TWO INDIAN BAGOUS WEEVILS (COLEOPTERA, CURCULIONIDAE), TUBER FEEDERS OF HYDRILLA VERTICILLATA (HYDROCHARITACEAE), ONE A POTENTIAL BIOCONTROL AGENT IN FLORIDA.

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ABSTRACT

Bagous affinis Hustache is redescribed and its release in south Florida as a potential biological control agent of Hydrilla verticillata is mentioned. A new species, B. laevigatus O'Brien & PAjni, is described. Included are habitus photographs, specific diagnoses, distributions, and line illustrations of the male phallus and endophallus and of the female spermatheca and eighth sternum of both species.

RESUMEN

Se redescribe Bagous affinis Hustache y se menciona su liberación en el sur de la Florida como agente potencial para el control biológico de Hydrilla verticillata. Se describe una especie nueva, B. laevigatus O'Brien & PAjni. Se incluyen fotografías del aspecto general, diagnósticos específicos, distribuciones, y dibujos del fallo y endofallo de los machos y de la espermataca y del 8vo. esternón de las hembras de ambas especies.

Because Hydrilla verticillata (L. F.) L. C. has been designated the number 1 target aquatic weed in the United States, research has been ongoing for several years to locate biological control agents for this Old World plant. One such potential agent (Bagous affinis Hustache) was discovered in Pakistan and India and a second species of Bagous, new to science, was collected in the same areas. Both of these species attack tubers (or turions) of hydrilla in soil exposed by receding waters. Some biology and field habits of these two species were reported by Baloch, et al. (1980) as Bagous sp. nr. limosus (affinis) and Bagous sp. (new species herein described). Buckingham (1988) has reported the release of Bagous affinis in south Florida in April, 1987 by the U. S. Army Corps of Engineers in a preliminary effort to control Hydrilla. He also discussed in detail the history of the search for a control agent of this important aquatic weed.

No key exists to the 13 species of Bagous currently known from the Indian subcontinent, but diagnoses of the two species herein and the illustrations included below will distinguish the two Hydrilla tuber feeding species. A research study on the 30 Bagous species (17 new to science) currently available from the Indian subcontinent should go to press later this year and will include a key to all species. The new species is being described herein to provide a name for publication of detailed life history studies that have been conducted in quarantine at Gainesville, FL.
Bagous affinis Hustache
(Figs. 1, 3, 5 & 6)

Bagous affinis Hustache 1926, p. 645.

Body medium sized, elongate-oval; sides weakly evenly rounded behind humeri to declivity; black, with reddish brown antennal scape and funicule, tibial apex, and tarsi; densely clothed with granulate, subcontiguous, pitted scales.

Male: Rostrum dorsally, evenly, strongly curved; ventrally evenly, weakly curved; lacking carina; subcylindrical, ventral margin not angulate, nor carinate; basally trisulcate; basal 2/3 densely clothed with contiguous, pitted scales; apical 1/3 subglabrous; apical 1/2 subquadrately expanded; 0.83 as long as prothorax. Head weakly convex; densely clothed with subcontiguous, granulate, pitted scales; articulating area with dense, whitish, plumose scales; frons moderately broad, 1.23 wider than apex of rostrum, strongly longitudinally sulcate; very weakly elevated along margin of eye, with several, evident, subrect, curved setae. Antenna inserted at apical 1/3; scape long, subclavate; funicule ca 1/10 shorter than scape; club broadly oval, subequal to funicular segments 1-3 together. Prothorax 0.92 as long as broad; sides unevenly, weakly rounded to strongly constricted apical 1/6; disc undulately convex with strong median longitudinal sulcus, deeper and broader subapically and subbasally; basal margin lacking transverse carina; with dense, coarse, rugulate coating of granulate, imbricate, pitted, sublunate, distinctly emarginate scales; color dark blackish brown, with 3 uneven, interrupted longitudinal paler whitish brown vittae. Elytra with well developed obliquely rounded humeri; markedly wider than prothorax, odd intervals convex, with rows of conspicuous, subcumbent, pale setae; even intervals flat; lacking swelling or tubercle in front of declivity; 5th interval with weakly developed, though evident, subangulate declivital callous; striae distinctly grooved with moderately elongate, evident punctures, densely clothed with contiguous, pitted scales; color dark brown to black, with numerous, scattered, small, paler brown to whitish maculae; very strongly narrowed behind declivity to non-acuminate, scarcely emarginate apices. Prosternum deeply broadly sulcate; sides of sulcus subparallel, scarcely narrower at apex, sharply raised, markedly rounded, just in front of coxae. Abdominal sternum 1 broadly deeply impressed; sternum 2 flat; sternum 5 laterally strongly impressed, medium area weakly impressed, with pair of evident, small, subapical tubercles; sternum 1 ca 1/3 longer than 2, 5 subequal to 2. Legs moderately long; femora strongly clavate; tibiae distinctly binate, moderately stout, inner surface not denticulate, with several moderately short, evident bristles, apex not distinctly narrowed, strongly curved inward very near apex; tibial uncus stout, shorter than width of tibiae; tarsi moderately short, not linear, segments 1-3 widened towards apex; segment 4 subequal to 2 and 3 together; ventrally with numerous, apical, fine bristles and apical pad of fine pubescence. Length, pronotum and elytron: 2.3 mm.

