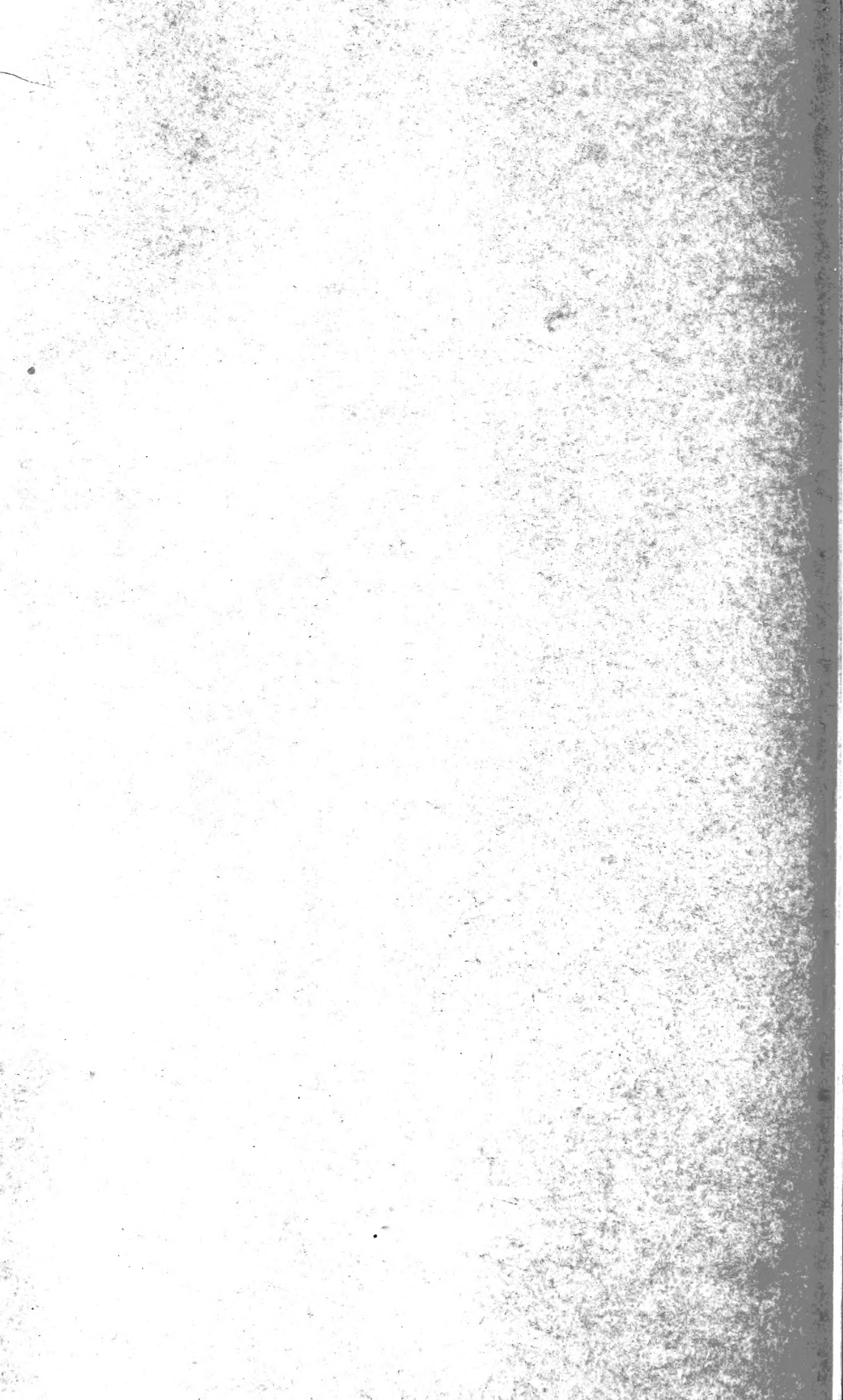


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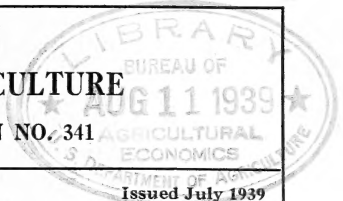


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# THE SPECIES OF PANTOMORUS<sup>1</sup> OF AMERICA NORTH OF MEXICO

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## CONTENTS

	Page		Page
Introduction.....	1	<i>Pantomorus</i> Schoenherr—Continued.	
Generic names in the <i>Pantomorus-Naupactus</i> complex.....	4	Subgenus <i>Asynonychus</i> Crotch—Continued.	
<i>Alceis</i> Billberg, 1820.....	4	(5) <i>Pantomorus (Asynonychus) tessellatus</i> (Say).....	21
<i>Naupactus</i> Dejean, 1821.....	4	(6) <i>Pantomorus (Asynonychus) pallidus</i> (Horn).....	23
<i>Pantomorus</i> Schoenherr, 1839.....	4	Subgenus <i>Phacepholis</i> Horn.....	25
<i>Pantoplanes</i> Schoenherr, 1840.....	5	Key to groups of <i>Phacepholis</i> .....	26
<i>Symmalthes</i> Schoenherr, 1847.....	5	Key to varieties of <i>elegans</i> .....	27
<i>Asynonychus</i> Crotch, 1867.....	5	(7) <i>Pantomorus (Phacepholis) elegans elegans</i> (Horn).....	27
<i>Phacepholis</i> Horn, 1876.....	5	(8) <i>Pantomorus (Phacepholis) elegans</i> var. <i>viridis</i> (Pierce).....	29
<i>Pantopactus</i> Jekel, 1876.....	5	(9) <i>Pantomorus (Phacepholis) elegans</i> var. <i>pallidulus</i> Emden.....	31
<i>Athetes</i> Pascoe, 1886.....	5	(10) <i>Pantomorus (Phacepholis) elegans ezimius</i> , new variety.....	32
<i>Pantomorus</i> Schoenherr.....	6	Key to species of the <i>candidus</i> group.....	33
Key to subgenera of <i>Pantomorus</i> north of Mexico.....	11	(11) <i>Pantomorus (Phacepholis) tezanelius</i> , new name.....	34
<i>Graphognathus</i> , new subgenus.....	11	(12) <i>Pantomorus (Phacepholis) candidus</i> (Horn).....	35
Key to species of <i>Graphognathus</i> .....	12	(13) <i>Pantomorus (Phacepholis) planitatus</i> , new species.....	36
(1) <i>Pantomorus (Graphognathus) leucoloma</i> (Boheman), new combination.....	12	(14) <i>Pantomorus (Phacepholis) obscurus</i> (Horn).....	38
(2) <i>Pantomorus (Graphognathus) peregrinus</i> , new species.....	14	Systematic list, with chief synonymy and distribution.....	39
<i>Atrichonotus</i> , new subgenus.....	15		
(3) <i>Pantomorus (Atrichonotus) taeniatus</i> (Berg), new combination.....	16		
Subgenus <i>Asynonychus</i> Crotch.....	18		
Key to groups and species of <i>Asynonychus</i> .....	18		
(4) <i>Pantomorus (Asynonychus) godmani</i> (Crotch).....	19		

## INTRODUCTION

In the summer of 1936 a South American weevil, the "white-fringed beetle (*Naupactus leucoloma* Boh.)" of recent entomological reports, was discovered near Svea, Fla. When and where the species gained entry into this country is not definitely known, but that it became established prior to 1936 seems certain, as it has since been found at several rather widely separated places in the Southeastern States. In 1937 it appeared in destructive abundance in limited areas along the Alabama-Florida border, and the United States Department of Agriculture, in cooperation with the States affected, has instituted a campaign designed at eradication.

<sup>1</sup> Order Coleoptera, family Curculionidae.

Field work and rearing experiments show that the white-fringed beetle reproduces by parthenogenesis, a rare phenomenon among beetles in general, but one of commoner occurrence in the Curculionidae than was formerly supposed. Several other introduced species of weevils treated in this publication are known or strongly suspected to be parthenogenetic, and the same mode of reproduction has been demonstrated for a few introduced species of two other genera, among them the vegetable weevil (*Listroderes obliquus* Klug) and the alfalfa snout beetle (*Brachyrhinus ligustici* (L.)). That these foreign pests have succeeded in establishing and maintaining themselves, often in the face of vigorous control measures, indicates that parthenogenesis is an important predisposing factor to the likelihood of dispersal and to potential destructiveness, the ability of any specimen to start a new colony and the accelerated rate of reproduction evidently being advantageous to their possessor in the contest to survive and to occupy new territory. It may be mentioned that, so far as known, all parthenogenetic species of Curculionidae are flightless.<sup>2</sup>

The white-fringed beetle (fig. 1, A) was first described by Boheman in 1840 as *Naupactus leucoloma*. It belongs to the *Pantomorus-Naupactus* complex, which includes 240 or more named species, all indigenous to the New World. Of these about 193 are natives of South America and about 45 of Mexico or Central America. At present the majority of the South American species are cataloged in *Naupactus*, most of the others in *Pantomorus*. This publication deals with the taxonomy of the 14 species and varieties now known from the United States; all these, for reasons stated later, are assigned to *Pantomorus*.

*Pantomorus* is a relatively natural group but *Naupactus* is heterogeneous and some of its species will have to be transferred to *Pantomorus* or to other genera. Sharp and Champion<sup>3</sup> were perhaps the first to recognize adequately the broad scope of *Pantomorus*, and its close affinity with *Naupactus*; they separated the two genera chiefly by the absence of wings and well developed humeri in *Pantomorus* and their presence in *Naupactus*. These are the best distinguishing characters yet discovered, though they are often difficult to use and they nearly fail in two or three South American species which have wings intermediate in size between the rudimentary and the fully developed forms. There is little doubt that the *Pantomorus-Naupactus* series eventually will be reclassified along lines other than those based on wing characters, but until all the species can be critically studied the wing and humeral distinctions must be used for dividing the entire complex into two vaguely defined genera, *Naupactus* and *Pantomorus*. All the species from the United States are flightless and are therefore placed in *Pantomorus*; they form, however, four rather distinct segregates which are here called subgenera.

Little is known in detail of the biologies, but it is probable that all the species of both *Pantomorus* and *Naupactus* are root feeders as

<sup>2</sup> WILCOX, J., MOTE, DON C., and CHILDS, LEROY. THE ROOT-WEEVILS INJURIOUS TO STRAWBERRIES IN OREGON. Oreg. Agr. Expt. Sta. Bull. 330, 109 pp., illus. 1934. See pp. 17-18, for a summary of data on parthenogenesis in the genera *Brachyrhinus* and *Dystobus*.

SMITH, FLOYD F. BIOLOGY AND CONTROL OF THE BLACK VINE WEEVIL. U. S. Dept. Agr. Tech. Bull. 325, 46 pp., illus. 1932. See pp. 20-21.

<sup>3</sup> SHARP, DAVID, and CHAMPION, G. C. BIOLOGIA CENTRALI-AMERICANA. INSECTA. COLEOPTERA. v. 4, pt. 3, 354 pp., illus. 1889-1911.

larvae and general feeders as adults. Some of them, such as Fuller's rose beetle and the white-fringed beetle, are often injurious. Of the

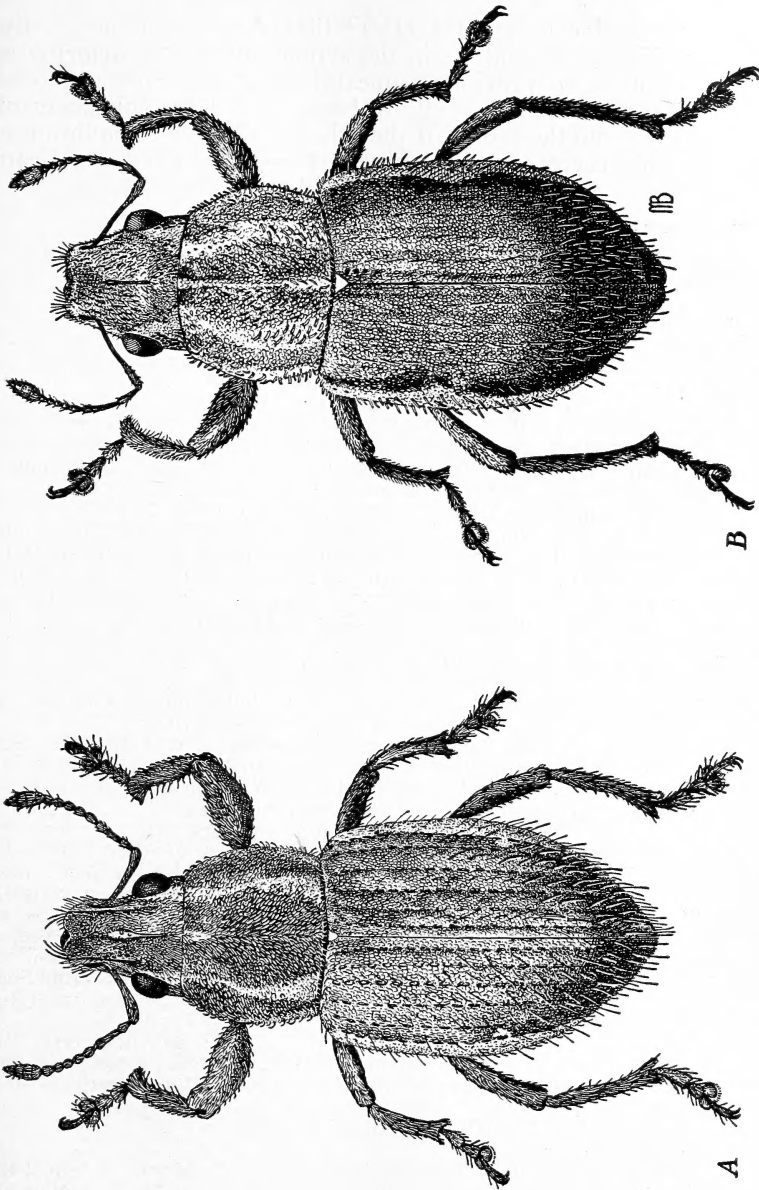


FIGURE 1.—A, Dorsal view of *Pantomorus leucoloma*; B, same of *P. peregrinus*.  $\times 7$ . (Drawings by Mary F. Benson.)

species now present in the United States only those comprising the subgenus *Phacepholis* are known to be gamogenetic and indigenous; all the others are certainly or probably parthenogenetic, and, with the possible exception of Fuller's rose beetle, are either South American importations or have their nearest allies in South America.

## GENERIC NAMES IN THE PANTOMORUS-NAUPACTUS COMPLEX

The latest world catalog of beetles<sup>4</sup> lists four genonyms in the synonymy of *Naupactus* and six in the synonymy of *Pantomorus*; in addition there are two previously uncataloged generic names to be considered. Of these 12 names, 2 are here revived for subgenera of *Pantomorus* and doubtless some of the others will later come into use. It seems desirable, therefore, to examine all these names and to indicate which ones appear nomenclatorially available.

### ALCEIS Billberg, 1820

*Alceis* Billberg, 1820, Enumeratio Insectorum, p. 45. Monobasic. Type, *Curculio longimanus* F., 1775; type locality, Brazil. Genus not described by Billberg, but the name established by its association with a described species. The type species has the humeri subobsolete, and is undoubtedly flightless, though the hind wing is almost as long as an elytron—that is, nearly midway between the rudimentary and the macropterous wing forms.

*Iphius* Schoenherr, 1823, Isis von Oken, column 1140. Monobasic. Type, *Curculio longimanus* F. *Iphius* is thus an absolute synonym of *Alceis* Billberg.

*Leptocerus* Germar, 1824, Insectorum Species Novae, v. 1, p. 417. (Homonym of *Leptocerus* Müller, 1817). Germar referred several species, including (*rivulosus* F.)=*rivulosus* Oliv. and *longimanus* F. to his *Leptocerus*. Schoenherr, 1826 (Curculionidum Dispositio Methodica, pp. 104-107) cites "*Iphius* nob. olim" in the synonymy of *Leptocerus* Germar, divides the latter into three "stirpes" plus the subgenus *Plectrophorus*, and makes *longimanus* F. the type of stirps 1. To fix the status of *Leptocerus* definitely, *Curculio longimanus* F. is hereby designated type of *Leptocerus* Germar (not *Leptocerus* Müller), which thus becomes an absolute synonym of *Alceis* Billberg.

### NAUPACTUS Dejean, 1821

*Naupactus* Megerle, Dejean, 1821, Catalogue de la Collection de Coléoptères, p. 94. Genotype, *Curculio (rivulosus)* F. 1792)=*rivulosus* Oliv., 1790, designated by Champion, 1911, Biologia Centrali-Americana, v. 4, pt. 3, p. 232. This genus, not known from the United States, will include various winged species from Mexico and southward. Dejean refers the genus to Megerle and assigns to it *rivulosus* F. and several other species, not including *longimanus* F. Pending examination of Megerle's papers (which apparently are not available in the United States) *Naupactus* is here credited to Dejean, 1821. Both Olivier, 1790 (Encyclopédie Méthodique, v. 5, p. 545), and Fabricius, 1792 (Entomologia Systematica, v. 1, pt. 2, p. 477), erroneously record "Indes orientales" as the habitat of *rivulosus*. The species is South American and is so recorded by Germar, 1824 (Insectorum Species Novae, v. 1, p. 419) and by later writers. Heller's 1921 designation of ("*longimanus* Schönh.")=*longimanus* F. as type of *Naupactus* (An. Soc. Cient. Argentina 91: 20) is apparently invalid and also is antedated by Champion's designation.

*Archopactus* Heller, 1921, An. Soc. Cient. Argentina 91: 20. Genotype, by original designation ("*Leptocerus rivulosus* Germ.")=*Naupactus rivulosus* (Oliv.). *Archopactus* is thus an absolute synonym of *Naupactus*.

### PANTOMORUS Schoenherr, 1839

*Pantomorus* Schoenherr, 1839, Genera et Species Curculionidum, v. 5, p. 942. Monobasic. Type, *P. albosignatus* Boh. *ibid.*, p. 943; type locality, Mexico. Of the type species the author has examined about 100 specimens, all of them apparently females. As interpreted in this publication, *Pantomorus* sens. str. does not occur in the United States. The approximately two dozen species of *Pantomorus* sens. lat. from Mexico and Central America

<sup>4</sup> DALLA TORRE, K. W. VON, and EMDEN, M., VAN, and EMDEN, F., VAN. CURCULIONIDAE, BRACHYDERINAE I. In Schenkling S., Coleopterorum Catalogus, pt. 147, 132 pp. 1936.

at hand differ as a whole from those of the United States by having the basal margin of the elytron more or less strongly, and often sharply, elevated.

