

Description of a new species of *Phytocoris* from Crete (Hemiptera: Heteroptera: Miridae)

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Abstract

A new species of the plant bug genus *Phytocoris* (Hemiptera: Heteroptera: Miridae: Mirinae), *Ph. (Exophytocoris) fosteri* n. sp., is described from the island of Crete, eastern Mediterranean. It is the tenth known species belonging to the *pinihalepensis*-group, and can be separated from the other members by its unique combination of size and shape, colouration, morphometric characters and male genitalia. Some specimens had previously been assigned to *Ph. (E.) scituloides* Lindberg, 1948, but both species are clearly distinguishable by external morphology rather than male genitalia. They should be considered as endemic species to the islands of Crete and Cyprus, respectively.

Key words: *Phytocoris*, *Exophytocoris*, new species, Heteroptera, Miridae, Crete, taxonomy.

Resumen

Descripción de una nueva especie de Phytocoris de Creta (Hemiptera: Heteroptera: Miridae)

Se describe una nueva especie de mirido del género *Phytocoris* (Hemiptera: Heteroptera: Miridae: Mirinae) de la isla de Creta, en el Mediterráneo oriental: *Ph. (Exophytocoris) fosteri* n. sp. Se trata de la décima especie conocida perteneciente al grupo de *pinihalepensis*, y su distintiva combinación de tamaño y forma, coloración, caracteres morfométricos y genitalia masculina permite separarla de los otros representantes del grupo. Algunos ejemplares habían sido asignados previamente a *Ph. (E.) scituloides* Lindberg, 1948, si bien ambas especies son fácilmente diferenciables por su morfología externa y no tanto por la genitalia masculina. Deberían considerarse especies endémicas de las islas de Creta y de Chipre, respectivamente.

Palabras clave: *Phytocoris*, *Exophytocoris*, nueva especie, Heteroptera, Miridae, Creta, taxonomía.

Laburpena

Phytocorisen Kretako espezie berri baten deskribapena (Hemiptera: Heteroptera: Miridae)

Miridoen *Phytocoris* generoko (Hemiptera: Heteroptera: Miridae: Mirinae) espezie berri bat deskribatzen da ekialdeko Mediterraneoko Kreta irlakoa: *Ph. (Exophytocoris) fosteri* n. sp. Hau da *pinihalepensis* taldeko hamargarren espezie ezagutua, eta tamaina eta formaren, kolorazioaren, karaktere morfometrikoen eta arren genitaliaren konbinazioak bereizten du espeziea talde horretako beste kideengandik. Zenbait ale *Ph. (E.) scituloides* Lindberg, 1948 delakoari esleituta zeuden aldez aurretik, baina bi espezieak erraz bereiz daitezke kanpo-morfologian oinarrituta, arren genitalian baino gehiago. Hurrenez hurren, Kreta eta Zipre irltako espezie endemikotzat hartu beharko lirarteke.

Gako-hitzak: *Phytocoris*, *Exophytocoris*, espezie berria, Heteroptera, Miridae, Kreta, taxonomia.

Introduction

Phytocoris Fallén, 1814 is the largest genus known within Miridae, with more than 700 species described

worldwide (Schuh, 2002-2013) and including a vast majority of non-tropical members, mainly from the Holarctic Region but also from the temperate zones of the Southern Hemisphere (Stonedahl, 1988).

As to southern South America, a special mention deserves the contemporary, long-term project by Carpintero and Chérot (*e.g.* 2011, 2014, and references and discussions therein included).

Still without any comprehensive study of species relationships at a global scale, the infrageneric classification of the Palaearctic *Phytocoris* is based on the recognition of 9 subgenera (Wagner and Weber, 1964; Wagner, 1974; Aukema, 2019). Up to 27 species have hitherto been described as belonging to the subgenus *Exophytocoris* Wagner, 1961, as it can be ascertained in the compilations by Kerzhner and Josifov (1999) and Aukema *et al.* (2013) plus the recent updates by Carapezza (2016), Pagola-Carte and Rieger (2017), Aukema (2019), Çerçi *et al.* (2019) and Pagola-Carte (2019). Within *Exophytocoris*, the *pinihalepensis*-group was defined by Linnavuori (1994) as the «third group» for those species in which the sclerotized basal process (= spiculum) of the vesica is not comb-like, as usually in *Phytocoris*, but formed of several marginally dentate lamellae. Most of its species have been discovered recently or very recently. Pagola-Carte (2019) described two new species from Turkey, comparing them to all previously known taxa of the group and providing some figures and a table which gather the most used distinguishing characters. Probably forming a monophyletic clade or natural lineage, 9 species belong to this group.

Among them, *Pb. (E.) scituloides* Lindberg, 1948 was described on the basis of two females from Cyprus (localities of Kikko and Livadia) collected on *Pinus pallasiiana*, the description including a habitus drawing. Subsequently, Wagner (1974) provided a short diagnosis based on 6 additional specimens (males and females) from the locality of Kakomallis, also in Cyprus, and illustrated the head (in frontal view) and pronotum of both sexes, the antenna of males, as well as the right and left parameres and the «kamartiges Spikulum der Vesika», these latter structures lacking enough accuracy or being erroneous in the case of the nowadays referred to as sclerotized basal process (SBC) of the vesica. Both type specimens are deposited in the Finnish Museum of Natural History (Luomus) [= Zoological Museum, University of Helsinki, Finland (MZHF)] (see: Huldén *et al.*, 1996) whereas the Kakomallis series is part of Wagner's collection in the Zoologisches Museum, Universität Hamburg, Germany (ZMUH) (see: Ribes and Goula, 1986). In addition to the identification keys by Wagner (1974), those published by Linnavuori are of great interest: firstly (1974) recognizing this species

as part of a «*scitulus* group» of the genus *Phytocoris*; later (1994) including it within the above mentioned «third group» of the subgenus *Exophytocoris*, and illustrating quite accurately all the sclerifications of the vesica.

Interestingly, by the end of the 20th century the species was recorded from the other great island of the eastern Mediterranean, *i.e.* Crete, more than 500 km distant from Cyprus (Heiss *et al.*, 1991, 1993). The specimens were collected by light traps and deposited in several collections of the authors of that study. Having read the paper by Pagola-Carte (2019), one of us (ChR) reexamined the specimens of *Pb. (E.) scituloides* from Crete in his collection and, in collaboration with SPC, realized that they could belong to a different species. Additional specimens were then requested to, and kindly provided by, Hannes Günther, Ralf Heckmann and Ernst Heiss, from their respective collections. Moreover, at the time when comparisons with type and non-type specimens from Cyprus were being carried out, a further support came serendipitously from Stuart Foster, who contacted SPC with regard to some *Exophytocoris* collected by him in Crete which were impossible to ascribe to any known species according to their external morphology.

In fact, the excellent condition of Foster's specimens has much facilitated the separation of all the material from Crete as a new species different from *Pb. (E.) scituloides*, mainly based on characters of external morphology. As a consequence: (1) The new species from Crete is herein described as *Pb. (E.) fosteri* n. sp.; (2) *Pb. (E.) scituloides* will therefore remain as endemic to Cyprus; (3) The number of known species of *Pb. (Exophytocoris)* and its *pinihalepensis*-group raises to 28 and 10, respectively.

Throughout the description, measurements are based on all the males and females of the type series and are given in millimetres (mm). For most morphometric characters, the whole range is given in parentheses after the average value. When possible and/or convenient (*e.g.* characters showing sexual dimorphism), measurements are indicated separately for males and females. If a character was not measurable in one given specimen (*e.g.* a missing antennal segment), the ranges (and derived ratios) were adapted accordingly. Measurements are given in greater detail in the description than in the diagnosis. Female genitalia was not studied, due to the scarcity of mature specimens and because of the currently undeveloped comparative knowledge at species level. In the transcription of labels, «/ /» means separation of lines.

