

A Taxonomic Review of the Gall Wasp Genus *Saphonecrus* Dalla-Torre and Kieffer and other Oak Cynipid Inquilines (Hymenoptera: Cynipidae) from Mainland China, with Updated Keys to Eastern Palaearctic and Oriental Species

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After the examination of the oak cynipid inquilines deposited in the Parasitic Hymenoptera Collection of the Agriculture and Forestry University of Zhejiang (ZAFU, China), we provide a revision of the species of *Saphonecrus*, *Lithosaphonecrus*, *Ufo* (Hymenoptera: Cynipidae: Synergini) and *Ceroptres* (Hymenoptera: Cynipidae: Ceroptresini) found in mainland China. Two new species of *Saphonecrus* are described: *S. albidus* Lobato-Vila and Pujade-Villar, sp. nov. and *S. segmentatus* Lobato-Vila and Pujade-Villar, sp. nov. Four *Saphonecrus* species (*S. gilvus* Melika and Schwéger, 2015, *S. globosus* Schwéger and Tang, 2015, *S. leleyi* Melika and Schwéger, 2015, and *S. nantoui* Tang, Schwéger and Melika, 2015) are new records for this region. We also provide new data on the biology and distribution, redescriptions, illustrations and corrections to some of the species, as well as updated keys to Eastern Palaearctic and Oriental species of *Saphonecrus* and *Ufo*. Three species of *Saphonecrus* are considered to have an uncertain status: *S. gemmariae* (Ashmead, 1885) *incertae sedis* from the USA, *S. excisus* (Kieffer, 1904) *nomen dubium* from India, and *S. sinicus* Belizin, 1968 *incertae sedis* from China. The validity of *Saphonecrus* in the Nearctic region as well as the current status of *S. serratus* Weld, 1926 from the Philippines and *S. favanus* Weld, 1944 from the USA are discussed.

Key words: Gall wasps, Asia, Taxonomy, Identification key, New species.

BACKGROUND

Gall wasps (Hymenoptera: Cynipidae) constitute

the largest radiation of gall-inducing insects after gall midges (Diptera: Cecidomyiidae). Most of the roughly 1,400 species of gall wasps known worldwide induce

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galls on different host plants; however, about 200 species develop as inquilines inside galls initiated mainly by other members within the Cynipidae family (Liljeblad and Ronquist 1998; Ronquist 1999; Csóka et al. 2005; Péntzes et al. 2009 2012; Bozsó et al. 2015; Ronquist et al. 2015; Schwéger et al. 2015a b; Lobato-Vila and Pujade-Villar 2019; Lobato-Vila et al. 2018 2019 2020a–d). Both gall-inducing wasps and cynipid inquilines are endophytrophagous herbivores whose larvae grow inside galls by feeding on their highly modified nutritive tissues. Unlike gall-inducing wasps, inquilines usually cannot initiate gall formation by themselves, even though larvae can turn the gall vegetable cells surrounding them into nutritive tissues (thus forming their own larval chambers) and even modify the size and the shape of the host gall substantially, enlarging or stunting it (Ronquist 1994 1999; Pujade-Villar et al. 2003 2017; Péntzes et al. 2009 2012; Bozsó et al. 2014; Lobato-Vila and Pujade-Villar 2019; Lobato-Vila et al. 2019 2020a–d).

The former tribe Synergini, which used to include all known cynipid inquilines, was divided into three tribes (Ronquist et al. 2015): Synergini *sensu stricto*, Ceroptresini and Diastrophini. Synergini *s. str.* includes most of the inquiline species and it is divided into seven genera: *Agastoroxenia* Nieves-Aldrey and Medianero; *Lithosaphonecrus* Tang, Melika and Bozsó (= *Lithonecrus* Nieves-Aldrey and Butterill); *Rhoophilus* Mayr; *Saphonecrus* Dalla-Torre and Kieffer; *Synophrus* Hartig; *Synergus* Hartig; and *Ufo* Melika and Pujade-Villar (Schwéger et al. 2015b). Synergini are inquilines (rarely true gall-inducing wasps) associated with cynipid galls within the tribe Cynipini occurring on Fagaceae, principally oaks (*Quercus* L.), with the exception of *Rhoophilus* (South Africa), which is associated with Cecidosidae galls (Lepidoptera) on *Searsia* F.A. Barkley (Anacardiaceae) (van Noort et al. 2007), and a few species from different genera that are associated with Cecidomyiidae galls (see Pujade-Villar et al. 2003; Melika 2006; Wang et al. 2010; Wachi et al. 2011a). *Synergus*, with about 130 described species (Péntzes et al. 2012; Schwéger et al. 2015a; Pujade-Villar et al. 2015b 2016 2017; Lobato-Vila and Pujade-Villar 2017 2018; Lobato-Vila et al. 2017 2018 2019 2020a–d 2021) and *Saphonecrus*, with somewhat fewer than 40 known species (Pujade-Villar et al. 2014 2015a 2017; Schwéger et al. 2015b; Melika et al. 2018; Lobato-Vila et al. 2019; Yang et al. 2020), are the most speciose genera of inquilines to date. However, *Saphonecrus* has been considered a non-monophyletic group by various authors (Pujade-Villar and Nieves-Aldrey 1990; Melika 2006; Péntzes et al. 2009 2012; Ács et al. 2010; Bozsó et al. 2014 2015) and its morphological differences in relation to *Synergus* are

still unclear and have been widely discussed (Nieves-Aldrey and Medianero 2011; Schwéger et al. 2015a b; Lobato-Vila and Pujade-Villar 2017; Lobato-Vila et al. 2020c). On the other hand, tribe Ceroptresini is currently divided into two genera (*Buffingtonella* Lobato-Vila and Pujade-Villar and *Ceroptres* Hartig) and includes inquilines that are associated mainly with Cynipini galls on *Quercus*, rarely with Cecidomyiidae galls (Lobato-Vila and Pujade-Villar 2019). Lastly, tribe Diastrophini includes both gall-makers and inquilines associated with Rosaceae.

Gall-makers and inquilines are distributed mainly throughout the Northern Hemisphere and are well represented in temperate areas of the Nearctic and Palaearctic. In this paper, we focus on the Eastern Palaearctic and the Oriental regions. The Eastern Palaearctic, as mentioned in Péntzes et al. (2018), includes Asia bounded by Afghanistan and the Ural Mountains to the west and the Himalayas in the south, and extends through central China into Far Eastern Russia and Japan (except for the Ryūkyū Islands, in the Oriental region). Iran lies at the eastern limit of the Western Palaearctic, but its cynipid fauna includes widespread Western Palaearctic species (Sadeghi et al. 2006; Tavakoli et al. 2008). On the other hand, Taiwan is at a limit between the Eastern Palaearctic (Taiwan mountains) and the Oriental region (Taiwan lowlands); the same is true in mainland China (northern and mid provinces are within the Eastern Palaearctic, whereas southern provinces are within the Oriental region), so several species are shared between these biogeographical regions. The Oriental region includes South and South-East Asia (both mainland regions and their surrounding islands, like the Philippines and the Indonesian archipelagos) bounded by the Hindu Kush mountain range situated between south-east Afghanistan and Pakistan, the Himalayas in the north and the Moluccas in Indonesia in the south-east, where it borders the Australasian region (*e.g.*, Darlington 1966; Cox and Moore 1993; Krefl and Jetz 2010).

Five genera of oak cynipid inquilines are known from the Eastern Palaearctic and the Oriental region: *Saphonecrus*, *Lithosaphonecrus*, *Ufo*, *Synergus* (Synergini), and *Ceroptres* (Ceroptresini). Eastern Palaearctic and Oriental species of *Synergus* were addressed separately by Lobato-Vila et al. (2021) since it is a large and speciose genus that needed a separate treatment; thus, they were not included in this revision.

Saphonecrus is the most species-rich genus after *Synergus*. It was originally raised to include some *Synergus*-like species characterized by having the radial cell of the fore wing always open along the wing margin (usually closed in *Synergus*), frons and vertex delicately sculptured and without lateral frontal carinae

(frons usually conspicuously sculptured and with lateral frontal carinae in *Synergus*) and female antennae with 13 segments (usually 14 in *Synergus*). However, these characteristics are sometimes intermixed, and so morphological differences between the two genera are vague. *Saphonecrus* is distributed mainly throughout the whole Palaearctic (with a clear division between Eastern and Western Palaearctic species), as well as in the Oriental region. The validity of two species described from the USA (Nearctic), *S. gemmariae* (Ashmead, 1885) and *S. favanus* Weld, 1944, has been questioned (Pénzes et al. 2012; Schwéger et al. 2015b). Previously, two other species described from the USA, *S. brevicornis* (Ashmead, 1896) and *S. brevis* Weld, 1926, were transferred to *Synergus* (Lobato-Vila et al. 2019; Schwéger et al. 2015b). *Saphonecrus* species are associated with Cynipini galls (rarely Cecidomyiidae galls) on *Quercus* and *Lithocarpus* Blume (Pénzes et al. 2012; Schwéger et al. 2015b), and recently one species, *S. kuriphilusi* Melika and Avtzis, 2018, known from Greece was found on *Castanea* Mill. in association with *Dryocosmus kuriphilus* Yasumatsu galls (Melika et al. 2018). The most recent revision of Eastern Palaearctic and Oriental *Saphonecrus* was done by Schwéger et al. (2015b).

Lithosaphonecrus was established by Bozsó et al. (2015) and includes *Saphonecrus*-like species reared from Cynipini galls on *Lithocarpus* (Fang et al. 2020b) and, later, also on *Castanopsis* (D. Don) Spach (Abe et al. 2014); however, the latter host association should be revised. In contrast to the rest of the herein studied genera, *Lithosaphonecrus* is currently known exclusively from the Oriental region and the transitional areas between the Eastern Palaearctic and the Oriental region, except for *L. papuanus* (Nieves-Aldrey and Butterill, 2014) from Papua New Guinea, in the Australasian region (Nieves-Aldrey and Butterill 2014). Presumably, *Lithosaphonecrus* is more widely distributed in the Eastern Palaearctic (Pujade-Villar et al. 2020c). This genus associates with galls on Fagaceae species with the most southern distribution within Asia.

Ufo species are almost exclusively distributed in the Eastern Palaearctic, but also found in the transitional areas between the Eastern Palaearctic and the Oriental region (Taiwan). This genus has been reared exclusively from Cynipini galls (including some still undescribed species) on *Quercus* subgenus and section *Cerris*. Melika et al. (2012) published the most updated revision of *Ufo*, with a morphological key including all the currently described species except *U. rufiventris* Wang, Guo, Wang, Pujade-Villar and Chen, 2016.

Lastly, *Ceroptres* is known to be distributed throughout the Holarctic: Nearctic, Western and Eastern Palaearctic, with a clear division between species. It

has not yet been found in the Oriental region. Most *Ceroptres* species are associated with Cynipini galls (rarely Cecidomyiidae) found exclusively on *Quercus* species from different subgenera and sections. A complete revision of all known species of this genus has been carried out by Lobato-Vila and Pujade-Villar (2019), with a key to worldwide *Ceroptres*.

After examining the collection of inquiline deposited in the Parasitic Hymenoptera Collection of the Agriculture and Forestry University of Zhejiang (ZAFU, China), we carried out a taxonomic revision of the species of *Saphonecrus*, *Lithosaphonecrus*, *Ufo* and *Ceroptres* from mainland China that included the Eastern Palaearctic and the Oriental regions.

MATERIALS AND METHODS

Study of samples

We examined all the specimens of *Saphonecrus*, *Ufo* and *Ceroptres* deposited in ZAFU's Parasitic Hymenoptera Collection (Hangzhou, Zhejiang, China), including new, unexamined material. This material was collected in different locations throughout mainland China, reared from galls on Fagaceae or swept, and stored dried and/or mounted on cards. In many cases, the relationship between the inquiline and its host gall was impossible to establish, since most adults and galls were deposited separately without a common identifier after the specimens emerged. Regarding *Lithosaphonecrus*, no extra material was examined, only some paratypes of recently described *L. puigdemonti* Pujade-Villar, 2020 that are deposited in this collection.

Morphological studies

For species identification, we used identification keys, descriptions and photos provided by Schwéger et al. (2015b) for *Saphonecrus*; Melika et al. (2012) for *Ufo*; and Lobato-Vila and Pujade-Villar (2019) for *Ceroptres*. We also consulted Pujade-Villar et al. (2014) for the description of *Saphonecrus fabris* Pujade-Villar, Wang, Guo and Chen, 2014, and Pujade-Villar et al. (2015a) for the description of *S. lithocarpus* Pujade-Villar, Guo, Wang and Chen, 2015 (none of them were addressed by Schwéger et al. (2015b) nor included in the key provided by these authors); Yang et al. (2020) for the description of *S. emarginatus* Liu, Zhu and Pang, 2019; and Wang et al. (2016) for the description of *Ufo rufiventris* Wang, Guo, Wang, Pujade-Villar and Chen, 2016. For morphological descriptions and diagnoses, we used the terminology of adult morphological structures as given in Liljeblad and

Ronquist (1998) and Melika (2006); for the fore wing venation, Ronquist and Nordlander (1989) and for the cuticular sculpture, Harris (1979). We have also as far as possible followed the Hymenoptera Anatomy Ontology guidelines (<http://portal.hymao.org/projects/32/public/ontology/>). The following are measurements and abbreviations used in this paper: F1–Fn, the first and the following flagellomeres; POL (post-ocellar distance), the distance between the inner margins of posterior ocelli; OOL (ocellar-ocular distance), the distance from the outer margin of lateral ocellus to the inner margin of compound eye; LOL (lateral-ocular distance), the distance between lateral and frontal ocellus; transfacial distance, distance between inner margins of compound eyes measured across toruli; width of radial cell, measured as the distance between the upper margin of the fore wing and the Rs vein. Lengths (except body length) and distances are given as relative measures.

