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## Psyllid pests (Hemiptera, Psylloidea) in South American eucalypt plantations

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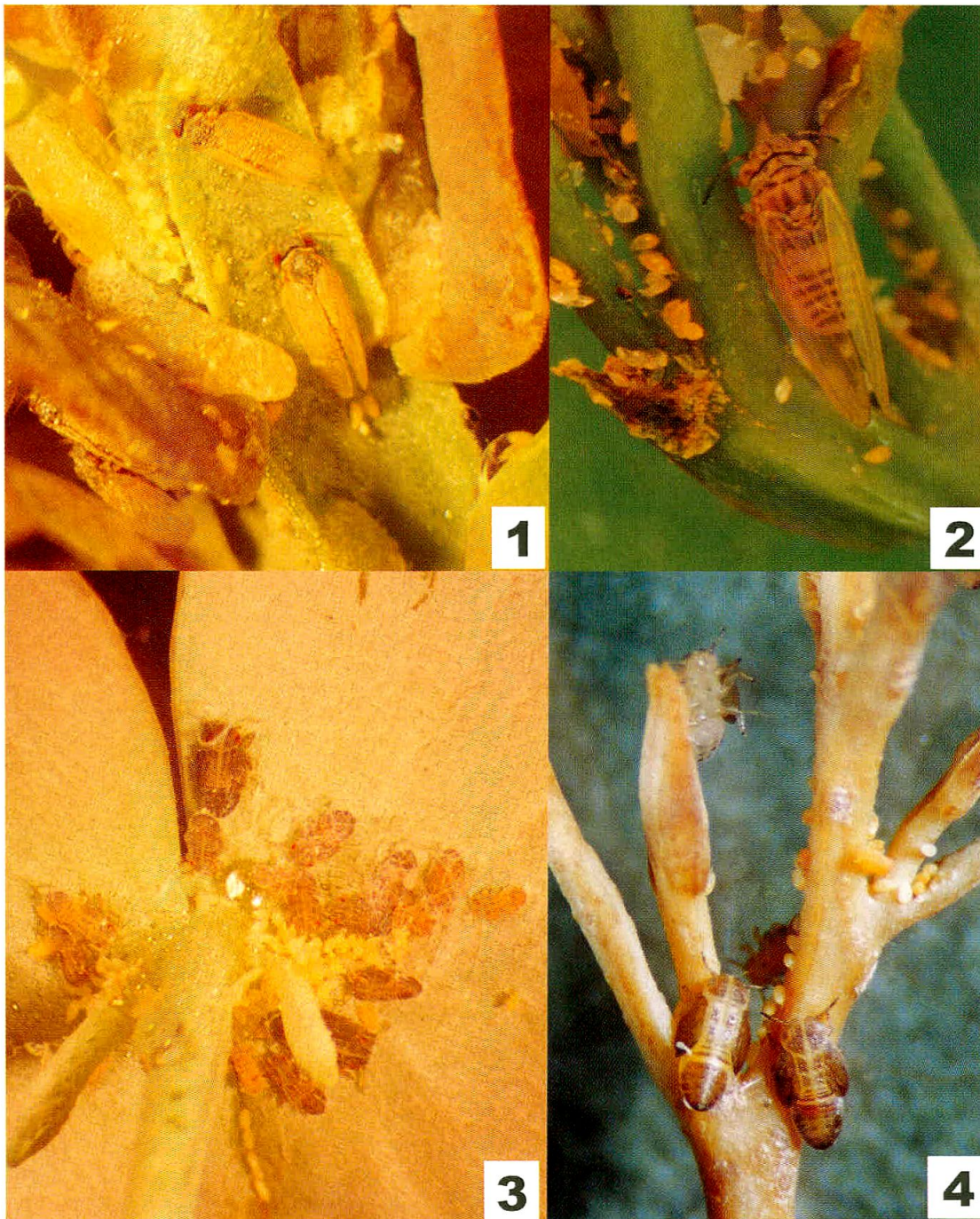
*Ctenarytaina eucalypti* (MASKELL, 1890) and *Ctenarytaina spatulata* TAYLOR, 1997 (Psyllidae: Spondyliaspidini) are currently producing considerable damage to eucalypt plantations in Brazil and Uruguay, as does *Blastopsylla occidentalis* TAYLOR, 1985, in Brazil. The species were relatively recently discovered and are, so far, the only eucalypt psyllids in South America. As eucalypts are widely planted in other South American countries, these pests may well become more widespread in the Neotropics. Information is provided on distribution, biology and damage of these psyllids in South America. Morphological differences between *C. eucalypti* and *C. spatulata* are detailed and illustrated.

