DESCRIPTION OF A NEW PRIMARY PARASITOID, *ZARHOPALUS* ASHMEAD (HYMENOPTERA: ENCYRTIDAE), OF *ORACELLA ACUTA* (HOMOPTERA: PSEUDOCOCCIDAE)

JIANGHUA SUN

Department of Forestry, Northeast Forestry University, Harbin 150040, China

GARY L. DEBARR[1]

USDA Forest Service, 320 Green Street, Athens, Georgia, USA 30602

C. WAYNE BERISFORD

Department of Entomology, University of Georgia, Athens, Georgia, USA 30602

and MICHAEL E. SCHAUFF

Systematic Entomology Laboratory, USDA, National Museum of Natural History, NHB 168, Washington, District of Columbia, USA 20560

Abstract

The Canadian Entomologist **130**: 793 – 797 (1998)

Zarhopalus debarri Sun sp.nov. reared from the loblolly pine mealybug, *Oracella acuta* (Lobdell), in the southeastern United States is described.

Sun, J., G.L. DeBarr, C.W. Berisford et M.E. Schauff. 1998. Description d'un nouveau parasitoïde primaire, *Zarhopalus* Ashmead (Hymenoptera : Encyrtidae), chez *Oracella acuta* (Homoptera : Pseudococcidae). *The Canadian Entomologist* **130** : 793–797.

Résumé

On trouvera ici la description de *Zarhopalus debarri* Sun sp. nov. (Hymenoptera : Encyrtidae) obtenu par élevage sur la cochenille farineuse *Oracella acuta* (Lobdell) (Homoptera : Pseudococcidae) dans le sud-est américain.

[Traduit par la Rédaction]

Introduction

The loblolly pine mealybug, *Oracella acuta* (Lobdell) (Homoptera: Pseudococcidae), is a native North American species infesting pines, *Pinus* spp. (Pinaceae), throughout the southeastern United States. However, it is seldom a pest in the United States, largely because an effective complex of natural enemies regulates the population at low levels (Clarke et al. 1990, 1992; J. Sun, G.L. DeBarr, and C.W. Berisford, unpublished data). *Oracella acuta* was accidentally introduced from the southeastern United States into Guangdong Province, China, in 1988 and spread at a rapid rate, apparently due to the lack of natural enemies (Sun et al. 1996). By June 1995, its range covered more than 212 540 ha of exotic slash pine (*Pinus elliottii* Englem. var. *elliotti*) in China. A Sino-United States cooperative project to introduce natural enemies was initiated in 1995 (DeBarr et al. 1998). During the investigation of the parasitoid complex of *O. acuta*, one primary parasitoid reared from loblolly pine mealybug was identified as a new species in the genus *Zarhopalus* (Hymenoptera: Encyrtidae).

[1] Author to whom all correspondence should be addressed.

Zarhopalus Ashmead (1900) is a New World group of mealybug parasitoids. Timberlake (1924) first revised the genus and provided a key to the three species, *Zarhopalus corvinus* (Girault), *Zarhopalus sheldoni* Ashmead, and *Zarhopalus inquisitor* (Howard), found in the United States. Bennett (1957) described another species, *Zarhopalus putophilus* Bennett, from Trinidad. Kerrich (1978) redescribed the four species in the genus and described *Zarhopalus clavatus* Kerrich in his revision of the dinocarsiine Encyrtidae. Only females were described and used in published keys (Ashmead 1900; Timberlake 1924; Bennett 1957; Kerrich 1978). We report here the description of a new species.

Zarhopalus debarri Sun sp.nov.

Diagnosis. *Zarhopalus debarri* is most similar to *Z. inquisitor* and *Z. corvinus*. The species can be separated by the following differences: antennae of female *Z. debarri* have the scape about 4.2 times as long as wide at its greatest width, whereas in *Z. corvinus* (2.4), *Z. sheldoni* (2.8), *Z. putophilus* (2.5), *Z. clavatus* (2.9), and *Z. inquisitor* (2.7), it is only about 2.4–2.9 times as long as wide. The club is over 2 times as long as the funicle in *Z. debarri*, whereas it is only 1.3–1.5 times as long as the funicle in the other species.

