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Some new species records of the predatory mite family Phytoseiidae (Acari: Mesostigmata) from The Netherlands

Farid Faraji* and Paul H. Hoekstra

Eurofins MITOX, Science Park 408, 1098 XH Amsterdam, The Netherlands
*Corresponding author, Email: faridfaraji@eurofins-mitox.com

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Abstract

Thirteen species of phytoseiid mites collected from the Netherlands are re-described and illustrated. Among them 9 are new species records for the Dutch fauna and *Metaseiulus* (*Metaseiulus*) *smithi* (Schuster, 1957) is a new record for Europe. *Metaseiulus* (*Metaseiulus*) *neosmithi* nom. nov. Faraji is proposed as a replacement name for *Metaseiulus* (*Metaseiulus*) *smithi* Denmark & Evans, 2011. Also, *Kampimodromus coryli* Meshkov, 1999 is considered as a junior synonym of *Kampimodromus langei* Wainstein & Arutunjan, 1973.

Keywords Biodiversity | Biological control | Dutch fauna | Gamasida | Taxonomy

1. Introduction

The predatory mite family Phytoseiidae plays an important role controlling phytophagous mites and small insects in natural habitats, agricultural crops and greenhouses (Gerson et al. 2003, McMurtry 1984).

Siepel et al. (2018) provided a useful checklist of Mesostigmata including phytoseiid mites found in The Netherlands. The list comprises around 50 species of phytoseiid mites distributed in the open field as well as indoors in The Netherlands. The faunistics of phytoseiid mites of The Netherlands are mostly known by the extensive discoveries of Anthonie Cornelis Oudemans, Bert Vierbergen & Els Miedema (for the literature see Vierbergen & Loomans 2009).

In addition to the published literature (Miedema 1978; Vierbergen & Loomans 2009; Siepel et al. 2018) we have found 9 additional species new for the fauna of The Netherlands in our projects' samplings as well as in our personal collection. This paper aims to re-describe them as well as 4 other species based on the collected specimens.

2. Materials and Methods

Mites were collected either by extraction during 3–4 days from field-collected weed samples using Berlese funnels or by directly removing mites from foliage under a stereomicroscope. Phytoseiid specimens were cleared in a mixture of Nesbitt and lactophenol solutions 1:1, and mounted in modified Hoyer's medium as described by Faraji & Bakker (2008). Drawings were made with the aid of a camera lucida (drawing tube) attached to an Olympus phase contrast microscope. The notations used for dorsal and ventral setations follow those of Lindquist & Evans (1965) as adapted by Rowell et al. (1978) and Chant & Yoshida-Shaul (1991), respectively. The notation for gland pores (solenostomes) or lyrifissures (poroids) is according to Athias-Henriot (1975). All measurements are given in micrometers (µm). The mean of the measurements is given first followed by the range in parentheses. The classification systems follow those of Chant & McMurtry (2007). The data for distribution are taken from Demite et al. (2021). The voucher specimens of mites are deposited in the Acari collection of MITOX Consultants/Eurofins, Amsterdam Science Park.

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3. Results

Kampimodromus florinensis
Papadoulis, Emmanouel & Kapaxidi, 2009
(Fig. 1: A–F)
Female – Six specimens measured.

Idiosomal setal pattern: 10A:8C/JV–3:ZV.

Dorsal idiosoma (Fig. 1A) – Dorsal shield 319 (303–328) long and 175 (169–183) wide at j_6 level, oval with waist at R1 setae, sclerotized, lightly sculptured with irregular ornamentation and striae; with 18 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae serrated, except for j_5, J_2 J_5, z_5 and Z_1; lengths: j_1 17 (17–18), j_3 35 (33–36), j_4 17 (16–19), j_5 13 (13–14), j_6 17 (16–19), J_2 12 (11–13), J_5 6 (5–7), z_2 28, z_4 43 (40–44), z_5 13 (10–14), Z_1 13 (13–16), Z_4 64 (62–66), Z_5 54 (52–55), s_4 49 (46–51), S_2 58 (57–60), *S5* 9 (8–11); setae r_3 39 (36–41) and R_1 24 (23–25) on lateral integument; dorsal shield with 6 pairs of solenostomes (gd_1, gd_2, gd_4, gd_6, gd_8, gd_9) and 11 pairs small poroids.

Peritreme – Extending to level of setae j_3 (Fig. 1A).

Ventral idiosoma (Fig. 1B) – Sternal shield smooth, posterior margin not visible, 64 (63–65) wide at level of setae ST_2, with three pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 30–32, ST_2 28–30, ST_3 28–30; distances between ST_1–ST_3 56 (55–57) and ST_1–ST_1 45 (44–47), ST_2–ST_2 58 (57–58); metasternal setae ST_4 28–29 and a pair of pores (iv_3) on small platelets; genital shield smooth width at widest point 81 (79–82), ST_5 23–24; two pairs of narrow metapodal shields, primary 28 (26–30) long and accessory 8–10 long; ventrianal shield relatively small (Fig. 1B), smooth, length 81 (79–82), width at level of setae ZV_2, 39 (38–40), and width at level of paranal setae 44 (44–45); with one pair of preanal setae (JV_2 16–17), one specimen exceptionally with two pairs of preanal setae (Fig. 1E); six pairs of setae surrounding ventrianal shield on integument (JV_1 16–17, JV_4 10–13, JV_5 25 (24–27), ZV_1 16–17, ZV_2 15–16, ZV_3 8–10), five pairs of pores and two pairs of small platelets surrounding ventrianal shield. Ventrianal shield with a pair of small round pores posteriad to JV_2 wider apart than the distance between setae JV_2 insertions, distance between these pores 28.

Spermatheca – Calyx cup-shaped 4–5 long, 10–11 in diameter of the calyx; atrium nodular c-shaped (Fig. 1C).

Chelicera – Fixed digit 24 long with 2 or 3 apical teeth (apical hook is not considered) and a pilus dentilis; movable digit 25 long smooth (Fig. 1D).

Legs – Leg IV (Fig. 1F) with one short and barbed macroseta, StIV 17 (16–18), some dorsal setae of legs are barbed; legs I, II and III with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 258 (255–261), leg II 223 (220–230), leg III 216 (208–225), leg IV 294 (285–299); chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 8 (2-2/1, 2/0-1) – 7 (1-2/1, 2/0-1) – 8 (2-2/1, 2/0-1) and 10 (2-2/1, 2/1-2) – 7 (1-1/1, 2/1-1) – 7 (1-1/1, 2/1-1) – 7 (1-1/1, 2/0-2) setae respectively.

Distribution – Greece and The Netherlands (this study).

Specimen examined – Twenty females, 10 September 2014, *Salix cinerea*, Science park, Amsterdam, The Netherlands (52°21'20.8"N 4°57'34.2"E), collector: Farid Faraji.

Remarks – This is a new species record for Dutch fauna. All the morphological features of the Dutch specimens fit well with those described by Papadoulis et al. (2009). There are four features which were not indicated in the original description: fixed digit of chelicera with 2 or 3 teeth, JV_5 and StIV serrated, presence of idl3 on dorsal shield and ventrianal shield rarely having 2 preanal setae.

Kampimodromus langei
Wainstein & Arutunjan, 1973
Kampimodromus coryli
Meshkov, 1999: 428, new synonym
(Fig. 2: A–E)
Female – Six specimens measured.

Idiosomal setal pattern: 10A:8C/JV–3:ZV.

Dorsal idiosoma (Fig. 2A) – Dorsal shield 308 (303–317) long and 165 (163–168) wide at j_6 level, oval with waist at R1 setae, sclerotized, lightly sculptured with irregular ornamentation; with 18 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae serrated, except for j_4, j_5, j_6, J_2 J_5, z_5 and Z_1 slightly serrated; lengths: j_1 20 (19–20), j_3 29 (28–31), j_4 14, j_5 13 (13–14), j_6 15 (14–16), J_2 23 (22–24), J_5 7 (6–7), z_2 29 (27–30), z_4 33 (32–33), z_5 14 (13–14), Z_1 19 (18–21), Z_4 44 (43–45), Z_5 51 (48–52), s_4 37 (36–38), S_2 40 (39–41), S_5 21 (19–23); setae r_3 36 (36–37) and R_1 28 (27–30) on lateral integument are serrated; dorsal shield with 5 pairs of solenostomes (gd_1, gd_2, gd_6, gd_8, gd_9), gd_2 the largest, gd_9 almost attached to the base of S_5 and 12 pairs of small poroids.

Peritreme – Extending to level of setae z_2 or between z_2 and j_3 (Fig. 2A).

Ventral idiosoma (Fig. 2B) – Width and length of sternal shield subequal and smooth, posterior margin slightly concave, irregular, 58 (55–60) long, 61 (60–62) wide at level of setae ST_2, three pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 27–28, ST_2 25–26, ST_3 25–26; distances between ST_1–ST_3 58 (57–58) and ST_1–ST_1 43 (41–46), ST_2–ST_2 54 (53–55); metasternal setae ST_4 25–27 and a pair of pores (iv_3) on small platelets; genital shield smooth width at widest point 50 (49–50), ST_5 23–

24; two pairs of narrow metapodal shields, primary 25 (24–27) long and accessory 9–10 long; ventrianal shield elongate, narrower at the middle part (Fig. 2B), with a few horizontal striae, length 91 (87–94), width at level of setae ZV_2, 53 (52–54), and width at level of paranal setae 51 (50–51); with three pairs of preanal setae (JV_1 17–20, JV_2 16–19, ZV_2 16–20); four pairs of setae surrounding ventrianal shield on integument (JV_4 13–17, JV_5 28 (27–30), ZV_1 19–21, ZV_3 12), five pairs of pores and one pair of small platelets surrounding ventrianal shield. Ventrianal

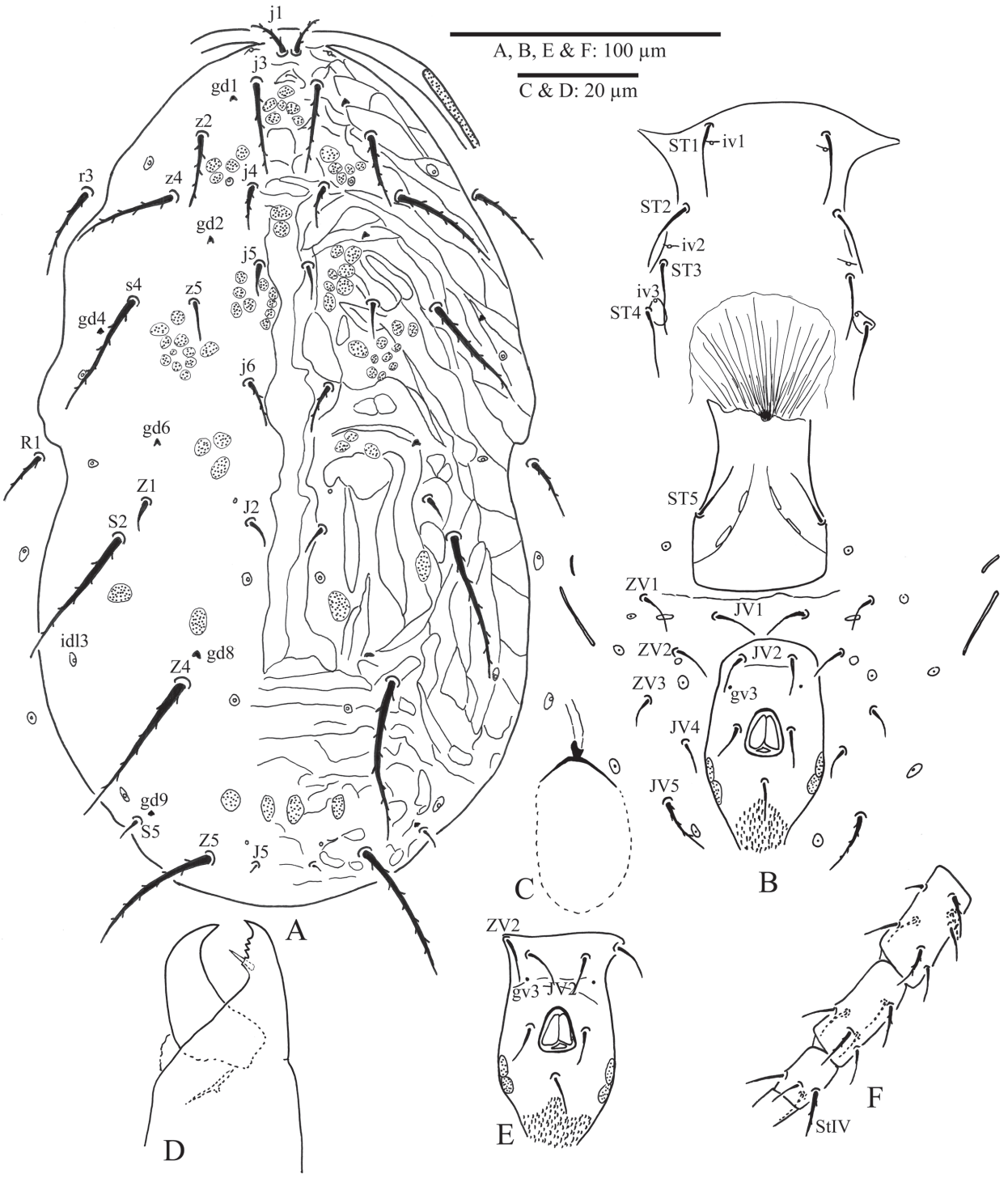

Figure 1. *Kampimodromus florinensis* Papadoulis, Emmanouel & Kapaxidi (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermathecae; (**D**) Chelicera; (**E**) Ventrianal shield, a variation; (**F**) Leg IV.

shield with a pair of small round pores (gv_3), posteriad to JV_2, distance between these pores 23 (21–24).

Spermatheca – Calyx cup-shaped 4–5 long, 10–11 in diameter of the calyx; atrium nodular c-shaped (Fig. 2C).

Chelicera – Fixed digit 24–25 long with two apical teeth (apical hook is not considered) and a pilus dentilis; movable digit 25–26 long with 1 tooth (Fig. 2D).

Legs – Leg IV (Fig. 2E) with one short macroseta, StIV 18 with a dull tip; legs I, II and III with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 264 (260–268), leg II 217 (212–220), leg III 205 (200–210), leg IV 268 (266–270); chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 8 (2-2/1, 2/0-1) – 7 (1-2/1, 2/0-1) – 8 (1-2/1, 2/0-2) and 10 (2-2/1, 2/1-2) – 7 (1-1/1, 2/1-1) – 7 (1-1/1, 2/1-1) – 7 (1-1/1, 2/0-2) setae respectively.

Distribution – Armenia, Croatia, Italy, Moldova, Norway, Russia and The Netherlands (this study).

