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Adelphocoris falukei n. sp. from Almería, southeastern Iberian Peninsula (Hemiptera: Heteroptera: Miridae)

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Abstract

Adelphocoris falukei **n. sp.** (Hemiptera: Heteroptera: Miridae: Mirinae: Mirini) is described from the coast of Almería, Andalusia (southeastern Iberian Peninsula), associated to *Limonium cossonianum* Kuntze and/or *Limonium angustebracteatum* Erben (Plumbaginaceae). It is the smallest Iberian member of *Adelphocoris*, easily recognized by its dark red appendages, orangish ochraceous dorsal colouration and broad black spots on pronotum. The new species can be separated from the remaining species of the genus by characters of external morphology, male and female genitalia. A deeper comparative study is conducted to distinguish it from *A. lineolatus*, *A. ticinensis* and *A. vandalicus*. The usefulness of the phallic comb of the vesica as a specific diagnostic character in *Adelphocoris* is briefly discussed.

Key words: *Adelphocoris falukei* **n. sp.**, Heteroptera, Miridae, Almería, Iberian Peninsula, taxonomy.

Resumen

Adelphocoris falukei *n. sp. de Almería, sureste de la Península Ibérica* (*Hemiptera: Heteroptera: Miridae*)

Se describe *Adelphocoris falukei* **n. sp.** (Hemiptera: Heteroptera: Miridae: Mirinae: Mirini) de la costa de Almería, Andalucía (sureste de la Península Ibérica) y asociado a *Limonium cossonianum* Kuntze y/o *Limonium angustebracteatum* Erben (Plumbaginaceae). Es el representante ibérico más pequeño de *Adelphocoris*, fácilmente reconocible por sus apéndices de color rojo oscuro, coloración dorsal ocráceo-anaranjada y grandes manchas negras del pronoto. La nueva especie puede separarse de las demás especies del género mediante caracteres de morfología externa, de la genitalia masculina y de la femenina. Se realiza un estudio comparativo más profundo para diferenciarla de *A. lineolatus*, *A. ticinensis* y *A. vandalicus*. Se ofrece una somera discusión sobre la utilidad del peine fálico de la vesica como carácter diagnóstico específico en *Adelphocoris*.

Palabras clave: *Adelphocoris falukei* **n. sp.**, Heteroptera, Miridae, Almería, Península Ibérica, taxonomía.

Laburpena

Adelphocoris falukei *n. sp., Almeriakoa, Iberiar Penintsularen hegoekialdea* (*Hemiptera: Heteroptera: Miridae*)

Adelphocoris falukei **n. sp.** (Hemiptera: Heteroptera: Miridae: Mirinae: Mirini) deskribatzen da, Almeriako kostaldekoa, Andaluzia (Iberiar Penintsularen hegoekialdea), eta *Limonium cossonianum* Kuntze eta/edo *Limonium angustebracteatum* Erben (Plumbaginaceae) landareei lotua. *Adelphocoris* generoaren iberiar ordezkaririk txikiena izanik, antzematen erraza suertatzen da kolore gorri iluneko apendizeak, gainaldeko kolorazio okre laranjaxka eta pronotoaren orban beltz handiak direla eta. Generoaren beste espezieetatik, kanpo-morfologiaren eta arren eta emeen genitalien hainbat karaktererengatik berez daiteke espezie berria. Konparazio-ikerketa sakonagoa burutzen da *A. lineolatus*, *A. ticinensis* eta *A. vandalicus* espezieetatik bereizteko. *Adelphocoris*-espezieen karaktere diagnostikotzat jo izan den besikaren falo-orratzaren baliogarritasunari buruz eztabaidatzen da laburki.

Gako-hitzak: *Adelphocoris falukei* **n. sp.**, Heteroptera, Miridae, Almeria, Iberiar Penintsula, taxonomia.

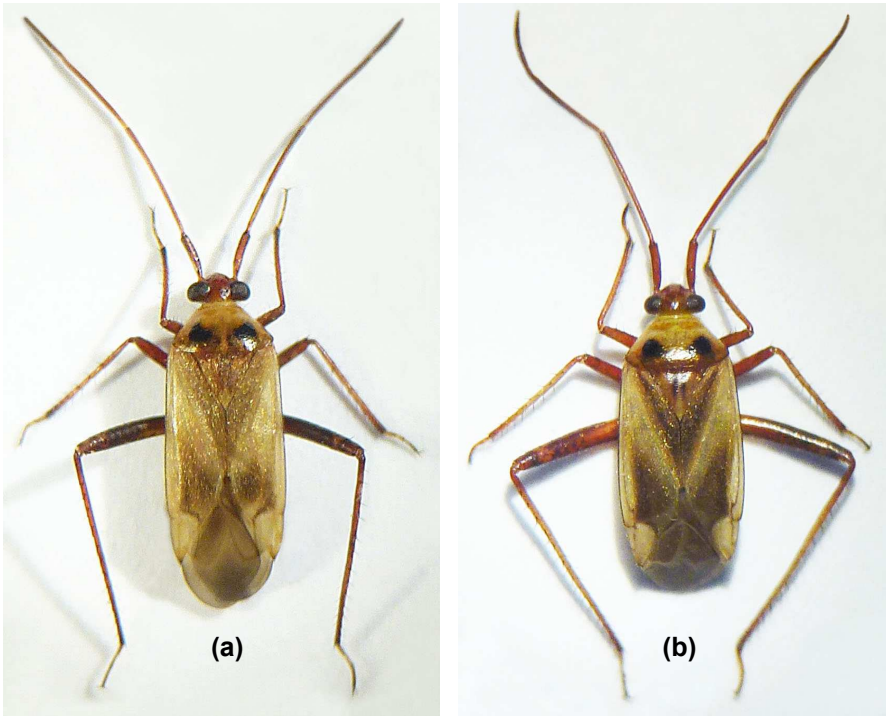

FIGURE 1. *Adelphocoris falukei* **n. sp.**, habitus: (a) Male (holotype); (b) Female (paratype).

Introduction

The genus *Adelphocoris* Reuter, 1896 (Miridae: Mirinae: Mirini) comprises about fifty species, most (41) of them belonging to the Palaearctic fauna (Kerzhner and Josifov, 1999; Aukema *et al.*, 2013). It is particularly speciose in the eastern Palaearctic region, as for example in China (see: Zheng *et al.*, 2004) and Japan (see: Yasunaga, 1990a, 1990b, 1996). The diagnosis of the genus provided by Wagner (1974) has subsequently been improved or complemented several times, notably by Yasunaga (1990a), Rosenzweig (2001) and Chérot and Malipatil (2016). The latter authors have included *Adelphocoris* in the previous «*Creontiades* complex» of genera, among other relevant changes. In fact, their work is a thorough review of the «*Adelphocoris–Creontiades–Megacoelum* complex» which has since become composed of 20 genera of usually elongate and big Mirini.

Concerning the identification keys, those by Štys (1963), Wagner and Weber (1964) and Wagner (1974) are useful for the European or the Mediterranean fauna. Out of the western Palaearctic region, the high species diversity of *Adelphocoris* of China is keyed by Zheng *et al.* (2004) and that of Japan by Yasunaga (1990b).

Among the material of Heteroptera sent by Francisco Rodríguez Luque from Almería province, Spain (southeastern Iberian Peninsula), a number of specimens of presumed *Adelphocoris vandalicus* (Rossi, 1790) attracted my attention. They could not be ascribed to that species due to a number of differences in external morphology. A comparative examination of those characters and of the genitalia has revealed a new species which is described below.

Measurements are based on 10 males and 10 females of the type series and are given in millimetres (mm). For most morphometric characters, after the average value, the whole range is given in parentheses. Measurements are indicated separately for males and for females only for those characters showing sexual dimorphism.