Keywords: *Eucalyptus*, Psylloidea, *Ctenarytaina*, *Blastopsylla*, Brazil, Uruguay.

### INTRODUCTION

The genus *Eucalyptus* (Myrtaceae) comprises, depending on author, some 450–700 species most of which are restricted to Australia (MABBERLEY, 1987; BROOKER & KLEIN, 1983–1994). Nearly 70% of Australia's native forests are made up of eucalypts (gum trees). These are the major source of hardwood timber for Australia's forest industries. Eucalypts are evergreen trees or shrubs with a morphologically differentiated juvenile phase. Due to their rapid growth, over 200 eucalypt species are currently grown in plantation in warmer regions throughout the world (FAO, 1990). Apart from their timber, eucalypts are planted for wood chips, oils, tannins etc. In South America eucalypts are commercially grown on a large scale in e.g. Brazil (3.2 millions ha in 1986; DUARTE PEREIRA, 1993), Chile (308,762 ha in 1996; ODEPA, 1997), Uruguay (over 180,000 ha in the last 10 years; TERRA, unpublished), Peru (92,882 ha in 1975; FAO, 1981), and Argentina (80,000 ha in 1973; FAO, 1981).

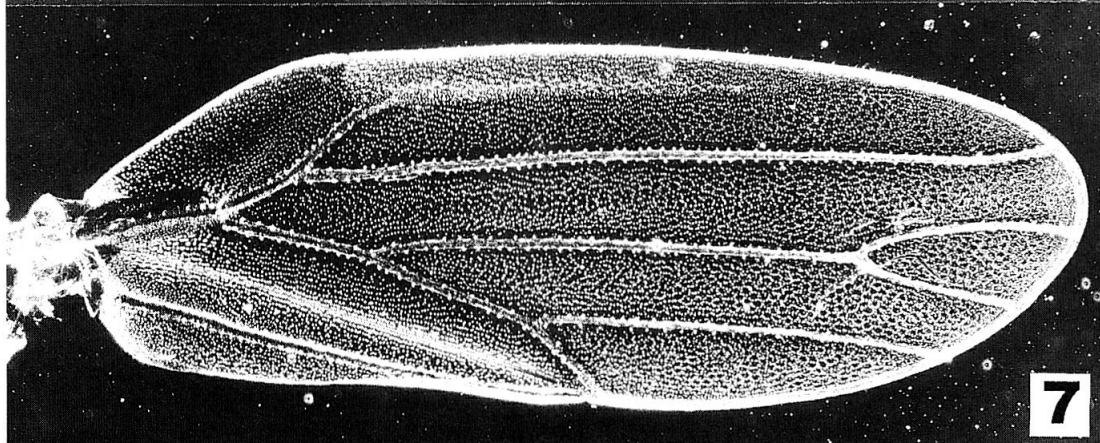
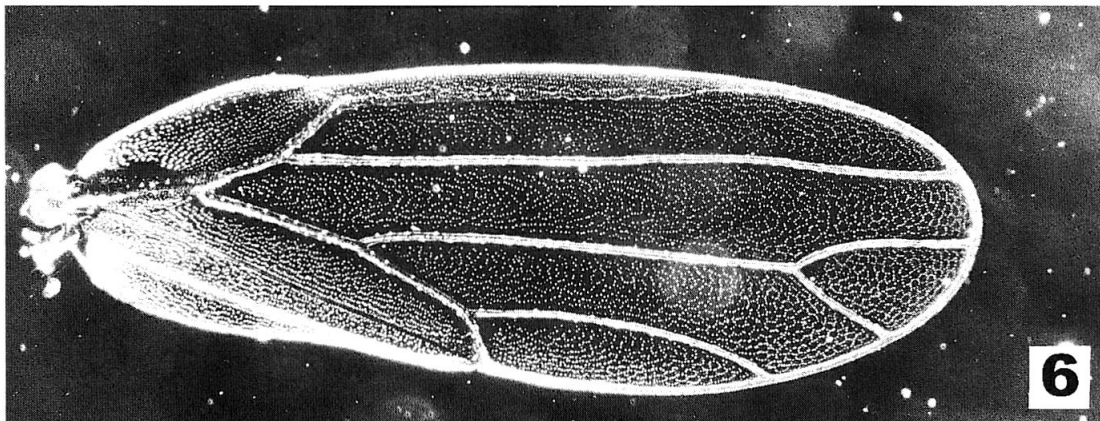
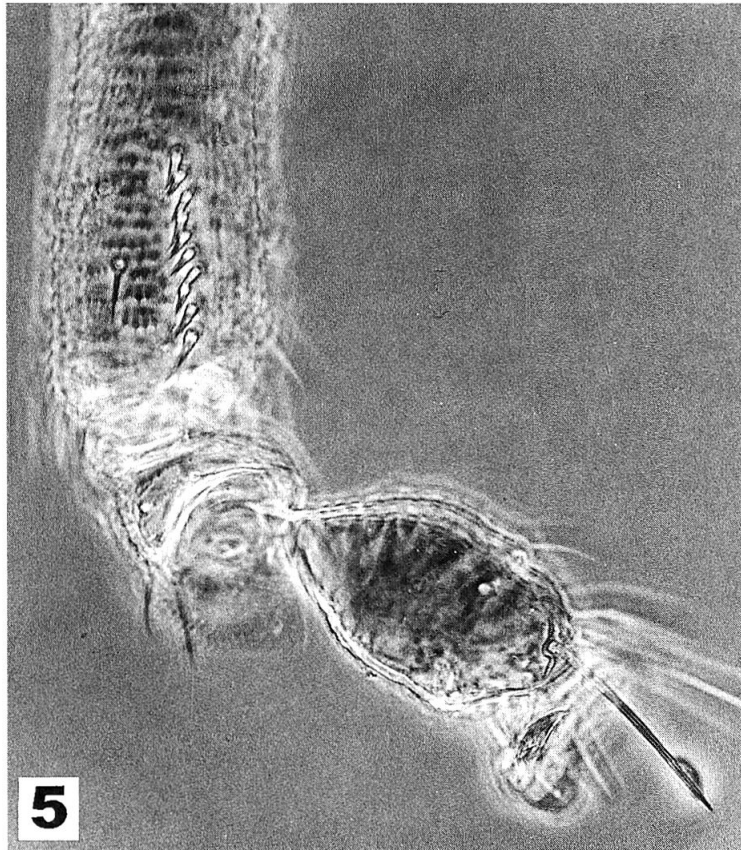
Eucalypts host a diverse fauna of phytophages some of which have become serious pests in plantations, such as the psyllids or jumping plant-lice which are tiny sap-sucking insects resembling minute cicadas. World-wide the group comprises about 2500 species most of which develop on woody dicotyledoneous plants (BURCKHARDT, 1994). The tribe Spondyliaspidini (Psyllidae) is almost exclusively