#### PANTOPLANES Schoenherr, 1840

*Pantoplanes* Schoenherr, 1840, *Genera et Species Curculionidum*, v. 6, pt. 1, p. 111. Monobasic. Type, *Naupactus anthribiformis* Boh., 1833; type locality, Brazil. Species not at hand and status of genus uncertain. (See Chevrolat, *Bull. Soc. Ent. France* 1879: cxxx.)

#### SYMMATHETES Schoenherr, 1847

*Symmathetes* Schoenherr, 1847, *Mantissa secunda Familiae Curculionidum*, p. 31. Monobasic. Type, *S. kollari* Schoen., *ibid.*, p. 32; type locality, Brazil. Species not at hand, and status of genus uncertain. Schoenherr gives a combined generic and specific description, and both the generic and the specific names should be credited to him.

#### ASYNONYCHUS Crotch, 1867

*Asynonychus* Crotch, 1867, *Zool. Soc. London Proc.*, p. 388. Monobasic. Type, *A. godmani* Crotch, *ibid.*, p. 389; type locality, island of Fayal, Azores Islands. Here revived as a subgenus of *Pantomorus*.

*Aramigus* Horn, 1876, *Amer. Phil. Soc. Proc.* 15: 93. Type, *Liparus tessellatus* Say, 1824, designated by Pierce, 1913, *U. S. Natl. Mus. Proc.* 45: 416; type locality, Missouri.

*Aomopactus* Jekel, 1876, quoted from letter of Jekel by Horn, *Amer. Phil. Soc. Proc.* 15: 94, footnote. This uncataloged name apparently was never published by Jekel, but it is validated by its association with *Liparus tessellatus* Say and "*N. durius* Germar" in the above-cited paper. *Liparus tessellatus* Say, 1824, is hereby designated type of *Aomopactus* Jekel, 1876, which thus becomes an absolute synonym of *Aramigus* Horn.

#### PHACEPHOLIS Horn, 1876

*Phacepholis* Horn, 1876, *Amer. Phil. Soc. Proc.* 15: 95. Type, *P. elegans* Horn, *ibid.*, p. 96, designated by Pierce, 1913, *U. S. Natl. Mus. Proc.* 45: 416; type locality, "Kansas to Texas." Here revived as a subgenus of *Pantomorus*.

#### PANTOPACTUS Jekel, 1876

*Pantopactus* Jekel, 1876, quoted from letter of Jekel by Horn, *Amer. Phil. Soc. Proc.* 15: 96, footnote. This genonym, as in the case of *Aomopactus*, has not been cataloged heretofore, but it is validated in the paper cited by its association with *Phacepholis elegans* Horn, *Naupactus stupidus* Boh., *N. nobilis* Boh., and *N. crinitus* Boh. The last three of these four species are Mexican and belong to *Pantomorus* sens. lat., but they do not seem to be properly referable to any of the named segregates of *Pantomorus*, except possibly to *Athetetes*. Champion, 1911 (*Biologia Centrali-Americana*, v. 4, pt. 3, p. 335), suggests that *stupidus* and *uniformis* belong to *Phacepholis*, but in the species mentioned the basal margin of the conjoined elytra is slightly but sharply prominent, the dorsal comb of the hind tibia is longer, and the scape differently shaped and clothed. It appears desirable so to fix genotypes that *Pantopactus* Jekel will be available, if needed. Therefore, *Naupactus stupidus* Boh., 1840, type locality Alvarado, Mexico, is hereby designated type of *Pantopactus* Jekel.

#### ATHETETES Pascoe, 1886

*Athetetes* Pascoe, 1886, *Ann. and Mag. Nat. Hist.* (5) 17: 415. Monobasic. Type, *A. globicollis* Pascoe, *ibid.*, p. 416; type locality, Mexico. In the type species the exaggeration of the male characters on the anterior parts of the body gives this sex a distinctive appearance, but in other respects *Athetetes* is doubtfully separable from *Pantopactus*.

Except for *Naupactus*, which includes winged species, and possibly *Pantoplanes* and *Symmalthetes*, which are unknown to the writer, the above groups are based on flightless type species and therefore can be provisionally listed as subgenera of *Pantomorus*.

### PANTOMORUS Schoenherr

*Pantomorus* Schoenherr, Genera et Species Curculionidum, v. 5, p. 942, 1839; Lacordaire, Genera des Coléoptères, v. 6, p. 70, 1863; Gemminger and Harold Catalogus Coleopterorum, v. 8, p. 2203, 1871; Chevrolat, Bull. Soc. Ent. France, 1879: cxxx; Sharp, Biologia Centrali-Americana, v. 4, pt. 3, pp. 101, 152, 1889-1911 (1891); Perkins, Fauna Hawaiiensis, v. 2, pt. 3, p. 130, 1900; Champion, Biologia Centrali-Americana, v. 4, pt. 3, p. 333, 1889-1911 (1911); Pierce, U. S. Natl. Mus. Proc. 45: 416, 1913; Blatchley and Leng, Rhynchophora of North Eastern America, p. 124, 1916; Leng, Catalogue of the Coleoptera of America North of Mexico, pp. 313, 314, 1920; Heller, An. Soc. Cient. Argentina 91: 19, 20, 1921; Bradley, Manual of the Genera of Beetles of America North of Mexico, pp. 273, 331, 1930; Winkler, Catalogue Coleopterorum Regionis Palaearcticae, pt. 12, column 1477, 1932; Dalla Torre, Emden, and Emden, Coleopterorum Catalogus, pt. 147, p. 25, 1936; Emden, Stettin, Ent. Ztg. 97: 85 and footnote, 1936.

Length rarely less than 5 mm; vestiture usually abundant, squamiform, setae present or absent. Head broad; prementum<sup>5</sup> not setose; mandibles scaly and setose; apical margin of rostrum in side view deeply emarginate (fig. 2, *Q*, *R*); rostrum continuous or subcontinuous with front in profile, above with a median groove which extends on to head; nasal plate rather small, often poorly defined; scrobe lateral, narrow, curved, directed toward lower part of eye or below eye; antennal socket subapical; scape rather slender, attaining or exceeding hind margin of eye, funicular segment 2 frequently longer than 1; eye lateral, rounded or elliptical, often prominent. Prothorax without ocular lobe or vibrissae, basal margin of pronotum subtruncate, broadly rounded, or bisinuate; scutellum obsolescent to rather large. Elytra usually with 10 rows of punctures (row 10 interrupted medially in *Atrichonotus* and in *Aramigus* section of *Asynonychus*), well impressed striae usually absent; humeri rounded, moderately prominent to obsolete; erect setae, when present, often longer on apical declivity; no callus on apical declivity. Metepisternal suture usually distinct, at least in part; abdominal sternites 1 and 2 longer, each longer than 3 or 4. Fore coxae contiguous, closer to anterior than to posterior margin of prothorax, middle coxae narrowly separated; femora not toothed; at least fore tibia denticulate or spinose on lower edge, front and middle tibiae (in United States species) mucronate; tarsi dilated, claws free. Hind wings nonfunctional. Ental surface of abdominal sternite 5 of female with an erect or suberect sclerotized protuberance on each side (fig. 3, *G*). Male, where known, with internal sac extraordinarily large, extending far beyond base of median lobe and ending in a balloonlike enlargement (fig. 4, *I*). For other sex differences see subgenus *Phaecepholis*.

The combination of lateral eyes, nonsetose prementum, slender scape, denticulate or spinose lower edge of fore tibia, and absence of vibrissae and ocular lobes from the prothorax is sufficient to separate *Pantomorus* from any United States genus with which it otherwise might be confused.

The lateral position of the eyes in *Pantomorus* and allied genera (Naupactini) is one of the important distinctions between this tribe and the Barynotini (*Epicaerus*, etc.), in which the eyes are in part dorsal. In general this distinction is true, but in some species of *Pantomorus* the eyes are not strictly lateral in that they are not separated above by the full basal width of the rostrum; however,

<sup>5</sup>TING, PETER C. THE MOUTH PARTS OF THE COLEOPTEROUS GROUP RHYNCOPHORA. Microentomology 1: 93-114, illus. 1936. Ting points out that the mouth part called mentum in curculionid literature is the fused mentum and submentum, and he uses the term "prementum" in referring to it.



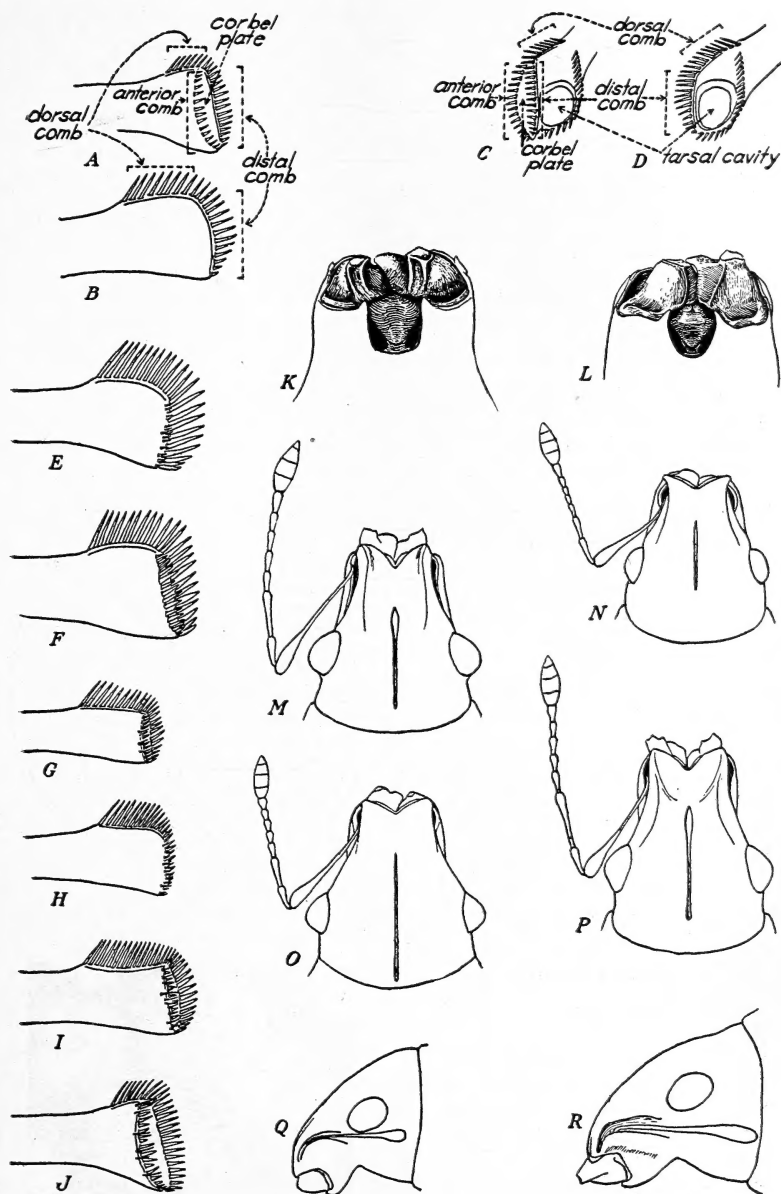


FIGURE 2.—Parts of species of the genus *Pantomorus*: A, Anterior diagrammatic view of apex of hind tibia with closed corbel; B, same with open corbel; C, end diagrammatic view of apex of hind tibia with closed corbel; D, same with open corbel; E, anterior view of apex of hind tibia of *P. leucoloma*; F, same of *P. peregrinus*; G, same of *P. taeniatulus*; H, same of *P. godmani*; I, same of *P. pallidus*; J, same of *P. elegans*; K, ventral view of mouth of *P. leucoloma*; L, same of *P. pallidus*; M, dorsal view of head of *P. godmani*; N, same of *P. taeniatulus*; O, same of *P. pallidus*; P, same of *P. elegans*; Q, side view of head of *P. taeniatulus*; R, same of *P. godmani*. (A to J drawn by L. L. Buchanan; K to R, by Eleanor A. Carlin.)

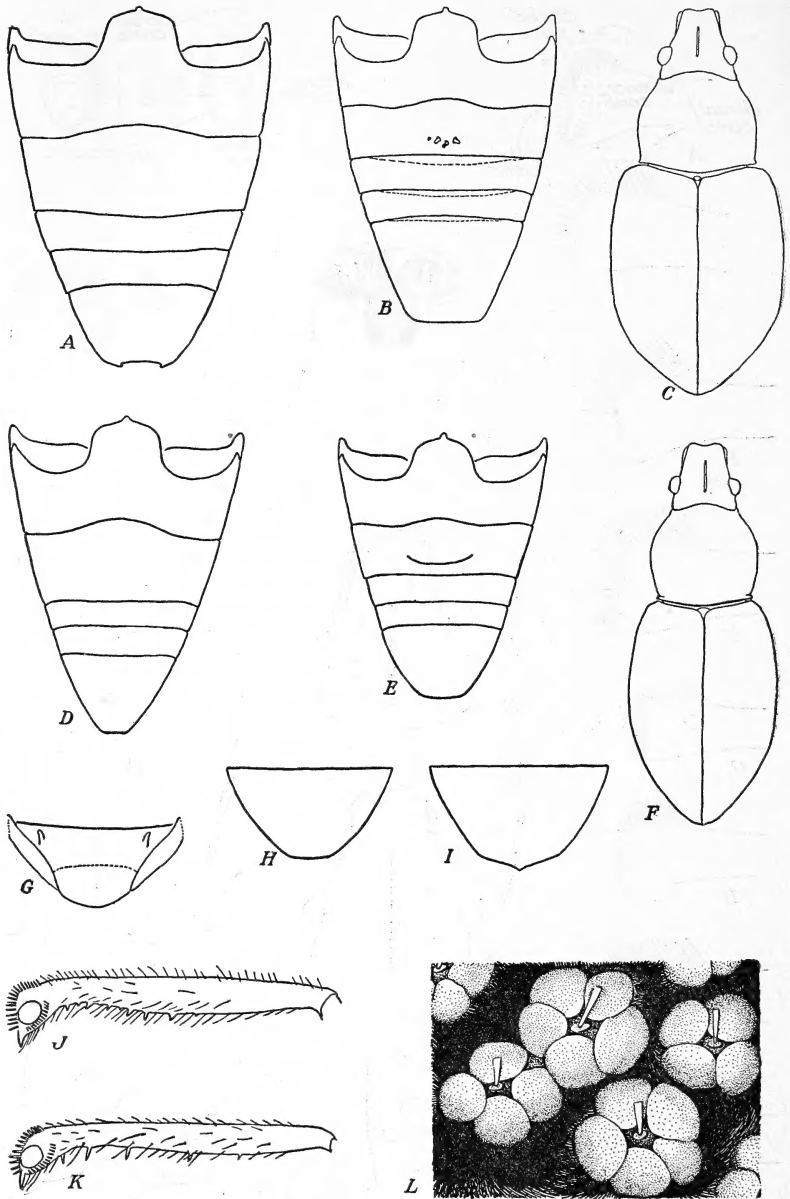


FIGURE 3.—A, Ventral view of abdomen of *Pantomorus planitatus* (female); B, same of *P. planitatus* (male); C, dorsal outline of *P. obscurus* (female); D, ventral view of abdomen of *P. elegans* (female); E, same of *P. elegans* (male); F, dorsal outline view of *P. obscurus* (male); G, ental surface of abdominal sternite 5 of *P. leucoloma* (diagram); H, ventral outline of abdominal sternite 5 of *P. tessellatus*; I, same of *P. pallidus*; J, fore tibia of *P. planitatus*; K, same of *P. obscurus*; L, small section of pronotum of *P. elegans*. (C, F, and L drawn by E. A. Carlin; others by L. L. Buchanan.)

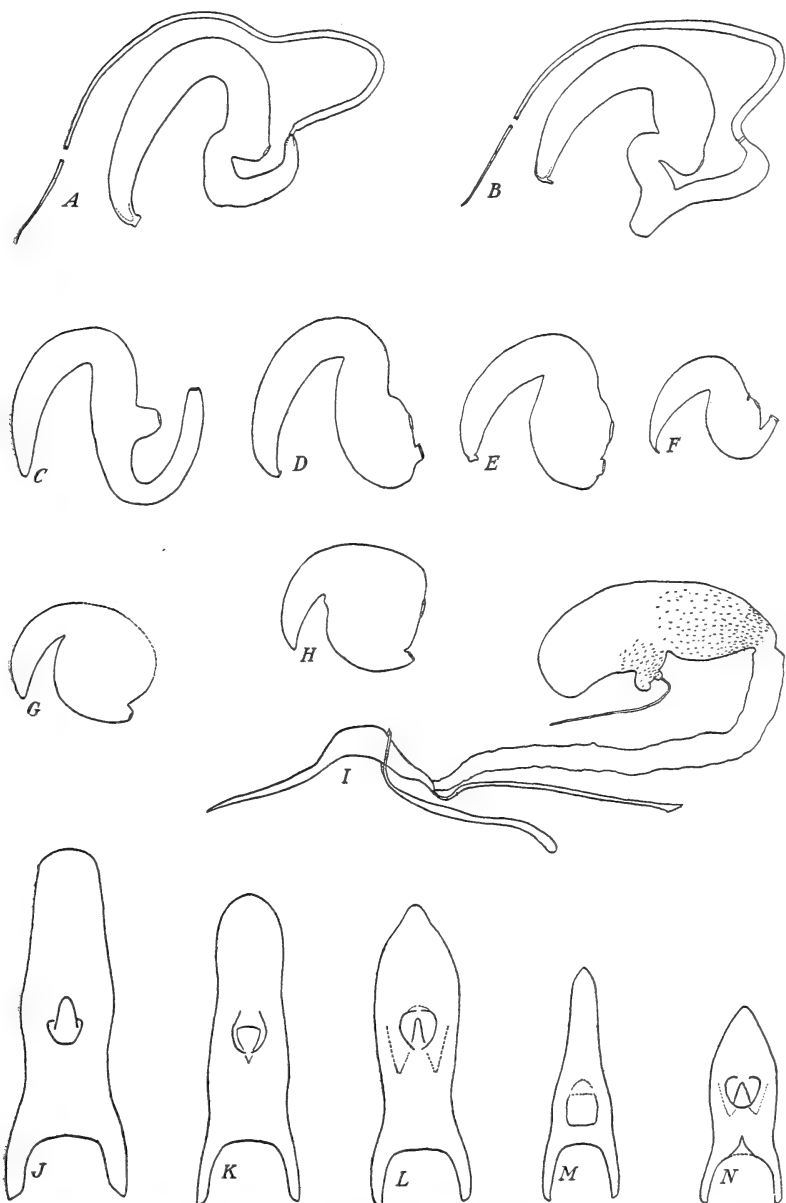


FIGURE 4.—A, Spermatheca of *Pantomorus tessellatus*; B, same of *P. pallidus*; C, same of *P. godmani*; D, same of *P. leucoloma*; E, same of *P. peregrinus*; F, same of *P. taeniatus*; G, same of *P. elegans*; H, same of *P. candidus*; I, side view of median lobe of *P. obscurus*; J, dorsal view of median lobe (struts and tegmen omitted) of *P. candidus*; K, same of *P. planitatus*; L, same of *P. eximius*; M, same of *P. obscurus*; N, same of *P. elegans*. (Drawings by L. L. Buchanan.)

they are so nearly lateral that the value of the character is scarcely lessened.