Results

Phytocoris (Exophytocoris) fosteri n. sp.

(Figs. 1-4, 7)

Type material:

HOLOTYPE:

♂, labelled «Phytocoris // [line] // ELOUNDA // CRETE // 11.6.2009» [white, handwritten label] + «Crete: Elounda // 11.6.2009 // Stuart Foster leg.» [white, printed label]. Deposited in the Muséum national d'Histoire naturelle (MNHN, Paris).

PARATYPES: 10 ♂♂, 8 ♀♀:

1 ♂, labelled «Phytocoris // [line] // ELOUNDA // CRETE // 11.6.2009 /// [reverse:] Leg. S. Foster» [white, handwritten label]. Deposited in Foster coll. (Doncaster).

1 ♂, labelled «Phytocoris // [line] // ELOUNDA // CRETE // 12.6.2009 /// [reverse:] Leg. S. Foster // [line] // Cupressus» [white, handwritten label]. Deposited in Pagola-Carte coll. (Villabona).

1 ♂, labelled «Kreta, Kastellakia // 30.9.77 // 24 29' E 35 22' N // Lux, Malicky leg.» [white, printed label, with date handwritten]. Deposited in Rieger coll. (Nürtingen).

1 ♂, labelled «KRETA 17 VII 1977 // Kastellakia LF // 24°29'/35°22' // Malicky» [white, printed label, with date partly handwritten] + «Phyt. // scituloides // Lbg.» [white, handwritten label] + «FERDINANDEUM // INNSBRUCK // SPENDE G. HEISS // 2001-104» [white, printed label]. Deposited in Heiss coll. (at the Tiroler Landesmuseum, Innsbruck).

1 ♀, *idem* except for 21 VII 1977.

1 ♀, *idem* except for 6 VII 1978.

1 ♂, labelled «KRETA, Kastellakia // 24° 29' E 35° 22' N // 8.8.1978 // Malicky leg. lux» [white, printed label with date handwritten] + «scituloides // Ldbg // Chr. Rieger det. 90» [white, handwritten label with «Chr. Rieger det.» printed]. Deposited in Günther coll. (at the Naturhistorisches Museum, Mainz). Lacking pygophore and genitalia.

1 ♀, labelled «KRETA, Kastellakia // 24° 29' E 35° 22' N // 19.7.1978 // Malicky leg. lux» [white, printed label with date handwritten] + «Phytocoris scituloides // Lindberg // C. Rieger det. 1990» [white, handwritten label]. Deposited in Günther coll. (at the Naturhistorisches Museum, Mainz).

5 ♂♂, 5 ♀♀, labelled «GR-Kreta, Sougia, Lissos // 35°14'44"N, 23°47'46"E // Schlucht, Macchie, 25.5.13 // R. Heckmann leg. 2013» [white, printed label] + «Phytocoris // parvuloides // R. Heckmann det. 2015» [orange, handwritten label with third line printed]. Deposited in Heckmann coll. (Konstanz) (3 ♂♂, 3 ♀♀), Rieger coll. (Nürtingen) (1 ♂, 1 ♀) and Pagola-Carte coll. (Villabona) (1 ♂, 1 ♀).

A red, printed label is now added below to each specimen: «HOLOTYPE [or PARATYPE] ♂ [or ♀] // *Phytocoris (Exophyto- // coris) fosteri* n. sp. // Pagola-Carte & Rieger, 2021». The specimens are mounted on a white or transparent card, several males with the genitalic structures glued on a transparent card or deposited inside a microvial, and pinned below.

Diagnosis:

Recognized as a species of *Phytocoris (Exophytocoris)* belonging to the *pimihalepensis*-group («third group» *sensu* Linnavuori, 1994) due to the sclerotized basal process of the vesica formed by marginally dentate lamellae. Distinguished from the other species in the same group by its unique combination of: (a) Size and shape: small (3.5–4.1 mm) and rather short and ovate (*e.g.* length/width = 2.74 × in ♂♂ and 2.51 × in ♀♀); (b) General colouration: stramineous to brown, with pronotum paler anteriorly and dark-striped posteriorly, a pale area around cuneal fracture and the cuneus pinkish red; (c) Colouration of appendages: legs noticeably clear due to scarcity of dark spots, particularly on metafemora, and antennal segment II mostly pale with a peculiar longitudinal, inner-lateroventral dark stripe; (d) Morphometric characters: a low ocular index (0.66 in ♂♂ and 1.17 in ♀♀) and relatively short antennal segments I and II, resulting in comparatively low ratios segment I / diatone (0.65 in ♂♂ and 0.73 in ♀♀) and segment II / pronotum (1.24 in ♂♂ and 1.21 in ♀♀), being the ratio segments II / I = 2.64 in ♂♂ and 2.48 in ♀♀; (e) Male genitalia: very similar to that of *Ph. (E.) scituloides*: left paramere with the apex of the apophysis tapered to enlarged and the sensory lobe slightly protruded; vesica with the sclerotized basal process (SBP) formed by 5 marginally dentate lamellae (MDL), with a large lobal sclerite (LS) ending in two points, and with two main dentate longitudinal areas (DLA) near secondary gonopore.

Description:

General habitus: (Fig. 1)

Macropterous males (Fig. 1a) and females (Fig. 1g). Length (mm): ♂♂ = 3.83 (3.59–4.08); ♀♀ = 3.71 (3.48–4.00). Body slightly ovate (♂♂) to ovate (♀♀), 3.22 (3.04–3.38) × (♂♂) and 3.05 (2.82–3.22) × (♀♀) longer than basal width of pronotum and 2.74 (2.64–2.87) × (♂♂) and 2.51 (2.34–2.68) × (♀♀) longer than maximum width. Dorsal vestiture consisting of strong, dark, semierect setae intermixed with fine, whitish, reclining setae. General dorsal colour yellow

ochre (stramineous) to brown, with a subbasal dark stripe on pronotum, a pinkish red cuneus and three paler regions: (1) vertex and anterior part of pronotum; (2) mesoscutum and scutellum; (3) a more or less pale area around cuneal fracture; very clear legs with scarce red to brown bands or irrorations, antennal segments I and II mostly pale and segments III and IV mostly dark; without mesal pale stripe along pronotum and/or scutellum and with several reddish tinged areas showing interindividual variability. Moderately shiny; some males with hemelytra somewhat translucent (the underlying abdomen noticeable as a darker central area) and some specimens, notably females, with truly darker endocoria contrasting the paler area around cuneal fracture (so that a tricolour pattern «brownish-whitish-pinkish» may be obvious from the middle of hemelytra to the apex of cuneus) (Fig. 1g-h).

