Prospectus for a Revision of the Genus *Philolithus* Lacordaire (Coleoptera: Tenebrionidae: Asidini)

Kirby W. Brown

&

Aaron D. Smith

It all started with LeConte in 1858 who reluctantly described Lacordaire's genus *Philolithus*

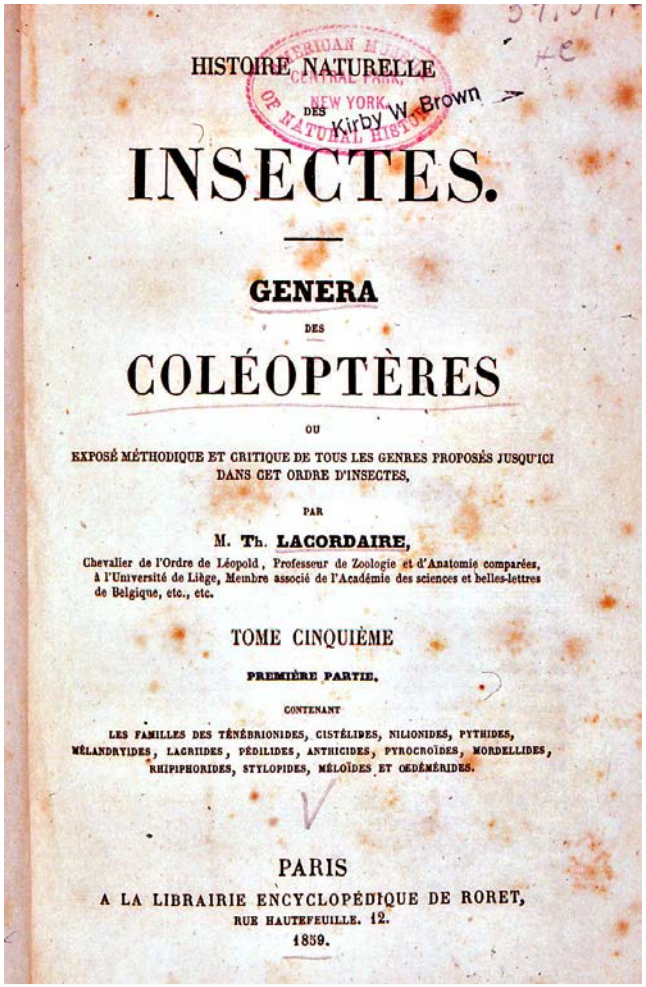
ART. II.—*Catalogue of Coleoptera of the Regions adjacent to the Boundary Line between the United States and Mexico.*

By John L. LeConte, M. D.

Philolithus Lac.

In advance of the publication of the fifth volume of his work on the genera of Coleoptera, Prof. Lacordaire has sent me his description of the characters of this new genus, which contains all the species described by me as Pelecyphorus. Though agreeing with that genus in the form of the mentum, which leaves a free space each side, more than sufficient for the movement of the palpi, it differs in the anterior tibiæ not being produced into a spine at the outer apical angle. Such at least is the only distinct difference noted in Prof. Lacordaire's description, and the only one that I have found in comparing specimens of Pelecyphorus mexicanus *Sol.*, kindly sent me by Mr. Sallé. An unnamed Mexican species, related by form and sculpture to P. mexicanus, also sent me by Mr. Sallé, does not show any trace of this spine, while in P. confluens, hirsutus, and especially in P. rimatus, this spine, or rather prolongation of the apical angle is quite distinct. Under these circumstances, though I have adopted the genus proposed by my learned friend, I am greatly in doubt whether it will not be necessary to recombine it again with Pelecyphorus, the species of which being numerous and very different in form, may be divided into several natural groups, according to the form of the antennæ and tarsi, and the sculpture of the elytra.

Lacordaire in the 5th volume of his monumental work more fully described and illustrated *Philolithus* in 1859.



HISTOIRE NATURELLE

DES

INSECTES.

GENERA

DES

COLÉOPTÈRES

OU

EXPOSÉ MÉTHODIQUE ET CRITIQUE DE TOUS LES GENRES PROPOSÉS JUSQU'ICI DANS CET ORDRE D'INSECTES,

PAR

M. Th. **LACORDAIRE,**

Chevalier de l'Ordre de Léopold, Professeur de Zoologie et d'Anatomie comparées, à l'Université de Liège, Membre associé de l'Académie des sciences et belles-lettres de Belgique, etc., etc.

TOME CINQUIÈME

PREMIÈRE PARTIE.

