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The Costa Rican species of *Ateuchus* (Coleoptera: Scarabaeidae)

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Abstract: This paper is the result of a study of the genus *Ateuchus* Weber (Coleoptera: Scarabaeidae) in Costa Rica. Nine species are reported, of which six are new. The previously known species are: *A. aeneomicans* (Harold), *A. candezei* (Harold) and *A. rodriguezi* (Preudhomme de Borre). The new taxa are: *A. fetteri* (profemur with fine punctures, last abdominal segment rounded, apex of elytra slightly shagreened); *A. ginae* (last abdominal segment very convex and broad, pronotum and head finely punctured); *A. hendrichsi* (last abdominal segment very convex and broad, head and pronotum evidently punctured); *A. howdeni* (small, anterior pronotal margin complete, elytral striae not impressed at apex, pygidial margin incomplete or almost effaced); *A. solisi* (large, anterior pronotal margin weakly impressed, very broad pygidium); *A. zoebischi* (anterior pronotal margin incomplete, proepimeron coarsely punctured, pronotal disk slightly to evidently shagreened). The male internal sac of all species is illustrated, and the species distribution is mapped. An identification key is also presented. The nine species indicate that Costa Rica has a very rich *Ateuchus* fauna for its size. For comparison Mexico has twelve known species and the United States three.

Key Words: *Ateuchus*, Scarabaeinae, dung beetles, Coleoptera, new species, neotropical, biodiversity, Costa Rica

The genus *Ateuchus* Weber is a species-rich, but rather poorly known group in need of a thorough revision (Howden and Young 1981, Howden & Gill 1987). This paper is primarily an attempt to describe the members of this most difficult and homogeneous genus in Costa Rica.

The study is a continuation of work originally done on this genus for the North American area, and it is intended to be the foundation for a subsequent treatment of the entire Central American region. The original North American monograph (Kohlmann 1984) also needs to be updated.

The biodiversity of Costa Rica is remarkable, this paper reports the existence of nine *Ateuchus* species from this Central American country; whereas the USA has three and Mexico twelve (two undescribed).

The study uses as many external morphological characters as possible, especially for the identification key. However, *Ateuchus* has proven to be a remarkably homogeneous group and sometimes the degree of variation makes the identification of material a difficult endeavour. The use of the lamellae and spines of the internal sac of the aedeagus has proven again (Kohlmann 1984) to be of invaluable assistance. I followed the methodology described by Zunino (1989). The internal sacs of all species are depicted, as well as the species distribution. It is interesting to note that the females posses a vagina in the form of a simple sac, which does not seem to have any structure complementary to the spines, hooks and lamellae of the males.

MATERIALS AND METHODS

The great majority of the study material came from the Instituto Nacional de Biodiversidad, Santo Domingo de Heredia,

Costa Rica. Additional material was obtained from the collections of Henry Howden, Bruce Gill and F. Génier, Ottawa; W. Warner, Arizona, R. Cave, Zamorano, Honduras and from the collection of Bert Kohlmann, Las Mercedes de Guácimo, Limón, Costa Rica. Type material was obtained from the British Museum, Natural History, London (P. Hammond and M.E. Bacchus); the Institut Royal des Sciences Naturelles de Belgique, Brussels (R. Damoiseau) and the Muséum National d'Histoire Naturelle, Paris (Y. Cambefort and N. Berti).

The specimens were studied using a Leica Stereozoom SZ-4 binocular microscope. Measurements were made to the nearest 0.1 mm using a micrometer. Genital dissections and preparations were done following the techniques described by Zunino (1978).

Types of the new species are all deposited at INBio. Paratypes are deposited with H. Howden, B. Gill and B. Kohlmann.

Ateuchus Weber

Ateuchus Weber, 1801:10; Fabricius *(in part)* 1801:54; Chapin, 1946:79: Howden and Young, 1981:68; Kohlmann, 1984:25-26.

Type-species: *Ateuchus histeroides* Weber, 1801 (by monotypy).

Choeridium Serville, 1828:356; Harold, 1868:32-35; Bates 1887:44; Balthasar 1939:44; Chapin 1946:79.

Size small to moderate; oval-ovoid; strongly convex. Head with clypeus feebly to distinctly bidentate; frons and vertex lacking horns, distinct tubercles or carinae, third labial palpus evident, antennae with nine segments. Pronotum relatively evenly convex, lacking posterior marginal bead; lacking line of punctures or indented line before or behind lateral fovea. Scutellum absent. Elytron with eight striae. Pygidium unarmed. Mesosternum distinct. Fore coxa transverse, not conical. Middle coxae widely separated, inner margins parallel. Fore tibia with three or four teeth on outer margin, the margin basally lacking distinct serrations, apex truncate. Male of most species with fore tibial spur expanded. Hind tibia lacking transverse carinae on outer surface; hind tibia strongly expanded in apical half.

The name derives from the Greek word ateuches, which means unarmed. The word has been subsequently latinized.

Key to the Species of *Ateuchus* of Costa Rica

1. Anterior pronotal margin complete or weakly impressed (Fig. 1). 2

   Anterior pronotal margin incomplete (Fig. 2) 5

2. Small specimens (4.0-5.5 mm); body very convex to globular (Fig. 3), elytral striae not impressed at apex, central to south Pacific coast 3

Medium to large specimens (6.0-9.5 mm); body ovoid or rectangular (Fig. 3), central elytral striae impressed at apex, Atlantic slope or in tropical montane forest on the Pacific slope 4

3. Very shiny specimens, green or red with golden or coppery cast on all body surface; procoxa evidently punctate; elytral striae very lightly impressed (Fig. 3), slightly more near apices, and with flat intervals; pygidial margin complete; head generally clearly punctured throughout; internal sac with spines but no copulatory hooks (Fig. 4) . . . . . *aeneomicans* (Harold)

   Head and prothorax reddish with coppery reflections; procoxae minutely punctate; elytral striae impressed (Fig. 3) and with raised intervals; pygidial margin incomplete or almost effaced; head generally punctured at anterior margin; internal sac with copulatory hooks (Fig. 4) . . . . . *howdeni n. sp.*

4. Medium sized specimens (6.0-7.0 mm); head and pronotum reddish with coppery reflections; shagreened elytra; upper part of pygidium and basal part of prothorax less evidently shagreened; metatibiae very elongate; apical elytral striae slightly impressed; head and pronotum finely punctured; internal sac as in Fig. 4. . . . . *candezei* (Harold)

   Large specimens (8.2-9.6 mm); black specimens; elytra and pygidium not shagreened; metatibia not elongate; apical elytral striae clearly impressed; pygidium very broad and apical border incomplete; head and pronotum covered with big, coarse punctures; internal sac as in Fig. 4 . . . . . *solisi n. sp.*

5. Black body with rectangular form; eyes viewed from above five times larger than wide; males with very elongate profemur and anteriorly raised pronotal lateral margin, forming some kind of tooth; northern Pacific coast and slope; internal sac according to Fig. 4 ....*rodriguezi* (Preudhomme de Borre)

   Head and pronotum with reddish or greenish coppery reflections; body form oval or ovoid; eyes viewed from above 2-3 times longer than wide; males not as above.....6

6. Profemur and proepimeron with coarse punctures; generally the anterior and posterior pronotal humera, as well as the lateral pronotal margins and base and sometimes disk coarsely punctured; pronotal disk slightly to evidently shagreened; last abdominal segment very broad in both sexes, internal sac as in Fig. 4, Atlantic slope, if Pacific slope, then in wet tropical forest.....*zoebischi n. sp.*

   Profemur finely to coarsely punctured; proepimeron without punctures or finely punctate; no shagreening on the pronotal disk, elytral apices occasionally shagreened, Pacific slope..... 7

7. Pygidium convex; last abdominal segment rounded; anterior pronotal angles generally with evident punctures; profemur usually with very fine punctures, rarely a few coarse ones towards the apex or base; apex of elytra with slight shagreenation; body form slim and oval (Fig. 3); internal sac as in Fig. 4. ..*fetteri n. sp.*

   Pygidium very convex; last abdominal segment very convex and broad, somewhat protruding; pronotum either coarsely or finely punctured throughout; body broad; profemur with always evident coarse to moderate punctures 8

8. Polished head surface with very fine punctures and some coarse ones or wrinkles at anterior margin; pronotum very finely punctured; profemur with evident coarse punctures at apex and base; area of coarse punctures at the base of the pronotal midline; internal sac as in Fig. 4..... *ginae n. sp.*

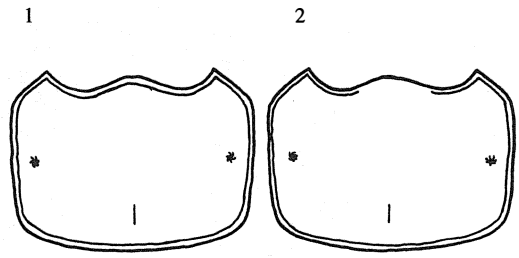

Fig. 1. Complete anterior pronotal margin of *Ateuchus*.
Fig. 2. Incomplete anterior pronotal margin of *Ateuchus*.

