# Six recently recorded Australian insects associated with *Eucalyptus* in South Africa

S.J. Bush[1,3]*, B. Slippers[2,3], S. Neser[3], M. Harney[3], G. Dittrich-Schröder[1,3] & B.P. Hurley[1,3]

[1]*Department of Zoology and Entomology, University of Pretoria, Pretoria, 0002 South Africa*
[2]*Department of Genetics, University of Pretoria, Pretoria, 0002 South Africa*
[3]*Forestry and Agricultural Biotechnology Institute, University of Pretoria, Pretoria, 0002 South Africa*

The increased movement of goods and pathways to transport these goods around the world, combined with the global homogenisation of cultivated areas has resulted in an increase in insect movement and establishment (McCullough *et al.* 2006; Roques *et al.* 2008; Aukema *et al.* 2010; Garnas *et al.* 2012). This pattern has been evident in South Africa (Giliomee 2011), including plantations of *Eucalyptus* where an increase in the rate of introduction of non-native insect herbivores has been reported (Wingfield *et al.* 2008; Garnas *et al.* 2012; Hurley *et al.* 2016). Indeed, in just three years (2012–2014), at least six insect species native to Australia and associated with *Eucalyptus* trees have been detected in South Africa for the first time. This short communication serves to formally report these six species, namely *Glycaspis brimblecombei* Moore (Hemiptera: Psyllidae), *Psyllaephagus bliteus* Riek (Hymenoptera: Encyrtidae), *Spondyliaspis* cf. *plicatuloides* Froggatt (Hemiptera: Psyllidae), *Ophelimus maskelli* Ashmead (Hymenoptera: Eulophidae), *Closterocerus chamaeleon* Girault (Hymenoptera: Eulophidae) and *Psyllaephagus blastopsyllae* Tamesse, Soufo, Tchanatame, Dzokou, Gumovsky & Coninck (Hymenoptera: Encyrtidae).

*Glycaspis brimblecombei* was first noticed at the 'Zoo Plot', Rietondale, Pretoria, Gauteng (25°43′58.50″S 28°14′20.26″E) in 2012. The presence of *G. brimblecombei* had been reported by Tribe (2015) but without the information on reference specimens. Specimens were identified by the Natural History Museum, Basel, Switzerland, and lodged at the ARC-Plant Protection Research Institute (ARC-PPRI) (Biosystematics Division), Pretoria, South Africa (Accession number AcPsy639). *Glycaspis brimblecombei* (red gum lerp psyllid) (Fig. 1B), is a sap-sucking psyllid, the nymphs of which build conical structures called lerps (Fig. 1A) from a sugary wax secretion exuded during feeding. Damage includes leaf wilt, abscission and, with high numbers, branch and tree death. In addition, the sugars from the lerp promote fungal growth which reduces the photosynthetic potential of the leaf (Brennan *et al.* 2001). *Glycaspis brimblecombei* was first recorded as a pest in California in 1998 (Brennan *et al.* 1998). It has since been reported from most of South America (Bouvet *et al.* 2005; Burckhardt *et al.* 2008; Rosales *et al.* 2008) and is spreading through parts of Europe (Hurtado & Reina 2008; Valente & Hodkinson 2009; Laudonia & Garonna 2010; Lo Verde *et al.* 2011; Cocquempot *et al*. 2012). In Africa *G. brimblecombei* has been reported in Mauritius in 2001 (Sookar *et al.* 2003), Madagascar in 2004 (Hollis 2004), Morocco in 2008 (Maatouf & Lumaret 2012) and Algeria in 2013 (Reguia & Peris-Filipo 2013). The most recent records of introduction are from Greece (Bella & Rapisarda 2013), Tunisia (Attia & Rapisarda 2014), Portugal (Dhahri *et al.* 2014) and Turkey (Karaca *et al.* 2015).