SEM pictures of *Saphonecrus albidus*, sp. nov. and *S. segmentatus*, sp. nov. were taken using a field-emission gun environmental scanning electron microscope (FEI Quanta 200 ESEM) for hard-resolution imaging at high voltage (15 kV) at UB (University of Barcelona, Barcelona, Spain). Optical images were taken using an Olympus SC30 camera, coupled with an Olympus U-CMAD3, adapted to a stereomicroscope Olympus SZX10 and combining multiple photographs with image processing using Helicon Focus 6.2.2 at UB.

Depository institutions

The new material examined was deposited into the Parasitic Hymenoptera Collection of the Agriculture and Forestry University of Zhejiang (Hangzhou, Zhejiang, China, ZAFU; YP. Wang) and the University of Barcelona (Barcelona, Spain, UB; J. Pujade-Villar), as some specimens from ZAFU were ceded to JP-V collection (UB).

RESULTS

The species of *Ceroptres*, *Lithosaphonecrus*, *Saphonecrus* and *Ufo* known from mainland China are listed and commented in alphabetical order below. A summary of all the species known from the Eastern Palaearctic and the Oriental region is given in table 1.

TRIBE CEROPTRESINI Nieves-Aldrey, Nylander and Ronquist, 2015

Genus *Ceroptres* Hartig, 1840

New material of *Ceroptres* was found deposited

in ZAFU's collection. A single species occurred in the Eastern Palaearctic. A complete revision and a key to all known *Ceroptres* species has already been published (Lobato-Vila and Pujade-Villar 2019).

Ceroptres kovalevi Belizin, 1973

Ceroptres kovalevi Belizin, 1973. Revue d'Entomologie d'URSS 52(1): 37. Type material: ZIN.

Ceroptres masudai Abe, 1997. Appl. Entomol. Zool. 32 (1): 253. Type material: KPU. Synonymized by Lobato-Vila and Pujade-Villar (2019: 33).

Material examined (4 ♂ and 12 ♀): Deposited in ZAFU with the following data: Quqianjia Forestry Farm, Liupan Mountain (Ningxia Hui Autonomous Region), Ex undetermined small spherical galls on leaves, unknown tree, 07.vii.2008, Zhemin Rao leg. (1 ♂ and 6 ♀); Qianqingtang, Qingliangfeng (Zhejiang), Ex unknown gall, unknown tree, 16.v.2012, Rui Guo leg. (1 ♀); same data, but *Q. aliena*, 03.iv.2016 (1 ♀); Shizifeng, Ludai (Henan), Ex unknown gall, unknown tree, 24.viii.1996, Ping Cai leg. (1 ♀); Dongling, Shenyang (Liaoning), Ex unknown gall, unknown tree, 07.vi.1994, Juxian Lou leg. (1 ♀); South Meiling Road, Xihu (Zhejiang), Ex unknown gall, unknown tree, 29.iv.2011, Xiaogui Zhou leg. (1 ♀); West Tianmu Mountain (Zhejiang), Ex undetermined small spherical galls on leaves, *Q. fabri*, (28.v.2011) 10.vi.2011, Rui Guo leg. (1 ♀); Changhua Town (Zhejiang), Ex unknown gall, *Q. serrata*, 25.vii.2014, Rui Guo leg. (1 ♂); Firebreak of West Tianmu Mountain (Zhejiang), Ex unknown gall, unknown tree, (22.viii.2014) 25.viii.2014, Jie Shen leg. (1 ♂); Banqiaogou, Huoditang Forestry Farm (Shanxi), Ex unknown gall, unknown tree, 05.vi.1998, Zizhou Du leg. (1 ♂).

Diagnosis: See Lobato-Vila and Pujade-Villar (2019).

Distribution: Far Eastern Russia, Japan, South Korea and mainland China (Henan, Liaoning, Shaanxi and Zhejiang Provinces, and Ningxia Hui Autonomous Region) (Belizin 1973; Abe 1997; Abe et al. 2007; Wang et al. 2012; Lobato-Vila and Pujade-Villar 2019; Lobato-Vila et al. 2020d; this study).

Biology: Originally reared from an unknown gall (Belizin 1973). According to Pénez et al. (2012), reared from galls of *Andricus kashiwaphilus* Abe, *A. mukaigawae* (Mukaigawa) and *Ussuraspis nervosa* Kovalev collected in Japan and Far Eastern Russia (Abe 1997; Melika 2012); from galls of *Andricus targionii* Kieffer and *A. pseudoflos* (Monzen) in Japan (Abe 1997; Abe et al. 2007); from leaf galls of an undescribed *Ussuraspis* species in Far Eastern Russia (Melika 2012) and, occasionally, from galls of *Andricus hakonensis* (Ashmead) (= *A. attractus* Kovalev, = *A. symbioticus*

Kovalev) (Wachi and Abe 2010). The galls from which *C. kovalevi* has traditionally been reared have been collected on *Q. dentata* Thunb. and *Q. serrata* Murray (Abe 1997; Abe et al. 2007; Wang et al. 2012). Reared also from asexual galls of *Plagiotrochus kunugiphagus*

(Ide and Abe) (new combination after Pujade-Villar et al. 2020a) on *Q. acutissima* Carruth in South Korea (Lobato-Vila et al. 2020d). The new material presented here was reared from unknown small spherical galls on leaves on *Q. fabri* Hance, from unknown galls on *Q.*

Table 1. Summary of the valid Eastern Palearctic and Oriental *Ceroptres*, *Lithosaphonecrus*, *Saphonecrus* and *Ufo* species, with information about their host galls, host plants^a, and distribution

Species	Gall(s)	Host plant		Distribution
		Species	Subgenus and Section	
<i>Ceroptres</i> (<i>Ceroptresini</i>)				
<i>kovalevi</i>	<i>Andricus kashiwaphilus</i>	<i>Q. dentata</i>	SubG <i>Quercus</i>	Far East Russia, Mainland China, Japan, and South Korea
	<i>Andricus mukaigawae</i>	<i>Q. serrata</i>	Sect. <i>Quercus</i>	
	<i>Andricus pseudoflos</i>			
	<i>Andricus targionii</i>			
	<i>Ussuraspis nervosa</i>			
	Occasionally, <i>A. hakonensis</i>			
	Spherical galls on leaves	<i>Q. fabri</i>		
	Unknown	<i>Q. aliena</i>		
<i>Plagiotrochus kunugiphagus</i>		<i>Q. serrata</i>	SubG <i>Cerris</i> Sect. <i>Cerris</i>	
		<i>Q. acutissima</i>		
<i>Lithosaphonecrus</i>^b (<i>Synergini</i>)				
<i>arcoverticus</i>	Green, pumpkin-shaped galls on new shoots and stems	<i>L. glaber</i>		Mainland China
<i>dakengi</i>	Bud galls	<i>L. hancei</i>		Taiwan
<i>decarinatus</i>	Green, pumpkin-shaped galls on new shoots and stems	<i>L. glaber</i>		Mainland China
<i>edurus</i>	Globular woody galls	<i>L. cleistocarpus</i>		Mainland China
<i>formosanus</i>	Bud, catkin and stem galls	<i>L. glabra</i>		Taiwan
		<i>L. hancei</i>		
		<i>L. konishii</i>		
		<i>L. glabra</i>		
<i>huisuni</i>	Bud galls	<i>L. glabra</i>		Taiwan
<i>mindatus</i>	Bud gall	<i>L. thomsonii</i>		Myanmar
<i>puigdemonti</i>	Unknown (sweeping net)	Probably <i>Lithocarpus</i>		Mainland China
<i>vietnamensis</i>	Bud galls	Presumably <i>Castanopsis</i>		Vietnam
<i>yunnani</i>	Bud galls	<i>L. fenestratus</i>		Mainland China
<i>Saphonecrus</i> (<i>Synergini</i>)				
<i>albidus</i> , sp. nov.	Unknown	<i>Q. glauca</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Mainland China
<i>chaodongzhui</i>	Leaf galls ^c	<i>Q. dentata</i> ^c	SubG <i>Quercus</i> Sect. <i>Quercus</i>	Mainland China, South Korea ^c , and Japan ^c
<i>diversus</i>	Unknown	Unknown		Far East Russia
<i>emarginatus</i>	Green, pumpkin-shaped galls on new shoots and stems	<i>L. glaber</i>		Mainland China
<i>fabris</i>	Galls on main leaf veins	<i>Q. stewardiana</i>	SubG <i>Cerris</i>	Mainland China
	Unknown	<i>Q. ciliaris</i>	Sect. <i>Cyclobalanopsis</i>	
<i>flavitibilis</i>	Cecidomyiidae galls	Unknown		Mainland China
	Hedgehog-like small galls on leaf veins	<i>Q. ciliaris</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	
<i>gilvus</i>	Hair suit round galls on leaf midribs	<i>Q. gilva</i>	SubG <i>Cerris</i>	Taiwan and mainland China (new record)
	Unknown	<i>Q. stewardiana</i>	Sect. <i>Cyclobalanopsis</i>	
<i>globosus</i>	Leaf galls	<i>Q. glauca</i>	SubG <i>Cerris</i>	Taiwan and mainland China (new record)
	Unknown	<i>Q. ciliaris</i>	Sect. <i>Cyclobalanopsis</i>	

Table 1. (Continued)

Species	Gall(s)	Host plant		Distribution
		Species	Subgenus and Section	
<i>leleyi</i>	Bud galls	<i>Q. glauca</i>	SubG <i>Quercus</i> Sect. <i>Quercus</i>	Far East Russia and mainland China (new record) Mainland China
		<i>Q. stewardiana</i>		
		<i>Q. mongolica</i>		
<i>lithocarp</i>	Multilocular, integral swelling galls at the base of leaf midribs	<i>L. harlandii</i>		
<i>longinuxi</i>	Round bud galls	<i>L. fenestratus</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Taiwan
	Small round galls on the upper face of leaves	<i>Q. longinux</i>		
<i>morii</i>	Leaf galls	<i>Q. morii</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Taiwan
<i>naiquanlini</i>	Unknown	Unknown		Mainland China
<i>nantoui</i>	Leaf petiole thickening galls	<i>Q. glauca</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Taiwan and mainland China (new record)
<i>nichollsi</i>	Stem swelling-like galls	<i>L. konishii</i>		Taiwan
<i>pachylomai</i>	Stem swelling-like galls	<i>Q. pachyloma</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Taiwan
<i>robustus</i>	<i>Dryocosmus</i> sp.	<i>Q. hypophaea</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Taiwan
<i>salicina</i>	Small egg-shaped galls on leaf midribs	<i>Q. salicina</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Taiwan
<i>segmentatus</i> , sp. nov.	Unknown	Unknown		Mainland China
? <i>serratus</i>	Unknown	Unknown		Philippines
<i>shanzhukui</i>	Rounded stem swelling-like galls	<i>Q. hypophaea</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Taiwan
<i>shirakashii</i>	Leaf galls	<i>Q. glauca</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Japan, Taiwan, mainland China, and South Korea
	<i>Neuroterus</i> nr <i>hakonensis</i>			
<i>shirokashicola</i>	Leaf galls	<i>Q. glauca</i>	SubG <i>Cerris</i> Sect. <i>Cyclobalanopsis</i>	Japan and Taiwan
<i>symbioticus</i>	<i>Andricus hakonensis</i>	<i>Q. dentata</i>	SubG <i>Quercus</i> Sect. <i>Quercus</i>	Far East Russia, Japan, and South Korea
		<i>Q. longinux</i>		
		<i>Q. mongolica</i>		
<i>taitungi</i>	Undetermined pedicel swellings	<i>L. dodonifolius</i>		Taiwan
<i>taiwanensis</i>	Bud and leaf galls	<i>L. glabra</i>		Taiwan
		<i>L. konishii</i>		
		<i>Q. acutissima</i>	SubG. <i>Cerris</i> Sect. <i>Cerris</i>	Japan
Ufo (Synergini)				
<i>abei</i>	Unknown	<i>Q. variabilis</i>	SubG <i>Cerris</i> Sect. <i>Cerris</i>	Japan
<i>cerroneuroteri</i>	<i>Biorhiza nawai</i>	<i>Q. variabilis</i>	SubG <i>Cerris</i> Sect. <i>Cerris</i>	Mainland China, Taiwan, and South Korea
	<i>Cerroneuroterus vonkuenburgi</i>			
<i>koreanus</i>	Leaf galls (probably, <i>Trichagalma</i> sp.)	<i>Q. chenii</i>	SubG <i>Cerris</i> Sect. <i>Cerris</i>	South Korea
	<i>Biorhiza nawai</i>	<i>Q. variabilis</i>		
<i>nipponicus</i>	<i>Trichagalma acutissimae</i>	<i>Q. acutissima</i>	SubG <i>Cerris</i> Sect. <i>Cerris</i>	Japan
	<i>Cerroneuroterus monzeni</i>	<i>Q. variabilis</i>		
	<i>Cerroneuroterus vonkuenburgi</i>	<i>Q. acutissima</i>		
<i>rufiventris</i>	Small leaf galls	<i>Q. acutissima</i>	SubG <i>Cerris</i> Sect. <i>Cerris</i>	Mainland China

^a*Quercus* sections were assigned following <http://oaks.of.the.world.free.fr/liste.htm> [Last entry: September 2020] and the new classification of oaks proposed by Denk et al. (2017). ^bOnly one species, *Lithosaphonecrus papuanus* (Nieves-Aldrey and Butterill), was excluded from the table, as it was described from Papua New Guinea (Australasian region). ^cAccording to the notes about *S. connatus* provided by Schwéger et al. (2015b).

serrata and *Q. aliena* Blume, and from other unknown galls on undeterminate *Quercus*.

Remarks: *Ceroptres kovalevi* is the only species currently known from the Eastern Palaearctic since Pujade-Villar et al. (2019) transferred *C. distinctus* Wang, Liu and Chen, 2012 and *C. setosus* Wang, Liu and Chen, 2012, both species described from mainland China (Wang et al. 2012), to the newly described genus *Xestophanopsis* Pujade-Villar and Wang (Diastrophini) and *Periclistus* Förster, respectively. *Ceroptres kovalevi* has not yet been found in the Oriental region.