   Head evidently punctured throughout, anterior margin wrinkled; pronotum evidently punctured; profemur finely to coarsely punctured, mostly towards its base; internal sac as in Fig. 4..... *hendrichsi n. sp.*

Ateuchus aeneomicans (Harold)
Figs. 1, 3, 4, 7

Choeridium aeneomicans Harold, 1868:82.
Ateuchus aeneomicans (Harold); Howden and Young, 1981:69-70.
Type, in Muséum National d'Histoire Naturelle, Paris. Seen.

Redescription. Length 3.5-5.5 mm, greatest width 3.0-3.8 mm. Body color: dark green brown or black, dorsally shining with greenish, reddish or golden cast, ventral surface also shiny and with metallic reflections, body globose.

Clypeal margin anteriorly shallowly, broadly emarginate; clypeal teeth feebly developed, separated by a very open notch, genae evenly arcuate, clypeal border with moderately coarse punctuation to distinctly wrinkled, frons and vertex feebly tumid and lightly to coarsely punctured. Eye dorsally small.

Pronotum shiny and smooth, sometimes with some punctuation at the anterior angles and at the base of the midline. Midline very slightly impressed to almost effaced, pronotum emarginate anteriorly and laterally. Proepisternum and proepimeron smooth and lightly shagreened.

Elytra smooth and shiny, striae very feebly impressed throughout, punctures in striae very slightly crenating, interstriae flat and sometimes minutely punctate.

Pygidium emarginate, shiny, smooth and minutely punctured. Femora shiny, smooth, and small, meso- and metafemur very broad, foretibiae with three teeth on outer margin,

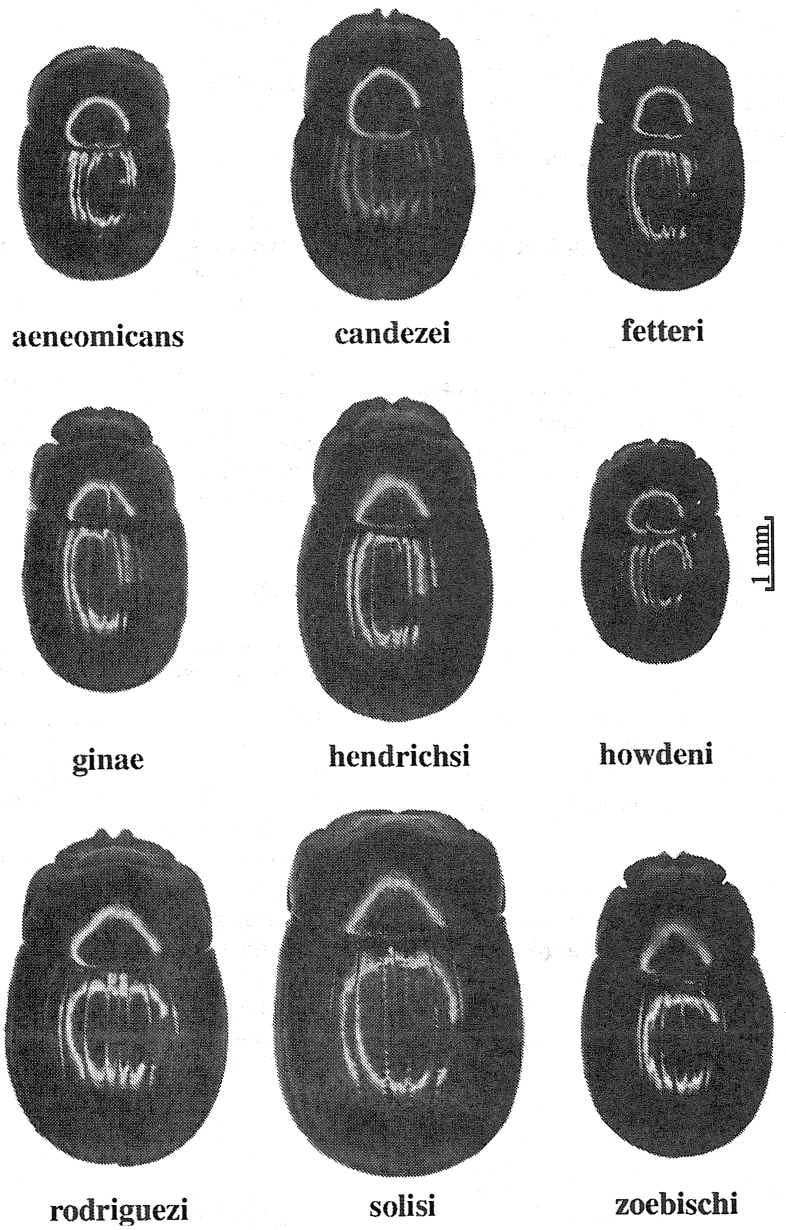

Fig. 3. Dorsal habitus of the known Costa Rican species of *Ateuchus*.

foretibial spur of males broad and rectangular and with apical edge asymmetrically sinuated, female foretibial spurs slender and forked at apex. Females have the last abdominal segment broader than males.

The internal sac of the aedeagus (Fig. 4) is covered by small spines and presents two apical lamellae.

MATERIAL EXAMINED. Costa Rica: Puntarenas: Est. Sirena, P.N. Corcovado, 0-100 m, VI/1990, N. Obando; XII/1989, IV-1990, II-1990, IV-1990, VI-1991, I-1992, III-1992, IV-1992, V-1992, I-1993, III-1993, IV-1994, G. Fonseca; IV-1992, G. Rodríguez; 21/IV-21/V-1992, Z. Fuentes; Estac. Quebrada Bonita, 50 m, R. B. Carara, XII/1989, I, 1990, R. Zúñiga; XII-1990, V-1992, XII-1992, I-1993, I-1994, II-1994, J.C. Saborio, 6-27/XI-1992, 4-26/I-1993, VI-1993, X-1993, XI-1993, R.