In April 2015 one female of *Psyllaephagus bliteus* (Fig. 1C), a parasitoid of *G. brimblecombei*, emerged from material collected from the same location *G. brimblecombei* was first recorded. In order to both sequence and morphologically identify the emerged female as *P. bliteus* more individuals were needed. A tree infested with *G. brimblecombei* was sleeved and the female released in the sleeve to produce offspring. The male offspring that emerged were sequenced and used for morphological identification. Sequence data of the cytochrome *b* region of the mitochondrial DNA (mtDNA) of *P. bliteus* from Australia (GenBank, reference number KT251037), as well as Brazil (GenBank reference numbers KT251035 & KT251036) were compared to the Pretoria specimens (GenBank reference numbers KT251034) and confirmed as the same species. The primers CP1 (5′-GAT GAT GAA ATT TTG GAT C-3′) (Harry *et al.* 1998) and CB2 (5′-ATT ACA CCT CCT AAT TA TTA GGA AT-3′) (Jermin & Crozier 1994) were used to amplify the cytochrome *b* locus. The molecular species

*Author for correspondence. E-mail: samantha.bush@fabi.up.ac.za

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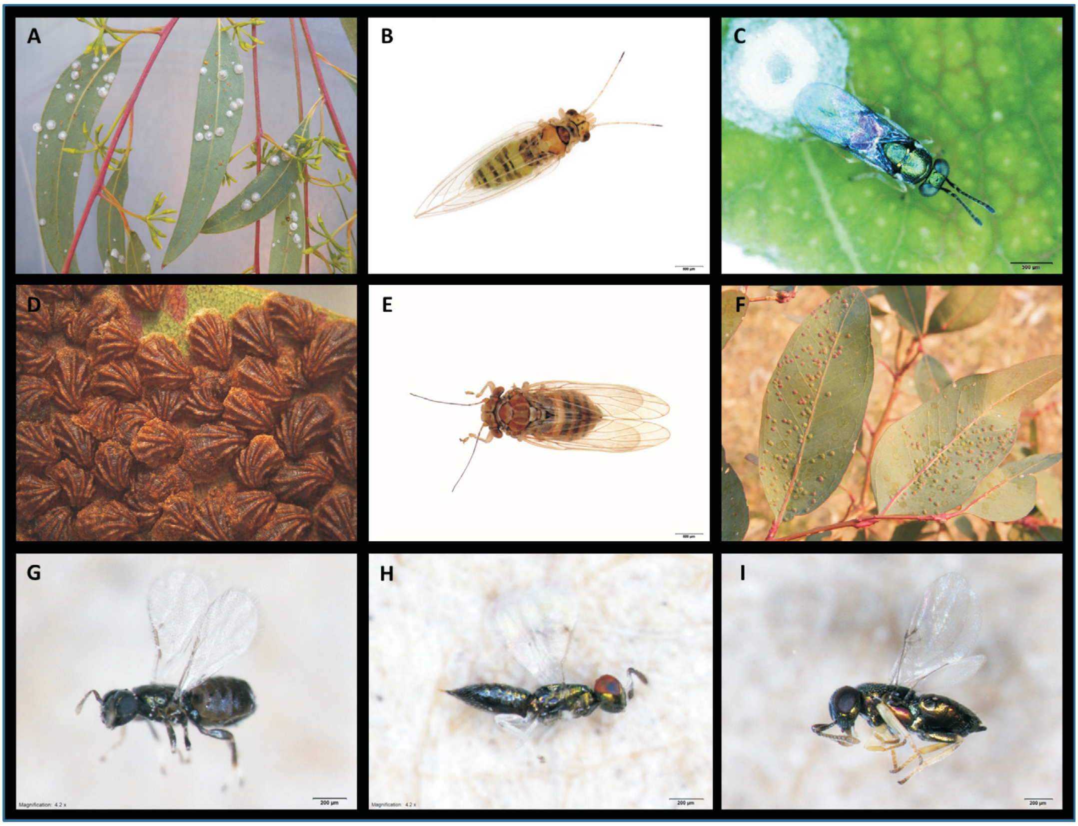