Female: Very similar to male except: Rostrum lacking evident median sulcus, medially flattened. Abdominal sternum 1 basally, weakly, broadly impressed, apical half weakly convex; sternum 5 flattened medially, lacking evident subapical tubercles. Length, pronotum and elytron: 3.6 mm.

Remarks and Comparative Notes.—The 284 specimens on hand range in size from 2.8 to 4.0 mm. In India and Pakistan, this relatively nondescript species superficially resembles the smaller (usually less than 2.5 mm.) vicinus Hustache, but the latter has round, granulate, not emarginate scales and its scale color is mainly brown with whitish maculae and vittae and some black areas, not mainly black with whitish and brownish maculae and whitish prothoracic vittae as in affinis. Most affinis are black and grey in color and have scarcely projecting, round to angulate, declivital calli.
Fig. 1. B. affinis, male; Fig. 2. B. laevigatus, male; Fig. 3. B. affinis, female; Fig. 4. B. laevigatus, female. a, phallus, dorsal view; b, endophallus, [Fig. 1] dorsal view only, [Fig. 2] left, dorsal view; right, lateral view; c, phallus, lateral view; d, spermatheca, lateral view; e, 8th sternum, ventral view. Lines = 1mm. (line A, males; line B, females).

In the United States, this species most resembles texanus Tanner, and keys to this species in couplet 7 in his North American revision (Tanner, 1943) but texanus has round, not emarginate, thoracic scales and has shallow, small, poorly defined, subapical, and subbasal, median thoracic impressions.

Type locality.—India, Uttar Pradesh State, Sarda River.

Range.—Known from Bangladesh, India, Pakistan, Thailand, and introduced in south Florida, U.S.A.

Body medium sized, elongate-oval; sides subparallel; black, and reddish black, with reddish brown antennal funicle, tibiae and tarsi; densely clothed with contiguous and imbricate, flat, finely pitted or not pitted, black, and grey scales.

Holotype male: Rostrum moderately unevenly curved, moderately depressed in apical 1/2; lacking carina; with long, evident, lateral suture; subcylindrical, ventral margin not angulate, nor carinate; densely clothed with contiguous, subgranulate scales; apical 1/3 strongly quadrately expanded; 0.80 as long as prothorax. Head moderately convex, densely clothed with subgranulate, contiguous scales; frons moderately broad, 1.31 wider than apex of rostrum, medially flattened with large, deep, median fovea, slightly elevated along margin of eye, elevation with several long, erect, curved setae. Antenna inserted at apical 1/3; scape long, subulate; funicle ca 1/5 shorter than scape; club broadly oval, subequal in length to funicular segments 1-3 together. Prothorax 0.94 as long as broad; sides subparallel, widest near base, weakly narrowed to rounded apical 1/5, there weakly constricted; disc moderately convex, with indistinct, very narrow, median, longitudinal impression, and small, broader, shallow, basal impression; basal margin lacking transverse carina; densely clothed with contiguous, smooth, round to oval scales and several sparse, scarcely distinct punctures, and numerous, fine, scarcely evident, apical and marginal, subrectet setae; black, with median, narrow, basal, grey fascia and pair of lateral, broader, basal, grey maculae, and several indistinct, small, scattered, grey maculae. Elytra with obliquely, weakly angled, rounded, moderately developed humeri; markedly wider than prothorax; intervals flat; lacking swelling or tubercle in front of declivity; striae distinctly, finely grooved, with scarcely evident small elongate punctures; 5th interval with weak, scarcely evident, deelvital callus; color black with numerous, scattered, small, grey maculae, and with one medium sized macula anterior to declivity on intervals 3 and 4; sides subparallel, weakly roundly expanded behind humeri to declivity, there suddenly narrowed to non-acuminate, weakly emarginate apices. Prosternum broadly, moderately shallowly sulcate; sides of sulcus moderately biangulate, narrowest at apical constriction, lacking sharp margins, moderately rounded in front of coxae. Abdominal sternum 1 broadly, deeply impressed; 2 flattened, deelvital at apical 1/10; sternum 5 scarcely impressed laterally, remainder flattened; sternum 1 ca 1/5 longer than 2, 2 ca 2/5 longer than 5; sterna 3 and 4 slightly shorter than 5. Legs moderately short; femora strongly clavate; tibiae stout, sinuate, moderately curved inward apically, inner margin with several small evident denticles, and moderately long bristles, apex not distinctly narrowed; with long tibial uncus ca as
long as width of tibia; tarsi moderately long, sublinear, 3rd segment not wider than 2nd, 4th segment as long as 2 and 3 together, ventrally with several long, apico-lateral bristles, no pubescent pads. Length, pronotum and elytron: 3.8 mm.