CONTENANT

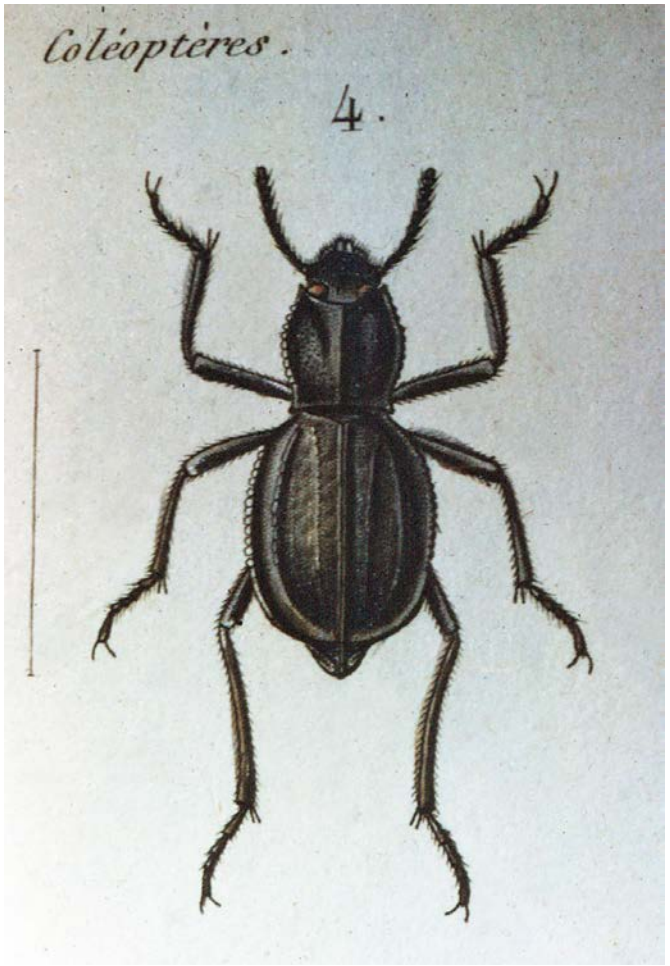
LES FAMILLES DES TÉNÉBRIONIDES, CISTÉLIDES, NILIONIDES, PYTHIDES, MÉLANDRYIDES, LAGRIIDES, PÉDILIDES, ANTHICIDES, PYROCROÏDES, MORDELLIDES, RHIPIPHORIDES, STYLOPIDES, MÉLOÏDES ET ŒDÉMÉRIDES.

PARIS

A LA LIBRAIRIE ENCYCLOPÉDIQUE DE RORET,

RUE HAUTEFEUILLE. 12.

1859.



DESCRIPTIONS

OF

SOME GENERA AND SPECIES OF COLEOPTERA

FROM THE VICINITY OF THE SOUTHERN BOUNDARY

OF THE UNITED STATES OF AMERICA;

BY JOHN L. LECONTE, M. D.

PELECYPHORUS, Sol.

12. P. CARINATUS, *niger opacus, thorace longiore quadrato, medio elevato et varioloso, lateribus crenulatis, subreflexis variolosis; elytris marginatis rotundato-ovatis, apice acutis valde declivibus, dorso rugosis, costa utrinque abbreviata cum margine parallela.* — Long. 21 1/2 mill. — Tab. XII, fig. 1.

Leconte, *Annals of the Lyceum of Natural History of New York*, V, 128. San Felipe, at the base of the mountains limiting the Colorado Desert westwardly.