**Fig. 1**. Lerp structures (**A**) and adult female (**B**) of *Glycaspis brimblecombei*; **C**, *Psyllaephagus bliteus* ovipositing into a *G. brimblecombei* nymph through the lerp; lerp structures (**D**) and adult (**E**) of *Spondyliaspis* cf. *plicatuloides*; galls (**F**) and adult female (**G**) of *Ophelimus maskelli*; **H**, *Closterocerus chamaeleon* adult female; **I**, *Psyllaephagus blastopsyllae* adult female.

identification was confirmed using morphological taxonomy by the ARC-PPRI (Biosystematics Division), Pretoria, South Africa (Accession number HYMT07333). *Psyllaephagus bliteus* was deliberately introduced as a control agent for *G. brimblecombei* in California in 2000 (Daane *et al.* 2005), in Mexico in 2002 (Plascencia-González *et al.* 2005) and Chile in 2003 (Ide *et al.* 2006). *Psyllaephagus bliteus* has been found with *G. brimblecombei* in other South American countries such as Brazil (Berti-Filho *et al.* 2003) and Colombia (Carlos Rodas, pers. comm.) without deliberate introduction, possibly spreading from Mexico or Chile. *Psyllaephagus bliteus* has also been found with *G. brimblecombei* in Europe, namely Spain (Pérez-Otero *et al.* 2011), Italy (Caleca *et al.* 2011), Greece (Bella & Rapisarda 2013) and Portugal (Dhari *et al.* 2014), as well as in Tunisia (Dhari *et al.* 2014), Turkey (Karaca *et al.* 2015) and Algeria (Reguia & Peris-Filipo 2013).

A second lerp-forming psyllid (Fig. 1D, E) was observed in March 2014 in Pretoria, Gauteng (25°44′0.13″S 28°14′32.57″E) with lerps that look like scallop seashells and that are usually dark brown when fresh. Voucher specimens were sent for identification to the Natural History Museum, Basel, Switzerland, and lodged with the ARC-PPRI (Biosystematics Division) (Accession number AcPsy643). This species has tentatively been identified as *Spondyliaspis* cf. *plicatuloides*, but it may be *S. bancrofti*. This uncertainty is because the genus is insufficiently studied in its native range and in need of taxonomic revision. Although there is uncertainty as to the species name, specimens from South Africa were sequenced and compared to specimens collected near Hobart, Tasmania, Australia, and were found to be the same species (GenBank, reference numbers KU065144 to KU065146). South Africa is the first country outside Australia where this psyllid has been recorded and it appears to have arrived without parasitoids. It has been recorded from Gauteng, Mpumalanga and North West Province, but it may be more widespread. As this insect is not considered a pest in Australia (Simon Lawson, pers. comm.), its preferred *Eucalyptus* hosts and impact are unknown.

Galls of *Ophelimus maskelli* (Fig. 1F) were first noticed in Midrand, Johannesburg (25°59′6.72″S 28°5′52.20″E) in May 2014, but adult *O. maskelli* (Fig. 1G) did not emerge from these galls until September 2014. Emerged adults were sent to the Australian National Insect Collection (ANIC), Canberra, Australia (Accession numbers 32-065512 to 32-065517), as well as the ARC-PPRI (Biosystematics Division), Pretoria, South Africa (Accession number HYMT07338). In addition, comparison of sequence data using the cytochrome *b* region of the mtDNA (using the same CP1 and CB2 primers as reported above), from the Midrand specimens (GenBank, reference number KT024786) and *O. maskelli* obtained from Israel (GenBank, reference number KT024785), was used to confirm species identification. *Ophelimus maskelli* was first recorded as a pest in the Mediterranean area in Italy in 1999 where it was incorrectly identified as *Ophelimus eucalypti* Gahan (Arzone & Alma 2000). It subsequently spread to other Mediterranean countries such as Israel in 2003 (Protasov 2007a), Turkey in 2006 (Doğanlar & Mendel 2007), Portugal in 2006 (Branco *et al.* 2009) and Algeria in 2010 (Caleca 2010). *Ophelimus maskelli* was also found in Argentina in 2013 (Aquinho *et al.* 2014).