TRIBE SYNERGINI Ashmead, 1896

Genus *Lithosaphonecrus* Tang, Melika and Bozsó, 2013

No new material of *Lithosaphonecrus* was found in ZAFU's collection, only some paratypes of the recently described species *L. puigdemonti* Pujade-Villar, 2020. Currently, five species of *Lithosaphonecrus* (out of 11 described within this genus) are known from mainland China. A key to all known *Lithosaphonecrus* species has already been published (Pujade-Villar et al. 2020c), barely after which two new species, *L. mindatus* Ide, Aung and Tanaka, 2020 (Ide et al. 2020) and *L. edurus* Fang, Melika and Tang, 2020 (Fang et al. 2020b), were described.

Lithosaphonecrus arcoverticus Liu, Zhu and Pang, 2019

Lithosaphonecrus arcoverticus Liu, Zhu and Pang in Yang et al. (2020) [published online: 2019]. Insect Syst. Evol. 51(4): 557. Type material: CSUFT (holotype), paratypes in CSUFT, FMNH, and ZLCC.

Diagnosis: See Yang et al. (2020).

Distribution: Mainland China. Hunan Province (Yang et al. 2020).

Biology: Reared from green, pumpkin-shaped terminal galls on new shoots and on inflorescence stems of *Lithocarpus glaber* (Thunb.) Nakai (Yang et al. 2020).

Lithosaphonecrus decarinatus Liu, Zhu and Pang, 2019

Lithosaphonecrus decarinatus Liu, Zhu and Pang in Yang et al. (2020) [published online: 2019]. Insect Syst. Evol. 51(4): 562. Type material: CSUFT (holotype), paratypes in CSUFT, FMNH, and ZLCC.

Diagnosis: See Yang et al. (2020).

Distribution: Mainland China. Hunan Province

(Yang et al. 2020).

Biology: Reared from green, pumpkin-shaped galls formed terminally on new shoots as well as on inflorescence stems of *Lithocarpus glaber* (Yang et al. 2020).

Lithosaphonecrus edurus Fang, Melika and Tang, 2020

Lithosaphonecrus edurus Fang, Melika and Tang in Fang et al. (2020b). Proc. Entomol. Soc. Wash. 122(4): 809. Type material: EBRRS.

Diagnosis: See Fang et al. (2020b).

Distribution: Mainland China. Sichuan Province (Fang et al. 2020b).

Biology: Reared from undescribed globular woody galls on *Lithocarpus cleistocarpus* (Seem.) Rehd and Wils (var. *cleistocarpus* and var. *omeiensis*) (Fang et al. 2020b).

Lithosaphonecrus puigdemonti Pujade-Villar, 2020

Lithosaphonecrus puigdemonti Pujade-Villar in Pujade-Villar et al. (2020c). Entomotaxonomia 42(1): 72. Type material: UB (holotype), paratypes in UB and ZAFU.

Diagnosis: See Pujade-Villar et al. (2020c).

Distribution: Mainland China. Fujian Province (Pujade-Villar et al. 2020c).

Biology: Unknown (captured with a sweeping net). The *Lithocarpus* host plant associations of other *Lithosaphonecrus* species would predict that *L. puigdemonti* is also associated with *Lithocarpus* (Pujade-Villar et al. 2020c).

Lithosaphonecrus yunnani Tang, Bozsó and Melika, 2013

Lithosaphonecrus yunnani Tang, Bozsó and Melika in Bozsó et al. (2015) [published online: 2013]. Insect Syst. Evol. 46(1): 104. Type material: NMNS (holotype), paratypes in NMNS, PHMBL, NCHU, and USNM.

Diagnosis: See Bozsó et al. (2015).

Distribution: Mainland China. Yunnan Province (Bozsó et al. 2015).

Biology: Reared from an unknown bud gall on *Lithocarpus fenestratus* (Roxb.) Rehder (Bozsó et al. 2015).

Genus *Saphonecrus* Dalla-Torre and Kieffer, 1910

New material of *Saphonecrus* deposited in

ZAFU's collection was examined. A total of 13 species of *Saphonecrus* (out of 27 described from the Eastern Palearctic and the Oriental region) are known from mainland China, of which four are new records for this region (*S. gilvus* Melika and Schwéger, 2015; *S. globosus* Schwéger and Tang, 2015; *S. leleyi* Melika and Schwéger, 2015; and *S. nantoui* Tang, Schwéger and Melika, 2015) and two are new species (*S. albidus* Lobato-Vila and Pujade-Villar, sp. nov. and *S. segmentatus* Lobato-Vila and Pujade-Villar, sp. nov.). Additionally, a few more morphotypes have been identified among the samples, each of which probably represent undescribed species; however, given the paucity of material, we have refrained from describing these taxa until more fresh material is obtained. An updated key to Eastern Palearctic and Oriental species based on the key given by Schwéger et al. (2015b) is provided.

***Saphonecrus albidus* Lobato-Vila and Pujade-Villar, sp. nov.**

(Figs. 1–2)

urn:lsid:zoobank.org:act:3CD2EB49-B1DA-40AB-BEF7-E84EF0A55137

Type material: Holotype ♀ deposited in UB with the following labels: 'Xijing Mountain, Hangzhou (Zhejiang), Ex unknown gall, unknown tree, (03.vii.2016) 05.xii.2016, Miao Chai leg.' / 'Holotype ♀ *Saphonecrus albidus* Lobato-Vila and Pujade-Villar, desig. Lobato-Vila 2020' (red label). Paratypes (2 ♂ and 6 ♀) with the following labels: same as the holotype: 1 ♂ (deposited in UB); 'Linlong Mountain, Lin'an

(Zhejiang), Ex unknown gall, *Quercus glauca*, (18.iii.2014) 20.iv.2014, Shijun Wang leg.' (white label) / 'Paratype *Saphonecrus albidus* Lobato-Vila and Pujade-Villar, desig. Lobato-Vila 2020' (red label) (1 ♂ and 4 ♀; 1 ♂ and 2 ♀ deposited in ZAFU, 2 ♀ deposited in UB); same data but emerged 19.ix.2013 (2 ♀; 1 deposited in ZAFU, 1 deposited in UB).

Etymology: Adjective relative to the light coloration of the metasoma, which is yellow, in contrast to the mesosoma, which is dark brown to black.

Diagnosis: *Saphonecrus albidus*, sp. nov. belongs to a group of species characterized by a strong and complete lateral pronotal carina, simple tarsal claws (without a basal lobe), complete notauli and the radial cell at most 3.0x as long as wide. It differs from the rest of species within this group (*S. fabris*, *S. lithocarp*i, *S. nantoui* and *S. taiwanensis*) by the yellow metasoma (reddish brown to dark brown in these species), the malar space being about 0.3x and the transfacial distance 0.7x as long as height of eye (malar space 0.6x or more, and the transfacial distance at least 0.9x as long as height of eye in these species), and the mesoscutum and mesoscutellum being delicately sculptured, without carinae nor wrinkles (carinate and/or wrinkled in these species). See also the key to species below.

Description: Female: Length: Body length 1.0–1.4 mm ($n = 7$).

Color (Fig. 1a): Head dark brown to black. Antenna pale yellow. Mesosoma dark brown to black; tegulae yellow. Metasoma yellow. Legs pale yellow. Wings hyaline, veins pale yellow, hardly traceable.

Head: Trapezoid to subtriangular, about 1.2x as

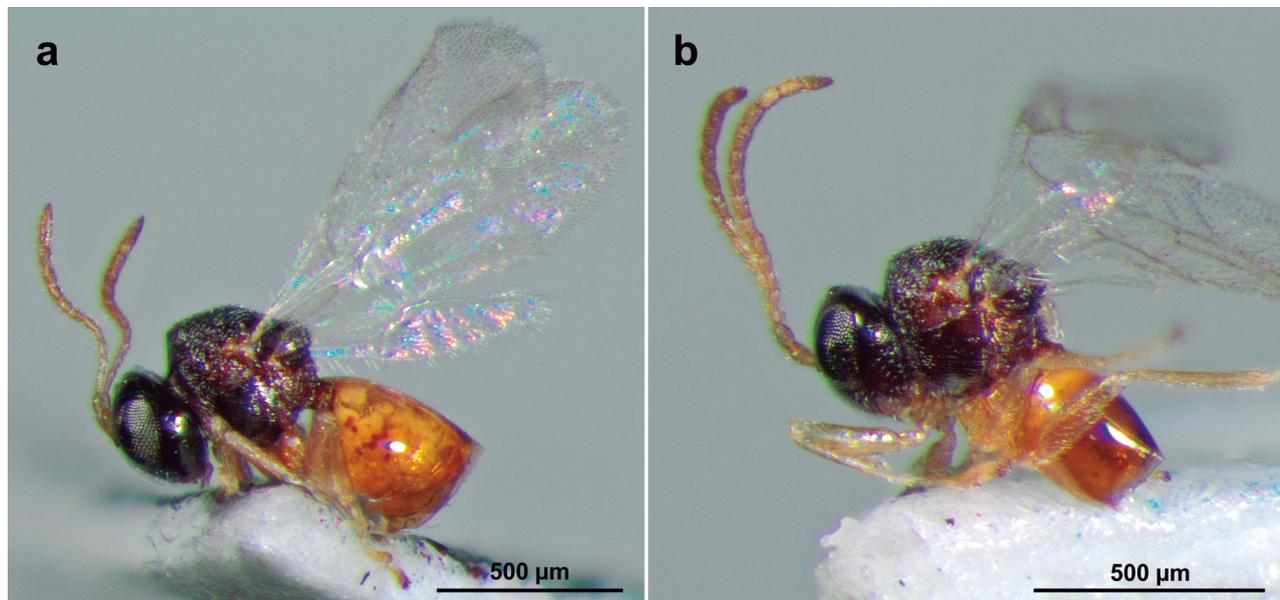


Fig. 1. *Saphonecrus albidus* Lobato-Vila and Pujade-Villar, sp. nov.: a, female habitus; b, male habitus.

wide as high in anterior view (Fig. 2a), gena straight, not expanded behind eyes. Face faintly pubescent, lower face with few weak striae radiating from clypeus, reaching compound eyes and almost reaching the base of toruli; medial striae absent. Clypeus indistinct, ventral margin slightly projected over mandibles. Malar space above $0.3x$ as long as height of eye. Anterior tentorial pit small but visible; pleurostomal and epistomal sulcus

absent. Transfacial distance about $0.7x$ as long as height of eye. Toruli situated slightly over mid-height of eyes; distance between torulus and eye shorter than diameter of torulus; distance between toruli shorter than diameter of torulus. Frons alutaceous to delicately coriaceous, without punctures and wrinkles; lateral frontal carina absent. Head (Fig. 2b) is about $2.3x$ as wide as long in dorsal view. Vertex alutaceous to delicately coriaceous,

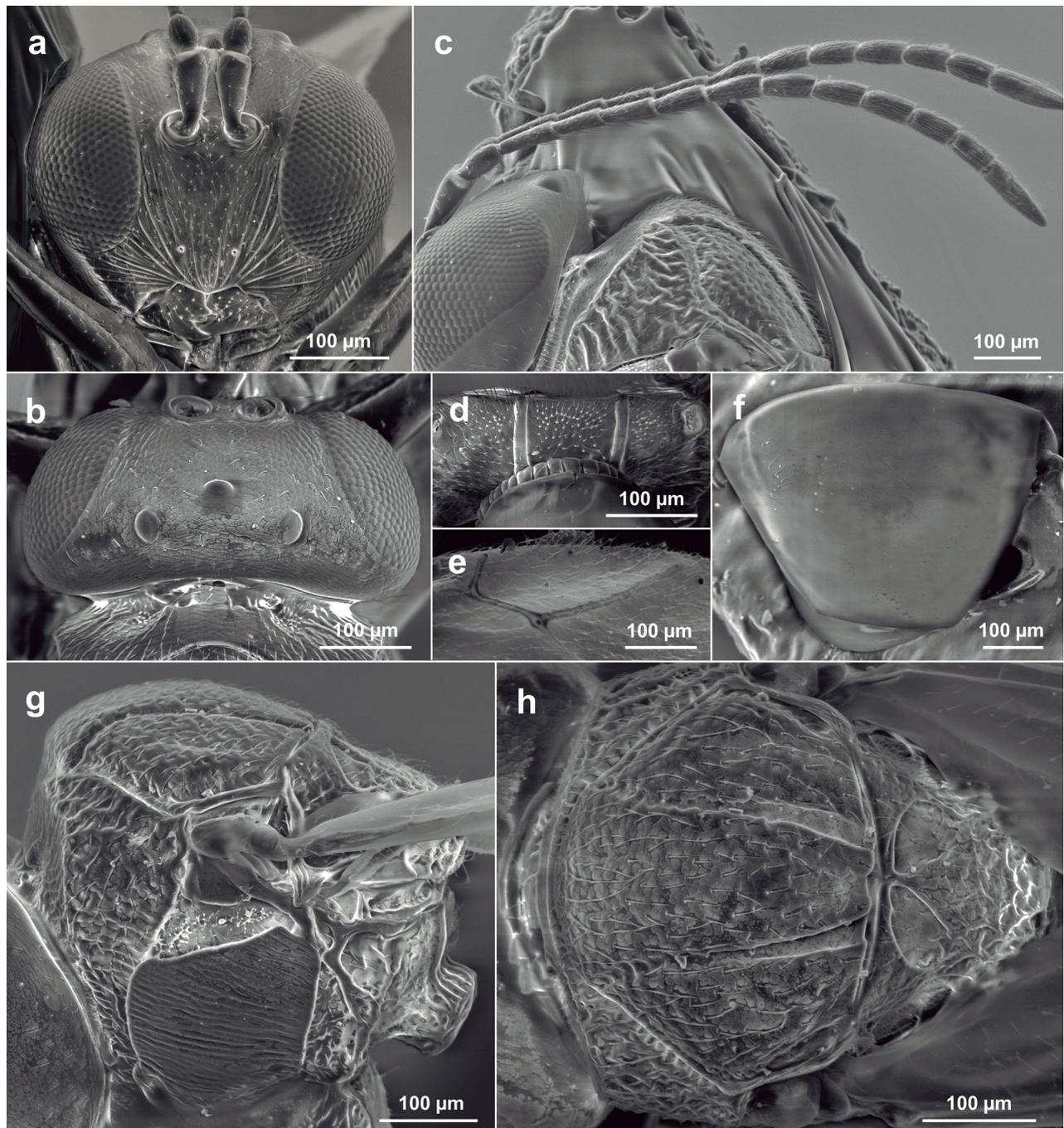


Fig. 2. *Saphonecrus albidus* Lobato-Vila and Pujade-Villar, sp. nov. (female): a, head in anterior view; b, head in dorsal view; c, antennae and lateral pronotum; d, propodeum; e, radial cell of the fore wing; f, metasoma in lateral view; g, mesosoma in lateral view; h, mesosoma in dorsal view.

without punctures and wrinkles. POL: OOL: LOL = 6: 2.5: 3 and diameter of lateral ocelli, 1.5. Occiput coriaceous, without punctures and wrinkles.

