Rediscovery of *Cenopalpus lineola* (Canestrini and Fanzago, 1876) in Hungary (Acari Tenuipalpidae)

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The pine pest, *Cenopalpus lineola* (Canestrini and Fanzago, 1876) was discovered after 45 years again in Hungary. Proto-, deutonymphs, male and female specimens were collected, therefore a new and detailed re-description are presented with description of the leg chaetotaxy of the immature stages.

**Keywords:** Flat mite, occurrence, morphology, Hungary.

The flat mites or tenuipalpids are a very diverse group of plant-feeding mites occurring in most regions of the Earth. Numerous species are known as pests, especially from the genera *Brevipalpus, Cenopalpus, Dolichotetranychus, Raoiella* and *Tenuipalpus*. Contrary with the large economic impact, the majority of the Central European countries are poorly known from flat mite point of view. Hungary is no exception, only twenty species are recorded (Kontschán and Ripka, 2017, 2018). Majority of these 20 species are presented more than 40 years ago, so their current occurrences are very questionable.

One of these questionable species is the pine pest, *Cenopalpus lineola* (Canestrini and Fanzago, 1876) which was reported by Bozai (1974) from two different localities of Hungary, and later has never been found again.

*Cenopalpus lineola* was described by Canestrini and Fanzago (1876) in Italy, but later, several times was re-described (see Mesa et al., 2009). These re-descriptions were incomplete because the description of the leg chaetotaxy was omitted, therefore our aim is to give a new description and a note to the ontogeny of leg chaetotaxy following Seeman and Beard (2011).

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Materials and Methods

Specimens of *Cenopalpus lineola* were collected in planted Scots pine tree (*Pinus sylvestris* L.) close to village Csévharaszt (Pest county) using the beating method. The fallen mites were placed into 75% ethanol on the site. In laboratory the specimens were placed into lactic acid for a week and then slide-mounted in Hoyer’s medium. The specimens are deposited in the Plant Protection Institute, CAR, HAS, Budapest.

All specimens were examined by a Leica 1000 scientific microscope; the illustrations were made with the aid of a drawing tube on this microscope. All measurements and scales are given in micrometers.

Results

*Cenopalpus lineola* (Canestrini and Fanzago, 1876)

(Figs 1–8)

Material examined. Three females, one male, one deutonymph and one protonymph. Hungary, Csévharaszt (Central Hungary), from Scots pine trees, 12 July 2018, leg J. Kontschán.

Diagnosis (Based on female). Tarsal claws uncinate. Anterior margin of prodorsal shield with paired projections, prodorsum weakly sculptured, with few irregular lines. Opisthosoma with polygonal reticulation. Propodosomal and opisthosomal setae wide and serrate, except smooth and needle-like setae *d1* and *e1*. Length of dorsal setae 6–14.

Description. Female (*n* = 3).

Idiosoma reddish-brown, oval in shape, body measured from *v2* to *h1* 290–300; from tip of rostrum 330–340; width 180–190 near setae *sc2*; distance between setae *sc2* 170–175; length of legs I–IV (without coxa), leg I 130–138, leg II 105–109, leg III 98–103, leg IV 90–94.

Dorsum (Fig. 1): Anterior margin of prodorsal shield with paired projections covered by oval pits, depth of notch 14–15. Propodosoma finely lineate. Opisthosoma with polygonal reticulation. Propodosomal and opisthosomal setae serrate, except *d1* and *e1* which short and smooth. Prodorsal setae *v2* longer than half distance between their bases. Length of dorsal setae: *v2* 22–23, *sc1* 16–18, *sc2* 21–23, *cl* 15–16, *c2* 17–19, *c3* 18–19, *dl* 8–9, *d3* 17–19, *el* 8–9, *c1* 17–19, *f2* 17–18, *f3* 16–18, *h1* 14–15, *h2* 17–18.

Venter (Fig. 2a): Surface of ventral idiosoma with longitudinal and transversal striations. Genital and anal plates smoothly reticulated. Length of ventral setae, *1a* 29–32, *3a* 11–12, *4a* 35–39, *1b* 12–14, *2b* 10–11, *3b* 6–9, *4b* 7–9, *1c* 11–12, *2c* 25–28, *ag* 7–9, *gl* 7–8, *g2* 7–8. All ventral setae simple and smooth. Pseudanal setae serrate and 6–8 long.

Gnathosoma (Fig. 2b): Setae *m* on subcapitulum 3–4 long. Palp setal counts: tarsus with one solenidion, two eupathidia and a seta, tibia and genu with one-one dorsal setae. All setae smooth.

Legs (Fig. 2c–f): Setal formula for leg I–IV (coxae to tarsi): 3–1–4–3–5–9, 2–1–3–2–4–9, 2–2–2–1–3–5, 2–0–1–0–3–5. A part of setae serrate. Solenidia on tarsi I and II 15–20 long, finger-like. Tarsal claws uncinate and empodium pad-like.

