A NEW SPECIES OF *CHAENUSA* (HYMENOPTERA: BRACONIDAE) REARED FROM *HYDRELLIA PAKISTANAE* AND *HYDRELLIA SARAHAE LATICAPSULA* (DIPTERA: EPHYDRIDAE) INFESTING *HYDRILLA VERTICILLATA* (ALISMATALES: HYDROCHARITACEAE) IN INDIA AND PAKISTAN

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ABSTRACT

Chaenusa glabra Kula, new species from India and Pakistan is described, and sexual dimorphism is reported and discussed. A diagnosis is provided to differentiate it from all other species of *Chaenusa* Haliday *sensu lato*. It was reared from *Hydrellia pakistanae* Deonier and *Hydrellia sarahae laticapsula* Deonier infesting *Hydrilla verticillata* (L. f.) Royale during foreign exploration for natural enemies of *H. verticillata*, and is in quarantine at the Florida Biological Control Laboratory in Gainesville. It is the first species of *Chaenusa* described from the Oriental Region and the only species of *Chaenusa* known to attack species of *Hydrellia* Robineau-Desvoidy infesting plants from a genus other than *Potamogeton* L.

Key Words: Alysiinae, biological control, Dacnusini, Oriental Region, parasitoid

RESUMEN

Chaenusa glabra Kula, nueva especie, de la India y de Pakistán es descrita y el dimorfismo sexual en esta especie es reportado y discutido. Una diagnosis para diferenciar esta especie del resto de las especies dentro del género *Chaenusa* Haliday *sensu lato* es proporcionada. Esta especie fue criada de *Hydrellia pakistanae* Deonier e *Hydrellia sarahae laticapsula* Deonier infectando *Hydrilla verticillata* (L. f.) Royale, durante una exploración en busqueda de enemigos naturales de *H. verticillata* y en cuarentena en el Laboratorio de Control Biológico de Florida en Gainesville. Ésta es la primera especie de *Chaenusa* descrita de la Región Oriental y es la única especie de *Chaenusa* conocida que ataca especies de *Hydrellia* Robineau-Desvoidy infectando plantas de un género diferente a *Potamogeton* L.

Translation provided by the author.

Hydrilla verticillata (L. f.) Royale (Hydrocharitaceae), commonly known as hydrilla, is an invasive submersed aquatic plant endemic to Africa, Asia, Australia (Balciunas & Burrows 1996; Balciunas et al. 2002), and portions of Europe (Bennett & Buckingham 2000). It was introduced into the United States in 1951 or 1952 near Tampa, Florida (Schmitz et al. 1991), subsequently spread throughout the U.S., and is on the Federal Noxious Weed List (USDA, APHIS 2006). The USGS Nonindigenous Aquatic Species (NAS) database (http://nas.er.usgs.gov/Default.asp) contains reports of hydrilla from 24 states, the District of Columbia, and Puerto Rico. The USDA PLANTS database (USDA, NRCS 2008) contains a report of hydrilla from Iowa, but this record is not in the NAS database. Balciunas et al. (2002) provided a detailed overview of hydrilla in the U.S. with an emphasis on biological control.

Two species of *Hydrellia* Robineau-Desvoidy (Diptera: Ephydridae) have been imported and released in the U.S. to control hydrilla (Balciunas et al. 2002). *Hydrellia balciunasi* bock, first released in Florida in 1989 (Buckingham et al. 1991), established only in Texas through subsequent releases and has not expanded its range substantially (Balciunas et al. 2002; Grodowitz et al. 2004). *Hydrellia pakistanae* Deonier, first released in Florida in 1987, established throughout the southeastern U.S. and occurs at most sites infested with hydrilla (Center et al. 1997; Balciunas et al. 2002; Doyle et al. 2002; Grodowitz et al. 2004). *Hydrellia pakistanae* has had a greater impact on populations of hydrilla in the U.S. than *H. balciunasi* (Wheeler & Center 2001; Grodowitz et al. 2004).