Specimens examined – Nine females, 25 September 2018, in erinea caused by the mite *Aceria cerrea* on a

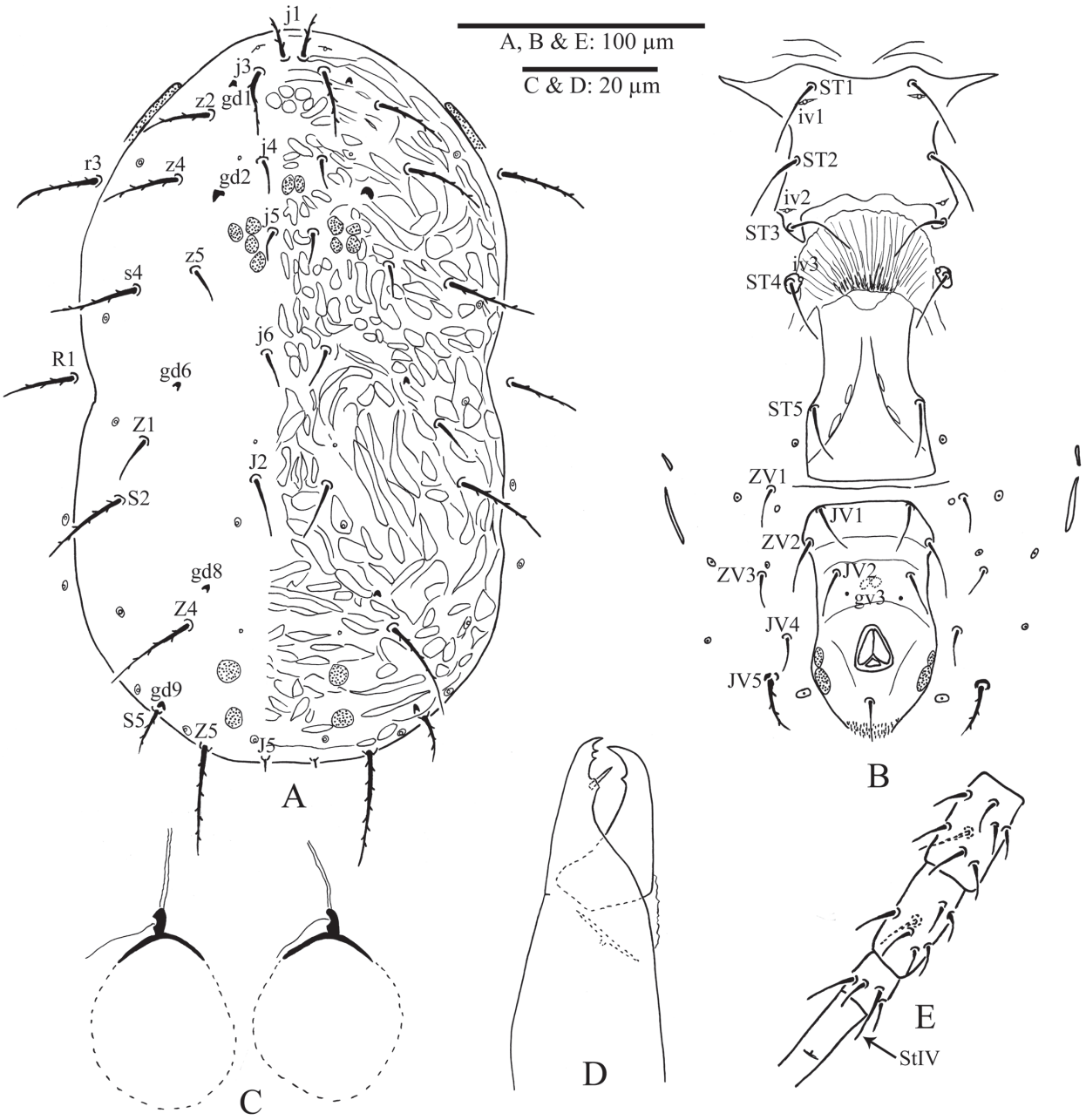

Figure 2. *Kampimodromus langei* Wainstein & Arutunjan (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermathecae; (**D**) Chelicera; (**E**) Leg IV.

Quercus cerris (Turkey Oak), Bos der Onverzettelijken, Almere, Flevoland, Netherlands (52°23'11.0"N 5°14'30.1"E), collector: Paul Hoekstra.

Remarks – This is a new species record for Dutch fauna. All the morphological features of the Dutch specimens fit well with those described by Wainstein & Arutunjan (1973). Meshkov (1999) described *K. coryli*, which is very similar to *K. langei* based on the shape of StIV and the length of peritreme: having macroseta with pointed tip and the peritreme extending to j_3–z_2 for *K. coryli* and having macroseta with knobbed tip and the peritreme extending to z_2 for *K. langei*. Despite Tixier et al. (2008) suspicion for synonymy, Döker et al. (2017) used these two characters in their key to separate these two species. As our data shows, the tip of StIV has a dull tip, a feature in between pointed and knobbed as well as the peritreme extending either to z_2 or j_3–z_2. Therefore, as Tixier et al. (2008) suggested, we consider these two differences as intraspecific variation, and recognize them as conspecifics with *K. coryli* as a junior synonym of *K. langei*.

Amblyseius herbicolus (Chant, 1959)

For other names and synonyms see Demite et al. (2021)

(Fig. 3: A–E)

Female – One specimen measured.

Idiosomal setal pattern: 10A:9B/JV–3:ZV.

Dorsal idiosoma (Fig. 3A) – Dorsal shield oval, slightly constricted at R_1 level, 425 long and 288 wide at j6 level, smooth with some striae anterolaterally; with 19 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae smooth, except for Z_4 and Z_5, slightly serrated; lengths: j_1 38, j_3 46, j_4 8, j_5 6–7, j_6 8, J_2 9, J_5 9, z_2 14, z_4 15, z_5 8, Z_1 13, Z_4 115, Z_5 263, s_4 101, S_2 11, S_4 11, *S5* 8; setae r_3 14 and R_1 10 on lateral integument; Z_4, Z_5 and s_4 are the longest, dorsal shield with 7 pairs of solenostomes (gd_1, gd_2, gd_4, gd_5, gd_6, gd_8, gd_9) and 11 pairs small poroids.

Peritreme – Extending almost beyond setae j_1 (Fig. 3A).

Ventral idiosoma (Fig. 3B) – Sternal shield slightly wider than long, posterior margin straight, smooth at the central area with a few lateral striae, 79 long, 87 wide at level of setae ST_2, three pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 41, ST_2 35, ST_3 33; distances between ST_1–ST_3 76 and ST_1–ST_1 71, ST_2–ST_2 79; metasternal setae ST_4 33 and a pair of pores (iv_3) on small platelets; genital shield smooth width at widest point 82, ST_5 33; two pairs of metapodal shields, primary 26 long and accessory 17 long; ventrianal shield smooth vase-shaped (Fig. 3B), length 133, width at level of setae ZV_2, 68, and width at level of paranal setae 74; with three pairs of preanal setae (JV_1 27, JV_2 25, ZV_2 21); four pairs of setae surrounding ventrianal shield on integument (JV_4 11, JV_5 71, ZV_1 20, ZV_3 11), five pairs of pores surrounding ventrianal shield. Ventrianal shield with a pair of elliptical pores (gv_3) posteromesad to JV_2, distance between these pores 32.

Spermatheca – Calyx elongate 35 long, 4 in diameter at the middle part of the calyx; one-third of calyx wall toward vesicle much thinner than the rest; atrium relatively large and C-shaped (Fig. 3D).

Chelicera – Fixed digit 30 long with about 10 teeth and a pilus dentilis; movable digit 33 long with 4 teeth (Fig. 3C).

Legs – Leg IV (Fig. 3E) with three pointed macrosetae, SgeIV 111, StiIV 87, StIV 70; length of macrosetae on other legs: SgeI 44, SgeII 40, SgeIII 47; length of legs from the base of coxae to the tip of claws: leg I 311, leg II 233, leg III 256, leg IV 321; chaetotactic formulae of genua and tibiae I–II–III–IV with 10(2-2/1, 2/1-2) – 7(2-2/0, 2/0-1) – 7(1-2/1, 2/0-1) – 7(1-2/0, 2/1-1) and 10(2-2/1, 2/1-2) – 7(1-2/1, 1/1-1) – 7(1-1/1, 2/1-1) – 6(1-1/0, 2/1-1) setae respectively.

Distribution – Many tropical and subtropical countries (see Demite et al., 2021).

Specimen examined – One female, 12 November 2015, *Phoenix* sp., in greenhouse, Hortus Botanicus Amsterdam, The Netherlands (52°22'00.4"N 4°54'25.8"E), collector: Farid Faraji.

Remarks – It seems that *Amblyseius herbicolus* has a well-established population in the greenhouse of Hortus Botanicus Amsterdam for generations. The features of the specimen found in The Netherlands fits well with the re-descriptions of this species. The spermatheca figures by Denmark & Muma (1989) and Zannou et al. (2007) show a uniform calyx wall while ours shows the part of calyx towards atrium thicker. The photograph by Ferragut et al. (2010) indicates that feature very well.

Amblyseius meridionalis Berlese, 1914

For other names and synonyms see Demite et al. (2021)

(Fig. 4: A–E)

Female – Five specimens measured.

Idiosomal setal pattern: 10A:9B/JV–3:ZV.

Dorsal idiosoma (Fig. 4A) – Dorsal shield 378 (360–395) long and 247 (238–255) wide at j_6 level, with 19 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae smooth, except for Z_4 and Z_5, slightly serrated; lengths: j_1 29 (27–30), j_3 52 (51–52), j_4, j_5, z_5 5–6, j_6 7 (7–8), J_2 8 (8–9), J_5 13 (13–14), z_2 9, z_4 11 (10–11), z_5 8 (7–8), Z_1 10 (9–10), Z_4 116 (111–120), Z_5 219 (208–229), s_4 77 (74–79), S_2 11,

S_4 11 (10–11), *S5* 13 (12–13); setae r_3 15 (14–16) and R_1 10 (9–11) on lateral integument; dorsal shield with 7 pairs of solenostomes (gd_1, gd_2, gd_4, gd_5, gd_6, gd_8, gd_9) and 12 pairs of small poroids.

Peritreme – Extending well beyond setae j_1 (Fig. 4A).

Ventral idiosoma (Fig. 4B) – Sternal shield wider than long, posterior margin slightly concave, smooth at the central area with a few lateral striae, 59 (57–62) long, 82 (81–82) wide at level of setae ST_2, three pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 32–34, ST_2 30–33, ST_3 28–30; distances between ST_1–ST_3 64 (63–65), ST_1–ST_1 55 (54–56) and ST_2–ST_2 72 (71–73); metasternal setae ST_4 28 and a pair of pores (iv_3) on small platelets; genital shield smooth width at widest point 85 (80–88),

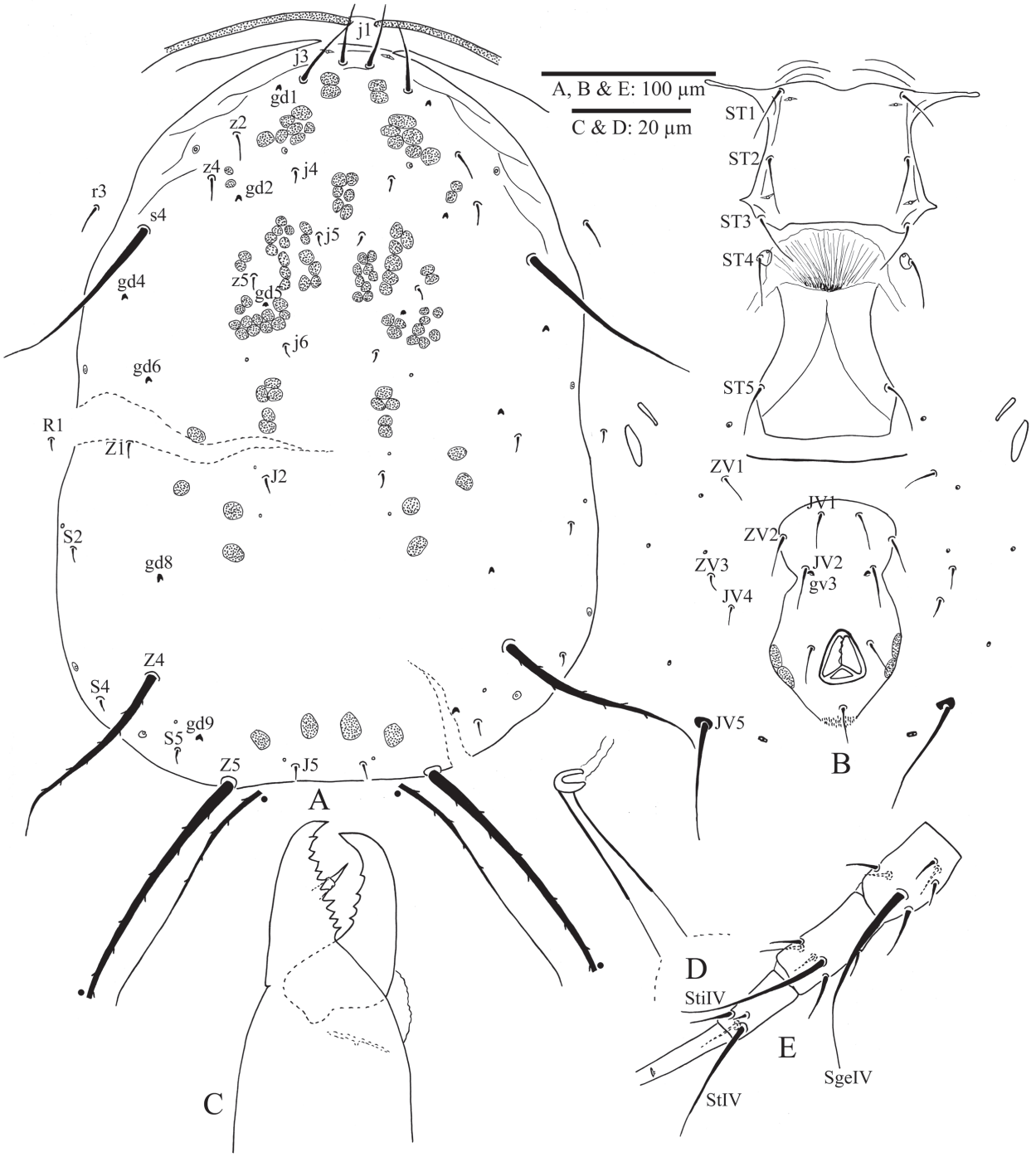

Figure 3. *Amblyseius herbicolus* (Chant) (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Chelicera; (**D**) Spermatheca; E – Leg IV.

ST_5 30 (30–31); two pairs of metapodal shields, primary 28 (27–30) long and accessory 15–17 long; ventrianal shield pentagonal (Fig. 4B), striated anterior to the ventrianal pores, length 121 (115–126), width at level of setae ZV_2, 100 (98–103), and width at level of paranal setae 77 (74–81); with three pairs of preanal setae (JV_1 20–21, JV_2 23–24, ZV_2 18–19); four pairs of setae surrounding ventrianal shield on integument (JV_4 10–12 JV_5 85 (80–87), ZV_1 17–19, ZV_3 9–10), five pairs of pores and one pair of small platelets surrounding ventrianal shield. Ventrianal shield with a pair of small round pores (gv_3) posteromesad to JV_2, distance between these pores 46 (40–51).

