Descriptions of four new species of *Cryptolestes* Ganglbauer, with a revised key to the New World species and notes on other species (Coleoptera: Laemophloeidae)

Michael C. Thomas
Florida State Collection of Arthropods
Florida Department of Agriculture and Consumer Services
P.O. Box 147100
Gainesville, FL 32614-7100 U.S.A.

Abstract: The following new species of *Cryptolestes* Ganglbauer are described and illustrated: *Cryptolestes obesus* Thomas, new species, Brazil; *Cryptolestes turnbowi* Thomas, new species, Honduras and Mexico; *Cryptolestes inyoensis* Thomas, new species, California; *Cryptolestes spectabilis* Thomas, new species, Ecuador. A revised key to the New World species is provided. The male genitalia are illustrated and the female of *C. calabozus* Thomas is characterized, and new distribution records are provided for it, *C. cornutus* Thomas and Zimmerman, *C. trinidadensis* Thomas, *C. curus* Lefkovitch, and *C. klapperichi* Lefkovitch.

Introduction

Since my revision of the New World members of *Cryptolestes* Ganglbauer (Thomas 1988), specimens of several undescribed species have accumulated, as well as new distribution data for described species.

The follow codens are used for repositories:

BPBM - Bernice P. Bishop Museum, Honolulu, HI, USA
CASC - Calfornia Academy of Sciences, San Francisco, CA, USA
CDFA - California Department of Food and Agriculture, Sacramento, CA, USA
CMNC - Canada Museum of Nature, Ottawa, Canada
FSCA - Florida State Collection of Arthropods, Gainesville, FL, USA
MZSP - Museu de Zoologica da Universidade de São Paulo, São Paulo, Brazil
PASC - Polish Academy of Sciences, Krakow, Poland
SBPC - Stewart B. Peck Collection, Ottawa, Ontario, Canada

Cryptolestes obesus Thomas, new species
Fig. 1

Diagnosis: The body form, which is very stout and robust for the genus; the elongate, clavate scape; and the possession of complete secondary sublateral lines on the pronotum, characterize this species.

Description: Holotype, female. Length, 1.46 mm. Dark testaceous, legs and antennae slightly paler.

Head: Transverse, 2.09x wider than long across eyes. Surface coarsely punctate, more so laterally; punctures less than the diameter of an eye facet, separated by about 1 diameter medially; pubescence pale, short, recumbent, conspicuous. Clypeus broadly emarginate, so that anterior angles project slightly as horns. Antennae moderate, attaining basal third of elytra; scape elongate, stoutly clavate, pedicel stout, about two-thirds length of scape; antennomeres 3-8 filiform, 8 shortest; antennomeres 9-11 longer and broader, forming a loose club. Eyes normal; length equal to about half length of exposed part of head.

Thorax: Pronotum transverse, 1.65x wider than long at widest point just behind anterior angles, slightly, evenly narrowed posteriorly, lateral margins more or less straight, rather thick. Surface sculpture and pubescence as on head, except medially punctation less dense. Secondary sublateral line present, complete from apex to base, equally distant from sublateral line and lateral margin. Anterior angles narrowly rounded, posterior angles obtuse. Elytra 1.41x longer than wide, more or less parallel-sided; apices conjointly rounded to suture; cells present.

Venter: Anterior coxal cavities closed; intercoxal process broad, posterior margin slightly curved.

Genitalia: Sclerotization of bursa not present.

Type: Holotype female (deposited in MZSP) with following data: "BRAZIL: Rondonia, 63"/" km. SW

Figure 1. Habitus, *Cryptolestes obesus*Thomas, n.sp.

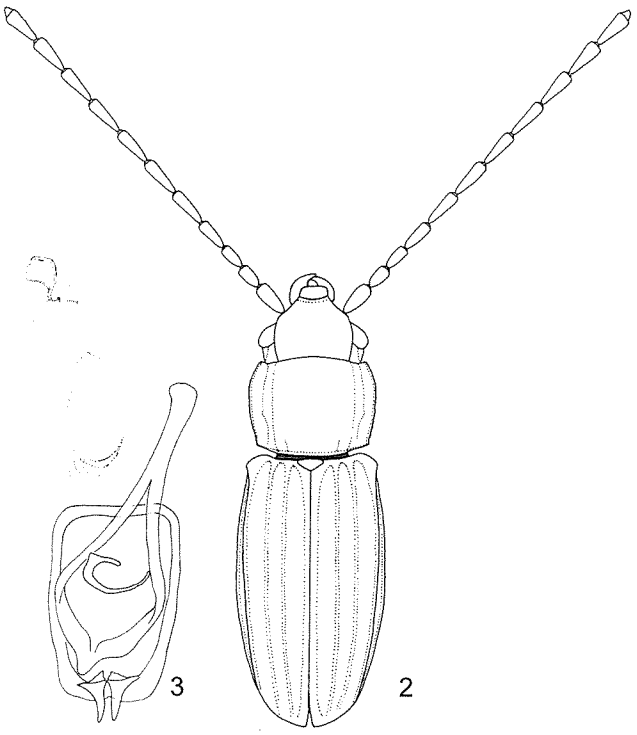


Figure 2-3. *Cryptolestes turnbowi* Thomas, n. sp. 2. habitus, male; 3. aedeagus.