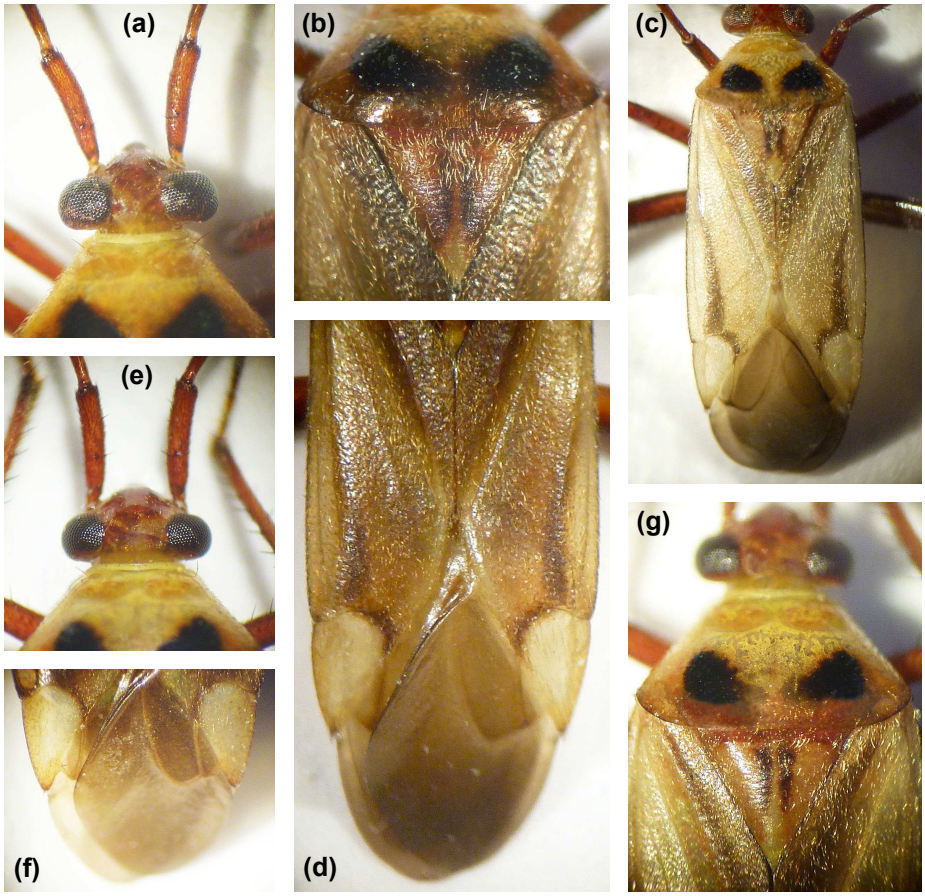

FIGURE 2. *Adelphocoris falukei* **n. sp.**, external morphology in several specimens: (a)-(d) Males; (e)-(g) Females; (a), (e) Head; (b) Scutellum; (c)-(d) Hemelytra; (f) Cuneus and membrane; (g) Pronotum and scutellum.

Description

Adelphocoris falukei n. sp.

General habitus:

Macropterous males and females (Fig. 1). Total length: ♂♂ = 6.63 (6.30–7.26); ♀♀ = 6.15 (5.66–6.44). Body oblong to oval, 3.31 (3.15–3.57) × (♂♂) and 3.09 (2.98–3.24) × (♀♀) longer than basal (posterior) width of pronotum and 2.78 (2.65–2.93) × (♂♂) and 2.57 (2.48–2.65) × (♀♀) longer than maximum width. Maximum width: ♂♂ = 2.39 (2.28–2.50), at the level of claval apex; ♀♀ = 2.39 (2.25–2.55), slightly anteriorly (♀♀). Pronotal width: ♂♂ = 2.00 (1.88–2.05); ♀♀ = 1.99 (1.85–2.10). Tegument shiny. General colour noticeably similar in all specimens: dorsally orangish ochraceous with a pattern of dark areas as in Figs. 1, 2, 6, and head, antennae and legs dark red. Living insects, and particularly teneral individuals, may be tinged with greenish dorsally (see, for example, Fig. 6b). Pubescence consisting of reclining, pale setae.

Head:

Red to dark red, with frons and/or tylus darker in some specimens. Head width (diatone): ♂♂ = 1.28 (1.25–1.33); ♀♀ = 1.19 (1.13–1.23). Approximately 1.3–1.4 × (♂♂) (Fig. 10a) and 1.2–1.3 × (♀♀) wider

than high in front view and 1.5–1.7 × higher than long in lateral view (Fig. 10c). Basal carina indistinct or absent. Sulcus of vertex almost imperceptible in some specimens. Frons evenly convex and bearing stiff setae, particularly a conspicuous cluster near eye. Tylus slightly protruding. Eyes dark red, very large, globose and protruding, wider than long in superior view (Figs. 2a, e) and conspicuously longer than anterior part of head in lateral view (Fig. 10c), bearing minute interfacetal setae. Minimum interocular distance (synthlipsis): ♂♂ = 0.38 (0.35–0.40); ♀♀ = 0.49 (0.48–0.50). Ocular index: ♂♂ = 0.83 (0.78–0.86); ♀♀ = 1.39 (1.31–1.46). Antennae slightly shorter than body length, uniformly red or dark red, without pale rings or, at most, segment III with a very short basal ring; some specimens with base and apex of segment I darkened. Length of antennal segments I–II–III–IV = 0.88 (0.82–0.92) – 2.27 (2.05–2.42) – 1.75 (1.55–1.87) – 1.01 (0.82–1.15). Segment I clavate to slightly fusiform, provided with three longer, erect setae inward, arising from small but distinct black spots. Segment II slightly clavate (about 1.25 × wider apically than basally) and wider than the length of pronotal collar (approximate proportions: pronotal collar / ant. II base / ant. II apex = 3 / 4 / 5). Segments III and IV almost cylindrical; apex of segment IV fusiform. Ratio antennal segment I / diatone: ♂♂ = 0.70 (0.67–0.73); ♀♀ = 0.74 (0.70–0.76). Ratio antennal segment II / pronotum width = 1.14 (1.08–1.23). Ratio antennal segments II / III+IV = 0.82 (0.77–0.87). Mandibular and maxillary plates sometimes paler than tylus, bucculae always distinctly pale (Fig. 10c). Rostrum red or dark red, with the fourth segment darkened and a pair of lateral dark stripes on the basal half of first segment; reaching or slightly surpassing mesocoxae.

Thorax:

Pronotum orangish with two large black spots on its posterior half, triangular or trapeziform, rarely fusing together and forming a broad band, which does not reach lateral or posterior margins of pronotum. Collar and anterior half of pronotum paler, sometimes greenish, being the palest dorsal region of the insect together with cuneus. Calli orange, well defined. Collar bearing stiff, pale to brown setae. Each anterolateral angle with a dark, long, erect seta. Dorsally, scattered pale pubescence; laterally, more abundant pale to brown setae. Lateral margins not carinate. Margin of posterolateral angles finely bordered in black. Punctuation shallow, less dense than on hemelytra. Laterally, pronotum orangish pale; meso- and metapleura generally pale tinged with reddish; metathoracic scent glands pale; coxae pale. Scutellum very weakly swollen; orangish ochraceous tinged with red laterally and with two longitudinal dark stripes in the middle, sometimes almost fusing together, and ending anteriad of apex, which is paler; pubescence similar to that on hemelytra. Mesoscutum darker, orange or reddish.

Hemelytra:

Orangish ochraceous with a dark pattern involving clavus and a posterior region of the endocoria, and more conspicuously a brown longitudinal stripe along posterior half of radial vein, which is broadened backwards forming in most specimens a semilunar fringe anteriorly to cuneal fracture (Figs. 2c-d). Cuneus conspicuously pale, of cream colour and very slightly darkened (red) apically (Fig. 2f). Endocoria slightly nacreous in some specimens, particularly females. Margin of hemelytra finely bordered in black along all its length (Fig. 6e). Hemelytra surpassing apex of abdomen and densely covered by reclining, pale setae, giving the appearence of a golden pubescence. Punctuation dense, shallow. Posterior third more declivent in females. Membrane grey, gradually darkened posteriad; veins orangish ochraceous in living individuals (Fig. 6) and more or less concolor or dull ochraceous in dry specimens (Figs. 1-2). Posterior apex of major cell not acute but roundish.

Legs:

Elongate. Dark red, except coxae and trochanters, which are pale. Femora very dark, particularly the apical half of metafemora, with several rows of black maculae, more conspicuous and/or abundant ventrally and on metafemora (up to four rows), with maculae more evenly arranged basally than apically; sometimes, rows of maculae visible dorsally on mesofemora. Tibiae red, apically darkened, densely covered with short, black hairs and bearing prominent black spines, slightly but clearly longer than tibial width (approximate proportion of 6/5). Tarsi of the same colour as tibiae, except the third tarsomeres, gradually darkened from the base and with the apical half always completely black. Length of metatarsomeres (approximate proportions): I–II–III = 10–15–17. Claws (Fig. 7c) noticeably long and evenly curved, not showing any abrupt change of curvature along its length; pulvillus narrow.

Abdomen:

Pale, mostly greenish in living individuals (Fig. 6e), colour subdued in dry specimens. Genital, and particularly pregenital, segments with a long, pale pubescence laterally and ventrally.