Spermatheca – Calyx bell-shaped 18 (17–19) long, 8 in diameter at the middle part of the calyx; atrium C-shaped (Fig. 4C).

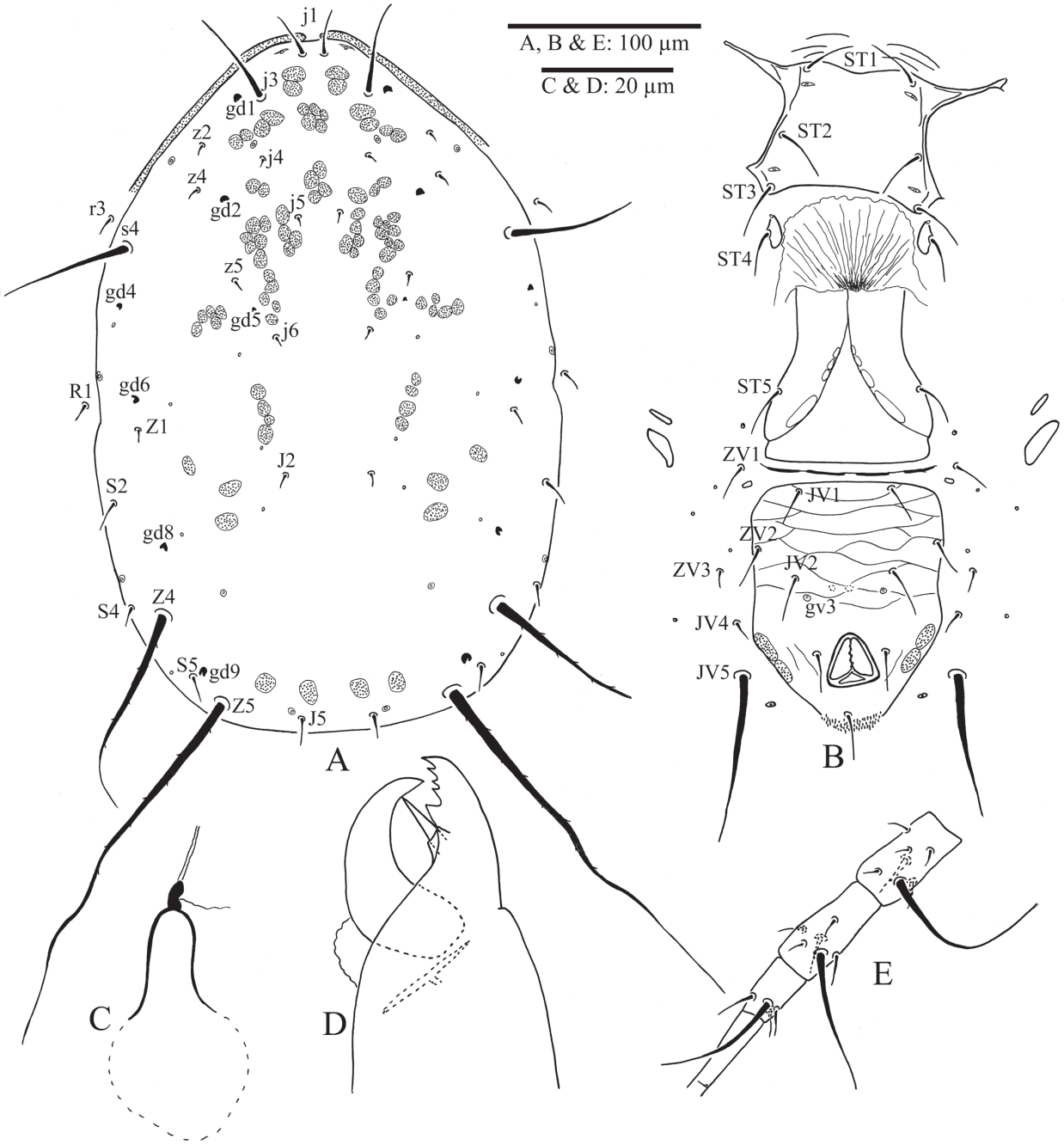

Figure 4. *Amblyseius meridionalis* Berlese (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermatheca; (**D**) Chelicera; (**E**) Leg IV.

Chelicera – Fixed digit 28–29 long with 4 teeth and a pilus dentilis, the one close to pilus dentilis slightly larger; movable digit 31–32 long and smooth (Fig. 4D).

Legs – Leg IV (Fig. 4E) with three pointed macrosetae, SgeIV 89 (87–91), StiIV 72 (70–76), StIV 65 (65–66); length of macrosetae on other legs: SgeI 31 (30–32), SgeII 38 (37–40), SgeIII 42 (40–45); length of legs from the base of coxae to the tip of claws: leg I 411 (402–420), leg II 319 (307–330), leg III 310 (305–315), leg IV 417 (415–418); chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 7 (2-2/0, 2/0-1) – 7 (1-2/1, 2/0-1) – 7 (1-2/0, 2/1-1) and 10 (2-2/1, 2/1-2) – 7 (1-2/1, 1/1-1) – 7 (1-1/1, 2/1-1) – 6 (1-1/0, 2/1-1) setae respectively.

Distribution – Algeria, Azerbaijan, Canada, France, Germany, Greece, Hungary, Iceland, Iran, Italy, Latvia, Moldova, Morocco, Poland, Spain, Switzerland, The Netherlands, Tunisia, Turkey, Ukraine and USA.

Specimen examined – Five females, 28 June 2010, unidentified weeds from a grassland, Sinderhoeve, near Renkum, The Netherlands (51°59’52.9”N 5°45’15.9”E), collector: Frank Bakker.

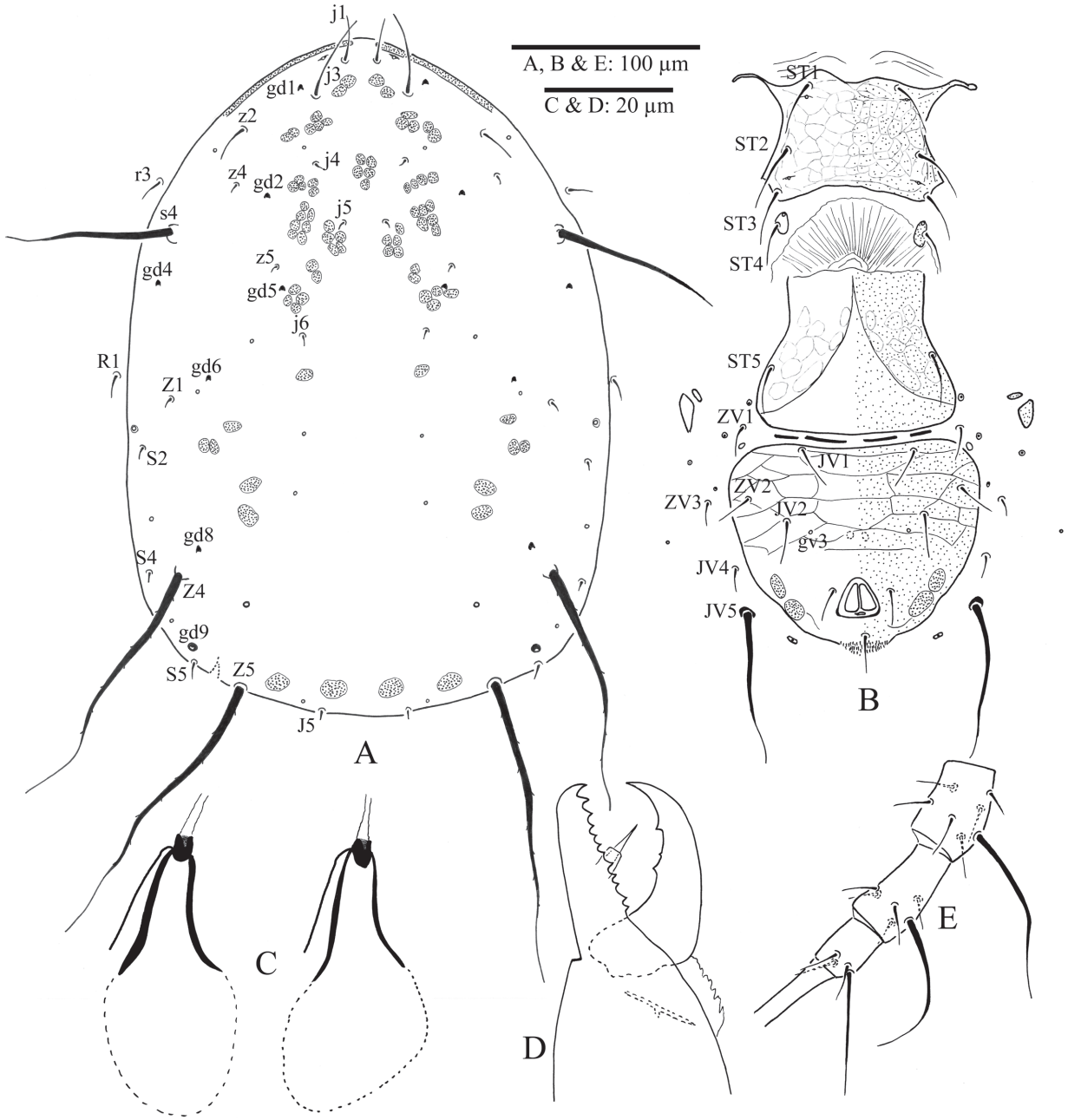

Figure 5. *Proprioseiopsis gallus* Karg (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermathecae; (**D**) Chelicera; (**E**) Leg IV.

Remarks – The characteristics of the specimens found in The Netherlands fits well with the re-descriptions of this species. Faraji et al. (2008, 2011) mentioned the movable digit of chelicera with one minute tooth while the Dutch specimens show it smooth.

Proprioseiopsis gallus Karg, 1989

(Fig. 5: A–E)

Female – Five specimens measured.

Idiosomal setal pattern: 10A:8E/JV–3:ZV.

Dorsal idiosoma (Fig. 1A) – Dorsal shield oval and smooth 369 (363–375) long and 283 (273–295) wide at j_6 level, with 18 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae smooth, except for Z_4 and Z_5, slightly serrated; lengths: j_1 32 (30–33), j_3 48 (46–51), j_4, j_5, j_6, z_5 & Z_1 4–5, J_5 4, z_2 23 (22–24), z_4 7 (6–8), Z_4 147 (142–150), Z_5 165 (161–166), s_4 105 (103–109), S_2 4–5, S_4 4–5, *S5* 8; setae r_3 18 (17–19) and R_1 10 (9–11) on lateral integument; Z_4, Z_5 and s_4 are the longest; dorsal shield with 7 pairs of solenostomes (gd_1, gd_2, gd_4, gd_5, gd_6, gd_8, gd_9) and 12 pairs of small poroids. Setae z_2 about 3 times longer than z_4.

Peritreme – Extending almost beyond setae j_1 (Fig. 5A).

Ventral idiosoma (Fig. 5B) – Sternal shield wider than long, posterior margin slightly concave, reticulated with fine punctation, 63 (62–63) long, 109 (106–115) wide at level of setae ST_2, three pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 33, ST_2 33, ST_3 30; distances between ST_1–ST_3 63 (62–65), ST_1–ST_1 49 (47–51) and ST_2–ST_2 70 (69–71); metasternal setae ST_4 29 and a pair of pores (iv_3) on small platelets; genital shield slightly reticulated with fine punctation, width at widest point 109 (106–115), ST_5 32; two pairs of metapodal shields, primary 22 (21–22) long and accessory 7–9 long; ventrianal shield shield-shaped (Fig. 5B), reticulated all over with fine punctation, length 127 (125–130), width at level of setae ZV_2, 143 (140–148), and width at level of paranal setae 100 (98–102); with three pairs of preanal setae (JV_1 33–36, JV_2 38, ZV_2 33); four pairs of setae surrounding ventrianal shield on integument (JV_4 25–26, JV_5 61 (57–63), ZV_1 30, ZV_3 20–21), five pairs of pores and one pair of small platelets surrounding ventrianal shield. Ventrianal shield with a pair of small round pores (gv_3) posteromesad to JV_2, distance between these pores 57 (53–59).

Spermatheca – Calyx saccular 19 (18–19) long, 6–7 in diameter at the middle part of the calyx; atrium U-shaped inserted at base of the calyx (Fig. 5C).

Chelicera – Fixed digit 29 long with 11 teeth and a pilus dentilis; movable digit 32 long with 3 teeth (Fig. 5D).

Legs – Leg IV (Fig. 5E) with three pointed macrosetae, SgeIV 91 (88–93), StiIV 71 (67–73), StIV 63 (59–65); length of macrosetae on other legs: SgeIII 46 (43–49), SgeII 37 (35–38); leg I with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 407 (405–408), leg II 310 (295–325), leg III 314 (310–318), leg IV 405 (400–410); chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 8 (2-2/1, 2/0-1) – 7 (1-2/1, 2/0-1) – 7 (1-2/0, 2/1-1) and 10 (2-2/1, 2/1-2) – 7 (1-1/1, 2/1-1) – 7 (1-1/1, 2/1-1) – 6 (1-1/1, 2/0-1) setae respectively.

Distribution – Germany and The Netherlands.

Specimen examined – Five females, 28 July 2010, unidentified weeds from a grassland, Sinderhoeve, near Renkum, The Netherlands (51°59'52.9"N 5°45'15.9"E), collector: Frank Bakker.

Remarks – This is a new species record for Dutch fauna. Among the other morphological characters in the genus *Proprioseiopsis*, the length of setae z_2 and z_4, and its ratio are very important in identification. *Proprioseiopsis gallus* can be identified by the ventrianal shield which is wider than long and setae z_2 22–24, z_4 6–8 with ratio 3 to 1. Karg (1989) described *P. gallus* from Germany. All the features of Dutch collected specimens conform to those of the original description, with the exception of seta JV_5 which is shorter (57–63 *vs* 90) and the movable digit of the chelicera which has 3 teeth rather than 2. Having 3 or 2 teeth can be considered as a morphological variation or the third teeth could have been overlooked due to the smaller size of the middle tooth. Whether the atrium clearly enters the calyx or not was used by Karg (1993) to separate *P. gallus* from the closely related species. We think that character creates confusion to separate it from *P. jugortus* based on our specimen collection.

Proprioseiopsis sharovi (Wainstein, 1975)

For other names and synonyms see Demite et al. (2021)

(Fig. 6: A–E)

Female – One specimen measured.

Idiosomal setal pattern: 10A:8E/JV–3:ZV.