In *Pantomorus leucoloma*, *P. peregrinus*, and *P. godmani*, there are transverse aciculations on the metasternum and abdominal sternites. This type of sculpture on the feebler form is found in some of the other species also. The gamogenetic species (i. e., those of the subgenus *Phacepholis*) as a general rule have the hind margin of the prothorax in side view more strongly angulate opposite the elytral humerus, the nasal plate feebler, the setae at the latero-apical angle of the rostrum more numerous, the dorsal comb of the hind tibia shorter, and the spermatheca broader and more feebly sclerotized than in the parthenogenetic species. In the latter the spermatheca is well sclerotized and, except in *leucoloma* and *peregrinus*, more or less elongated basally (fig. 4, *A, B, C, F*); it is not elongated in the subgenus *Phacepholis* (fig. 4, *G, H*). The median line of the pronotum in side view is nearly flat except in certain species of *Phacepholis*, in which it is rather strongly convex. In *leucoloma*, *peregrinus*, and *godmani* there is a well-defined glabrous spot on the mesepisternum, and a broad line along the middle of the abdomen where the vestiture is sparser than at the sides. A somewhat similar arrangement of the abdominal vestiture is found in the males of some species of *Phacepholis*.

The term "combs" refers to the rows of spinules toward and at the apex of the hind tibia (fig. 2, *A* to *J*). In some species the upper and lower apical angles of the tibia are connected by two distinctly separated combs, the intervening space being called the corbel plate ("corbel closed" of curculionid literature) (fig. 2, *A, C*). The comb nearest the tarsal cavity is called distal comb, the other one, anterior comb. In *Pantomorus* the distal and anterior combs are moderately to narrowly separated, the corbel plate being correspondingly wider or narrower; or there may be only a single comb, the distal, and no corbel plate evident ("corbel open" of curculionid literature) (fig. 2, *B, D*). In the open corbel traces of the anterior comb and corbel plate can sometimes be detected on the anterior face of the tibia next to the distal comb. From the upper apical angle of the tibia the distal comb extends a greater or less distance toward the base of the tibia, and this extension is called dorsal comb because in side view it appears to rise from the dorsal edge of the tibia (fig. 2, *A* to *D*). These tibial structures are important in the higher classification of some Curculionidae, but in *Pantomorus* they are often hardly of subgeneric value. The "subapical area" is a somewhat vaguely defined region on the dorsum of the rostrum just posterior to the nasal plate; it is often slightly impressed, and is usually more finely sculptured than the remainder of the rostrum, and clothed with smaller and differently colored scales. The mandibular prominence to which the deciduous appendage is attached is called support of deciduous piece, or merely support. The length of the rostrum is the shortest distance between the front margin of the eye and the apex of the rostrum, excluding the mandibles. The point on the head attained by the scape is shown when it is lying in the scrobe and touching the lower margin of the eye; the scape is said to reach or exceed the hind margin of the eye, or to "exceed the eye," when it reaches or exceeds a downward extension of an imaginary line, the shortest line, connect-

ing the hind margins of the eyes across the dorsum of the head. The visible abdominal sternites are numbered 1 to 5, 1 being the third, and 5 the seventh morphological sternite.

Unless otherwise stated, localities listed under Distribution are for specimens actually examined during this study,<sup>6</sup> most of them in the National Museum collection.

### KEY TO SUBGENERA OF PANTOMORUS NORTH OF MEXICO

1. Mandible with a shallow sulcus, bounded each side by a blunt carina, from lower edge of scar to lower edge of mandible (fig. 2, *K*); support of deciduous piece short; scutellum densely, contrastingly clothed with white scales; elytral setae erect, and conspicuous throughout; elytron with white stripe from humerus posteriorly; abdominal vestiture sparser medially; length usually more than 7.5 mm.; male unknown-----*Graphognathus*, new subgenus (p. 11)
- Mandible without such a sulcus, though sometimes with a distinct carina (the inner carina of *Graphognathus*) (fig. 2, *L*); scutellum not so clothed (except in certain *Phacepholis*); elytron rarely with humeral white stripe; length usually less than 7.5 mm----- 2
2. Setae on basal half of elytron prostrate or nearly so; pronotum punctate to shallowly rugose, scales not in radial clusters; scales on pronotum and elytra not metallic green; hind tibia slightly thickened apically, corbel plate narrow to obsolete, the dorsal comb as long as or longer than distal comb (fig. 2, *G* to *I*); basal portion of spermatheca rather slender and more or less produced (fig. 4, *A, B, C, F*); male unknown----- 3
- Elytral setae erect or suberect throughout; pronotum rugo-punctate or rugo-verrucose (sculpture often obscured by scales), often some of the scales in radial clusters (fig. 3, *L*); pronotal and elytral scales sometimes metallic green; hind tibia more thickened apically, corbel plate broader, the dorsal comb about half as long as distal comb (fig. 2, *J*); basal portion of spermatheca broad, not produced (fig. 4, *G, H*); male known-----*Phacepholis* Horn (p. 25).
3. Eye moderately convex, the outer margin in dorsal view evenly curved (fig. 2, *N*); support of deciduous piece barely elevated; funicular segment 1 equal to or longer than 2; rostral groove not or hardly exceeding eyes (fig. 2, *N*); basal margin of elytron not thickened; elytral setae prostrate or subprostrate nearly throughout; spermatheca slightly produced basally (fig. 4, *F*).  
*Atrichonotus*, new subgenus (p. 15).
- Eye strongly convex, the curvature of outer margin in dorsal view steeper posteriorly than anteriorly (fig. 2, *M, O*); support of deciduous piece distinctly elevated; funicular segment 2 longer than 1; rostral groove exceeding eyes (fig. 2, *M, O*); basal margin of elytron usually, but not greatly, thickened; erect or slanting setae present on apical half of elytron; spermatheca greatly produced basally (fig. 4, *A, B, C*).  
*Asynonychus* Crotch (p. 18).

### GRAPHOGNATHUS, new subgenus

Scaly and setose, scales not metallic though sometimes, in part, faintly pinkish or iridescent. Head not constricted behind eyes, interocular distance equal to or slightly greater than length of rostrum; rostral groove to opposite hind margin of eye; eye elliptical, moderately convex; rostrum short, stout; mandible stout, not toothed on mesal edge above, sulcus with a few scales and setae; scape reaching or slightly exceeding hind margin of eye, subequal in length to funicle without club, funicular segment 2 considerably longer than 1, 5+6+7 as long as club. Prothorax broadly, subevenly rounded at sides, base a little wider than apex, posterior margin in side view obtusely or scarcely angulate opposite elytral humerus; pronotum not, or feebly, rugose, median groove shallow to obsolete, basal margin not, or faintly, bisinuate and with its declivity subvertical, only

<sup>6</sup>The writer is indebted to E. T. Cresson, Jr., and Hugo Kahl for the loan of specimens, and to Elizabeth Smith for aid in the dissection of numerous specimens of *Pantomorus leucoloma*.

moderately high, and clothed with setae or scales; basal transverse groove usually obsolete except sometimes toward sides; pronotal vestiture transversely or somewhat obliquely directed except medially. Scutellum triangular, squamose. Elytron 10-striate, humerus rounded and slightly prominent, basal margin not prominent, conjoined elytra widest about middle, basal margin broadly and evenly emarginate; elytral setae irregularly triseriate on each interval, of unequal lengths, the longer ones median on each interval. Abdomen beneath transversely aciculate, at least latero-basally, intercoxal piece three-fourths to seven-ninths as wide as a hind coxa, sternite 3 a little longer than 4, the surface of each longitudinally subplanate, sternite 5 short and with a more or less distinct groove just behind and paralleling apical margin; metepisternum distinct; mesepisternum with a glabrous, polished spot. Fore coxae large; fore femur only moderately stout, but stouter and a little longer than the middle and hind femora; hind tibia with corbel open or closed, the corbel plate if present narrow and not scaly, dorsal comb three-fourths to about as long as distal comb (fig. 2, *E, F*). Spermatheca not produced basally (fig. 4, *D, E*).

*Type of subgenus.*—*Naupactus leucoloma* Boheman.

A mandibular sulcus such as that of *leucoloma* and *peregrinus* has not been observed in any other species of the *Pantomorus-Naupactus* complex, though occasionally, as in some specimens of *godmani*, a feeble, incomplete, and more oblique sulcus is present.

#### KEY TO SPECIES OF GRAPHOGNATHUS

Color usually grayish; dorsal setae longer and finer, the longer ones on elytra whitish; rostrum in dorsal view scarcely tapering (fig. 1, *A*), the latero-marginal carina rather strong and slightly overhanging side of rostrum; vestiture along median line of pronotum directed cephalad; scales on disk of elytron longer than broad in general; corbel plate absent (fig. 2, *E*).

(1) *leucoloma* (Boh.) (p. 12).

Color brownish; dorsal setae shorter and stiffer, some or most of the longer ones on elytra brown or blackish; rostrum in dorsal view obviously tapering (fig. 1, *B*), latero-marginal carina feeble and not overhanging side of rostrum; vestiture along posterior half of median line of pronotum directed caudad; scales on disk of elytron subcircular in general and more nearly covering the surface; a narrow corbel plate present (fig. 2, *F*).

(2) *peregrinus*, new species (p. 14).

#### (1) PANTOMORUS (GRAPHOGNATHUS) LEUCOLOMA (Boheman), new combination

(Figs. 1, *A*; 2, *E, K*; 3, *G*; 4, *D*)

*Naupactus leucoloma* Boheman (Schoenherr) Genera et Species Curculionidum, v. 6, pt. 1, p. 62, 1840; Berg, Stettin. Ent. Ztg. v. 42: 61-62, 1881; (Marshall) Rev. Appl. Ent. (A) 21: 303, 1933; Watson, Fla. Ent. 20: 1-3, fig., 1937; and *ibid.*, pp. 22-25; Young, App. Green, and Dopson (The white fringed beetle, *Naupactus leucoloma* Boh.), U. S. Bureau Entomology and Plant Quarantine, E-420, 13 pp. illus. 1938; Anderson, W. H., (A key to separate the larva of the white-fringed beetle, *Naupactus leucoloma* Boh., from the larvae of closely related species), *ibid.*, E-422, 2 pp., illus., 1938; Tissot, Fla. Ent. 21: 20-27, illus., 1938.

Length, 8-12 mm. Brownish gray to gray, apical declivity of elytron usually paler than disk, the latter sometimes indistinctly variegated with gray and pale brown. Scales moderately dense, setae long and conspicuous, elytral scales in general broader than those on head and pronotum; elytral setae of unequal lengths, the longer ones fine, often somewhat kinky apically in dried specimens and two or three times as long as the shorter ones, the latter brown to whitish; elytral puncture rows, at low magnifications, appearing as narrow, dark lines.

Vestiture on head and rostrum brownish in general, white above and below eye and on side of rostrum below scrobe, the scales on subapical area and on mandibles very small, often somewhat coppery or greenish, the setae on front inclined, those above eye and on rostrum above suberect; nasal plate with its posterior margin elevated; median groove much widened anteriorly, the widest portion sometimes about one-fourth width of dorsum of rostrum; scape reach-

ing hind margin of eye, funicular segment 2 considerably longer than 1, often nearly twice as long, longer than 3 and 4 together; eye distinctly elliptical. Prothorax wider than long (about 7 to 5), sides broadly and subevenly rounded; pronotum with broader white and narrower brownish scales, the white ones forming a narrow, median line toward apex and base (rarely complete), a curved, often indistinct, stripe beginning opposite elytral interval 3, and a lateral stripe which is often incomplete anteriorly, the disk sometimes with small, vague, scattered, whitish spots; pronotal setae curved, inclined on disk, more nearly erect laterally; pronotum (with scales removed) irregularly punctate and feebly rugo-granulate, median groove feeble or obsolescent. Elytral intervals faintly convex, each with about 3 or 4 confused rows of setae, the longer ones more abundant on apical declivity, the length of each longer seta equal to or greater than the width of the interval; white stripe covering interval 7 throughout, about apical two-fifths of interval 6, and basal half or more of interval 8, the stripe bordered mesad (on striae 5 and 6) by a broken, usually indistinct dark line, and bordered laterad (on stria 8) by a narrow, blackish line. Body beneath scaly and setose, the setae longer and more nearly erect medially, the abdominal scales progressively finer from base to apex, abdominal vestiture sparser medially; metasternum a little longer than in *peregrinus*. Legs with abundant, mostly setalike, prostrate and suberect vestiture; fore tibia with short, well separated denticulations; posterior face of hind tibia with a usually distinct ridge from base to about middle.

Described from about 250 specimens, most of them collected at Florala, Ala., in July 1937 by P. N. Annand.

*Type locality*.—Argentina (Tucuman).

*Distribution*.—UNITED STATES: Florida (Svea, Pensacola); Alabama (Florala, Monroeton, Elba, Tunnel Springs, Drewry, Nadawah, Beatrice, Repton, Mobile); Mississippi (Laurel, De Lisle, Moss Point, Gulfport); Louisiana (New Orleans). SOUTH AMERICA: Argentina (Tucuman); Peru (Lima); Chile (Angol, Concepcion, Santiago, Quillota); Uruguay (Montevideo, Colonia Suiza). AUSTRALIA (New South Wales).

*Type*.—Probably at Stockholm.

Bosq<sup>7</sup> gives the following Argentine localities for *leucoloma*: Provinces of Buenos Aires, Santiago del Estero, Cordoba, San Luis, and Salta. Carlos A. Lizer y Trelles, in a letter of October 18, 1937, to Avery S. Hoyt, Assistant Chief of the Bureau of Entomology and Plant Quarantine, adds the Provinces of Mendoza, Entre Rios, Santa Fe, San Juan, and Tucuman, and the Territories of Rio Negro, La Pampa, and Chaco, all in Argentina. The species has also been reported from Willow Tree, New South Wales, Australia, where it was attacking the roots of alfalfa.

In the United States, *leucoloma*, the "white-fringed beetle," was first reported from the vicinity of Svea, Fla., the record being based on two specimens collected by E. R. Nelson in July 1936 and forwarded to Washington for identification by A. N. Tissot. During the following year the species was extremely abundant near Florala, Ala., and on July 14 "in a heavily infested cotton field one man collected approximately 80,000 beetles from one-half acre in 4 hours." The facts that no male of the white-fringed beetle could be found in the field, and that every one of 2,311 specimens, dissected for sex determination, proved to be a female, strongly indicated parthenogenesis, and this was later established by H. C. Young, B. A. App, G. D. Green, and

<sup>7</sup> BOSQ, JUAN M. PRIMERA LISTA DE LOS COLEOPTEROS DE LA REPUBLICA ARGENTINA DAÑINOS A LA AGRICULTURA. Argentina Min. Agr. de la Nacion Bol. 36: [313]-344 1934. See p. 332.

R. N. Dopson, of this Bureau, who conducted rearing experiments in which fertile eggs were produced by each of 32 virgin females.

The species is polyphagous in both the larval and adult stages and has been found feeding on at least 50 different kinds of plants. The chief damage is done by the larva, which feeds underground on roots. Serious injury has been reported to potato and peanut crops as well as to various ornamental and garden plants.

The size, white stripe of elytron, and long, fine elytral setae distinguish *leucoloma* from any other curculionid of this region except *peregrinus*. In most cases *peregrinus* and *leucoloma*, when examined without magnification, can be separated by the difference in elytral appearance; in *peregrinus* the elytra seem to be nonstriate, the puncture rows being obscured by the scales, whereas in the less densely scaly *leucoloma* the puncture rows are visible as narrow, dark lines. The shape of the spermatheca does not vary much in either *leucoloma* or *peregrinus*.

The corbel of *leucoloma* is of the open type although traces of the anterior comb are sometimes detectable, but so closely approximated to the distal comb that the corbel plate is nearly or quite effaced. In the specimens dissected a stylus was usually found on each coxite, but in some examples the stylus was absent from one or both coxites.

(2) PANTOMORUS (GRAPHOGNATHUS) PEREGRINUS, new species

(Figs. 1, B; 2, F; 4, E)

Length 7-10.5 mm. General color light brown (avellaneous to buffy-brown of Ridgway's Color Standards and Color Nomenclature), pronotum usually lighter than elytron, the latter with a black (subglabrous) stripe toward side bordering inner margin of the white stripe; dorsal scales dense, obscuring the serial punctures on elytra; elytral setae slender but stiff, and of two fairly well differentiated lengths, the shorter ones predominating on disk, the longer ones more numerous laterally and on declivity.