Antennae (Fig. 2c): 13-segmented (3.5: 3: 4: 3: 3: 3.5: 3.5: 3: 3: 2.5: 2.5: 2.5: 6); subclavate, slightly broadened apically; with dense and short pubescence; placodeal sensilla on F4–F11. Pedicel almost 2.0x as long as wide; F1 1.3x as long as F2 and 1.3x as long as pedicel, F2 as long as F3. Last flagellomere about 3.0x as long as wide and about 2.5x as long as F10.

Mesosoma: About as long as high in lateral view including nucha, with short and sparse pubescence (Fig. 2g). Ratio of length of pronotum medially/laterally: 0.25. Pronotal plate visible only anteriorly, not reaching the posterior margin of pronotum (Fig. 2b). Pronotum laterally carinate to wrinkled, especially dorsally, interspaces coriaceous; lateral carina strong and complete (Fig. 2g). Mesoscutum (Fig. 2h) about 1.3x as wide as long, alutaceous to delicately coriaceous; anterior grooves inconspicuous. Notauli complete and well defined interrupted by sculpture anteriorly, wider and convergent posteriorly. Median groove inconspicuous, in a form of posterior short incision. Parapsidal grooves inconspicuous. Mesoscutellum (Fig. 2h) rounded, about as long as wide, alutaceous to delicately coriaceous anteriorly and medially, weakly wrinkled posteriorly; circumscutellar carina absent; scutellar foveae shallow, with smooth and shining bottom, subtriangular, well defined and separated by a narrow median carina. Mesopleuron (Fig. 2g) finely and regularly striate, interspaces smooth and shining, very delicately reticulate anteriorly; slightly pubescent basally. Metapleural sulcus reaches to 4/5 of mesopleuron height. Propodeum (Fig. 2d) faintly pubescent, smooth; propodeal carinae straight and parallel. Nucha weakly sulcate dorsally and laterally.

Legs: Tarsal claws simple, without basal lobe.

Wings: Fore wings pubescent with long marginal setae, slightly longer than body length (Fig. 1a). Radial cell open and almost 3.0x as long as wide (Fig. 2e); areolet inconspicuous. Rs+M inconspicuous, not reaching the basal vein. Basal cell sparsely setose.

Metasoma: About as long as head+mesosoma, about 1.2x as long as high in lateral view (Figs. 1a, 2f). Syntergite smooth, with few setae anterolaterally, posteriorly without punctures; not incised dorsodistally, the tip somewhat pointed. Hypopygial spine slightly longer than wide and with a few lateral setae; without apical setae.

Male (Fig. 1b): Similar to female, except the body length 0.8–1.0 mm ($n = 2$); antennae 15-segmented (2.5: 2: 3: 2: 2: 2: 2: 2: 2: 2: 2: 2: 2: 2: 3), F1 slightly curved, very weakly incised medially, not expanded apically nor basally; head in anterior view more rounded; metasoma

shorter than head+mesosoma.

Distribution: Mainland China (Zhejiang Province).

Biology: Reared from unknown galls on *Quercus glauca* Thunb. (= *Q. globosa* (Lin and Liu) Liao), and from another unknown gall on an undetermined species of *Quercus*.

***Saphonecrus chaodongzhui* Melika, Ács and Bechtold, 2004**

Saphonecrus chaodongzhui Melika, Ács and Bechtold in Melika et al. (2004). Acta Zool. Acad. Sci. Hung. 50(4): 330. Type material: IZCAS (holotype), paratypes in IZCAS and PHMBL.

Diagnosis: *Saphonecrus chaodongzhui* belongs to a group of species (*S. flavitibilis*, *S. leleyi*, *S. segmentatus*, sp. nov. and *S. symbioticus*) characterized by the absence of lateral pronotal carinae and by having tarsal claws with a basal lobe. *Saphonecrus chaodongzhui* is morphologically close to *S. segmentatus*, sp. nov., both having females with 14-segmented antennae (instead of 13 typical of *Saphonecrus*), pedicel of antenna at most 1.5x as long as wide and gena not broadened behind eyes. However, *S. chaodongzhui* differs from *S. segmentatus*, sp. nov. by having the frons without punctures (with small punctures in *S. segmentatus*, sp. nov.), POL 1.7x as long as OOL and OOL 1.8–2.0x as long as diameter of lateral ocelli (POL 1.4x as long as OOL and OOL 2.3x as long as diameter of lateral ocelli in *S. segmentatus*, sp. nov.), the mesoscutum with weak interrupted transversal carinae (coriaceous to imbricate, without carinae, in *S. segmentatus*, sp. nov.) and face reddish brown, except two blackish brown lateral spots on lower face (face yellow in *S. segmentatus*, sp. nov.). See also the key to species below.

Distribution: Mainland China (Yunnan Province, according to Melika et al. (2004) and Zhejiang Province, according to Wang et al. (2010)). South Korea and Japan (Schwéger et al. 2015b: 62, *Saphonecrus connatus* section).

Biology: Unknown, according to the original description. According to Schwéger et al. (2015b), reared from leaf galls on *Quercus dentata* based on the notes about *Saphonecrus connatus* made by Sakagami (1949) and Abe et al. (2007).

Remarks: *Saphonecrus connatus* is thought to be a trans-Palaeartic species and was mentioned from Japan and South Korea (Sakagami 1949; Abe et al. 2007). However, this record might be *Saphonecrus chaodongzhui*, a species that is closely related to *S. connatus*, according to Melika et al. (2004) and Schwéger et al. (2015b). The original description of *S. chaodongzhui* and the drawings provided in Melika et

al. (2004: 330, 331) show some differences with respect to the pictures of one of its paratypes given in Schwéger et al. (2015b: 64, 65). So, the malar space is 0.6x as long as height of eye (not 0.65–0.7 as mentioned in the original description), the POL is 1.7x as long as OOL (POL is not nearly equal to OOL), the pedicel is 1.3x as long as wide (not 1.5) and F1 is 1.6x as long as F2 (not 1.8).

***Saphonecrus emarginatus* Liu, Zhu and Pang, 2019**

Saphonecrus emarginatus Liu, Zhu and Pang in Yang et al. (2020) [published online: 2019]. Insect Syst. Evol. 51(4): 568. Type material: CSUFT (holotype), paratypes in CSUFT, FMNH, and ZLCC.

Diagnosis: *Saphonecrus emarginatus* is characterized by its lateral pronotal carina, which is short, weak and incomplete, indistinct dorsally (pronotum not sharply angled in dorsal view). Also, by having simple tarsal claws (without a basal lobe), complete notauli and the radial cell of the fore wing at most 3.0x as long as wide. The only species that shares all these characteristics is *S. gilvus*. *Saphonecrus emarginatus* differs from *S. gilvus* by the malar space being 0.6x as long as height of eye (0.7 in *S. gilvus*), the transfacial distance shorter than height of eye (1.2x as long in *S. gilvus*), POL 1.7x as long as OOL and OOL slightly longer than diameter of lateral ocelli (POL 2.6x as long as OOL and OOL 1.5x as long as diameter of lateral ocellus in *S. gilvus*), F1 1.2–1.3x as long as wide in both sexes (F1 1.7x as long as F2 in females, 2.3 in males, in *S. gilvus*) and female sytergite dorsodistally incised (not incised in *S. gilvus*). See also the key to species below. Furthermore, *S. emarginatus* is associated with galls on *Lithocarpus*, whereas *S. gilvus* has been reared from galls on *Quercus*. See also the diagnosis given by Yang et al. (2020).

Distribution: Mainland China. Hunan Province (Yang et al. 2020).

Biology: Reared from green, pumpkin-shaped galls formed terminally on new shoots and on inflorescence stems of *Lithocarpus glaber* (Yang et al. 2020).

***Saphonecrus fabris* Pujade-Villar, Wang, Guo and Chen, 2014**

Saphonecrus fabris Pujade-Villar, Wang, Guo and Chen in Pujade-Villar et al. (2014). Zool. Sys. 39(3): 420. Type material: ZAFU (holotype), paratypes in ZAFU and UB.

Material examined (8 ♂ and 6 ♀): Deposited in ZAFU and UB with the following data: West Tianmu Mountain (Zhejiang), Ex undetermined gall found on

the main vein of leaves of *Q. stewardiana*, (07.ix.2010) 11.ix.2010, Rui Guo leg. (6 ♂ and 3 ♀ deposited in ZAFU, 2 ♂ and 1 ♀ deposited in UB); Dashuwang, Tianmu Mountain (Zhejiang), Ex unknown gall, *Q. ciliaris*, (24.iv.2013) 08.v.2013, Shijun Wang leg. (2 ♀ deposited in UB).

Diagnosis: *Saphonecrus fabris* belongs to a group of species (*S. albidus*, *S. lithocarpi*, *S. nantoui* and *S. taiwanensis*) with a strong and complete lateral pronotal carina, simple tarsal claws (without a basal lobe), complete notauli, and the radial cell of the fore wing at most 3.0x as long as wide. The differences between *S. fabris* and *S. albidus* have already been commented (see the diagnosis of *S. albidus*). *Saphonecrus fabris* differs from *S. lithocarpi* and *S. taiwanensis* by having F1 1.3–1.4x as long as F2 in females and 1.5–1.6 in males (F1 just slightly longer than F2 in both sexes in these two species) and the scutellar foveae separated by a narrow carina (separated by a wide septum in these two species). Furthermore, *S. fabris* associates with galls on *Quercus* (on *Lithocarpus* in these two species). *Saphonecrus fabris* is close to *S. nantoui*, from which differs by the malar space being 0.7–0.8x as long as height of eye (0.6 in *S. nantoui*), the scutellar foveae with smooth and shining bottom (with some wrinkles on a smooth bottom in *S. nantoui*) and female sytergite slightly incised dorsodistally (strongly incised in *S. nantoui*). See also the key to species below.

Description: **Male:** Similar to female, except for the body length 1.3 ($n = 3$); antennae 15-segmented (4.5: 3: 6: 4: 4: 4: 4: 4: 4: 4: 3.5: 3.5: 3: 2.5: 3.5); F1 medially incised, thin and long, slightly expanded apically and basally; F1 1.5x as long as F2; POL: OOL: LOL = 6: 3: 2.5, and diameter of lateral ocellus 2.0; and transfacial distance about as long as height of eye.

Distribution: Mainland China. Zhejiang Province (Pujade-Villar et al. 2014; this work, see the material examined).

Biology: *Saphonecrus fabris* was associated with galls of *Andricus flavus* Pujade-Villar, Wang, Guo and Chen on *Quercus fabri* (Pujade-Villar et al. 2014), but this association appeared to be incorrect (see remarks). The new material presented here was reared from unknown galls on the main vein of leaves of *Quercus stewardiana* A. Camus, and from unknown galls on *Q. ciliaris* C.C. Huang and Y.T. Chang (= *Cyclobalanopsis gracilis* (Rehd. and Wils.) W.C. Cheng and T. Hong).

Remarks: According to the original description (Pujade-Villar et al. 2014: 420), the type series of *S. fabris* is composed exclusively of females: the holotype (deposited in ZAFU) and five paratypes (four deposited in ZAFU and one deposited in UB); males were unknown. However, a posterior re-examination of the type series revealed that one of the paratypes is, in

fact, a male. Currently, the holotype and three female paratypes are deposited in ZAFU, while a female paratype and the only male paratype are deposited in UB. Since we identified more males of *S. fabris* among the material deposited in ZAFU, we described them here for the first time.

Pujade-Villar et al. (2014) report that *Saphonecrus fabris* was reared from galls of *A. flavus* on *Q. fabri*. The gall-maker adults that were presumably related to these galls were confirmed to be *Andricus mairei* (Kieffer) (= *A. flavus*); however, the galls mentioned in Pujade-Villar et al. (2014) do not correspond to *A. mairei*, but to an undetermined gall wasp species (Pujade-Villar et al. 2020b). Furthermore, the host tree of *A. mairei* is not *Q. fabri*, but *Q. serrata* (= *Q. glandulifera* var. *brevipetiolata* (A.DC.) Nakai) (Pujade-Villar et al. 2020b). According to the new material examined herein and to the determination conflict addressed by Pujade-Villar et al. (2020b), the biology of *Saphonecrus fabris* (at least of its type material) is doubtful.

***Saphonecrus flavitibilis* Wang and Chen, 2010**

Saphonecrus flavitibilis Wang and Chen in Wang et al. (2010). *Biologia* 65(6): 1035. Type material: ZAFU (holotype), paratypes in ZAFU and UB, according to Wang et al. (2010) and this work (see remarks).

Material examined (3 ♀): Deposited in ZAFU with the following data: Qianqingtang, Qingliangfeng (Zhejiang), Ex undetermined hedgehog-like small galls on leaf veins, unknown tree, viii.2012, Shijun Wang leg. (1 ♀); Longtang Mountain (Zhejiang), Ex undetermined hedgehog-like small galls on leaf veins, *Q. ciliaris*, (22.iii.2013) 15.iv.2013 (2 ♀).