Dorsal idiosoma (Fig. 6A) – Dorsal shield 365 long and 248 wide at j_6 level smooth with a pair of strips between j_3 and Z_5, with 18 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae smooth, except for Z_4 and Z_5, slightly serrated; lengths: j_1 19, j_3 28, j_4 4–6, j_5 4–6, j_6 4–6, J_5 8, z_2 13, z_4 10, z_5 4–6, Z_1 4–6, Z_4 93, Z_5 122, s_4 66, S_2 4–6, S_4 8, *S5* 9; setae r_3 13 and R_1 10 on lateral integument; Z_4, Z_5 and s_4 are the longest; dorsal shield with 7 pairs of solenostomes (gd_1, gd_2, gd_4, gd_5, gd_6, gd_8, gd_9) and 12 pairs of small poroids. Setae z_2 slightly longer than z_4.

Peritreme – Extending almost beyond setae j_1 (Fig. 6A).

Ventral idiosoma (Fig. 6B) – Sternal shield wider than long, posterior margin slightly concave, smooth with a few lateral striae, 62 long, 80 wide at level of setae ST_2, three pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 30, ST_2 28, ST_3 27; distances between ST_1–ST_3 62, ST_1–ST_1 51 and ST_2–ST_2 66; metasternal setae ST_4 27 and a pair of pores (iv_3) on small platelets (metasternal shields); genital shield smooth width at widest point 81, ST_5 28; two pairs of metapodal shields, primary 25 long and accessory 13 long; ventrianal shield pentagonal (Fig. 6B), reticulated all over but slightly darker at the edges, length 111, width at level of setae ZV_2, 103, and width at level of paranal setae 71; with three pairs of preanal setae (JV_1 20, JV_2 19, ZV_2 19); four pairs of setae surrounding ventrianal shield on integument (JV_4 13, JV_5 51, ZV_1 17, ZV_3 13), five pairs of pores and one pair of small platelets surrounding ventrianal shield. Ventrianal shield with a pair of small round pores (gv_3) posteromesad to JV_2, distance between these pores 42.

Spermatheca – Calyx cup shaped 6 long, 13 in diameter at the middle part of the calyx; atrium U-shaped (Fig. 6C).

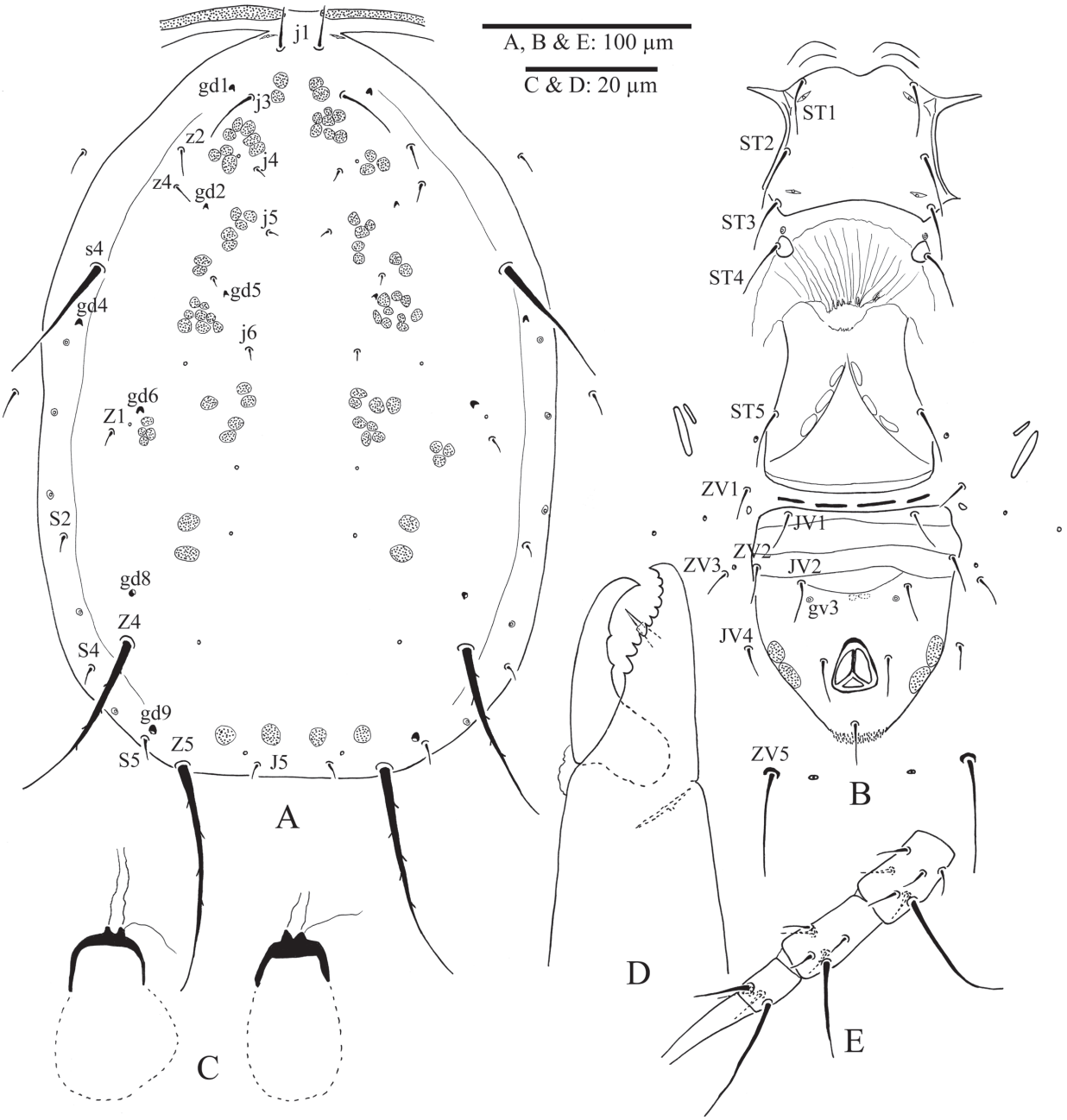

Figure 6. *Proprioseiopsis sharovi* (Wainstein) (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermathecae; (**D**) Chelicera; (**E**) Leg IV.

Chelicera – Fixed digit 28 long with 10 teeth and a pilus dentilis; movable digit 32 long with 2 teeth (Fig. 6D).

Legs – Leg IV (Fig. 6E) with three pointed macrosetae, SgeIV 68, StiIV 47, StIV 63; length of macrosetae on other legs: SgeIII 32, SgeII 25; leg I with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 373, leg II 295, leg III 293, leg IV 385; chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 8 (2-2/1, 2/0-1) – 7 (1-2/1, 2/0-1) – 7 (1-2/0, 2/1-1) and 10 (2-2/1, 2/1-2) – 7 (1-1/1, 2/1-1) – 7 (1-1/1, 2/1-1) – 6 (1-1/1, 2/0-1) setae respectively.

Distribution – Germany, Greece, Norway, Russia and The Netherlands (this study).

Specimen examined – One female, 29 June 2018, soil of a grassland meadow, situated near the village of Beuningen, The Netherlands (51°50'11.33"N 5°45'01.57"E), collector: Bogdan Dehelean.

Remarks – This is a new species record for Dutch fauna. The morphological characters and measurements of the specimen collected from The Netherlands fit well with those re-described by Faraji et al. (2018) from Germany. *Proprioseiopsis sharovi* can be easily identified by the unique shape of its spermatheca.

Proprioseiopsis cf. *umidus* Karg, 1989

(Fig. 7: A–D)

Female – One specimen measured.

Idiosomal setal pattern: 10A:8E/JV–3:ZV.

Dorsal idiosoma (Fig. 7A) – Dorsal shield oval smooth 345 long and 240 wide at j_6 level, with 18 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae smooth, except for Z_4, Z_5, slightly serrated; lengths j_1 20, j_3 40, j_4, j_5, z_5, 5–6, j_6 8, J_5 7, z_2 17, z_4 24, Z_1 8, Z_4 85, Z_5 93, s_4 66, S_2 9, S_4 12, *S5* 16; setae r_3 17 and R_1 11 on lateral integument; dorsal shield with 7 pairs of solenostomes (gd_1, gd_2, gd_4, gd_5, gd_6, gd_8, gd_9) and 14 pairs of small poroids. Setae z_4 longer than z_2.

Peritreme – Extending well beyond setae j_1 (Fig. 7A).

Ventral idiosoma (Fig. 7B) – Sternal shield smooth but with fine punctation wider than long, posterior margin slightly concave, smooth at the central area with some lateral striae, 58 long, 84 wide at level of setae ST_2, three pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 28, ST_2 28, ST_3 25; distances between ST_1–ST_3 60, ST_1–ST_1 49 and ST_2–ST_2 68; metasternal setae ST_4 24 and a pair of pores (iv_3) on small platelets; genital shield smooth with fine punctation, width at widest point 81, ST_5 25; two pairs of metapodal shields, primary 21 long and accessory 13 long; ventrianal shield shield-shaped (Fig. 7B), with some striae and fine punctation, length 107, width at level of setae ZV_2, 112, and width at level of paranal setae 79; with three pairs of preanal setae (JV_1 21, JV_2 20, ZV_2 20); four pairs of setae surrounding ventrianal shield on integument (JV_4 13, JV_5 46, ZV_1 17, ZV_3 13), six pairs of pores and one pair of small platelets surrounding ventrianal shield. Ventrianal shield with a pair of small round pores posteromesad to JV_2, distance between these pores 41.

Spermatheca – Calyx saccular 15–17 long, 6 in diameter at the middle part of the calyx; atrium inserted at the base of the calyx (Fig. 7C).

Chelicera – Digits are closed but it seems to have a fixed digit with 9–10 teeth and a pilus dentilis; movable digit with 2 teeth.

Legs – Leg IV (Fig. 7D) with three pointed macrosetae, SgeIV 59, StiIV 55, StIV 57; lengths of macrosetae on other legs: SgeIII 30, SgeII 29; leg I with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 361, leg II 290, leg III 280, leg IV 366; chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 8 (2-2/1, 2/0-1) – 7 (1-2/1, 2/0-1) – 7 (1-2/0, 2/1-1) and 10 (2-2/1, 2/1-2) – 7 (1-1/1, 2/1-1) – 7 (1-1/1, 2/1-1) – 6 (1-1/1, 2/0-1) setae respectively.

Distribution – Finland, Germany, Russia and The Netherlands (this study).

Specimen examined – One female, 28 July 2010, unidentified weeds from a grassland, Sinderhoeve, near Renkum, The Netherlands (51°59'52.9"N 5°45'15.9"E), collector: Frank Bakker.

Remarks – Following the key for *Propriosiopsis* species provided by Karg (1993), this species would be identified as *P. umidus* by having the fixed digit of chelicera multidentate, z_2 shorter than j_1 and Z_5 less than half of dorsal shield's width. Our specimen however shows clearly that z_4 (24) is longer than z_2 (17), while in *P. umidus* z_4 is shorter than z_2. Seta s_4 in our specimen is much shorter than that of *P. umidus* (51–52 *vs* 80–90). This finding might represent a new species, but pending collection of more material, we avoid describing it as a new species.

Neoseiulus insularis (Athias-Henriot, 1978)

For other names and synonyms see Demite et al. (2021)

(Fig. 8: A–E)

Female – Four specimens measured.

Idiosomal setal pattern: 10A:9B/JV–3:ZV.

Dorsal idiosoma (Fig. 8A) – Dorsal shield 379 (374–385) long and 195 (193–198) wide at j_6 level, reticulated entirely with 19 pairs of dorsal setae (r_3 and R_1 included);

dorsal shield setae smooth, except for Z_5, serrated; lengths: j_1 26 (25–26), j_3 38 (36–41), j_4 25 (24–26), j_5 24 (21–27), j_6 33 (30–35), J_5 14 (13–15), z_2 30 (29–32), z_4 39 (38–42), z_5 22 (22–23), Z_1 46 (43–48), Z_4 65 (62–68), Z_5 69 (63–77), s_4 51 (51–52), S_2 59 (57–62), S_4 59 (55–65), $S5$ 32 (30–33); setae r_3 27 (24–28) and R_1 38 (36–41) on lateral integument; dorsal shield with 4 pairs of solenostomes (gd_1, gd_2, gd_6, gd_9) and 13 pairs small poroids.

Peritreme – Extending to the level between setae j_1 and j_3 (Fig. 8A).

Ventral idiosoma (Fig. 8B) – Sternal shield wider than long, posterior margin slightly concave, smooth, 59 (55–63) long, 76 (74–78) wide at level of setae ST_2, three pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 31, ST_2 29, ST_3 28; distances between ST_1–ST_3 62 (58–64), ST_1–ST_1 53 (52–55) and ST_2–ST_2 65 (63–66); metasternal setae ST_4 26 and a pair of pores (iv_3) on metasternal shields; genital shield smooth width at widest point 70 (67–74), ST_5 25; two pairs of metapodal shields, primary 42 (40–44) long and accessory 11–13 long; ventrianal shield pentagonal to vase-shaped (Fig. 8B), smooth anteriorly but with some striae between preanal pores and anus, length 119 (115–122), width at level of setae ZV_2, 73 (72–73), and width at level of paranal setae 66 (63–68); with three pairs of preanal setae (JV_1 20–22, JV_2 21–22, ZV_2 20–21); four pairs of setae surrounding ventrianal shield on integument (JV_4 17–19, JV_5 36 (35–37), ZV_1 19–20, ZV_3 16–17), five pairs of pores and one pair of small platelets