restricted to Australia, and most of the constituent species develop on *Eucalyptus* and other Myrtaceae. Within the tribe, *Ctenarytaina* FERRIS & KLYVER has the widest natural distribution reaching from India and Southeast Asia to Australia,



Figs 1–4. – Figs 1, 3: *Ctenarytaina eucalypti* (MASKELL) on *Eucalyptus bicostata* in Brazil (photo D. L. Q. SANTANA). 1, adults and eggs; 3, larvae and eggs. – Figs 2, 4: *Ctenarytaina spatulata* TAYLOR on *Eucalyptus grandis* in Brazil (photo D. L. Q. SANTANA). 2, adults and eggs; 4, larvae and eggs.

New Zealand and some Pacific islands (BURCKHARDT, 1998). Some *Ctenarytaina* species have been introduced into other countries together with their eucalypt hosts (TAYLOR, 1997). The blue gum psyllid, *Ctenarytaina eucalypti* (MASKELL), is the best known member and infests young foliage of several *Eucalyptus* species. It naturally occurs in Southeast Australia and Tasmania, and was introduced into New Zealand,

Figs 5-7. – Figs 5, 6: *Ctenarytaina eucalypti* (MASKELL). 5, apex of mesotibia with comb of bristles; 6, forewing of female. – Fig. 7: *Ctenarytaina spatulata* TAYLOR. 7, forewing of female.



Papua New Guinea, Sri Lanka, South Africa, the Canary Islands, California and Europe (France, Italy, Portugal, Spain, Madeira, the UK and Germany). *Blastopsylla* TAYLOR is more restricted in distribution with *Blastopsylla occidentalis* TAYLOR originating from Australia (Queensland, Western Australia, Southern Australia, New South Wales) and being introduced into New Zealand, California and Mexico (HODKINSON, 1991).