Ariquemes, nr"/"Fzda. Rancho Grande 20-VII-1992 U. Schmitz"/"blacklight trap".

Discussion: I have hesitated to describe this species, based as it is on a single female specimen. However, it is so distinctive that it should be fairly simple to associate the male when it is collected. The holotype is missing antennomeres 7-11 of the right antenna and all of the legs on the right side.

Cryptolestes turnbowi Thomas, new species
Figs. 2-3

Diagnosis: The possession of angulate secondary sublateral lines, the very sparse dorsal punctation, and the structure of the male genitalia are characteristic of this species.

Description: Holotype, male. Length, 1.74 mm. Color dark testaceous, legs and antennae a little paler.

Head: Transverse, 1.54x wider than long across eyes. Surface with sparse, scattered punctures, each much smaller than an eye facet, separated by 4-6 diameters; surface between puncture smooth and glossy; each puncture subtending a pale, recumbent seta, pubescence inconspicuous at 75x. Clypeus broadly emarginate. Antennae elongate, filiform, attaining apical fourth of elytra; scape robust, elongate, not clavate; pedicel robust, about two-thirds length of scape; antennomeres 3-8 elongate; antennomeres 9-11 each a little longer and broader than 3-8, forming an inconspicuous club. Eyes normal, length about 0.40x length of head.

Thorax: Pronotum transverse, 1.19x wider than long at widest point at about anterior third, gradually narrowed posteriorly. Surface sculpture and pubescence as on head. Anterior angles narrowly rounded; posterior angles obtuse. Secondary sublateral line present, attaining anterior margin but not quite attaining posterior margin, closer to sublateral line than to lateral margin; sublateral line angulate laterally at about basal third. Elytra 1.83x longer than wide, almost impunctate.

Venter: Anterior coxal cavities closed; intercoxal process broad, posterior margin broadly curved.

Genitalia: Male genitalia as in Fig. 3, female without sclerotization of bursa.

Variation: The female paratype is 1.48 mm in length, and the antennae are much shorter than in the male, attaining only about the basal fourth of the elytra.

Types: Holotype male (deposited in FSCA) with following data: "HONDURAS: Francisco"/"Morazon,

P. N. La Tigra"/"29 May 1995 /"R. Turnbow"; Paratype female (deposited in CMNC) with following data: "MEX. Oax. 14km N"/"San Juan del Estado"/"2600m. 4-VIII.1986"/"H. & A. Howden"/"berlese".

Discussion: I take pleasure in naming this very distinctive species after Robert W. Turnbow, Jr., who collected the holotype and who has provided many fine specimens for study as well as companionship on many collecting trips.

Cryptolestes inyoensis Thomas, new species
Fig. 4-6

Diagnosis: The combination of small eyes, moniliform antennae, and the genital structure in both sexes readily distinguishes adults of this species from those of any other known species of the genus. Additionally, the individuals in the type series seem to be brachypterous.

Description: Holotype, male. Length, 1.24 mm. Pale testaceous, tips of mandibles darker.

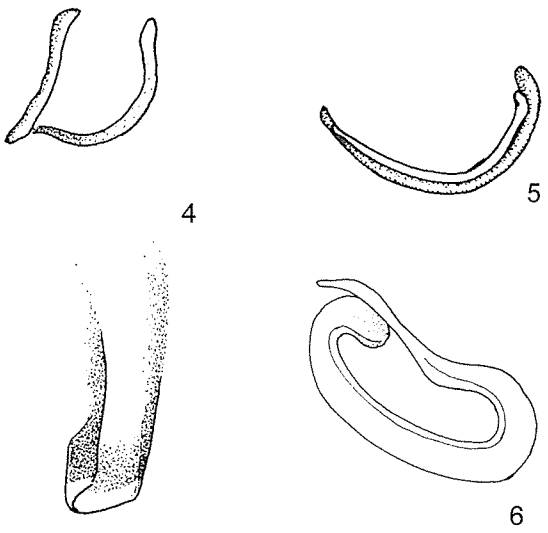
Head: Transverse, 1.50x wider than long across eyes; disc rather flat. Surface coarsely punctate, more so laterally; punctures about the diameter of 1 eye facet, separated by about 1 diameter medially; pubescence pale, short, recumbent, conspicuous. Clypeus shallowly emarginate. Antennae short, about 2x length of pronotum, attaining base of pronotum; scape stout, pedicel stout, a little shorter than scape; antennomeres 3-8 moniliform, 8 shortest; antennomeres 9-11 larger, forming a loose club; 11 longest, about as long as scape. Eyes small; length equal to about 0.25x length of head, about 6 facets long in dorsal view; situated basally.