*Closterocerus chamaeleon* (Fig. 1H) and *Selitrichodes neseri* Kelly & La Salle (Hymenoptera: Eulophidae) emerged from the *O. maskelli* galls collected in Midrand, Johannesburg (25°59′6.72″S 28°5′52.20″E) from May to October 2014. Unlike *O. maskelli*, adults emerged throughout the period that the galled material was collected. *Closterocerus chamaeleon* is an ectoparasitoid of *O. maskelli* on the late second and third instar larval stages and pupae (Protasov *et al.* 2007b). *Closterocerus chamaeleon* reproduces by parthenogenesis and only females are produced (Protasov *et al.* 2007b). *Closterocerus chamaeleon* was deliberately introduced to Israel in 2005 (Protosov *et al.* 2007b) and Italy in 2006 (Caleca 2010) and has since spread to other Mediterranean countries such as Turkey (Doğanlar & Mendel 2007), Spain (Borrajo *et al.* 2008), Portugal (Branco *et al.* 2009) and Algeria (Caleca 2010). The most recent reports of its presence are from Chile in 2012 (Servicio Agrícola y Ganadero de Chile, 2012) and Argentina in 2013 where it has been accidentally introduced with its host (Aquino *et al.* 2014). *Closterocerus chamaeleon* was identified and lodged at the ANIC (Accession numbers 32-065518 and 32-065519). As a known parasitoid of *O. maskelli*, confirmation of the morphological identification with sequencing was not necessary. *Selitrichodes neseri* is a parasitic wasp of the Eucalyptus gall wasp *Leptocybe invasa* and was released in South Africa as a biological control agent in 2012 (Kelly *et al.* 2012; Dittrich-Schröder *et al.* 2014).

A second parasitoid of *Blastopsylla occidentalis* Taylor (Hemiptera: Psyllidae) is reported in this paper. This parasitoid emerged from nymphs collected near Buffelspoort, west of Pretoria (25°49′58.98″S 27°24′40.83″E) in 2012. Specimens were sent to the ARC-PPRI (Biosystematics Division), Pretoria, South Africa (Accession number HYMT07334) for identification. The parasitoid was identified as *Psyllaephagus blastopsyllae* and is conspecific with the newly described *P. blastopsyllae* in Cameroon (Tamesse *et al.* 2014). This parasitoid was probably accidentally introduced with *B. occidentalis*.

Including the three insect pests reported here there are currently a total of 11 non-native insect pest species of *Eucalyptus* known from South Africa. The increase in invasive species is expected to continue and places significant pressure on the forestry industry, impacting productivity and sustainability (Wingfield *et al.* 2008; Hurley *et al.* 2016). The recent introductions also include three natural enemies of insect pests of *Eucalyptus* now present in South Africa, which could potentially be used for their biocontrol. Classic biological control through the use of natural enemies obtained from the native range of the pest provides one of the most viable options to manage insect pests of plantation trees, including *Eucalyptus* (Garnas *et al.* 2012). Biological control agents have already been released for some of these pests (Tooke 1955; Webb, 1974; Tribe 2000; Mutitu *et al.* 2013; Dittrich-Schröder *et al.* 2014; Tribe 2015). The success of the recently reported natural enemies in South Africa will need to be evaluated, *i.e.* the potential impact of *P. bliteus* on *G. brimblecombei*, *C. chamaeleon* on *O. maskelli* and *P. blastopsyllae* on *B. occidentalis*. In the case of *C. chamaeleon*, Israel has reported favourable control (Protosov *et al.* 2007b) while for *P. bliteus* its original release location has reported differing results in different climatic regions (Daane *et al.* 2012).