Allotype female: Very similar to male except: Prothorax 0.87 as long as broad. Abdominal sternum 1 broadly, very shallowly impressed; sternum 5 with strong lateral impression. Length, pronotum and elytron: 4.2 mm.

Etymological Note.—This epithet is from the Latin, laevigatus (= smooth, slippery), and refers to the extremely smooth and shining surface of this species.

Remarks and Comparative Notes.—The 783 specimens on hand (holotype, allotype and 781 paratypes) range in size from 2.6 to 4.6 mm. This distinctive, smooth, and shiny species is not likely to be confused with any other from the Indian region or Florida. Superficially it resembles affinis Hustache, but lacks its deep prothoracic impressions, and coarsely pitted, emarginate scales, and laevigatus has scarcely evident declivital calli. Both brown, and grey color forms are common.

Type locality.—India, Karnataka State, 18 km E. Bangalore, Madras Road.

Range.—Known from India and Pakistan.


The holotype, allotype and numerous paratypes are deposited in the senior author's collection. Paratypes are deposited also in the following collections: Auburn University, Auburn, AL; Bombay Natural History Society Research Centre, Bharatpur, India;
British Museum (Natural History), London, England; California Academy of Sciences, San Francisco, CA; California State University, Long Beach, CA; College of Madura, Madurai, India; Commonwealth Institute of Biological Control, Bangalore, India; Commonwealth Institute of Biological Control, Islamabad, Pakistan; Florida State Collection of Arthropods, Gainesville, FL; Indian Agriculture Research Institute, New Delhi, India; Kerala Agricultural University, Trichur, India; Modern College, Pune, India; Museum National d'Histoire Naturelle, Paris, France; Panjab University, Chandigarh, India; Staatsliches Museum fur Tierkunde, Dresden, GDR; Texas A&M University, College Station, TX; United States National Museum, Washington, DC; and Zoological Survey of India, Calcutta, India.

ACKNOWLEDGEMENTS

We wish to express our special thanks to Dr. Gary Buckingham, USDA-ARS, Gainesville, FL, who made available to us the majority of the specimens used in this study and who aided the senior author in obtaining funding for the travel needed to complete the research.

We also thank the following individuals and their institutions for the loan of specimens and/or assistance during the senior author's field work in India and Pakistan: Prof. Imitiaz Ahmad, Department of Zoology, University of Karachi, Karachi, Pakistan; Dr. John George M., Bombay Natural History Society Research Centre, Bharatpur, India; Drs. Swaraj Ghai and V. V. Ramamurthy, Division of Entomology, Indian Agricultural Research Institute, New Delhi, India; Dr. Peediakal J. Joy, Regional Agricultural Research Station, Kottayam, India; Dr. R. Krause, Staatliches Museum fur Tierkunde, Dresden, GDR; Dr. A. Ikrum Mohyuddin, Commonwealth Institute of Biological Control, Rawalpindi, Pakistan; Dr. S. Y. Paranjape, Department of Zoology, Modern College, Pune, India. Mr. Alexander Riedel, Friedberg, FRG; Drs. T. Sankaran and M. J. Chacko, Commonwealth Institute of Biological Control, Bangalore, India; Drs. K. G. SivaranaKrisnan and K. Venkataraman, Department of Zoology, College of Madura, Madurai, India; Mr. Richard Thompson, Department of Entomology, British Museum (Natural History), London, England; and Dr. B. K. Tikader, Zoological Survey of India, Calcutta, India.

This research was supported in part by a travel grant from the U. S. Army Corps of Engineers to study types in London and Paris; and a travel grant to Pakistan and India from the U. S. Department of Agriculture, Office of International Cooperative Development, to collect Bagous and to obtain host data. Research was also partially supported by a research program (FLAX 85006) of the SEA/CR, USDA.

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