Diagnosis: *Saphonecrus flavitibilis* belongs to a group of species (*S. chaodongzhui*, *S. leleyi*, *S. segmentatus*, sp. nov. and *S. symbioticus*) characterized by the absence of lateral pronotal carina and by having tarsal claws with a basal lobe. It is grouped with *S. chaodongzhui* and *S. segmentatus*, sp. nov. by F1 being 1.6–2.0x as long as F2 (F1 at most 1.2x as long as F2 in *S. leleyi* and *S. symbioticus*), POL 2.0 or less times as long as OOL (about 2.5 in *S. leleyi* and *S. symbioticus*), malar space 0.6–0.65x as long as height of eye (0.5 in *S. leleyi* and *S. symbioticus*) and syntergite with a small posterodorsal patch of micropunctures (without punctures in *S. leleyi* and *S. symbioticus*), but differs from these species by having female antennae with 13 segments (14 in *S. chaodongzhui* and *S. segmentatus*, sp. nov.), pedicel almost 2.0x as long as wide (1.3–1.5 in *S. chaodongzhui* and *S. segmentatus*, sp. nov.) and the gena slightly broadened behind eyes (not broadened in *S. chaodongzhui* and *S. segmentatus*, sp. nov.). See also

the key to species below.

Distribution: Mainland China. Zhejiang Province (Wang et al. 2010; this study).

Biology: Reared from Cecidomyiidae galls on an unknown host plant (Wang et al. 2010), but this association must be confirmed. The new material examined was reared from undetermined hedgehog-like small galls on leaf veins (like those addressed by Schwéger et al. 2015b: 77, Fig. 366) of *Q. ciliaris*.

Remarks: According to Wang et al. (2010: 1035, 1036), the whole type series (holotype plus paratypes) is deposited in ZAFU. However, a paratype female was later sent to J. Pujade-Villar and deposited in UB.

***Saphonecrus gilvus* Melika and Schwéger, 2015**

Saphonecrus gilvus Melika and Schwéger in Schwéger et al. (2015b). *Zootaxa* 4054(1): 16. Type material: NCHU (holotype), paratypes in NCHU, PHMBL, and USNM.

Material examined (1 ♂ and 3 ♀): Deposited in ZAFU and UB with the following data: Taohuacun, Dabie Mountain, Yin, Huanggang (Hubei), Ex unknown gall, unknown tree, (23.vi.2014) 25.vii.2014 (1 ♀ deposited in ZAFU); Du Mountain (Guizhou), Ex unknown gall, unknown tree, 27.vi.1980, Shengxhen Zhou leg. (1 ♀ deposited in ZAFU); West Tianmu Mountain, Lin'an, Hangzhou (Zhejiang), Ex unknown gall, *Q. stewardiana*, (07.ix.2010) 11.ix.2010, Rui Guo leg. (1 ♂ and 1 ♀ deposited in UB).

Diagnosis: *Saphonecrus gilvus* is characterized by having lateral pronotal carina, which is short and incomplete, weak, indistinct dorsally (pronotum not sharply angled in dorsal view), simple tarsal claws (without a basal lobe), complete notauli and radial cell of the fore wing at most 3.0x as long as wide. Another species shares all these characteristics: *S. emarginatus*. The main differences between these two species have already been commented (see the diagnosis of *S. emarginatus*).

Distribution: Taiwan. Taichung county (Schwéger et al. 2015b). First record of this species from mainland China (Guizhou, Hubei, and Zhejiang Provinces).

Biology: Reared from undescribed hairy round galls on leaf midribs of *Quercus gilva* Blume (Schwéger et al. 2015b). The new material examined presented here was reared from unknown galls on *Q. stewardiana*, as well as from other unknown galls on unknown host trees.

***Saphonecrus globosus* Schwéger and Tang, 2015**

Saphonecrus globosus Schwéger and Tang in Schwéger et al.

(2015b). Zootaxa 4054(1): 20. Type material: NCHU (holotype), paratypes in NCHU, PHMBL, and USNM.

Material examined (17 ♂ and 35 ♀): Deposited in ZAFU and UB with the following data: Dashuwang, Tianmu Mountain (Zhejiang), Ex unknown gall, *Q. ciliaris*, (26.iv.2013) 08.v.2013, Shijun Wang leg. (3 ♂ and 3 ♀ deposited in ZAFU, 2 ♂ and 2 ♀ deposited in UB); Qingliangfeng, Lin'an, Hangzhou (Zhejiang), Ex unknown gall, *Q. glauca*, emerged 15.iv.2013 (4 ♂ and 8 ♀ deposited in ZAFU, 1 ♂ deposited in UB); Longtang Mountain, Hangzhou (Zhejiang), Ex unknown gall, *Q. stewardiana*, (15.iv.2013) 05.vii.2013, Shijun Wang leg. (4 ♂ and 10 ♀ deposited in ZAFU, 2 ♂ and 2 ♀ deposited in UB); Changhua Town, Hangzhou (Zhejiang), Ex unknown gall, *Q. stewardiana*, emerged 02.vii.2013 (6 ♀ deposited in ZAFU, 2 ♀ deposited in UB); Tianmu Mountain (Zhejiang), Ex unknown gall, unknown tree, emerged 05.iv.2015, Jie Shen leg. (1 ♂ and 1 ♀ deposited in UB); same data but collected (12. iv.2015) and emerged 06.v.2015 (1 ♀ deposited in UB).

Diagnosis: *Saphonecrus globosus* belongs to a group of species (*S. longinuxi* and *S. saliciniae*) that has lateral pronotal carina, simple tarsal claws and incomplete notauli, which reach at most to half length of the mesoscutum. It differs from *S. longinuxi* by a trapezoid head in anterior view (rounded in *S. longinuxi*), pedicel being 1.6x as long as wide (globose, as long as wide, in *S. longinuxi*) and F1 1.7x as long as F2 (F1 nearly equal to F2 in *S. longinuxi*). It differs from *S. saliciniae* by the transfacial distance being as long as height of eye (shorter in *S. saliciniae*), POL 2.3x as long as OOL and OOL 1.7x as long as diameter of lateral ocellus (POL 3.0x as long as OOL and OOL just slightly longer than diameter of lateral ocellus in *S. saliciniae*), pedicel 1.5–1.6x as long as wide in both sexes (2.1x as long as wide in females, just slightly longer than wide in males in *S. saliciniae*) and syntergite without punctures posterodorsally (with a small patch of micropunctures in *S. saliciniae*).

Distribution: Taiwan. Nantou county (Schwéger et al. 2015b). First record of this species from mainland China (Zhejiang Province).

Biology: Reared from undescribed leaf galls on *Q. glauca* (Schwéger et al. 2015b). The new material examined here was reared from unknown galls on *Q. ciliaris*, *Q. glauca* and *Q. stewardiana*.

***Saphonecrus leleyi* Melika and Schwéger, 2015**

Saphonecrus leleyi Melika and Schwéger in Schwéger et al. (2015b). Zootaxa 4054(1): 23. Type material: PHMBL.

Material examined (3 ♀): Deposited in UB with

the following data: West Tianmu Mountain, Lin'an, Hangzhou (Zhejiang), Ex unknown gall, unknown tree, emerged 24.iv.2011, Rui Guo leg. (2 ♀); Yuyingzi Village, Luanping (Hebei), Ex unknown gall, unknown tree, emerged 19.x.2015, Rui Guo leg. (1 ♀).

Diagnosis: *Saphonecrus leleyi* belongs to a group of species (*S. chaodongzhui*, *S. flavitibialis*, *S. segmentatus*, sp. nov. and *S. symbioticus*) characterized by the absence of lateral pronotal carina and by having tarsal claws with a basal lobe. *Saphonecrus leleyi* is grouped with *S. symbioticus*, both differing from the rest of the species within this group by F1 being at most 1.2x as long as F2 (longer in the rest of species), POL about 2.5x as long as OOL (2.0x or less in the rest of species), malar space 0.5x as long as height of eye (0.6–0.65 in the rest of species) and syntergite posteriorly without punctures (with a small patch of micropunctures in the rest of species). However, *S. leleyi* differs from *S. symbioticus* by having frons and vertex alutaceous to coriaceous, with scattered punctures (reticulate in *S. symbioticus*), mesoscutum with weak interrupted transversal carinae and mesoscutellum wrinkled (both reticulate to delicately coriaceous in *S. symbioticus*), OOL 2.1x as long as diameter of lateral ocellus (1.3 in *S. symbioticus*), notauli incomplete (complete in *S. symbioticus*) and radial cell of the fore wing 2.8x as long as wide (2.3–2.5 in *S. symbioticus*). See also the key to species below.

Distribution: Far Eastern Russia. Primorskij Krai (Schwéger et al. 2015b). First record of this species from mainland China (Hebei and Zhejiang Provinces).

Biology: Reared from undescribed bud galls on *Q. mongolica* Fisch. ex Ledeb. (Schwéger et al. 2015b). The hosts of the new material examined here is unknown.

***Saphonecrus lithocarpi* Pujade-Villar, Guo, Wang and Chen, 2015**

Saphonecrus lithocarpi Pujade-Villar, Guo, Wang and Chen in Pujade-Villar et al. (2015a). Entomotaxonomia 37(3): 214. Type material: ZAFU (holotype), paratypes in ZAFU and UB, according to Pujade-Villar et al. (2015 2017) and this work (see remarks).

Saphonecrus chinensis Tang and Schwéger in Schwéger et al. (2015b). Zootaxa 4054(1): 13. Type material: PHMBL. Synonymized by Pujade-Villar et al. (2017: 63).

Diagnosis: *Saphonecrus lithocarpi* belongs to a group of species (*S. albidus*, *S. fabris*, *S. nantoui* and *S. taiwanensis*) characterized by a strong and complete lateral pronotal carina, simple tarsal claws (without a basal lobe), complete notauli, and the radial cell of the fore wing at most 3.0x as long as wide. The differences between *S. lithocarpi* and *S. albidus* have already been

commented (see the diagnosis of *S. albidus*), as well as the differences between *S. lithocarpi*, *S. fabris* and *S. nantoui* (see the diagnosis of *S. fabris*). *Saphonecrus lithocarpi* is morphologically close to *S. taiwanensis*, from which differs by the subtrapezoid head in anterior view and genae being slightly broadened behind eyes (rounded in anterior view and with genae not broadened in *S. taiwanensis*), vertex delicately coriaceous (smooth in *S. taiwanensis*), female syntergite dorsodistally incised and with a small patch of micropunctures (not incised and without punctures in *S. taiwanensis*) and, in males, lower face, malar space and genae with sparse setae (with dense whitish setae in *S. taiwanensis*).

Distribution: Mainland China. Guangdong Province (Pujade-Villar et al. 2015a) and Yunnan Province (Schwéger et al. 2015b).

Biology: Reared from multilocular, integral swelling galls at the base of leaf midribs of *Lithocarpus harlandii* (Hance ex. Walpers) Rehder (Pujade-Villar et al. 2015a), and from undetermined round bud galls on *L. fenestratus* (Roxburgh) Rehder (Schwéger et al. 2015b).

Remarks: Pujade-Villar et al. (2017) noticed that the type series of *S. lithocarpi* is composed of females and males, and not only females as stated in the original description, so they described the males. Also Schwéger et al. (2015b) described *S. chinensis* (females and males), which later became a junior synonym of *S. lithocarpi*.

***Saphonecrus naiquanlini* Melika, Ács and Bechtold, 2004**

Saphonecrus naiquanlini Melika, Ács and Bechtold in Melika et al. (2004). Acta Zool. Hung. 50: 334. Type material: IZCAS (holotype), paratypes in IZCAS and PHMBL.

Diagnosis: *Saphonecrus naiquanlini* belongs to a group of species (*S. shanzhukui*, *S. shirakashii* and *S. shirokashicola*) characterized by having lateral pronotal carina and tarsal claws with a basal lobe. It differs from *S. shirokashicola* by the malar space being 0.6x as long as height of eye (0.5 in *S. shirokashicola*), POL 2.5x as long as OOL (2.0 in *S. shirokashicola*), notauli complete (incomplete, short, in *S. shirokashicola*) and female syntergite dorsodistally incised (not incised in *S. shirokashicola*). It differs from *S. shirakashii* by the transfacial distance being as long as height of eye (longer in *S. shirakashii*), POL 2.5x as long as OOL (3.0 in *S. shirakashii*) and mesoscutum with weak interrupted transversal carinae (delicately coriaceous to alutaceous in *S. shirakashii*). Lastly, it differs from *S. shanzhukui* by the malar space being 0.6x as long as height of eye (0.7 in *S. shanzhukui*), the vertex delicately coriaceous with very weak, delicate dense transverse rugae

(alutaceous to smooth in *S. shanzhukui*), and OOL slightly longer than diameter of lateral ocellus (1.6 in *S. shanzhukui*). See also the key to species below.

Distribution: Mainland China. Zhejiang Province (Melika et al. 2004; Wang et al. 2010).

Biology: Unknown (Melika et al. 2004; Wang et al. 2010).

Remarks: According to both the original description and drawings given in Melika et al. (2004: 332, 334), this species has the speculum smooth and shining, without striae, and POL 3.5x as long as OOL. However, the photos of one of the paratypes of *S. naiquanlini* provided by Schwéger et al. (2015b: 69) reveal that the speculum is completely striate, and that POL is at most 2.5x as long as OOL. Other differences observed between the photos provided by Schwéger et al. (2015b) and the original description are that the malar space is 0.6x as long as height of eye (0.5 in the original description) and F11 is almost 2.0x as long as F10 (1.3 in the original description). Furthermore, *S. naiquanlini* is keyed out twice in the morphological key provided by Schwéger et al. (2015b: 12): one for specimens measuring more than 2.5 mm in length and with the mesoscutum strongly transversely carinate, and the other for specimens spanning from 1.3–2.0 mm in length and with the mesoscutum coriaceous, without or with weak carinae. This species shows no size nor sculptural variability, with all the specimens belonging to the type series being 2.0 mm long and having the mesoscutum weakly carinate, according to the original description; so, the option for larger specimens with a stronger sculpture in the key is incorrect.