Head:

Clearly wider than high ($\times 1.2-1.4$) in front view; and short, distinctly (approx. $\times 2$) higher than long in lateral view. Markedly orthognathous. Frons evenly convex and only very slightly protruded anteriorly of antennal fossae, about $1/5$ ($\sigma\sigma$) or $2/5$ (♀♀) of the eye length. Clypeus slightly convex in lateral view, completely concealed by frons in dorsal view, and meeting it along a moderate notch. Colouration in front view showing two rather well delimited areas (Fig. 1f): prevailing red-and-white (chequered appearance) and prevailing orange or cream (less contrasted), respectively below and above the level of antennal fossae. Ground colour of vertex cream with orangish areas; medially pale and with a pair of similarly pale spots near inner margin of eyes; a pair of comma-shaped orange spots posteriad of eyes, followed by another pair of smaller and red spots hardly visible under anterior margin of pronotum. Ground colour of frons orangish cream; profusely marked by bilaterally branched orange striae. Clypeus pale with a longitudinal maroonish red stripe combined with variable additional marks, most frequently a basal «Y»-shaped mark (visible in frontal view) and another transversal one more apically. Mandibular plates pale with a transversal maroonish red stripe. Maxillary plates largely maroonish red with the anterior apex pale. Bucculae with a longitudinal maroonish red stripe. Diatone = $0.78-0.88$ mm. Ocular index: $\sigma\sigma = 0.66$ ($0.60-0.71$); $\text{♀♀} = 1.17$ ($1.12-1.26$). Eyes big and globose, occupying about $4/5$ ($\sigma\sigma$) or $3/5$ (♀♀) of height of head in lateral view; maroonish brown in preserved specimens. Maxillary plates in front view protruding or arcuate. Bucculae almost not

concealing segment I of rostrum. Rostrum reaching metacoxae; segments I to III pale with a lateral, thin, red stripe on segment I; segment IV infuscated. Antennae subequal in length to body in both sexes. Length of antennal segments: I – II – III – IV = ($0.53-0.63$) – ($1.38-1.55$) – ($0.90-1.05$) – ($0.65-0.78$) mm. Segment I, dorsally and dorsolaterally, bearing 6-9 dark to pale (including brownish or amber coloured), erect setae, longer than the diameter of the segment, in addition to the dense, mostly pale, adpressed setae directed forward. Colour pattern of segments as in Fig. 1d. Segment I whitish with maroonish red irrorations dorsally, forming four hardly recognizable wide rings; an outer-lateroventral longitudinal area completely pale. Segment II narrower ($2/3$) than segment I, mostly yellowish beige or dirty cream, darkening towards the apex, which may be broadly brownish; a short, whitish, basal ring (6% of segment length in $\sigma\sigma$, 7% in ♀♀) and a dark, irregular, subbasal spot connected to a longitudinal, inner-lateroventral dark stripe (more or less visible dorsally but always quite distinct in ventral view; see not only Fig. 1d, but also Fig. 1e). Segment III slightly narrower than II, dark brown to blackish, with two short, whitish rings: a basal one (about 7% of segment length in $\sigma\sigma$, 10% in ♀♀) and an apical one (about 4% of segment length). Segment IV slightly narrower than III, entirely dark brown to blackish. Ratio segment I / diatone: $\sigma\sigma = 0.65$ ($0.63-0.68$); $\text{♀♀} = 0.73$ ($0.71-0.75$). Ratio segment II / diatone: $\sigma\sigma = 1.71$ ($1.65-1.80$); $\text{♀♀} = 1.80$ ($1.76-1.94$). Ratio segment II / basal width of pronotum: $\sigma\sigma = 1.24$ ($1.17-1.33$); $\text{♀♀} = 1.21$ ($1.14-1.33$). Ratio segments II / I: $\sigma\sigma = 2.64$ ($2.50-2.82$); $\text{♀♀} = 2.48$ ($2.40-2.61$). Ratio segments II / III+IV = $0.82-0.91$.

Thorax:

Pronotum (Fig. 1b) subtrapezoidal, 1.89 ($1.81-1.96$) \times ($\sigma\sigma$) and 1.90 ($1.88-1.96$) \times (♀♀) wider than long (including collar) and 1.39 ($1.34-1.42$) \times ($\sigma\sigma$) and 1.49 ($1.45-1.55$) \times (♀♀) wider than diatone. Basal width = $1.13-1.25$ mm. Mesal length (including collar) = $0.60-0.68$ mm. Gently declivent anteriorly. Lateral margins almost straight. Posterior margin convex with a very slight concavity mesally. Centrally stramineous to pale brown, gradually becoming yellowish anteriorly, with calli and anterior ring being the palest regions; anterolateral angles tinged with red; a subbasal, brown stripe, as long (broad) as the width of antennal segment I, slightly displaced forward medially and vanishing gradually laterally. Pronotal calli not very distinct. Pronotal ring or collar subequal in length to the width of antennal segment I; dorsally

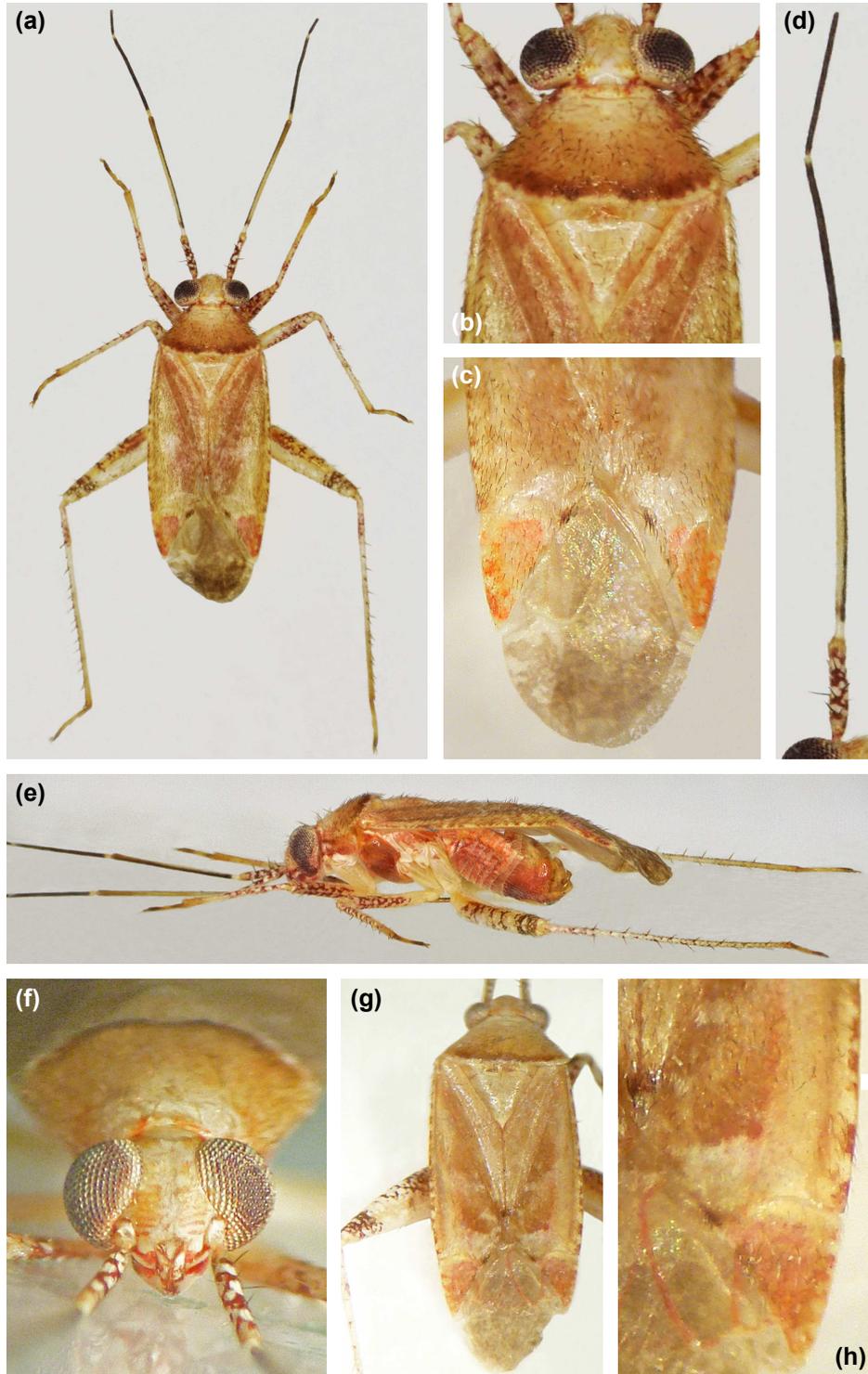


FIGURE 1. *Phytocoris (Exophytocoris) fosteri* n. sp., male and female: (a) Dorsal habitus, male; (b) Head, pronotum and scutellum, male; (c) Posterior part of hemelytra, male; (d) Left antenna, male (segment IV «reconstructed» from known data); (e) Lateral habitus, male; (f) Head of male in front view; (g) Partial dorsal habitus, female; (h) Hemelytron of female, partial view. [Photographs (a), (b), (d), (e) courtesy of Stuart Foster]