Until recently, eucalypt psyllids were absent from South America. This paper reports the more or less simultaneous findings of two *Ctenarytaina* species in Brazil and Uruguay, and one *Blastopsylla* species in Brazil.

#### MATERIAL AND METHODS

The following material was examined by the senior author and is preserved in the „Naturhistorisches Museum“ Basel, Switzerland, with additional specimens in „Embrapa Florestas“ Colombo, Brazil, „Colección de referencia de insectos y ácaros, DGSA, MGAP“ Montevideo, Uruguay, and C.S. Morey private collection, Montevideo, Uruguay:

*Blastopsylla occidentalis* TAYLOR – Brazil: Goiás State, Niquelândia, 20.viii.1997 and 9.vi.1998, *Eucalyptus urophylla* (A. FARDIN).

*Ctenarytaina eucalypti* (MASKELL) – Brazil: Paraná, Colombo, 7.ix.1998, *Eucalyptus dunnii* (D. L. Q. SANTANA). – Uruguay: Río Negro, Ruta 24, km 49, 22.x.1998, *Eucalyptus globulus* ssp. *bicostata* (Carlos S. MOREY).

*Ctenarytaina spatulata* TAYLOR – Brazil: Paraná State, Arapoti, 6.i.1995, *Eucalyptus grandis*; Paraná State, Colombo, 3.ix.1997, *Eucalyptus grandis* (D. L. Q. SANTANA); São Paulo State, Botucatu, 13.ix.1997, *Eucalyptus* sp. (F. MAIA); and Santa Catarina State. – Uruguay: near Montevideo, viii.1994, *Eucalyptus* sp. (C. S. M. TREMOLERAS); Canelones, Ruta 8, km 52, 10.x.1994, *Eucalyptus grandis* (Carlos S. MOREY & Juan F. PORCILE).

Drawings were made from slide mounted material.

#### RESULTS

##### *Blastopsylla occidentalis* TAYLOR, 1985

For description and identification see TAYLOR (1985). *Blastopsylla occidentalis* can easily be separated from the two *Ctenarytaina* species by the lack of an outer apical comb of bristles on the mesotibia, and the apically curved vein Rs in the forewings (TAYLOR, 1990).

Distribution: Brazil (Goiás State, Central Brazil).

Hosts: *Eucalyptus urophylla* and hybrids of *E. urophylla* and *E. grandis*.

Biology and damage: The species feeds on the young tips of the host, and larvae secrete copious white flocculence (TAYLOR, 1985). Contrary to the two *Ctenarytaina* spp., *Blastopsylla occidentalis* occurs in Central Brazil where the dry season is longer than in Southern Brazil, with over four months without rain.

##### *Ctenarytaina eucalypti* (MASKELL, 1890)

Figs 1, 3, 5, 6, 8, 10, 12, 14, 16, 18, 20, 22

*Ctenarytaina* is characterised by the presence of an outer apical comb of bristles on the mesotibia (Fig. 5). Differences to *C. spatulata* are detailed in Tab. 1.

Tab. 1: Differences in coloration and morphology of *C. eucalypti* (MASKELL, 1890) and *C. spatulata* TAYLOR, 1997.