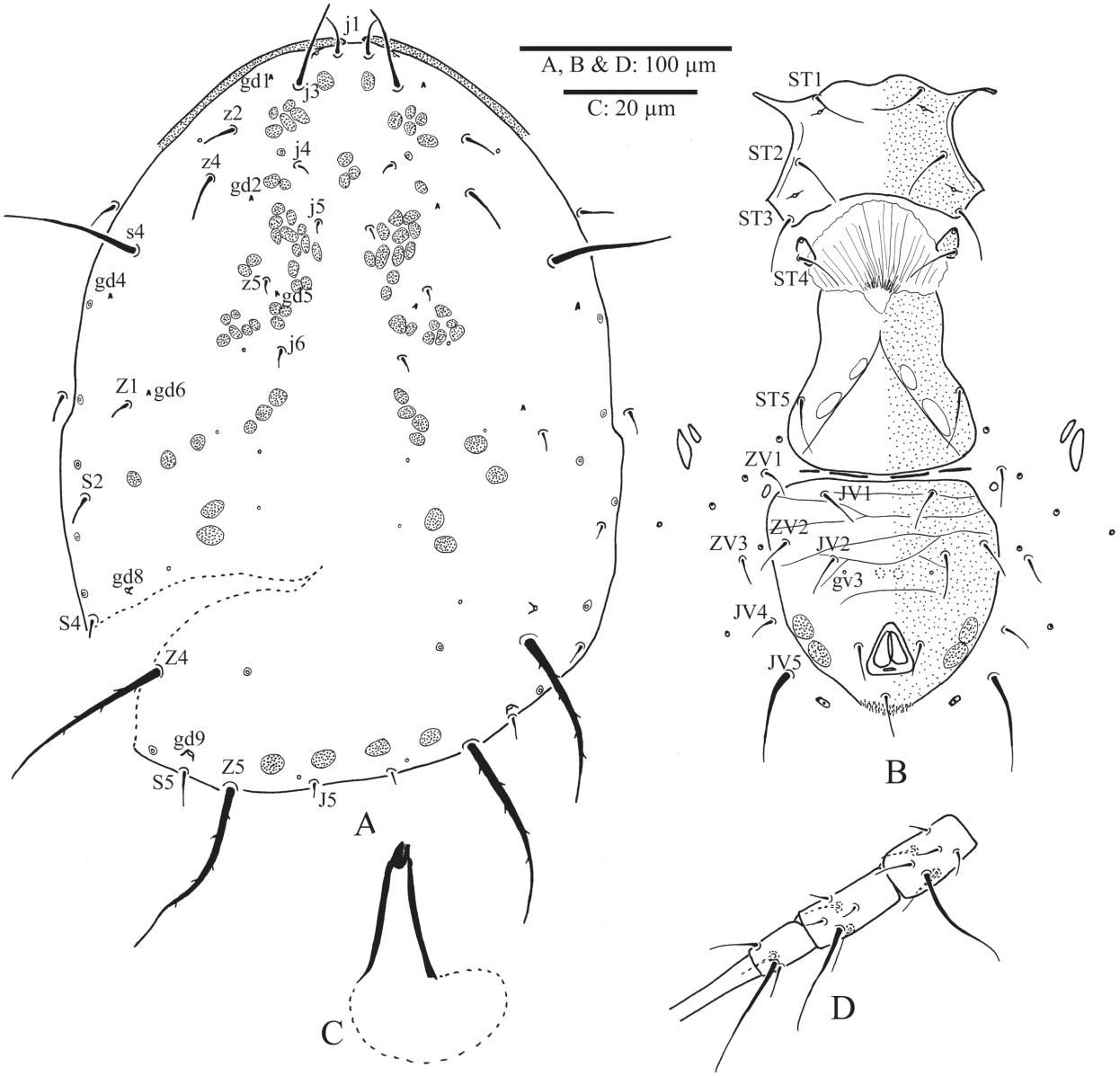

Figure 7. *Proprioseiopsis* cf. *umidus* Karg (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermatheca; (**D**) Leg IV.

surrounding ventrianal shield. Ventrianal shield with a pair of small round pores (gv_3) wide apart, posteromesad to JV_2, distance between these pores 43.

Spermatheca – Calyx cup-shaped 11 (10–11) long, 5–6 in diameter at the middle part of the calyx; atrium C-shaped (Fig. 8C).

Chelicera – Fixed digit 29 long with 3 subapical and one relatively larger tooth as well as a pilus dentilis; movable digit 31 long with 1 tooth (Fig. 8D).

Legs – Leg IV (Fig. 8E) with three pointed short macrosetae, SgeIV 28, StiIV 29 (28–29), StIV 29 (28–30); lengths of macrosetae on other legs: SgeIII

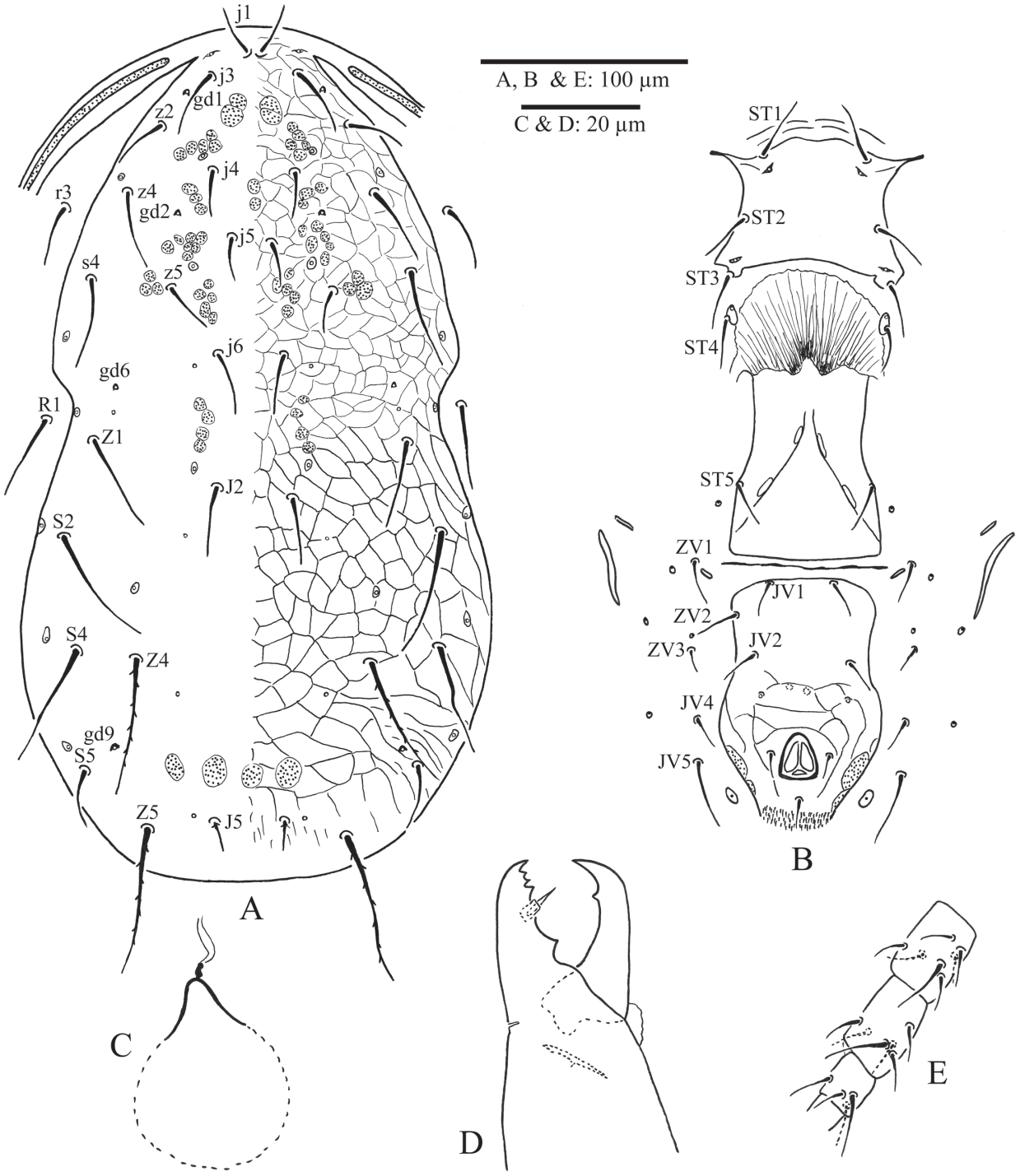

Figure 8. *Neoseiulus insularis* (Athias-Henriot) (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermatheca; (**D**) Chelicera; (**E**) Leg IV.

22, SgeII 24, SgeI 28; length of legs from the base of coxae to the tip of claws: leg I 282 (278–289), leg II 262 (255–267), leg III 267 (263–270), leg IV 330 (329–333); chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 7 (2-2/0, 2/0-1) – 7 (1-2/1, 2/0-1) – 7 (1-2/0, 2/1-1) and 10 (2-2/1, 2/1-2) – 7 (1-2/1, 1/1-1) – 7 (1-1/1, 2/1-1) – 6 (1-1/0, 2/1-1) setae respectively.

Distribution – France, Russia, The Netherlands (this study), Turkey and Ukraine.

Specimen examined – This is a new species record for Dutch fauna. Four females, 08 September 2014, on *Salix viminalis*, Science park, Amsterdam, The Netherlands (52°21'20.8"N 4°57'34.2"E), collector: Farid Faraji.

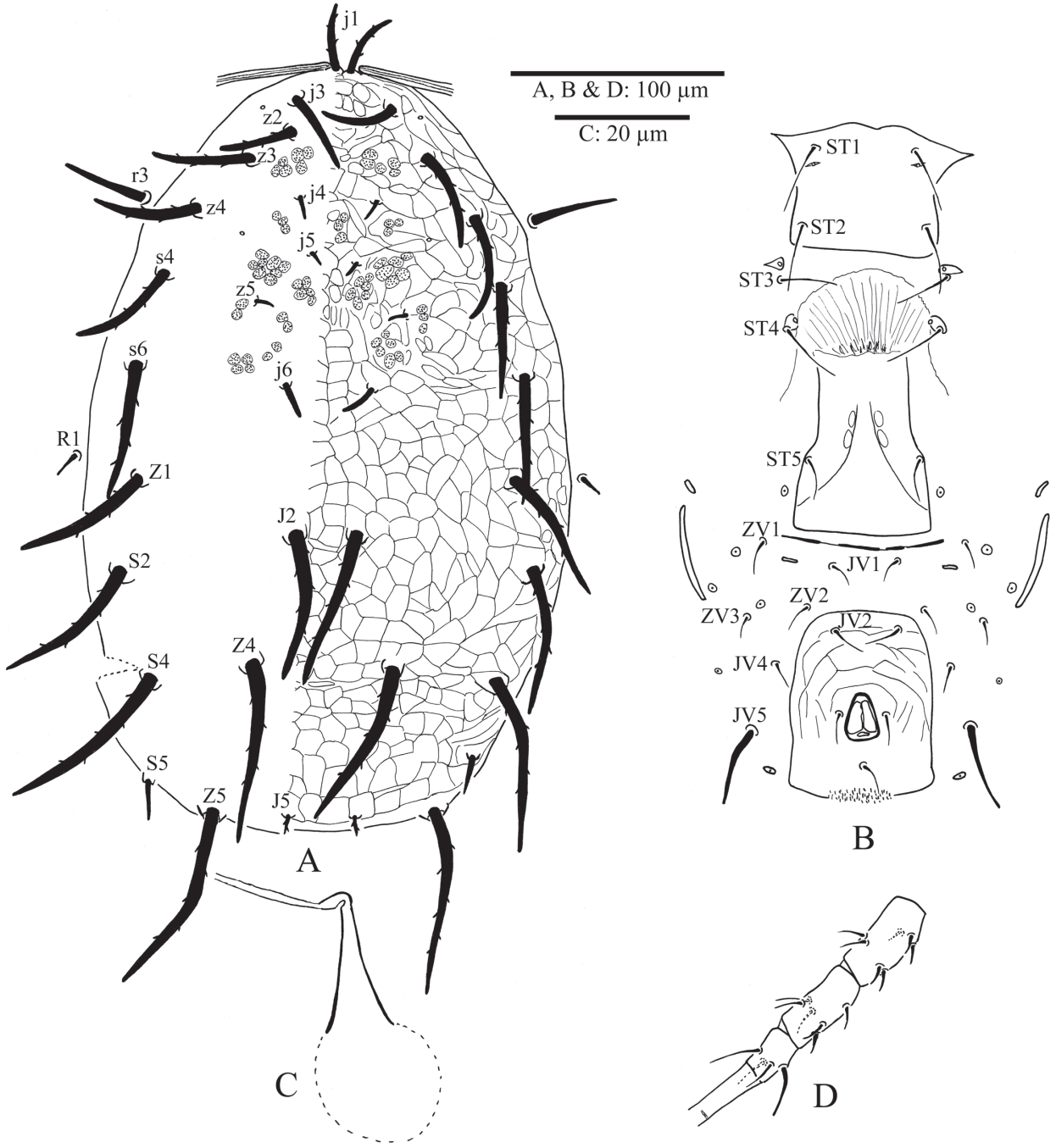

Figure 9. *Typhloseiulus peculiaris* (Kolodochka) (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermatheca; (**D**) Leg IV.

Remarks – *Neoseiulus insularis* was described by Athias-Henriot (1978) collected near Avignon, France on *Salix* sp. Kolodochka (1991) also found this species (=*Amblyseius riparius*) in Ukraine on *Salix* sp. We have collected *N. insularis* from *Salix viminalis*. The genus *Salix* might be the preferred host for this predatory mite. All the features and measurements of the specimens collected from The Netherlands fit well with those provided by Kolodochka (1991).

Typhloseiulus peculiaris (Kolodochka, 1980)

For other names and synonyms see Demite et al. (2021)
(Fig. 9: A–D)
Female – Three specimens measured.

Idiosomal setal pattern: 12A:9B/JV–3:ZV.

Dorsal idiosoma (Fig. 9A) – Dorsal shield heavily sclerotized and reticulated 360 (350–370) long and 217 (200–223) wide at j_6 level, with 21 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae strong, thick and serrate, except for j_4, j_5, j_6 and z_5 shorter and smooth; lengths j_1 29 (24–33), j_3 36 (32–40), j_4 12 (10–15), j_5 8 (7–9), j_6 20 (17–23), J_2 71 (68–73), J_5 9 (8–10), z_2 33 (32–35), z_3 44 (40–47), z_4 47 (44–49), z_5 9 (8–10), Z_1 61 (58–63), Z_4 86 (82–89), Z_5 91 (88–92), s_4 53 (47–58), s_6 63 (58–68), S_2 68 (65–72), S_4 79 (73–84), S_5 14 (10–19), setae r_3 41 (35–44) and R_1 11 (10–13) on lateral integument; solenostomes and poroids are not visible.

Peritreme – Extending to the level of setae j_1 and striated (Fig. 9A).

Ventral idiosoma (Fig. 9B) – Sternal shield wider than long, posterior margin straight, smooth, 53 (48–58) long, 63 wide at level of setae ST_2, two pairs of setae and one pair of pores (iv_1), ST_1 32–33, ST_2 32; distances between ST_1–ST_2 34 (32–35), ST_1–ST_1 46 (45–46) and ST_2–ST_2 59 (57–60); ST_3 28–32 and iv_2 on a small platelet, metasternal setae ST_4 30–33 and a pair of pores (iv_3) on small platelets; genital shield smooth, width at widest point 63 (60–65), ST_5 25–28; two pairs of narrow metapodal shields, primary 44 (41–47) long and accessory 8–13 long; ventrianal shield subrectangular (Fig. 9B), reticulated anterior to anus, length 87 (87–88), width at level of paranal setae 64 (63–65); with one pair of preanal setae (JV_2 16–20); six pairs of setae surrounding ventrianal shield on integument (JV_1 20–22, JV_4 11–15, JV_5 32 (27–35), ZV_1 16–19, ZV_2 15–16, ZV_3 8–10), five pairs of pores and one pair of small platelets surrounding ventrianal shield. Ventrianal shield with no pores.

Spermatheca – Calyx saccular 20–24 long, 5–6 in diameter at the middle part of the calyx; atrium inserted at base of the calyx (Fig. 9C).

Chelicera – Due to the closed digits, dentation cannot be seen.