Baloch & Sana-Ullah (1974) first reported *H. pakistanae* (as *Hydrellia* sp.) from hydrilla in 1971 and conducted preliminary tests on its physiological host range. Deonier (1978) described the species of *Hydrellia* from Baloch & Sana-Ullah (1974) as *H. pakistanae*. Baloch et al. (1980) conducted additional physiological host range tests,

as well as choice tests, and concluded that *H. pakistanae* was the "most promising" of 3 insect species assessed for control of hydrilla. *Hydrellia pakistanae* and an undetermined species later described as *Hydrellia sarahae laticapsula* Deonier (Deonier 1993) were recovered during a survey of hydrilla in Karnataka, India from May to Nov 1985 (Krishnaswamy & Chacko 1990). *Hydrellia pakistanae* was hand-carried from Bangalore, India to the Florida Biological Control Laboratory (FBCL) quarantine facility at the Division of Plant Industry in Gainesville where it was subjected to host range testing before its release (Buckingham et al. 1989). Additional field-collected specimens of *Hydrellia* from Bangalore and Rawalpindi, Pakistan were brought to the FBCL quarantine facility in 1990 to reduce the risk of decreased fly performance due to inbreeding in the original colony (Center et al. 1997). The specimens from Bangalore and Rawalpindi were a combination of *H. pakistanae* and *H. sarahae laticapsula* (Deonier 1993); the latter species was eliminated through rearing in quarantine (C. Bennett, Invasive Plant Research Laboratory, USDA-ARS, personal communication).

Few parasitoid species were reared from specimens of *Hydrellia* infesting hydrilla during exploration in India and Pakistan and at the FBCL quarantine facility. Baloch & Sana-Ullah (1974) reported the braconid *Ademon decrescens* Nees parasitizing *H. pakistanae* (as *Hydrellia* sp.) in Pakistan. Krishnaswamy & Chacko (1990) reported a species of *Ademon* near *decrescens* and an undetermined species of *Chaenusa* Haliday from *H. pakistanae* and *H. sarahae laticapsula* (as *Hydrellia* sp.) from the survey in Karnataka. An undetermined species of *Chaenusa* was reared from specimens of *Hydrellia* brought to the FBCL quarantine facility from Bangalore and Rawalpindi. As far as is known, all species of *Ademon* Haliday and *Chaenusa* are koinobiont endoparasitoids of species of *Hydrellia* (Wharton 1997a, b; Yu et al. 2005). The author compared specimens of *Chaenusa* reared in Karnataka (Krishnaswamy & Chacko 1990) and at the FBCL quarantine facility and determined that they are conspecific. Reference to identification keys, as well as species diagnoses and descriptions, revealed that the species is undescribed. The purpose of this article is to describe this species and report its hosts.

Materials and Methods

Specimens of the new species were borrowed from or are located at the following repositories: the Canadian National Collection of Insects, Ottawa, Ontario (CNC); the Insect Collection at Texas A&M University, College Station, USA (TAMU); the Smithsonian Institution National Museum of Natural History, Washington, DC, USA (USNM); and The Natural History Museum, London, England (BMNH). Most of the specimens from TAMU were reared at the FBCL quarantine facility according to the protocol detailed in Buckingham et al. (1989). Label data were used to infer that specimens from the BMNH and USNM were reared during the survey in Karnataka as detailed in Krishnaswamy & Chacko (1990). The source of the specimens from the CNC is equivocal, but label data suggest that they also were reared during the survey in Karnataka.

The new species was determined as *Chaenusa sensu lato* as defined in Kula & Zolnerowich (2008). Riegel (1950, 1982) treated *Chaenusa s.l.* as *Chaenusa sensu stricto*, *Chorebidea* Viereck, and *Chorebidella* Riegel. Griffiths (1964) synonymized the genera, and Kula & Zolnerowich (2008) demonstrated that most New World species of *Chaenusa s.l.* cannot be placed unequivocally in any of the 3 genera as defined in Riegel (1950, 1982). In addition to the specimens mentioned above, the following material borrowed for other research projects was examined: specimens determined by the author as the Australasian species *Chaenusa rugosa* Wharton (TAMU); the holotypes of all New World species of *Chaenusa s.l.* (repositories listed in Kula & Zolnerowich 2008); and determined Palearctic specimens of *Chaenusa conjungens* (Nees), *Chaenusa elongata* (Stelfox), *Chaenusa naiadum* (Haliday), *Chaenusa nereidum* (Haliday), *Chaenusa opaca* (Stelfox), and *Chaenusa orghidani* (Burghele) (BMNH and/or USNM). Published keys, diagnoses, and descriptions were used to differentiate the new species from all other species of *Chaenusa s.l.*