FIGURE 2. *Phytocoris (Exophytocoris) fosteri* n. sp., legs of male: Femora shown by partial removal of body.

mostly yellow but irrorated with reddish orange posteriorly to the similarly coloured spots of vertex. Scutellum *sensu stricto* (Fig. 1b) triangular, roughly as wide as long; apex acute; more or less uniformly yellowish to stramineous and laterally slightly tinged with orange in some specimens. Mesoscutum narrowly exposed, concolour with scutellum except for a mesal brownish to orangish area. Scutellum + mesoscutum moderately raised. Pronotum laterally (propleura) (Fig. 1e) orange to maroonish red and broadly pale distally. Meso- and metapleura also with distal margins pale and coloured similarly to propleura although generally mesopleura darker, maroon. Coxae, trochanters, base of femorae and scent efferent system pale.

Hemelytra:

Subparallel-sided to arcuate, largely surpassing apex of abdomen (Fig. 1a, c, e, g-h). General colour of

corium stramineous to brown, in some specimens (notably females: Fig. 1g-h) with inner half of endocorium, and to a lesser extent clavus, darker; a more or less noticeably pale area around cuneal fracture, which extends anterior to the fracture a length of 1/3 the cuneal length, more conspicuously in females. In some specimens, apex of clavus narrowly darkened and/or corial veins subtly tinged with red. Embolium ornamented with red to reddish brown spots on its margin, in a number of 10-16 depending on the coalescence degree. Cuneus mostly pinkish red (Fig. 1c, h), stronger red in females; apex concolor or very narrowly pale; inner margin bearing two elongate, not much distinct, dark brown spots, the anterior longer than the posterior; outer margin ornamented with about 3 reddish spots longer than those of embolium. Membrane (Fig. 1c) brownish grey and densely mottled with darker brown, particularly on the posterior half; a pair of conspicuous paler areas: a big one posterior to cells, a smaller one immediately posterior along the margin; veins generally two-coloured: anteriorly (longitudinal veins) red or ivory tinged with red, posteriorly (including transversal veins) ivory, sometimes irrorated with red, the variability not depending on the sex.

Legs: (Figs. 1a, g, 2)

Noticeably clear. With dense, mostly pale, adpressed setae; tibiae bearing semierect, pale to amber coloured spines, longer (up to twice in metatibiae) than tibial width; metatibial spines the darkest and arising from minute, dark dots. Femora whitish to cream, dorsally irrorated with maroon to brown spots unevenly distributed along anterior and posterior marginal and submarginal regions, more abundant on profemora, less abundant on mesofemora, where the spots are mainly distributed on posterior half, and noticeably scarce on metafemora, where the spots are only distributed on anterior half (centrally and more reddish) except for a denser (and distinctly brownish) ring on apical 1/4; ventrally the spots are similarly more abundant in the profemora than in the mesofemora and more abundant in the mesofemora than in the metafemora, where they lack completely except for the mentioned apical ring. Tibiae mostly pale, basally whitish and apically darkened (stramineous to ochraceous, even to reddish in one female), with scarce maroon to brown spots, more abundant on protibial basal 2/3, mesotibial basal 1/2 and a metatibial subbasal ring, which is more reddish and the only conspicuous tibial ring. All tarsi of roughly equal colour: stramineous with tarsomere III darker on apical half. Length of metatibiae = 2.33–2.55 mm.

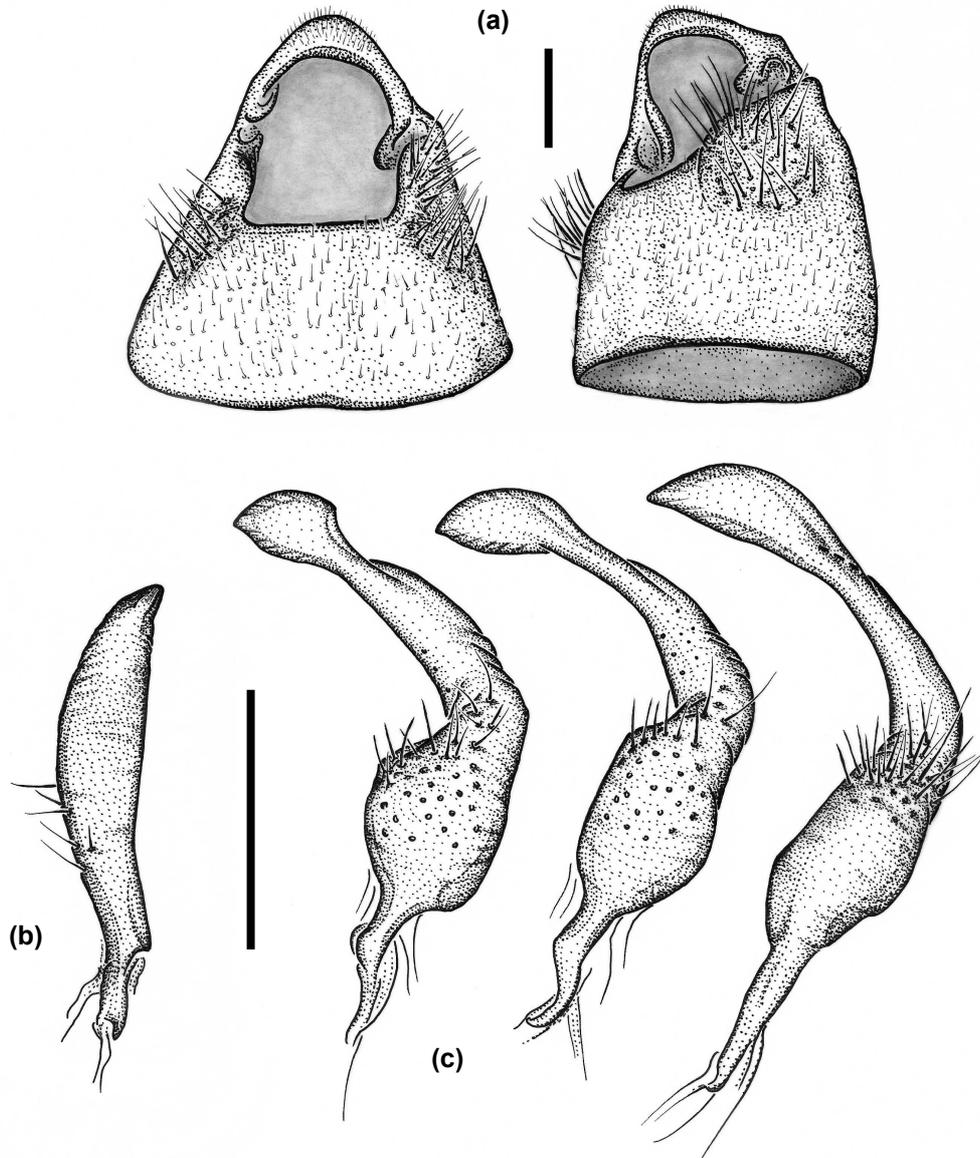


FIGURE 3. *Phytocoris* (*Exophytocoris*) *fosteri* n. sp., male genitalia: (a) Pygophore in dorsal and laterodorsal views; (b) Right paramere; (c) Left paramere in different views and/or specimens (Scale bars = 0.2 mm).