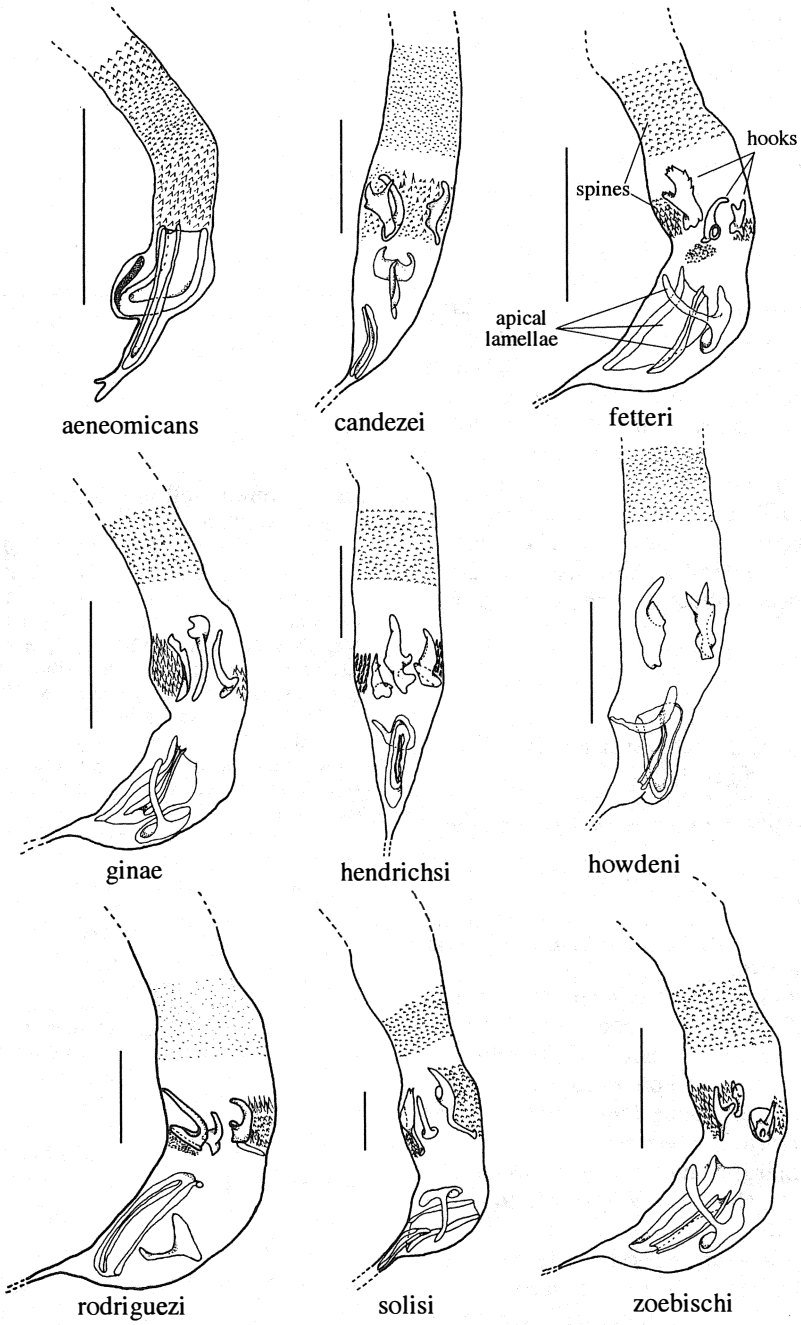

Fig. 4. Internal sac of aedeagus of the known Costa Rican species of *Ateuchus*. The scale represents 1 mm.

Guzmán; Rancho Quemado, Pen. Osa, XII-1990, I-1991, II/1991, XII-91 F. Quesada; IV-1992, D. Brenes; 11-28/X-1993, A.H. Gutiérrez; 4-21/I-1993; Península de Osa, V/1979, A. Forsyth; 118 specimens.

Panama: Canal Zone: Gatún L., Barro Colorado I., 5-7/V/1981, flight intercept trap, B. D. Gill; 1/III/1959, on fresh dung on trail, H. S. Dybas; 9°09'N, 79°51'W, VIII/1994, David Banjs, ex F.I.T.; 4 specimens.

Remarks. The internal sac of the aedeagus (Fig. 4) is interesting, it is covered by small spines and has two apical lamellae, but it is the only species of *Ateuchus* known to me so far, that does not have any hooks.

The species is also found in the Amazon (Balthasar, 1939) and seems to be confined to tropical wet forest along the Pacific coast in Costa Rica. This is the first time the species has been recorded in this country and seems to represent its northernmost distribution, making contact at Carara (Fig. 7) with typical tropical dry forest species like A. *rodriguezi*. Carara is an incredibly biologically varied area, where evergreen plant species dominate (Boza, 1988); a transition zone of tropical wet forest and tropical dry forest starts at its north-westerly part (Tosi, 1969; ICE y Centro Científico Tropical, 1988). Howden and Young (1981) report it from tapir and *Ateles* dung in Panama. In Costa Rica it has been collected in traps baited with human dung.

Ateuchus candezei (Harold)
Figs. 1, 3, 4, 7

Choeridium candezei Harold, 1868:82.

Choeridium poropyge Bates, 1887:46; Kohlmann, 1984:35

Ateuchus candezei (Harold); Howden and Young, 1981:69; Kohlmann, 1984:35-38.

Lectotypes and paralectotypes in Muséum National d'Histoire Naturelle, Paris and British Museum of Natural History, London. Seen.

Redescription. Lentgth 6.0-7.0 mm., greatest width 4.0-4.5 mm. Ovoid body form, convex. Elytra dull, opaque and shagreened. Dorsally dark brown to black, head and pronotum with dark red or golden green reflections. Pygidium shagreened at base. Ventral surface brown and shiny.

Clypeal margin anteriorly broadly (male) to moderately (female) V-shaped, tooth on each side rounded to acute, lateral margin arcuate, clypeal margin moderately punctured or slightly wrinkled, frons and vertex feebly tumid and very finely punctured. Eyes seen from above small.

Pronotum minutely punctate, finely punctate at anterior angles and laterally, completely emarginate anteriorly, a small thickening present at anterior lateral margin, midline feebly impressed, surface shiny and very lightly shagreened. Proepisternon and proepimeron smooth and finely shagreened, proepimeron minutely punctate.

Elytra totally shagreened or sometimes shagreened only on posterior third, finely granular, minutely punctuate, striae very feebly impressed, more so apically and with widely separated small punctures, intervals feebly convex. Pygidium convex, finely punctate, emarginate and shagreened at base.

Femora elongated, smooth and finely punctate. Foretibiae with four teeth on outer margin (the basal very small), fore-tibial spurs of male expanded into an irregular oval shape, female spur slender and slightly bent near acute apex. Female with last abdominal segment broader than in male.

Internal sac of the aedeagus (Fig. 4) with spines, three well-developed hooks and three apical lamellae.

MATERIAL EXAMINED. Costa Rica: Guanacaste: Est. Cacao, Lado suroeste del Volcán Cacao, 1000-1400 m, VI/1990, II curso Parataxon.; Estac. Pitilla, 9 km S Santa Cecilia, 700 m, 27/I-4/II/1989, GNP Biod. Sur.; IX/1991, 22/X-22-XI-1992, C. Moraga; 6-18/VIII, P. Ríos; 5 specimens; Limón: Est. Hitoy Cerere, R. Cerere, Res. Biol. Hitoy Cerere, 100 m, 7-26/I/1992, G. Carballo; I-1991, A. Solís; 4 specimens.

Belize: Orange Walk: Lamanai, 22-26/II/1980, palm forest trail, Glen Kit; Cayo: Belmopán, 11-16/VIII/1972, S. & J. Peck; Augustine, 12-20/VII/1972, 1500', S. Peck; 12 specimens.

Guatemala: Alta Verapaz: Lanquin, 1000', 28-30/VIII/1969, tropical forest, S. & J. Peck; 1 specimen.

Mexico: Chiapas: Bonampak, 230 m, 8-24/VII/1983, rainforest, S. & J. Peck; Hwy. 24, 9 mi SE Teopisca, 16/V/1969, H.F. Howden; 3 specimens.

Panamá: Canal Zone: B.C.I. 17-18/1975, tapir feces trap, O.P. Young; *ibid.*, IX-X/1946, Zetek; ibid., 9-12/V/1981, B. Gill; ibid., 9°09'N, 79°51'W, VIII/1994, David Banks, ex F.I.T.; Lago Bayano. Isla de Maje, 17-20/XII/1988, R.G. Hancock; 11 specimens.

Honduras: Atlántida: Tela, Lancetilla Bot. Gard., Roca, 15°46'N, 87°37'W, 10-20 m, 23/VI/1994, J. Ashe & R. Brooks, 4 specimens.

Remarks. This is probably a species that invaded Central America and Mexico in recent times, since it can be found all the way to Amazonía (A. Martínez *pers. com.*). This pattern is repeated with a great number of other dung-beetle species.

The dull, shagreened elytra easily separates this species from all the others in Costa Rica. The species is restricted to tropical wet forest and from moist to wet premontane forest.