Female. Body length about 1.3 mm. Color black except the following: frontovertex, axillae, and scutellum with dark blue metallic reflections; midfemur brownish black; midtibia blackish to dark brownish; and tarsi light brown. Antenna (Fig. 1A) with scape about 4.2 times as long as wide, funicular segments wider than long, with each successive segment slightly wider than the preceding, and sixth funicular segment about 2.6 times as broad as long; club wider than last funicular segment and 2.2 times as long as funicle. Head with ocelli in a wide obtuse triangle with lateral ocelli near the dorsal eye margin; frontovertex almost equal in length to breadth of eye, covered with fine mesh sculpture and spare irregularly shaped piliferous punctures, punctures larger above ocelli. Mesosoma with mesoscutum, scutellum, and axillae finely punctate reticulate; scutellum asetose posteriorly, scutellum smooth. Metasoma longer than mesosoma. Forewing fuscous beneath submarginal and stigmal veins (Fig. 2A), evenly setose beyond linea calva; length of postmarginal vein about one-third that of submarginal, equal in length to stigmal vein; submarginal vein appearing broken just prior to marginal vein; marginal vein punctiform.

Male. Body length about 1.0 mm. Color black except the following: frontovertex, axillae, and scutellum with much less metallic reflection than in the female; midfemur blackish; midtibia dark to light brownish; and tarsi light yellow whitish. Antenna (Fig. 1B) with scape about 3.5 times as long as wide, funicular segments wider than long, more uniform than in female, and sixth funicular segment about 2 times as broad as long; club about as wide as last funicular segment, tapering to the rounded apex, and about equal in length to the last three funicular segments combined. Head with ocelli in a wide obtuse triangle with lateral ocelli close to the occipital margin; frontovertex slightly longer than breadth of eye, covered with close, shallow sparse pin-punctures. Mesosoma with mesoscutum, axillae and scutellum shiny, finely punctate reticulate, scutellum asetose posteriorly. Metasoma about equal or slightly longer than mesosoma. Forewing nearly transparent under submarginal vein and extending anteriorly under stigmal vein (Fig. 2B), evenly setose beyond linea calva; postmarginal vein weak, not distinct, about one-sixth the length of submarginal vein, slightly shorter than stigmal

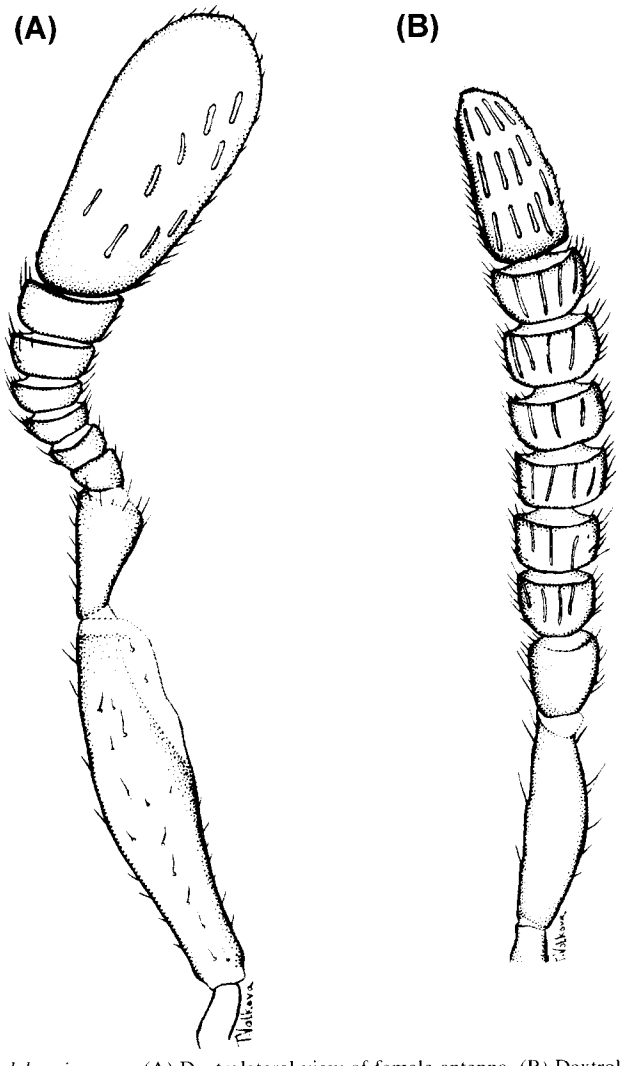

FIG. 1. *Zarhopalus debarri* sp.nov. (A) Dextrolateral view of female antenna. (B) Dextrolateral view of male antenna.

vein and appearing broken just prior to marginal vein, stigmal vein short, at an angle of about 45° from the margin; marginal vein less punctiform than in female.