Ratio metatibia / basal width of pronotum = 1.96–2.13.
 Length of metatarsomeres (relative proportions):
 I – II – III = 6 – 8 – 10.

Abdomen: (Fig. 1e)

Ventrolaterally light brown to maroonish red,

but medially paler. Genitalic segments darker than preceding sternites; particularly, pygophore maroon or maroonish red similarly to mesopleura. Sternite VII of females bearing a band of tufted, long hairs.

Male genitalia:

Pygophore (Fig. 3a) troncoconical to subtriangular, slightly wider than long in dorsal view and slightly longer than wide in lateral view; a tuft of longer and thicker setae arising from a pair of almost unnoticeable tubercles to each side of the anterior margin of genital opening. Right paramere as in Fig. 3b: elongate, with a subbasal belt of setae and a subapical area paler or less sclerotized. Left paramere as in Fig. 3c: edentate, with primary apophysis long and apically tapered to enlarged and sensory lobe slightly protruded; apical enlargement showing a moderate crest; abundant setae on the sensory lobe, sparser and shorter more distally. Vesica as in Fig. 4: sclerotized basal process (= spiculum) formed by 5 marginally dentate lamellae; a large lobal sclerite extending for more than third the vesical length and which is the darkest (most sclerotized) part of the vesica, with two apical points and a «joint» or «hinge» basally (= apically with respect to vesica) allowing its unfolding; variously chitinized areas, including two main dentate longitudinal areas near secondary gonopore: one of them located as if «covering» the secondary gonopore and extending basad into a series of twists or folds, the other one narrower, more laterally located and in connection with a subjacent structure conspicuously but narrowly sclerotized apically.

Female genitalia:

Not studied (see Introduction).

Etymology:

We are glad to dedicate the name of the new species to the hemipterist Stuart Foster (Doncaster, United Kingdom), collector of three of the type specimens, for his crucial contribution to this research.

Type locality:

Greece, island of Crete, Elounda (= Elunda), 35.25194 N 25.72984 E, practically at sea level.

Distribution and biology:

All the specimens were collected in the island of Crete, eastern Mediterranean: localities of Elounda to the NE, Kastellakia to the NW and Sougia to the SW. The holotype and two paratypes from Elounda were collected on *Cupressus* sp. in the gardens of a hotel (Stuart Foster, pers. comm.) while the paratypes from Sougia on a very old fruiting *Pinus* (Ralf Heckmann, pers. comm.). The remaining paratypes, from Kastellakia, were attracted to light traps.

Discussion

Ph. (E.) fosteri n. sp. is placed in the subgenus *Exophytocoris* due to the following combination of characters (Wagner, 1974; Rieger, 1989; Linnavuori, 1999; Carapezza, 2016): hemelytra not ornamented with regular dense orangish or red mottling, right paramere entirely sclerotized, left paramere edentate, antennal segment I shorter than diatone, antennal segment III dark brown with pale base, head in lateral view higher than long and frons moderately convex, with a shallow depression between it and the base of clypeus. Besides, like most species of *Exophytocoris*, it has a small size (< 6 mm) and reddish or reddish brown patterns. Within *Exophytocoris*, the new species undoubtedly belongs to the *pinihalepensis*-group, characterized by the sclerotized basal process of the vesica, which is formed (in almost all included species) of several marginally dentate lamellae instead of being comb-like as usually in *Phytocoris*. In addition, they often bear dentate longitudinal areas or ridges near the secondary gonopore and sometimes also denticulations on the sclerotized apical portion (Linnavuori, 1994; see also: Pagola-Carte, 2019).

As frequently among the species of the genus *Phytocoris*, the separation of *Ph. (E.) fosteri* n. sp. relies on a unique combination of characters which, separately, may be shared (in a complex and somewhat puzzling way) with one or another of its close congeners. Nevertheless, many of those characters use to be rather constant for each species, so that the availability of series of specimens becomes a particularly helpful tool in the taxonomy of a genus that is so speciose and full of subtleties. For the new species, such unique «distinguishing combination of characters» (rather than «combination of distinguishing characters»!) has been provided in the diagnosis.

Let us summarize some «first-glance» similarities between *Ph. (E.) fosteri* n. sp. and other species of the *pinihalepensis*-group⁽¹⁾ before exploring and explaining the dissimilarities which define it as a separate species. Following the order of the diagnosis:

⁽¹⁾ The names of all the species are as follows (alphabetically): *Ph. (E.) carapezzai* Çerçi, Koçak & Tezcan, 2019; *Ph. (E.) koronis* Linnavuori, 1992; *Ph. (E.) matocqi* Pagola-Carte, 2019; *Ph. (E.) parvuloides* Wagner, 1961 [= *Ph. (Ph.) malickyi* Rieger, 1995 (Çerçi and Koçak, 2017, syn.)]; *Ph. (E.) pinihalepensis* Lindberg, 1948; *Ph. (E.) pluotae* Pagola-Carte, 2019; *Ph. (E.) raunolinnavuorii* Carapezza, 2016; *Ph. (E.) scitnoides* Lindberg, 1948; *Ph. (E.) zenobia* Linnavuori, 1994.