Head thick, scales paler above and below eye and on side of rostrum below scrobe, some or all the scales on subapical area and on mandibles usually coppery or greenish, setae above eye pale, those elsewhere on dorsum of head and rostrum mostly brownish; rostrum stout, dorsum subplanate to feebly impressed, median groove slightly widened apically, subapical area not, or feebly, impressed, nasal plate with posterior margin not, or scarcely, elevated; scape slightly exceeding hind margin of eye, funicular segment 1 two-fifths to three-fourths as long as 2, 2 fully as long as 3+4, which are subequal; eye slightly elliptical. Prothorax wider than long (about 6 to 5), widest near middle, only a little wider at base than at apex, a trifle more narrowed basally than in *leucoloma*, broadly rounded at sides, which are often slightly emarginate near basal angles; pronotal vestiture whitish to brown, the setae inclined and about as long as the shorter elytral setae, the paler scales forming a narrow, whitish, median stripe which is usually distinct in basal half and near apex but rarely distinct throughout, a curved stripe, broadest basally (broader than in *leucoloma*) beginning opposite elytral intervals 3 and 4, and a lateral stripe which is usually present in basal half only, the two latter stripes often poorly defined or nearly absent; pronotal surface (normally covered by scales) with fine, sparse punctures intermixed with minute ones, the sculpture smoother than in *leucoloma*, basal margin sometimes slightly prominent laterally, median groove fine, shallow, and usually closed over with scales. White scutellum conspicuous. Conjointed elytra broadly, evenly emarginate at base, humeri slightly prominent, sides nearly straight and slightly diverging from base to about basal two-fifths; intervals flat, each with about three confused rows of setae, those on lateral white strip usually white, those on disk usually darker (yellowish to fuscous), the long ones apparently darker, on the average, than the short ones; scales narrower and darker, or nearly wanting, on a conspicuous, black stripe located chiefly on interval 6, the stripe narrowed basally and apically and, in different specimens, extremely variable in



width and distinctness, and often partially interrupted here and there by scaly patches; laterad of the black stripe is a broad stripe of whitish scales covering interval 7 throughout, covering 8 from base to middle or beyond, and 6 from apex to about apical third. Body beneath scaly and setose; abdomen transversely aciculate, very sparsely punctulate medially, scaly and setose on sides of sternites 1 to 4, setose only in a broad, median stripe and on most of sternite 5, intercoxal piece about seven-ninths as wide as a hind coxa; metasternum very short, distance between hind and midcoxae hardly greater than half width of midcoxa. Legs with rather dense, chiefly prostrate setae but also with a few slender scales and some inclined bristlelike setae; fore tibia with short, blunt denticulations which are shorter than in *leucoloma*; corbel plate narrow, poorly defined, not scaly but often with a few short, stout spinules, dorsal comb a little shorter than distal. As in *leucoloma*, the stylus of one or both coxites is sometimes absent.

*Type locality*.—Mississippi (Gulfport).

*Distribution*.—Mississippi (Gulfport, Saucier, Landon, McHenry).

*Type*.—Female (September 3, 1937, Gladney and Padgett) and 169 paratypes, Cat. No. 52355, United States National Museum.

Described from 170 specimens, most of them collected at Gulfport, Miss., on September 3, 1937, by Gladney and Padgett, or at Saucier, September 8, 1937, by Dopson, Padgett, and Baker. *Pantomorus peregrinus* is probably indigenous to South America, but it does not seem to agree with any of the numerous descriptions examined by the writer. As far as known, it was first found in the United States at Gulfport, Miss., August 22, 1937, by H. Gladney. It resembles *leucoloma* in a general way and its habits are probably similar. All specimens at hand are females and it is reasonably certain that *peregrinus*, like *leucoloma*, is parthenogenetic.

In addition to the differences already noted, *peregrinus* and *leucoloma* differ in some relative and average characteristics that are obvious when the two species are compared. Such differences are the following:

*P. peregrinus*. Average length about 8.5 mm.; body stouter, head thicker; rostrum shorter, its median groove less widened anteriorly, subapical area more feebly impressed; eye shorter and a trifle more convex; scape reaching farther past eye, funicular segment 2 relatively shorter; pronotal punctures finer; black stripe bordering inner margin of white stripe usually conspicuous; longer elytral setae darker, fine but rigid, and not kinky at tips; blackish subglabrous area along middle of abdomen conspicuous; ridge on posterior face of hind tibia feebler to obsolete.

*P. leucoloma*. Average length about 9.5 mm.; body less stout, head not so thick; rostrum longer, its median groove considerably widened anteriorly, subapical area more strongly impressed; eye longer, less convex; scape relatively shorter, funicular segment 2 relatively longer; pronotal punctures coarser; elytral black stripe rarely conspicuous; longer elytral setae usually white, their tips very fine and often somewhat kinky; blackish median area on abdomen less distinct; ridge on posterior face of hind tibia more prominent.

#### ATRICHONOTUS, new subgenus

Scales dense, setae prostrate. Head not constricted, interocular distance greater than length of rostrum (about 5 to 4); eye distinctly elliptical; rostrum slightly tapering, nasal plate feeble, mandibles thick, not, or feebly, subangulate on mesal edge above, support slightly elevated, scar facing forward or somewhat laterad; scape slightly exceeding eye, funicular segment 1 at least as long as 2. Prothorax broadly rounded laterally, hind angles in side view feeble; pronotum even, fore margin rounded, basal margin subtruncate, sometimes faintly prominent laterally, vestiture on median portion directed caudad, on sides directed transversely. Scutellum small, glabrous. Elytra with puncture row 10 obsolete medially, humeri subobsolete, basal margin of conjoined elytra broadly and feebly emarginate, not prominent. Body beneath and legs scaly and setose,

abdominal vestiture not sparser medially, intercoxal piece about as wide as a hind coxa, sternite 3 equal to or a trifle longer than 4, the surface of each longitudinally subplanate; metepisternum distinct, elongate; mesepisternum without well defined, smooth, polished, glabrous spot. Fore coxae large; corbel plate scaly, rather narrow, dorsal comb longer than distal comb (fig. 2, *G*). Spermatheca slightly produced basally (fig. 4, *F*).

*Type of subgenus.*—*Naupactus taeniatus* Berg.

*Atrichonotus* is similar to *Graphognathus* in the large fore coxae, thick rostrum, thick mandible with feebly prominent support, and in the general shape of the eye, prothorax, elytra, and spermatheca. *Atrichonotus*, however, lacks the mandibular sulcus and the conspicuous dorsal setae of *Graphognathus*, and differs also in the shorter second funicular segment, squamose corbel plate, and longer dorsal comb, and in the even distribution of vestiture on the abdominal sternites.

(3) PANTOMORUS (ATRICHONOTUS) TAENIATULUS (Berg), new combination

(Figs. 2, *G*, *N*, *Q*; 4, *F*; 5, *A*)

*Naupactus taeniatus* Berg, Stettin. Ent. Ztg. 42: 61, 1881; Berg, (Argentine Republic) Comisión Científica de la Expedición al Río Negro 1879, Informe Oficial, p. 105, pl. 2, fig. 16, 1881.

*Artipus texanus* Pierce, Ent. Soc. Wash. Proc. 13: 49, 1911. (New synonymy.)

Length 4.5–6.5 mm. Usually pale brownish gray, some of the scales with a faint cupreous, bluish, or opalescent tinge, flanks of elytra often more or less distinctly ochreous, the elytra and pronotum sometimes with irregular, blackish vittae, the vittate specimens with scales on dorsum of head and rostrum brown to blackish. Scales small, dense, partially obscuring puncture rows on elytra. Dorsal setae prostrate or nearly so except near apex of rostrum and of elytron, where they are inclined.

Rostrum above with median groove narrow and little or not widened apically, subapical area not impressed, nasal plate feeble, scales around eye paler. Prothorax slightly wider than long, sides usually with a slight emargination very near base; pronotum usually without distinct markings, but sometimes with three broad, brownish to blackish vittae, surface nearly flat in profile, median groove feeble or absent, punctures (with scales removed) fine, shallow, and irregularly spaced on disk, the sculpture becoming somewhat rugose laterally. Conjoined elytra broadly, feebly emarginate at base, intervals slightly convex, color uniform or nearly so in most specimens, but in a few the scales are brownish to blackish in a broad, common sutural vitta, and in a sublateral vitta which is usually broadest basally and confined chiefly to intervals 5 and 6, the vittae extremely variable in width and distinctness, their margins here and there more or less deeply indented by the encroachment of patches of pale scales, the lateral vittae occasionally much wider than usual, diffuse, and much broken, and giving the general surface a variegated appearance; traces of the vittae, especially toward base of elytron, present in some specimens, which are otherwise almost uniformly gray. Anterior tibia as a rule with only about five slender spines, between which are usually several denticulations; corbel plate wider in the larger specimens, narrower in the smaller ones.

*Type locality.*—Of *taeniatus*, Argentina (Buenos Aires and Río Colorado); of *texanus*, Texas (Victoria).

*Distribution.*—UNITED STATES: Florida (Pensacola); Alabama (Florala, Tuscaloosa); Mississippi (Wiggins, Lucedale, specimen from the latter in H. C. Fall collection); Texas (Victoria). SOUTH AMERICA: Argentina (Buenos Aires, Río Colorado, San Pedro).

*Type.*—Of *taeniatus*, location doubtful; of *texanus*, a female in the United States National Museum, No. 13546.

The small size, dense scaly coating, absence of erect setae on dorsum, and subequal funicular segments 1 and 2 are distinctive fea-

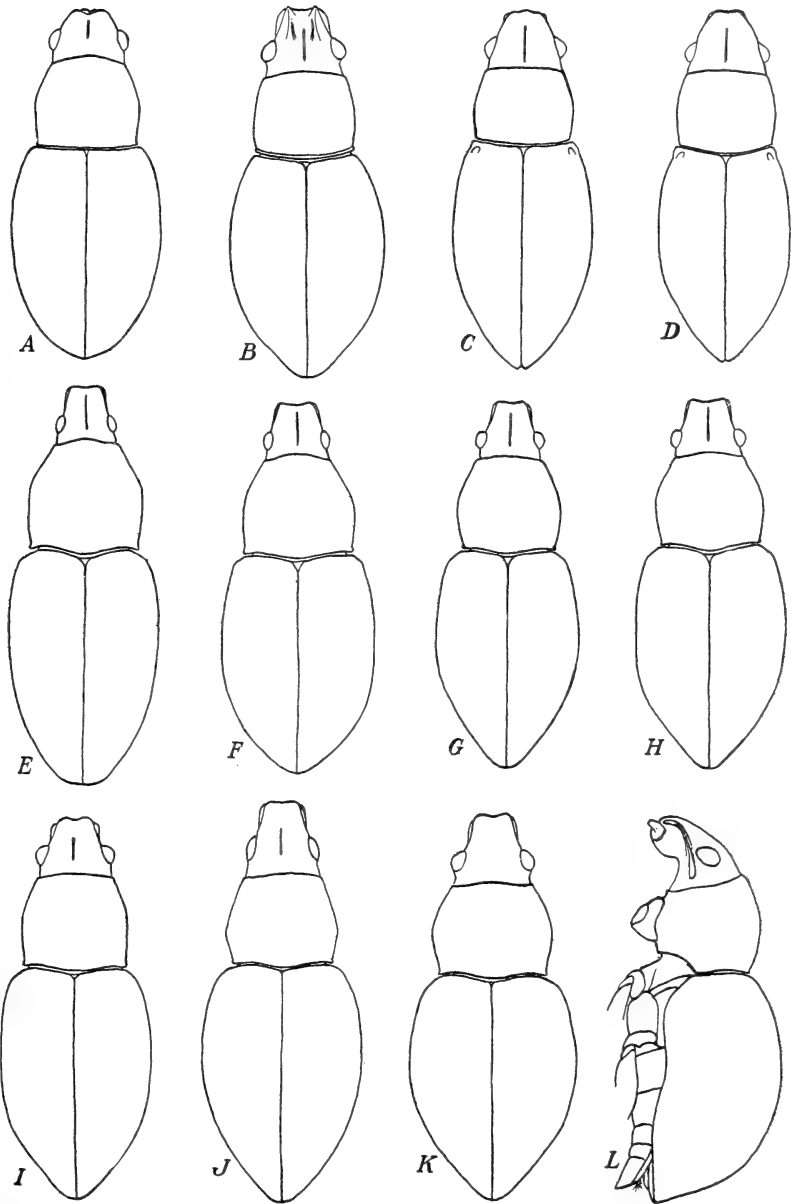


FIGURE 5.—A, Dorsal outline view of *Pantomorus taeniatulus*; B, same of *P. godmani*; C, same of *P. pallidus*; D, same of *P. tessellatus*; E, same of *P. candidus* (male); F, same of *P. candidus* (female); G, same of *P. planitatus* (male); H, same of *P. planitatus* (female); I, same of *P. elegans* (female); J, same of *P. eximius* (female); K, same of *P. viridis* (female); L, lateral outline view of *P. viridis* (female). (Drawings by E. A. Carlin.)

tures of this species. The apical portion of the spermatheca varies considerably in length and curvature, the one figured (fig. 4, *F*) being probably of about average shape.

The 90 specimens of *taeniatus* examined are all females and it is probable that the species is parthenogenetic. Most of the specimens were collected in September, a few in August and November. A specimen from Pensacola, Fla., was collected on beggarweed, and several from Wiggins, Miss., on goatweed.

In the material at hand are two specimens from Buenos Aires, and one from San Pedro, Argentina. These are of the vittate form and, though they do not agree very well with Berg's description of *taeniatus*, they are very similar to his figure, and the writer believes that they belong to this species. As indicated above, most of the United States specimens are nearly immaculate, or at most indistinctly vittate. Both vittate and nonvittate specimens were collected at Pensacola, Fla., in 1937.

The type specimen of *texanus* was collected in 1906, the paratype in 1907. Unless there have been subsequent introductions, *taeniatus* has therefore been present in this country for at least 32 years.

#### Subgenus ASYNONYCHUS Crotch

*Asynonychus* Crotch, Zool. Soc. London Proc. 1867: 388; Champion, Ent. Mo. Mag. 58: 162, 1922; Leng, Catalogue of the Coleoptera of America North of Mexico Sup. 1, p. 47, 1927; Bradley, Bull. Brooklyn Ent. Soc. 25: 262, 1930.

*Aramigus* Horn, Amer. Phil. Soc. Proc. 15: 93, 1876; Henshaw, List of the Coleoptera of America, North of Mexico, p. 135, 1885; Sharp, Biologia Centrali-Americana, v. 4, pt. 3, p. 167, 1891; Champion, *ibid.*, pp. 232, 333, 334, 1911; Pierce, Jour. Econ. Ent. 3: 361, 1910; Pierce, U. S. Natl. Mus. Proc. 45: 416, 1913.

*Aomopactus* Jekel, Amer. Phil. Soc. Proc. 15: 94, 1876, footnote.

Moderately to densely scaly. Head broad, eyes strongly convex and elliptical to subcircular, interocular distance a little greater than length of rostrum; rostrum not so thick as in preceding subgenera, feebly to distinctly tapering; median groove exceeding eyes, support on mandible slightly to strongly elevated, scape passing eye, funicular segment 2 longer than 1. Prothorax with sides feebly rounded, base of pronotum not bisinuate. Scutellum small to obsolete, vestiture sparse, fine. Elytron with base feebly, sometimes scarcely, thickened, humeri subobsolete. Angular piece between posterior margins of fore coxae frequently elevated. Sternite 5 of abdomen without transverse groove next to apical margin. Fore tibia feebly curved apically; corbel plate narrow or absent, dorsal comb equal to or longer than distal comb. (fig. 2, *H, I*). Spermatheca greatly elongated basally (fig. 4, *A, B, C*).

*Type*.—Of *Asynonychus*, *A. godmani* Crotch, monobasic; of *Aramigus*, *Liparus tessellatus* (sic) Say, designated by Pierce, 1913, p. 416; of *Aomopactus*, *Liparus tessellatus* Say, by present designation.

The similarity of the remarkable spermathecae of *Asynonychus* and *Aramigus* seems to indicate fundamental relationship, and it is chiefly on the strength of this likeness that the two groups are here synonymized. They differ considerably in several other respects.

#### KEY TO GROUPS AND SPECIES OF ASYNONYCHUS

1. Derm brownish to piceous, not entirely covered by the scales; rostrum scarcely tapering, latero-marginal carina distinct, intercarinal area concave; mandibles with supports prominent, one or both scars facing obliquely mesad, left mandible not toothed on mesal edge above; scape exceeding eye by length of first funicular segment; puncture row 10 of elytron complete; vestiture on abdominal sternites ab-

ruptly finer and sparser in a broad, median stripe, intercoxal piece as wide as hind coxa; corbel plate absent or virtually so (fig. 2, *H*) duct of spermatheca membranous

(*Asynonychus* proper)—(4) *godmani* (Crotch) (p. 19)

Derm black, covered by a dense coating of gray or gray and brownish scales; rostrum obviously tapering, latero-marginal carina feeble, intercarinal area not concave; mandibles with supports shorter, scars facing approximately forward, left mandible obtusely toothed on mesal edge above; scape exceeding eye by distinctly less than length of first funicular segment; puncture row 10 of elytron obsolete medially; vestiture on abdominal sternites subevenly distributed, intercoxal piece plainly narrower than hind coxa; corbel plate present, squamose (fig. 2, *I*); duct of spermatheca sclerotized. (*Aramigus* of Horn)

2

2. Length 5–6.5 mm; usually mottled with brown; prothoracic to elytral length about as 1 to 2.6; elytron feebly or not impressed just mesad of humeral angle; apical margin of abdominal sternite 5 subtruncate (fig. 3, *H*)

Length 6.5–8 mm; not brownish mottled, usually subuniformly gray; prothoracic to elytral length about as 1 to 3; elytron with a usually distinct impression just mesad of humeral angle; apical margin of abdominal sternite 5 rounded or subacuminate, often with a small lobe at middle (fig. 3, *I*)

(4) PANTOMORUS (ASYNONYCHUS) GODMANI (Crotch)

(Figs. 2, *H*, *M*, *R*; 4, *C*; 5, *B*)

*Asynonychus godmani* Crotch, Zool. Soc. London Proc. 1867; 389, pl. xxiii; Leng, Catalogue of the Coleoptera of America North of Mexico, Sup. 1, p. 47, 1927.

*Aramigus fulleri* Horn, Amer. Phil. Soc. Proc. 15: 94, 1876; Horn, Canad. Ent. 16: 184, 1884 (early occurrence in United States); Harrington, Canad. Ent. 23: 23, 1891 (local outbreak in Canada); Schwarz, Ent. Soc. Wash. Proc. 3: 145, 1895 (note on history in U. S.); Chittenden, U. S. Div. Ent. Bull. (n. s.) 27: 88–96, fig. 24, 1901; Koebele, U. S. Div. Ent. Bull. (n. s.), 30: 88–90, 1901; Pierce, Nebr. State Bd. Agr. Ann. Rept. 1907: 255; Solari, Boll. Soc. Ent. Ital. 40: 268, 1908 (occurrence in Italy and elsewhere); Pierce, Jour. Econ. Ent. 3: 361, 1910.

*Pantomorus olindae* Perkins, Fauna Hawaïensis, v. 2, pt. 3, p. 130, 1900.