***Saphonecrus nantoui* Tang, Schwéger and Melika, 2015**

Saphonecrus nantoui Tang, Schwéger and Melika in Schwéger et al. (2015b). Zootaxa 4054(1): 34. Type material: NCHU (holotype), paratypes in NCHU, PHMBL, and USNM.

Material examined (1 ♀): Deposited in ZAFU with the following data: Linglong Mountain, Lin'an, Hangzhou (Zhejiang), Ex unknown gall, unknown tree.

Diagnosis: *Saphonecrus nantoui* belongs to a group of species (*S. albidus*, *S. fabris*, *S. lithocarpi* and *S. taiwanensis*) characterized by a strong and complete lateral pronotal carina, simple tarsal claws (without a basal lobe), complete notauli, and the radial cell being at most 3.0x as long as wide. The differences between *S. nantoui* and *S. albidus* have already been commented (see the diagnosis of *S. albidus*), as well as the differences between *S. nantoui*, *S. fabris*, *S. lithocarpi* and *S. taiwanensis* (see the diagnosis of *S. fabris*).

Distribution: Taiwan. Nantou county (Schwéger

et al. 2015b). First record of this species from the mainland China (Zhejiang Province).

Biology: Reared from undescribed leaf petiole thickening galls on *Q. glauca* (Schwéger et al. 2015b). The biology of the new material examined here is unknown.

***Saphonecrus segmentatus* Lobato-Vila and Pujade-Villar, sp. nov.**

(Figs. 3–4)

urn:lsid:zoobank.org:act:AB3C666C-7C53-4174-99E6-D2AB85BB894E

Type material: Holotype ♀ deposited in UB with the following labels: ‘Baima Snow Mountain, Deqin (Yunnan), 3350–4290 m, Ex unknown gall, unknown tree, 21.viii.2009, Lixin Su leg.’ (white label) / ‘Holotype ♀ *Saphonecrus segmentatus* Lobato-Vila and Pujade-Villar, Lobato-Vila desig. 2020’ (red label). Paratype (1 ♀) deposited in UB with the following labels: ‘Yunshanping, Yulon Snow Mountain, Lijiang (Yunnan), Ex unknown gall, unknown tree (net capture), 12.vii.2014, Rui Guo leg.’ (white label) / ‘Paratype ♀ *Saphonecrus segmentatus* Lobato-Vila and Pujade-Villar, Lobato-Vila desig. 2020’ (red label).

Etymology: From the Latin term ‘segmentum’ for segment (and ‘segmentatus’ for segmented), as females of this species have 14-segmented antennae instead of 13-segmented like most of species within *Saphonecrus*.

Diagnosis: *Saphonecrus segmentatus*, sp. nov. belongs to a group of species (*S. chaodongzhui*,

flavitibilis, *S. leleyi* and *S. symbioticus*) characterized by the absence of lateral pronotal carina and by having tarsal claws with a basal lobe. It is morphologically close to *S. chaodongzhui*, both having females with 14-segmented antennae (instead of 13-segmented typical of *Saphonecrus*), pedicel at most 1.5x as long as wide and genae not broadened behind eyes. Differences between these two species have already been commented on (see the diagnosis of *S. chaodongzhui*).

Description: Female: Length: Body length 2.0–2.3 mm ($n = 2$).

Color (Fig. 3a, b): Lower face, gena, frons laterally and occiput, yellow; frons medially, vertex and area surrounding the occipital foramen, dark brown to black. Antenna yellow, the tip somewhat darker (Fig. 3b). Mesosoma dark brown to black; tegula yellow. Metasoma dark rufous to chestnut, hypopygium lighter. Legs yellow, except dark brown basal half of metacoxae and distal tarsi. Wings hyaline, veins brownish.

Head: Subtrapezoid, almost 1.3x as wide as high in anterior view (Fig. 4a), gena slightly curved aside, not expanded behind eye. Face faintly pubescent, lower face with regular and dense striae radiating from clypeus, reaching eye and toruli; medial striae absent. Clypeus indistinct, ventral margin straight, not projected over mandibles. Malar space above 0.6x as long as height of eye. Anterior tentorial pits small, inconspicuous; pleurostomal and epistomal sulcus absent. Transfacial distance slightly longer than height of eye. Toruli located under mid-height of eyes; distance between torulus and eye about as long as diameter of torulus;

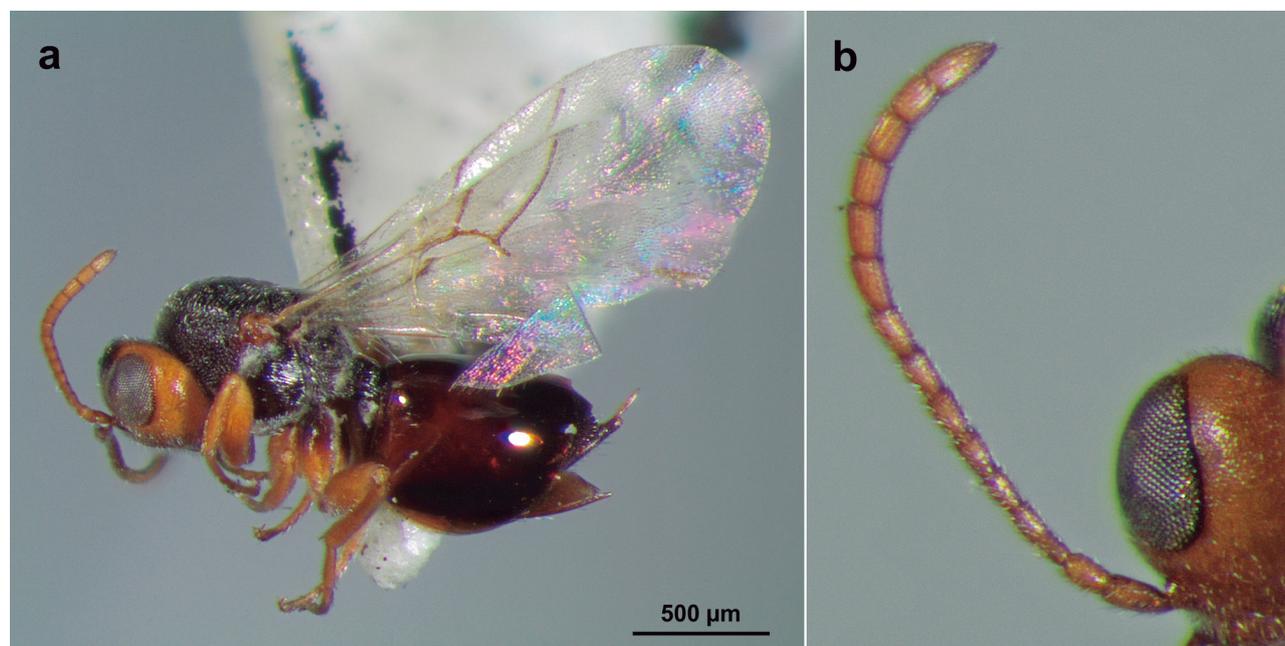


Fig. 3. *Saphonecrus segmentatus* Lobato-Vila and Pujade-Villar, sp. nov. (female): a, habitus; b, antenna.

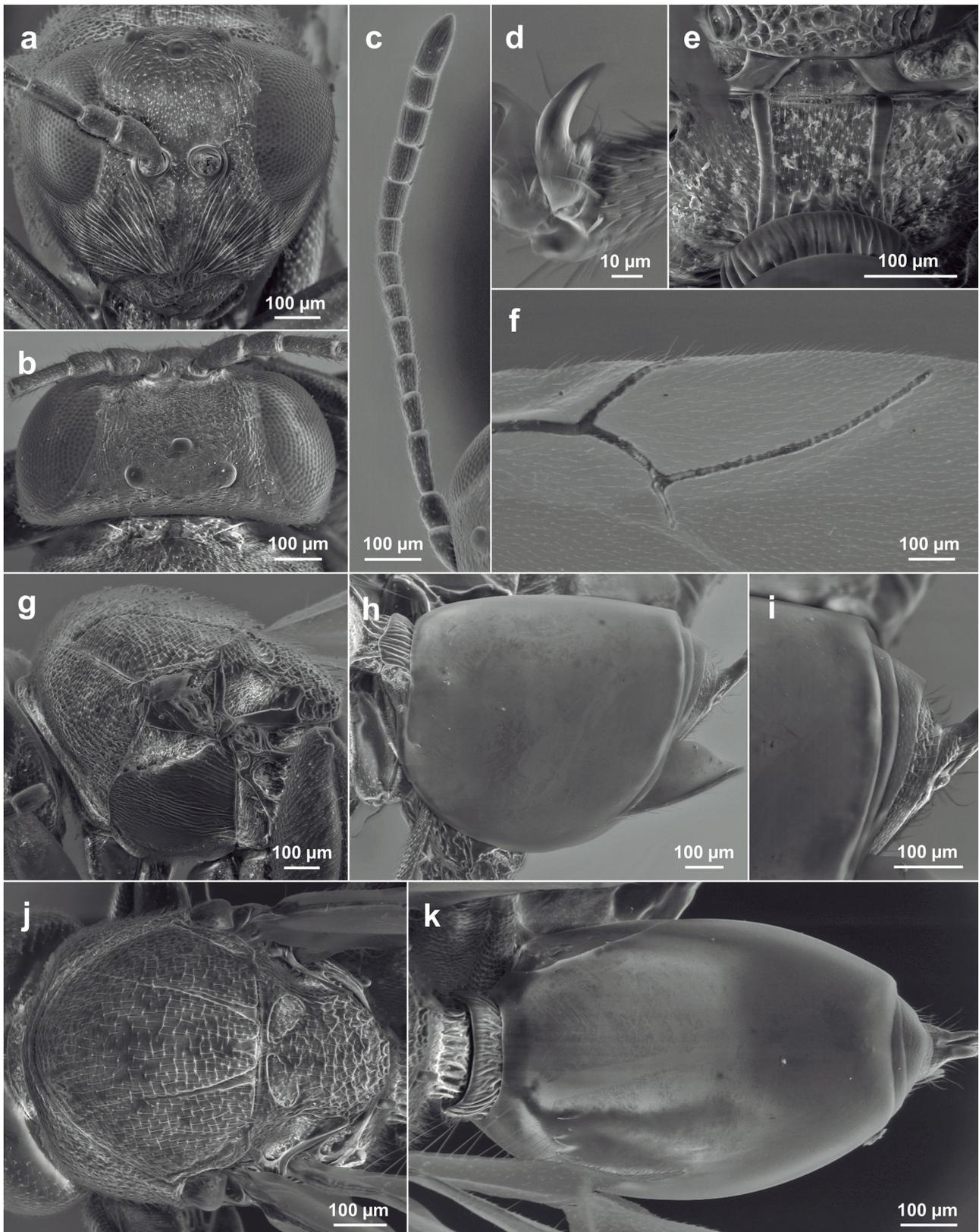


Fig. 4. *Saphonecrus segmentatus* Lobato-Vila and Pujade-Villar, sp. nov. (female): a, head in anterior view; b, head in dorsal view; c, antenna; d, tarsal claw; e, propodeum; f, radial cell of the fore wing; g, mesosoma in lateral view; h, metasoma in lateral view; i, detail of metasomal punctuation; j, mesosoma in dorsal view; k, metasoma in dorsal view.

distance between toruli shorter than diameter of torulus. Frons delicately coriaceous, with small and scattered piliferous punctures, without wrinkles; lateral frontal carina absent. Head (Fig. 4b) is about 2.0x as wide as long in dorsal view. Vertex delicately coriaceous, with small and scattered piliferous punctures, without wrinkles. POL: OOL: LOL = 5: 3.5: 2.5 and diameter of lateral ocellus, 1.5. Occiput coriaceous, without punctures nor wrinkles.

Antennae (Fig. 4c): 14-segmented (4: 3: 4.5: 2.5: 2.5: 2.5: 3: 3: 3: 3: 3: 3: 3: 5); short, barely reaching the mesoscutellum; almost filiform, slightly broadened apically; with dense and short pubescence; placodeal sensilla on F3–F12. Pedicel about 1.5x as long as wide; F1 almost 2.0x as long as F2 and 1.5x as long as pedicel, F2 as long as F3. Last flagellomere 2.5x as long as wide and 1.7x as long as F11.

Mesosoma: About 1.2x as long as high in lateral view including nucha, with short, sparse setae (Fig. 4g). Ratio of length of pronotum medially/laterally: 0.25. Pronotal plate indistinct (Fig. 4b). Pronotum laterally coriaceous, somewhat imbricate basally; lateral carina absent, the pronotal contour rounded from dorsal view (Fig. 4g). Mesoscutum (Fig. 4j) about 1.1x as wide as long, coriaceous to weakly imbricate; anterior grooves shallow and narrow, almost inconspicuous. Notauli complete, narrower and less impressed anteriorly, broader and convergent posteriorly. Median groove shallow, short, projecting to at most 1/3 of mesoscutal length. Parapsidal grooves shallow, almost inconspicuous. Mesoscutellum (Fig. 4j) rounded, about as long as wide, imbricate to weakly wrinkled, especially posteriorly; circumscutellar carina absent; scutellar foveae subtriangular, well defined, the bottom weakly sculptured and separated by a narrow median carina. Mesopleuron (Fig. 4g) finely and more or less regularly striate, interspaces smooth and shining; slightly pubescent basally. Metapleural sulcus reaches to 4/5 of mesopleural height. Propodeum (Fig. 4e) densely pubescent, smooth; propodeal carinae straight and parallel. Nucha weakly sulcate dorsally and laterally (Fig. 4h, k).

Legs: Tarsal claws bidentate, with small basal lobe (Fig. 4d).

Wings: Fore wings pubescent with short marginal setae, slightly longer than body length (Fig. 3a). Radial cell open, about 3.0x as long as wide (Fig. 4f); areolet with only the posterior vein well pigmented. Rs+M inconspicuous, not reaching basalis. Basal cell sparsely setose.

Metasoma: About as long as head+mesosoma, about 1.4x as long as high in lateral view (Fig. 4h). Syntergite smooth, with few setae anterolaterally, posterodorsally with a small patch of micropunctures

(Fig. 4i); slightly or not incised dorsodistally; subsequent tergites punctate (Fig. 4i). Hypopygial spine above 2.0x as long as wide, with few lateral setae; without apical setae.