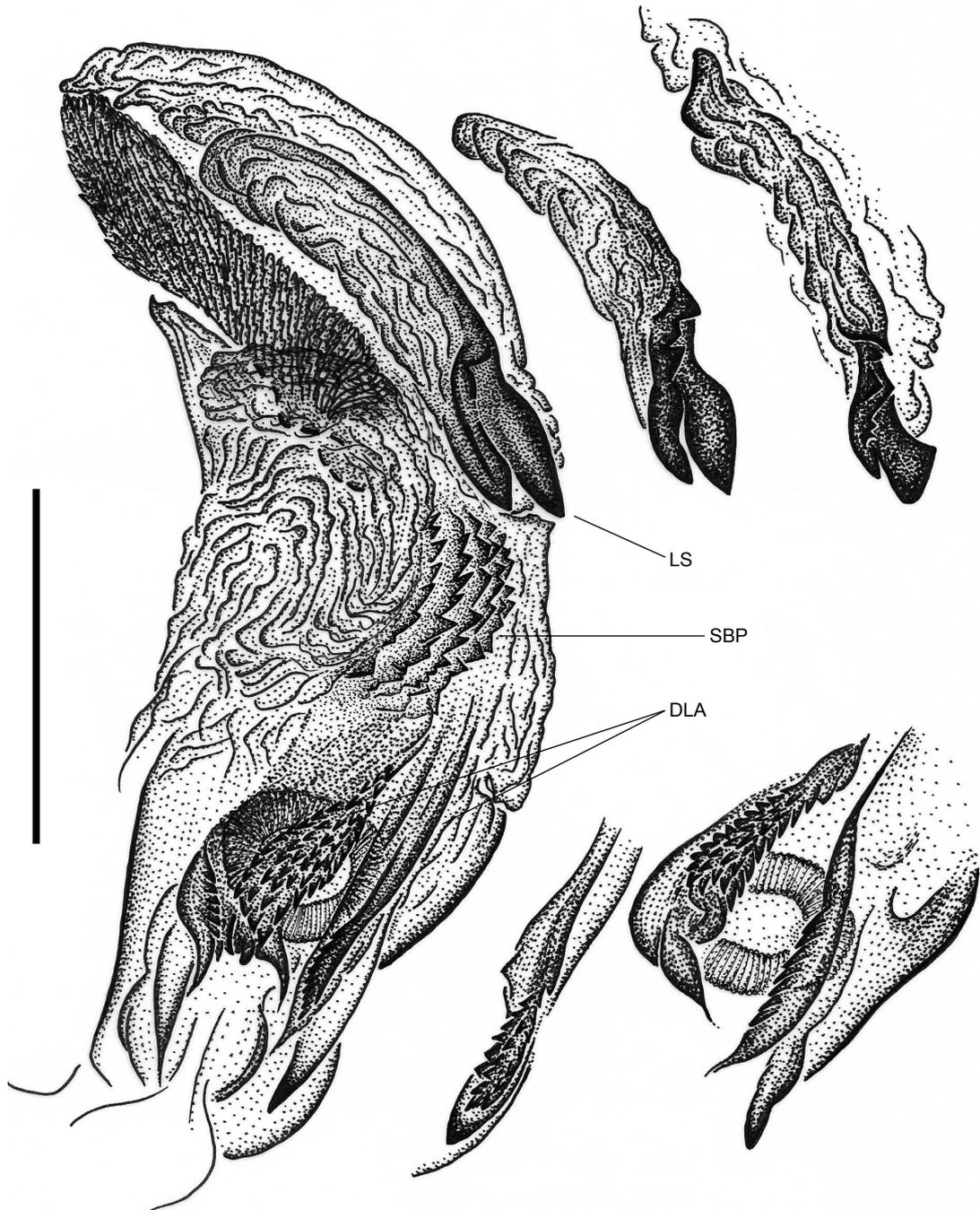


FIGURE 4. *Phytocoris* (*Exophytocoris*) *fosteri* n. sp., male genitalia: Vesica and additional views (same or different specimens) of some of its structures (Abbreviations: DLA = dentate longitudinal area; LS = lobal sclerite; SBP = sclerotized basal process or spiculum) (Scale bar = 0.2 mm).

- (a) Size and shape: *Pb. (E.) parvuloides*, *Pb. (E.) pinibalepensis* and *Pb. (E.) pluotae* are, together with the new species, the smallest ones in this group (with some individuals < 4 mm), and they also share a subovate shape.
- (b) General colouration: the most similar species are *Pb. (E.) carapezzai*, *Pb. (E.) pinibalepensis* and *Pb. (E.) pluotae*, all of them clear, as is the case of the new species.
- (c) Colouration of appendages: the legs are also largely pale in *Pb. (E.) pinibalepensis* and *Pb. (E.) pluotae*, but the pattern of antennal segment II is only partially shared with *Pb. (E.) scituloides*.
- (d) Morphometric characters: the new species is most similar to *Pb. (E.) carapezzai*, *Pb. (E.) pinibalepensis* and, to a lesser extent, *Pb. (E.) scituloides* (see: Pagola-Carte, 2019: table 1).
- (e) Male genitalia: both the left paramere and the vesica are very close among *Pb. (E.) carapezzai*, *Pb. (E.) scituloides*⁽²⁾ and the new species, particularly similar between the latter two.

Concerning the dissimilarities, in a first step we must leave aside four species which are strongly different within the *pinibalepensis*-group: *Pb. (E.) parvuloides* and *Pb. (E.) rannolinnavuorii* for lacking the characteristic sclerotized basal process of the vesica (SBP) formed of several marginally dentate lamellae; and *Pb. (E.) matocqi* and *Pb. (E.) pluotae* because of their unique antennae, with a very short segment I and a very long segment II, besides other morphometric and genitalic differences. Concerning *Pb. (E.) koronis* and *Pb. (E.) zenobia*, apart from their greater size and different colouration, the male genitalia is also different from that of *Pb. (E.) fosteri* **n. sp.**, particularly by the lack of a conspicuous lobal sclerite (LS).

At this point, and taking also into account the similarities mentioned above, it seems rather obvious that *Pb. (E.) carapezzai*, *Pb. (E.) pinibalepensis* and *Pb. (E.) scituloides* form, together with *Pb. (E.) fosteri* **n. sp.**, a subgroup of species with a high resemblance, and maybe closely related phylogenetically.

Pb. (E.) pinibalepensis, however, bears a sclerotized basal process (SBP) with 10 marginally dentate lamellae (MDL), has extremely short antennal segment I, a more reddish dorsal colouration and relatively

longer and black tibial spines and setae of antennal segment I. As to *Pb. (E.) carapezzai*, its male genitalia is somewhat different to the new species, not only concerning the vesical structures but also the right and left parameres. Even if the general dorsal colouration (and even a presumably longitudinally infuscated underside of antennal segment II, as suspected from fig. 2A by Çerçi *et al.* (2019)) are rather similar to *Pb. (E.) fosteri* **n. sp.**, the colouration pattern of metafemora and metatibia (his fig. 2B) and some other traits (*e.g.* greater size, more elongate shape, dark spots on embolium, claval apex and cuneal apex and margins) definitely separate them.

Of particular interest is the comparison with *Pb. (E.) scituloides*, not only because it is the species that appears as most similar in the ongoing analysis of similarities/dissimilarities within the *pinibalepensis*-group, but also because some of the specimens upon which the new species is described were previously considered as belonging to it.

A brief history of the taxon *Pb. (E.) scituloides* Lindberg, 1948 and its recordings has been presented in the Introduction section. We have had the opportunity to examine directly (external morphology and dissections) two males and one female of the *Kakomallis* series (Cyprus) deposited in Wagner's collection at ZMUH, and indirectly (photographs) the two females, holotype from Kikko and paratype from Livadia (Cyprus), deposited in MZHF. Additionally, we have studied the literature containing descriptive information on the species (Lindberg, 1948; Linnavuori, 1974, 1994; Wagner, 1974; see also: Pagola-Carte, 2019: table 1). As a result: (a) The habitus and some relevant characters of both type specimens of *Pb. (E.) scituloides* are shown in Fig. 5; (b) The comparison of relevant morphometric characters between *Pb. (E.) fosteri* **n. sp.** and *Pb. (E.) scituloides* is provided in Table 1; (c) The male genitalia of *Pb. (E.) scituloides* is illustrated in Fig. 6. The photographs of Fig. 5 are also available online: <http://id.luomus.fi/GZ.51448> and <http://id.luomus.fi/GZ.51449>.

Interestingly, the male genitalia is not critical for the separation of the new species. *Pb. (E.) fosteri* **n. sp.** and *Pb. (E.) scituloides* show almost identical male genitalic structures. Only slight differences can be mentioned: the apical enlargement of left paramere bears a moderate *versus* conspicuous crest in *Pb. (E.) fosteri* **n. sp.** and *Pb. (E.) scituloides*, respectively (compare Figs. 3c with 6b) and the dentate longitudinal areas (DLA) near secondary gonopore are somewhat different: one of them (the central one) extends basad into a series of twists or folds in *Pb. (E.) fosteri* **n. sp.**

⁽²⁾ The table 1 provided by Pagola-Carte (2019) is erroneous concerning the male genitalia of *Pb. (E.) scituloides*, as will be clarified below.