Specimens were examined with a Leica Wild M10 stereomicroscope with 25X oculars. Measurements were taken with an ocular micrometer as in Wharton (1977) with additions and modifications as in Kula & Zolnerowich (2005) except body length was measured as in Kula & Zolnerowich (2008). Additionally, scutellar sulcus length was measured medially in dorsal view, and scutellar sulcus width is the maximum width of the scutellar sulcus in dorsal view. Stigma length was measured from where the parastigma meets the stigma to where the stigma meets vein R1; stigma height was measured from the anterior edge of the stigma to where the stigma meets vein r. The following abbreviations are used in the description: head length (HL), head width (HW), temple width (TW), face width (FW), face height (FH), eye length (EL), eye height (EH), flagellomere 1 length (F1L), flagellomere 2 length (F2L), mesosoma length (ML), mesoscutum width (MW), mesosoma height (MH), scutellar sulcus length (SSL), scutellar sulcus width (SSW), stigma length (SL), stigma height (SH), median tergite 1 length (T1L), median tergite 1 width (T1W), and median tergites one through eight (t1 . . . t8).

Terminology for anatomical features, surface sculpture, and setation follows Sharkey & Whar-

ton (1997) except gonoforceps is as in Wharton (1977). As defined in Sharkey & Wharton (1997), setiferous and setose both refer to areas bearing setae, setiferous areas "not necessarily with dense setae" and setose areas "with dense setae." Data on mandibular sculpture, setation, and tooth shape were taken as described in Kula & Zolnerowich (2008). The numbering of teeth follows Kula (2008). The maxillary palpus is described as apparently four- to five-segmented when the segmentation is weak and difficult to discern. The pronope and dorsope are described as apparently present or absent when the pits are small and difficult to differentiate from sculpture and/or grooves within the pronotal collar and at the base of t1. When a range of intraspecific variation is reported (e.g., lateral portion of pronotum coriaceous to rugulose), the most common condition is the first condition mentioned (i.e., coriaceous) except for color. Color is difficult to describe efficiently, and therefore, color is described as concisely as possible without regard to mentioning the most common condition first. Specimens are described exactly as they appeared at the time of examination, but those that were improperly dehydrated and/or preserved may deviate from their natural color. Also, telescoping of the metasoma may affect how color is interpreted. The material examined section is formatted as in Kula & Zolnerowich (2008). The phrase "virtually same data as previous" is used when data labels for a specimen listed in the material examined have the same content as the previous entry but differ slightly in punctuation (e.g., presence or absence of periods).

Results and Discussion

Chaenusa glabra Kula, **new species**
(Figs. 1-8)

Diagnosis.—The following combination of characters differentiate *C. glabra*, *Chaenusa bergi* (Riegel), and *C. rugosa* from all other species of *Chaenusa*: labial palpus 2- or 3-segmented; forewing stigma broad, differentiated from vein R1 distally; forewing vein RS+M absent; forewing first subdiscal cell open; and gonoforceps roughly triangular in lateral view. Other species of *Chaenusa* have the aforementioned features but in combination with at least one of the following: labial palpus 4-segmented; stigma elongate, distal margin tapering into R1; RS+M at least partially present; first subdiscal cell closed; and gonoforceps boot-shaped in lateral view. *Chaenusa glabra* is most similar morphologically to the Nearctic species *C. bergi* and *C. rugosa*. The labial palpus is 2-segmented in *C. glabra* and is 3-segmented in *C. bergi* and *C. rugosa*. *Chaenusa glabra* females and males have 10-12 and 12-15 flagellomeres, respectively. *Chaenusa bergi* has 14-15 and 17-20 flagellomeres, respectively, and *C. rugosa* has 14-16 and 18 flagellomeres, respectively. Median tergite 1 is usually rugulose to weakly coriaceous anterior to spiracles and smooth posterior to spiracles or entirely smooth (97.7%, n = 45) in *C. glabra*; t1 is entirely aciculo-rugose in *C. bergi* and entirely aciculo-rugose to rugose in *C. rugosa*. The vertex and gena are smooth in *C. glabra* and are rugose in *C. rugosa*.