Types. HOLOTYPE [deposited in the National Museum of Natural History (USNM)]: 1 ♀, 30 August 1995 ex. from *Oracella acuta* (Lobdell) on loblolly pine, *P. taeda* L., Weyerhaeuser Seed Orchard, Lyons, Georgia, collected by J. Sun. PARATYPES (deposited in USNM): 1♂, ex. 29 August 1996 from *O. acuta* on loblolly pine, collected from Lyons, Georgia (deposited in the Natural History Museum of the University of Georgia, Athens, Georgia): 2♀♀, ex. 29 August 1996, 2♀♀, ex. 5 June 1996 (Mount), and 1♂, ex. 29 August 1996 from *O. acuta* on loblolly pine, collected from Lyons, Georgia.

Etymology. This species is named in honor of G.L. DeBarr, Research Entomologist, United States Department of Agriculture, Forest Service, for his effort in initiating and

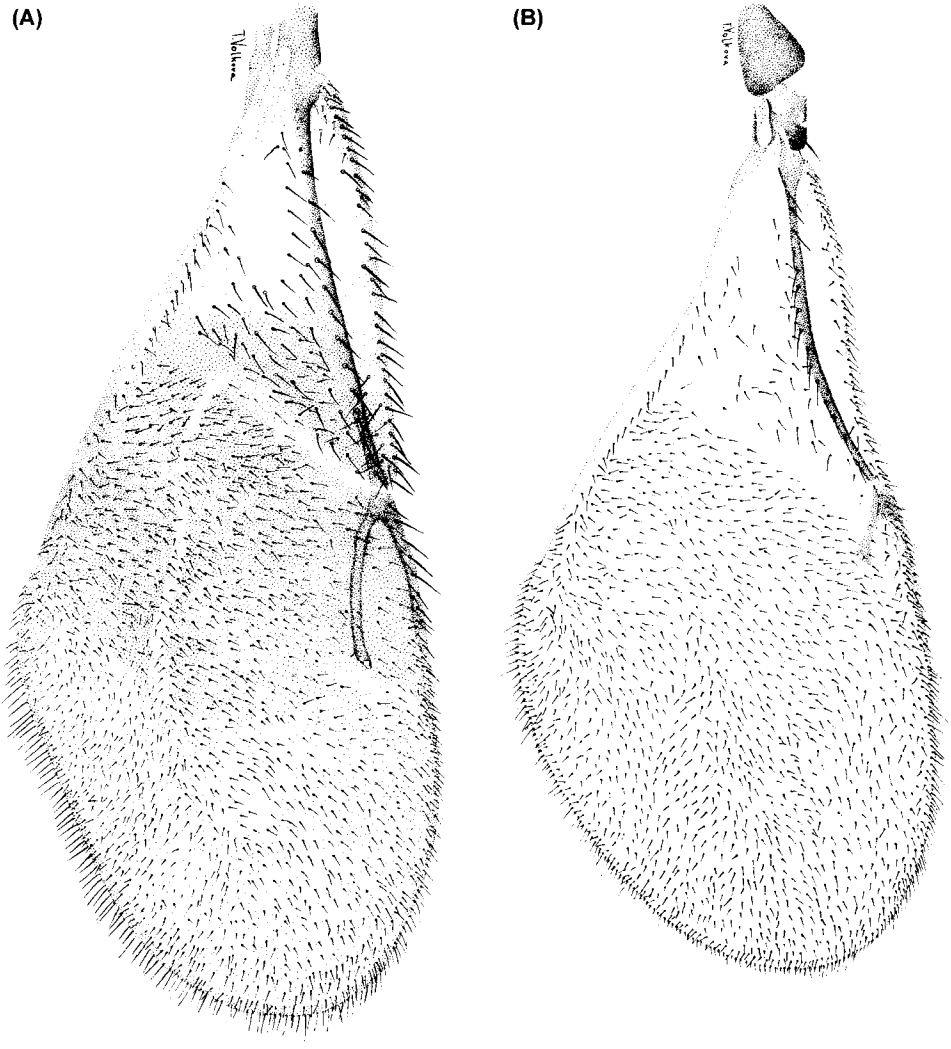

FIG. 2. *Zarhopalus debarri* sp.nov. (A) Female forewing. (B) Male forewing.

carrying out the Sino-United States cooperative project for the biological control of *O. acuta* in the People's Republic of China.