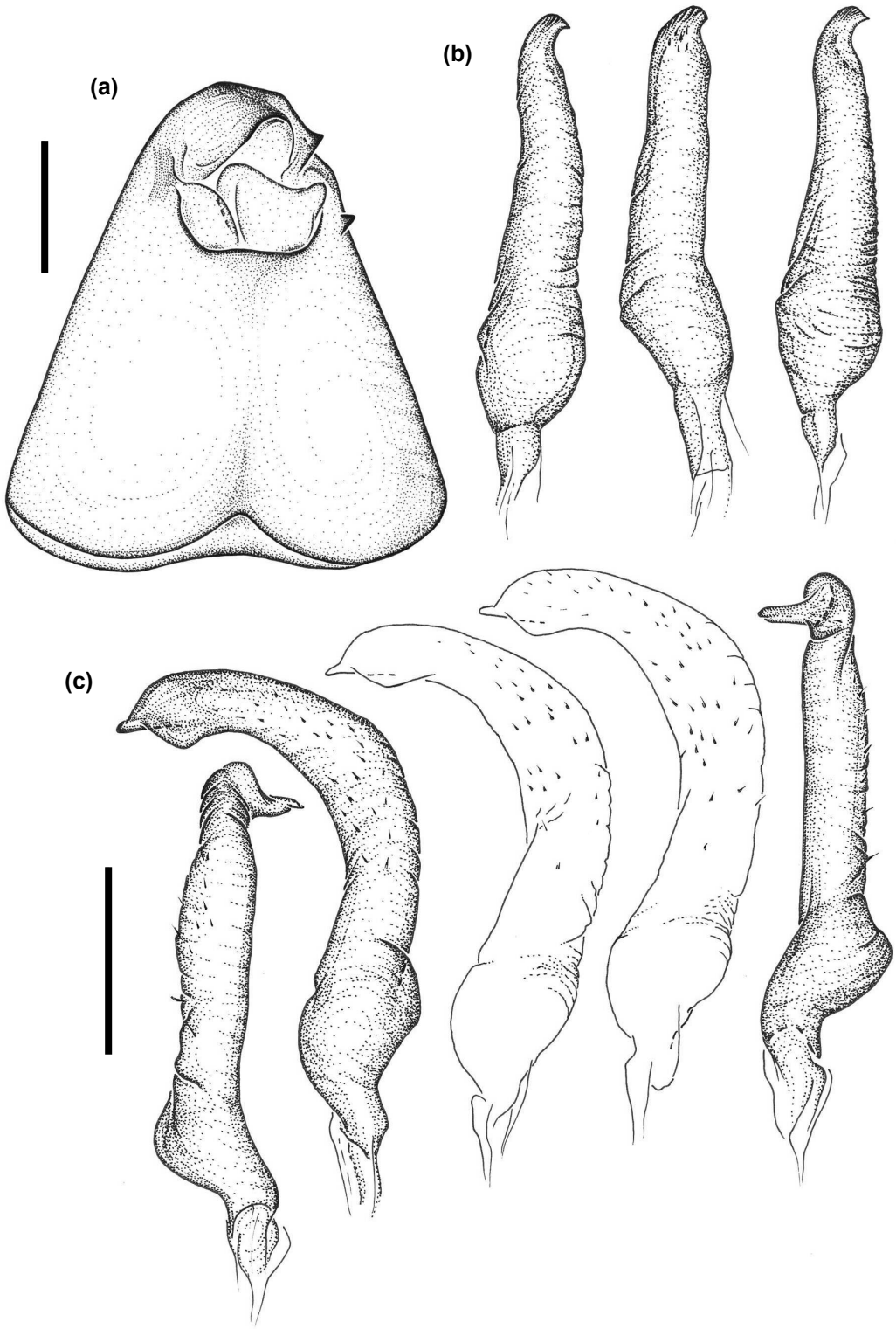

Figure 3. *Adelphocoris falukei* **n. sp.**, pygophore and male genitalia: (a) Pygophore (after removal of parameres, setae omitted); (b) Right paramere in different views and/or specimens; (c) Left paramere in different views and/or specimens (Scale bars: (a) = 0.5 mm; (b)-(c) = 0.2 mm).

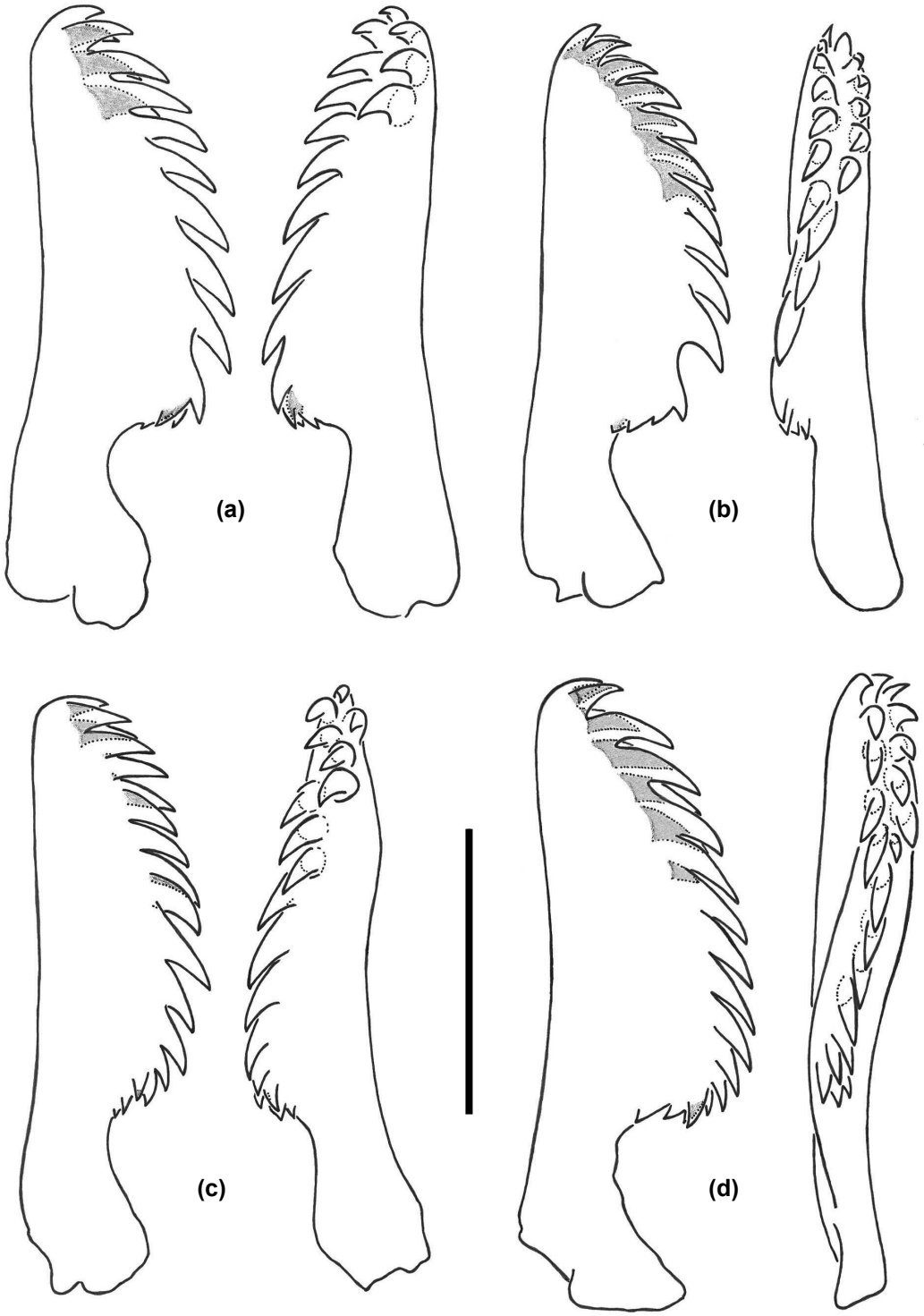

FIGURE 4. *Adelphocoris falukei* **n. sp.**, male genitalia: (a)-(d) Phallic comb of the vesica in four specimens and two views for each (left and right drawings). The left drawings represent the same, lateral view; the right drawings are not necessarily comparable views between specimens (Scale bar = 0.2 mm).