Legs – Leg IV (Fig. 9D) with one relatively short and thick macroseta, StIV 25 (24–25); legs I, II and III with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 297 (280–315), leg II 267 (250–283), leg III 258 (245–270), leg IV 335 (320–350); chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 8 (2-2/1, 2/0-1) – 7 (1-2/1, 2/0-1) – 7 (1-2/1, 2/0-1) and 10 (2-2/1, 2/1-2) – 7 (1-1/1, 2/1-1) – 7 (1-1/1, 2/1-1) – 6 (1-1/1, 2/0-1) setae respectively.

Distribution – Greece, Iran, Moldova, The Netherlands (this study) and Turkey.

Specimen examined – Three females, 27 June 2017, 25 September 2018, in erinea caused by the mite *Aceria cerrea* on a *Quercus cerris* (Turkey Oak), Bos der Onverzettelijken, Almere, Flevoland, Netherlands (52°23'11.0"N 5°14'30.1"E), collector: Paul Hoekstra.

Remarks – This is a new species record for Dutch fauna. The Dutch specimens resemble that of the original description and re-description by Faraji et al. (2007), except seta j_6 is rather longer in the Dutch specimens: 17–23 *vs* 13 (Iran) and 12 (Moldova).

Typhlodromus (*Anthoseius*) *kerkirae* Swirski & Ragusa, 1976

(Fig. 10: A–E)
Female – Six specimens measured.

Idiosomal setal pattern: 12A:8A/JV:ZV.

Dorsal idiosoma (Fig. 10A) – Dorsal shield reticulated entirely and sclerotized 344 (328–358) long and 183 (180–188) wide at j_6 level, with 20 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae smooth, except for Z_4 and Z_5, slightly serrated; lengths: j_1 22 (22–24), j_3 25 (24–26), j_4 16 (15–16), j_5 17 (16–17), j_6 19 (18–20), J_2 23 (22–24), J_5 13 (12–14), z_2 19 (19–20), z_3 25 (23–27), z_4 25 (23–26), z_5 17, Z_4 33 (32–35), Z_5 54 (50–55), s_4 30 (29–32), s_6 31 (30–33), S_2 34 (32–35), S_4 33 (31–35), *S5* 30 (28–33); setae r_3 27 (26–29) and R_1 25 (24–26) on lateral integument; dorsal shield with 5 pairs of solenostomes (gd_2, gd_4, gd_6, gd_8, gd_9) and 15 pairs of small poroids.

Peritreme – Extending to the level of setae j_1 (Fig. 10A).

Ventral idiosoma (Fig. 10B) – Sternal shield wider than long, smooth, posterior margin irregular, 50 (48–51) long, 63 (62–94) wide at level of setae ST_2, two pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 28–30, ST_2 27–29, ST_3 28; distances between ST_1–ST_2 32 (30–35), ST_1–ST_1 52 (51–53) and ST_2–ST_2 54 (53–55); ST_3 and ST_4 on separate platelets, ST_4 27–28, pore (iv_3) located on integument between ST_3 and ST_4; a v-shaped plate present posterior to sternal shield and between metasternal shields;

genital shield smooth width at widest point 62 (60–65), ST_5 24–25; two pairs of relatively narrow metapodal shields, primary 31 (30–33) long and accessory 13–14 long; ventrianal shield pentagonal (Fig. 10B), with some horizontal striae, length 106 (103–109), width at level of setae ZV_2, 91 (87–95), and width at level of paranal setae 79 (74–81); with four pairs of preanal setae (JV_1, JV_2 and JV_3 20–22, ZV_2 33); four pairs of setae surrounding ventrianal shield on integument (JV_4 17, JV_5 41 (38–45), ZV_1 22–24, ZV_3 13–14), five pairs of pores and one pair of

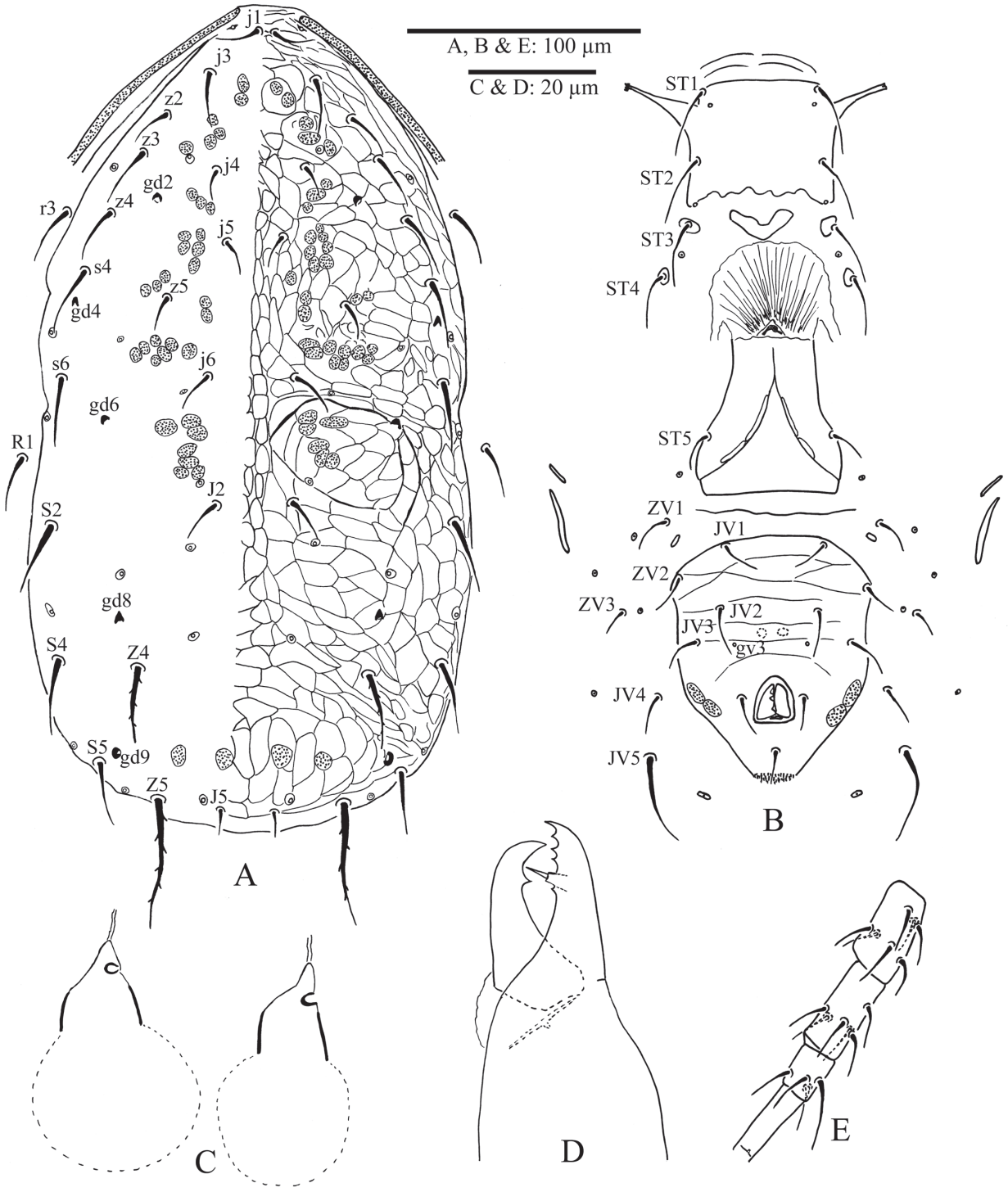

Figure 10. *Typhlodromus* (*Anthoseius*) *kerkirae* Swirski & Ragusa (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermathecae; (**D**) Chelicera; (**E**) Leg IV.

small platelets surrounding ventrianal shield. Ventrianal shield with a pair of small round pores (gv_3) posteromesad to JV_2, distance between these pores 33 (32–34).

Spermatheca – Calyx cup-shaped 13 (12–14) long, 9–11 in diameter at the middle part of the calyx; atrium c-shaped incorporated in the calyx (Fig. 10C).

Chelicera – Fixed digit 25–27 long with 4 teeth and a pilus dentilis; movable digit 27–28 long with 1 tooth (Fig. 10D).

Legs – Leg IV (Fig. 10E) with one pointed macroseta, StIV 31 (30–32); legs I, II and III with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 304 (298–310), leg II 250 (248–251), leg III 246 (243–249), leg IV 326 (323–329); chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 7 (2-2/0, 2/0-1) – 7 (1-2/1, 2/0-1) – 7 (1-2/0, 2/1-1) and 10 (2-2/1, 2/1-2) – 7 (1-2/1, 1/1-1) – 7 (1-2/1, 1/1-1) – 6 (1-1/0, 2/1-1) setae respectively.

Distribution – Croatia, France, Greece, Iran, Italy, Spain, The Netherlands (this study) and Turkey.

Specimen examined – Fourteen females, unidentified weeds from a grassland, Sinderhoeve, near Renkum, The Netherlands (51°59'52.9"N 5°45'15.9"E), collector: Frank Bakker.

Remarks – This is a new species record for Dutch fauna. All the measurements and morphological characteristics of the specimens collected in The Netherlands conform to the original description and re-description provided by Faraji et al. (2011) based on French specimens.

Typhlodromus (*Anthoseius*) *suecicus* (Sellnick, 1958)

For other names and synonyms see Demite et al. (2021)

(Fig. 11: A–E)

Female – One specimen measured.

Idiosomal setal pattern: 12A:8A/JV:ZV.

Dorsal idiosoma (Fig. 11A) – Dorsal shield reticulated 385 long and 180 wide at j_6 level, with 20 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae smooth, except for Z_5 slightly serrated; lengths j_1 21, j_3 24, j_4 20, j_5 17, j_6 24, J_2 22, J_5 9, z_2 21, z_3 23, z_4 24, z_5 21, Z_4 41, Z_5 47, s_4 25, s_6 32, S_2 35, S_4 28, *S5* 22; setae r_3 23 and R_1 21 on lateral integument; dorsal shield with 3 pairs of solenostomes (gd_2, gd_6, gd_9) and 14 pairs of small poroids.

Peritreme – Extending to the level between setae j_1 and j_3 (Fig. 11A).

Ventral idiosoma (Fig. 11B) – Posterior margin of sternal shield irregular wavy, 63 long, 63 wide at level of setae ST_2, two pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 27, ST_2 23; distances between ST_1–ST_2 40, ST_1–ST_1 49 and ST_2–ST_2 58; metasternal setae ST_3 22, ST_4 24 and a pair of associated pores (iv_3) on small platelets; genital shield smooth width at widest point 66, ST_5 22; two pairs of metapodal shields, primary 38 long and accessory 13 long; ventrianal shield pentagonal constricted at JV_2 (Fig. 11B), with some horizontal striae, length 107, width at level of setae ZV_2, 70, and width at level of paranal setae 74; with three pairs of preanal setae (JV_1 17, JV_2 16, ZV_2 17); four pairs of setae surrounding ventrianal shield on integument (JV_4 17, JV_5 27, ZV_1 14, ZV_3 16), five pairs of pores surrounding ventrianal shield. Ventrianal shield with a pair of small round pores (gv_3) wider apart from the distance between insertions of JV_2, posteromesad to JV_2, distance between these pores 42.

Spermatheca – Calyx cup-shaped 14 long, 12 in diameter at the middle part of the calyx; atrium inserted at base of the calyx (Fig. 11C).

Chelicera – Fixed digit 24 long with 4 teeth and a pilus dentilis; movable digit 27 long with 1 tooth (Fig. 11D).

Legs – Leg IV with one macroseta knobbed apically, StIV 24 (Fig. 11E); legs I, II and III with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 285, leg II 243, leg III 268, leg IV 313; chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 6 (1-2/0, 2/0-1) – 6 (1-2/0, 2/0-1) – 7 (1-2/0, 2/1-1) and 10 (2-2/1, 2/1-2) – 7 (1-2/1, 1/1-1) – 7 (1-2/1, 1/1-1) – 6 (1-1/0, 2/1-1) setae respectively.

Distribution – Finland, Norway, Russia, Sweden and The Netherlands (this study).

Specimen examined – One female, 04 July 2004, Birch tree (*Betula pendula*), Science park, Amsterdam, The Netherlands (52°21'20.8"N 4°57'34.2"E), collector: Farid Faraji.

Remarks – This is a new species record for Dutch fauna. The specimen found in The Netherlands has slightly longer dorsal shield setae compare to those re-described by Evans & Edland (1998) from Norway. For example, Z_4 41 *vs* 25–32 and Z_5 47 *vs* 40–43. The number of setae on genu III is mistakenly mentioned 7 in the text while in their key they correctly mentioned 6 setae.

Typhlodromus (*Typhlodromus*) *baccettii* Lombardini, 1960

For other names and synonyms see Demite et al. (2021)

(Fig. 12: A–E)

Female – Six specimens measured.

Idiosomal setal pattern: 10A:7A/JV:ZV.

Dorsal idiosoma (Fig. 12A) – Dorsal shield reticulated 331 (325–338) long and 166 (155–178) wide at j_6 level, with 17 pairs of dorsal setae (r_3 and R_1 included); dorsal shield

setae smooth, except for Z_5 slightly serrated; lengths j_1 24 (23–25), j_3 27 (25–28), j_4 16 (15–16), j_5 15 (15–16), j_6 18 (17–19), J_2 19 (18–20), J_5 7 (6–7), z_2 16 (15–16), z_3 21 (21–22), z_4 22 (21–22), z_5 17 (16–17), Z_4 30 (29–30), Z_5 49 (47–50), s_4 24 (23–25), s_6 27 (26–27), S_2 29 (28– 29), S_4 31 (30–32), setae r_3 22 (22–23) and R_1 20 (19–21) on lateral integument; dorsal shield with 3 pairs of solenostomes (gd_2, gd_6, gd_9) and 14 pairs small poroids.

Peritreme – Extending to the level of setae j_1 (Fig. 12A).