	<i>C. eucalypti</i>	<i>C. spatulata</i>
<b>Adults</b>		
Colour		
Head and thorax dorsally	dark brown to black (Fig. 1)	yellowish with brown spots (Fig. 2)
Forewings	dirty whitish with contrasting brown veins (Fig. 1)	yellow with only slightly darker veins (Fig. 2)
Structure		
Vertex	1.5 times as wide as long, antero-laterally weakly concave (Fig. 12)	2.0 times as wide as long, antero-laterally strongly concave (Fig. 13)
Preocular tubercle (arrow)	flattened (Fig. 12)	prominent (Fig. 13)
Eyes	hemispherical (Fig. 12)	oblong (Fig. 13)
Forewings	evenly rounded apically (Fig. 6)	irregularly rounded apically (Fig. 7)
Vein C+Sc	weakly, evenly curved (Fig. 6)	straight with marked subapical bend (Fig. 7)
Vein Cu <sub>1b</sub>	weakly curved apically (Fig. 6)	more or less straight (Fig. 7)
Surface spinules	slightly finer (Fig. 6)	slightly coarser (Fig. 7)
Male proctiger with apical portion (arrow)	about half the length of the basal portion (Fig. 14)	only slightly shorter than basal portion (Fig. 15)
Paramere (arrow)	slender (Fig. 14)	broad (Fig. 15)
Inner paramere face	with thick setae in apical half and a band in the middle; at the base with two groups of peg-like setae; middle of hindmargin without peg-like setae (Fig. 16)	with thick setae mostly restricted to a band along foremargin; at the base with one anterior group of peg-like setae; middle of hindmargin with a few peg-like setae (arrow) (Fig. 17)
Apical dilatation of distal segment of aedeagus	relatively long (Fig. 18)	relatively short (Fig. 19)
Female proctiger	longer and more slender, with relatively fine apico-lateral peg setae (arrow) (Fig. 20)	shorter and stouter, with relatively stout apico-lateral peg setae (arrow) (Fig. 21)
Valvula ventralis	strongly curved (Fig. 22)	moderately curved (Fig. 23)
<b>Fifth instar larva</b>		
Antennae	longer (Fig. 8)	shorter (Fig. 9)
Additional pore fields (arrow) along margins of caudal plate	present in large numbers (Fig. 10)	reduced in number or absent (Fig. 11)

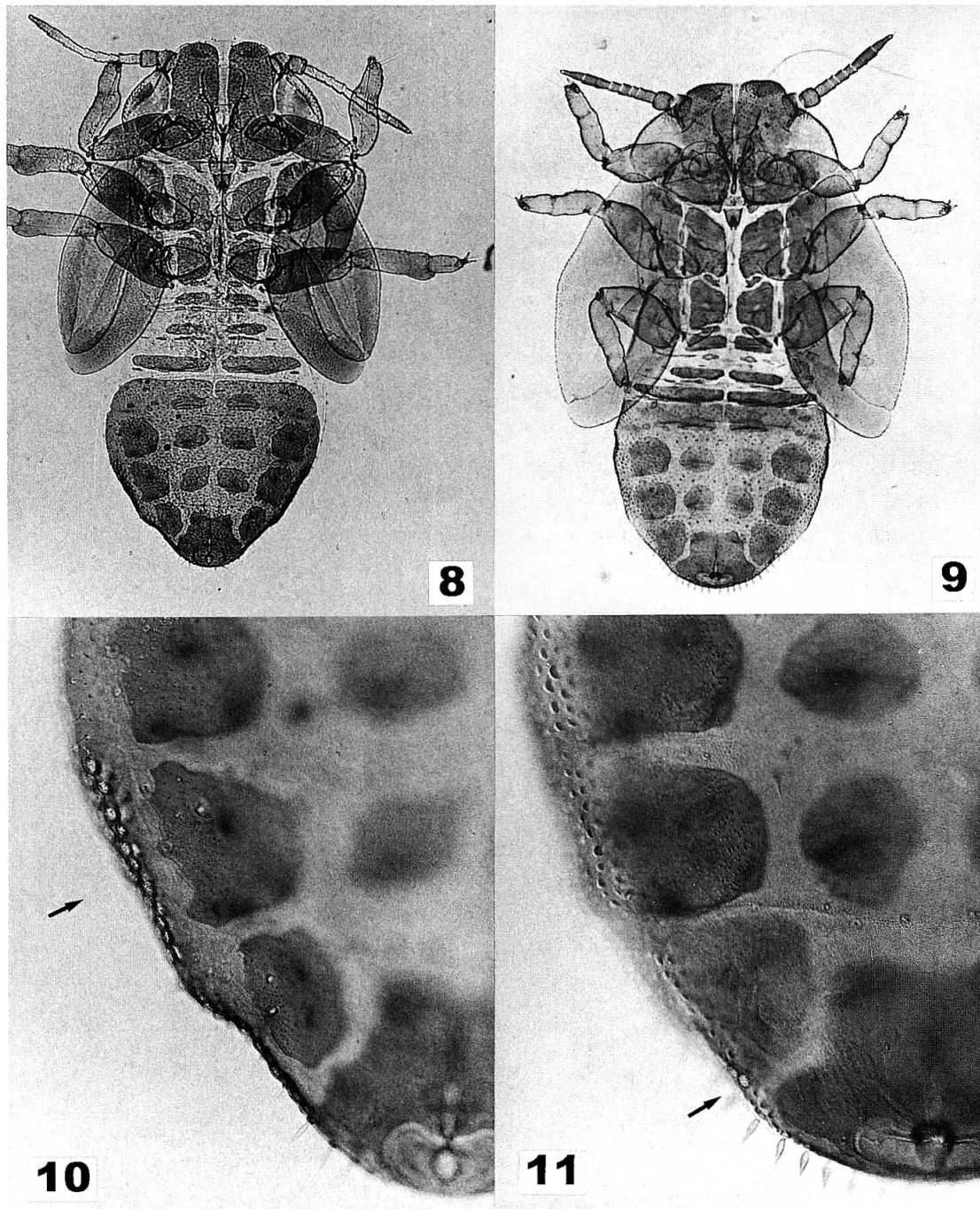
Distribution: Brazil (Paraná State), Uruguay (widely distributed over the whole country).