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Male (n = 1)

Idiosoma reddish-brown, oval in shape, body measured from v2 to h1 285–288; from tip of rostrum 260; width 145 near setae sc2; distance between setae sc2 120; length of legs I–IV (without coxa), leg I 108–110, leg II 85–87, leg III 72–75, leg IV 80–83.

Dorsum (Fig. 3): Anterior margin of prodorsal shield with paired projections with two lateral edges, depth of notch 7. Propodosoma smooth. Propodosomal and opisthosomal setae serrate, except d1 and e1 which short and smooth. Prodorsal setae v2 shorter than half distance between their bases. Length of dorsal setae: v2 22–23, sc1 16–18, sc2 21–23, c1 15–16, c2 17–19, c3 18–19, d1 8–9, d3 17–19, e1 8–9, e3 17–19, f2 17–18, f3 16–18, h1 14–15, h2 17–18.

Venter (Fig. 4a): Surface of ventral idiosoma with transversal striations. Genital and anal plates smoothly reticulated. Length of ventral setae, 1a 29–32, 3a 11–12, 4a 38–40, 1b 7–8, 2b 8–9, 3b 8–9, 4b 9–10, 1c 11–12, 2c 18–20, ag 25–26, gl 7–8, g2 7–8. All ventral setae simple and smooth. Pseudanal setae serrate, all 6–8.

Fig. 1. Dorsal view of *Cenopalpus lineola* (Canestrini and Fanzago, 1876), from Hungary, female.
Fig. 2. *Cenopalpus lineola* (Canestrini and Fanzago, 1876), from Hungary, female:

a: ventral view of idiosoma, b: dorsal view of gnathosoma, c: dorsolateral view of leg I,
d: dorsolateral view of leg II, e: dorsolateral view of leg III, f: dorsolateral view of leg IV.

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Gnathosoma (Fig. 4b): Setae m on subcapitulum 3–4 long, palp setal counts: tarsus with one solenidion, two eupathidia and a seta, tibia and genu with one-one dorsal setae. All setae smooth.

Legs (Figs 4c–f): Setal formula for leg I–IV (coxae to tarsi): 3–1–4–3–5–9, 2–1–4–3–5–9, 2–2–2–1–3–5, 2–1–1–0–3–5. A part of setae serrate. Solenidia on tarsi I and II 16–22 long, finger-like. Tarsal claws uncinate and empodium pad-like.

Deutonymph (n = 1)

Idiosoma reddish-brown, oval in shape, body measured from v2 to h1 271–273; distance between setae sc2 138; length of legs I–IV (without coxa), leg I 100–102, leg II 81–83, leg III 55–57, leg IV 65–68.

Dorsum (Fig. 5): Propodosoma smooth. Propodosomal and opisthosomal setae serrate, except dl and el which short and smooth. Prodorsal setae v2 shorter than half distance between their bases. Length of dorsal setae: v2 13–14, scl 15–16, sc2 19–20, c1 14–15, c2 15–16, c3 19–20, dl 8–9, d3 17–19, e1 7–8, e3 22–23, f2 24–25, f3 20–22, h1 19–20, h2 22–24.
Fig. 4. *Cenopalpus lineola* (Canestrini and Fanzago, 1876), from Hungary, male: a: ventral view of idiosoma, b: dorsal view of gnathosoma, c: dorsolateral view of leg I, d: dorsolateral view of leg II, e: dorsolateral view of leg III, f: dorsolateral view of leg IV.
Venter (Fig. 6a): Surface of ventral idiosoma with striations. Length of ventral setae, 1a 24–25, 3a 11–12, 4a 45–47, 1b 6–7, 2b 5–6, 3b 19–20, 4b 13–14, 1c 6–8, 2c 5–6, ag 8–9, g 7–8, ps1–2 5–6. All ventral setae simple and smooth.

Gnathosoma: Palp setal counts (Fig. 6b): tarsus with one solenidion, two eupathidia and a seta, tibia and genu with with one-one dorsal setae. All setae smooth.

Legs (Fig. 6c-f): Setal formula for leg I-IV (coxae to tarsi): 3–1–4–3–4–3–9, 2–1–3–2–3–9, 2–2–2–1–3–5, 2–0–1–0–3–5. A part of setae serrate. Solenidia on tarsi I and II 16–22 long, finger-like. Tarsal claws uncinate and empodium pad-like.

Protonymph (n = 3)

Idiosoma reddish-brown, oval in shape, body measured from v2 to h1 215–222; distance between setae sc2 115–120; length of legs I–IV (without coxa), leg I 65–68, leg II 58–62, leg III 47–50, leg IV 41–45.