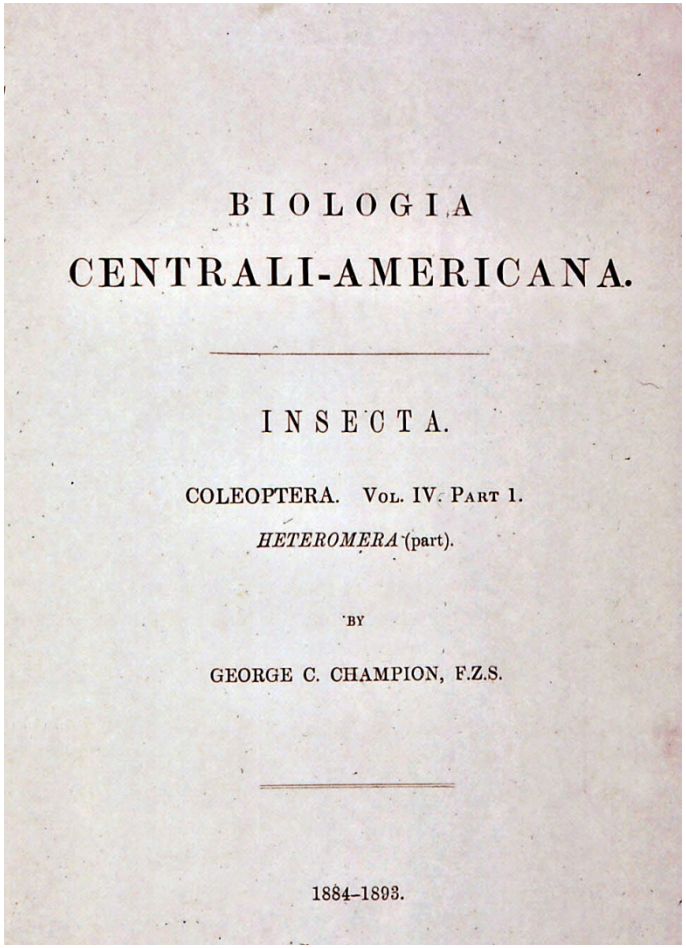
13. P. ELATUS, *niger, capite excavato; thorace latitudine breviore, lateribus antice latissime reflexis medio angulatis, angulis omnibus distinctis; elytris oblongo-ovalibus, postice subacutis, convexis, thorace plus duplo latioribus, minus profunde rugose punctatis, sutura lineisque tribus lævibus, humeris minutis porrectis.* — Long. 35 mill. — Tab. XII, fig. 7.

Leconte, *Proceedings of the Academy of Natural Sciences of Philadelphia*, VI, 445. Texas. Allied to this species is *P. difformis*, Lec. (loc. cit., VII, 223); the latter, however, differs by the narrower form and strongly striate elytra; it is found in Arizona.

The two species above mentioned serve to illustrate, in a small degree, the varied form of the *Pelecyphori* of North America. Lacordaire has separated them as a distinct genus, *Philolithus*, which does not appear to me capable of being retained. The only difference between it and *Pelecyphorus*, is that the external terminal angle of the anterior tibiæ is distinct in the latter and slightly prolonged, while in the former it is rounded. Now I do not find an exact correspondence between our species in this respect. *P. elatus*, for instance, has the angle distinct but rounded, while in *P. carinatus* it is much less prominent. In *P. hirsutus, rimatus* and some others, it is quite as acute as in *Asida* or *Euschides*. For this reason, I have not adopted the genus proposed by my learned friend, who states with a proper caution, that the genera of this portion of the tribe *Asidites* are very indefinite and separated by very feeble characters. The only character of moment which I find to separate *Asida*

LeConte took it away that same year, sinking *Philolithus* into synonomy with the old genus *Pelecyphorus* Solier. There it remained until 1870 when Horn sunk them both into the genus *Asida* Latreille.

Champion described many new species of Asidini including these two.



BIOLOGIA

CENTRALI-AMERICANA.

INSECTA.

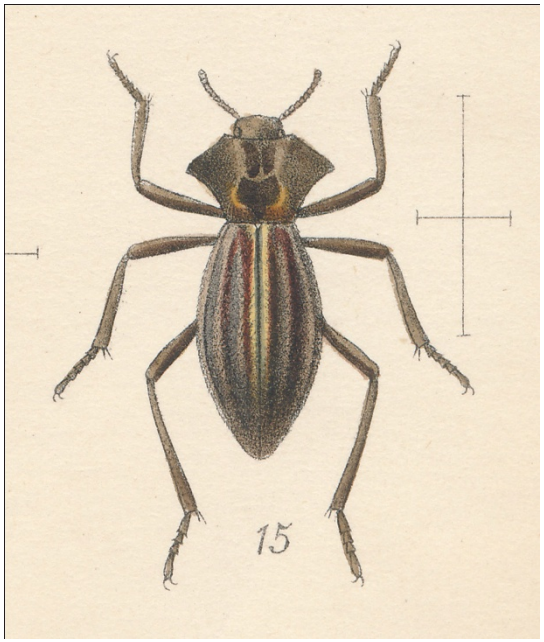
COLEOPTERA. Vol. IV. Part 1.

HETEROMERA (part).