Hosts: *Eucalyptus globulus*, *E. maidenii*, *E. bicostata*, *E. dunnii* and *E. nitens*.

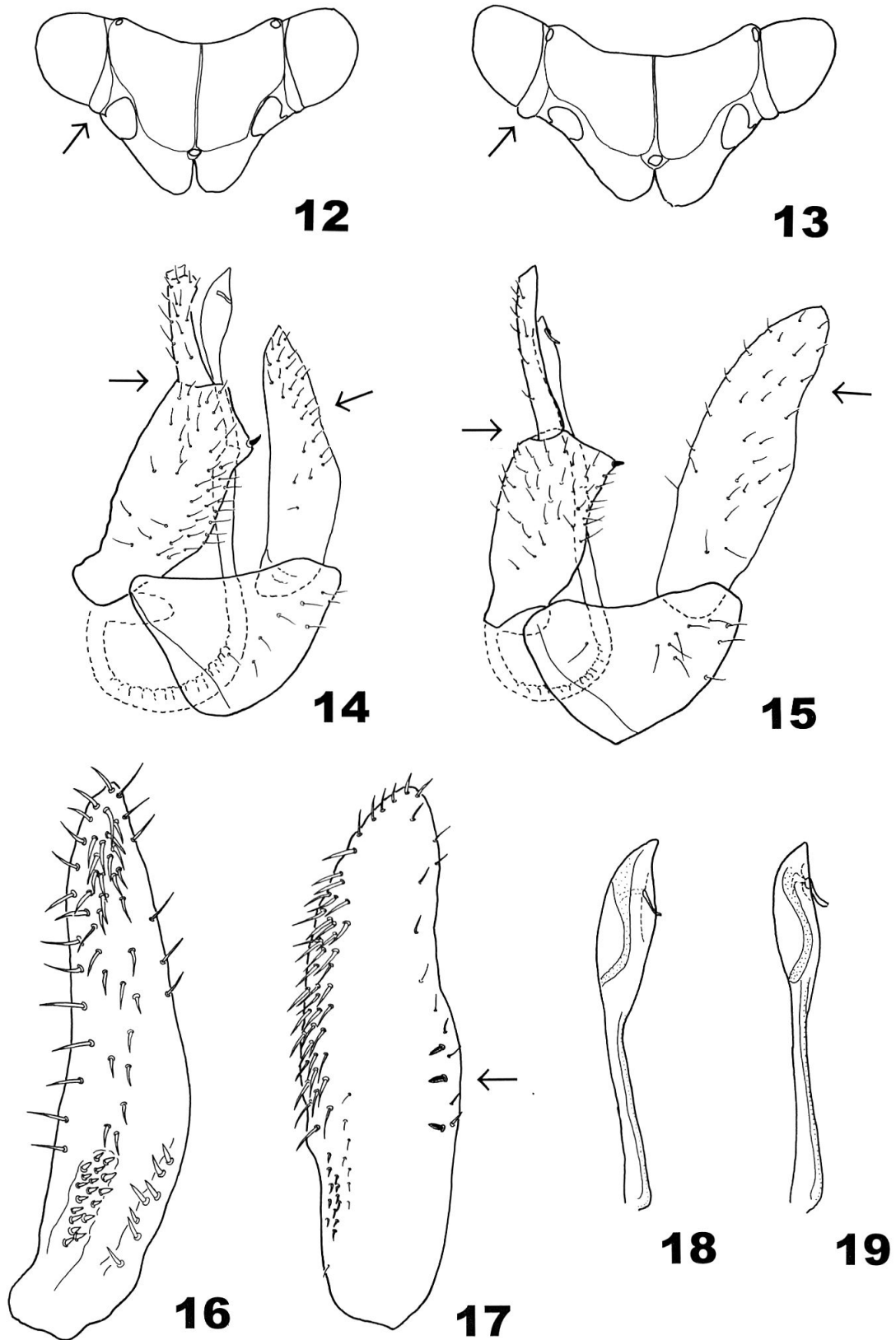
Biology and damage: In Brazil (Paraná State), *C. eucalypti* was detected on nursery seedling, in June 1998, causing damage similar to the one described by CADAHIA (1980). Chemical control was necessary as the damage was very extensive. On the other hand, seedlings of *E. grandis* were not attacked by this species.

