TWO NEW SPECIES OF *NEOSEIULELLA* MUMA OF THE CANARY ISLANDS (ACARI: PHYTOSEIIDAE)

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ABSTRACT - Two new species of phytoseiid mites, *Neoseiulella longiseta* n. sp. and *Neoseiulella arinoi* n. sp., collected from soil, litter and lichens on the islands of La Gomera and Tenerife (Canary Islands), Spain are described and illustrated. Females of both species have two pairs of sternal setae and four pairs of preanal setae.

Key words - Acari, Phytoseiidae, *Neoseiulella*, taxonomy, new species, Canary Islands, La Gomera, Tenerife, Spain.

INTRODUCTION

Phytoseiid mites are relatively well-known in agricultural areas in North America, Europe and Australia. However, little is known about the species in continental natural ecosystems and even less about species living on islands. Previous surveys conducted in the Canary Islands in the Atlantic Ocean, off the west coast of Africa, reported eight species of phytoseiid mites from various agroecosystems of the islands (Evans, 1952; Ferragut *et al.*, 1988; Pande *et al.*, 1989; Izquierdo *et al.*, 2001) and 20 species from natural ecosystems of Gran Canaria Island (Ferragut and Peña, 2003). The genus *Neoseiulella* Muma is represented by a small group of free-living predatory mites (Denmark and Rather, 1996). Only three species had been reported previously from Gran Canaria Island (Ferragut and Peña, 2003). Further surveys conducted from 1997 to 2002 in natural ecosystems of La Gomera and Tenerife Islands indicated the presence of two new species that are described here.

MATERIAL AND METHODS

Mites were collected by Miguel Angel Peña Estévez. The specimens were extracted using a Berlese-Tullgren funnel. Mites were cleared in Nesbitt's solution before mounting in Hoyer's medium on microscope slides. Measurements in micrometers (µm) are presented

as ranges (minimum to maximum) and sample size or as approximations. Shield lengths were measured along the midlines and widths at different setal levels. Setae were measured from the base of insertion to the tip. Idiosomal setal notation follows Lindquist and Evans (1965), with modifications for the caudal region as given by Lindquist (1994). Idiosomal notation of glands follows Athias-Henriot (1975) and Swirski *et al.* (1998). Generic nomenclature follows the criteria proposed by Chant and McMurtry (1994) for the Typhlodrominae.

Holotypes and paratypes are deposited in the Museum of Zoology of University of Navarra, Spain. Paratypes of each species are also deposited in the Natural History Museum (British Museum), London, UK; US National Collection, Washington, DC, USA and Museum of Biological Diversity, The Ohio State University, 1315 Kinnear Road, Columbus, Ohio 43212, USA.

Neoseiulella longiseta n. sp.
(Figs. 1-4, 11-13)

Diagnosis - Large mite, dorsal shield 409-478 long, 252-278 wide at level of S2 (n = 10 females), oval, with faintly striate opistonotal and smooth podonotal region. Smooth and heterogeneous dorsal setae: z2 at least six times longer than s6; s6 2.5 times longer than j6; J5 well developed. Podonotal and opisthonotal marginal setae located on small tubercles. Seven pairs of dorsal glands and

Figs. 1-4. *Neoseiulella longiseta* n. sp. - 1. Female, dorsal idiosoma (holotype); 2. Female, ventral idiosoma (holotype); 3. Spermatheca; 4. Male, ventrianal shield.

12 pairs of dorsal lyrifissures. Peritremes reach level of *j1*. Sternal shield with two pairs of setae (*st1*, *st2*). Ventrianal shield wider than genital shield (ratio length/width: 2), with convex lateral margins, four pairs of preanal setae and a pair of well separated solenostomes. Four pairs of opisthogastric setae around ventrianal shield. Fixed digit of chelicera with seven small teeth, movable digit with two teeth. Penciliform spermatheca. Three macrosetae on leg IV, macroseta on genu and tibia of similar length and macroseta on

basitarsus longest. Ventrianal shield in male striate, with seven pairs of preanal setae and fused with peritrematal shield.