*Pantomorus fulleri* (Horn), Perkins, Fauna Hawaïensis, v. 3, pt. 6, p. 653, 1910; *ibid.*, v. 1, pt. 6 (prefatory section), p. cxx, 1913; Champion, Biologia Centrali-Americana, v. 4, pt. 3, p. 333, 1889–1911 (1911); Pierce, U. S. Natl. Mus. Proc. 45: 417, 1913; Blatchley and Leng, Rhynchophora of North Eastern America, pp. 124, 125, fig. 49, 1916; Aurivillius, Coleoptera-Curculionidae, Natural History of Juan Fernandez and Easter Island, ed. by C. Skottsberg, v. 3, p. 463, 1926 (literature); Tanner, Amer. Ent. Soc. Trans. 53: 34, pl. 13, figs. 179–180, 1927 (♀ genitalia).

*Pantomorus godmani* (Crotch), Hustache, Bull. Soc. Ent. France 1922: 100; Champion, Ent. Mo. Mag. 58: 161, 1922; Essig, Insects of Western North America, p. 491, 1926; Clerc, Bull. Soc. Ent. France 1928: 290; Bradley, Bull. Brooklyn Ent. Soc. 25: 261, 1930; Barrett, Calif. Univ. Pubs., Ent. 5: 90–91, figs. 1, 7, 13, 19, 1930; Lockwood and Keifer, Calif. Dept. Agr. Monthly Bull. 19: 29, pl. 1, figs. 6, 6 b, and pl. 3, fig. 23, 1930 (chiefly on larva); Essig, A History of Entomology, pp. 173–177, figs. 69–70, 1931; Ting, Microentomology, 1: 95, 98, 99, 102, figs. 76, 81, 1936 (mouth parts).

"*Naupactus ovulum* Jek. in litt." (Hustache, Bull. Soc. Ent. France 1922: 100). "*?Naupactus subvittatus* Fairm. and Germain, Coleoptera Chilensia, II, 1861, p. 7." (Hustache, *ibid.*). As pointed out farther on, the description of *subvittatus* F. and G. does not seem to fit *godmani*.

Most of the references in economic literature are omitted; they can be consulted in Colcord's index and in the Junk Catalog.

Length 6–8.5 mm. Derm brownish to piceous, scales brownish to gray and not entirely covering surface, prevailing color a nearly uniform brown, brownish tan, or brownish gray; scales on sides of pronotum larger and denser than

those on elytra; elytron normally with a medio-lateral patch of whitish scales and a spot of similar scales on humerus; opposite humerus on prothorax an incomplete whitish vitta that usually consists of a short stripe in basal third and a spot at about apical third; flank of elytron a little paler than dorsum; dorsal setae mostly prostrate except on apical half of elytron.

Rostrum and head together arcuate in profile, nasal plate distinct, median groove not quite reaching vertex, vertex slightly prominent; funicular segment 2 longer than 1 (about 4 to 3). Prothorax wider than long, hind margin broadly subangulate opposite elytral humerus, side margin slightly emarginate near base; pronotum medially with the vestiture finer and the sculpture irregularly punctiform or subrugose, laterally with broader scales and coarser, rugose sculpture, the median groove fine and shallow, prebasal transverse groove shallow but usually distinct except medially. Conjoined elytra ovate, basal margin broadly emarginate and usually slightly thickened, at least laterally, humerus subobsolete, side margin sometimes with a shallow, posthumeral emargination; intervals subplanate, alternate ones on declivity each with a row of rather widely spaced, stout, suberect, yellowish brown to whitish setae; vestiture on intervals 6 and 7 darker than elsewhere, often forming an inconspicuous vitta which is interrupted about middle by a short, oblique bar of broader, paler to whitish scales, the bar beginning on interval 5 and extending obliquely forward to interval 7, where it is broader. Abdomen beneath transversely aciculate basally; anterior half of metepisternum (except dilated apex) glabrous or subglabrous, the suture visible opposite the glabrous portion; glabrous area on mesepisternum variable in size, shagreened (not polished as in *Graphognathus*); femoral vestiture prostrate or subprostrate. Fore tibia with 7 to 9 denticulations, which are stouter and longer than in *tessellatus*; mucro on middle tibia minute, probably sometimes absent; corbel plate absent or extremely narrow, dorsal comb about as long as distal.

*Type locality*.—Of *godmani*, Fayal, Azores Islands; of *fulleri*, New Jersey to Montana, U. S. A.; of *olindae*, Oahu and Maui, Hawaii.

*Distribution* (partly from literature records).—CANADA (southern). UNITED STATES (general, but chiefly in the South Atlantic States and in California); MEXICO (Guanajuato); SOUTH AMERICA (Brazil, Chile, Paraguay, Argentina); AFRICA (Morocco, Transvaal); AZORES ISLANDS; ITALY; FRANCE; SPAIN; AUSTRALIA (New South Wales); HAWAII; POLYNESIA (Easter Island, "Rikiteu" Island).

*Type*.—Of *fulleri*, lectotype 2833, Pennsylvania, in Horn collection at Philadelphia; of *godmani* and *olindae*, not ascertained, but former probably in British Museum, latter in British Museum or in Perkins collection.

*Pantomorus godmani*, commonly known as Fuller's rose beetle, feeds on a great variety of plants, shrubs, and trees. It is often a pest in greenhouses, where, once established, it is capable of doing much damage, the adults eating and cutting off leaves, the larvae feeding underground on roots. The species can maintain itself out of doors as far north as Michigan, though apparently the warmer sections of the country are better suited for its development. The original home of *godmani* remains uncertain, but probably is South America.

The fact that no male was found among the approximately 500 specimens of *godmani* at hand suggested parthenogenesis, but Floyd F. Smith, of this Bureau, was the first to learn by rearing experiments that the species actually is parthenogenetic. The results of Dr. Smith's investigation on the biology of *godmani* are still unpublished, but he has kindly permitted the inclusion here of a statement of his interesting discovery. During 1927 to 1929 Smith reared *godmani* through four generations of virgin females and also dissected more

than 1,200 adults, from Massachusetts, Pennsylvania, Virginia, North Carolina, and California, all of which proved to be females.

In some specimens the mandible has a faint, incomplete sulcus which, however, is hardly comparable with the structure found in *Graphognathus*. When the abdomen is detached the lateral margins, at least apically, are seen to be minutely, irregularly serrulate, a feature not observed in any other *Pantomorus* treated here. The prevailing color is sometimes subuniformly slaty gray, but usually is brownish. In most specimens the triangular piece between the hind margins of fore coxae is more or less completely fused with the postcoxal surface, but occasionally this piece is set off by a deep groove posteriorly.

*Pantomorus godmani* is easy to recognize by the marked concavity on the rostrum between the distinct latero-marginal carinae, the prominent, obliquely truncate supports on the mandibles, the long scape, the sublateral, whitish patch on the elytron, and the absence of erect setae on the disk, but their presence on the alternate intervals on the declivity of the elytron. The spermatheca varies considerably in curvature and in the size and shape of the submedian hump.

In American literature the generic name *Aramigus* was used for *godmani* from 1876 to about 1914, although as early as 1901 both Koebele and Chittenden alluded to its specific identity with the Hawaiian *Pantomorus olindae* Perkins. In 1910 Perkins pointed out that *Aramigus* apparently is not generically distinct from *Pantomorus*, and about 1915 the combination *Pantomorus fulleri* came into general use in North America. In 1922 Hustache announced the chief synonymy for the species and suggested that *godmani* might be a synonym of the South American *Naupactus subvittatus* Fairmaire and Germain; and in the same year Champion verified the synonymy given by Hustache. *Naupactus subvittatus* F. and G., 1861, was described in a paper now difficult to obtain (Coleoptera Chilensia, à L. Fairmaire et P. Germain, descripta, II Paris, 1861) and the short original description is therefore quoted below.

*Naupactus subvittatus*.—Long. 7 à 10 mill.—Ovatus, convexus, fuscus, griseo aut flavo-farinosus, prothorace vittis 2 vagis, elytris vitta dorsali, saepe interrupta, albidis, prothorace convexo, medio tenuiter sulcato, elytris ovoideis, convexis, basi prothorace haud latioribus, substriato-punctatis, interstitiis leviter convexis, pilosulis; subtus cnm (sic) pedibus griseo-farinosus, antennis fuscis, griseo-squamosis.

The presence of a dorsal white vitta on the elytron and of pilosity on the elytral intervals of *subvittatus* seems to eliminate all probability that *godmani* is a synonym. The specific name *subvittatus* F. and G., 1861, is a homonym of *subvittatus* Boh., 1840, and has been changed to *subvittulus* by Van Emden (Coleopterorum Catalogus, pt. 147, p. 23, 1936).

(5) PANTOMORUS (ASYNONYCHUS) TESSELLATUS (Say)

(Figs. 4, A ; 5, D)

*Liparus tessellatus* Say, Jour. Acad. Nat. Sci. Phila. (1) 3: 318, 1824.

*Thylacites (Strophosomus) tessellatus* (Say), Descriptions of New Species of Curculionides of North America, etc., p. 9, 1831, New Harmony, Ind.

*Phyllobius sublineatus* Dejean, Catalogue des Coléoptères, ed. 3, p. 289, 1837. (Manuscript name.)

- ? *Naupactus durius* Boheman (not *Sitona durius* Germ., 1824), Schoenherr, Genera et Species Curculionidum, v. 6, pt. 1, p. 27, 1840.
- Strophosomus* ? *tessellatus* (Say), Melsheimer, Catalogue of the Described Coleoptera of the United States, p. 97, 1853.
- Ophryastes tessellatus* (Say), Gemminger and Harold, Catalogus Coleopterorum, v. 8, p. 2317, 1871.
- Aomopactus tessellatus* (Say) = "*N. durius* Germ.", (?) Jekel, quoted from letter of Jekel by Horn, Amer. Phil. Soc. Proc. 15: 94, footnote, 1876. (This probably refers to *pallidus*.)
- Aramigus tessellatus* (Say), Horn, Amer. Phil. Soc. Proc. 15: 93, 1876; Henshaw, List of the Coleoptera of America North of Mexico, p. 135, 1885; Pierce, Nebr. State Bd. Agr. Ann. Rept. 1907: 255; Pierce, U. S. Natl. Mus. Proc. 37: 361, 1909; Pierce, Ent. Soc. Wash. Proc. 13: 49, 1911.
- ? *Phaeopholis candida* Horn, Hart, Ill. State Lab. Nat. Hist. Bull. 7: 248, 265, 1907.
- Pantomorus tessellatus* (Say), Pierce, U. S. Natl. Mus. Proc. 45: 417, 1913; Leng, Catalogue of the Coleoptera of America North of Mexico, p. 314, 1920; Dalla Torre, Emden, and Emden, Coleopterorum Catalogus, pt. 147, p. 28, 1936.
- Pantomorus tessellatus* (Say), Blatchley and Leng, Rhynchophora of North Eastern America, p. 124, 1916.

Length 5-6.5 mm. Densely scaly, usually brown or tan with slightly golden luster, occasionally mostly gray, the pronotum with a very broad but indefinite median stripe, and a narrower lateral stripe, brownish, and a pale to whitish stripe on flank opposite elytral humerus. Elytra with sutural brownish stripe, at least basally, and usually with some indefinite and irregular brownish mottlings which are more pronounced laterally, sometimes largely brownish with a paler, longitudinal area on disk of each elytron; scales paler and denser and forming a short basal, and a longer apical, stripe on interval 9, and a rather conspicuous lateral stripe opposite abdominal sternites 1 and 2.

Head broad, vertex not prominent, setae subprostrate; eye very prominent, scales around eye and on side of rostrum below scrobe paler than those on dorsum; rostrum strongly tapering, above with forwardly inclined setae, median groove sharply defined and not, or slightly, widened anteriorly, nasal plate feeble, mandibles each with a fine carina from lower, mesal edge of scar to lower edge of mandible; scape slightly passing eye. Prothorax with sides broadly, feebly rounded, hind margin in side view scarcely angulate opposite elytral humerus; pronotum with median groove obsolete, basal margin broadly rounded. Scutellum broadly to narrowly triangular, glabrous. Conjoined elytra feebly emarginate basally, surface with a slight thickening or prominence at humerus so that side of elytron has a feeble posthumeral emargination (fig. 5, D); puncture rows 1 to 4, especially row 2, more or less bent laterad near base; intervals flat to feebly convex, each with a confused double or triple row of setae which are subprostrate and indistinct on disk but inclined to suberect on declivity, those on interval 1 a little longer and more crowded than elsewhere; interval 1 usually slightly prominent. Under side and legs rather finely setose and densely scaly; metepisternum long, its suture usually obscured by scales medially. Denticulations on fore tibia unusually slender and short, mucro on middle tibia minute, corbel plate narrow, the dorsal comb longer than distal. Spermatheca contorted and greatly elongated (fig. 4, A).

*Type locality*.—Missouri (banks of the Mississippi River and lower part of the Missouri River).

*Distribution*.—Illinois (Nashville); Missouri (Charleston, one specimen reared from *Elymus virginicus*, Virginia wild-rye, by A. F. Satterthwait), Scott County, "On beans," L. Haseman); Oklahoma (Atoka); Arkansas (labeled "*Phyllobius sublineatus* Dej. C."); Kansas.

*Type*.—Not extant.

Twenty-two specimens seen, all females, most of them undated; a few are dated April, June, and August.

Of the references given in the synonymy, those from 1885 to 1936, beginning with the Henshaw list, are composite in that they refer, in



part, to what Horn described as variety *pallidus* of *tessellatus*; *pallidus* is here treated as a distinct species. Data on the possible South American origin of *tessellatus* are given in the discussion of *pallidus*.

(6) PANTOMORUS (ASYNONYCHUS) PALLIDUS (Horn)

(Figs. 2, I, L, O; 3, I; 4, B; 5, C)

? *Naupactus durius* Boheman, in Schoenherr, Genera et Species Curculionidum, v. 6, pt. 1, p. 27, 1840. (Not *Sitona durius* Germar, 1824.)

*Aramigus tessellatus* var. *pallidus* Horn, Amer. Phil. Soc. Proc. 15: 94, 1876.

? *Sitona durius* Germar, quoted from letter of Pascoe by Horn, *ibid.*, p. 94.

*Aomopactus tessellatus* (Say) = "N. durius Germ." (?), quoted from letter of Jekel by Horn, *ibid.*, p. 94, footnote. (The name *tessellatus* only was mentioned by Jekel, but the context indicates that the species was *pallidus*.)

? *Phaeopholis candida* Horn, Hart, Ill., State Lab. Nat. Hist. Bull. 7: 248, 265, 1907.

*Pantomorus tessellatus* var. *pallidus* (Horn), Blatchley and Leng, Rhynchophora of North Eastern America, p. 124, 1916.

*Pantomorus tessellatus* var. *pallidus* (Horn), Dalla Torre, Emden, and Emden, Coleopterorum Catalogus, pt. 147, p. 29, 1936.

As stated under *tessellatus*, some of the references under that name refer, in part, to *pallidus*.

Length 6.5–8 mm. General color gray, sometimes grayish green, pale tan, or feebly coppery, occasionally with feeble violet tinge. Pronotum usually with a tan to fuscous lateral stripe (partly the result of the black derm showing through the sparser scales), and often with a very indefinite, median, darker area; median groove absent or nearly so. Elytron with lateral stripe of dense, pale scales opposite abdominal sternites 1 and 2. Elytral striae 5 and 6 subapproximate basally in a slight but usually distinct impression just mesad of humerus. Apical margin of abdominal sternite 5 usually with a faint emargination each side of a small, median lobe (fig. 3, I). Spermatheca (fig. 4, B) slightly different in shape from that of *tessellatus*. Otherwise, and except as noted in key, like *tessellatus*.

*Type locality* (restricted).—Oklahoma.

*Distribution*.—Illinois (Forest City, Havana); Iowa (Pottawattamie County); Nebraska (Westpoint); Kansas (Topeka, Salina, Garnett, McPherson, Ottawa, Medora, Wellington, Riley County, Clay County, Gove County, Reno County, Sedgwick County); Colorado; Arkansas; Oklahoma (Ardmore, Atoka, Anadarko, Oklahoma City, Wewoka); Texas (Austin, Calvert, Dallas, Fuller, Gainesville, Weatherford, Brewster County); New Mexico (Albuquerque).

*Lectotype*.—One of the four specimens labeled "I. T" in the Horn collection at Philadelphia.

Horn described *pallidus* as from "Kansas to Texas", and placed it as a color variety of *tessellatus*. He apparently considered *pallidus* a very weak form, scarcely deserving a name, as none of the 16 specimens in the Horn collection at Philadelphia bears a name label. E. T. Cresson has informed the writer that one of the "I. T" = (Oklahoma) specimens will be labeled lectotype. Since its description in 1876, *pallidus* was almost lost sight of in the literature, evidently because it was thought to be a mere color phase of *tessellatus*, and it is still labeled *tessellatus* in collections.

About 180 specimens were examined, all females. The species is probably parthenogenetic. According to pin-label data on some of the specimens, *pallidus* has been collected on *Sideranthus rubiginosus* and *Galpinsia hartwegi* in Oklahoma, and on *Monarda*, tomato plant, and Johnson grass in Texas. Collecting dates range from

May to August, May and June apparently being the period of greatest abundance.

The possibility that both *tessellatus* and *pallidus* are South American species was first brought to notice in 1876 when Horn, who had sent specimens of *pallidus* to Pascoe and specimens, probably of *pallidus*, to Jekel, states (Amer. Phil. Soc. Proc. 15: 94) that Pascoe thought the species might be "*Sitona durius* Germ." and that Jekel considered it very close to "*N. [aupactus] durius* Germ. from Brazil."