Ateuchus fetteri n. sp.
Figs. 2-4, 7

Description. HOLOTYPE. Male. Length 5.5 mm, greatest width 3.5 mm. Small, oval shape, convex body, body color dark brown to black, head and pronotum shining, dorsally with a golden-green cast, metasternum with a golden-green cast.

Clypeal margin anteriorly broadly V-shaped, tooth on each side rounded, lateral margin arcuate, dorsal head surface densely and moderately punctate, clypeal margin lightly wrinkled, frons and vertex feebly tumid, eyes seen from above small.

Pronotal surface granular and finely punctate, moderately punctate at anterior angles and at base of the mid-line, midline slightly impressed, anterior pronotal margin incomplete. Proepisternum wrinkled, proepimeron minutely punctate.

Elytral surface granulate and minutely punctate, striae lightly impressed, distinctly impressed at apex, punctures of striae lightly impressed except at apex where they become crenating, intervals feebly convex. Pygidium with granular surface and minutely punctate, convex, grooved along its inner border.

Foretibia with four teeth on outer margin, foretibial spur expanded into a rectangle, femora short and thick and minutely punctate.

Internal sac of aedeagus (Fig. 4) with three hooks and three apical lamellae and small spines.

ALLOTYPE. Length 6.0 mm, greatest width 3.8 mm. Differing from holotype as follows: Body with golden-red reflections, especially at head and pronotum, anterior clypeal margin anteriorly moderately V-shaped, anterior clypeal border evidently wrinkled, foretibial spur slender and slightly bent near acute apex, last abdominal segment broader, pygidium incompletely grooved at apex along inner border.

TYPE MATERIAL. Holotype. Male. Costa Rica: Guanacaste: Estac Cacao, SW side Volcan Cacao, 1000-1400 m, XI-XIII/1989, URCG, R.Blanco & C. Chávez. Allotype. Female, same data as holotype. Types deposited at Instituto Nacional de Biodiversidad (INBio), Santo Domingo de Heredia, Costa Rica.

Paratypes. Costa Rica: Alajuela: San Ramón, Río San Lorencito, 800 m, 5/IX/1989, 2/XI/1986, A. Solís; 4 specimens; Guanacaste: Estac. Cacao, SW side Volcán Cacao, 1000-1400 m, X-1989, XI-XII/1989, R. Blanco & C. Chávez; VI-1990, II curso Parataxon; 21-29/V-1992, A. Gutiérrez; SW side Volcán Cacao, Est. Mengo, 1100 m, 16-III-1989, M. Espinoza; II-1989, GNP Biodiversity Survey; Estac. Las Pailas, P.N. Rincón de la Vieja, 800 m, 24/VIII-14/IX/1992, C. Cano; 82 specimens. Paratypes deposited at INBio, Museo Nacional de Costa Rica, H. Howden and B. Kohlmann collections.

Etymology. This species (Fig. 6) is named after my very good friend, Alfred Fetter.

Remarks. In the type series, both males and females show either golden-green or golden-red reflections, especially at the head and the pronotum. Males and females vary also from 5.0-6.5 mm in length and 3.0-3.5 mm in greatest width.

The species can be distinguished from the other members of the Costa Rican fauna, because of its small size, slender body form and the evident red and green metallic shine shown by the head and pronotum in different specimens. The species seems to be confined at mid-elevations (800-1400 m) on the Pacific mountain slopes in premontane moist, wet and rain forest.

Ateuchus ginae n. sp.
Figs. 2-4, 5, 7

Description. HOLOTYPE. Male. Length 6.0 mm, greatest width 4.0 mm. Body slightly ovoid and convex, dorsally dark brown to black, head and pronotum with strong cupreous red reflections, sometimes with a golden-green hue, elytra with golden-green hue; ventrally dark brown.

Clypeal margin anteriorly broadly V-shaped, tooth on each side rounded, margin laterally arcuate, dorsal surface of head finely punctateand granular, frons and vertex feebly tumid, eye dorsally small.

Pronotum finely punctate and granular, a small area moderately punctate at the base of the midline, midline weakly impressed, anterior pronotal margin incomplete. Proepisternum finely wrinkled, proepimeron granular.

Elytral surface granular and minutely punctate, striae lightly impressed, more strongly impressed at apex, striae feebly punctate, intervals slightly convex. Pygidium with granular surface and minutely punctate, grooved along inner border (in females too, although some specimens lack it distally).

Foretibia with four teeth on outer margin (although fourth is rather small), foretibial spur expanded into a slightly transverse oval shape, profemur ventrally and moderately to coarsely punctate from its middle to apex, punctate area strongly melanized, meso- and metafemur short and thick.

Internal sac of the aedeagus (Fig. 4) with three slender hooks, three apical apical lamellae and a well-developed spiny fascies.

ALLOTYPE. Length 7.0 mm, greatest width 4.5 mm. Differing from the holotype in the following characters: Clypeal margin anteriorly moderately V-shaped, anterior clypeal border moderately punctate, foretibia with spur slender and slightly bent at acute apex, last abdominal segment broader.

TYPE MATERIAL. Holotype. Male. Costa Rica: San José: Cd. Colón, El Rodeo, 17/X/1988, 1000 m, A. Solís. Allotype. Female. Same data as holotype. Types deposited at INBio.

Paratypes. Costa Rica: San José: Cd. Colón, El Rodeo, 1000 m, 17/X/1988, A. Solís, 103 specimens;

Nicaragua: Chontales: Chontales, T. Belt, 1 specimen.

Panamá: Chiriquí: Cerro Hornito, 15 km NE Gualaca, 1200 m, 21/VI-16/VII/1982, B. Gill, 1 specimen. Paratypes deposited at INBio, H. Howden, B. Gill and B. Kohlmann collection.

Etymology. This species (Fig. 6) is named after my caring, loving and understanding wife, Gina Reyes-Gallardo.

Remarks. The paratypes vary in length from 6.0 to 7.5 mm and 3.5 to 4.5 in greatest width. Several specimens also show a moderately punctate anterior clypeal margin, and many of the specimens do not show the evident cupreous-red metallic shine at head and pronotum.

The species seems to be distributed at mid-altitudes (aprox. 1000-1200 m) in mountain slopes along the Pacific rim in premontane moist forest.

Ateuchus hendrichsi n. sp.

Figs. 2-4, 7

Description. HOLOTYPE. Male. Length 6.8 mm, greatest width 4.5 mm. Body ovoid, convex, dorsally dark brown, head and pronotum with a very weak golden-green cast, ventral surface dark brown.

Clypeal margin anteriorly broadly V-shaped, tooth on each side rounded, margin laterally arcuate, anterior clypeal border moderately punctate, frons and vertex finely punctate and feebly tumid, eyes dorsally small.

Anterior pronotal margin incomplete, midline very weakly impressed at base, surface finely-moderately punctate, midline base with a small region moderately punctate. Proepisternum finely wrinkled, proepimeron finely granular.

Elytral surface smooth and minutely punctate, elytral striae weakly impressed, more strongly at apex, striae weakly punctate, slighly crenating at apex, intervals almost flat. Pygidium with surface finely granular and minutely punctate, grooved along inner border but interrupted distally. Last abdominal segment broader than in other Costa Rican species.

Foretibia with four teeth on outer margin (although fourth is very small), foretibial spur of males expanded into a rectangle, ventral surface of forefemur finely punctate, more coarsely towards apex, meso- and metafemur short and broad.

Internal sac of aedeagus (Fig. 4) with three hooks, three apical lamellae and a well developed spiny fascies.

ALLOTYPE. Female. Length 7.5 mm, greatest width 4.8 mm. Differs from holotype in the following characteristics: Clypeal margin anteriorly moderately V-shaped, anterior clypeal border wrinkled, foretibial spur slender and slightly bent near acute apex, last abdominal segment broader.

TYPE MATERIAL. Holotype. Costa Rica: Guanacaste: Estac. Cacao, lado suroeste del Volcán Cacao, 1000-1400 m, Junio 1990, II curso Parataxon. Allotype. *ibid.* Oct. 1989, URCG, R. Blanco & C. Chávez. Types deposited at INBio.