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## REFERENCES

AQUINO, D.A., HERNÁNDEZ, C.M., CUELLO, E.M., ANDORNO, A.V. & BOTTO, E.N. 2014. Primera cita de la Argentina de *Ophelimus maskelli* (Ashmead) (Hymenoptera: Eulophidae) y su parasitoide, *Closterocerus chamaeleon* (Girault) (Hymenoptera: Eulophidae). *Revista de la Sociedad Entomológica Argentina* **73**: 79–182.

ARZONE, A. & ALMA, A. 2000. Eulofide galligeno dell'Eucalipto in Italia. *Informatore Fitopatologica* **12**: 43–46.

ATTIA, S.B. & RAPISARDA, C. 2014. First record of the red gum lerp psyllid, *Glycaspis brimblecombei* Moore (Hemiptera Psyllidae), in Tunisia. *Phytoparasitica* **42**: 535–539.

AUKEMA, J.E., McCULLOUGH, D.G., VON HOLLE, B., LIEBHOLD, A.M., BRITTON, K. & FRANKEL, S.J. 2010. Historical accumulation of nonindigenous forest pests in the continental United States. *Bioscience* **60**: 886–897.

BELLA, S. & RAPISARDA, C. 2013. First record from Greece of the invasive red gum lerp psyllid *Glycaspis brimblecombei* Moore (Hemiptera Psyllidae) and its associated parasitoid *Psyllaephagus bliteus* Riek (Hymenoptera Encyrtidae). *Redia* **96**: 33–35.

BERTI-FILHO, E., COSTA, V.A., ZUPARKO, R.L. & LA SALLE, J. 2003. Ocorrência de *Psyllaephagus bliteus* Riek (Hymenoptera: Encyrtidae) no Brasil. *Revista de Agricultura* **78**: 304.

BORRAJO, P., LÓPEZ, M.A., OCETE, R., LÓPEZ, G. & RUIZ, F. 2008. Comuncación primera cita de *Closterocerus chamaeleon* Girault (Hymenoptera, Eulophidae), parasitoide de *Ophelimus maskelli* Ashmead (Hymenoptera, Eulophidae) en la provincial de Huelva (SO España). *Boletín de Sanidad Vegetal Plagas* **34**: 383–385.

BOUVET, J.P.R., HARRAND, L. & BURCKHARDT, D. 2005. Primera cita de *Blastopsylla occidentalis* y *Glycaspis brimbelcombei* (Hemiptera: Psyllidae) para la República Argentina. *Revista de la Sociedad Entomológica Argentina* **64**: 99–102.

BRANCO, M., BOAVIDA, C., DURAND, N., FRANCO, J.C. & MENDEL, Z. 2009. Presence of the Eucalyptus gall wasp *Ophelimus maskelli* and its parasitoid *Closterocerus chamaeleon* in Portugal: first record, geographic distribution and host preference. *Phytoparasitica* **37**: 51–54.

BRENNAN, E.B., GILL, R.J., HRUSA, G.F. & WEINBAUM, S.A. 1998. First record of *Glycaspis brimblecombei* (Moore) (Homoptera: Psyllidae) in North America: initial observations and predator associations of a potentially serious new pest of *Eucalyptus* in California. *Pan-Pacific Entomologist* **75**: 55–57.

BRENNAN, E.B., HRUSA, G.F. WEINBAUM, S.A. & LEVISON Jr., W. 2001. Resistance of *Eucalyptus* species to *Glycaspis brimblecombei* (Homoptera: Psyllidae) in the San Francisco Bay area. *Pan-Pacific Entomologist* **77**: 249–253.

BURCKHARDT, D., LOZADA, P.W. & DIAZ, W.B. 2008. First record of the red gum lerp psyllid *Glycaspis brimblecombei* (Hemiptera: Psylloidea) from Peru. *Bulletin de la Societe Entomologique Suisse* **81**: 83–85.

CALECA, V. 2010. First record in Algeria of two Eulophid wasps: *Closterocerus chamaeleon* (Girault) and its host, the Eucalyptus gall wasp *Ophelimus maskelli* (Ashmead) (Hymenoptera Eulophidae). *Il Naturalista Siciliano* **4**: 201–206.