BY

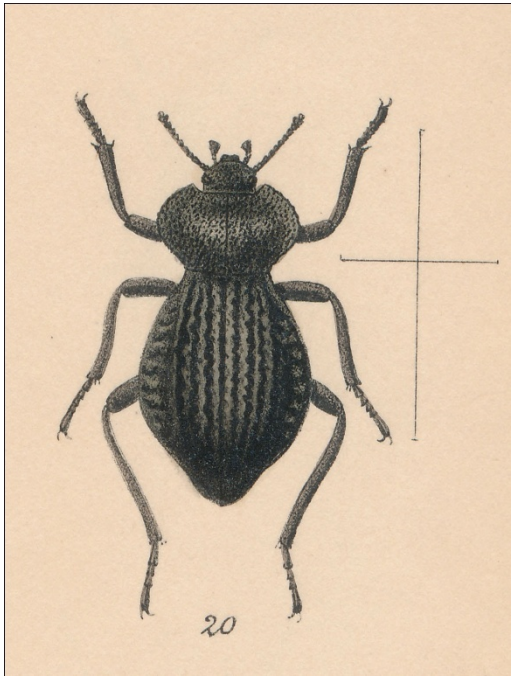
GEORGE C. CHAMPION, F.Z.S.

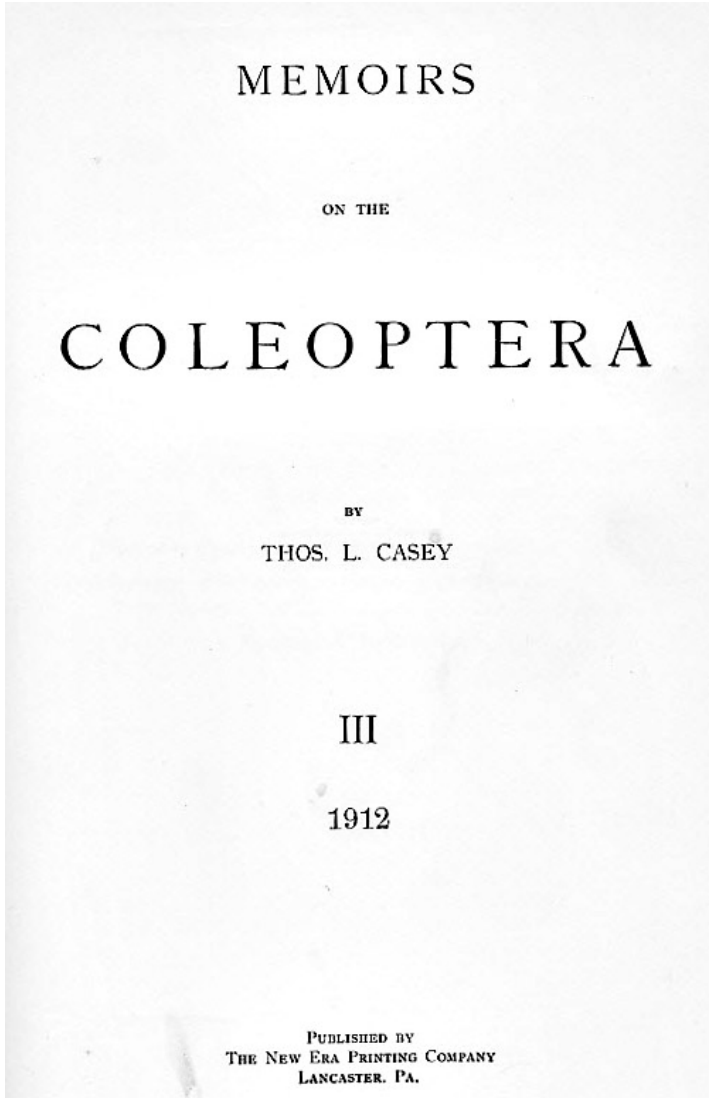
1884–1893.