FEMALE (Figs. 1-3, 11, 13, Adult female, holotype) - **Dorsum** (Fig. 1) - Dorsal shield oval, 419 long, 254 wide at level of *S2*. Smooth surface or with faint striae in opisthonotal region. Seven pairs of dorsal glands (solenostomes) and 12 pairs of lyrifissures (Fig. 1). Nineteen pairs of smooth dorsal setae except for slightly serrate *Z4* and *Z5*. Marginal setae located on small tubercles.

Figs. 5-8. *Neoseiulella arinoi* n. sp. - 5. Female, dorsal idiosoma (holotype); 6. Female, ventral idiosoma (holotype); 7. Spermatheca (holotype); 8. Male, ventrianal shield.

Length of setae $j1 = 32$, $j3 = 39$, $j4$ and $z2 = 11$, $j5$ and $z5 = 15$, $j6 = 26$, $z3 = 43$, $z4 = 28$, $s4 = 65$, $s6 = 69$, $r3 = 22$, $J2$ and $Z1 = 13$, $J5 = 9$, $Z4 = 84$, $Z5 = 116$, $S2 = 73$, $S4 = 65$, $S5 = 43$, $R1 = 32$. Peritreme extending to level of setae $j1$.

Venter (Fig. 2) - Sternal shield smooth, with two pairs of smooth setae, 32 long, and two pairs of lyrifissures; straight posterior and convex anterior margins. Metasternal sclerites small, bearing $st3$ (26 long), metasternal $st4$ (26 long) and $gv1$. Genital shield 138 long, 86 wide at posterior margin. Posterior lateral margin tapering at level of $st5$; posterior margin straight.

Ventrianal shield wide and fairly striate, 138 long and 69 wide at level of setae $Jv3$. With four pairs of preanal setae ($Zv2$ shortest, 11 long) and pair of "pores" well-separated and located posterior to setae $Jv3$ (69 long). Four pairs of smooth opisthogastric setae around ventrianal shield, $Jv4$ (19 long) similar to central setae of ventrianal shield, $Zv1$ and $Zv3$ similar in length to $Zv2$, and $Jv5$ (82 long) similar to dorsal setae $Z4$. Three pairs of small sclerites present around shield on soft cuticle and a thin and long sclerite present on integument between genital and ventrianal

Figs. 9-13. *Neoseiulella arinoi* n. sp. - 9a. Female (paratype), chelicera, antaxial view; 9b. Female (paratype), chelicera, fixed digit, ventral view, apical detail; 10. Female (paratype), dorsal aspect of left leg IV (genu, tibia and tarsus). *Neoseiulella longiseta* n. sp. - 11a. Female (paratype), chelicera, antaxial view; 11b. Female (paratype), chelicera, fixed digit, paraxial view, apical detail; 12a. Male, chelicera, antaxial view; 12b. Male, detail of fixed digit, ventral view; 12c. Male, movable digit with spermatodactyl, antaxial view; 12d. Male, distal region of spermatodactyl with dorsal heel; 13. Female (paratype), dorsal aspect of left leg IV (genu, tibia and tarsus).

shields. Two pairs of well-developed metasternal sclerites.

Chelicerae (Figs. 11a, b) - Movable digit of chelicerae with two small teeth, fixed digit with six minute teeth and a long apical tooth.

Spermatheca (Fig. 3) - Calyx of spermatheca poculiform, as long as wide.

Legs - Measurement of legs (from base of leg to base of pretarsus) as follows: leg I: 411, leg II: 320, leg III: 318 and leg IV: 563. Three pointed macrosetae on leg IV (Fig. 13) - on genu (54), tibia (54) and basitarsus (67).

MALE (Figs. 4, 12) - Body shape similar to female. Dorsal shield 327 long, 194 wide at level of J2. Dorsal surface smooth. Dorsal chaetotaxy, adenotaxy and

poroidotaxy similar to female. Peritremes similar to female.