Thorax: Pronotum transverse, 1.25x wider than long at widest point just behind anterior angles, evenly narrowed posteriorly, lateral margins more or less straight. Surface sculpture and pubescence as on head; sublateral line made less conspicuous by coarse surface sculpture. Anterior angles rounded, posterior angles obtuse. Elytra 1.48x longer than broad.

Venter: Anterior coxal cavities closed; intercoxal process broad, posterior margin truncate.

Genitalia: Sclerotizations of male internal sac as in Fig. 4-5, sclerotization of bursa present, as in Fig. 6.

Variation: The length of the male paratype is 1.30 mm; that of the female allotype is 1.36 mm. The antennae of the female are proportionally shorter than in the male, attaining only about the midpoint of the pronotum.



Figures 4-6. *Cryptolestes inyoensis* Thomas, n. sp. 4-5. sclerotizations of internal sac; 6. bursa copulatrix.

Types: Holotype male (deposited in CASC) with following data: "CALIF:Inyo Co. Westgard Pass VIII-17-1991 Under bark of Pinus monophylla R.J. Gill, coll." Allotype female (genitalia dissected) (deposited in CDFA) with same data. Paratype male (genitalia and mouthparts dissected) (deposited in FSCA) with same data.

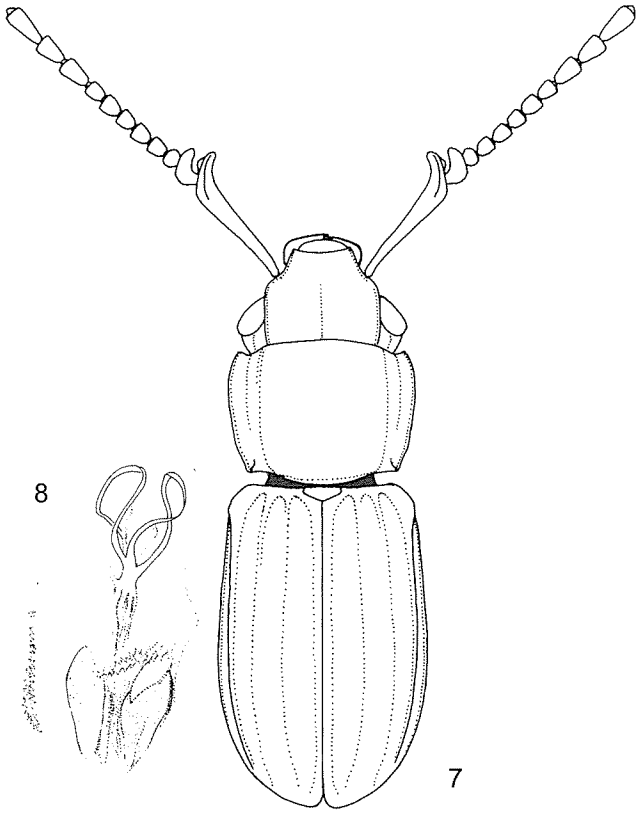
Discussion: This is the first species of *Cryptolestes* with reduced eyes to be described. It also appears to be brachypterous, as I have only been able to find strap-like remnants of hind wings. However, the elytral humerus appears normal and the metasternum is not noticeably shortened.

Cryptolestes spectabilis Thomas, new species
Figs. 7-8

Diagnosis: The distinctive red and black bicolored body and possession of secondary sublateral lines, and in the male, the very elongate, horned antennal scape, toothed pedicel, and genitalia are diagnostic for this species.

Description: Holotype, male. Length, 1.40 mm. Head, pronotum, appendages, and scutellum bright reddish testaceous, elytra piceous.

Head: Transverse, 1.75x wider than long measured across eyes. Surface between punctures smooth



Figures 7-8. *Cryptolestes spectabilis* Thomas, n. sp. 7. Habitus, male; 8. Armature of internal sac.

and glossy, moderately punctate, punctures smaller than an eye facet, separated by 1-2 diameters; pubscence inconspicuous at 75x Clypeus truncate, frons depressed somewhat, as in *C. spatulifer* Thomas. Antennae elongate, attaining basal third of elytra, scape extremely elongate, equal in length to pronotum, straight, apically with a scoop-shaped process, topped with a short tooth; pedicel short, less than 0.25x length of scape, internally toothed; antennomeres 3 and 8 quadrate, 4-7 slightly elongate; antennomeres 9-11 longer and broader than 3-8, forming a loose club. Eyes normal, 0.42x length of head.