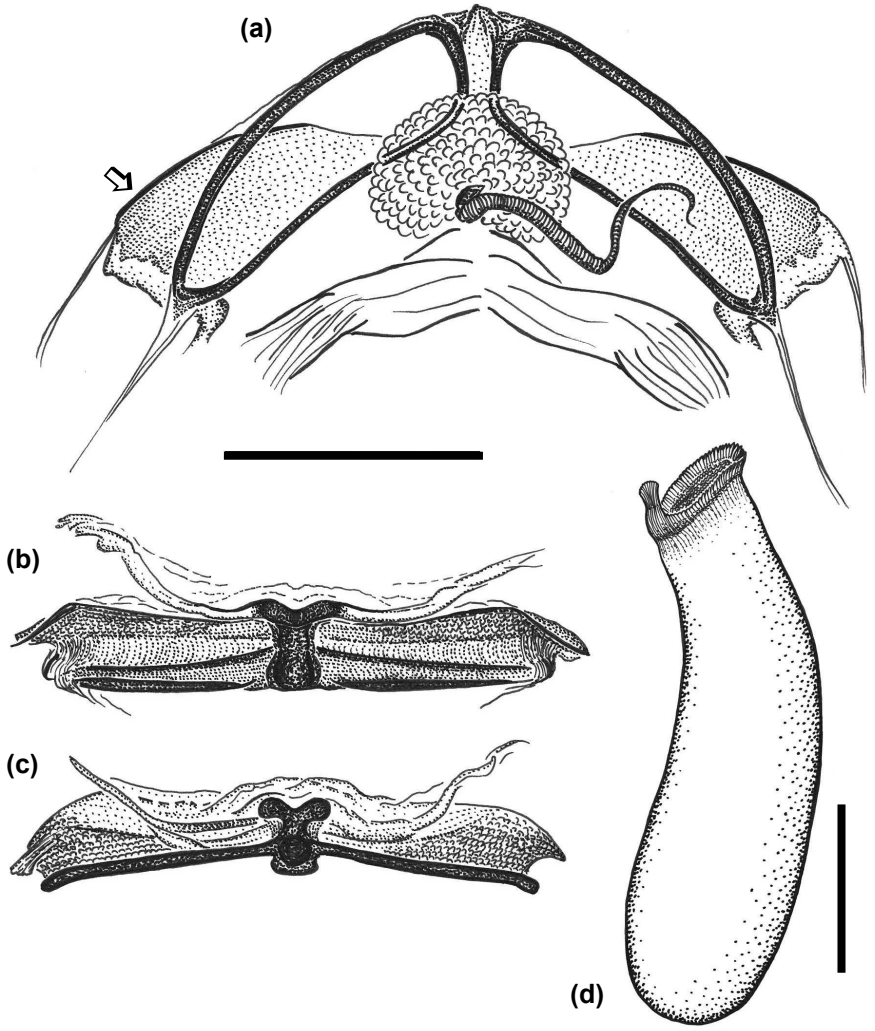

Figure 5. *Adelphocoris falukei* **n. sp.**, female genitalia: (a) Dorsal wall of the genital chamber; (b)-(c) Posterior wall of the genital chamber: (b) Ventral view; (c) Dorsal view; (d) An ovarian egg (Scale bars = 0.4 mm).

Male genitalia:

Pygophore (Fig. 3a) conical, slightly longer than wide, with two small but well-defined processes on the left side of genital orifice: one anterior to paramere, the other posterior to it.

Parameres almost glabrous, with only minute setae, more abundant on left paramere; ridges and margins variable, probably depending on the sclerotization degree. Right paramere as in Fig. 3b, with a claw-like apophysis. Left paramere as in Fig. 3c, with two rounded accesory lobes on the apophysis, giving a goosehead-like appearance; basally, with a sensory lobe usually marked. Vesica typical of the genus, bearing a true spiculum spirally twisted and a phallic comb, with the secondary gonopore reduced and showing a thin rim. Phallic comb as in Fig. 4, with two lateral rows of teeth: a «complete» row, usually consisting of 9-10 large teeth and about 4 smaller, basally located, and sometimes forming a separated cluster of teeth; and an «uncomplete» row consisting

of 3-6 teeth arranged closely to the former row or even overlapping with it.

Female genitalia:

Genital chamber typical of the genus (see: Slater, 1950; Rosenzweig, 2001). Dorsal wall (Fig. 5a) with large, elongate sclerotized rings not meeting medially; anterior region usually slightly bended dorsad so that the sclerotized rings seem more elongate and narrow. Dorsal sac rounded, nearly hemispherical. Posterior wall (Figs. 5b-c) with dorsal process, median process and interramal lobes well developed. Vulvar area with a pair of conspicuous sclerites between the gonapophyses 8. An ovarian egg is illustrated in Fig. 5d.

Type material:

Holotype: ♂, labelled «ALMERÍA: / El Ejido: Punta Entinas / 30SWF26 1 m / Arenales de playa / 4-07-2017 / F. Rodríguez Luque *leg.*». A red label is now added below: «HOLOTYPE ♂ / *Adelphocoris* / *falukei* **n. sp.** / Pagola-Carte, 2017». The specimen is mounted on a white card. Deposited in the Museo Nacional de Ciencias Naturales (MNCN, Madrid).

Paratypes: 22 ♂♂ + 45 ♀♀:

15 ♂♂ + 30 ♀♀, same data as the holotype.

1 ♂ + 4 ♀♀, same data as the holotype except for the date: 17-06-2016.

2 ♂♂ + 2 ♀♀, same data as the holotype except for the date: 10-06-2017.

4 ♂♂ + 9 ♀♀, labelled «ALMERÍA: / Balerma / 30SWF16 1 m / Arenales de playa / 17-06-2017 / F. Rodríguez Luque *leg.*».

A red label is now added below: «PARATYPE ♂ [or ♀] / *Adelphocoris* / *falukei* **n. sp.** / Pagola-Carte, 2017». The specimens are mounted on a white card, some of them with the genitalic segments, the genitalic structures and/or the third metatarsomere of the left leg glued separately on the same card. Deposited in: Museo Nacional de Ciencias Naturales (MNCN, Madrid) (1 ♂ + 1 ♀), Muséum National d'Histoire Naturelle (MNHN, Paris) (1 ♂ + 1 ♀), Zoologisches Museum Universität Hamburg (ZMUH, Hamburg) (1 ♂ + 1 ♀), the collections of Frédéric Chérot (Sombreffe) (1 ♂ + 1 ♀), Hannes Günther (Ingelheim) (1 ♂ + 1 ♀), Armand Matocq (Paris) (1 ♂ + 1 ♀), Christian Rieger (Nürtingen) (1 ♂ + 1 ♀) and Jean-Claude Streito (Montpellier) (1 ♂ + 1 ♀) and the author's collection (rest of paratypes).

Etymology:

I am glad to dedicate the name of the new species to my friend «Faluke», nickname of Francisco Rodríguez Luque (Roquetas de Mar, Almería). He is not only the collector of the type series, but also, and above all, a great naturalist who is discovering and documenting the amazing fauna and flora of Almería, Spain.

Type locality:

Punta Entinas, belonging to the municipality of El Ejido, in the province of Almería, in the Autonomous Community of Andalusia, in Spain.

Distribution and biology:

For the moment, only known from two localities of the province of Almería: Punta Entinas (El Ejido) and Balerma, in the most arid region of the southeastern Iberian Peninsula.

According to the collector, the species has always been observed on the herbaceous vegetation of sandy beaches (Mediterranean Sea), on plants of the speciose genus *Limonium* (Plumbaginaceae) (Fig. 6). All the specimens were collected specifically on *L. cossonianum* Kuntze and/or *L. angustebracteatum* Erben, growing syntopically. One or both of them might be the host plant(s) of *Adelphocoris falukei* **n. sp.** They belong to the coastal halophilous plant communities and their distribution is restricted to the southeastern Iberian Peninsula (the former species also reaching the Balearic Islands), being considered rare (the former) or very rare (the latter) (Blanca *et al.*, 2011).

This finding remembers that of *Phytocoris* (*Leptophytocoris*) *limonii* Günther, 1992 on *L. insigne* (Coss.) Kuntze, which is another *Limonium* endemic to the arid southeastern Iberian Peninsula. All three *Limonium* species mentioned share the reddish (pink or purple) colour or tinge of the stems. Moreover, flowers are also pink to purple in the case of *L. insigne* and *L. angustebracteatum* whereas *L. cossonianum* has white flowers. The particular colouration of both Mirini is cryptic on the stems, and even on the flowers, of their (presumed) host plants. Hence, it could be hypothesized that *L. angustebracteatum* (rather than *L. cossonianum*) is the true or preferred host plant of *A. falukei* **n. sp.**

FIGURE 6. *Adelphocoris falukei* **n. sp.** on its host plants of the genus *Limonium*: (a) Male; (b)-(e) Females; (b)-(c) Teneral individuals, showing a more greenish or yellowish colouration (Photos: Francisco Rodríguez Luque).