Paratypes. Costa Rica: Guanacaste: Estac. Cacao, SW side Volcano, 1000-1400 m, VI/1990, II Curso Parataxon; X/ 1989, XI-XII/1989, URCG, R. Blanco & C. Chávez; V-VI/1989, Benigno Guadamuz y Familia; 21-29/V/1992, Z. Fuentes; 21-29/V/1992, D. Brenes; 21-29/V/1992, C. Cano; 21-29/V/1992, R. Vargas; 21-29/V/1992, M. Segura; 21-29/V/1992, G. Rodríguez; 123 specimens. Paratypes deposited at INBio, H. Howden and B. Kohlmann collections.

Etymology. This species is named after the late Jorge Hendrichs, Mexican entomologist, in recognition of his work and labour teaching and forming younger entomologists.

Remarks. The paratypes vary in length from 6.5-7.5 mm and 4.0-4.5 mm in greatest width. Punctuation at the head, pronotal surface and ventral forefemur can vary from fine to moderate.

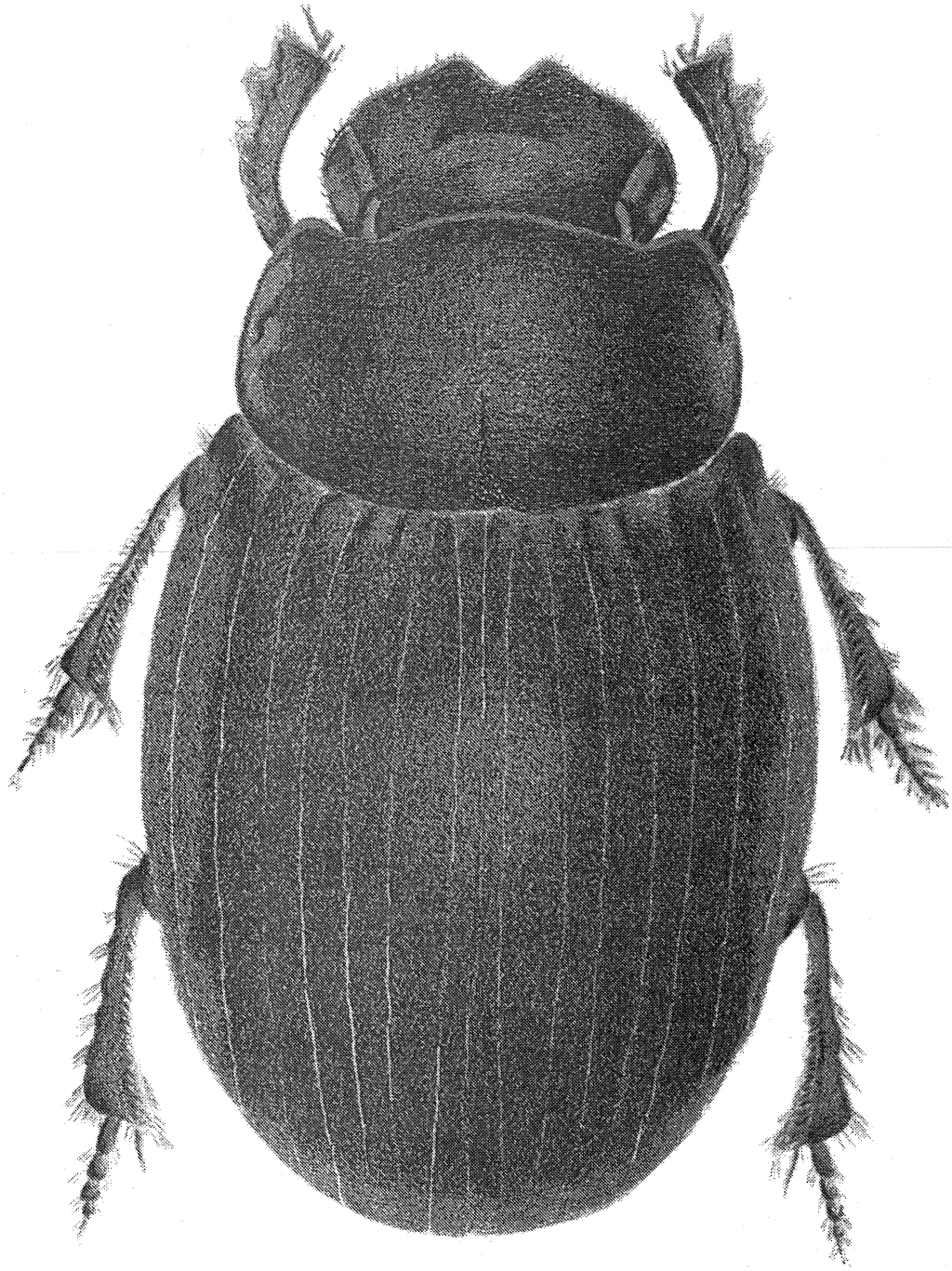

Fig. 5. Drawing of *A. ginae.*

The species seems to be confined to premontane wet forest and premontane rain forest.

Ateuchus howdeni n. sp.
Figs. 1, 3, 4, 7

Description. HOLOTYPE. Male. Length 5.0 mm, greatest width 3.1 mm. Small, body very convex, ovoid, dorsally dark brown to black, head and pronotum with red metallic reflections, ventral surface red-brown.

Clypeal margin anteriorly broadly V-shaped, tooth on each side rounded, lateral margin arcuate, anterior clypeal border moderately punctate, frons and vertex finely punctate and feebly tumid, eyes dorsally very small.

Anterior pronotal margin complete, mid-line weakly impressed, surface smooth and minutely punctate, a few moderate punctures at base of mid-line. Proepimeron and proepisternum finely rugose.

Elytral surface smooth and minutely punctate, elytral striae weakly impressed, slightly more impressed at apex, striae weakly punctate, slightly crenating at apex, intervals raised and convex. Pygidium smooth and minutely punctate, margin incomplete at apex.

Foretibia with four teeth on outer margin, foretibial spur expanded into an irregular rectangle, ventral surface of forefemur finely punctate, meso- and metafemur short and broad and minutely punctate.

Internal sac of aedeagus (Fig. 4) with two hooks, three apical lamellae and small spines.

ALLOTYPE. Female. Length 5.0 mm., greatest width 3.1 mm. Differing from holotype in the following characters: clypeal margin anteriorly moderately V-shaped, anterior clypeal margin more moderately punctate, foretibial spur slender and slightly bent near acute apex, last abdominal segment broader.

TYPE MATERIAL. Holotype. Costa Rica: Puntarenas: Est. Sirena, P.N. Corcovado, 0-100 m, XII/1990, J. C. Saborío. Allotype: Same data as holotype. Types deposited at INBio.

Paratypes. Costa Rica: Puntarenas: Est. Sirena, P.N. Corcovado, 0-100 m, XII/1990, C. Saborío; Corcovado National Park, Osa Peninsula, 4-7/VII71977, D.H. Janzen; Estac. Quebrada Bonita, 50 m, IX/1993, R. Guzmán, XI/1994; P.N. Manuel Antonio, 8-14/XII/1987. Génier & Bertrand, human feces, 7 specimens.

Panamá: Panama Province: Lago Bayano, Isla de Majé, 17-20/XII/1988, R. G. Hancock, 3 specimens; Canal Zone: Barro Colorado Island, VII-VIII/1942, VI-X/1948, J. Zetek; 9°09'N, 79°51'W, VII/1994, David Banks, ex F.I.T.; 4 specimens. Paratypes deposited at INBio, H. Howden and B. Kohlmann collections.

Etymology. This species is named after Henry Howden, in recognition of his high quality and extensive work done on Scarabaeidae.

Remarks. The series of paratypes vary from 4.2 mm to 5.6 mm in length and 2.6 mm to 3.7 mm in greatest width. The anterior clypeal margin is sometimes moderately punctate to lightly wrinkled, the pygidial margin is sometimes slightly effaced apically in some specimens. It is also the only Costa Rican species which has two hooks in the internal sac of the aedeagus.