Dorsum (Fig. 7): Propodosoma smooth with some longitudinal striae. Propodosomal and opisthosomal setae serrate, except d1 and e1 which short and smooth. Prodorsal setae v2 shorter than half distance between their bases. Length of dorsal setae: v2 12–13,
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Fig. 6. Cenopalpus lineola (Canestrini and Fanzago, 1876), from Hungary, deutonymph: a: ventral view of idiosoma, b: dorsal view of palp, c: dorsal view of leg I, d: dorsal view of leg II, e: dorsolateral view of leg III, f: dorsolateral view of leg IV.

sc1 12–14, sc2 16–18, c1 14–15, c2 15–17, c3 19–20, dl 6–7, d3 17–19, e1 5–7, e3 19–20, f2 19–21, f3 20–21, h1 13–15, h2 20–21.

Venter (Fig. 8a): Surface of ventral idiosoma with striations. Length of ventral setae, 1a 30–32, 3a 7–9, 1b 6–8, 2b 13–14, 3b 6–7, 1c 6–8, ag 8–9, g 7–8, ps1–2 4–5. All ventral setae simple and smooth.

Gnathosoma: Palp setal counts (Fig. 8b): tarsus with one solenidion, two eupathidia and a seta, tibia and genu with with one–one dorsal setae. All setae smooth.

Legs (Fig. 8c–f): Setal formula for leg I–IV (coxae to tarsi): 3–0–3–1–5–7, 1–0–3–1–4–7, 2–1–2–1–3–5, 0–0–1–0–3–5. A part of setae serrate. Solenidia on tarsi I and II 15–19 long, finger-like. Tarsal claws uncinate and empodium pad-like.

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Notes to the leg setation

Majority of the dorsal setae ($d$), some lateral ($bv''$ and $l'$) setae and setae ($u'-u''$) are serrate or pilose in all stages of this species. The other setae are smooth. The solenidia ($\omega$) of the legs I and II in all stages are very long, longer than the tarsal claws. The Table 1 shows the setation of the legs. Supplementary setae are presented on femora of leg I in females (setae $l'$), on femora of leg I and leg II in males (setae $l'$), and on femora of leg I and leg II in deutonymphs (setae $l'$), and on the tibiae of leg I on females (setae $l''$) and on the tibiae of legs I and II on males (setae $l''$). These supplementary setae are absent in protonymphs.

Discussion

*Cenopalpus lineola* seems to be a Mediterranean or subtropical pine-inhabiting flat mite species. Till today it was collected in the countries around the Mediterranean Sea (e.g. Greece (Hatzinikolis and Emmanouel, 1987), Italy (Pegazzano, 1971), France (Gutierrez...
**Table 1**

Development of leg setae of *Cenopalpus lineola* (after Seeman and Beard, 2011)

|       | Cx I | Cx II | Cx III | Cx IV | Tr I | Tr II | Tr III | Tr IV | Fe I | Fe II | Fe III |
|-------|------|-------|--------|-------|------|-------|--------|-------|------|-------|--------|
| PN    | +    | +     | +      | +     | +    | v'    | v'     | v'    | d    | v'    | bv''   | d    |
| DN    | +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
| Male  | +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
| Female| +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
|       | Fe IV | Ge I | Ge II | Ge III | Ti I | Ti II | Ti III | Ti IV |
| PN    | +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
| DN    | +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
| Male  | +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
| Female| +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
|       | Ta I-IV | Ta III | Ta IV |
| PN    | +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
| DN    | +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
| Male  | +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
| Female| +    | +     | +      | +     | +    | +     | +      | +     | +    | +     | +      | +    |
et al., 1989), Algeria, Morocco, Tunisia, Lebanon (Dosse, 1974), Israel (Ueckermann et al., 2018) and the countries close to Black Sea (like: Kazakhstan and Georgia (Mitrofanov and Strunkova, 1979), but it was collected in the subtropical Japanese island, Okinawa as well (Ehara, 1966). The Hungarian occurrences are very strange, because the climate of Hungary differs from the latter mentioned regions. Therefore this species is very rare in Hungary; we presume that this species can occur in specific dry and hot habitats, where the host plants were planted. The most important question is whether this species is native to Hungary in these habitats or it was introduced with the host plants from the Mediterranean countries. In Hungary Pinus sylvestris is an indigenous pine species.

On the other hand, the Hungarian specimens of Cenopalpus lineola are closer to the specimens collected in the countries of the post-Soviet states and Japan, than that of the other countries. The setae e1 and dI are smooth in the Hungarian specimens, similar to the illustrated mites by Mitrofanov and Strunkova (1979) and Ehara (1966), contrary with Ueckermann et al. (2018) where the illustrated setae are pilose.

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