In experimental eucalypt plantations the presence of *C. eucalypti* was detected on saplings of *E. bicostata* and *E. nitens*. *E. viminalis* and *E. deanei* in the same place did not show the damage by *C. eucalypti*.

In Uruguay, the species was widely distributed when discovered in August 1998, but was not encountered during the prospectings carried out in 1997. The most



Figs 8–11. – Figs 8, 10: *Ctenarytaina eucalypti* (MASKELL), fifth instar larva. 8, habitus; 9, abdomen with additional pores (arrow). – Figs 9, 11: *Ctenarytaina spatulata* TAYLOR, fifth instar larva. 9, habitus; 11, abdomen with additional pores (arrow).



Figs 12–19. – Figs 12, 14, 16, 18: *Ctenarytaina eucalypti* (MASKELL). 12, head, dorsal view; 14, male genitalia, lateral view; 16, paramere, inner face; 18, distal portion of aedeagus. – Figs 13, 15, 17, 19: *Ctenarytaina spatulata* TAYLOR. 13, head, dorsal view; 15, male genitalia, lateral view; 17, paramere, inner face; 19, distal portion of aedeagus.



important host species are the „eucaliptos blancos“ (*E. globulus*, *E. maidenii* and *E. bicostata*). To a much lesser degree, damage was observed also on *E. dunnii*. *C. eucalypti* was not observed to attack native Myrtaceae. Both *Ctenarytaina* species occur in very high numbers of insects, but the huge population size of *C. eucalypti* is more spectacular. At the moment none of the damage described in the literature was observed (e. g. CADAHIA, 1980).

*Ctenarytaina spatulata* TAYLOR, 1997

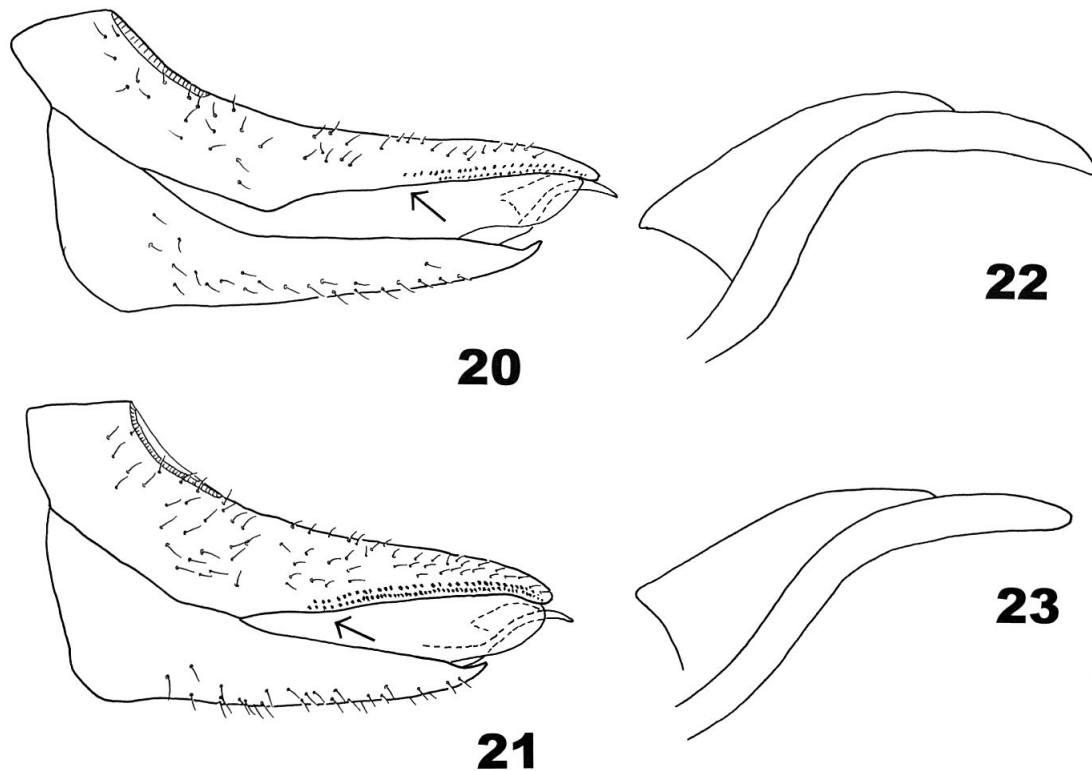
Figs 2, 4, 7, 9, 11, 13, 15, 17, 19, 21, 23