Discussion

The new species undoubtedly belongs to the genus *Adelphocoris* Reuter, 1896, as defined by Yasunaga (1990a), Rosenzweig (2001) and Chérot and Malipatil (2016).

Two obstacles make difficult the separation of *Adelphocoris falukei* **n. sp.** from other members of *Adelphocoris*. On the one hand, the high diversity of the genus (see Introduction) which is, however, rather well encompassed by a few comprehensive works provided with identification keys (see further below). On the other hand, the high intraspecific variability of the phallic comb, *i.e.* the genital structure mainly used for species separation. This fact is clearly shown by Figs. 4a-d of the new species, but it must be stressed that a similar situation has been found in some other taxa, as will be illustrated for some of them (see Figs. 9a-c, 11a-b). As a result, unconcordant illustrations for a single species can be detected in the literature(1). This problem is avoided by most identification keys, which are solely based on characters of external morphology. As a matter of fact, such characters are greatly useful in the genus *Adelphocoris*. In my opinion, the phallic comb may be useful for diagnosing species of this genus in some cases, but much care should be taken if a long series of specimens is not available or when examining teneral individuals. During the present study, relevant differences in the arrangement of the teeth have been observed between specimens of the same species and population, and even in the same specimen after slight rotations of the phallic comb. In agreement with Zheng *et al.* (2004)(2), several specimens and diverse views of the comb besides the typical, lateral one have been examined and illustrated herein.

Fortunately, *A. falukei* **n. sp.** is a species with a remarkably interindividual uniformity concerning external morphology, in contrast to the mentioned variability of its phallic comb. Fortunately, too, a long series of specimens (see Type material) has been available to me.

For the separation of the new species I have focused on western Palaearctic fauna. Nevertheless, eastern Palaearctic species have also been compared, mainly by using the keys and descriptions provided by Yasunaga (1990a, 1990b, 1996) for Japan and Zheng *et al.* (2004) for China. A brief review of these comparisons is made previously to the analysis of the taxa with a close distribution.

In contrast to *A. falukei* **n. sp.**, most of the species occurring in Japan have both pale («silvery») and dark setae on hemelytra (Yasunaga, 1990b). *A. suturalis* (Jakovlev, 1882) and *A. variabilis* (Uhler, 1896) are the only ones with solely pale pubescence. Of them, *A. variabilis* is a rather bigger species, differently coloured (Yasunaga *et al.*, 1993: fig. 73; Yasunaga *et al.*, 2001: fig. 199) and showing differences in the male genitalia (Yasunaga, 1990a). *A. suturalis* shows a higher similarity to *A. falukei* **n. sp.** in body size, ocular index or tendence to reddish colours, but other body proportions and the pattern of dark areas are markedly different (Linnavuori, 1963; Wagner and Weber, 1978; Yasunaga, 1990a; Yasunaga *et al.*, 1993: fig. 72; Zheng *et al.*, 2004: plate 2, fig. 5).

According to the keys by Zheng *et al.* (2004), the new species could not be ascribed to any of the species occurring in China. In the group of species with a pair of lateral, longitudinal dark stripes on scutellum (character shared with *A. falukei* **n. sp.**), *A. lineolatus* (Goeze, 1778), *A. ponghvariensis* Josifov, 1978 and *A. tibetanus* Zheng & X.Z. Li, 1990 are different, however, in body colour, size, proportions, etc. If the scutellum stripes were ignored, the single candidate would be *A. suturalis*, previously mentioned for Japan.

Only two non-western Palaearctic members of *Adelphocoris* are not dealt with in the abovementioned papers: *A. corallinus* Kerzhner, 1988, a Russian taxon very different from the new species (see: Kerzhner, 1988), and *A. yunnanensis* Zheng & X.Z. Li, 1990, a Chinese species probably synonym of *A. luridus* (suspected by Zheng *et al.*, 2004).

On the other hand, among the members of *Adelphocoris* accepted for certain by Chérot and Malipatil (2016), *A. rapidus* (Say, 1832) is the only one with a non-Eurasian distribution. It is a widespread American species with a very distinguishing colour, besides other differences (see, for example: Kelton, 1980; and abundant photos on internet).

Western Palaearctic members of *Adelphocoris* may be intuitively divided into «green», «red» and «dark» species. Although not in this oversimplified way, the available identification keys are largely based on colouration of different body parts (scutellum, cuneus, antennae, etc.), in addition to the presence and shape

(1) See, for example: *A. reichelii*: Wagner, 1974: fig. 208m *versus* Yasunaga, 1990a: fig. 2K; *A. quadripunctatus*: Wagner, 1974: fig. 210d *versus* Yasunaga, 1990a: fig. 3H.

(2) Following the same examples, see: *A. reichelii*: Zheng *et al.*, 2004: fig. 15; *A. quadripunctatus*: Zheng *et al.*, 2004: fig. 14.

		***A. falukei* n. sp.**	***A. ticinensis***	***A. vandalicus***	***A. lineolatus***
Length (mm)	♂♂	6.63 (6.30–7.26)	6.98 (6.64–7.45)	7.32 (7.20–7.50)	8.14 (7.43–8.80)
	♀♀	6.15 (5.66–6.44)	6.94 (6.78–7.10)	7.48 (7.30–7.60)	7.52 (6.85–8.58)
Length / Max. width	♂♂	2.78 (2.65–2.93)	2.69 (2.59–2.79)	2.85 (2.70–2.96)	2.87 (2.69–3.12)
	♀♀	2.57 (2.48–2.65)	2.48 (2.45–2.51)	2.60 (2.54–2.68)	2.68 (2.59–2.78)
Length / Pron. width	♂♂	3.31 (3.15–3.57)	3.21 (3.16–3.37)	3.36 (3.11–3.51)	3.49 (3.31–3.91)
	♀♀	3.09 (2.98–3.24)	3.11 (3.07–3.16)	3.08 (3.00–3.19)	3.34 (3.13–3.42)
Length / Antennae	♂♂	1.11 (1.04–1.19)	1.18 (1.13–1.23)	1.21 (1.15–1.26)	1.13 (0.93–1.23)
	♀♀	1.04 (0.99–1.09)	1.13 (1.09–1.17)	1.12 (1.07–1.15)	1.03 (0.98–1.18)
Ocular index	♂♂	0.83 (0.78–0.86)	1.28 (1.23–1.33)	1.05 (0.97–1.21)	0.85 (0.73–0.90)
	♀♀	1.39 (1.31–1.46)	1.69 (1.62–1.76)	1.51 (1.47–1.59)	1.51 (1.37–1.59)
Ant. I / Head width	♂♂	0.70 (0.67–0.73)	0.62 (0.58–0.65)	0.66 (0.63–0.71)	0.76 (0.69–0.81)
	♀♀	0.74 (0.70–0.76)	0.68 (0.67–0.69)	0.70 (0.65–0.75)	0.79 (0.73–0.85)
Ant. II / Pron. width	♂♂	1.14 (1.08–1.23)	1.02 (1.00–1.04)	1.10 (1.06–1.12)	1.22 (1.12–1.38)
	♀♀	1.13 (1.08–1.21)	1.05 (1.03–1.07)	1.07 (1.03–1.13)	1.25 (1.14–1.33)
Ant. II / Ant. III+IV	♂♂	0.82 (0.77–0.87)	0.75 (0.70–0.77)	0.85 (0.81–0.89)	0.84 (0.79–0.90)
	♀♀	0.82 (0.77–0.86)	0.78 (0.78–0.79)	0.81 (0.80–0.85)	0.80 (0.76–0.88)

Table 1. Summary of selected morphometric characters for the separation of *Adelphocoris falukei* **n. sp.** from *A. ticinensis*, *A. vandalicus* and *A. lineolatus*. After the average value (n = 10; n = 5; n = 5; n = 5), the whole range is given in parentheses. Outstanding differences with respect to the new species are indicated in red, less relevant ones in blue.

of pronotal spots, other dark patterns and a few morphometric characters (Štys, 1963; Wagner and Weber, 1964; Wagner, 1974).

A. quadripunctatus (Fabricius, 1794) and *A. hercynicus* Wagner, 1938 are the only species bearing both dark and pale setae on the hemelytra. Together with *A. lineolatus* (Goeze, 1778), they form the group of most obvious green species. All three can be considered big mirids (7.5–10.5 mm). *A. quadripunctatus* and *A. lineolatus* have a large Palaearctic distribution and are widespread on the Iberian Peninsula. *A. hercynicus* is a central European taxon closely related to *A. quadripunctatus* and not recognized as a valid species until Stehlík (1970).