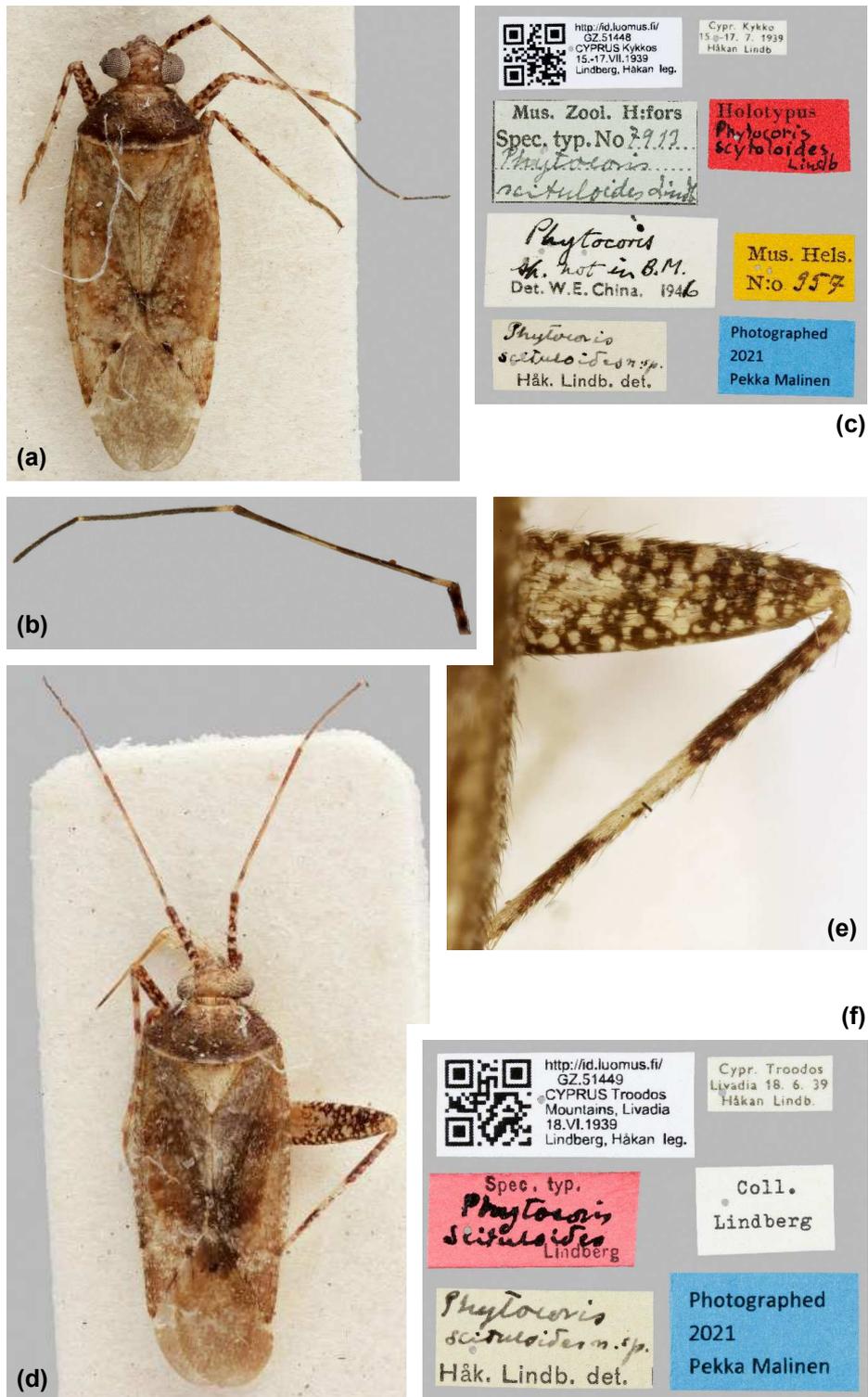


FIGURE 5. *Phytocoris* (*Exophytocoris*) *scituloides* Lindberg, 1948: (a)-(c) Holotype female; (d)-(f) Paratype female / (a), (d) Dorsal habitus; (c), (f) Labels; (b) Right antenna in latero-ventral view; (e) Femur and tibia of posterior leg [Photographs courtesy of Pekka Malinen, Finnish Museum of Natural History (Luomus)]

while it vanishes basally less conspicuously in *Ph. (E.) scituloides*; the other (the lateral one) has a subadjacent structure which is apically sclerotized narrowly *versus* widely in *Ph. (E.) fosteri* **n. sp.** and *Ph. (E.) scituloides*, respectively. Incidentally, it must be stressed that the table 1 by Pagola-Carte (2019) should be corrected for *Ph. (E.) scituloides*: it should say «yes» in the column about LS of vesica and «tapered to enlarged» in the column about the apophysis apex of left paramere.

Two comments should be here added about the examination of male genitalic structures in this group of species: (1) The left paramere must be examined in several positions; as an example, in our Fig. 3c the apex of the apophysis varies substantially (!); (2) The number of marginally dentate lamellae (MDL) of the sclerotized basal process (SBP) might not be so a reliable character for single specimens; as an example, the vesica of two teneral specimens of the new species (from the locality of Sougia) was dissected and displayed «face down» with respect to the usual positioning (Fig. 7), resulting in the observation of several apparently supernumerary MDL (in addition to the typical 5), as part of the otherwise hidden (in «face up» vesicae of mature specimens) lobulate area from which these sclerotized structures are formed.

Quite the opposite, the external morphology allows an easy separation of both species. On the one hand, two colouration traits are important characters dis-

tinguishing *Ph. (E.) fosteri* **n. sp.**: the femora and tibiae extremely pale, particularly metafemora (compare Figs. 2 with 5e), and the antennal segment II, largely pale and with a longitudinal inner-lateroventral dark stripe which is not so well defined in *Ph. (E.) scituloides* (compare Figs. 1d-e with 5b) and lack completely in other species.

On the other hand, a number of morphometric characters separate them as well. In Table 1 an asterik (*) has been indicated for those characters showing a meaningful difference. *Ph. (E.) fosteri* **n. sp.** is smaller than *Ph. (E.) scituloides* and has a shape slightly more ovate, as suggested by the first two ratios in the table. The antennal segments I and II are markedly shorter, as can be inferred from the following three ratios in the table. Finally, also concerning the body shape, the ratio «pronotum width / head width» is quite different between both species, and it explains the disparate appearance of their habitus (compare Figs. 1a with 5a, d).

In spite of the usual scarcity of biological information available, the host plant preferences deserve a comment: whereas *Ph. (E.) scituloides* has been collected on *Pinus pallasiana* (Pinaceae) (Lindberg, 1948; Wagner, 1974), in the case of *Ph. (E.) fosteri* **n. sp.** both *Cupressus* sp. (Cupressaceae) and *Pinus* sp. (Pinaceae) are suggested as potential host plants (see «Distribution and biology» section).

		<i>Ph. (E.) fosteri</i> n. sp.		<i>Ph. (E.) scituloides</i>			
		type series		examined		literature	
		♂♂	♀♀	♂♂	♀♀	♂♂	♀♀
L (mm)	*	3.83	3.71	4.62	4.78	4.6–5.0	
L / Max W	*	2.74	2.51	2.85	2.97		
L / Pron W	*	3.22	3.05	3.35	3.65		
Ant II / Pron W	*	1.24	1.21	1.30	1.35	1.43	1.23
Ant II / Head W	*	1.71	1.80	2.01	2.12		
Ant I / Head W	*	0.65	0.73	0.77	0.91	0.86	
Ocular index		0.66	1.17	0.66	1.14	0.70–0.86	1.23–1.30
Pron W/L		1.89	1.90	1.95	1.79		
Pron W / Head W	*	1.39	1.49	1.55	1.58		
Ant II / Ant I		2.64	2.48	2.63	2.33	2.2	

TABLE 1. Comparison of relevant morphometric characters between *Ph. (E.) fosteri* **n. sp.** (based on the whole type series) and *Ph. (E.) scituloides* Lindberg, 1948 (based on specimens examined and on bibliography: see text). Abbreviations: Ant = antennal segment; L = length; Pron = pronotum; W = width (with «Head W» = diatone).