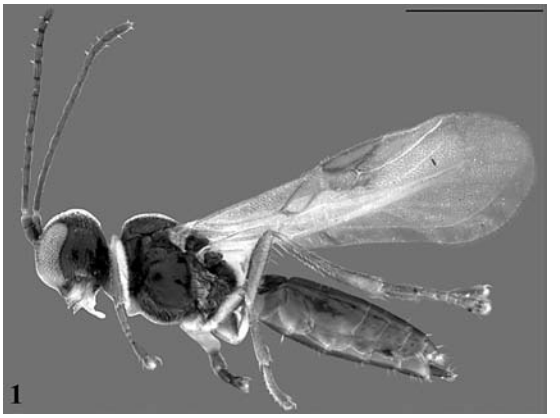
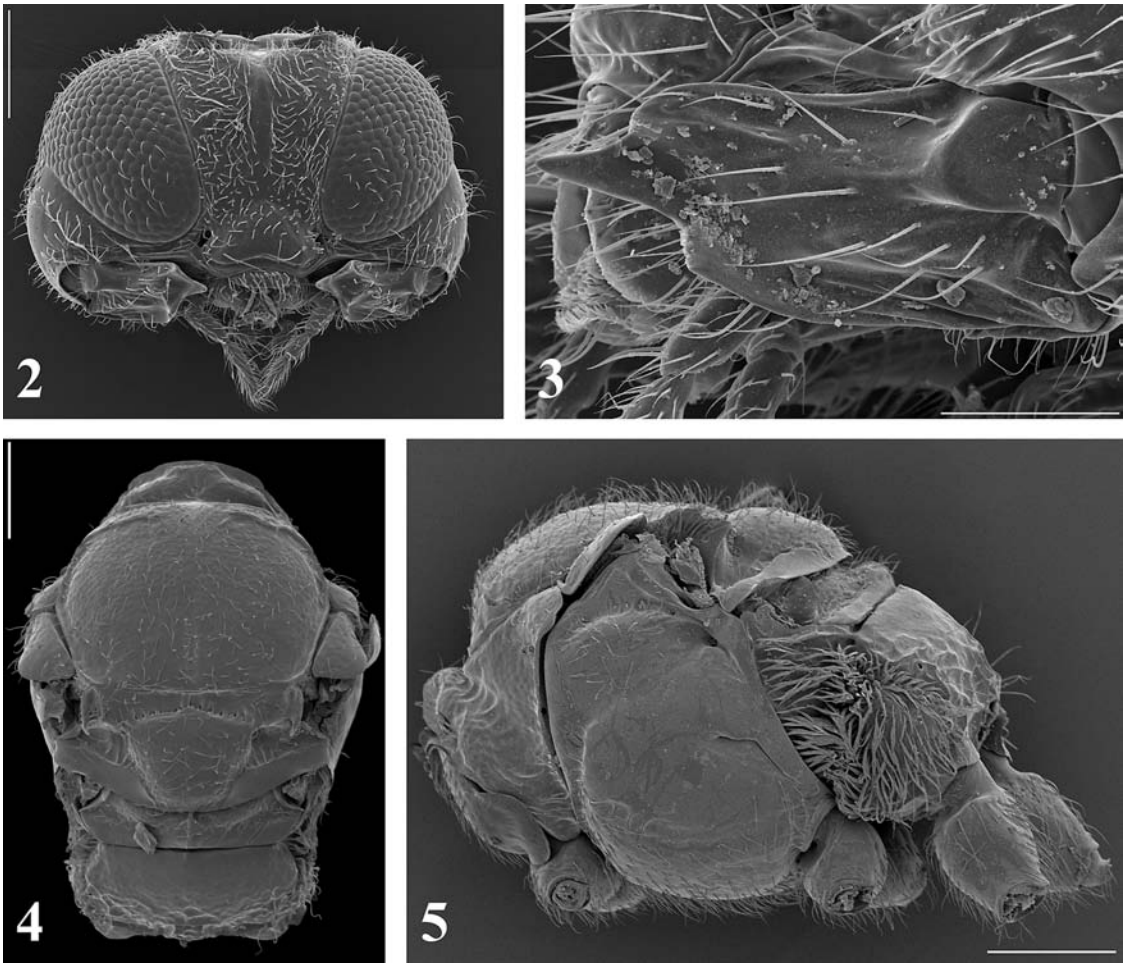


Fig. 1. Holotype of *Chaenusa glabra*, lateral habitus, scale bar = 500 µm.

Description.—Female. *Body length:* 1.64-1.72 mm. *Head* (Fig. 2): HL 0.67-0.73X HW, HW 0.92-0.97X TW, FW 0.63-0.77X FH, EL 0.33-0.46X EH, MNL 1.70-2.29X MNAW, MNAW 0.70-1.00X MNBW, F1L 1.00-1.50X F2L; antenna with 10-12 flagellomeres, maxillary palpus apparently 4- to 5-segmented, labial palpus 2-segmented; face smooth or rugulose, setose; frons smooth with rugulose or smooth longitudinal groove mesally, setose laterally and glabrous mesally; gena and vertex smooth, setose; occiput smooth, glabrous; eye setose; clypeus with apical rim, setiferous to setose; mandible with 3 teeth (Fig. 3), setiferous except excavated distal portion glabrous, weak horizontal ridge present mesally or ridge indiscernible, diagonal ridges associated with tooth 1 and 3 weak or indiscernible, tooth 1 triangular or orthogonal, rounded to acute apically, tooth 2 narrowly elongate, acute apically, tooth 3 orthogonal or triangular, acute apically.