Thorax: Pronotum transverse, 1.35x wider than long across widest point just behind anterior angles, moderately narrowed to base, lateral margin more or less straight. Surface sculpture and pubescence as on head. Anterior angles narrowly rounded, slightly produced anteriorly, posterior angles right. Elytra 1.58x longer than wide, sparsely punctate and inconspicuously pubescent.

Venter: Anterior coxal cavities closed; intercoxal process broad, posterior margin broadly curved.

Genitalia: Male genitalia as in Fig. 8.

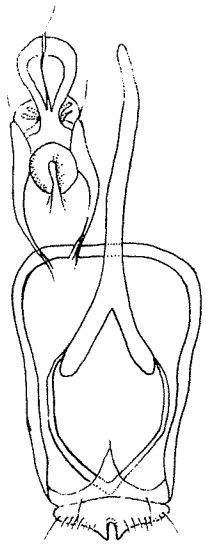


Figure 9. *Cryptolestes calabozus* Thomas, male genitalia.

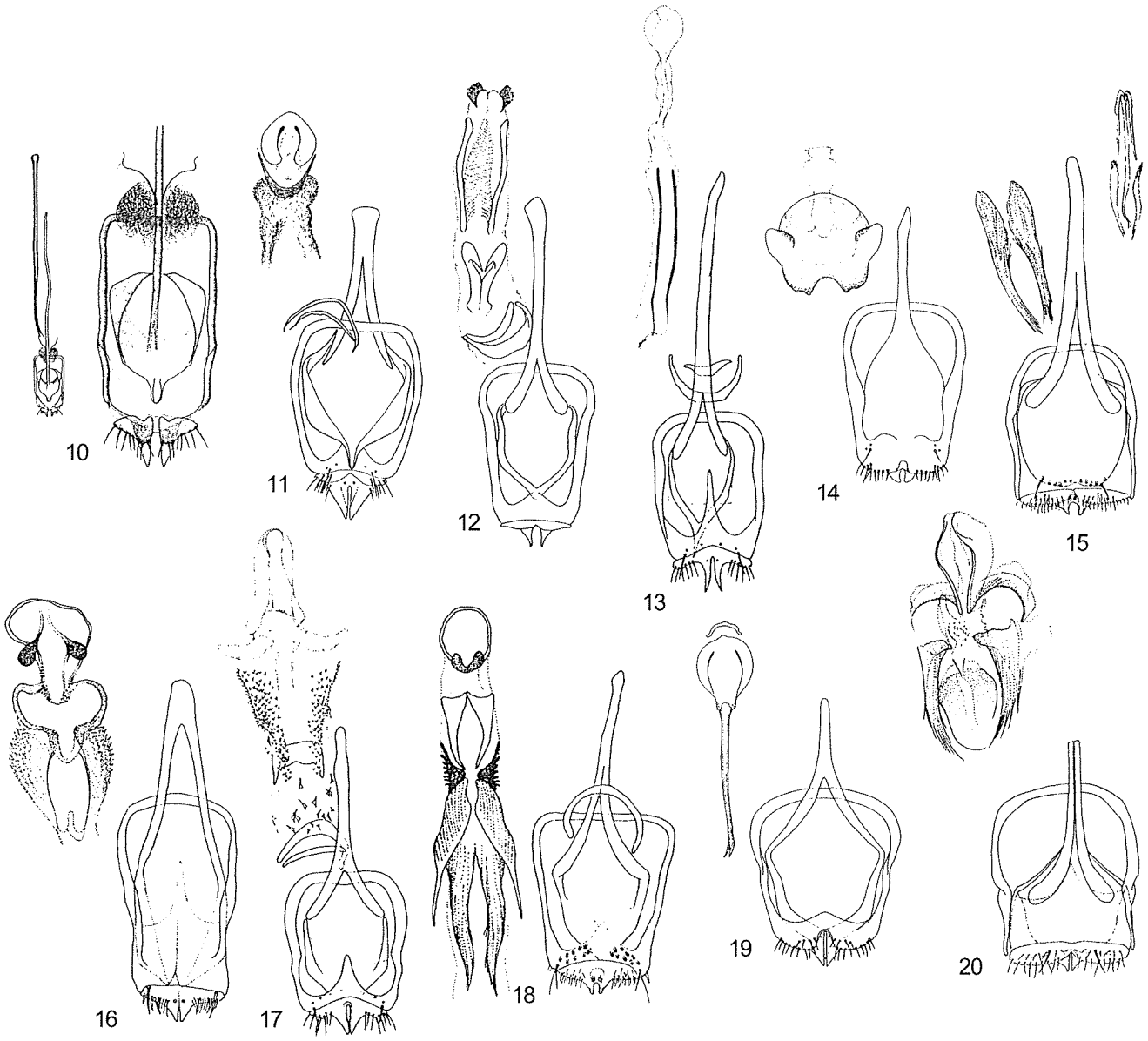
Variation: The single male paratype is almost identical to the holotype in all respects.