Venter - Ventrianal shield (Fig. 4) slightly striate, fused with peritrematal shields, 142 long, 129 wide. With seven pairs of thin and smooth preanal setae. Setae *Jv5* on soft opisthogastric cuticle.

Chelicera (Fig. 12a-d) - Movable digit with one tooth, fixed digit with two distal teeth and three proximal teeth. Spermatodactyl L-shaped, with a conspicuous heel.

Legs - Similar to those of female.

Etymology - The species name "longiseta" is a reference to its long posterior opisthonotal setae.

Type material - Holotype female and 33 paratype females, three males and three deutonymphs from dry soil and mosses under *Aeonium* sp., *Monanthes* sp. and *Asplenium* sp., coordinates UTM: 28RBS853092, altitude 850 meters, Degollada Peraza (La Gomera), 2 June 2002; one paratype female from dry soil under *Juniperus turbinata* Gus (Cupressaceae), UTM 28RBS 794196, altitude 400 m., Tunel de la Culata (La Gomera), 28 November 2000; one paratype female from dry soil and litter under *Cistus mospeliensis* Linneo (Cistaceae), UTM: 28RBS725112, altitude 860 m, Arure (La Gomera), 2 June 2002; two paratype females from soil and litter under *Juniperus turbinata*, UTM: 28RBS745195, altitude 500m, Tazo (La Gomera), 1 June 2002; four paratype females and one paratype male from lichens, UTM: 28RCS765568, altitude 980 m, Pico del Inglés (Tenerife), 25 January 1997.

Discussion - *Neoseiulella longiseta* n. sp. belongs to the group of species described by Chant and McMurtry (1994) with three macrosetae on leg IV, two pairs of sternal setae and ventrianal shield with four pairs of preanal setae. This species differs from the other species of the group especially in the relative length of dorsal setae *Z4* and *Z5* and the fused ventrianal shield in the adult male. It is similar to *N. canariensis* Ferragut and Peña-Estévez, 2003 in which the dorsal shield is smooth, dorsal setae are located on tubercles and ventrianal shield of the male has seven pairs of preanal setae. *N. cassinae* (Collyer, 1982) is also close to the new species but it has a reticulate dorsal shield posterior to *z4* and all dorsal setae are short and smooth and ventrianal pores are absent.

***Neoseiulella arinoi* n. sp.
(Fig. 5-10)**

Diagnosis - Large mite, dorsal shield 400-417 long, 226-278 wide at level of *J2* (*n* = 4 females). Body oval, dorsal shield reticulate. Dorsal setae smooth except for slightly serrate *Z4* and *Z5*. Setae *z2* almost three times *J5* and twice *s6*; *J5* well developed. Podonotal marginal setae located on small tubercles. Peritremes reach level of *j1*. Sternal shield with two pairs of setae. Ventrianal shield longer than wide (ratio length/width: 1.5), with four pairs of preanal setae and one pair of preanal pores. Four pairs of opisthogastric setae around the ventrianal

shield. Fixed digit of the chelicera with two teeth, movable digit with one tooth. Puculiform spermatheca. One macroseta on basitarsus of leg IV. Ventrianal shield in the male free, striate and with six pairs of preanal setae.

FEMALE (Figs. 5-10, Adult female, holotype) - **Dorsum** (Fig. 5) - Dorsal shield oval, 402 long, 226 wide at level of *J2*. Dorsal shield reticulate. Six pairs of dorsal glands (solenostomes) and 12 pairs of lyrifissures. Nineteen pairs of smooth dorsal setae except for slightly serrate *Z4* and *Z5*. Marginal opisthonotal setae located on small tubercles. Length of setae *j1* = 32, *j3* = 37, *j4* and *z2* = 29, *j5* and *z5* = 24, *j6* = 34, *z3* = 41, *z4* = 43, *s4* = 47, *s6* = 54, *r3* = 41, *J2* and *Z1* = 47, *J5* = 11, *Z4* = 71, *Z5* = 77, *S2* = 62, *S4* = 62, *S5* = 43, *R1* = 41. Peritremes extend to level of setae *j1*.