A. reichelii (Fieber, 1836) and *A. seticornis* (Fabricius, 1775) are easily separated from all other European *Adelphocoris* by their black or brownish black scutellum. I consider them as the group of dark species. Both species have a large Eurasian distribution. In the Iberian Peninsula *A. seticornis* is common whereas *A. reichelii* has only been, to my knowledge, recorded by Wagner (1974).

A. falukei **n. sp.** belongs to the group of red species (or reddish, or with reddish tinge or even yellowish ochraceous). Among this group, *A. ticinensis* (Meyer-Dür, 1843) and *A. vandalicus* (Rossi, 1790) are the most widespread species in Europe and well known on the Iberian Peninsula. In spite of its general colour, the new species is noticeably different from them concerning proportions, pattern of dark areas and male genitalia while it is more similar to the above-mentioned, green *A. lineolatus*. Numerous specimens of all four species have been examined and their genitalia dissected. The comparisons established between them are discussed in the following paragraphs (including Table 1 and several figures). As to the remaining species in this group, not occurring on the Iberian Peninsula, they can be easily distinguished as follows

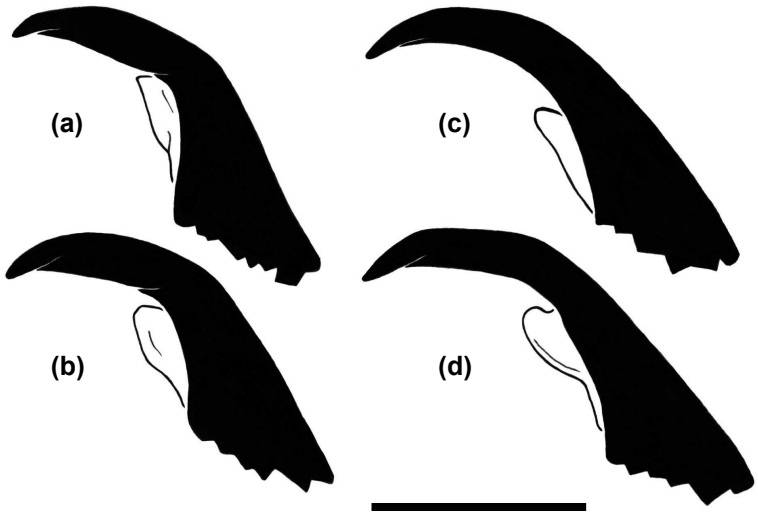

FIGURE 7. Claws of left posterior leg of *Adelphocoris* spp.: (a) *A. ticinensis*; (b) *A. vandalicus*; (c) *A. falukei* **n. sp.**; (d) *A. lineolatus* (Scale bar = 0.1 mm).

(Štys, 1963; Wagner, 1974): *A. detritus* (Fieber, 1861), from central-eastern Europe and mountain habitats (A. Matocq, pers. comm.) has a *vandalicus*-appearance, with the base of antennal segments II to IV pale and scutellum without longitudinal stripes, immaculate pronotum, and ocular index a little greater than in *A. falukei* **n. sp.**; *A. minor* Wagner, 1969, from the mountains of Morocco, has a *vandalicus*-appearance, with the base of antennal segments II to IV pale, segment II conspicuously clavate (apex 1.5 × wider than base), scutellum without longitudinal stripes, pronotum with a single broad, subbasal dark band, and phallic comb provided with only 6-7 teeth; *A. insignis* Horváth, 1898, from eastern Europe and Turkey, is a larger species (7.8–9.5 mm) with the base of antennal segments II to IV pale, segment II conspicuously clavate (apex 1.5 × wider than base), scutellum without longitudinal stripes, and immaculate pronotum; *A. josifovi* Wagner, 1968, from eastern Europe, has a *vandalicus*-appearance, with the base of antennal segments II to IV pale, segment II conspicuously clavate (apex 1.5 × wider than base), scutellum without longitudinal stripes, pronotum with basal margin pale and subbasal dark band progressively faded forward, and ocular index greater than in *A. falukei* **n. sp.**; finally, *A. bimaculicollis* Lindberg, 1948, from Middle East, is not actually reddish («hellgelbbraun» according to Lindberg, 1948, «grünlichgrau oder -gelblich» according to Wagner, 1974), has no longitudinal stripes on the scutellum, pronotum with a pair of small dark spots, ocular index a little greater than in *A. falukei* **n. sp.**, and phallic comb provided with only 6-7 teeth.

In comparison with *A. ticinensis* and *A. vandalicus*, *A. falukei* **n. sp.** is slightly smaller (see Table 1) and shows a different colour pattern (Figs. 1-2, 6). In fact, it is the smallest Iberian member of the genus, and the darkest among the group of red species. The pair of large black spots on pronotum, which are present in all the specimens examined, is highly characteristic of the new species, in contrast to the subbasal dark band of *A. vandalicus* and the paler pronotum (immaculate or with a pair of smaller spots) of *A. ticinensis*. The legs and antennae are notably darker in *A. falukei* **n. sp.** and the antennal segments II to IV are not bicolor as in *A. vandalicus*. The eyes are conspicuously large and protruding, so that the ocular index is lower than in both *A. ticinensis* and *A. vandalicus*, particularly lower than in the former.

The size and proportions of antennal segments are also distinguishing. In *A. ticinensis* the segments I and II are shorter than in the new species with respect to head width and pronotum width, respectively. In this species, the three longer, erect setae on segment I do not arise from perceptible black spots. In *A. van-*

dalicus the segment II is conspicuously clavate with apex 1.5 × wider than base (only 1.25 × wider in the new species). Concerning the total length of antennae, they are imperceptibly shorter than body length in *A. falukei* **n. sp.**, whereas they are usually more markedly shorter in the other two species.

The structure of claws has revealed as a good character to distinguish species or groups of species within *Adelphocoris*. Those of *A. falukei* **n. sp.** are noticeably long, slender and evenly curved (Fig. 7c), in contrast to those of *A. ticinensis* (Fig. 7a) and *A. vandalicus* (Fig. 7b), which show an abrupt change of curvature along its length. Tibiae also show some differences: their colour is pale in *A. vandalicus* and their spines are not longer than tibial width in *A. ticinensis*. The margin of the hemelytra and of the posterolateral angles of pronotum is finely bordered in black in the new species, whereas only the hemelytra of *A. vandalicus* are similarly bordered.

Concerning the male genitalia, the phallic comb (or comb-shaped spicule) is considered the most meaningful structure. In the context of Iberian *Adelphocoris*, the comb of *A. ticinensis* (Fig. 8; in agreement with Wagner, 1974: fig. 208s) is quite characteristic, with a cluster of many basal teeth extraordinarily developed. The comb of *A. vandalicus* (Fig. 9a-c) is more similar to that of *A. falukei* **n. sp.** concerning shape, number of teeth, etc. However, it is characterized by the stronger development of a ridge (see arrows in Figs. 9a-c) which is noticeable when the piece is rotated rather than in the typical lateral view. The female genitalia of *A. ticinensis* and *A. vandalicus* have been only shallowly examined. For that reason, and because other characters are sufficiently clear-cut, they are not illustrated here.

In comparison with *A. lineolatus*, *A. falukei* **n. sp.** is distinctly smaller (see Table 1) and totally different in colour. However, other differences concerning structure are more subtle than in the comparison with previous species. First of all, *A. lineolatus* is a more elongate and slender species, with the pronotum proportionally narrower, as reflected by the ratios «total length / pronotum width» and «antennal segment II / pronotum width», which are usually greater. The antennae, although not longer, are also more slender, the segments I and II being slightly less fusiform and less clavate, respectively. The claws are long and slender, as in *A. falukei* **n. sp.**, but they are not so evenly curved, and the pulvillus is differently shaped (Fig. 7d).

The form of the head is very useful to separate both species due to the greater development of the lower part in *A. lineolatus* and the greater lateral globosity of eyes in the new species. The head in frontal view is 1.3–1.4 × (♂♂) (Fig. 10a) and 1.2–1.3 × (♀♀) wider than high in *A. falukei* **n. sp.** while it is 1.2–1.3 × (♂♂) (Fig. 10b) and 1.1–1.2 × (♀♀) wider than high in *A. lineolatus*. Although those values seem to reveal no more than tiny differences and the measurements might be affected by some error due to head convexity, overlapping between both species is negligible. Moreover, in lateral view (Figs. 10c-d), the head of the latter species appears clearly more protruding below the eyes.