Types: Holotype male (deposited in CASC) with following data: "ECUADOR: Sucumbios Shushufindi, 215m 0°10.96'S/ 76°38.95'W VIII-11-1997 Fred G. Andrews". Paratype male (deposited in CDFA) with same data.

Discussion: This exceptionally handsome beetle is similar to *C. spatulifer* Thomas and *C. uncicornis* (Reitter) in the structure of the male antennae and pronotum, and especially to *C. spatulifer* in the structure of the head, but differs from both in coloration, surface sculpture, details of the scape and pedicel, and male genitalia. The female is unknown but can be expected to be similar to the male except for having relatively normal antennae. Although modified scapes in males are fairly frequently encountered in the Laemophloeidae, very few laemophloeids are known that possess a modified pedicel (see Lefkovitch 1958, Thomas 1988, 1995).

Revised key to adults of the New World species of *Cryptolestes* Ganglbauer

This key works best for males, but should be useful for females of most species. The male genital structures of all species and the female structures of many species are diagnostic and should be examined when a satisfactory outcome from the key cannot be obtained.Habitus illustrations of all non-economic

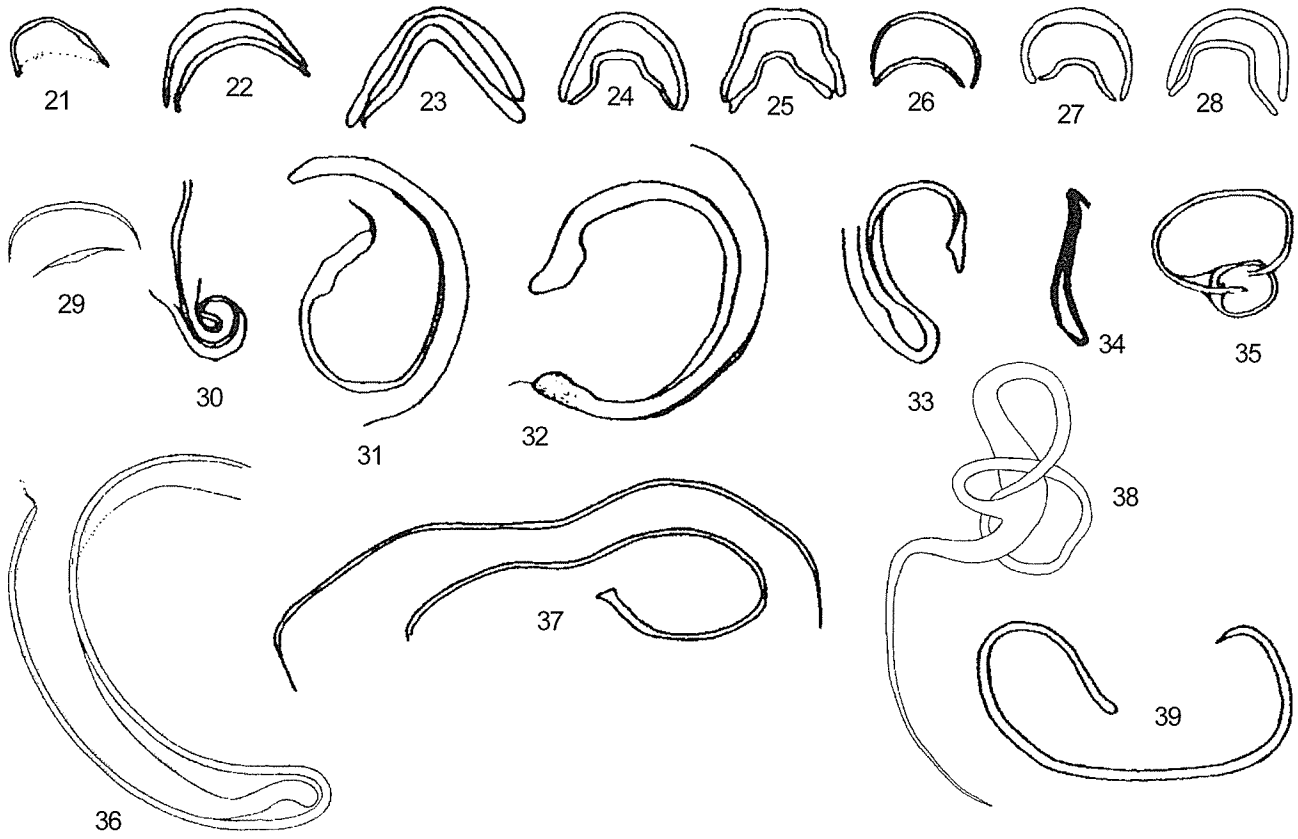


Figures 10-20. Male genitalia, *Cryptolestes* spp. 10, *C. ampiyacus*, distal (entire aedeagus reduced, inset on left); 11, *C. bicolor*; 12, *C. capillulus*; 13, *C. dybasi*; 14, *C. mexicanus*; 15, *C. pubescens* (complete internal sac reduced, inset on right); 16, *C. punctatus*; 17, *C. schwarzi*; 18, *C. spatulifer*; 19, *C. trinidadensis*; 20, *C. uncicornis* (all from Thomas 1988)

species are given by Thomas (1988, 1993a). Stored products species - *C. capensis* (Waltl) (Figs. 28, 37), *C. cornutus* Thomas and Zimmerman (Figs. 27, 38), *C. ferrugineus* (Stephens) (Figs. 22, 31), *C. klapperichi* Lefkovitch (Figs. 24, 33), *C. pusilloides* (Steel and Howe) (Figs. 26, 35), *C. pusillus* (Schönherr) (Figs. 21, 30), *C. turcicus* (Grouvelle) (Figs. 25, 34), *C. ugandae* Steel and Howe (Figs. 29, 36) - that have been found or intercepted in the New World are not included. They are best identified by referring to illustrations of the male and female genital structures supplied here, or by using the key presented by Halstead (1993).