Male: Unknown.

Distribution: Mainland China (Yunnan Province).

Biology: Unknown.

***Saphonecrus shirakashii* (Shinji, 1940)**

Andricus shirakashii Shinji, 1940. Insect World 44: 290. Type material: presumably lost, according to Wachi et al. (2011b).

Ufo shirakashii Wachi et al. (2011b). Ann. Entomol. Soc. Am. 104(4): 622.

Saphonecrus shirakashii Melika et al. (2012). Zootaxa 3478: 156.

Saphonecrus tianmushanus Wang and Chen in Wang et al. (2010).

Biologia 65(6): 1037. Type material: ZAFU. Synonymized by Pujade-Villar et al. (2017: 62).

Material examined (1 ♂ and 7 ♀): Deposited in ZAFU and UB with the following data: Guadun, Wuyi Mountain (Fujian), Ex unknown gall, unknown tree, 30.vii.2015, Jie Shen leg. (1 ♀ deposited in ZAFU); Tianmu Mountain (Zhejiang), 06.iv.2015, Jie Shen leg. (1 ♀ deposited in ZAFU); West Tianmu Mountain (Zhejiang), 02.vii.2000, Yun Ma leg. (1 ♀ deposited in ZAFU); Longtang Mountain (Zhejiang), Ex unknown gall, unknown tree, (22.iii.2013) 15.iv.2013 (1 ♂ and 1 ♀ deposited in UB); Baima Snow Mountain, Deqin (Yunnan), 3350–4290 m, Ex unknown gall, unknown tree, 21.viii.2009, Lixin Su leg. (1 ♀ deposited in UB); Tianmu Mountain (Zhejiang), Ex unknown gall, unknown tree, 11.v.1999, Mingshui Zao leg. (2 ♀ deposited in UB).

Diagnosis: *Saphonecrus shirakashii* belongs to a group of species (*S. naiquanlini*, *S. shanzhukui* and *S. shirokashicola*), characterized by the presence of the lateral pronotal carina and tarsal claws with a basal lobe. It differs from *S. shirokashicola* by the malar space being 0.6x as long as height of eye (0.5 in *S. shirokashicola*), POL 3.0x as long as OOL (2.0 in *S. shirokashicola*), notauli complete (incomplete, short, in *S. shirokashicola*) and female syntergite dorsodistally incised (not incised in *S. shirokashicola*). It differs from *S. naiquanlini* and *S. shanzhukui* by the transfacial distance being slightly longer than height of eye (as long as height of eye in these two species), frons alutaceous, shiny (delicately coriaceous in these two species), POL 3.0x as long as OOL (2.5 in these two species), and mesoscutum and mesoscutellum delicately coriaceous to alutaceous, mesoscutellum just somewhat wrinkled laterally and posteriorly (mesoscutum with weak interrupted transversal carinae or coriaceous with weak transversal elements not forming true carinae and mesoscutellum wrinkled in these two species). See also

the key to species below.

Distribution: Japan (Honshū and Kyūshū islands) (Wachi et al. 2011b; Melika et al. 2012); Taiwan (Nantou, Taichung and Hsinchu counties) (Melika et al. 2012); mainland China (Fujian, Yunnan and Zhejiang Provinces) (Wang et al. 2010; Pujade-Villar et al. 2017; this paper); South Korea (Lobato-Vila et al. 2020d).

Biology: Reared from undescribed leaf galls on *Q. glauca* (Wachi et al. 2011b; Melika et al. 2012), and from *Neuroterus* nr. *hakonensis* Ashmead on *Q. glauca* (Lobato-Vila et al. 2020d). The biology of the new material presented here is unknown.

Saphonecrus sinicus Belizin, 1968 incertae sedis

Saphonecrus sinicus Belizin, 1968. Zool. Zh. 47(5): 701. Type material: probably lost, according to Schwéger et al. (2015b).

Distribution: Mainland China. Sichuan Province (Belizin 1968).

Biology: Unknown (Belizin 1968).

Remarks: According to the original description (Belizin 1968), it is not clear if *S. sinicus* is a *Saphonecrus*. The number of antennal segments is not mentioned and, despite having the radial cell open, according to its descriptor, *S. sinicus* has two morphological traits that are untypical among *Saphonecrus* species: smoky wings and a broad mesoscutellum, the width of which is equal to the width of the mesoscutum. Schwéger et al. (2015b) consider *S. sinicus* as a valid species within *Saphonecrus*, despite they were unable to locate its type material (a single female). Since the original description does not give us enough data to decide *S. sinicus* is a valid species or even a *Saphonecrus*, we propose it here as *incertae sedis* until the type material is found and examined.

Key to Eastern Palaearctic and Oriental Saphonecrus species^{a,b}

- 1. Frons with numerous parallel striae, extending from toruli to lateral ocelli. Mesoscutum with strong and prominent transversal carinae. Female antenna 14-segmented *S. ? serratus*
- Frons without parallel striae; smooth, alutaceous, microreticulate, micropunctate or coriaceous; lateral frontal carina usually absent. Mesoscutum from alutaceous or coriaceous to weakly transversely carinate. Female antenna usually 13-segmented, rarely 14 2
- 2. Lateral frontal carina present, strong, reaching lateral ocellus *S. yukawai*^c
- Lateral frontal carina absent 3
- 3. Lateral pronotal carina absent, anterolateral sides of pronotum rounded in dorsal view. Tarsal claws with basal lobe. Female antenna 13- or 14-segmented 4
- Lateral pronotal carina present, complete or partially complete, anterolateral sides of pronotum usually sharply angled in dorsal view. Tarsal claws usually simple, without a basal lobe, rarely

- bidentate. Female antenna 13-segmented 8
- 4. F1 at most 1.2x as long as F2. POL about 2.5x as long as OOL. Malar space 0.5x as long as height of eye. Syntergite posteriorly without punctures. Female antenna 13-segmented 5
- F1 1.6–2.0x as long as F2. POL 2.0 or less times as long as OOL. Malar space 0.6–0.65x as long as height of eye. Syntergite with small posterodorsal patch of micropunctures. Female antenna 13- or 14-segmented 6
- 5. Frons and vertex alutaceous to coriaceous, with scattered punctures. Mesoscutum with weak interrupted transversal carinae. Mesoscutellum wrinkled, scutellar foveae separated by a wide septum. Head 1.8x as wide as long in dorsal view. OOL 2.1x as long as diameter of lateral ocellus. Notauli incomplete, reaching at most to half of mesoscutum length. Radial cell 2.8x as long as wide *S. leleyi*
- Frons and vertex reticulate. Mesoscutum and mesoscutellum reticulate to delicately coriaceous, scutellar foveae separated by narrow median carina. Head 2.1x as wide as long in dorsal view. OOL 1.3x as long as diameter of lateral ocellus. Notauli complete, sometimes less impressed anteriorly. Radial cell 2.3–2.5x as long as wide *S. symbioticus*
- 6. Female antenna 13-segmented. Pedicel almost 2.0x as long as wide. Head 1.5x as wide as high in frontal view and 2.3x as wide as long in dorsal view. Gena slightly broadened behind eye. Face dark brown to black *S. flavitibialis*
- Female antenna 14-segmented. Pedicel 1.3–1.5x as long as wide. Head at most 1.3x as wide as high in frontal view and at most 2.0x as wide as long in dorsal view. Gena not broadened behind eye. Face reddish brown to yellow 7
- 7. Frons and vertex delicately coriaceous, without punctures. POL 1.7x as long as OOL, OOL 1.8–2.0x as long as diameter of lateral ocellus. Mesoscutum with weak interrupted transverse carinae. Scutellar foveae indistinctly defined, with same sculpture as the rest of disk. Face reddish brown, except two blackish brown lateral spots on lower face *S. chaodongzhui*
- Frons and vertex delicately coriaceous, with scattered punctures. POL 1.4x as long as OOL, OOL 2.3x as long as diameter of lateral ocellus. Mesoscutum coriaceous to weakly imbricate, without transverse carinae. Scutellar foveae well defined, subtriangular, weakly sculptured. Face mainly yellow *S. segmentatus* sp. nov.
- 8. Mesoscutum densely punctate *S. diversus*
- Mesoscutum reticulate, alutaceous, coriaceous or with weak transverse carinae, never densely punctate 9
- 9. Tarsal claws bidentate, with a basal lobe 10
- Tarsal claws simple, without a basal lobe 13
- 10. Malar space 0.5x as long as height of eye. POL 2.0x as long as OOL. Pedicel 1.5x as long as wide. F1 1.6–1.7x as long as F2. Notauli incomplete, short. Female syntergite not incised dorsodistally *S. shirokashicola*
- Malar space 0.6–0.7x as long as height of eye. POL 2.5–3.0x as long as OOL. Pedicel about 2.0x as long as wide. F1 1.1–1.4x as long as OOL. Notauli complete. Female syntergite slightly incised dorsodistally 11
- 11. Transfacial distance slightly longer than height of eye. Frons alutaceous, shining. POL 3.0x as long as OOL. Mesoscutum and mesoscutellum delicately coriaceous to alutaceous, mesoscutellum with wrinkles laterally and posteriorly. Radial cell 3.2–3.5x as long as wide *S. shirakashii*
- Transfacial distance as long as height of eye. Frons delicately coriaceous. POL 2.5x as long as OOL. Mesoscutum with weak interrupted transverse carinae or coriaceous with weak transverse elements not forming true carinae, mesoscutellum wrinkled. Radial cell 3.0x as long as wide 12

12. Malar space 0.6x as long as height of eye. Vertex delicately coriaceous with very weak, delicate dense transverse striae. OOL slightly longer than diameter of lateral ocelli. Female metasoma slightly longer than high in lateral view *S. naiquanlini*
- Malar space 0.7x as long as height of eye. Vertex alutaceous to smooth. OOL 1.6x as long as diameter of lateral ocelli. Female metasoma nearly as long as high *S. shanzhukui*
13. Notauli incomplete, reaching at most half of mesoscutum length 14
- Notauli complete, deep or shallow, somewhat interrupted by the sculpture of mesoscutum, but always reaching the pronotal margin 16
14. Female and male more than 2.0 mm in length. Head rounded in frontal view. In both sexes, pedicel globose, about as long as wide, and F1 nearly equal to F2. Mesoscutellum alutaceous to coriaceous, weakly wrinkled posteriorly and laterally. Radial cell 4.0x as long as wide *S. longinuxi*
- Female 1.4–1.8 mm long, male 1.0–1.6 mm long. Head trapezoid in frontal view. Pedicel more than 1.5x as long as wide at least in females (nearly as long as wide in males of *S. salicinai*), and F1 1.5 or more times as long as F2 in both sexes. Mesoscutellum wrinkled. Radial cell 3.2–3.5x as long as wide 15
15. Transfacial distance as long as height of eye. POL 2.3x as long as OOL and OOL 1.7x as long as diameter of lateral ocelli. Pedicel 1.5–1.6x as long as wide in both sexes. Syntergite without punctures posterodorsally *S. globosus*
- Transfacial distance slightly shorter than height of eye. POL 3.0x as long as OOL and OOL slightly longer than diameter of lateral ocellus. Pedicel 2.1x as long as wide in females, slightly longer than wide in males. Syntergite with a small patch of micropunctures posterodorsally *S. saliciniai*
16. Radial cell of the fore wing at most 3.0x as long as wide 17
- Radial cell of the fore wing at least 3.5x as long as wide 23
17. Lateral pronotal carina short and incomplete or weak, indistinct dorsally, pronotum slightly or not sharply angled in dorsal view 18
- Lateral pronotal carina strong and complete, reaching lateral edge of pronotum, pronotum sharply angled in dorsal view 19
18. Malar space 0.6x as long as height of eye. Transfacial distance slightly shorter than height of eye. Frons and vertex coriaceous. POL 1.7x as long as OOL and OOL slightly longer than diameter of lateral ocellus. F1 1.2–1.3x as long as wide in both sexes. Median mesoscutal impression shallow but visible. Female syntergite incised dorsodistally. Reared from galls on *Lithocarpus* *S. emarginatus*
- Malar space 0.7x as long as height of eye. Transfacial distance 1.2x as long as height of eye. Frons and vertex alutaceous, shining. POL 2.6x as long as OOL and OOL 1.5x as long as diameter of lateral ocellus. F1 1.7x as long as F2 in females, 2.3 in males. Median mesoscutal impression absent. Female syntergite not incised dorsodistally. Reared from galls on *Quercus* *S. gilvus*
19. Head and mesosoma dark brown to black; metasoma yellow. Malar space about 0.3x as long as height of eye. Transfacial distance 0.7x as long as height of eye. Mesoscutum and mesoscutellum alutaceous to delicately coriaceous, mesoscutellum with weak wrinkles posteriorly and laterally. Median mesoscutal impression in form of a short incision *S. albidus* sp. nov.
- Head and mesosoma reddish brown, dark brown or black; metasoma reddish brown to dark brown. Malar space 0.6 or more times as long as height of eye. Transfacial distance at least 0.9x as long as height of eye, usually equal or longer. Mesoscutum with weak interrupted transverse carinae, mesoscutellum wrinkled. Median mesoscutal impression absent 20
20. F1 slightly longer than F2 in both sexes. Scutellar foveae separated by a wide septum. Reared from galls on *Lithocarpus* 21
- F1 1.3–1.4x as long as F2 in females, 1.5–1.6 in males. Scutellar foveae separated by a narrow carina. Reared from galls on *Quercus* 22
21. Head subtrapezoid in frontal view, gena slightly broadened behind eye. Vertex delicately coriaceous. Female syntergite incised dorsodistally, with a small patch of micropunctures. In males, lower face, malar space and gena with sparse setae *S. lithocarp*
- Head rounded in frontal view, gena not broadened behind eye. Vertex smooth. Female syntergite not incised dorsodistally, without micropunctures. In males, lower face, malar space and gena with dense whitish setae *S. taiwanensis*
22. Malar space 0.7–0.8x as long as height of eye. Scutellar foveae with smooth, shining bottom. Radial cell 2.7–2.8x as long as wide. Female syntergite slightly incised dorsodistally *S. fabris*
- Malar space 0.6x as long as height of eye. Scutellar foveae with some wrinkles on smooth bottom. Radial cell 2.5x as long as wide. Female syntergite strongly incised dorsodistally *S. nantoui*
23. Vertex smooth. Pedicel almost 3.0x as long as wide .. *S. nicholli*
- Vertex alutaceous. Pedicel about 2.0x as long as wide 24
24. Head trapezoid in frontal view. Transfacial distance slightly longer than height of eye. Radial cell about 4.0x as long as wide 25
- Head rounded in frontal view (except in males of *S. taitungi*, which is trapezoid). Transfacial distance slightly shorter than height of eye. Radial cell 3.6–3.7x as long as wide 26
25. Malar space 0.6x as long as height of eye. OOL 1.3x as long as diameter of lateral ocellus. Female syntergite slightly incised dorsodistally, with small patch of micropunctures. Males 2.2–2.3 mm in length, with F1 1.2x as long as F2 and weakly incised medially, very slightly expanded apically and basally *S. morii*
- Malar space 0.8x as long as height of eye. OOL slightly longer than diameter of lateral ocellus. Female syntergite not incised dorsodistally, without micropunctures. Males 1.3–1.6 mm in length, with F1 1.5x as long as F2 and strongly curved and incised medially, strongly expanded apically, not expanded basally *S. pachylomai*
26. Gena not broadened behind eye. POL 2.7x as long as OOL. OOL about 1.3x as long as diameter of lateral ocellus. Scutellar foveae indistinctly delimited, with wrinkled bottom. Female syntergite strongly incised dorsodistally. Hypopygial spine longer than wide. Reared from galls on *Quercus* *S. robustus*
- Gena slightly broadened behind eye. POL 2.2x as long as OOL. OOL slightly longer than diameter of lateral ocellus. Scutellar foveae well delimited, weakly sculptured. Female syntergite slightly incised dorsodistally. Hypopygial spine as long as wide. Reared from galls on *Lithocarpus* *S. taitungi*
- ^aBased on the key by Schwéger et al. (2015b) but omitting the Western Palearctic species, since these are not present neither in the Eastern Palearctic nor in the Oriental region. *Saphonecrus excisus* and *S. sinicus* are considered as *nomen dubium* and *incertae sedis*, respectively (see the discussion), and are not included in the key.
- ^b*Saphonecrus areolatus* (Weld), from Philippines, is not included in the key because it is no longer a *Saphonecrus* (Lobato-Vila et al. 2021).