The specific name *durius* is the center of a nomenclatorial tangle which involves *pallidus* and *tessellatus*. The chief facts are as follows:

1824. *Sitona durius* Germar, Insectorum Species Novae, v. 1, p. 417. Type locality, Buenos Aires. Original description.
1833. *Naupactus durius* (Germar), Schoenherr, Genera et Species Curculionidum, v. 1, pt. 2, p. 581. A two-line excerpt from Germar's original description, referring back to Germar's 1824 paper; it is not based on a study of specimens and is not signed by Boheman, being in effect no more than a notice of the transfer of *Sitona durius* Germar to the genus *Naupactus*.
1840. *Naupactus durius*, Boheman, not Germar, in Schoenherr, Genera et Species Curculionidum, v. 6, pt. 1, p. 27. A somewhat longer description, signed by Boheman, and citing the Schoenherr 1833 reference in synonymy, but based at least in part, on a study of specimens. To the Buenos Aires type locality is added Brazil.
1876. *Sitona durius* Germar, Argentina; Horn, teste Pascoe. (See above.)
1876. "*N. [aupactus] durius* Germar", Brazil; Horn, teste Jekel. (See above.)
1879. *Eurymetopus durius* (Germar), Chevrolat, Bull. Soc. Ent. France, p. cxxx. Chevrolat, though presumably possessing specimens which he thought represented *durius* Germar, did not describe them, but proposed the transfer of *Naupactus durius* Germar, 1824, to the genus *Eurymetopus*.
1934. Voss, Sbornik Ent. Oddel. Nar. Mus. Praze 12: 64, footnote, states that there are apparently typical specimens of Germar's 1824 *durius* in the Zoological Museum of Berlin, and that three species have been confused under this name. Voss assigns these species as follows:
1. *Pseudeudius* Voss, 1934, (n. gen., *ibid.*, p. 72) *durius* (Germar) (*Tanymecinae*)=(*Sitona durius* Germar, 1824)=(*Polydrusus vitiginosus* Germ.)=(? *Entyus nebulosus* Gyll., 1834).
  2. *Aramigus tessellatus* Say var. *pallidus* Horn. Voss mentions Pascoe's belief that *pallidus* might be the same as *Sitona durius* Germ., but gives no further suggestions as to the status or generic placement of *tessellatus* and *pallidus*. If Voss' interpretation of *durius* Germar is correct, both Boheman, 1840, and Pascoe, 1876, had misidentified the species.
  3. *Eurymetopus chevrolati* Voss, 1934 (new name, *ibid.*, p. 64)=(*Eurymetopus durius* Chevrolat, 1879, not *Sitona durius* Germ., 1824). The name *chevrolati* Voss is a nomen nudum.
1936. Dalla Torre, Emden, and Emden, Coleopterorum Catalogus, pt. 147, p. 19, list "*Naupactus durius* Boh., not *Sitona durius* Germ.," and date "*durius* Boh." as of 1833. The 1833 treatment of *durius*, however, is purely literary (see 1833 reference above) and the citation "*Naupactus durius* Schoenherr 1833, not *Sitona durius* Germar 1824" seems properly to belong in the synonymy of *Pseudeudius durius* (Germar) 1824. Boheman did not sign the *durius* description of 1833, which may therefore be credited to Schoenherr. Boheman's description of "*durius* Germ.," in 1840, p. 27, was based largely on specimens, and evidently refers to a species of the *Pantomorus-Naupactus* complex, certainly not to the *durius* Germar of Voss, this species belonging to another subfamily of Curculionidae (*Tanymecinae*). *Naupactus durius* Boheman 1840, p. 27, not *durius* Germar, 1824, Schoenherr, 1833, will need a new name unless Boheman's specimens prove to belong to *tessellatus* (Say), 1824, or to some other named species. This matter can be settled definitely only by a restudy of Boheman's specimens of "*durius*."

The National Museum collection contains one specimen from Argentina labeled "*Pantomorus durius* Germ.," and one specimen from Brazil labeled "*Naupactus durius* Sch." These seem to represent two very closely allied species, one or

both of which probably typify Boheman's 1840 incorrect interpretation of *durius* Germar. Both specimens have abdominal sternite 5 about as in *tessellatus*, but it is not altogether certain that either actually belongs to this species, though the writer believes that both *tessellatus* and *pallidus* are indigenous to South America. Pending a study of the entire group, the names *tessellatus* (Say) and *pallidus* (Horn) should be retained for the two species inhabiting the United States; their relation with the South American fauna may eventually become clear by the accumulation of data and of adequate series of specimens.

#### Subgenus PHACEPHOLIS Horn

*Phacepholis* Horn, Amer. Phil. Soc. Proc. 15: 95, 1876; Henshaw, List of the Coleoptera of America North of Mexico, p. 135, 1885; Pierce, U. S. Natl. Mus. Proc. 37: 361, 1909; Pierce, Jour. Econ. Ent. 3: 363, 1910; Champion, Biologia Centrali-Americana, v. 4, pt. 3, p. 333, 1911; Pierce, U. S. Natl. Mus. Proc. 45: 416, 1913.

Scaly and setose, scales sometimes metallic, setae erect; head often slightly constricted behind eyes, subplanate between eyes, eye rounded to elliptical and feebly to strongly prominent; rostrum continuous with front in profile, above with the median groove reaching or slightly exceeding hind margin of eye, latero-marginal carina feeble to rather strong, nasal plate feeble to obsolescent, support on mandible prominent, scar usually facing obliquely mesad; scape reaching about to or slightly beyond hind margin of eye, funicular segment 2 usually longer than 1, sometimes subequal to it. Prothorax more strongly narrowed apically than in the preceding subgenera, hind margin more or less angulate opposite elytral humerus; pronotum feebly to strongly convex longitudinally, median groove usually present though often feeble, sculpture coarse, usually rugo-verrucose, scales sometimes arranged in radial clusters on the elevations (fig. 3, *L*), each cluster surrounding a seta, basal margin subtruncate to moderately bisinuate, basal groove usually present. Scutellum obsolescent to fairly large. Elytron with 10 puncture rows, humerus rounded to slightly angulate, basal margin not, or feebly and broadly, prominent, setae rarely uniseriate, usually irregularly triseriate, on each interval, and of different lengths, the longer ones along middle of interval, the setae on interval 1 averaging longer than elsewhere, scales on lateral interval usually paler and denser than on adjacent surface and forming a more or less distinct vitta. Metepisternal suture present, sometimes partly obscured by scales; abdomen with intercoxal piece much narrower than a hind coxa, sternite 2 of male usually with a short, transverse, postmedian row of denticulations (fig. 3, *B*), sternite 5 of male flattened apically, and longer and more broadly rounded than in female (fig. 3, *B, E*). Forelegs not, or slightly, elongated in male, at least fore tibia distinctly denticulate, middle tibia frequently, hind tibia sometimes, with a few smaller denticles; corbel plate rather broad, squamose (setose in *eximius*), dorsal comb short (fig. 2, *J*). Spermatheca (fig. 4, *G, H*) rather feebly sclerotized and subject to considerable individual variation; internal sac of male enormously enlarged but without conspicuous sclerotizations (fig. 4, *I*).

*Type of subgenus.*—*Phacepholis elegans* Horn, designated by Pierce, 1913, p. 416.

The species of *Phacepholis* inhabit the Great Plains region from Illinois to Montana and southward to southern Texas.

The well defined, squamose corbel plate and the short dorsal comb distinguish *Phacepholis* from any other subgenus of this group in the United States.

The male, which is known for all the species, can be recognized by the longer and more broadly rounded sternite 5 and in most species by the presence of denticles, or of a feeble transverse ridge, on abdominal sternite 2. In addition, the male often has the body smaller and narrower than in the female, the rostrum more deeply sculptured and a trifle longer, the head more narrowed behind eyes, the prothorax more inflated laterally and larger compared with elytra, the pronotum more strongly convex longitudinally and with its basal

margin more distinctly sinuate, and the tibial denticulations stronger. The impression on abdominal sternite 1 of male is usually rather feeble. These sex differences are often not very obvious, and occasionally are reversed, as in the case of the eye, which, particularly in the *candidus* group, is sometimes more strongly convex in the female.

The extent of variation exhibited by different individuals which appear to belong to the same species, especially in the *elegans* complex, is very great, and far exceeds anything of this nature observed among the parthenogenetic species previously treated.

The species of *Phaecepholis* form two rather indefinite groups, as shown in the key below.

#### KEY TO GROUPS OF PHACEPHOLIS

Dorsal scales feebly to distinctly metallic or iridescent, usually green, occasionally coppery (sometimes dull gray or brown in var. *pallidulus*), those on elytra in general not, or only slightly, overlapping; elytral setae stout to slender, truncate apically, almost always either parallel sided or widened apically, biseriata or triseriata on each interval; humeri rounded; male with abdominal sternites 5 and 1 subequal (fig. 3, *E*), sternite 2 with or without denticles; female with apical margin of abdominal sternite 5 usually narrowly subtruncate, occasionally faintly emarginate (fig. 3, *D*).

*elegans* group (p. 27).

Scales dull, gray to brown, those on elytra usually plainly overlapping at least in places; elytral setae fine, tapering apically (except in *candidus*, in which they are blunt and, on even intervals, uniseriate); humeri often slightly angulate (fig. 5, *E* to *H*); male with abdominal sternite 5 longer than 1 (fig. 3, *B*) and sternite 2 always denticulate; apical margin of sternite 5 of female with a usually distinct, though shallow, emargination limited each side by a minute cusp (fig. 3, *A*)-----*candidus* group (p. 33).

In the female the shape of the apical margin of abdominal sternite 5 is sometimes difficult to perceive except at a favorable angle and until the pubescence that fringes the margin has been partially removed.

In addition to the characters mentioned, the *elegans* group has the general vestiture less dense than in the *candidus* group, the individual scales on elytra often much smaller and appearing convex, the prothorax usually less produced forward above and with its basal angle in side view averaging a little more prominent, the scutellum small to obsolescent and bare or setose, the abdominal sculpture, especially on sternites 3 to 5, rougher, the denticles on male sternite 2, when present, smaller, and the denticulations on hind tibia minute to absent in both sexes.

The *elegans* group consists of a complex of forms found chiefly between the ninety-fifth and one-hundredth meridians from South Dakota to extreme southern Texas. In the material studied the following four fairly distinct units are recognizable: 1, *elegans* proper, from South Dakota to Victoria, Tex., with westward extension indicated by a few specimens from Colorado and Nevada, and one from California, the last locality possibly erroneous; 2, *viridis*, from San Antonio; 3, *eximius* from San Diego, and 4, *pallidulus*, from Victoria to Brownsville, all in southern Texas. Specimens from north of Texas, as well as part of the Texan specimens, belong to *elegans* proper, which, although extremely variable, is clearly

different from any of the southern Texas forms; but a good many individuals from central and south-central Texas exhibit various intergrading characteristics tending to bridge the gap between *elegans* and *pallidulus*, and to a lesser extent between *elegans* and *viridis*. From farther south in Texas there are at hand what appear to be annectent specimens between *pallidulus* and *viridis*, and between *viridis* and *eximius*. The fact that *viridis*, *eximius*, and *pallidulus* all inhabit the same general section (San Antonio to Brownsville), in which no effective physical barriers exist, seems to preclude the supposition that they are subspecies, in the geographic sense; nor are host-plant barriers at all likely in a group whose species are as notoriously polyphagous as those in *Pantomorus*. Much of the evidence suggests the existence of four species, or "incipient" species, that interbreed rather freely on the overlapping borders of their ranges, or the three forms from southern Texas may represent tropical infusions whose close relation to *elegans* is more apparent than real. The dividing line between northern Texas and the section south of San Antonio, as shown on soil and vegetation-zone maps, coincides roughly with the line between the range of *elegans* to the north and the ranges of the other three forms to the south, but the significance of this to the present study is not clear. Whatever the true status of these segregates, they should be recognized by names, and they are here arbitrarily designated "varieties." Of these so-called varieties, *eximius* is relatively isolated by its setose corbel plate, and by the slightly longer fifth abdominal sternite and the larger denticles on the second sternite, in the male.

## KEY TO VARIETIES OF ELEGANS

1. Corbel plate densely setose; color above green; abdominal sternite 2 of male denticulate; San Diego  
 (10) *elegans eximius*, new variety (p. 32).
- Corbel plate squamose; color usually green; abdominal sternite 2 of male with or without denticles----- 2
2. Abdominal sternite 2 of male not denticulate; usually with prothorax subparallel basally, body slenderer, elytral setae longer, and elytra unicolorous or nearly so; chiefly South Dakota to Texas  
 (7) *elegans elegans* (Horn) (p. 27).
- Abdominal sternite 2 of male with or without denticles; prothorax narrowed basally, body stouter, setae shorter, at least a lateral vitta on elytron usually present; southern Texas----- 3
3. Color green, rarely gray; elytra basally and pronotum strongly convex longitudinally in both sexes; funicular segment 2 considerably longer than 1; abdominal sternite 2 of male denticulate  
 (8) *elegans viridis* (Pierce) (p. 29).
- Color gray, occasionally green; convexity of pronotum and elytra feeble in female, feeble to strong in male; funicular segment 2 typically only a little longer than 1; sternite 2 of male usually without denticles----- (9) *elegans pallidulus* Emden (p. 31).

## (7) PANTOMORUS (PHACEPHOLIS) ELEGANS ELEGANS (Horn)

(Figs. 2, J, P; 3, D, E; 4, G, N; 5, I)

*Phacepholis elegans* Horn, Amer. Phil. Soc. Proc. 15: 95, 96, 1876; Henshaw, List of the Coleoptera of America North of Mexico, p. 135, 1885; Pierce, U. S. Natl. Mus. Proc. 37: 361, 1909; Pierce, Jour. Econ. Ent. 3: 363, 1910.

*Pantomorus (Phacepholis) elegans* (Horn), Pierce, U. S. Natl. Mus. Proc. 45: 416, 417, 1913.

*Pantomorus (Phacepholis) metallicus* Pierce, U. S. Natl. Mus. Proc. 45: 417, 419, 1913. (New synonymy.)

Length 5-8.2 mm. Usually green, sometimes grayish green, bluish green, or pinkish tan, rarely gray, the scales on head and rostrum often paler than elsewhere on dorsum, those beneath and on legs often pinkish coppery; pronotum with or without a dark or coppery lateral vitta; elytron usually nearly or quite unicolorous, even the pale vitta on lateral interval being indistinct on most specimens.

Head feebly or not constricted behind eyes; eyes feebly to moderately prominent, subrotundate to elliptical; rostrum above usually subplanate between the feeble or obsolescent latero-marginal carinae in female, often more or less impressed between rather strong carinae in male; scape slightly exceeding eyes, funicular segment 2 longer than 1. Prothorax relatively longer than in the other three varieties, sometimes almost as long as wide, though usually plainly wider than long; pronotum usually feebly convex longitudinally, median groove obsolete to fairly well defined, sculpture usually rugo-verrucose, the scales often forming radial clusters on the tubercles, basal margin subtruncate to feebly bisinuate, basal groove usually distinct, basal angles slightly, obliquely prominent. Elytra scarcely to moderately convex in profile basally, intervals usually slightly convex and each with about three confused rows of erect setae, those on interval 1, a little longer than elsewhere. Abdominal sternite 5 of female usually longer than in *pallidulus*; sternite 2 of male without denticles but often with a transverse, curved ridge; male usually smaller and slenderer than female, eye a little more elongate and more convex, the rostral carinae stronger and sometimes rather distinctly converging anteriorly.

*Type locality*.—Of *elegans*, Kansas to Texas; of *metallicus*, Kansas (Onaga).

*Restricted type locality*.—Texas.

*Distribution*.—California; Nevada (Pioche); Colorado; South Dakota (Fort Thompson); Nebraska (Lincoln); Kansas (Riley County, Topeka, Douglas County, Baldwin City, Wichita); Iowa; Oklahoma (Oklahoma City); Arkansas; Texas (Wichita Falls, Belknap, Dallas, Mexia, Devalle, Lavaca County, Victoria).

*Lectotype*.—The second specimen of *elegans* in the Horn collection at the Philadelphia Academy. Type of *metallicus*, female, No. 14651 in United States National Museum.

Horn described *elegans* from "Kansas to Texas," and it would be preferable to select an example from Kansas as lectotype, because the population from this State is more homogeneous and better characterized, whereas many of the specimens from Texas show various intergrading characteristics. Unfortunately the series of *elegans* in the Horn collection now contains no specimen labeled Kansas. There are several examples from Kansas in the Ulke collection at Pittsburgh, and one in the Leconte collection at Cambridge, and some of these doubtless were studied by Horn, just which ones, however, being uncertain. The first specimen of *elegans* in the Horn collection is from Texas, bears Horn's longhand name label, and also a subsequently attached lectotype label (No. 2635) (unpublished); but this specimen is much stouter and with a less convex eye than is normal. The second specimen, also from Texas and marked as being from Horn's original series, is a female, 7 mm. long, very pale greenish tan above, and agreeing in all essentials with *elegans* sens. str. from farther north. This specimen is hereby designated lectotype of *elegans elegans* (Horn).

About 150 specimens were examined. The relatively few that are dated were collected in April, May, June, and July; the earlier dates in general are on the more southern specimens.

Even in the northern material there are occasional atypical specimens and in the series from Texas are a good many with the body stout, the prothorax narrowed basally, and with other divergencies, most of which are suggestive of *pallidulus*. In placing some of these apparent intergrades with *elegans* rather than with *pallidulus*, considerable weight has been given the fact that their elytra are nearly or quite unicolorous, the elytra of *pallidulus* showing a tendency toward variegation. Other fairly constant characters of *elegans elegans* by which it can often be recognized are the relatively slender body, often distinct pronotal verrucae, basally subparallel sides of the prothorax, feeble convexity of the pronotum and basal portions of the elytra, relatively long elytral setae, absence of denticles from abdominal sternite 2 of male, and the moderately long sternite 5 of female. The more northern range is characteristic also.

The elytral setae vary greatly in length and coarseness, and are often more numerous on some intervals than on others. The setae in the serial punctures on the elytra vary from very slender to rather broad. The rostral carinae are occasionally well developed in the female. The average proportions of funicular segments 2 and 1 are about as 4 to 3. The pronotal verrucae and the accompanying radial clusters of scales vary from distinct to obsolescent but on the whole are better developed than in the southern varieties. The vestiture on the scutellum, if present, is sometimes prostrate, sometimes inclined.

The scales are more or less iridescent or metallic on all specimens examined except on two gray females, one from Wichita Falls, Tex., the other from "Tex." In the former the scales have a faint pinkish iridescence, but in the latter, which was included by Pierce in the type set of *texanus*, the scales are without luster.

Eight females from Brady, Tex., 6 to 7 mm. long, have a coppery lateral vitta on the pronotum and a pale or coppery vitta on elytral intervals 8 and 9 in the apical two-thirds, the prothorax narrowed basally, sternite 5 usually short, and in some other ways agree closely with *pallidulus*, but they are tentatively placed with the variety *elegans* largely because of the locality (north-central Texas).

Among eight specimens from Victoria, Tex., labeled "on cotton", are two or three which have the prothorax about as strongly narrowed basally as in *pallidulus*, but in most other respects their relationship is evidently with the variety *elegans*. The average length in this series is distinctly less than in the Brady lot.

There are also at hand 11 specimens labeled "Tex.", of various sizes and shapes, some with the eyes much less convex than usual, others with the elytra basally and the pronotum more convex longitudinally, and 1 with funicular segments 1 and 2 subequal.

The *elegans* of Champion, not Horn (*Biologia Centrali-Americana*, v. 4, pt. 3, pp. 333, 336, 337, 1911) is *eximius*.