1. Pronotum with a secondary line between sublateral line and lateral margin 2
— Pronotum without a secondary line between sublateral line and lateral margin 11

2(1). Body very stout, convex; secondary line equidistant from sublateral line and lateral margin, complete from base to apex (Fig. 1) (male unknown) (Brazil) ..... *C. obesus*, n. sp.



Figures 21-38. Male and female genital armature of *Cryptolestes* spp. Males, 21-29. 21, *C. pusillus*; 22, *C. ferrugineus*; 23, *C. curus*; 24, *C. klapperichi*; 25, *C. turcicus*; 26, *C. pusilloides*; 27, *C. cornutus*; 28, *C. capensis*; 29, *C. ugandae*; Females, 30-39. 30, *C. pusillus*; 31, *C. ferrugineus*; 32, *C. curus*; 33, *C. klapperichi*; 34, *C. turcicus*; 35, *C. pusilloides*; 36, *C. ugandae*; 37, *C. capensis*; 38, *C. cornutus*; 39, *C. dybasi* (Figs. 27, 38, from Thomas and Zimmerman 1989; 29, redrawn from Lefkovitch 1962a; 36, redrawn from Steel and Howe 1955; rest from Thomas 1988).

— Body slender, not convex; placement or completeness of secondary line different 3

3(2). Punctation of head and pronotum sparse, punctures smaller than an eye facet and separated by 2-6 diameters, surface between punctures generally smooth and glossy 4

— Punctation of head and pronotum coarse, punctures as large or larger than an eye facet, separated by 1-2 diameters, surface between punctures generally microreticulate 6

4(3). Secondary line distinctly angulate at about basal third (Fig. 2); antennal scape in male unarmed; male genitalia as in Fig. 3. (Mexico and Honduras) ..... *C. turnbowi* Thomas, n. sp.

— Secondary line not angulate; other characters not as above 5

5(4). Secondary line diverging from sublateral line from apex to base, where it joins at the basal angle; pronotum abruptly declivous laterad secondary line; male with ventral tooth on antennal scape; male genitalia as in Fig. 19 (Trinidad, Brazil). ..... *C. trinidadensis* Thomas

— Secondary line parallel to sublateral line for about two-thirds of its length (in male); pronotum not abruptly declivous laterad sublateral line; male antennal scape unarmed; male genitalia as in Fig. 10 (Peru) ..... *C. ampiyacus* Thomas

6(3). Body distinctly bicolored red and black; male antennal scape and pedicel armed as in Fig. 7; male genitalia as in Fig. 8 (female unknown) (Ecuador) *C. spectabilis* Thomas, n. sp.