Ventral idiosoma (Fig. 12B) – Sternal shield wider than long, smooth, posterior margin slightly concave, irregular, 56 (51–60) long, 65 (64–65) wide at level of setae ST_2, two pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 26–27, ST_2 26; distances between ST_1–ST_2 34 (32–35), ST_1–ST_1 50 (49–51) and ST_2–ST_2 57 (55–58); metasternal setae ST_3 26 and ST_4 25–26 on small platelets,

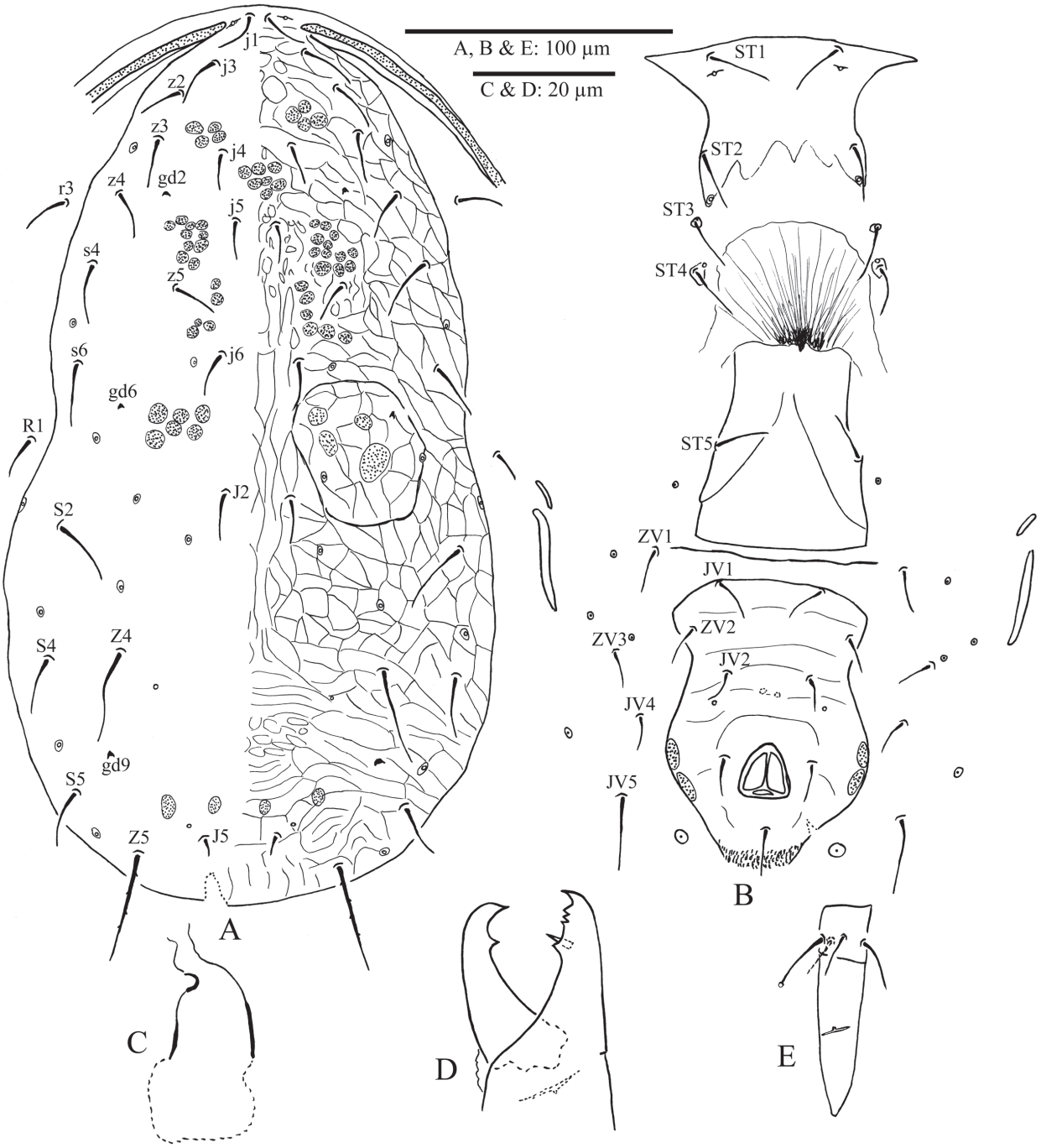

Figure 11. *Typhlodromus* (*Anthoseius*) *suecicus* (Sellnick) (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermatheca; (**D**) Chelicera; (**E**) Tarsus leg IV.

ST_4 associated with a pair of pores (iv_3); genital shield smooth, width at widest point 73 (70–74), ST_5 24; two pairs of metapodal shields, primary 25 (22–29) long and accessory 11–15 long; ventrianal shield pentagonal (Fig. 12B), striated with horizontal lines, length 104 (102–107), width at level of setae ZV_2, 104 (103–105), and width at level of paranal setae 67 (66–67); with four pairs of preanal setae (JV_1 20–21, JV_2 22, JV_3 17–18, ZV_2 19–21); four pairs of setae surrounding ventrianal shield on integument (JV_4 13–14, JV_5 47 (45–50), ZV_1 19–20, ZV_3

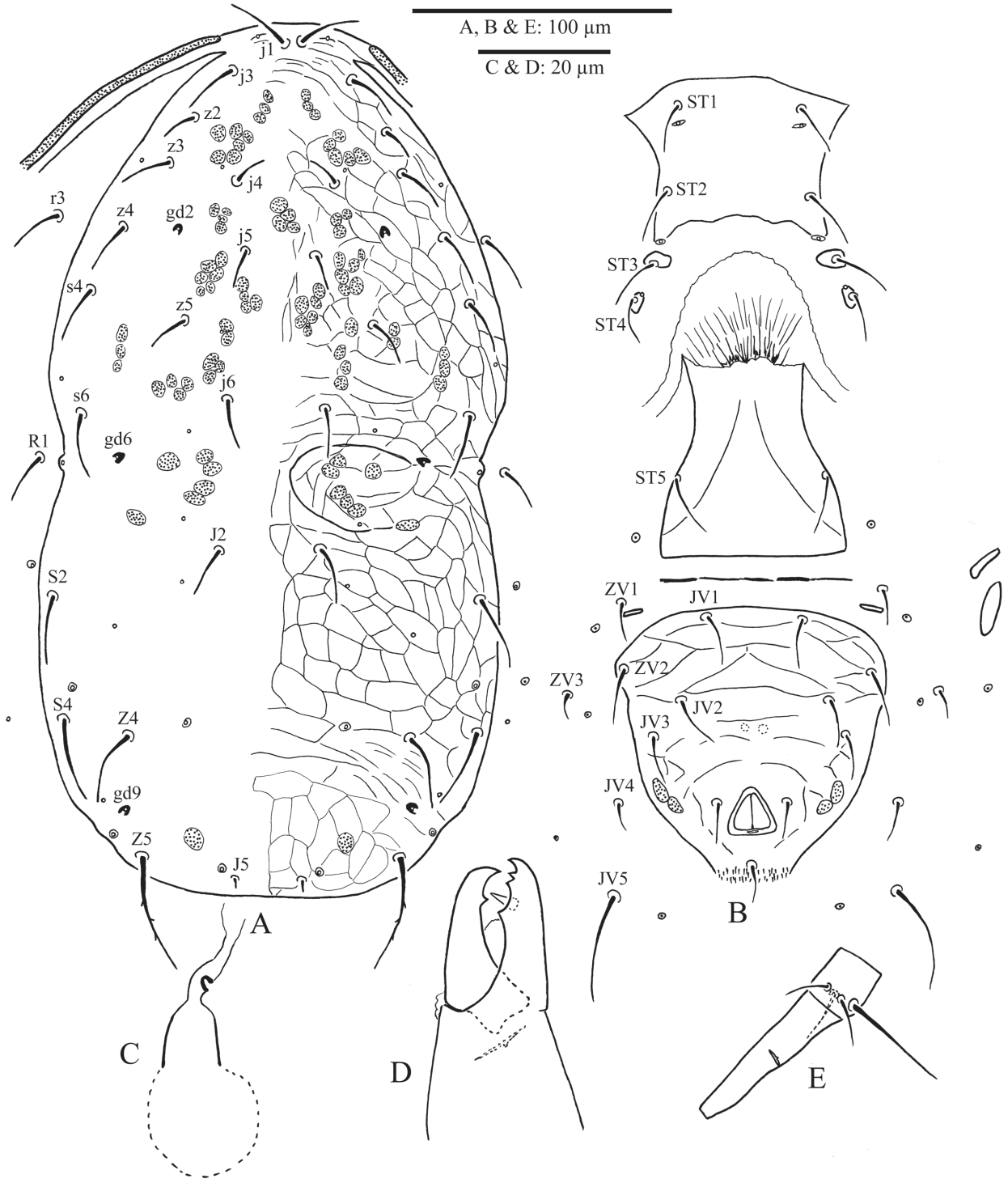

Figure 12. *Typhlodromus* (*Typhlodromus*) *baccettii* Lombardini (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermatheca; (**D**) Chelicera; (**E**) Tarsus leg IV.

12–13), five pairs of pores and one pair of small platelets surrounding ventrianal shield. Ventrianal shield with no pores.

Spermatheca – Calyx cup-shaped 10–11 long, 9–10 in diameter at the middle part of the calyx; atrium large C-shaped on a short stalk (Fig. 12C).

Chelicera – Fixed digit 25 long with 3 teeth and a pilus dentilis; movable digit 26 long with 1 tooth (Fig. 12D).

Legs – Leg IV with one pointed macroseta (Fig. 12E), StIV 45 (44–47); legs I, II and III with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 284 (280–288), leg II 251 (250–253), leg III 252 (251–253), leg IV 314 (308–318); chaetotactic formulae of genua and tibiae I–II–III–IV with 10 (2-2/1, 2/1-2) – 7 (2-2/0, 2/0-1) – 7 (1-2/1, 2/0-1) – 7 (1-2/0, 2/1-1) and 10 (2-2/1, 2/1-2) – 7 (1-2/1, 1/1-1) – 7 (1-2/1, 1/1-1) – 6 (1-1/0, 2/1-1) setae respectively.

Distribution – Australia, France, Italy, Morocco, Norway, Spain and The Netherlands.

Specimen examined – Six females, 04 September 2014, Poplar tree (*Populus alba*), Science park, Amsterdam, The Netherlands (52°21'20.8"N 4°57'34.2"E), collector: Farid Faraji.

Remarks – Chant & Yoshia-Shaul (1987) provided a re-description of *T. baccettii* based on non-type material collected in Italy. All the features of specimens collected in The Netherlands fit well with those.

Metaseiulus (*Metaseiulus*) *smithi* (Schuster, 1957)

For other names and synonyms see Demite et al. (2021)

(Fig. 13: A–E)

Female – Five specimens measured.

Idiosomal setal pattern: 12A:6B/JV–4:ZV–3.

Dorsal idiosoma (Fig. 13A) – Dorsal shield reticulated 405 (373–423) long and 212 (195–224) wide at j_6 level, with 18 pairs of dorsal setae (r_3 and R_1 included); dorsal shield setae smooth, except for Z_4 and Z_5 slightly serrated; lengths: j_1 31 (30–32), j_3 37 (35–38), j_4 27 (26–28), j_5 29 (26–32), j_6 38 (35–41), J_2 46 (39–49), J_5 13 (11–14), z_2 32 (31–35), z_3 36 (32–41), z_4 41 (38–44), z_5 30 (27–32), Z_4 57 (52–65), Z_5 66 (60–72), s_4 47 (46–49), s_6 52 (46–57), S_5 24 (23–24), setae r_3 33 (30–37) and R_1 54 (51–59) on lateral integument; dorsal shield with 4 pairs of solenostomes (gd_2, gd_6, gd_8, gd_9) and 10 pairs of small poroids.

Peritreme – Extending to the level between setae z_3 and z_4 (Fig. 13A).

Ventral idiosoma (Fig. 13B) – Sternal shield smooth, wider than long, posterior margin almost straight, 73 (71–75) long, 82 (76–87) wide at level of setae ST_2, with two pairs of setae and two pairs of pores (iv_1 and iv_2), ST_1 34–37, ST_2 35–36; distances between ST_1–ST_2 34 (32–35), ST_1–ST_1 50 (49–51) and ST_2–ST_2 57 (55–58); ST_3 33–36 on the integument, metasternal setae ST_4 32–38 and a pair of pores (iv_3) on small platelets; genital shield smooth, width at widest point 73 (70–74), ST_5 35–36; two pairs of metapodal shields, primary 36 (33–40) long and accessory 13–16 long; ventrianal shield smooth, pentagonal with anterior margin straight (Fig. 13B), length 117 (109–130), width at level of setae ZV_2, 73 (63–81), and width at level of paranal setae 89 (77–103); with two pairs of preanal setae (JV_2 27–34, JV_3 29–33); three pairs of setae surrounding ventrianal shield on integument (JV_1 27–35, JV_5 65 (63–68), ZV_1 28–32), pores and small platelets surrounding ventrianal shield not visible. Ventrianal shield with a pair of small round pores (gv_3) posteromesad to JV_2, distance between these pores 40 (36–46).

Spermatheca – Calyx saccular 17–21 long, calyx 11–13 in diameter at vesicle and 5 at the middle part; atrium inserted at the base of calyx (Fig. 13C).

Chelicera – Fixed digit 31–32 long with 3 teeth and a pilus dentilis; movable digit 33 long with 1 tooth (Fig. 13D).

Legs – Leg IV (Fig. 13E) with one pointed macroseta, StIV 61 (55–66); legs I, II and III with no recognizable macrosetae; length of legs from the base of coxae to the tip of claws: leg I 449 (436–475), leg II 357 (340–368), leg III 365 (354–377), leg IV 487 (460–507); chaetotactic formulae of genua and tibiae I–II–III–IV with 11 (2-2/2, 2/1-2) – 8 (2-2/1, 2/0-1) – 7 (1-2/1, 2/0-1) – 7 (1-2/1, 2/0-1) and 10 (2-2/1, 2/1-2) – 7 (1-1/1, 2/1-1) – 7 (1-1/1, 2/1-1) – 6 (1-1/1, 2/0-1) setae respectively.

Distribution – Canada, The Netherlands (this study), USA.

Specimen examined – Two females, 05 June 2018 and three females, 29 June 2018, unidentified weeds of a grassland meadow, situated near the village of Ooij, The Netherlands (51°50'45.8"N 5°55'56.6"E), collector: Bogdan Dehelean.

Remarks – This is a new species record for Dutch fauna. This species has three noticeable features: ventrianal shield with two pairs of preanal setae, relatively short peritreme and tibia I with 11 setae. Chant & Yoshia-Shaul (1984) provided a re-description of *M. smithi* based on a paratype. Compared to that description, the Dutch specimens have slightly longer dorsal setae. There is also one extra pair of solenostomes (gd_9) instead of three pairs mentioned by Chant & Yoshia-Shaul (1984). This is the first record of *M. smithi* from Europe. We think this species has been introduced to The Netherlands from North America. Since almost all of the species of the genus *Metaseiulus* are distributed in North, Central and South America and because *M. smithi* has only been found in Canada and USA.