CALECA, V., LO VERDE, G. & MALTESE, M. 2011. First record in Italy of *Psyllaephagus bliteus* Riek (Hymenoptera: Encyrtidae) parasitoid of *Glycaspis brimblecombei* Moore (Hemiptera: Psyllidae). *Il Naturalista Siciliano* **4**: 435–444.

COCQUEMPOT, C., MALAUSA, J-C., THAON, M. & BRANCACCIO, L. 2012. The red gum lerp psyllid (*Glycaspis brimblecombei* Moore) introduced on French *Eucalyptus* trees (Hemiptera, Psyllidae). *Bulletin de la Société Entomologique de France* **117**: 363–370.

DAANE, K.M., SIME, K.R., DAHLSTEN, D.L., ANDREWS Jr., J.W. & ZUPARKO, R.L. 2005. The biology of *Psyllaephagus bliteus* Riek (Hymenoptera: Encyrtidae), a parasitoid of the red gum lerp psyllid (Hemiptera: Psylloidea). *Biological Control* **32**: 228–235.

DAANE, K.M., SIME, K.R., PAINE, T.D. 2012. Climate and the effectiveness of *Psyllaephagus bliteus* as a parasitoid of the red gum lerp psyllid. *Biocontrol Science and Technology* **22**: 1305–1320.

DHAHRI, S., JAMAA, M.L.B., BOAVIDA, C. & BRANCO, M. 2014. Presence of *Glycaspis brimblecombei* and its parasitoid *Psyllaephagus bliteus* in Tunisia and Portugal. *Silva Lusitana* **22**: 99–115.

DITTRICH-SCHRÖDER, G., HARNEY, M., NESER, S., JOFFE, T., BUSH, S., HURLEY, B., WINGFIELD, W. & SLIPPERS, B. 2014. Biology and host preference of

*Selitrichodes neseri*: a potential biological control agent of the Eucalyptus gall wasp, *Leptocybe invasa*. *Biological Control* **78**: 33–41.

DOĞANLAR, M. & MENDEL, Z. 2007. First record of the Eucalyptus gall wasp *Ophelimus maskelli* and its parasitoid, *Closterocerus chamaeleon*, in Turkey. *Phytoparasitica* **35**: 333–335.

GARNAS, J.R., HURLEY, B.P., SLIPPERS, B. & WINGFIELD, M.J. 2012. Biological control of forest plantation pests in an interconnected world requires greater international focus. *International Journal of Pest Management* **58**: 211–223.

GILIOMEE, J.H. 2011. Recent establishment of many alien insects in South Africa – A cause for Concern. *African Entomology* **19**: 151–155.

HARRY, M., SOLIGNAC, M. & LACHAISE, D. 1998. Molecular evidence for parallel evolution of adaptive syndromes in fig-breeding *Lissocephala* (Drosophilidae). *Molecular Phylogenetics and Evolution* **9**: 542–551.

HOLLIS, D. 2004. *Australian Psylloidea: Jumping Plant Lice and Lerp Insects*. Australian Biological Resources Study (ABRS), Canberra, Australia.

HURLEY, B.P., GARNAS, J. WINGFIELD, M.J., BRANCO, M., RICHARDSON, D.M. & SLIPPERS, B. 2016. Increasing numbers and intercontinental spread of invasive insects on eucalypts. *Biological Invasions*. DOI: 10.1007/s10530-016-1081-x

HURTADO, A. & REINA, I. 2008. First report of *Glycaspis brimblecombei* Moore (Homoptera, Psyllidae) in Europe. New pest on *Eucalyptus*. *Boletin Sociedad Entomológica Aragonesa* **43**: 447–449.

IDE, S.M., MUÑOZ, C.A., BEÉCHE, M.C., MONDACA, J.E., JAQUES, L.R., GONZ LEZ, P.E. & GOYCOOLEA, C.P. 2006. *Deteccíon y control biológico de Glycaspis brimblecombei Moore (Hemiptera: Psyllidae)*. Servicio Agricola y Ganadero, Division de Proteccion Agricola, Santiago, Chile. 32 pp.

