mean (L/W)			
Femur	1.74/0.38	1.60-1.90/0.34-0.44	1.58-1.84/0.36-0.42
Patela	1.50/0.44	1.35-1.62/0.38-0.50	1.36-1.54/0.40-0.47
Chela	2.75/0.68	2.46-3.16/0.57-0.80	2.50-2.88/0.64-0.76
Hand	1.64/0.68	1.46-1.76/0.57-0.80	1.54-1.72/0.64-0.76
Finger	1.24	1.02-1.37	1.04-1.28
Ratio (L/W)			
Femur	4.58×	4.38-4.81×	4.30-4.44×
Patela	3.41×	3.20-3.55×	3.13-3.40×
Chela	4.04×	3.70-4.33×	3.66-3.91×
Hand	2.41×	2.26-2.73×	2.26-2.41×
Ratio (L/L)			
Femur/carapace	1.16×	1.16-1.31×	1.16-1.26×
Chela/carapace	1.83×	1.83-2.11×	1.80-1.90×
Hand/finger	1.32×	1.35-1.49×	1.34-1.48×