Discussion

Zarhopalus is a poorly studied group. Except for a few early works in biological control involving this genus (Noyes and Hayat 1994), there have been no studies on species ecology and biology. All six species in the genus are known to be parasites of mealybugs. Based on the limited records, those parasites appear host specific. Only one exception, *Z. sheldoni*, was reported to parasitize both *Phenacoccus aceris* (Signoret) (Homoptera: Pseudococcidae) and *Pseudococcus maritimus* (Ehrhorn) (Homoptera: Pseudococcidae); the latter is also the host for *Z. corvinus* (Kerrich 1978). It should be noted that only two female specimens of *Z. sheldoni* were collected from *P. maritimus* in 1943, and there have been no additional specimens recorded since then. Noyes and

Hayat (1994) list only *P. aceris* as a host for *Z. sheldoni* and *P. maritimus* as the only host for *Z. corvinus*.

Zarhopalus debarri is a primary parasitoid of the loblolly pine mealybug and therefore a candidate for potential importation into China. Further investigations on its biology and ecology are needed.

Acknowledgments

This paper is a part of a Sino-United States forestry biological control program, funded by the USDA Forest Service, Forest Health Management Enterprise Team, Morgantown, West Virginia, USDA Foreign Agricultural Service, Office of International Cooperation and Development, and the Ministry of Forestry, People's Republic of China. We thank G. Zolnerowich, Department of Entomology, Texas A&M University, and M. Williams, Department of Entomology, Auburn University, for their critical reviews of an earlier version of the manuscript.

References

Ashmead, W.H. 1900. On the genera of the Chalcid-flies belonging to the subfamily Encyrtinae. *Proceedings of the United States National Museum* **22:** 323–412.

Bennett, F.D. 1957. Trinidad Encyrtidae II. Some additional mealybug parasites. *The Canadian Entomologist* **89**: 569–572.

Clarke, S.R., G.L. DeBarr, and C.W. Berisford. 1990. Life history of *Oracella acuta* (Homoptera: Pseudococcidae) in loblolly pine seed orchards in Georgia. *Environmental Entomology* **19**: 99–103.

Clarke, S.R., Negron, J.F., and DeBarr, G.L. 1992. Effects of four pyrethroids on scale insect (Homoptera) populations and their natural enemies in loblolly and shortleaf pine seed orchards. *Journal of Economic Entomology* **85**: 1246–1252.

DeBarr, G.L., J.H. Sun, S.R. Clarke, and C.W. Berisford. 1998. Initial results of a biological control program for an introduced pine-feeding mealybug, *Oracella acuta* (Lobdell), in the People's Republic of China. pp. 15–19 *in* Proceedings of the Resource Technology 1997 Beijing International Symposium, September 1997, Beijing. Forestry Publishing House, Beijing, P.R.C.

Kerrich, G.J. 1978. A revision of the dinocarsiine Encyrtidae with a study of the genus *Pelmatencyrtus* De Santis (Hymenoptera: Chalcidoidae). *Zoological Journal of the Linnean Society* **62**: 109–159.

Noyes, J.S., and M. Hayat. 1994. Oriental Mealybug Parasitoids of the Anagyrini. CAB International, London.

Sun, J., G.L. DeBarr, T.K. Liu, C.W. Berisford, and S.R. Clarke. 1996. An unwelcome guest in China: a pine-feeding mealybug. *Journal of Forestry* **94**: 27–32.

Timberlake, P.H. 1924. The parasites of *Pseudococcus maritimus* (Ehrhorn) in California (Hymenoptera, Chalcidoidae). Part I. Taxonomic studies. *University of California Publications in Entomology* **3**: 223–251.

(Date received: 30 January 1998; date accepted: 18 May 1998)