JERMIN, L.S. & CROZIER, R.H. 1994. The cytochrome b region in the mitochondrial DNA of the ant *Tetraponera rufoniger*: sequence divergence in Hymenoptera may be associated with nucleotide content. *Journal of Molecular Evolution* **38**: 282–294.

KARACA, İ., KAYAHAN, A. ŞIMŞEK, B. & ÇELIKPENÇE, Y. 2015. First record of *Glycaspis brimblecombei* Moore (Hemiptera: Aphalaridae), in Turkey. *Phytoparasitica* **43**:171–175.

KELLY, J., LA SALLE, J., HARNEY, M., DITTRICH-SCHRÖDER, G. & HURLEY, B. 2012. *Selitrichodes neseri* n. sp., a new parasitoid of the eucalyptus gall wasp *Leptocybe invasa* Fisher & La Salle (Hymenoptera: Eulophidae: Tetrastichinae). *Zootaxa* **33**: 50–57.

LAUDONIA, S. & GARONNA, A.P. 2010. The red gum lerp psyllid, *Glycaspis brimblecombei*, a new exotic pest of *Eucalyptus camaldulensis* in Italy. *Bulletin of Insectology* **63**: 223–236.

LO VERDE, G., BELLA, S., CALECA, V., RAPISARDA, C. & SIDOTI, A. 2011. Presenza in Sicilia di *Glycaspis brimblecombei* Moore (Hemiptera Psyllidae) su *Eucalyptus camaldulensis* Dehnh. *Il Naturalista Siciliano* **4**: 425–434.

McCULLOUGH, D.G., WORK, T.T., CAVEY, J.F., LIEBHOLD, A.M. & MARSHALL, D. 2006. Interceptions of nonindigenous plant pests at US ports of entry and border crossings over a 17 year period. *Biological Invasions* **8**: 611–630.

MAATOUF, N. & LUMARET, J-P. 2013. Eco-éthologie des nouveaux ravageurs invasifs des eucalyptus du Maroc. *Annales de la Société Entomologique de France (N.S.): International Journal of Entomology* **48**(3-4): 289–297.

MUTITU, E.K., GARNAS, J.R., HURLEY, B.P., WINGFIELD, M.J., HARNEY, M., BUSH, S.J. & SLIPPERS, B. 2013. Biology and rearing of *Cleruchoides noackae* (Hymenoptera: Mymaridae), an egg parasitoid for the biological control of *Thaumastocoris peregrinus* (Hemiptera: Thaumastocoridae). *Journal of Economic Entomology* **106**: 1979–1985.

PÉREZ-OTERO, R., BORRAJO, P., MANSILLA, J.P. & RUIZ, F. 2011. Primera cita en España de *Psyllaephagus bliteus* Riek (Hymenoptera, Encyrtidae), parasitoide de *Glycaspis brimblecombe* (Hemiptera, Psyllidae). *Boletín de Sanidad Vegetal Plagas* **37**: 37–44.

PLASCENCIA-GONZÁLEZ, A., CIBRIÁN-TOVAR, D., LLANDERAL-CÁZARES, C., LÓPEZ-PÉREZ, I. & ARRIOLA-PADILLA, V. 2005. Biología del parasitoide *Psyllaephagus bliteus* (Hymenoptera: Encyrtidae). *Revista Chapingo Serie Ciencias Forestales y del Ambiente* **11**: 11–17.

PROTASOV, A., LA SALLE, J., BLUMBERG, D., BRAND, D., SAPHIR, N., ASSAEL, F., FISHER, N. & MENDEL, Z. 2007a. Biology, revised taxonomy and impact on host plants of *Ophelimus maskelli*, an invasive gall inducer on *Eucalyptus* spp. in the Mediterranean area. *Phytoparasitica* **35**: 50–76.