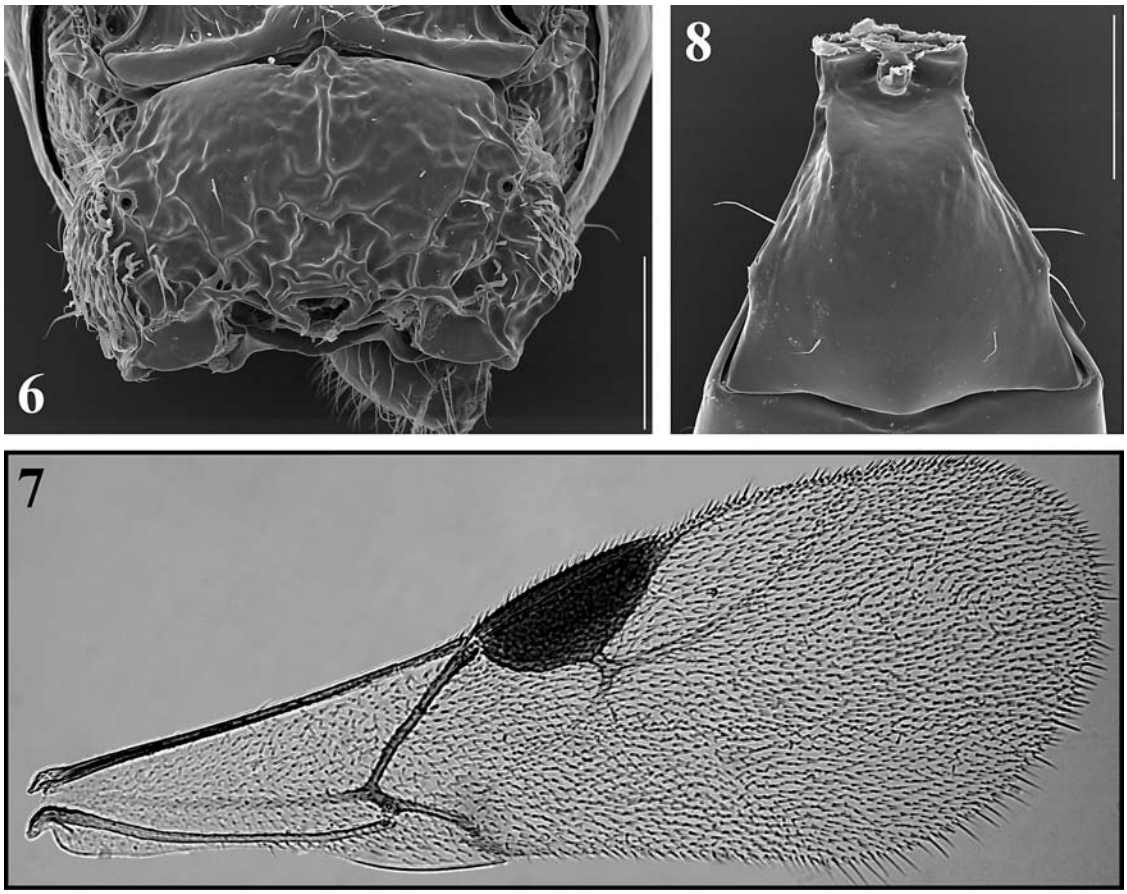
Mesosoma (Figs. 4, 5): ML 1.58-2.00X MW, ML 1.32-1.61X MH, MW 0.80-0.88X MH, SSL 0.08-0.21X SSW; pronotal collar (n = 21) often smooth or rugulose anteriorly with posterior furrow partially or completely crenulate to rugulose (76.2%) but occasionally entirely smooth or virtually so (23.8%), pronope apparently absent or present, lateral portion of pronotum coriaceous to rugulose, setiferous along margins, glabrous mesally, anterolateral furrow often rugulose to crenulate (75.0%, n = 20); notauli anteriorly carinate transverse grooves continuous with lateral margin of



Figs. 2-5. *Chaenusa glabra*. 2, Head, anterior view, scale bar = 100 µm. 3, Mandible, lateral view, scale bar = 50 µm. 4, Mesosoma, dorsal view, scale bar = 100 µm. 5, Mesosoma, lateral view, scale bar = 100 µm.