This species was cited by Howden and Young (1981) as A. (near?) *guatemalensis* in their revision of Panamanian Scarabaeinae. Later on, Howden and Gill (1987) considered that it might well be *A. calcaratus*. It is not related to that species.

Its presence in Puntarenas Province probably represents its northernmost expansion along the Pacific and it seems to be confined to tropical wet forest.

Ateuchus rodriguezi (Preudhomme de Borre)
Figs. 2-4, 7

Uroxys rodriguezi Preudhomme de Borre, 1886:107-108.

Choeridium ampliatum Bates, 1887:45-46, Tab. II, Fig. 25; Kohlmann, 1984:28

Ateuchus rodriguezi (Preudhomme de Borre); Kohlmann, 1984:28-32.

Holotype, Institut Royal des Sciences Naturelles de Belgique, Brussels. Seen.

Redescription. Length 5.0-7.0 mm., greatest width 3.5-5.0 mm. Body form slightly rectangular, convex, dorsal surface black and shiny with or without a red or green tinge Ventral surface brown and shiny.

Clypeal margin anteriorly broadly (male) to moderately (female) V-shaped, tooth on each side rounded, lateral margin arcuate, clypeal margin moderately punctate and sometimes wrinkled, frons and vertex feebly tumid and finely punctate, eyes seen from above long and slender.

Anterior pronotal margin incomplete, antero-lateral pronotal margin raised like an arch forming a small tooth in males, evenly rounded in females, midline almost effaced, pronotum finely punctate, anterior and posterior angles and lateral borders moderately to coarsely punctate, pronotal base with small

region moderately punctate. Proepimeron and proepisternum finely shagreened.

Elytra finely and regularly punctate, surface smooth, striae shallowly impressed but clearly so at apex, striae shallowly punctate, interstriae slightly convex. Pygidium slightly convex, finely punctate.

Foretibiae with four teeth on outer margin, foretibial spur of males trapezoidally expanded, female spur slender and slightly bent at apex, foretibia and forefemur thinner and longer in males, meso- and metafemur small and thick in both sexes, femora minutely punctate. Last abdominal segment broader in females.

Internal sack of aedeagus (Fig. 4) with three curved spine-like hooks, three apical lamellae and many small and medium-sized spines in the hook region.

MATERIAL EXAMINED. Costa Rica: Guanacaste: Cerro El Hacha, 400 m, 27/VII/1986, 15/I/1988, A. Solís; 25/VI/1992, III curso Parataxon; Ref. Nac. Vida Silvestre Rafael Lucas Rodríguez, Palo Verde, 10 m, X/1990, V/1991, VI/1991, 4-7/V/1992, 25-27/XI/1992, 6-13/III/1993, 20/VI/1993, U. Chavarría; 25/III-24/IV/1992, M. Ortiz; 28/VI/1989, J.F. Corrales; I/1991, VI/1991, VIII/1991, D. Acevedo; Finca Jenny, 31 km N Liberia, 300 m, IX/1988, X/1988, XI/1988, , GNP Biodiversity Survey; IV-V/1991, XII/1991, I/1992, 20/VI-11/VII/1992, 20/VIII-12/IX/1992, 18-25/III/1993, 20-27/III/1993, IV/1993, 9-14/V/1993, 20-24/V/1993, 25-29/V/1993, 16-23/VII/1993, 14-21/VIII/1993, 10-17/XI/1993, 8-20/III/1994, 20-30/V/1994, 7-12/VI/1994, E. Araya; 16/IX/1988, VI/1991, VII/1992, R. Espinoza; Estac. Maritza, W side Volcán Orosí, 600 m, V/1989, VI-1989, GNP Biodiv. Survey; V-1990, VI-1990, R. Blanco; 15/VI/1988, A, Chacón; 15/VI/1988, A. Chacón; Parque Nal. Santa Rosa, 300 m, I/IX/1977, A. Forsyth; VI-1989, VII/1989, GNP Biodiversity Survey; VI/1990, R. Espinoza; VIII/1990, II curso Parataxon.; VI/1991, D.H. Janzen & W. Hallwachs; 3-12/VI/1992, 13-28/VI/1992, III curso Parataxon.; VII/1992, R. Moraga; 12/XII/1978-10/I/1979, 29-31/V/1979, D. H. Janzen; 25/VII/1986, A. Solís; Hac. La Pacífica, 1 km W Cañas, 28-30/V/1976; Playa Naranjo, Santa Rosa, XII/1990, I/1991, II/1991, III/1991, E. Alcázar; Vicinity Estac. Murciélago, 8 km SW Cuajiniquil, 100 m, VI/1989, GNP Biodiversity Survey; VII-1990, I curso Microlepid.; 19-24/IV/1993, 3-8/V/1993, 15/V-6/VI/1993, 22/VII/1993, 10-28/X/1993, 3/V/1994, 6-24/VI/1994, C. Cano; 19-24/IV/1993, 3-8/V/1993, 16/VI-4/VII/1993, 17/VII-2/VIII/1993, 11-29/VIII/1993, 3-14/V/1994, 5-17/VII/1994, F.A. Quesada; 6-7/XII/1993, Curso Latinoamericano; Refugio Palo Verde, 10/I/1991, J.F. Corrales; Hda. Santa María, Liberia, 8/VIII/1992, J.F. Corrales; 3 km NW Nacaome, P.N. Barra Honda, 100 m, 5-27/VII/1992, 3-25/VIII/1992, 14/IX-5/X/1992, 13/X-5/XI/1992, XII-1992, IV-1993, 3-30/V/1993, 2-3/VII/1993, VII-1993, VIII-1993, 6/IX-4/X/1993, X-1993, M. Reyes; Tempisque, P.N. Barra Honda, 100 m, VI/1994, M. Reyes; Estac. Lomas Barbudal, 30 m, VII/1991, D. Acevedo; VII-1991, U. Chavarría; Est. Cacao, lado SO Vol. Cacao, 1000-1400 m, P.N. Guanacaste, 21-29/V/1992, M. Segura; Est. Exp. Horizontes, 100-150 m, 27/VI-2/VII/1993, C. Moraga; Est. Pitilla, 9 km S Sta. Cecilia, 700 m, 22/VIII/1993, C. Moraga; Los Almendros, P.N. Guanacaste, 300 m, 8-28/II/1993, C. Cano; 3-25/X/1993, E.E. López; Alajuela: Orotina, 17/VIII/1986, J. Corrales; La Guácima, 775 m, 22/VI/1986, J. Corrales; Puntarenas: 6 km S Santa Elena, 1100 m, 30/V/1979, H. & A Howden; Est. San Miguel, P.N. Cabo Blanco, IX/1993, M. Ramírez; Estac. Quebrada Bonita, 50 m, VI/1993, R. Guzmán; Rancho Quemado, Pen Osa, 200 m, 14-28/VII/1993, A. Gutiérrez; 1-20/XIII/1993, A Marín; San José: Potrerillos, 900 m, 20/VIII/1992, horse-dung, B. Kohlmann & J. Blackaller; Heredia: La Ribera, Belén, 950 m, 21/IV/1993, F.G. Zumbado; 1279 specimens.

El Salvador: La Libertad: Los Chorros, 4 km S Santa Tecla, 13/V/1971, H. Howden, 2 specimens.

Honduras: Francisco Morazán: 4 km E Zamorano, 870 m, 9/VI/1994, J.Ashe & R. Brooks, ex. feces tp., 1 specimen.

Remarks. The Pacific coast of Costa Rica seems to represent the southernmost limit of the distribution for this species; being sympatric with *A. aeneomicans* and *A. howdeni* at this point. Ecologically it is generally distributed in tropical dry forest, open areas and pastures. Actually, this species seems to be expanding its range southwards and inwards along the Pacific coast, since it is readily found in pasture-land opened for cattle-raising.

The Costa Rican specimens have a rather less densely punctate pronotum than the Mexican specimens. The spines in the lamellar region of the internal sac of the aedeagus are also less developed than in the Mexican specimens.

Ateuchus solisi n. sp.