Pierce's *metallicus* is inseparable from *elegans elegans*.

(8) PANTOMORUS (PHACEPHOLIS) ELEGANS var. VIRIDIS (Pierce)

(Fig. 5, K, L)

"*Phacepholis elegans* Horn, green form *viridis* Chittenden", Pierce, U. S. Natl. Mus. Proc. 37: 361, 1909.

"*Pantomorus viridis* Chittenden MS.", Champion, *Biologia Centrali-Americana*, v. 4, pt. 3, p. 336, tab. 15, fig. 23, 23a, 1911.

"*Pantomorus viridis* Sharp and Champion", Chittenden, Ent. Soc. Wash. Proc. 14: 106-107, fig. 1, 1912.

"*Pantomorus viridis* Champion", Dalla Torre, Emden, and Emden, Coleopterorum Catalogus, pt. 147, p. 29, 1936.

Length 5-7.8 mm. Stout, elytra usually rounded laterally; elytra basally and pronotum strongly convex in profile; prothorax rather strongly narrowed basally. Scales metallic, those on elytra and pronotum green, most of those elsewhere paler and, especially on legs, more or less strongly pinkish or coppery; scales denser and paler green in an inconspicuous vitta opposite eye on pronotum; scales on lateral interval of elytron forming a pale, slightly pinkish vitta which is usually evanescent near base; elytral setae stiff, rather short.

Head more or less distinctly narrowed behind eyes, especially in male, eye rounded to slightly elliptical, strongly convex, usually a little more convex in male than in female; rostrum above subplanate to broadly impressed between the feeble to moderately strong latero-marginal carinae; scape slightly to distinctly exceeding eye, funicular segment 2 considerably longer than 1, occasionally nearly twice as long. Prothorax with basal margin distinctly angulate opposite elytral humerus; pronotum rugo-punctate to rugo-verrucose, median groove narrow to obsolete, basal margin feebly bisinuate, basal groove distinct, basal angles slightly prominent, scales not entirely covering surface and often forming clusters on the elevations. Scutellum small to obsolete. Elytral intervals subplanate to slightly convex, each with three or four confused rows of setae; scales small, not overlapping, usually appearing convex. Intercostal piece of abdomen about half as wide as a hind coxa; abdominal sternite 2 of male usually with two or three denticles, and sometimes a few minute denticulations, all of them occasionally nearly or quite absent; sternite 5 of male a trifle longer than 1; fore tibia with distinct denticulations, middle tibia often, the hind tibia rarely, with a few denticulations.

*Type locality*.—Texas (San Antonio); 23 specimens, male and female, collected in May and June.

*Distribution*.—Texas (Kerrville, one male; Sabinal, two females); Mexico. Both of the Sabinal specimens were collected June 3, 1910; one has shorter and stouter elytral setae than the other.

*Lectotype*, hereby designated.—Female, May 21, labeled "cotype 9756," in United States National Museum. This is one of Chittenden's original specimens bearing his manuscript name *viridis*.

The name *viridis* has at one time or another been credited to Chittenden, to Champion, and to Sharp and Champion, but it should be credited to Pierce on the basis of his inadvertent published allusion to *viridis* as a bright-green form of *elegans*.

According to Chittenden, 1912, p. 107, *viridis* was reported as injurious to peach, plum, and pear at the type locality. The two Sabinal specimens are labeled "attacking cotton."

A male from Tallulah, La., the only Louisiana specimen of *Phaecepholis* at hand, seems about midway between *viridis* and *pallidulus*. It resembles *viridis* in color, in the structure of head and eye, and in the distinct convexity of the pronotum and elytra; it is more like *pallidulus* in having funicular segments 1 and 2 subequal, and in the rather short fifth abdominal sternite, the latter feature, however, being of doubtful significance. It is provisionally referred to *viridis*.

A female in the U. S. National Museum collection, without locality label but undoubtedly from Mexico, is one of the specimens studied by Champion and referred by him to *viridis*. It is not quite so stout and with the elytra basally not so strongly declivous as in typical *viridis*, but in other respects seems inseparable.

Two small males from San Antonio are entirely gray and have almost exactly the habitus of certain males of *pallidulus*, but they are here referred to *viridis* because of the relatively long second funicular segment, the presence of distinct denticles on abdominal sternite 2, and the strong convexity of the pronotum.



The eye in *viridis* varies considerably in shape and in degree of convexity. It is rounded to slightly elliptical in both sexes, and usually is a little larger, more convex, and more elliptical in the male. The narrowing of the head behind the eyes is usually perceptible, and in general better developed than in any of the other forms of *elegans*. A marked convexity of the pronotum in profile is one of the distinctive features of *viridis*, though sometimes the pronotum is no more convex than in certain specimens referred to *pallidulus*. The prothorax of the male, as is often the case in other species of *Phacepholis*, is larger, compared with the elytra, than in the female.

*Pantomorus viridis* usually can be told by the broad and laterally rounded elytra, the strong convexity of the pronotum and elytra in profile, and the strongly convex eyes.

(9) PANTOMORUS (PHACEPHOLIS) ELEGANS var. PALLIDULUS Emden

*Phacepholis pallida* Pierce, Jour. Econ. Ent. 3: 363, 1910.

*Pantomorus (Phacepholis) pallidus* (Pierce), U. S. Natl. Mus., Proc. 45: 417, 419, 1913.

*Pantomorus pallidulus* Emden, Dalla Torre, Emden, and Emden, Coleopterorum Catalogus, pt. 147, p. 28, 1936. (New name for *pallida* Pierce, preoccupied by *pallidus* Horn.)

Length 4.75-6.5 mm. Stout, elytra feebly rounded laterally. Usually gray, brownish gray, or brown, with or without evident metallic tinge, sometimes greenish gray to green with distinct metallic tinge, a narrow vitta usually present on lateral interval of elytron. An extremely variable color pattern sometimes present as follows: Prothorax with a pale, greenish or coppery lateral vitta opposite eye and a similarly colored, curved, vague, and incomplete dorsal vitta each side of middle; elytron with interval 3 pale at base and sometimes nearly throughout, interval 2 occasionally pale for a greater or less distance basally, intervals 7 and 8 in apical half to three-fourths and intervals 9 and 10 in basal fourth also pale; greenish specimens sometimes with a common, coppery vitta on intervals 9 and 10 in apical half. The above markings occur in various combinations on different specimens. A few specimens, including the type series, are a nearly unicolorous gray.

Head not, or slightly, narrowed behind eyes, eyes rounded to elliptical, moderately to strongly convex; rostrum usually subplanate above, sometimes slightly impressed, scape exceeding eye, funicular segments 1 and 2 subequal or 2 slightly to moderately longer than 1. Prothorax distinctly narrowed basally, basal angles usually projecting slightly; pronotum scarcely to distinctly convex longitudinally in profile, basal margin subtruncate to feebly bisinuate, median groove obsolete or nearly so, at most feebly defined, surface rugo-punctate, scales smaller at middle than on either side, often forming fairly distinct radial clusters on the elevations. Elytron in most females feebly declivous basally, more strongly so in most males, intervals subplanate to slightly convex, scales small and in general not overlapping, setae blunt and short, in about three irregular rows on each interval. Abdominal sternite 5 of female short, sternite 2 of male usually without denticles, rarely with minute ones, sometimes with a curved, transverse ridge as in *elegans*. Legs a little stouter, and denticulations on fore tibia a little longer, than in the other varieties of this group.

*Type locality*.—Texas (Corpus Christi).

*Distribution*.—Texas (Victoria, Beeville, Gregory, Sharpsburg, Sinton, Wades, Brownsville).

*Type*.—Female, May 17, 1905. No. 13123, United States National Museum.

Reported on cotton at Corpus Christi, Victoria, Sinton, and Kingsville; on *Leucasyris spinosa* at Gregory; feeding on sugar beets at Brownsville. Most of the 32 specimens were collected in May, a few in March, April, and June and 2 from Brownsville in January.

In its typical form, *pallidulus* is recognizable by its small size, stout form, predominantly gray or brown color, feeble convexity of

elytra basally and of pronotum, frequent obsolescence of median pronotal groove, and by having funicular segments 1 and 2 subequal. This character combination largely fails in several specimens which approach the variety *elegans* in some features and *viridis* in others. Most of the males resemble *viridis* in shape and in the rather strong convexity of the pronotum and elytra, but usually lack the abdominal denticles of that variety. The females have, in common with *viridis*, the basal narrowing of the prothorax, but resemble the variety *elegans* in the feeble convexity of the pronotum and elytra. The tendency toward the development of an elytral color pattern is rather distinctive, especially in the female. On the average, the median lobe of the male appears to be a little more broadly rounded apically than in *elegans* proper.

(10) *PANTOMORUS (PHACEPHOLIS) ELEGANS EXIMIUS*, new variety

(Figs. 4, *L*; 5, *J*)

*Pantomorus elegans* Champion (not Horn), *Biologia Centralia-Americana*, v. 4, pt. 3, pp. 333, 336, 337, 1911.

*Phacepholis elegans* Pierce (part) (not Horn), U. S. Natl. Mus. Proc. 37: 361, 1909.

Length 7–8.5 mm. Stouter than variety *elegans*, slenderer than *viridis*. Elytra basally and pronotum moderately convex in profile, prothorax narrowed basally. Scales iridescent to metallic, green on elytra and pronotum, elsewhere paler, and many of them, especially on legs, with a distinct pinkish luster, denser and a little paler green in an inconspicuous vitta opposite eye on side of pronotum, scales on lateral interval of elytron forming a pale-pinkish vitta which is usually evanescent near base; elytral setae stiff, rather short.

Head slightly or not constricted behind eyes; eye elliptical, more strongly so in male, feebly to moderately prominent; rostrum above with coarse, latero-marginal carinae, the intercarinal surface impressed; scape slightly to considerably exceeding eye, funicular segment 1 three-fourths to four-fifths as long as 2. Prothorax with basal margin in side view rather strongly angulate opposite elytral humerus; pronotum feebly grooved medially, rugo-verrucose to coarsely punctate, the setae entirely and the scales mostly located on the elevations, the scales in general not forming radial clusters, basal margin feebly to moderately bisinuate, basal groove distinct, basal angles more or less projecting. Scutellum obsolescent. Elytral intervals slightly convex, each with three or four irregular rows of setae; scales small, rounded, and crowded but in general not overlapping. Abdomen beneath with vestiture sparser and finer medially, especially on the three apical sternites; intercoxal piece slightly more than half as wide as a hind coxa; sternite 5 of male a trifle longer than 1, subtruncate at apex, sternite 2 of male with two to four larger and several small to minute denticulations; sternite 5 of female broad, narrowly subtruncate at apex. Fore tibia usually with 8 to 10 denticulations, middle tibia with a few smaller denticulations, hind tibia with a few minute ones in male, not denticulate in female. Sides of male median lobe feebly emarginate toward apex (fig. 4, *L*).

*Type locality*.—Texas (San Diego); three males and five females. Seven of these specimens, including the type, were collected by E. A. Schwarz on May 3, 6, 16, and 24, probably in 1895; the other specimen, by W. D. Pierce in 1912.

*Type*.—Female, May 16, Cat. No. 52802, United States National Museum.

The emargination of the sides of the male median lobe has not been observed in any other of the varieties of *elegans*; and may prove to be of taxonomic value. However, a single male from Cotulla, Tex., with setose corbel plate, has a somewhat differently shaped median lobe, without lateral emargination, and with the median orifice a little more basad in location. In this specimen the convexity of the eyes and the narrowing of the head behind the eyes are about as in *viridis*, but the

second funicular segment is shorter than in *viridis* and more as in typical *eximius*. The body form is more slender than in either *viridis* or *eximius*, and here, as well as in its somewhat larger elytral scales, it resembles the variety *elegans*. On the strength of its setose corbel plate, the Cotulla male is tentatively referred to *eximius*, though excluded from the type series.

The vestiture on the corbel plate appears to be a dense mat of subprostrate setae agglutinated by a varnishlike substance. In one or two specimens some of the setae are fairly distinct, but in most cases the individual setae cannot be clearly detected even after treatment with potassium hydroxide. When picked apart with a needle, the mat of setae disintegrates into minute, flakelike pieces each of which may be a seta imbedded in the cementing agent. This vestiture, though its exact nature is doubtful, evidently is different from the coating of true scales that is found on the corbel plate of the other species and varieties of *Phaeopholis*.

*Pantomorus eximius* seems most closely related to *viridis*, but differs by having the eye decidedly less convex (except in the Cotulla male), the form less stout, the second funicular segment averaging shorter, the color usually duller, and the corbel plate setose. The denticles on male abdominal sternite 2 are larger than in any other variety of the *elegans* group.

The convexity and shape of the eye vary considerably in different specimens of *eximius*; in general, the eye is longer and larger, but no more convex, in the male than in the female.

The *candidus* group differs as a whole from the *elegans* group in having the general vestiture denser, the elytral scales larger and flat, the prothorax more distinctly produced forward above, the scutellum larger and usually densely scaly, the elytral intervals sometimes rather strongly convex, the denticles on abdominal sternite 2 of male larger, and the hind tibia usually with small but distinct denticulations in the male; the abdominal vestiture usually is finer and sparser medially in the male, sometimes a little sparser and finer medially on sternites 3 to 5 in the female.

#### KEY TO SPECIES OF THE CANDIDUS GROUP

1. Funicular segment 2 almost twice as long as 1; setae rather fine, many of them tapering, those on even intervals of elytra uniseriate in general; about 15 spinules in distal comb. Texas.

(11) *tevanellus*, new name (p. 34).

Funicular segment 2 relatively shorter, often subequal to 1; elytral setae, if fine and tapering, usually irregularly biseriate on some portions of even intervals. North of Texas (except *obscurus*)-----

2. Elytral setae sparser and, except some of those on interval 1, blunt, subparallel sided, those on even intervals uniseriate in general; funicular segment 2 longer than 1, usually considerably so; eye rather feebly convex and, in male, distinctly elliptical; distal comb with about 17 or 18 spinules-----

(12) *candidus* (Horn) (p. 35).

Elytral setae longer and more abundant, fine, tapering, those on even intervals usually irregularly biseriate in general; funicular segment 2 shorter, often subequal to 1, though sometimes slightly but plainly longer than 1; eye more strongly convex and more nearly circular in both sexes-----

3. Average length about 6 mm; median groove on pronotum usually present though often obscured by the scales; spines on fore tibia relatively shorter, often six or seven larger and several shorter ones (fig. 3, J); about 14-16 spinules in distal comb.

(13) *planitatus*, new species (p. 36).

Average length about 4.5 mm; median groove on pronotum obsolete; spines on fore tibia relatively longer, usually four to six larger and two or three smaller ones (fig. 3, K); about 10-12 spinules in distal comb. (14) *obscurus* (Horn) (p. 38).

(11) **PANTOMORUS (PHACEPHOLIS) TEXANELLUS**, new name

*Pantomorus (Phacepholis) texanus* Pierce, U. S. Natl. Mus. Proc. 45: 417, 419, 1913 (preocc. by *Artipus texanus* Pierce 1911) = *Pantomorus (Atrichonotus) taeniatus* (Berg) 1881).

*Female*.—Length 7 mm. Gray, the pronotum with three broad, indefinite fuscous stripes, one median and one on each side, the rostrum and elytra with feeble, irregular, pale-brownish areas (apparently in part discolorations); scales dense, setae fine, stiff, erect, and rather short except on apical half of elytron, where they are longer.

Rostrum above with latero-marginal carina indistinct beneath the scales; eye slightly elliptical, rather strongly convex; scape barely exceeding eye. Prothorax a little wider than long (about 9 to 8), subparallel-sided in basal half, evenly narrowed apically; pronotum feebly convex longitudinally, sculpture largely hidden by scales but apparently somewhat rugose, median groove feeble and filled with scales, scales except in a few places not forming radial clusters, basal margin feebly bisinuate. Scutellum rather large, densely scaly. Conjoined elytra widest a little before middle, slightly rounded laterally, more abruptly so but hardly subangulate at humeri, scales slightly overlapping; intervals slightly but plainly convex, interval 1 not prominent, even ones each with a subregular single row, odd ones each with a partly double row, of setae, some of the longer setae toward apex at least equal to the width of an interval; serial punctures each with a small, setalike scale. Abdominal sternite 5 broadly, feebly emarginate at apex; intercoxal piece narrower than a hind coxa (about 13 to 21); metepisternal suture visible throughout. Fore tibia with 6 or 7 teeth and a few denticles, middle tibia with several shorter teeth, hind tibia with a few minute denticles.

*Type locality* (restricted).—Texas.

*Type*.—Female, No. 14652, in United States National Museum.

Pierce referred two Texas females and one Kansas male to (*texanus*) = *texanellus*. These specimens represent three species, namely, *texanellus* (type, female, Texas), *elegans elegans* (gray form, female, Texas), and *candidus* (male, Kansas).

In addition to the type, the writer has seen two specimens which appear to belong to *texanellus*. One of these, a male from Texas, is in the Horn collection at Philadelphia. It is dull grayish brown and closely resembles certain males of *candidus*, but differs in the finer elytral setae and the somewhat more convex eye; abdominal sternite 2 has three or four denticles, and funicular segment 1 is to 2 as 5.5 is to 9. The other specimen is a female bearing a yellow rectangular label, and incorrectly placed as *obscurus* in the Leconte collection at Cambridge. It has dark vittae on the pronotum, the elytron gray on the middle of the disk but with broad, dark area laterally; funicular segment 1 is to 2 as 5 is to 8. The setae on the elytra are a little shorter than in Pierce's type.

*Pantomorus texanellus* resembles *planitatus* in the fine elytral setae and in the subcircular and distinctly convex eye, but differs in the prothorax not being narrowed basally in the female, funicular segment 2 relatively much longer, and the elytral setae sparser and shorter; it resembles *candidus* in the elongation of funicular segment 2, the shape of the prothorax in the female, and the arrangement of the elytral setae, but differs in having more convex eyes and finer elytral setae.

## (12) PANTOMORUS (PHACEPHOLIS) CANDIDUS (Horn)

(Figs. 4, H, J; 5, E, F)

*Phacepholis candida* Horn, Amer. Phil. Soc. Proc. 15: 97, 1876; Henshaw, List of the Coleoptera of America North of Mexico, p. 135, 1885; ? Hart, Ill. State Lab. Nat. Hist. Bull. 7: 248, 265, note 16, 1907 (this may refer to *Pantomorus (Asynonychus) pallidus* or *tessellatus*).