— Body not bicolored; male antennae and genitalia otherwise 7

7(6). Male antennal scape armed; secondary line parallel to sublateral line 9

— Male antennal scape elongate, but not armed; secondary line parallel or not to sublateral line .. 8

8(7). Secondary line diverging from sublateral line from apex to base, where it joins at the basal angle; male antennal scape almost as long as head in major males; dorsal surface of head and pronotum moderately pubescent; setae equal to 4.0x or less the diameter of a puncture; male genitalia as

in Fig. 16 (eastern Nearctic) ..... *C. punctatus* (LeConte)

— Secondary line parallel to sublateral line; male antennal scape no more than 0.5x length of head; dorsal surface of head and pronotum heavily pubescent; setae equal to 6.0x the diameter of a puncture, giving the beetle a "shaggy" appearance; male genitalia as in Fig. 15 (California, Arizona) ..... *C. pubescens* (Casey)

9(7). Male antennal scape resembling a claw hammer; male genitalia as in Fig. 9 (Venezuela, Brazil) ..... *C. calabozus* Thomas

— Male antennal scape resembling a scoop or hook 10

10(8) Male antennal scape straight, armature shaped like a scoop; male genitalia as in Fig. 18 (Argentina) ..... *C. spatulifer* Thomas

— Male antennal scape sinuate, armature shaped like a hook; male genitalia as in Fig. 20 (southern Nearctic, widespread Neotropical) ..... *C. uncicornis* (Reitter)

11(1). Male antennae long, filiform, nearly equal in length to body 12

— Male antennae shorter, moniliform or, if filiform, not exceeding half body length 13

12(11). Lateral carina of elytra sharp, pronounced; disk of elytra concave; body of many individuals distinctly bicolored; male genitalia as in Fig. 11 (Cuba) ..... *C. bicolor* (Chevrolat)

— Lateral carina of elytra not exceptionally sharp or pronounced; disk of elytra not concave; body not distinctly bicolored; male genitalia as in Fig. 14 (Mexico, Central America) ..... *C. mexicanus* Thomas

13(11). Eyes abnormally small, comprising only about 0.25x length of head; armature of internal sac as in Figs. 4-5, sclerotization of bursa as in Fig. 6 (California) ..... *C. inyoensis* Thomas, n. sp.

— Eyes not abnormally small, comprising 0.35 or more length of head 14

14(13). Male mandibles with a ventrally directed tooth basally; body size usually larger, 1.8-2.2mm; sclerotization of internal sac as in Fig. 23; bursa as in Fig. 32 (Yemen, Aden, southwestern U.S., Florida) ..... *C. curus* Lefkovitch

— Male mandibles without tooth; body size less than 1.5mm; genitalia otherwise 15

15(14). Male genitalia as in Fig. 13; bursa as in Fig. 39 (southeastern U.S.) ..... *C. dybasi* Thomas

— Male genitalia as in Fig. 17; bursa unknown (southeastern U.S.) ..... *C. schwarzi* (Casey)

— Male genitalia as in Fig. 12; bursa unknown (Brazil) ..... *C. capillulus* Thomas

Notes

Cryptolestes calabozus Thomas: This species was described from a single male with damaged genitalia from Venezuela (Thomas 1988). Since then I have seen a large series of specimens with the following data: BRAZIL: Rondonia, 63 km. SW Ariquemes, nr Fzda. Rancho Grande, various dates, all collected in a blacklight trap (FSCA). This species has the procoxal cavities narrowly open posteriorly and the intercoxal process broadly curved. The male genitalia are illustrated in Fig. 9. The female is characterized as follows: Length, 1.30-1.40 mm. Color, surface sculpture, and accessory line of pronotum similar to male, scape is not modified, subequal in length to antennomeres II-III; antennae attaining only basal fourth of elytra; pronotum not as expanded apically; bursa copulatrix not sclerotized.

Cryptolestes trinidadensis Thomas: This species was described from two specimens from Trinidad (Thomas 1988). I have since seen two additional specimens from the following locality: BRAZIL: Rondonia, 63 km. SW Ariquemes, nr Fzda. Rancho Grande (FSCA).

Cryptolestes klapperichi Lefkovitch: This species was described by Lefkovitch (1962b) from a total of 17 specimens (7 males, 10 females) collected in 1953 in Jalalabad, Afghanistan. The description was brief and consisted of comparisons with *C. ferrugineus* and *C. capensis*. No biological information was provided. Shortly thereafter, Lefkovitch (1965) recorded a single additional specimen collected in 1937 from "... decaying trunks of arborescent aloes" in Western Aden.

Green (1979) first recorded *C. klapperichi* as a pest of stored products, listing it in nutmegs (*Myristica* sp.) from Sri Lanka and in cassava chips (*Manihot esculenta* Crantz) in Western Malaysia. Parker *et al.* (1981) noted that it was "very common" on cassava chips in Malaysia; C.P. Haines (*in litt.*) reported: "During 5 years in Indonesia I examined many hundred *Cryptolestes* but found only one (damaged) individual that appeared to belong to this species." The locality for that specimen was Teluk Betung in Lampung Province. Slipinski (1985) recorded specimens from Sri Lanka collected at light and under bark.