mesoscutum, smooth or bearing one or two crenulae, terminating anterior to mesoscutal midpit; mesoscutal midpit slitlike; mesoscutum (excluding lateral margin, notauli, and midpit) coriaceous, uniformly setose to setiferous; scutellar sulcus (n = 22) usually bearing median longitudinal ridge and several small crenulae (90.9%) but rarely entirely crenulate (9.1%); scutellar disc smooth or rugulose to weakly coriaceous, setose to setiferous; metanotum with carina mesally; propodeum (Fig. 6) (n = 22) usually transitioning from weakly coriaceous to rugose or smooth basally to areolate-rugose to rugose apically (90.9%) but rarely entirely areolate-rugose (9.1%), occasionally with longitudinal carina mesoapically (22.7%), glabrous or virtually so basally and mesally and setiferous apicolaterally; epicnemial carina absent; sternaulus present along entire length of mesopleuron, transitioning from crenulate anteriorly to smooth or rugulose posteriorly; posterior mesopleural furrow entirely smooth; mesopleuron (excluding sternaulus and posterior mesopleural furrow) weakly coriaceous or smooth except anterior margin partially or entirely dorsoventrally crenulate to rugulose, setiferous dorsally and ventrally, glabrous laterally and mesally; metapleuron with smooth or virtually smooth flat triangular area anteriorly and rugose to rugulose swelling posteriorly, flat area setose, setae generally oriented posteriorly, swelling setiferous to setose, setae on swelling generally oriented posteroventrally.

Forewing (Fig. 7): Hyaline; stigma with well-defined proximal and distal margins, semielliptical, SL 2.10-2.81X SH; vein r arising slightly basad or from middle of stigma; vein 3RS evenly curved to anterior margin; vein 2RS (n = 22) usually transitioning from tubular anteriorly to nebulous posteriorly (90.9%) but rarely entirely tubular (9.1%); vein 1m-cu (n = 20) often entirely spec-



Figs. 6-8. *Chaenusa glabra*. 6, Propodeum. 7, Forewing. 8, Tergum 1, dorsal view. Scale bars = 100 µm.

tral or absent (75.0%) but occasionally transitioning from absent or spectral anteriorly to spectral or tubular posteriorly (25.0%); vein (RS + M)a entirely absent; 1st subdiscal cell open, vein 2-1A entirely absent to present only proximally, vein 2cu-a absent.

Hind wing: Hyaline; basal cell closed, vein r-m rarely nebulous (4.8%, n = 21); subbasal cell open, vein 1A present only proximally and vein cu-a absent.

Metasoma: T1L 0.73-1.00X T1W; subcylindrical, no lateral compression; ovipositor partially exserted, slightly visible dorsally; t1 (Fig. 8) (n = 21) usually rugulose to weakly coriaceous anterior to spiracles and smooth posterior to spiracles (81.0%) but rarely entirely smooth (19.0%), setiferous posterolaterally and laterally but nearly glabrous, dorsope present or apparently absent; t2-t8 smooth; t2 setiferous posterolaterally but nearly glabrous, approximately in single line when multiple setae are present; t3 setiferous, setae located in posterior half of tergite and approximately in single line, often glabrous mesally (73.7%, n = 19); t4 setiferous, setae located in posterior half of tergite and approximately in single line, often glabrous mesally (68.4%, n = 19); t5 setiferous, setae located in posterior half of tergite and approximately in single line, often glabrous mesally (52.6%, n = 19); t6 setiferous, setae located in posterior half of tergite and approximately in single line, occasionally glabrous mesally (31.6%, n = 19); t7-t8 setiferous, setae located in posterior half of tergite and approximately in single line.

Color: Head (excluding mouthparts and antenna) brown, mandible and palpi yellow, antenna brown; mesosoma brown; wing venation brown; pro- and mesothoracic leg with coxa, trochanter, and trochantellus yellow, femur brownish yellow to yellow, and tibia and tarsus brown to brownish yellow, metathoracic leg with coxa yellowish brown to yellow, trochanter and trochantellus yellow, femur yellowish brown to brownish yellow, and tibia and tarsus brown to brownish yellow; t1 brown, t2 (n = 21) often brownish yellow to orangish brown (76.2%) but rarely brown (23.8%), t3-t5 brownish yellow to brown with posterior edge brown or slightly darker than rest of

tergite; t6 (n = 20) usually brownish yellow to orangish brown (70.0%) but rarely brown (30.0%); t7-t8 brownish yellow to brown.