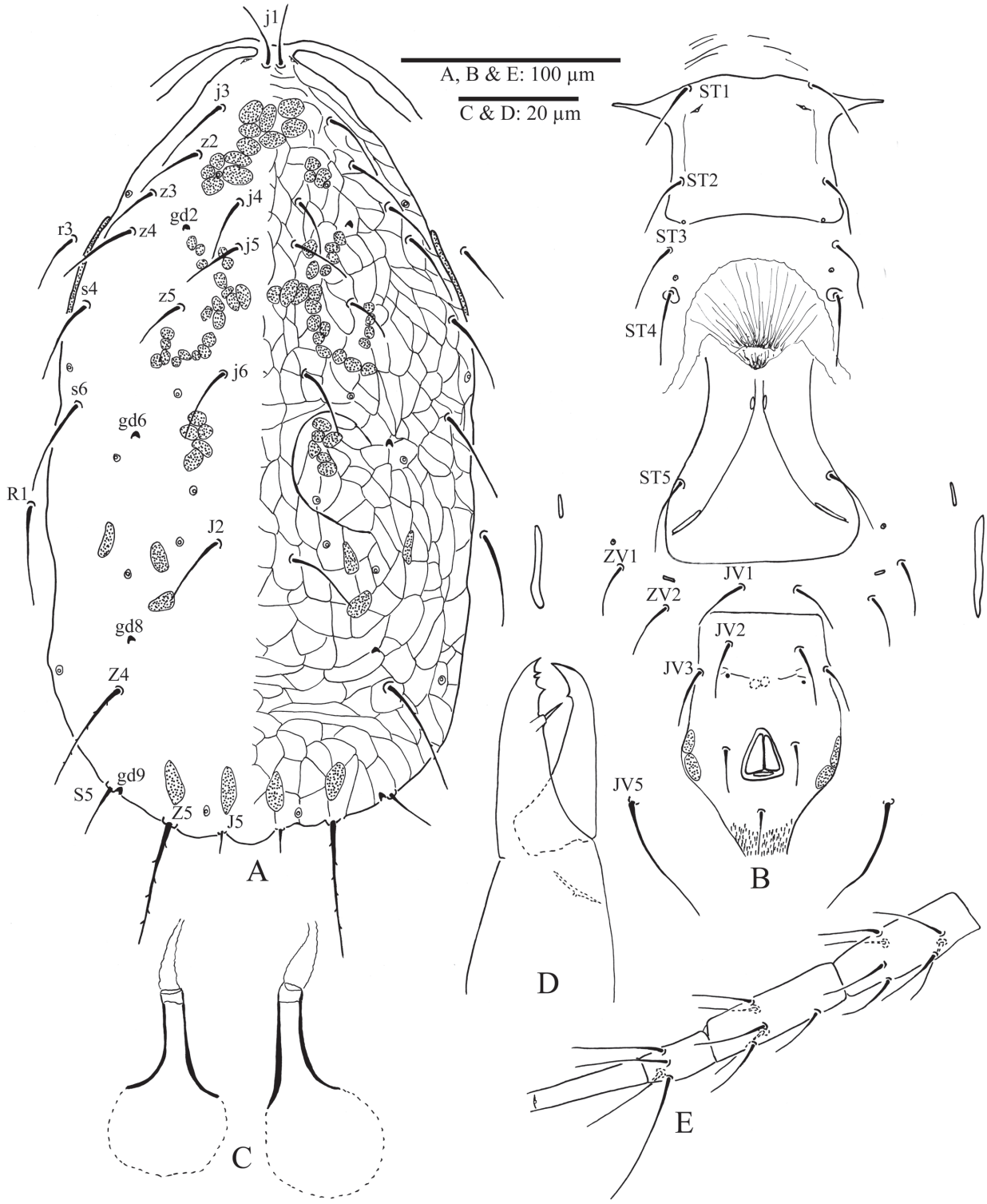

Figure 13. *Metaseiulus* (*Metaseiulus*) *smithi* (Schuster) (Female): (**A**) Idiosoma, dorsal view; (**B**) Idiosoma, ventral view; (**C**) Spermathecae; (**D**) Chelicera; (**E**) Leg IV.

Metaseiulus* (*Metaseiulus*) *neosmithi
Faraji nom. nov.
Metaseiulus (*Metaseiulus*) *smithi*
Denmark & Evans, 2011

Denmark & Evans (2011) described a new species of *Metaseiulus* (*Metaseiulus*) from the Bahamas named *smithi*. That name was preoccupied (*Metaseiulus* (*Metaseiulus*) *smithi* (Schuster, 1957)) and according to Article 57 of the International Code of Zoological Nomenclature (ICZN, 1999) a new name is proposed here.

4. Discussion

Siepel et al. (2018) listed 56 species of Phytoseiidae for the Acari fauna of The Netherlands. There was one species missing from that list, *viz*. *Metaseiulus pomi* (Parrott) that was recorded by Faraji (2006). Considering 9 species recorded new for The Netherlands in this study, the number of Dutch Phytoseiidae increases to 66 species. Siepel et al. (2018) prepared the phytoseiid checklist according to the taxonomic concept of Chant & McMurtry (2007) with three exceptions for *Amblyseius masseei* (Nesbitt), *Typhlodromips longulus* (Berlese) and *Typhlodromips similis* (Koch), which should be considered as *Aristadromips masseei*, *Arrenoseius longulus* and *Transeius similis*. Yoshida-Shaul & Chant (1995) mentioned that the holotype of *T. similis* has been lost. Based on this, Rahmani et al. (2010) considered *T. similis* as a *nomen dubium* and proposed *T. wainsteini* (Gomelauri) as the oldest available valid species. Two species *Amblyseius isuki* Chant & Hansell & *Kampimodromus elongatus* (Oudemans) are treated as valid species in the checklist of Siepel et al. (2018). Here, we follow the opinions of Wainstein (1975) and Ragusa Di Chiara & Tsolakis (1994) and consider them as junior synonyms of *A. obtusus* and *K. aberrans*, respectively.

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6. References

Athias-Henriot, C. (1975): Nouvelle notes sur lês Amblyseiini II. Le rélève organotaxique de la face dorsal adulte (Gamasides protoadeniques, Phytoseiidae). – Acarologia **17**(1): 20–29.

Athias-Henriot, C. (1978): Definition de *Dictyonotus* nov. gen., avec description de deux especes nouvelles de France Meridianale (Gamasides, Phytoseiidae). – Entomophaga **23**: 189–194.

Berlese, A. (1914): Acari nuovi. Manipulus IX. – Redia, **10**: 113–150.

Chant, D. A. (1959): Phytoseiid mites (Acarina: Phytoseiidae). Part I. Bionomics of seven species in southeastern England. Part II. A taxonomic review of the family Phytoseiidae, with descriptions of thirty-eight new species. – The Canadian Entomologist **61**(12): 1–166.

Chant, D. A. & J. A. McMurtry (2007): Illustrated keys and diagnoses for the genera and subgenera of the Phytoseiidae of the world (Acari: Mesostigmata). – West Bloomfield, MI, USA: Indira Publishing House: 220 pp.

Chant, D. A. & E. Yoshida-Shaul (1984): A world review of five similar species groups in the genus *Typhlodromus* Scheuten. Part III. The pini group (Acarina: Phytoseiidae). – Canadian Journal of Zoology **62**(2): 276–290.

Chant, D. A. & E. Yoshida-Shaul (1987): A world review of the pyri species group in the genus *Typhlodromus* Scheuten (Acari: Phytoseiidae). – Canadian Journal of Zoology **65**(7): 1770–1804.

Chant ,D. A. & E. Yoshida-Shaul (1991): Adult ventral setal patterns in the family Phytoseiidae (Acari: Gamasina). – International Journal of Acarology **17**: 187–199.

Demite, P. R., G. J. de Moraes, J. A. McMurtry, H. A. Denmark & R.C. Castilho (2021): Phytoseiidae Database. Available from: www.lea.esalq.usp.br/phytoseiidae (accessed 04/01/2021).

Denmark, H. A. & G. A. Evans (2011): Phytoseiidae of North America and Hawaii (Acari: Mesostigmata). – Indira Publishing House, West Bloomfield, USA: 451 pp.

Denmark, H. A. & M. H. Muma (1989): A revision of the genus *Amblyseius* Berlese, 1914 (Acari: Phytoseiidae). – Occasional Papers of the Florida State Collection of Arthropods **4**: 149 pp.

Döker, I., C. Kazak, M. M. Karaka & K. Karut (2017): Two new records of the genus *Kampimodromus* Nesbitt (Acari: Phytoseiidae) for Turkey with a revised key to the World species. – Acarologia **57**(2): 355–363.

Evans, G. O. & T. Edland, (1998): The genus *Anthoseius* De Leon (Acari: Mesostigmata) in Norway. – Fauna Norvegica, Ser. B **45**: 41–62.

Faraji, F. (2006): *Arrenoseius* Wainstein and *Metaseiulus* Muma: two new records for the European phytoseiid mite fauna (Acari: Phytoseiidae). – International Journal of Acarology **32**(1): 103–106.

Faraji, F., J. Hajizadch, E. A. Ueckermann, K. Kamali & J. A. McMurtry (2007): Two new records for Iranian Phytoseiid mites with synonymy and keys of *Typhloseiulus* Chant and McMurtry and Phytoseiidae in Iran (Acari: Mesostigmata). – International Journal of Acarology **33** (3): 231–239.

Faraji F. & F. M. Bakker (2008): A modified method for clearing, staining and mounting plant-inhabiting mites. – European Journal of Entomology **105**: 793–795.

Faraji, F., J. Roig & F. Bakker (2011): Some new records of Phytoseiidae from southwest Europe with description of a new species from Spain (Acari: Mesostigmata). – International Journal of Acarology **37**(4): 331–346.

Faraji, F., P. Mack, S. Staudt & J. Kolkman (2018): Two new species records of *Proprioseiopsis* Muma (Acari: Mesostigmata: Phytoseiidae) from Germany. – Soil Organisms **90**(3): 123–130.

Ferragut, F., I. Pérez Moreno, V. Iraola, & A. Escudero (2010): Ácaros depredadores em las plantas cultivadas. – Família Phytoseiidae. Ediciones Agrotécnicas, Madrid: 202 pp.

Gerson U., R. L. Smiley & R. Ochoa (2003): Mites (Acari) for pest control. Oxford (UK). – Blackwell Publishing: 537 pp.

International Commission on Zoological Nomenclature (1999): *International Code of Zoological Nomenclature. Fourth edition.* – International Trust for Zoological Nomenclature, London: xxix + 306 pp.

Karg, W. (1989): Neue Raubmilbenarten der Gattuig *Proprioseiopsis* Muma, 1961 (Acarina, Parasitiformes) mit Bestimmungsschlusseln. – Zoologische Jahrbucher Systematik **116(2)**: 199–216.

Karg, W. (1993): Acari (Acarina), Milben Parasitiformes (Anactinochaeta) Cohors Gamasina Leach. Raubmilbe. – Die Tierwelt Deutschlands: 59, Second Edition, Gustav Fischer Verlag, Jena, Germany: 523 pp.

Kolodochka, L. A. (1980): New phytoseiid mites (Parasitiformes: Phytoseiidae) from Moldavia, USSR. – Vestnik Zoologii **4**: 39–45 [in Russian].

Kolodochka, L. A. (1991): New phytoseiid mite species of the genus *Amblyseius* (Parasitiformes, Phytoseiidae). – Vestnik Zoologii **3**: 17–26 [in Russian].

Lindquist, E. E. & G. O. Evans (1965): Taxonomic concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina: Mesostigmata. – Memoirs of the Entomological Society of Canada **47**: 1–64.

Lombardini, G. (1960): *Typhlodromus baccettii* nuova specie di acaro predatore. – Redia **45**: 19–21.

McMurtry, J. A. (1984): A consideration of the role of predators in the control of acarine pests, pp. 109–121 in D. A. Griffiths, and C.E. Bowman (eds). – Acarology VI, v. 1, Ellis Horwood Ltd., New York.

Meshkov, Yu. I. (1999): Contribution to phytoseiid fauna (Parasitiformes, Phytoseiidae) of Moscow District. – Zoologicheskii Zhurnal **78**(4): 426–431 [in Russian].

Miedema, E. (1987): Survey of phytoseiid mites (Acari: Phytoseiidae) in orchards and surrounding vegetation of northwestern Europe, especially in the Netherlands. Keys, descriptions and figures. – Netherlands Journal of Plant Pathology, **93**(Supl.2): 1–64.

Papadoulis, G. Th., N. G. Emmanouel & E. V. Kapaxidi (2009): Phytoseiidae of Greece and Cyprus (Acari: Mesostigmata). – West Bloomfield, Indira Publishing House, 200 pp.

Ragusa Di Chiara, S. & H. Tsolakis (1994): Revision of the genus *Kampimodromus* Nesbitt, 1951 (Parasitiformes, Phytoseiidae), with a description of a new species. – Acarologia **35**(4): 305–322.

Rahmani, H., K. Kamali & F. Faraji (2010): Predatory mite fauna of Phytoseiidae of northwest Iran (Acari: Mesostigmata). – Turkish Journal of Zoology **34**: 497–508.

Rowell, H. J., D. A. Chant & R. I. C. Hansell (1978): The determination of setal homologies and setal patterns on the dorsal shield in the family Phytoseiidae (Acarina: Mesostigmata). – Canadian Journal of Zoology **110**: 859–876.

Schuster, R. O. (1957): A new species of *Typhlodromus* from California. – The Pan-Pacific Entomologist **33(4)**: 203–205.

Sellnick, M. (1958): Milben aus Landwirtschaftlichen Betrieben Nordschwedens. Untersokningar over Bollnas Sjukan. – Statens Vartskyddsanstalt, Meddeland **11**(71): 9–59.

Siepel, H., H. Cremers, W. Dimmers, A. Loomans & B. Vierbergen (2018): Checklist of the Mesostigmatic mites of the Netherlands (Acari: Mesostigmata). – Nederlandse Faunistische Mededelingen **51**: 115–188.

Tixier, M.-S., S. Kreiter, B. A. Croft, & B. Cheval (2008): *Kampimodromus aberrans* (Acari: Phytoseiidae) from the USA: morphological and molecular assessment of its density. – Bulletin of Entomological Research **98**: 125–134.

Swirski, E. & S. Ragusa (1976): Notes on predacious mites of Greece, with a description of five new species (Mesostigmata: Phytoseiidae). – Phytoparasitica **4**: 101–122.

Vierbergen, G. & A. J. M. Loomans (2009): Phytoseiidae in Dutch green space. Proc. Neth. – Proceedings of the Netherlands Entomological Society Meeting **20**: 45–53.

Wainstein, B. A. & E. S. Arutunjan (1973): New species of predatory mites of the family Phytoseiidae (Parasitiformes) in Armenian SSR. – Doklady Akademii Nauk Armyanskoy SSR, **56**: 55–58 [in Russian].

Wainstein, B. A. (1975): Predatory mites of the family Phytoseiidae (Parasitiformes) of Yaroslavl Province. – Entomologicheskoe Obozrenie, Russia **54**(4): 914–922 [in Russian]; Entomological Review **54**(4): 138–143 [English translation].

Yoshida-Shaul, E. & D. A. Chant (1995): A review of the species of Phytoseiidae (Acari: Gamasina) described by A. C. Oudemans. – Acarologia **36**(1): 3–19.

Zannou, I. D., G. J. de Moraes, E. A. Ueckermann, A. R. Oliveira, J. S. Yaninek & R. Hanna (2007): Phytoseiid mites of the subtribe Amblyseiina (Acari: Phytoseiidae: Amblyseiini) from sub-Saharan Africa. – Zootaxa **1550**: 1–47.