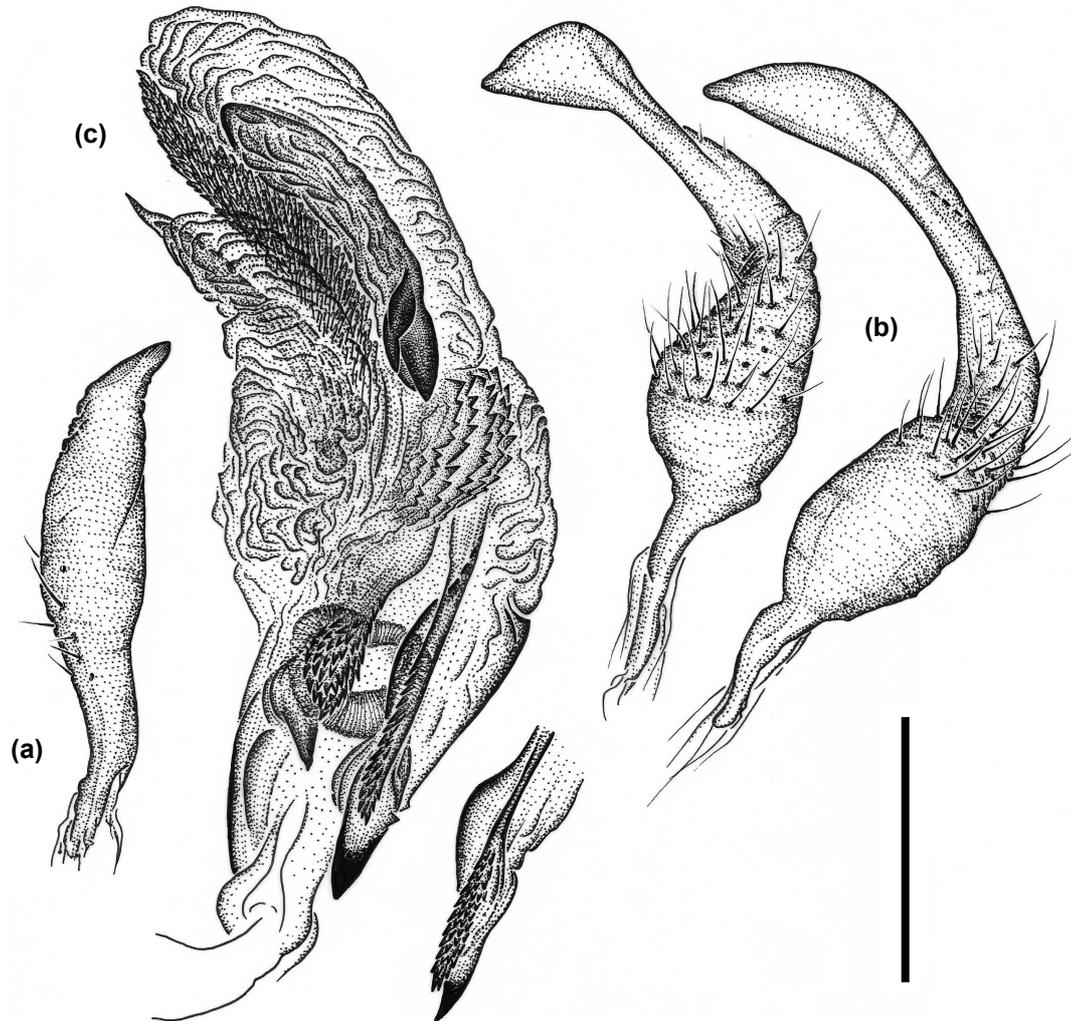


FIGURE 6. *Phytocoris (Exophytocoris) scituloides* Lindberg, 1948, male genitalia: (a) Right paramere; (b) Left paramere in two views; (c) Vesica, with an additional view of one of the dentate longitudinal areas near secondary gonopore (Scale bar = 0.2 mm).

As to the distribution of these taxa, it should be noted that Önder (1976) recorded *Ph. (E.) scituloides* from several localities in Turkey, as compiled by Çerçi *et al.* (2021). They are not included in the Palearctic Catalogue (Aukema, 2019) but we hope that a reexamination of specimens, which is still to be performed (Barış Çerçi, comm. pers.) and is out of the scope of the present paper, will clarify whether they belong to *Ph. (E.) scituloides*, to *Ph. (E.) fosteri* n. sp. or to any other undescribed or described species, as for example

Ph. (E.) carapezzai, recently described from Turkey and with important similarities, as mentioned above in the present Discussion. The latter (that they belong to *Ph. (E.) carapezzai* or to an undescribed one) is more likely in our opinion, given the high degree of speciation and endemism suggested for this group of *Phytocoris*.

In addition to clarifying the identity of the presumed «*scituloides*» from Crete with the description of a new species, two conclusions can be drawn from this study:

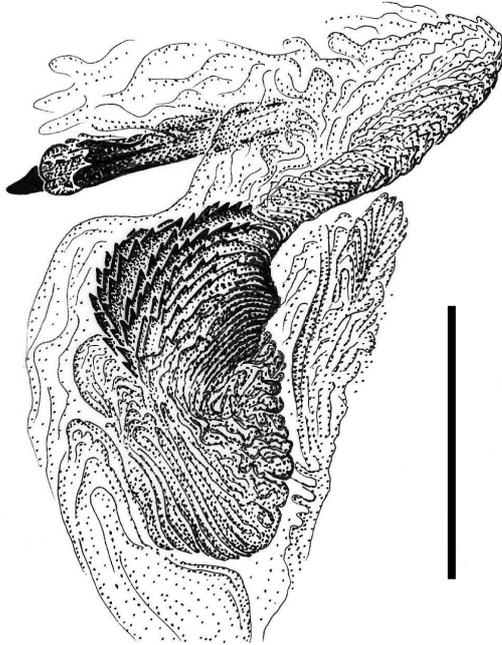


FIGURE 7. *Phytocoris (Exophytocoris) fosteri* n. sp., male genitalia: Partial view of a vesica showing apparently supernumerary marginally dentate lamellae (MDL) as a result of examining the vesica of a teneral specimen (locality of Sougia) in a «face down» position (compare with Fig. 4 and particularly note the different position of the lobal sclerite (LS) as a reference) (Scale bar = 0.2 mm).

- (1) In our opinion, *Ph. (E.) fosteri* n. sp. and *Ph. (E.) scituloides* should be considered as endemic species to Crete and Cyprus, respectively.
- (2) This could be considered as an interesting case of «inverse pseudocryptic» species: inversely to many other unnoticed («cryptic» or «pseudocryptic») species which are externally very similar and which are only unveiled when examining their genitalia, here the discovery of an undescribed species has been possible when the availability of specimens in good conditions have allowed a proper examination of the external morphology in addition to the recognition of genitalic characters (so widespread and systematic in the identification of *Phytocoris*). Two species with similar male genitalia, *Ph. (E.) scituloides* and *Ph. (E.) fosteri* n. sp., could only be detected in this way.

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