Figs. 1, 3, 4, 6, 7

Description. HOLOTYPE. Male. Length 9.0 mm, greatest width 6.1 mm. Big, oval-ovoid form, body convex, very dark brown to black dorsal surface, head and pronotum with a slight golden-green hue, ventral surface very dark brown.

Clypeal margin anteriorly broadly V-shaped, tooth on each side obtuse, margin laterally arcuate, anterior clypeal border moderately punctate to slightly wrinkled, frons and vertex finely to moderately punctate and feebly tumid, eyes dorsally small.

Anterior pronotal margin complete (Fig. 1), but not very evident, mid-line feebly impressed, dorsal surface finely to moderately punctate, more coarsely toward the margins and especially the anterior and posterior angles. Proepisternum finely wrinkled, proepimeron granulose and finely punctate.

Elytra with dorsal surface smooth and finely but evidently punctate, striae evidently

impressed, more impressed at apex, striae crenately-punctate, intervals sligthly convex. Pygidium slightly convex and very broad, surface smooth and finely punctate, apical margin incomplete.

Foretibia with four teeth on outer margin, foretibial spur expanded into an irregular rectangle, profemur finely punctate and with a row of coarse punctures at the posteroventral margin, meso- and metafemur minutely to finely punctate, profemur slender, meso- and metafemur short and broad.

Internal sac of the aedeagus (Fig. 4) with three hooks, three lamellae and a spiny fascies.

ALLOTYPE. Female. Length 9.5 mm. greatest width 6.6 mm. Differing from holotype in the following characters: clypeal margin moderately V-shaped, foretibial spur slender, slightly bent near acute apex, head more coarsely punctate and wrinkled, all of pronotal surface moderately to coarsely punctate, profemur shorter, last abdominal segment broader.

TYPE MATERIAL. Holotype. Costa Rica: Limón: Est. Miramar, Res. Biol. Hitoy Cerere, 500 m, IX/1992, G. Carballo. Allotype. Same data as holotype. Types deposited at INBio.

Paratypes. Costa Rica: Limón: Est. Miramar, Res. Biol. Hitoy Cerere, 500 m, IX/1992, X/1992, G. Carballo; Valle la Estrella, R.B. Hitoy Cerere, A.C. Amistad, 100m, VI/1994, G. Carballo; 22 specimens; Guanacaste: Est. Pitilla, 700 m, VII/1994, C. Moraga, 2 specimens. Paratypes deposited at INBio, H. Howden and B. Kohlmann collections.

Etymology: This species is named after Angel Solís in recognition for having brought this remarkable species to my attention and for his consistently high standards in helping entomologists with information and the use of the insect collection at INBio.

Remarks. The series of paratypes vary from 8.2 mm to 9.6 mm in length and from 5.9 mm to 6.6 mm in greatest width. The pronotal midline can be more impressed, and some individuals have coarse punctures in head and pronotum, and the anterior clypeal border can be very wrinkled.

The species seems to be confined to premontane and transitional premontane tropical wet forest on the Atlantic side, and has been collected only in rotting heart of palm (*Iriartea or Socratea*)and in humid or half-rotting leaf-sheafs. It can be easily distinguished from all other Costa Rican species by its large size. Most probably it will be also found on the Panamanian and Nicaraguan side of Costa Rica.

Ateuchus zoebischi n. sp.

Figs. 2-4, 7

Description. HOLOTYPE. Male. Length 6.1 mm, greatest width 4.0 mm. Small, body convex, form oval-ovoid, dorsal and ventral surface black to dark brown, head, pronotum and occasionally elytra with golden-green cast.

Clypeal margin anteriorly broadly V-shaped, tooth on each side rounded, margin laterally arcuate, anterior clypeal borded punctate and slightly wrinkled, frons and vertex with finely granular surface, evidently and finely to moderately punctate and sligtly tumid, eyes dorsally small.

Anterior pronotal margin incomplete, midline weakly impressed, pronotal surface finely granular, pronotal disk finely shagreened, pronotal borders moderately punctate, especially at anterior and posterior angles and at base of mid-line, disk finely to minutely punctate. Proepisternum finely granular, proepimeron evidently and moderately punctate.

Elytral surface smooth and finely punctate, elytral striae weakly impressed, more impressed at apex, elytral striae crenately-punctate, intervals slightly convex. Pygidium finely punctate and very convex, completely margined. Last abdominal segment very broad relative to other Costa Rican species.

Foretibia with four teeth on outer margin, fourth is very small, foretibial spur expanded into an irregular rectangle, ventral surface of profemur finely punctate and getting moderately to coarsely punctate toward the apex, this area is also melanized, meso-and metafemur short and broad with surface minutely punctate.

Internal sac of aedeagus (Fig. 4) with three hooks, three lamellae and a spiny fascies.

ALLOTYPE. Female. Length 6.4 mm., greatest width 4.2 mm. Differing from holotype in the following characters: clypeal margin anteriorly moderately V-shaped, head and pronotum less moderately punctate, dorsal surface dark brown to black, elytra also with golden-green cast, foretibial spur slender and slightly bent at apex, last abdominal segment broader.

TYPE MATERIAL. Holotype. Costa Rica. Guanacaste: Estac Cacao, lado SO Volcán Cacao, 1000-1400 m, 21-29/V/1992, M Segura. Allotype. Female. Costa Rica: Heredia: Est. El Ceibo, Braulio Carrillo N. P., 400-600 m, XII/1989, R. Aguilar & M. Zumbado. Types deposited at INBio.

Paratypes. Costa Rica: Guanacaste: Estac. Cacao, lado suroeste del Volcán Cacao, 1000-1400 m,X/1989, XI-XII/1989, R. Blanco y C. Chávez; VI/1990, II curso parataxon; 21-29/V/1992, C. Cano; 21-29/V/1992, M.

Segura; Est. Pitilla, 9 km S Santa Cecilia, 700 m, 21/II-2/III/1989, R. Miranda; 1-15/VII/1992, 21/III-6/IV/1993, 22/VIII/1993, X/1993, 9-20/XI/1993, I/1994, C. Moraga; 27/VII-14/VIII/1992, VIII/1992, X/1993, P. Ríos; 21/I/1988, A. Solís; Falda Atlántica, Volcán Tenorio, Colonia Río Celeste, 400-500 m, 4/XI/1988, A. Solís; Heredia: Est. El Ceibo, P.N. Braulio Carrillo, 400-600 m, X/1989, XI/1989, R. Aguilar & M. Zumbado; Limón: Est. Hitoy Cerere, Res. Biol. Hitoy Cerere, 100 m, VI/1992, G. Carballo; entre Ríos Coen y Telire, 1/VIII/1984, A. Solís; Alajuela: Guatuso, falda este Volcán Tenorio, 500 m, 15/VIII/1988, J. Corrales; Cartago: Turrialba, CATIE, 600 m, 19-21/V/1976, H. & A. Howden, 197 specimens. Paratypes at INBio, Museo Nacional de Costa Rica, B. Kohlmann and H. Howden collections.

Etymology. This species is named after my very good friend Thomas Zoebisch, who is also active in the field of economic entomology and pest management.

Remarks. The type series varies from 5.4 mm to 6.8 mm in length and 3.4 mm to 4.2 mm in greatest width. There is also variation in the degree of puncture coarseness and the extension and intensity of shagreenation in the pronotum and at the base of the elytra.

This species seems to be widely distributed in tropical and premontane rain forest along the Atlantic side of Costa Rica. Most probably it will be also found under the same conditions in Panama and Nicaragua. It also seems to penetrate the Pacific side slightly, following wet forests along volcanic slopes.

FINAL REMARKS

The distribution of *Ateuchus* in Costa Rica presents several peculiarities. First, many species (*A. fetteri, A. ginae, A. hendrichsi, A. solisi* and *A. zoebischi*) show an association with the piedmont and middle elevations of mountain ranges. This could suggest higher speciation rates in this group, related with orographic systems in lower Central America.

Second, species along the Pacific lowlands tend to have great distribution ranges (*A. rodriguezi* can be found from Sinaloa to Puntarenas; *A. aeneomicans* is distributed from Puntarenas to Amazonía; whereas, the distribution of *A. howdeni*, is not yet fully known). Apparently, they did not originate in this area.