Halstead (1993) added China and Hong Kong. *Cryptolestes klapperichi* was first intercepted in foodstuffs imported into the United States in 1984 in dried chili pods (*Capsicum* sp.) from Thailand (Zimmerman 1987), and it continued to be commonly intercepted in stored products from the Far East (Zimmerman 1990). Thomas (1988) recorded it from the U.S. Virgin Islands, where a long series was collected from the ascomycete fungus *Daldinia concentrica* (Bolton ex Fr.) Ces. & de Not. growing on a dead citrus tree.

I have examined a number of museum specimens of this species representing new distribution records as follows: "**EGYPT**: Meadi, 26-VI-33 Dr. Priesner" (1, PASC); "**GHANA**: Accra 1-XII-1969 C.W. Campbell blacklight trap" (1, FSCA); same data except date is 27-XI-1969 (1, FSCA); **HAWAII**: "T[erritory of]. H[awaii]. 1-16-1923 Van Dyke Collection" (12, CASC); "**GALAPAGOS IS.**: Espanola, Bahia Manzanilla 5-10-VI-85, S. & J. Peck littoral *Cryptocarpus* & *Prosopis*, FIT, malaise" (3, SBPC); "**ST. LUCIA**: Union Agricultural Sta. 8-IX-1988 Woodruff & Mathurin blacklight trap" (3, FSCA); same data except date is 24-25-V-1987 and collector is R.E. Woodruff (1, FSCA); same data except date is 25-V-1987 (2, FSCA); "**ST. LUCIA**: Dist. Gros Islet, Bonne Terre Habitat 8-IX-1988 Woodruff & Mathurin blacklight trap" (11, FSCA).

Specimens from three of these localities were caught in the wild; that is, they were not associated with stored products, and *C. klapperichi* almost certainly is established at those sites. The Hawaiian specimens were associated with other stored products *Cryptolestes* and were probably the result of an interception. It is unknown whether the Egyptian specimen was associated with stored products.

Four of the new localities for *C. klapperichi* are islands, and islands comprise three of the four new localities at which *C. klapperichi* has been collected in the wild. Why this should be so, and whether *C. klapperichi* has some special affinity for islands, is unknown.

Interceptions of *C. klapperichi* by U.S. Food and Drug Administration inspectors in the southern California-Arizona area from December 1984 through December 1987 include the following: ex Thailand in *Capsicum*, 10 interecptions; ex China in preserved prunes, 1 interception; ex Hong Kong in licorice apricot, 1 interception (Zimmerman 1990).

Additionally, A. Delobel of the Institut Française de Recherche Scientifique pour le Developpement en Cooperation reported (*in litt.*) collecting *klapperichi* in southern and eastern Congo Brazzaville in cassava chips, noting "The species was probably not recently introduced as I found it in several villages." Specific localities and dates listed by Delobel (*in litt.*) were: Brazzaville (I-87, II-88), Bene (XI-87), Bouansa (XII-87), and Loutete (I-88).

Cryptolestes cornutus Thomas and Zimmerman: This species was described from specimens intercepted in the U.S. on *Capsicum* sp. imported from Thailand (Thomas and Zimmerman 1989). Halstead (1993) added no new distribution records. I have seen two specimens collected in Hawaii with the following data: "Barbers Pt. Oahu 11-49 Coll. Ford" and "Barbers Pt. Oahu 4-50 Coll. Ford" (BPBM). Since these were included with other stored products species, it is likely that they were the result of interceptions and that *C. cornutus* is not established in the Hawaiian Islands.

Cryptolestes curus Lefkovitch: This species, which has been recorded from Aden and South Yemen, was described as *C. dissimulatus* Thomas (1988) from Arizona and California where it has been reported as a predator of red date-palm scale (*Phoenicoccus marlatti* Cockerell). The latter name was subsequently synonymized (Thomas 1993). I have seen a series of this species from a red date-palm scale-infested palm grove in Spain with the following data: SPAIN: Alicante, Elche VI-2002 S. Gómez Vives. The collector reported that the scale was first discovered in the grove during the winter of 1993-94 and that the beetle has been present since at least early 1994 (S. Gómez Vives, pers. comm.). This is the first record of *C. curus* from Europe. I have also seen three specimens of *C. curus* collected in southern Florida (Palm Beach County, Delray Beach, November and December, 1992) in association with date palms (*Phoenix dactylifera* L.) imported from California. Whether there is now a breeding population of this species in Florida is unknown.

Acknowledgments

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