? *Pantomorus candida* (Horn), Champion, Biologia Centrali-Americana, v. 4, pt. 3, p. 333, 1911; ? Blatchley and Leng, Rhynchophora of North Eastern America, p. 125, 1916.

*Pantomorus (Phacepholis) nebraskensis* Pierce, U. S. Natl. Mus. Proc. 45: 416, 418, 1913. (New synonymy.)

Length 5.7-8 mm. Light gray or grayish brown or occasionally dark brown, the pronotum usually without, sometimes with, a median and a lateral brownish stripe, the elytron of darker specimens occasionally with pale stripe on third, or on third and fifth, intervals. Scales dense, setae sparse and short.

Rostrum with subapical area impressed, latero-marginal carina moderate and intercarinal area subplanate (usually in female) or carina strong and intercarinal area more or less concave (usually in male), median groove usually coarse and reaching or exceeding hind margin of eye; eye elliptical and feebly convex in male, a little more convex and more nearly circular in female; scape slightly exceeding eye, funicular segment 2 longer than 1. Prothorax wider than long, rather strongly angulate on hind margin opposite elytral humerus, not or slightly narrowed in basal half in female, more distinctly narrowed in male; pronotum feebly to moderately convex longitudinally, usually more convex in male, irregularly rugo-verrucose, scales forming radial clusters here and there, median groove present, basal margin moderately bisinuate, basal transverse groove usually well impressed, hind angles acute and more or less projecting obliquely. Scutellum small to rather large, scaly. Elytron of male with basal margin somewhat thickened from scutellum to interval 5, not, or more feebly, thickened in female, humerus rounded or, especially in male, subangulate; intervals slightly to distinctly convex, the alternate (odd) ones sometimes more prominent than the even, interval 1 sometimes moderately prominent basally; setae often longer and a little more numerous on the odd intervals, especially on interval 1, but in general forming a subregular to staggered single row on each interval, the setae usually separated one from the other by more than the length of a seta. Abdomen beneath with vestiture finer and sparser medially in male, sometimes slightly finer and sparser medially on sternites 3 to 5 in female; intercoxal piece considerably narrower than a hind coxa, sternite 5 with a broad, shallow emargination at apex in female, longer and with the apex broadly truncate to feebly emarginate in male, sternite 2 of male with three to seven or eight denticulations of variable sizes and prominence. Fore tibia with six or nine teeth, middle tibia of female with a few denticles, middle and hind tibia of male with a few short teeth or denticles. Median lobe rather abruptly widened basally (fig. 4, J).

*Type locality*.—Of *candidus*, Colorado to Kansas; of *nebraskensis*, Nebraska (Lincoln).

*Restricted type locality*.—Colorado.

*Distribution*.—South Dakota (Fort Pierre, three females and one male from stomach of toad *Bufo cognatus*, No. 654, Biological Survey); Nebraska (Lincoln, McCook); Kansas and western Kansas; Colorado (Grenada); Montana (Otter Creek, June 28, one head from stomach of toad, *Bufo woodhousii*, No. 165, Biological Survey); Wyoming (Newcastle).

*Lectotype*.—A Colorado female in the Horn collection at Philadelphia, marked "Lectotype 2834." Type of *nebraskensis*, female, No. 14650, in United States National Museum.

The Montana record is based on a head of *candidus* taken from a toad's stomach which contained also one fairly complete specimen of *Pantomorus planitiatius*.

Horn described *candidus* from two specimens from Colorado and Kansas. The lectotype at Philadelphia undoubtedly is Horn's Colo-

rado specimen, and the first of the two Kansas specimens in the Leconte collection at Cambridge probably is Horn's Kansas specimen. The second example in the Leconte collection is *planitiatus*.

The rugose nature of the pronotal sculpture is usually evident, even with the normal dense coating of scales in place. This sculpture, as shown on abraded specimens, consists of coarse granules or small tubercles, each with a fine, seta-bearing puncture at the summit; many of the granules, especially toward sides of pronotum, coalesce to form irregular ridges, thus giving a rugose effect. The sculpture varies greatly, irrespective of sex, though in general it is deeper and more distinct in the male.

About 30 specimens of *candidus* have been examined. The eye varies in outline and convexity but as far as noted is never quite so convex as in *planitiatus* and *texanellus*, and usually is decidedly less so. The rostrum is subplanate to broadly, rather deeply concave above. Funicular segment 2 is almost always considerably longer than 1 and in a female from western Kansas approaches the length seen in *texanellus*; rarely (one male, Wyoming) are these segments about as in *planitiatus*, that is, subequal. In a Kansas female and a South Dakota female the pronotum is considerably more convex than is usual in this sex, though not so convex as in the male. The pronotum, in the case of a few females, has a vague, shallow, postmedian impression on each side. The emargination on abdominal sternite 5 of the female varies in width and depth. The median lobe of the male, as shaped in a Nebraska specimen, is rather abruptly widened basally, the width at apical third subequal to width at basal third, and the apical margin broadly rounded. In a South Dakota male the width at the apical third is obviously less than at the basal third, in this respect resembling the median lobe of *planitiatus*, in which species, however, the basal portion is less abruptly widened and the apical margin is more narrowly rounded. In a Kansas male the basal portion is more as in *planitiatus* but the apical margin is rounded as in the Nebraska male mentioned above. These variations do not seem to be correlated with differences in habitat in any way suggestive of geographic races.

In *candidus* the short elytral setae, less convex and more elliptical eye, the longer second segment of the funicle, and the fact that the prothorax is not, or less, narrowed basally will usually distinguish it from *planitiatus*. Other differences are mentioned under *planitiatus*.

(13 PANTOMORUS (PHACEPHOLIS) PLANITIATUS, new species

(Figs. 3, A, B, J; 4, K; 5, G, H)

*Phacepholis candida* Pierce (not Horn), U. S. Natl. Mus. Proc. 37: 362, 1909; Jour. Econ. Ent. 3: 363, 364, 1910.

*Pantomorus (Phacepholis) candidus* Pierce (not Horn), U. S. Natl. Mus. Proc. 45: 417, 419, 1913.

Length 6-7.5 mm. Usually gray or brownish gray, head with a whitish patch above eye, pronotum with rather indefinite median and lateral brownish stripes, the elytra with indefinite brownish areas or faint to rather conspicuous pale-brown to fuscous stripes on even intervals, the elytra occasionally dark gray to fuscous with paler stripes on the odd intervals. Scales dense, those on elytra overlapping, at least in places; setae erect, longer, finer, and more numerous than in *candidus*.

Rostrum in dorsal view slightly tapering, subapical area scarcely to distinctly impressed, latero-marginal carina feeble to moderate, the intercarinal area

subplanate to feebly concave, median groove finer than in *candidus*; eye rather strongly convex in both sexes, a little more convex in female, outline usually subcircular in both sexes, sometimes slightly elliptical in male; scape hardly exceeding eye, funicular segments 1 and 2 usually subequal. Prothorax wider than long (average for both sexes about 7 to 6), a little longer, relatively, in male, slightly to rather strongly rounded laterally, more strongly so in male, usually plainly narrowed basally in both sexes; pronotum rather strongly convex longitudinally in male, more feebly so in female, verrucose to rugo-verrucose, the radial clusters of scales usually more numerous and more clearly isolated than in *candidus*, median groove present, basal margin subtruncate to feebly bisinuate, basal groove (with scales in place) indistinct in most specimens, hind angles obtuse to acute, often slightly prominent. Scutellum small to rather large, densely scaly. Elytron not, or faintly, thickened at basal margin, humerus subangulate, intervals slightly convex, the alternate (odd) ones often a little wider and usually with more setae than the even, the first one sometimes slightly prominent basally, each interval in female usually with an irregular double row of setae, in male with a single, or only partly double, row; setae conspicuous, the longer ones nearly or quite equal to the width of an interval. Metepisternum distinct; abdominal vestiture sparser medially in male, subevenly distributed in female; sternite 5 shallowly emarginate at apex in female, broadly subtruncate in male, sternite 2 of male usually with three or four larger, and often one to several minute, denticles, the larger ones sometimes formed by the fusion of two or more smaller denticles, the denticles, as in *candidus*, irregular in shape and size and often asymmetrical in placement. Fore tibia with 5 to 9 rather strong denticles, middle and hind tibiae of male with a few smaller ones, middle tibia of female with a few denticles. Median lobe gradually widened basally (fig. 4, K).

*Type locality*.—Colorado (Pueblo).

*Distribution*.—Colorado (Pueblo and Fort Collins); New Mexico; western Kansas; Nebraska (McCook); Montana (Otter Creek, one female from stomach of toad *Bufo woodhousii*, No. 165, Biological Survey).

*Type*.—Female, and 65 paratypes, male and female, Cat. No. 52801, United States National Museum. Paratypes in Academy of Natural Sciences at Philadelphia and in Carnegie Museum at Pittsburgh. Described from 66 specimens, most of them from Colorado.

The type is labeled "May 18, Collection H. Soltau." Most of the Colorado specimens were collected in April and May, a Nebraska specimen on May 22, and the Montana specimen on June 28.

In most cases the male has the elytra relatively narrower and the prothorax more inflated laterally than in the female. In a few females the sides of the prothorax are subparallel in the basal half, about as in *candidus*. Occasionally the first funicular segment is slightly longer than the second, and sometimes the reverse is true. The emargination of the apex of abdominal sternite 5 of the female varies in width and depth. A minute forking of the tips of some of the elytral setae has been observed in several specimens but apparently is of less frequent occurrence than in *obscurus*. The series from Pueblo, Colo., consists of specimens somewhat smaller than the average, having the pronotal scales more generally arranged in radial clusters on the small tubercles and the tubercles appearing to be more distinctly isolated than in most specimens from other localities. A few specimens from Fort Collins, Colo., are larger and darker than usual. In a Pueblo male the median lobe proper is moderately widened basally, and as long as a median strut, whereas in a male from Fort Collins the median lobe is about one-third longer than a median strut, and the base more abruptly widened, in this latter respect approaching the shape seen in *candidus*. In a male from western Kansas the median lobe proper is only a little longer than a median

strut and about the same shape as in the Pueblo male. The shape of the spermatheca varies considerably in different specimens.

*Pantomorus planitatus* differs from *candidus* by having longer, finer, and denser elytral setae, the prothorax usually narrowed basally in both sexes, the head relatively wider, the eye rotundate and more convex, and funicular segments 1 and 2 subequal. Minor and average differences between these two species are as follows:

*planitatus*. Vittae more often present on dorsum; rostrum above less deeply impressed, latero-marginal carinae feebler, median groove finer; pronotal sculpture not so coarse, the radial clusters of scales more numerous and regular, basal margin more feebly sinuate; elytral intervals less convex; sides of elytra of female more nearly parallel.

*candidus*. Color more nearly uniform; rostrum above (especially in male) more concave, latero-marginal carinae stronger, median groove coarser; pronotal sculpture coarser, the radial clusters of scales fewer and more irregular in size and placement, basal margin more strongly sinuate; elytral intervals more convex; sides of elytra a little more rounded.

From *obscurus*, *planitatus* differs in its larger size, usually paler color, somewhat shorter elytral setae, the presence of a median groove on the pronotum, and the more numerous spinules in the distal comb.

#### (14) PANTOMORUS (PHACEPHOLIS) OBSCURUS (Horn)

(Figs. 3, C, F, K; 4, I, M)

*Phacepholis obscura* Horn, Amer. Phil. Soc. Proc. 15: 96, 1876; Henshaw, List of the Coleoptera of America North of Mexico, p. 135, 1885; Pierce, U. S. Natl. Mus. Proc. 37: 362, 1909; Pierce, Jour. Econ. Ent. 3: 363, 364, 1910.

*Pantomorus (Phacepholis) obscurus* (Horn), Pierce, U. S. Natl. Mus. Proc. 45: 417, 419, 1913.

Length 4-5.5 mm. Fuscous or lighter brown to gray, pronotum with a lateral whitish stripe opposite eye, head usually with a pale patch above eye; elytra usually very irregularly mottled with fuscous and gray, the darker specimens with pronotum fuscous and elytron with irregular grayish to brownish tessellations on disk, the paler specimens with broad median and sublateral, indefinite, brownish stripes on pronotum, and darker mottlings or tessellations on elytra, the elytral marks sometimes confined to the even intervals; elytron sometimes largely gray, with a dark line on base of interval 4; scales dense, those on elytra usually overlapping; dorsal setae longer than in any other species of *Phacepholis*.

Rostrum above with latero-marginal carina moderate to feeble, often scarcely perceptible beneath the scales, intercarinal area subplanate; eye rounded and rather strongly convex in both sexes; scape hardly exceeding eye, funicular segments 1 and 2 usually equal or 1 a little longer than 2, rarely 2 slightly longer than 1. Prothorax wider than long (though in an occasional male virtually as long as wide), sides rounded, convergent basally in both sexes; pronotum finely rugo-granulate, sculpture finer and more regular than in *candidus*, scales forming several to many radial clusters, setae erect, median groove obsolescent, basal margin subtruncate to faintly bisinuate, basal groove usually complete or nearly so, hind angles sharp, slightly projecting laterally. Scutellum variable in size, scaly. Elytron not thickened on basal margin, humerus rounded; intervals subplanate to feebly convex, interval 1 sometimes slightly prominent basally, each interval with an irregular double or triple row of long, fine, tapering, whitish to fuscous setae, the longer ones very conspicuous, the length of each longer one greater than the width of the interval, some of the setae minutely forked apically; setae in serial punctures slender to broad; lateral interval often with a stripe of pale to whitish scales. Metepisternum distinct, a little shorter than in *candidus* and *planitatus*; abdominal vestiture finer and sparser medially in male; sternite 5 shallowly emarginate at apex in female, much longer and with apex broadly rounded to truncate in male, sternite 2 of male with one to five (usually two, three, or four) moderate-sized denticles and sometimes one to a few minute ones in addition. Fore tibia with several spinelike teeth (fig. 3, K) that are relatively longer than in any other species of *Phacepholis*, middle and hind tibiae of male with a few shorter teeth, middle



and sometimes the hind tibiae of female with a few denticles. Median lobe, in dorsal view, tapering from base to apex (fig. 4, *M*).

*Type locality*.—Texas.

*Distribution*.—Texas (Mineral Wells, March 20, and College Station); Oklahoma (Ardmore); Kansas (Meade County, May 16).

*Lectotype*.—Female, marked "Lectotype 2836," in the Horn collection at Philadelphia.

Thirty-one females and 26 males are at hand, most of them from Mineral Wells, Tex., and labeled "injuring spinach."

As in *candidus* and *planitatus*, the male has the elytra relatively narrower, the prothorax more inflated laterally, and the pronotum more convex longitudinally, than in the female. In general, the eye is at least as strongly convex in the female as in the male. The median pronotal groove is not perceptible in most specimens, but occasionally traces of it are present. In some specimens a good many of the elytral setae are forked apically, in others very few. The color markings are exceedingly variable but, judging by available material, the color in *obscurus* is considerably darker on the average than in *candidus* and *planitatus*. A large, grayish female from Oklahoma has the setae shorter, the elytral intervals nearly flat, the elytral scales not overlapping, and the eyes less convex than usual, the characters tending toward *planitatus*.

Distinctive features of *obscurus* are the small size, usually dark color with rather conspicuous lateral whitish vitta on pronotum, the long and abundant elytral setae, the spinelike teeth on the fore tibia, and the relatively few spinules in the distal comb.

In the Horn collection at Philadelphia is a gray male about 5.5 mm. long, labeled "S. W. Tex." and placed with the Horn lectotype of *obscurus*. This specimen evidently belongs either to an undescribed species or to some described exotic species. It is more like members of the *candidus* group in its habitus and in the overlapping of the elytral scales, but the shape and arrangement of the elytral setae are more as in the *elegans* group.

## SYSTEMATIC LIST, WITH CHIEF SYNONYMY AND DISTRIBUTION

*Pantomorus* Schoenherr, 39-942.<sup>8</sup>

Subgenus *Graphognathus*, new subgenus.

1. *leucoloma* (Boheman), 40-62. UNITED STATES: Florida, Alabama, Mississippi, Louisiana. SOUTH AMERICA: Argentina, Peru, Chile, Uruguay. AUSTRALIA: New South Wales.

2. *peregrinus*, new species. Mississippi.

Subgenus *Atrichonotus*, new subgenus.

3. *taeniatus* (Berg), 81-61 (*Artipus texanus* Pierce, 11-49).

UNITED STATES: Texas, Mississippi, Alabama, Florida. SOUTH AMERICA: Argentina.

Subgenus *Asynonychus* Crotch, 67-388 (*Aramigus* Horn, 76-93; *Aomopactus* Jekel, in Horn 76-94).

4. *godmani* (Crotch), 67-389 (*fulleri* Horn, 76-94; *olindae* Perkins, 00-130). NORTH and SOUTH AMERICA, EUROPE, AZORES, AFRICA, AUSTRALIA, HAWAII, OCEANIA.

5. *tessellatus* (Say), 24-318 (? *durius* Boheman, 40-27, not *durius* Germar, 24-417). Illinois, Missouri, Oklahoma, Arkansas, Kansas. ? SOUTH AMERICA.

6. *pallidus* (Horn), 76-94. Illinois to Colorado, south to Texas and New Mexico. ? SOUTH AMERICA.

Subgenus *Phaecepholis* Horn, 76-95.

7. *elegans* var. *elegans* (Horn), 76-95 (*metallicus* Pierce, 13-417, 419). South Dakota to Texas, west to Nevada.

8. *elegans* var. *viridis* (Pierce), 09-361. Texas.

9. *elegans* var. *pallidulus* Emden, 36-28 (*pallida* Pierce, 10-363, preoccupied by *pallidus* Horn, 76-94). Texas.

10. *elegans* var. *eximius*, new variety. Texas.

11. *texanellus*, new name (*texanus* Pierce, 13-417, 419, preoccupied by (*Artipus texanus* Pierce, 11-49) = *Pantomorus* (*Atrichonotus*) *taeniatus* (Berg), 81-61). Texas.

12. *candidus* (Horn), 76-97 (*nebraskensis* Pierce, 13-416, 418).

- Colorado, Wyoming, Montana, South Dakota, Nebraska, Kansas.

13. *planitatus*, new species. Colorado, New Mexico, Montana, Nebraska, Kansas.

14. *obscurus* (Horn), 76-96. Texas, Kansas, Oklahoma.

<sup>8</sup> Numbers following author names are abbreviated date-page citations to original literature, the number preceding the dash denoting the year, the other number the page. The complete reference can be obtained from the body of this publication or from the bibliography in the Leng Catalogue of Coleoptera.

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