For differences to *Blastopsylla* see there; from *C. eucalypti*, *C. spatulata* is distinguished as indicated in Tab. 1.

Distribution: Brazil (States of Paraná, São Paulo and Santa Catarina), Uruguay (widely distributed over the whole country).

Hosts: *Eucalyptus grandis*, *E. amplifolia*, *E. dunnii*, *E. globulus*, *E. saligna*, *E. robusta*, *E. rostrata*, *E. tereticornis* and *E. viminalis*.

Biology and damage: In Brazil, *C. spatulata* was collected mostly on *Eucalyptus grandis* in the States of Paraná and São Paulo, and on *E. viminalis* in Santa Catarina State. The population fluctuations of this species have been studied since 1 October, 1997 in an experimental *Eucalyptus grandis* stand in Colombo,



Figs 20–23. – Figs 20, 22: *Ctenarytaina eucalypti* (MASKELL). 20, female genitalia, lateral view; 22, valvulae dorsalis and ventralis. – Figs 21, 23: *Ctenarytaina spatulata* TAYLOR. 21, female genitalia, lateral view; 23, valvulae dorsalis and ventralis.

Paraná State, by counting eggs and larvae in 2 buds of 10 plants each, once a week. All stages (eggs, larvae and adults) of this species occurred all year round, but the population declined with abundant rain. On the other hand, the population increased during cold and low rainfall periods. The methodology was very efficient to monitor the immature stages but not the adults. In a green house trial, *E. grandis* was infected by *C. spatulata* which reduced eucalypt growth, distorted and discoloured the leaves, and helped fungal growth but, without additional stress, did not produce eucalypt die-back.

In Uruguay, the species was found all over the country when first discovered in 1994. It is important to note that during prospections made in 1993, *C. spatulata* was not found. The most important host species is *Eucalyptus grandis*; *Eucalyptus amplifolia*, *E. dunzii*, *E. globulus* (adult foliage), *E. robusta*, *E. rostrata*, *E. tereticornis* and *E. viminalis* constitute additional hosts. The species was not found on native Myrtaceae. The most important attacks were observed in winter and spring. The population size of *C. spatulata* is spectacular though slightly less than that of *C. eucalypti*.

#### DISCUSSION

Based on the information given above, it is likely that the presence of eucalypt psyllids in South America is fairly recent (about five years). Currently these pests are restricted to Brazil and Uruguay but a spread to other countries seems probable unless effective quarantine measurements are being taken.

#### ZUSAMMENFASSUNG

*Ctenarytaina eucalypti* (MASKELL, 1890) und *Ctenarytaina spatulata* TAYLOR, 1997 (Psyllidae: Spondyliaspidini) verursachen beträchtliche Schäden in *Eucalyptus*-Pflanzungen in Brasilien und Uruguay wie dies auch für *Blastopsylla occidentalis* TAYLOR in Brasilien der Fall ist. Die Arten wurden erst vor relativ kurzer Zeit in diesen beiden Ländern entdeckt und stellen bisher die einzigen *Eucalyptus*-Psylliden in Südamerika dar. Da *Eucalyptus* in vielen Staaten von Südamerika grossflächig angepflanzt wird, besteht eine reelle Gefahr, dass sich diese Schädlinge weiter in der neotropischen Region verbreiten. Die vorliegende Arbeit fasst die gegenwärtigen Kenntnisse über Verbreitung, Biologie und Schaden in Südamerika zusammen. Unterschiede in Färbung und Morphologie zwischen *C. eucalypti* und *C. spatulata* werden diskutiert und abgebildet.

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