Venter (Fig. 6) - Sternal shield smooth, with two pairs of smooth setae (28 long) and two pairs of lyrifissures; straight posterior and anterior margins. Metasternal sclerites small, bearing *st3* (28 long) and metasternal shields with *st4* (28 long) and *gv1*. Genital shield 125 long, 77 wide at posterior margin. Posterior lateral margin tapering at level of *st5*; posterior margin straight. Ventrianal shield narrow, with faint transverse striation in preanal region and around anal opening; 140 long, 94 wide, ratio length/width: 1.5. With four pairs of preanal setae, one pair of clear round small areas in front of anus and one pair of well-separated preanal pores. Four pairs of smooth opisthogastric setae around ventrianal shield, *Jv4* (13 long) shorter than central setae of ventrianal shield, *Zv1* and *Zv3* similar in length to *Zv2*, and *Jv5* (54 long) similar to dorsal setae *Z4*. Two pairs of metapodal shields (11 and 22 long) and three pairs of small sclerites around shield on soft cuticle.

Chelicerae (Fig. 9) - Movable digit of chelicerae with two small teeth, fixed digit with one tooth.

Spermatheca - Calyx of spermatheca puculiform, longer than wide (Fig. 7).

Legs - Measurement of the legs (from base of leg to base of pretarsus) as follows - leg I: 323, leg II: 295, leg III: 293 and leg IV (Fig. 10): 389. One blunt macroseta on basitarsus IV, 75 long.

MALE - Body shape similar to female. Dorsal shield 348 long, 191 wide, widest at level of *J2* (*n* = 2). Dorsal chaetotaxy, adenotaxy and poroidotaxy similar to female. Peritremes extending to setae *j3*.

Venter - Sternogenital shield smooth. Ventrianal shield free and faintly striate, punctiform preanal pores present posterior to *Jv3* (Fig. 8), with six pairs of smooth and thin preanal setae. Ratio length/width: 0.8 (140 long, 172 wide). Setae *Jv5* on soft opisthogastric cuticle.

Chelicera - Movable digit with one tooth, fixed digit with two small distal teeth and a basal tooth. Spermatodactyl L-shape, with a conspicuous heel.

Legs - Similar to female. Measurement of the legs (from base of the leg to base of pretarsus) as follows - leg I: 303, leg II: 243, leg III: 240 and leg IV: 323. One pointed macroseta on basitarsus IV.

Etymology - The species name "arinoi" refers to Dr. Arturo Hugo Ariño, a good friend and colleague of the senior author.

Type material - Holotype female and two paratype females and one male from lichens on dead log, UTM: 28RCS 868 606, altitude 550 meters, Chamorga (Tenerife), 25 January 1997; one paratype female and one paratype male from soil of "lapilli" and litter of *Ficus carica* Linn. (Moraceae), *Castanea sativa* Miller (Fagaceae) and *Echium virescens* DC. (Boraginaceae), UTM: 28RCS 605 394, altitude 1100 meters, Chivisaya (Tenerife), 30 May 1997.

Discussion - *Neoseiulella arinoi* n. sp. belongs to the group of species described by Chant and McMurtry (1994) with one macrosetae on leg IV, two pairs of sternal setae and ventrianal shield with four pairs of preanal setae. This species differs from the other species of the group especially in length of marginal opisthonotal setae S and Z. *Neoseiulella splendida* Ferragut and Peña-Estévez, 2003, for example, has a reticulate dorsal shield with serrated-edged cells, however setae z2 are half the length of j3 and setae S4 and S5 are no more than 1/3 length of Z5. In *N. montforti* (Rivnay and Swirski, 1980) the peritremes extend to level of setae j3, setae Z4 and S4 have approximately the same length and Z5 is serrate. *N. litoralis* Swirski and Amitai (1984), shares with the new species the length of dorsal setae S4 and Z4 but it has a longer spermatheca, setae Z1, S2 and S4 are shorter (they do not reach the base of the following setae) and the male ventrianal shield has five preanal setae.

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