Concerning the male genitalia, the parameres are rather homogeneous in all these species. However, the accesory rounded lobes on the apophysis of left paramere seem to be always more swollen in the new species (Fig. 3c) than in other members of the genus (illustrated *A. vandalicus* and *A. lineolatus* in Figs. 9d and 11c, respectively). The phallic comb is rather similar between *A. lineolatus* (Figs. 11a-b) and *A. falukei* **n. sp.**, but it is generally thicker in the former, even coming

Figure 8. *Adelphocoris ticinensis*, male genitalia: Phallic comb of the vesica in two views (Scale bar = 0.2 mm).

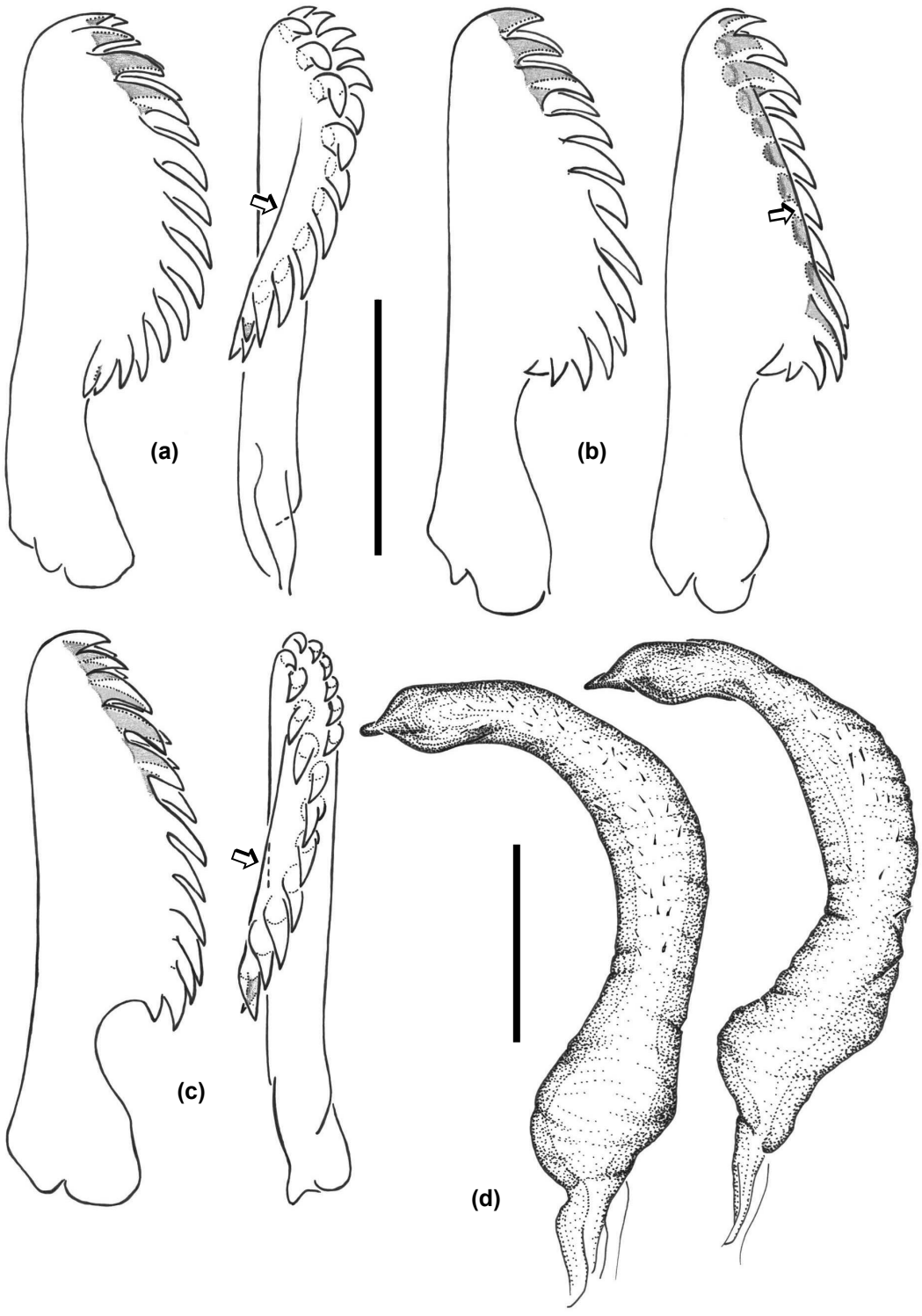

FIGURE 9. *Adelphocoris vandalicus*, male genitalia: (a)-(c) Phallic comb of the vesica in three specimens and two views for each (left and right drawings). The left drawings represent the same, lateral view; the right drawings are not necessarily comparable views between specimens; (d) Left paramere in two different views and specimens (Scale bars = 0.2 mm).

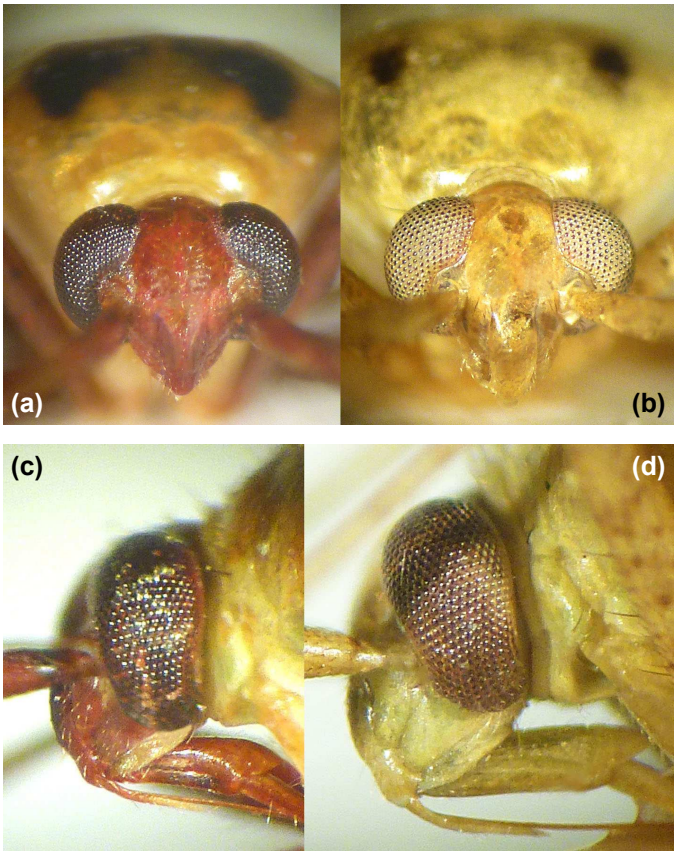

FIGURE 10. Head of males of: (a), (c) *Adelphocoris falukei* **n. sp.**; (b), (d) *Adelphocoris lineolatus*; (a)-(b) Frontal view; (c)-(d) Lateral view.

to bear supernumerary teeth between both rows of teeth (see an example: Fig. 11b), in contrast to the comb of the new species (Fig. 4), which is thinner and consequently shows a tendency towards reducing the distance between both rows of teeth, even to the extreme of their overlap (see examples: Figs. 4c-d).

The female genitalia is very similar between *A. falukei* **n. sp.** and *A. lineolatus*. However, the dorsal wall of the genital chamber is useful to distinguish both species (compare Fig. 5a and Fig. 11d): the sclerotized rings are more elongate and separated in the new species, and some paired structures associated to them are also differently shaped (see arrows in Figs. 5a and 11d). On the contrary, I have not been able to find any noticeable difference in the posterior wall (Figs. 5b-c could be valid for both species).