PROTASOV, A., BLUMBERG, D., BRAND, D., LA SALLE, J. & MENDEL, Z. 2007b. Biological control of the *Eucalyptus* gall wasp *Ophelimus maskelli* (Ashmead): Taxonomy and biology of the parasitoid species *Closterocerus chamaeleon* (Girault), with information on its establishment in Israel. *Biological* Control **42**: 196–206.

REGUIA, K. & PERIS-FELIPO, F.J. 2013. *Glycaspis brimblecombei* Moore, 1964 (Hemiptera Psyllidae) invasion and new records in the Mediterranean area. *Biodiversity Journal* **4**: 501–506.

ROQUES, A., RABITSCH, W., RASPLUS, J-Y., LOPEZ-VAAMONDE, C., NENTWIG, W. & KENIS, M. 2008. Alien Terrestrial Invertebrates of Europe. In: Daisie (Ed.) *The Handbook of Alien Species in Europe*. Chapter 5. Springer Science + Business Media B.V., Berlin, Germany. 63–79.

ROSALES, C.J., LOBOSQUE, O., CARVALHO, P., BERMÚDEZ, L. & ACOSTA, C. 2008. *Glycaspis brimblecombei* Moore (Hemiptera: Psyllidae). "Red Gum Lerp". Nueva plaga forestall en Venezuela. *Entomotropica* **23**: 103–104.

SERVICIO AGRICOLA Y GANADERO DE CHILE. 2012. *Informativo Fitosanitario Forestal: Detecciones de Organismos Benefices.* Año 5(8): 3. Ministerio de Agricultura, Subdepartamento de Vigilancia y Control Oficial Forestal, División Protección Agricola y Forestal, Santiago, Chile.

SOOKAR, P., SEEWOORUTHUN, S.I. & RAMKHELAWON, D. 2003. The redgum lerp psyllid, *Glycaspis* *brimblecombei*, a new pest of *Eucalyptus* sp. in Mauritius. In: Proceedings Annual Meeting of Agricultural Scientists. 327–332. Food and Agricultural Research Council, Réduit, Mauritius.

TAMESSE, J.L., SOUFO, L., TCHANATAME, E.C., DZOKOU, V.J., GUMOVSKY, A. & DE CONINCK, E. 2014. Description of *Psyllaephagus blastopsyllae* sp.n. (Encyrticdae), new species, endoparasitoid of *Blastopsylla occidentalis* Taylor (Psyllidae, Spondyliaspidinae) in Cameroon. *Journal of Biodiversity and Environmental Sciences* **5**: 228–236.

TOOKE, F.G.C. 1955. The Eucalyptus snout beetle, *Gonipterus scutellatus* Gyll.: a study of its ecology and control by biological means. Entomology Memoirs Vol. 3. Department of Agriculture, Pretoria, South Africa.

TRIBE, G.D. 2015. Eucalypts. In: Prinsloo, G.L. & Uys, V.M. (Eds) *Insects of Cultivated Plants and Natural Pastures in Southern Africa*. 645–646. Entomological Society of Southern Africa, Pretoria, South Africa.

TRIBE, G.D .2000. Ecology, distribution and natural enemies of the *Eucalyptus*-defoliating tortoise beetle *Trachymela tincticollis* (Blackburn) (Chrysomelidae: Chrysomelini: Paropsina) in southwestern Australia, with reference to its biological control in South Africa. *African Entomology* **8**: 23–45.

VALENTE, C. & HODKINSON, I. 2009. First record of the red gum lerp psyllid, *Glycaspis brimblecombei* Moore (Hem.: Psyllidae), in Europe. *Journal of Applied Entomology* **133**: 315–317.

WEBB, D.V.V 1974. *Forest and Timber Entomology in the Republic of South Africa*. Entomology Memoirs No. 34. Department of Agriculture, Pretoria, South Africa.

WINGFIELD, M.J., SLIPPERS, B., HURLEY, B.P., COUTINHO, T.A., WINGFIELD, B.D. & ROUX, J. 2008. Eucalypt pests and diseases: growing threats to plantation productivity. *Southern Forests* **70**: 139–144.

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