^c*Saphonecrus yukawai* Wachi, Ide and Abe was transferred to *Synergus* by Schwéger et al. (2015b) and re-established in *Saphonecrus* by Ide et al. (2018).

Genus *Ufo* Melika and Pujade-Villar, 2005

No new material of *Ufo* was found in ZAFU, only types of a single species, *U. rufiventris* Wang, Guo, Wang, Pujade-Villar and Chen, 2016, and non-type specimens of *U. cerroneuroteri* Tang and Melika, 2012 that were mentioned in Wang et al. (2016). Currently, only these two species (out of five known species) are known from mainland China. An updated key to the species based on the key given by Melika et al. (2012) is provided.

Ufo cerroneuroteri Tang and Melika, 2012

Ufo cerroneuroteri Tang and Melika in Melika et al. (2012). Zootaxa 3478: 147. Type material: NMNS (holotype), paratypes in PPLD, USNM, and NCHU.

Diagnosis: See Melika et al. (2012).

Distribution: Taiwan (Nantou, Hsinchu and Taoyuan counties) and South Korea (Melika et al. 2012), and mainland China (Zhejiang Province) (Wang et al. 2016).

Biology: Reared from asexual galls of *Cerroneuroterus vonkuenburgi* (Dettmer) and *Biorhiza nawai* (Ashmead), both reared from on *Q. variabilis* (Melika et al. 2012), and from unknown galls on the underside of leaves of *Q. chenii* Nakai (Wang et al. 2016) (probably *Trichagalma* sp., according to the pictures of the gall provided by the authors: 224).

Remarks: According to Melika et al. (2012: 156), a paratype of *U. koreanus* labeled as 'KOREA, NIAST, 10. Oct. 1997, YPT., June Yeol Choi.' belongs to *U. cerroneuroteri*.

Ufo rufiventris Wang, Guo, Wang, Pujade-Villar and Chen, 2016

Ufo rufiventris Wang, Guo, Wang, Pujade-Villar and Chen, 2016 in Wang et al. (2016). Entomotaxonomia 38 (2): 222. Type material: ZAFU.

Diagnosis: See Wang et al. (2016).

Distribution: Mainland China. Zhejiang Province (Wang et al. 2016).

Biology: Undetermined galls on the underside of leaves of *Q. acutissima* (Wang et al. 2016). The galls are probably induced by a species of *Cerroneuroterus*, according to the pictures provided by Wang et al. (2016: 225).

Remarks: After examining the type material of this species (the holotype and one paratype, both females) and checking the original description (Wang et al. 2016: 222), we noticed that some morphological characteristics were incorrectly mentioned: pedicel of antenna in *U. rufiventris* is 1.5x as long as wide, which is correct in the main text of the description but incorrect in the drawing given by the authors, where the pedicel is more than 2.0x as long as wide; also the ratio pedicel/F1/F2 is incorrect; the mesoscutum finely coriaceous, with some weak striae and punctures (which are absent in the description); notauli are incomplete, reaching at most 1/3 or 1/2 of the mesoscutum length, and not complete as stated in the original description; parapsidal and anterior lines are visible, however, shallowly impressed, but not absent as stated in the original description; the radial cell is at most 2.5x as long as wide, and not 2.8 as mentioned in the description; and Rs vein is not straight, but slightly curved at the terminal end.

Key to *Ufo* species^a

1. Notauli complete. Median mesoscutal line present in a form of short triangle posteriorly *U. cerroneuroteri*
- Notauli incomplete, extending most to half-length of mesoscutum, very indistinct or even absent in the anterior half. Median mesoscutal line absent 2
2. Frons smooth, shining, at most very finely alutaceous 3
- Frons finely coriaceous to microreticulate 4
3. Head about 2.7–2.8x as long in dorsal view. Radial cell of fore wing above 3.0x as long as wide. Body uniformly reddish brown to black *U. abei*
- Head about 2.3x as wide as long in dorsal view. Radial cell of fore wing at most 2.5x as long as wide. Body blackish brown to black, metasoma rufous to chestnut *U. rufiventris*
4. Lower face with dense white setae. Malar space about 0.5x as long as height of eye. F1 of female antenna 2.0x as long as pedicel *U. nipponicus*
- Lower face with scattered setae. Malar space above 0.6x as long as height of eye. F1 of female about 1.5x as long as pedicel *U. koreanus*

^aBased on the key by Melika et al. (2012), here we include *U. rufiventris*.

DISCUSSION

The worldwide distribution of three of the genera studied in this paper, *Ceroptres*, *Lithosaphonecrus* and *Ufo*, is more or less well delimited. However, when referring to *Saphonecrus*, which has been linked mainly to the Palaearctic, worldwide distribution turns out to be less clear, especially regarding the Nearctic region. Two species of *Saphonecrus* were described from the Nearctic: *S. gemmariae* (Ashmead, 1885) and

S. favanus Weld, 1944 (Ashmead 1885; Weld 1944). Herein, we consider *S. gemmariae* as *incertae sedis*, at least until the type material is found and examined. *Saphonecrus favanus*, which was reared from root galls in Washington D.C. and Missouri (USA), might represent a distinct, *Saphonecrus*-related, undescribed genus (Pénzes et al. 2012, Schwéger et al. 2015b), even though new material is required to decide whether it is a new genus or not. Thus, the presence of *Saphonecrus* in the Nearctic region is doubtful. Furthermore, the morphological boundaries between some *Synergus* species from the New World (Nearctic and Neotropical regions) and *Saphonecrus* are vague (Lobato-Vila and Pujade-Villar 2017; Lobato-Vila et al. 2020c), which makes us question even more the division between these two genera.

In contrast to Nearctic *Saphonecrus*, the Palearctic fauna, at least the Western Palearctic fauna (represented by seven species: *S. barbotini* Pujade-Villar and Nieves-Aldrey, 1986; *S. connatus* (Hartig, 1840); *S. gallaepomifomis* (Boyer de Fonscolombe, 1832); *S. haimi* Mayr, 1873; *S. irani* Melika and Pujade-Villar, 2006; *S. kuriphilusi* Melika and Avtzis, 2018; and *S. undulatus* (Mayr, 1872)), seems to be better known. However, the Eastern Palearctic fauna, which includes most of the species within this genus described to date, is still poorly characterized. Furthermore, some species have not been found since being described, and their validity is herein questioned. This is the case for *Saphonecrus excisus* (Kieffer, 1904), a species presumably reared from *Neuroterus* galls on *Lithocarpus* from India (Kurseong, West Bengal) (Kieffer 1904). According to Schwéger et al. (2015b), the type material of *S. excisus* is lost, and moreover its original description is too vague to differentiate it from other *Saphonecrus*; for this reason, we consider *S. excisus* as *nomen dubium* until the type material is found and we can conclude whether it is a valid species or not.

Another difficult species from Asia is *Saphonecrus serratus* Weld, 1926, which was included in the key of genera provided by Schwéger et al. (2015b) between *Saphonecrus* and *Lithosaphonecrus*. We consider this to be a doubtful species, so we decided to include it in the updated morphological key of *Saphonecrus* as *Saphonecrus? serratus*. According to the original description (Weld 1926) and Schwéger et al. (2015b), *S. serratus* differs from a typical *Saphonecrus* mainly by the number of antennal segments in females (14 in *S. serratus*, almost always 13 in the rest of *Saphonecrus*) and the sculpture of both head and mesoscutum (frons with striae running from toruli to ocelli and mesoscutum with strong transverse carinae in *S. serratus*, whereas the head is delicately sculptured, without striae

and usually without lateral frontal carinae, and the mesoscutum is from alutaceous or coriaceous to weakly carinate in the rest of *Saphonecrus*). Frontal striae in *Saphonecrus serratus* resemble those found in *Lithosaphonecrus*; however, *S. serratus* differs from all known *Lithosaphonecrus* by having F1 only slightly longer than F2 (F1 always longer than F2 in both sexes in *Lithosaphonecrus*), antennae of females with 14 segments (always 13 in *Lithosaphonecrus*), and the syntergite with a posterodorsal patch of micropunctures (posteriorly punctured or reticulate, the sculpture forming a band always reaching the ventral edge of the tergite in *Lithosaphonecrus*) (Bozsó et al. 2015; Pujade-Villar et al. 2020c). Since we have not examined the type material of *S. serratus* and males are still unknown for this species, it is still questionable whether this species belongs to *Lithosaphonecrus* or *Saphonecrus*.

Morphological and molecular boundaries between *Saphonecrus* and other related genera are still unclear. *Saphonecrus* has been considered as a non-monophyletic group by several authors (Pujade-Villar and Nieves-Aldrey 1990; Melika 2006; Pénez et al. 2009 2012; Ács et al. 2010; Bozsó et al. 2014 2015), which is still an unsolved question that is being addressed by different researchers (Lobato-Vila et al., unpublished data).

Southeast Asia is the region with the greatest richness of oak species and other potential host trees within Fagaceae (*Lithocarpus*, *Castanea*, and *Castanopsis*), although it is also one of the areas where the cynipid fauna remains understudied; therefore, it is clear that future work will certainly reveal many new taxa (Abe et al. 2007 2014; Liu et al. 2012; Bozsó et al. 2015; Schwéger et al. 2015a b; Pénez et al. 2012 2018; Yang et al. 2020; Fang et al. 2020a b). The range of distribution of each genus of potential Fagaceae hosts, however, is a limiting factor in the occurrence of some gall-inducing gall wasps and their related cynipid inquiline in Asia. The genus *Quercus* is widely distributed throughout East and Southeast Asia, with the subgenus *Quercus* occurring predominately in the north (northern China, Far Eastern Russia, North and South Korea and the main islands of Japan) and the subgenus *Cerris*, especially section *Cyclobalanopsis*, in the mid and south of its distribution (most of China and different countries from Southeast Asia, which constitutes the richest spot of oak diversity after Mexico) (Denk et al. 2017). On the contrary, all species of *Lithocarpus* known to science are native to East and Southeast Asia, limited to tropical and subtropical latitudes where only a few cynipid gall wasps on Fagaceae have been found and studied (Bozsó et al. 2015; Pénez et al. 2018), whereas others remain undescribed. Therefore, it is more than likely that a great diversity of inquiline

associated with galls on trees of the genus *Quercus*, such as *Saphonecrus*, *Ufo*, and *Ceroptres* (not yet found in Southeast Asia), await discovery in this region—especially *Saphonecrus*, whose host breadth (*Quercus*, *Lithocarpus*, and recently also *Castanea* (Melika et al. 2018)) increases its potential distribution range. On the other hand, most of the species within *Lithosaphonecrus*, which are mainly associated with galls on *Lithocarpus*, are limited to the Oriental region and the transition areas between the Eastern Palaearctic and the Oriental region; however, as some *Castanopsis* species have also been found in temperate areas within the Eastern Palaearctic, such as Korea and Japan (Camus 1929), the possibility that *Lithosaphonecrus* is more widely distributed throughout Asia should not be ruled out (Pujade-Villar et al. 2020c).

CONCLUSIONS

Eastern Palaearctic and Oriental cynipid fauna is still far from well known. The current review provides new data on oak cynipid inquiline from mainland China, one of the most Fagaceae-rich locations in all Asia. However, further efforts are needed to characterize gall wasp diversity from Eastern and Southeastern regions of the continent.

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Competing interests: Irene Lobato-Vila, Yiping

Wang, George Melika, Rui Guo, Xiaoxue Ju, and Juli Pujade-Villar have no conflict of interests.

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