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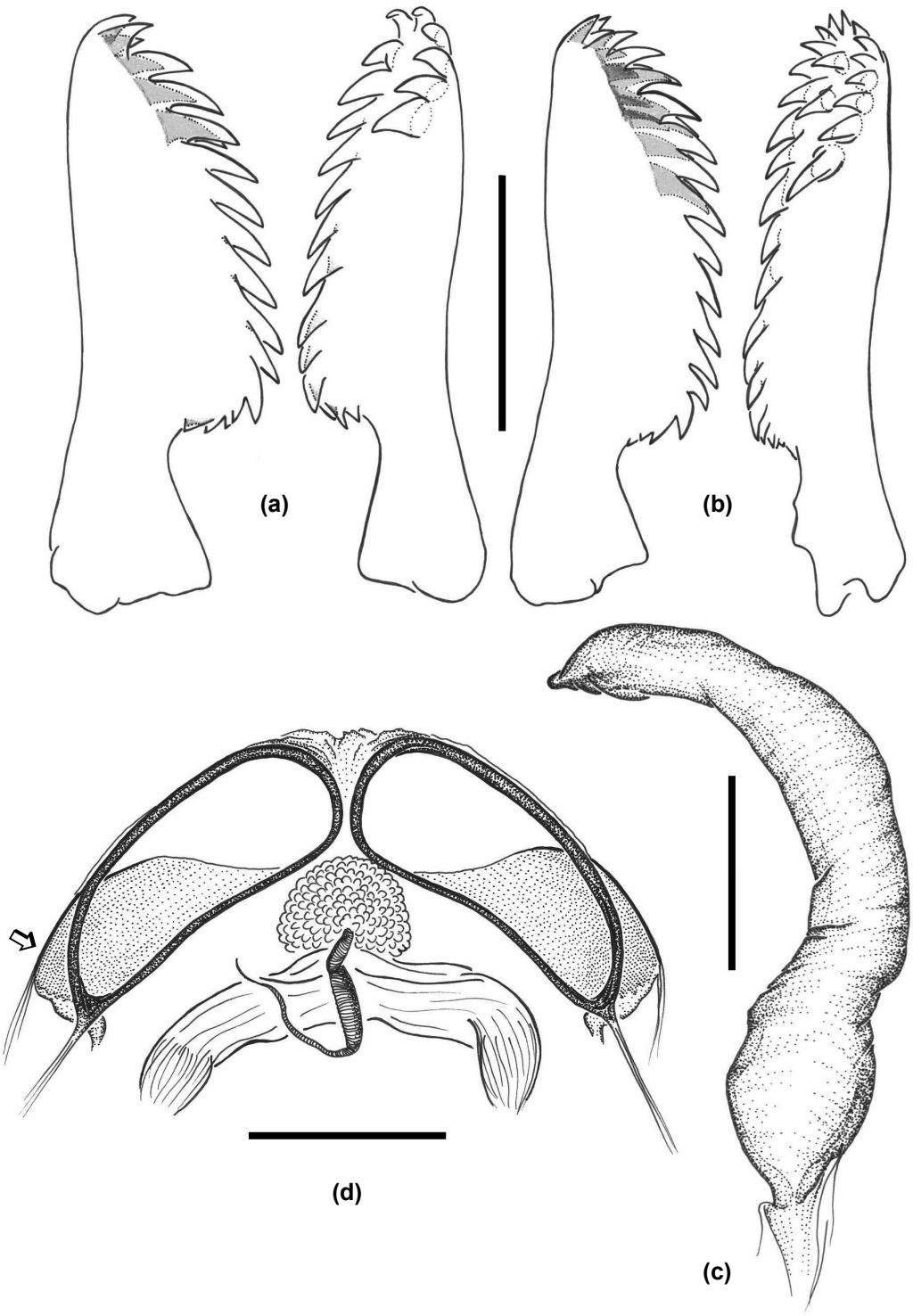

FIGURE 11. *Adelphocoris lineolatus*, male and female genitalia: (a)-(b) Phallic comb of the vesica in two specimens and two views for each (left and right drawings). The left drawings represent the same, lateral view; the right drawings are not necessarily comparable views between specimens; (c) Left paramere; (d) Dorsal wall of the genital chamber (Scale bars: (a)-(c) = 0.2 mm; (d) = 0.4 mm).

References

AUKEMA B, RIEGER CH, RABITSCH W. 2013. *Catalogue of the Heteroptera of the Palaearctic Region, volume 6*. The Netherlands Entomological Society. Amsterdam.

BLANCA G, CABEZUDO B, CUETO M, SALAZAR C, MORALES TORRES C (Eds.). 2011. *Flora vascular de Andalucía Oriental* (*2ª edición*). Universidades de Almería, Granada, Jaén y Málaga. Granada.

CHÉROT F, MALIPATIL MB. 2016. A review of *Adelphocoris-Creontiades-Megacoelum* complex (Hemiptera: Heteroptera: Miridae: Mirini), with descriptions of two new genera and four new species. *Zootaxa* **4126(2)**: 151-206.

GÜNTHER H. 1992. *Phytocoris limonii* n. sp., eine neue Miriden-Art aus Spanien. *Mitteilungen des Internationales Entomologischen Vereins* **17(1)**: 23-28.

KELTON LA. 1980. *The plant bugs of the prairie provinces of Canada. Heteroptera: Miridae*. The insects and arachnids of Canada, part 8. Agriculture Canada Research Branch Publication 1703. Hull, Quebec.

KERZHNER IM. 1988. Family Miridae. In: Lehr PA (Ed.). *Keys to the insects of the Far East of the USSR* **2**: 778-857. Nauka. Leningrad. [translated from Russian, 2001. U.S. Department of Agriculture]

KERZHNER IM, JOSIFOV M. 1999. Miridae Hahn, 1833. In: Aukema B, Rieger Ch (Eds.). *Catalogue of the Heteroptera of the Palaearctic Region, volume 3. Cimicomorpha II*. The Netherlands Entomological Society. Amsterdam.

LINDBERG H. 1948. On the insect fauna of Cyprus. Results of the expedition of 1939 by Harald, Håkan and P.H. Lindberg, I-II. *Commentationes Biologicae* **10(7)**: 1-175.

LINNAVUORI R. 1963. Contributions to the Miridae fauna of the Far East III. *Annales Entomologicae Fennicae* **29(2)**: 73-82.

ROSENZWEIG VYE. 2001. Synopsis of the Palaearctic genera of Mirina (Heteroptera: Miridae). *Zoosystematica Rossica* **9(2)**[2000]: 367-383.

SLATER JA. 1950. An investigation of the female genitalia as taxonomic characters in the Miridae (Hemiptera). *Iowa State College Journal of Science* **25**: 1-81.

STEHLÍK JL. 1970. Contribution to the knowledge of Heteroptera of Moravia and Slovakia. *Acta Musei Moraviae, Scientiae Naturales* **55**: 209-232.

ŠTYS P. 1963. The female of *Adelphocoris insignis* Horváth, 1898 (Heteroptera, Miridae). *Acta Entomologica Musei Nationalis Pragae* **35**: 531-535.

WAGNER E. 1974. Die Miridae Hahn, 1831, des Mittelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera). Teil 1. *Entomologische Abhandlungen herausgegeben vom Staatlichen Museum für Tierkunde in Dresden* **37(Suppl.)**[1970-1971]: 1-484.

WAGNER E, WEBER HH. 1964. Hétéroptères Miridae. *Faune de France* **67**: 1-591.

WAGNER E, WEBER HH. 1978. Die Miridae Hahn, 1831, des Mittelmeerraumes und der Makaronesischen Inseln (Hemiptera, Heteroptera). Nachträge zu den Teilen 1-3. *Entomologische Abhandlungen herausgegeben vom Staatlichen Museum für Tierkunde in Dresden* **42(Suppl.)**: 1-96.

YASUNAGA T. 1990a. A revision of the genus *Adelphocoris* Reuter (Heteroptera, Miridae) from Japan. *Japanese Journal of Entomology* **58(3)**: 606-618.

YASUNAGA T. 1990b. A revision of the genus *Adelphocoris* Reuter (Heteroptera, Miridae) from Japan. Part II. *Japanese Journal of Entomology* **58(4)**: 725-733.

YASUNAGA T. 1996. Two new species of the mirine genus *Adelphocoris* Reuter from Hokkaido, Japan and the Southern Primorskij Kraj, Russia (Heteroptera, Miridae). *Japanese Journal of Entomology* **64(4)**: 713-722.

YASUNAGA T, TAKAI M, YAMASHITA I, KAWAMURA M, KAWASAWA T. 1993. *A field guide to Japanese bugs. Terrestrial heteropterans*. Zenkoku Noson Kyoiku Kyokai, Publishing Co., Ltd. Tokyo, Japan. [in Japanese]

YASUNAGA T, TAKAI M, KAWASAWA T. 2001. *A field guide to Japanese bugs II. Terrestrial heteropterans*. Zenkoku Noson Kyoiku Kyokai, Publishing Co., Ltd. Tokyo, Japan. [in Japanese]

ZHENG LY, LI XZ. 1990. Three new species of genus *Adelphocoris* from China (Insecta, Heteroptera: Miridae). *Reichenbachia* **27(17)**: 97-100.

ZHENG LY, LÜ N, LIU GQ, XU BH. 2004. *Hemiptera. Miridae. Mirinae. Fauna Sinica. Insecta, vol. 33*. Science Press. Beijing. [in Chinese; English summary, keys and descriptions]

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