Male.—As in female except: *Head:* HL 0.64-0.78X HW, HW 0.90-0.98X TW, FW 0.96-1.14X FH, EL 0.35-0.50X EH, MNL 1.50-2.29X MNAW, MNAW 0.67-0.91X MNBW; antenna with 12-15 flagellomeres; frons smooth with rugulose to crenulate or smooth longitudinal groove or oval pit mesally, setose to setiferous laterally and glabrous mesally; gena and vertex setose to setiferous.

Mesosoma: ML 1.42-1.64X MH, MW 0.78-0.88X MH; pronotal collar (n = 17) usually smooth or weakly coriaceous anteriorly with posterior furrow partially or completely crenulate to rugulose (88.2%) but rarely entirely smooth or virtually so (11.8%), lateral portion of pronotum weakly coriaceous to rugulose, anterolateral furrow often rugulose to crenulate (68.2%, n = 22); mesoscutal midpit slitlike to oval; scutellar sulcus (n = 24) often bearing median longitudinal ridge and several small crenulae (66.7%) but occasionally entirely crenulate (33.3%); metanotum with carina or flange mesally; propodeum (n = 25) usually transitioning from rugulose to rugose or smooth basally to areolate-rugose to rugose apically (88.0%) but rarely entirely rugose (12.0%), rarely with longitudinal carina mesoapically (20.0%); sternaulus present along entire or ~0.75 length of mesopleuron; mesopleuron with anterior margin partially or entirely dorsoventrally crenulate to rugose; metapleuron with smooth or rugulose and setose to setiferous flat triangular area anteriorly, setae on flat area generally oriented posteriorly or posteroventrally, setae on swelling generally oriented posteroventrally or posteriorly.

Forewing: SL 1.72-2.33X SH; vein r arising slightly basad, from, or slightly distad middle of stigma; vein 2RS (n = 21) often transitioning from tubular or nebulous anteriorly to nebulous or spectral posteriorly (57.1%) but occasionally entirely tubular to spectral (33.3%) and rarely present only anteriorly (9.5%); vein 2-1A entirely absent to nebulous proximally and distally but absent mesally.

Hind wing: Vein cu-a entirely absent to present only anteriorly.

Metasoma: T1L 0.69-1.00X T1W; t1 (n = 24) usually rugulose to rugose anterior to spiracles and smooth or rugulose posterior to spiracles (87.5%) but rarely entirely smooth (12.5%); t3 usually glabrous mesally (91.3%, n = 23); t4 often glabrous mesally (61.9%, n = 21); t5 often glabrous mesally (66.7%, n = 21); t6 often glabrous mesally (63.6%, n = 22); t7 occasionally glabrous mesally (27.2%, n = 22); t8 setose to setiferous, setae located in posterior half of tergite but in no apparent pattern; gonoforceps triangular in lateral view.

Color: Mesosoma brown to orangish brown; pro- and mesothoracic leg with femur yellow to brown, metathoracic leg with coxa brown to yellow and femur brown to brownish yellow; t1 (n = 24) usually brown to yellowish brown (95.8%) but rarely brownish orange (4.2%), t2 (n = 23) often brownish orange to brownish yellow (52.2%) but occasionally brown to yellowish brown (47.8%), t6 (n = 23) often brownish orange to brown with posterior edge brown or slightly darker than rest of tergite (73.9%) but occasionally entirely brown to orangish brown (26.1%), t7 (n = 23) often entirely brownish yellow to brown (69.6%) but occasionally brownish orange to yellowish brown with posterior edge brown or slightly darker than rest of tergite (30.4%).

Host.—*Hydrellia pakistanae* and *H. sarahae laticapsula* (as *Hydrellia* sp.) ex *H. verticillata* (Krishnaswamy & Chacko 1990).