Finally, despite collecting for many years in the lowlands of the Atlantic, specimens of *Ateuchus* have failed to appear in this area. This fact is not yet fully understood.

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RESUMEN

Este trabajo es el resultado del estudio del género *Ateuchus* Weber (Coleoptera: Scarabaeidae) en Costa Rica. Nueve especies se reportan para el país, de las cuales seis son nuevas. Las especies previamente conocidas son: *A. aeneomicans* (Harold), *A. candezei* (Harold) y *A. rodriguezi* (Preudhomme de Borre). Las nuevas especies son: *A. fetteri, A. ginae, A. hendrichsi, A. howdeni, A. solisi* y *A. zoebischi.* Para cada especie se ilustra el saco interno del macho, así como su distribución en un mapa. Una clave para la identificación se incluye también. Se considera que Costa Rica posee una fauna de *Ateuchus* muy rica para el tamaño del país, ya que comparativamente México alberga doce especies y los Estados Unidos tres especies conocidas.

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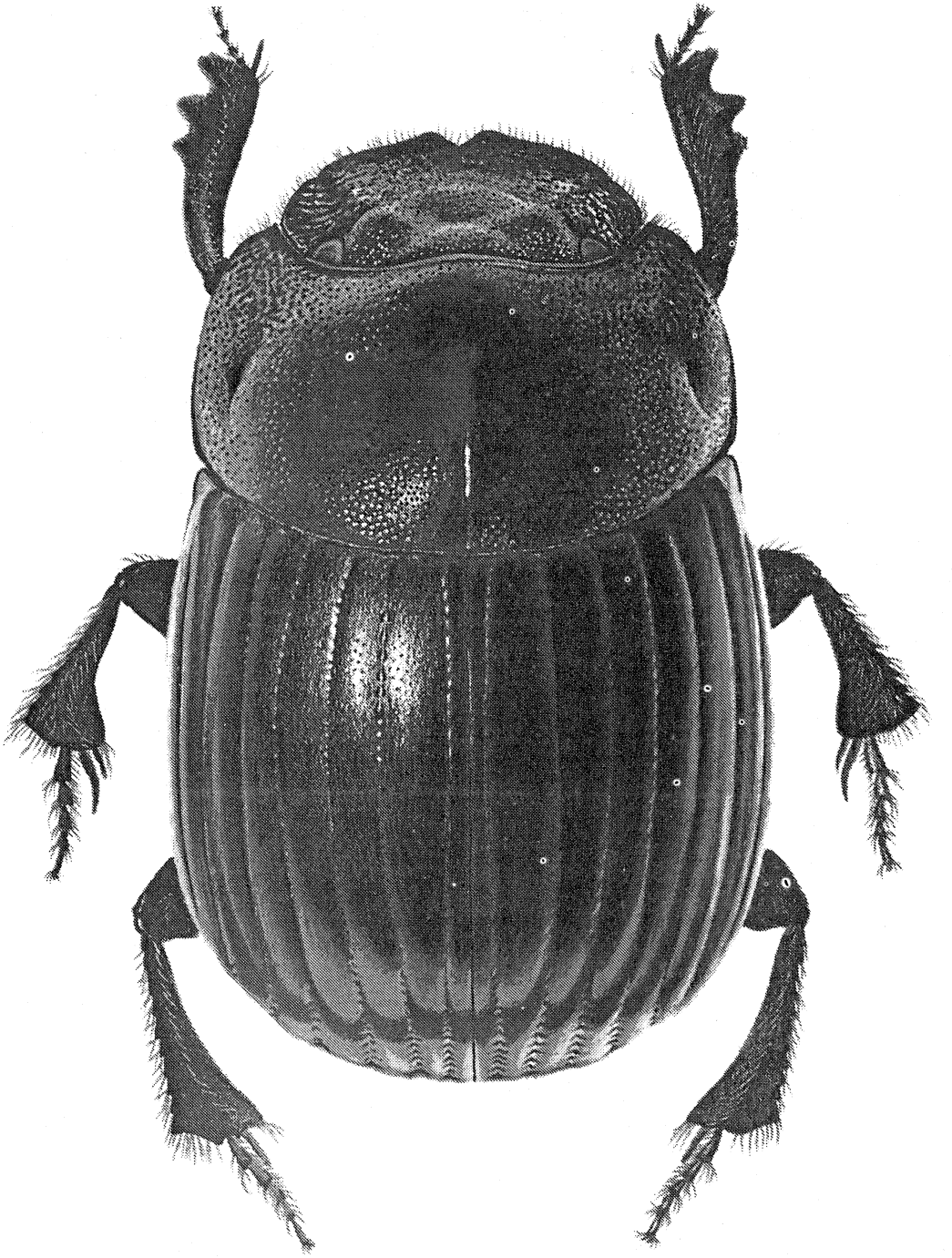

Fig. 6. Drawing of *A. solisi*.

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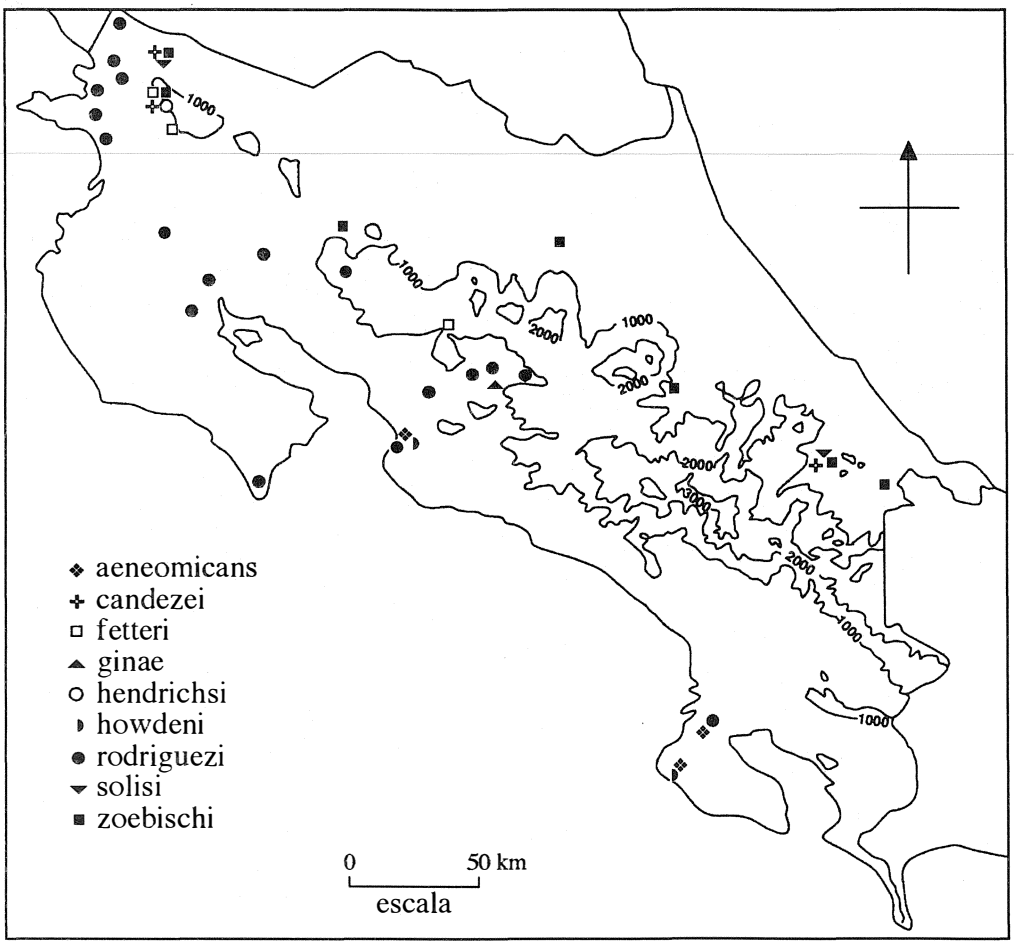

Fig. 7. Known distribution of the species of *Ateuchus* in Costa Rica.