Material examined.—*Holotype female:* Top label (white; typewritten) = "INDIA: Karnataka St [;] Bangalore [;] Kumbaleagodu [;] 18-19.viii.1990 [;] GR Buckingham". Second label (white; typewritten) = "emgd DPI Quarantine [;] Gainesville FL [;] FBCL-90-1045" (TAMU). *Paratypes:* 7 f 8 m same data as holotype (TAMU). INDIA: KARNATAKA, 1 f 5 m Bangalore VI/3-7/1982 M. Minno ex *Hydrellia* (TAMU); 1 m Ex. [*sic*] Puparium of *Hydrellia* sp. from *Hydrilla verticillata*, Loc: Chikkannakere [indecipherable handwriting] Road May 1985, C.I.B.C-I.S BANGALORE, IV-2; 1 m Ex: Puparium of *Hydrellia* sp. on *Hydrilla verticillata,* Dasappanadoddi [*sic*] Karnataka - INDIA June '85 Colld. By S. Krishnaswamy, C.I.B.C.-I.S, IV-6; 1 m Ex. [*sic*] Puparium of *Hydrellia* sp. from *Hydrilla verticillata*, Loc: Dasappanadoddi [*sic*] Karnataka July 1985, C.I.B.C-.I.S. BANGALORE, IV-1; 1 f virtually same data as previous except IV-3; 1 m virtually same data as previous except IV-4; 1 f virtually same data as previous except IV-5 (USNM); 1 m virtually same data as previous except No. 2-5, C.I.E. COLL. A.17330, Pres by AKW Comm Inst Ent B.M. 1986-1; 1 f virtually same data as previous except No. 2-7, *Chaenusa* sp. det. A.K. Walker, 1986; 1 f same data as previous except Sp. 2 No. 8, No. 2-8 (BMNH); 4 f 5 m Bangalore CIBC grounds ["CIBC grounds" crossed out with black ink] V-VI-1985, ex: *Hydrellia pakistanae* Deon[i]er (CNC). PAKISTAN: PUNJAB, 2 f 1 m Rawalpindi 23.viii.1990 R Mahmood, ex *Hydrellia* in hydrilla FBCL-90-1047 emgd Gainesville, FL (TAMU). USA: FLORIDA, 1 m Alachua Co Gainesville DPI 3.xi.1988 E Okrah, ex Hydrellia sp on Elodea canadensis Oshkosh Wildlife Nursery WI (TAMU).

The specimen with Florida locality data was reared at the FBCL from *Elodea canadensis* Michx. artificially infested with *H. pakistanae*. The plants were purchased from an aquatic plant dealer based in Wisconsin (Buckingham et al. 1989).

Etymology.—The specific epithet *glabra* is Latin for "smooth" and refers to the absence of sculpture on the vertex, gena, and usually t1 posterior to the spiracles.

Discussion.—*Chaenusa glabra* is the first species of *Chaenusa* described from the Oriental Region and the only species of *Chaenusa* known to attack species of *Hydrellia* infesting plants from a genus other than *Potamogeton* L. (Yu et al. 2005). However, Natarajan & Mathur (1980) reported an undetermined species of *Chaenusa* from *Hydrellia philippina* Ferino presumably infesting *Oryza sativa* L. (rice), although the host plant was not stated explicitly. Several authors have reported *C. conjungens* from *Hydrellia griseola* Fallén (small rice leaf miner) (Deonier 1971; Yu et al. 2005), and *C. orghidani* also has been reported from *H. griseola* (Burghele 1960). Considering the record from Natarajan & Mathur (1980) and the host range of *H. griseola* (Deonier 1971), it seems unlikely that species of *Chaenusa* attack only hosts on *Potamogeton* and *H. verticillata*. Additionally, one percent of *H. pakistanae* eggs developed into adults on *E. canadensis*, *Egeria densa* Planch., and *Najas guadulupensis* (Spreng.) Magnus in laboratory tests (Buckingham et al. 1989).

Kula & Zolnerowich (2008) discussed the characters Riegel (1950, 1982) used to define *Chaenusa s.s.*, *Chorebidea*, and *Chorebidella* and demonstrated that most New World species of *Chaenusa s.l.* cannot be placed in those genera unequivocally due to intraspecific morphological variation. *Chaenusa bergi* and *C. rugosa* are the only species of *Chaenusa s.l.* that unequivocally fit *Chorebidella*. *Chaenusa glabra* fits *Chorebidella* except the labial palpus has 2 rather than 3 segments.

Chaenusa glabra exhibits sexual dimorphism in flagellomere number (10-12, females; 12-15, males) and FW: FH ratio (0.63-0.77X, females; 0.96-1.14X males), as do 9 New World species of *Chaenusa*, although 1 and 3 species have slightly overlapping flagellomere and FW: FH values, respectively (Kula & Zolnerowich 2008). *Chaenusa rugosa* also exhibits sexual dimorphism in flagellomere number (14-16, females; 18 males); the FW: FH ratio appears to be sexually dimorphic based on orientation of the eyes, but measurements could not be taken because of poor specimen condition. Males of *C. glabra* tend to have a slightly broader stigma than females (SL: SH = 2.10-2.81, females; 1.72-2.33, males), as has been observed in *C. bergi* (Riegel 1950) and *C. conjungens* (Griffiths 1964).

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