Tisamenes truquii Champion

Asida ingens Cha. placed in new monotypic genus *Herthasida* by Wilke in 1921





MEMOIRS

ON THE

COLEOPTERA

BY

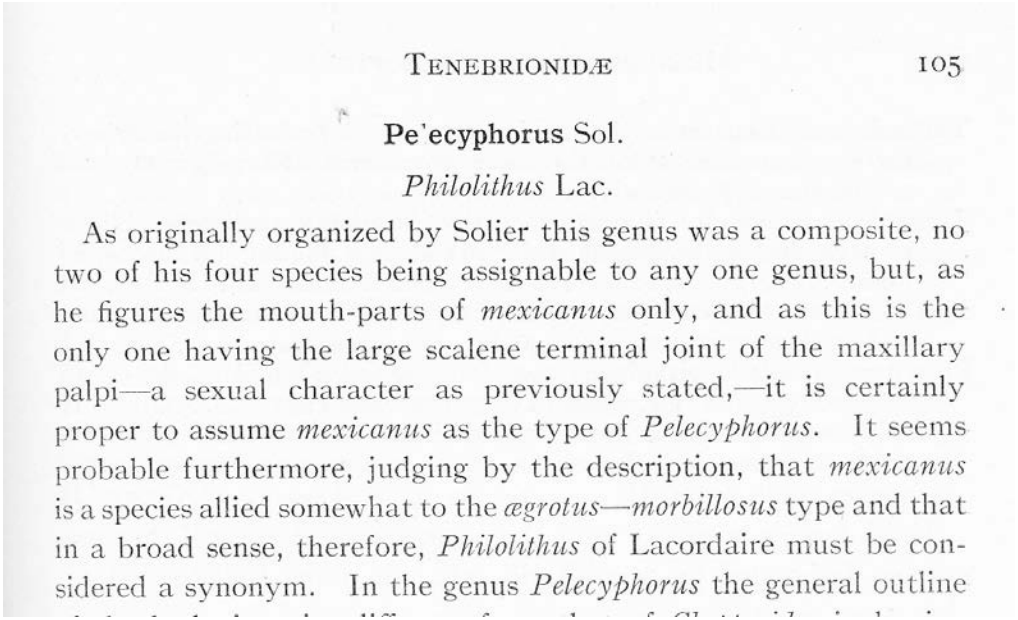
THOS. L. CASEY

III

1912

PUBLISHED BY
THE NEW ERA PRINTING COMPANY
LANCASTER, PA.

Along came Mr. Casey in 1912 who resurrected *Pelecyphorus* without knowing what it was, described dozens of new genera and buckets of new “species”.



TENEBRIONIDÆ 105

Pe'ecyphorus Sol.

Philolithus Lac.

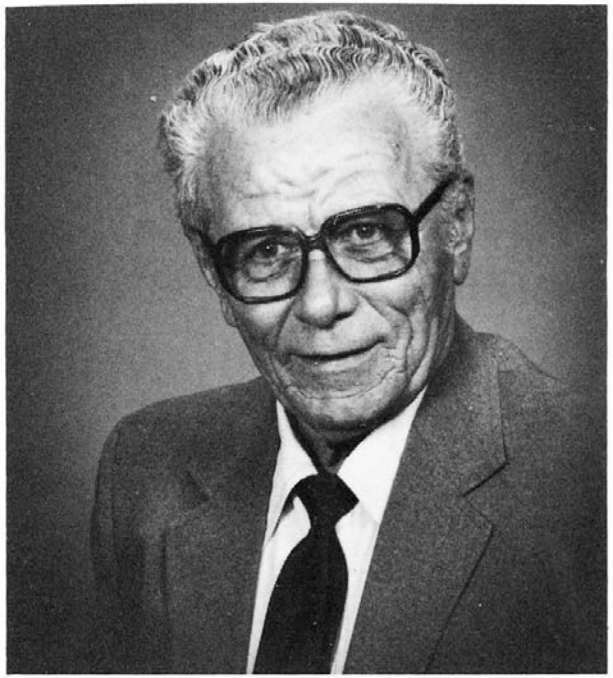
As originally organized by Solier this genus was a composite, no two of his four species being assignable to any one genus, but, as he figures the mouth-parts of *mexicanus* only, and as this is the only one having the large scalene terminal joint of the maxillary palpi—a sexual character as previously stated,—it is certainly proper to assume *mexicanus* as the type of *Pelecyphorus*. It seems probable furthermore, judging by the description, that *mexicanus* is a species allied somewhat to the *ægrotus—morbillosus* type and that in a broad sense, therefore, *Philolithus* of Lacordaire must be considered a synonym. In the genus *Pelecyphorus* the general outline

Among the genera that Casey described were *Gonasida and Glyptasida.*

Gonasida inferna Casey

Glyptasida rugosissima (Cha.)

Jump to 1964 when a green undergraduate at U. C. Riverside met Charlie Papp who turned him on to tenebs, especially Asidini.



Charles S. Papp

A REVISION OF THE ACTUOSUS GROUP OF THE GENUS PELECYPHORUS FOUND IN CALIFORNIA WITH NOTES ON MORPHOLOGY (COLEOPTERA: TENEBRIONIDAE)

by Kirby W. Brown

Department of Entomology,
University of California,
Riverside, California

Submitted June 5, 1964

(submitted as partial fulfillment of the course requirements in Entomology 112 under Prof. E. I. Schlinger)

After over 100 years in limbo, *Philolithus* was finally resurrected to its rightful place, but the other genera proliferated by Casey remained.

REDEFINITION OF THE GENERA *PELECYPHORUS* AND *PHILOLITHUS* WITH A KEY TO THE GENERA OF THE TRIBE ASIDINI (COLEOPTERA: TENEBRIONIDAE).[1]

KIRBY W. BROWN
Peabody Museum of Natural History,
Yale University, New Haven, Conn. 06520

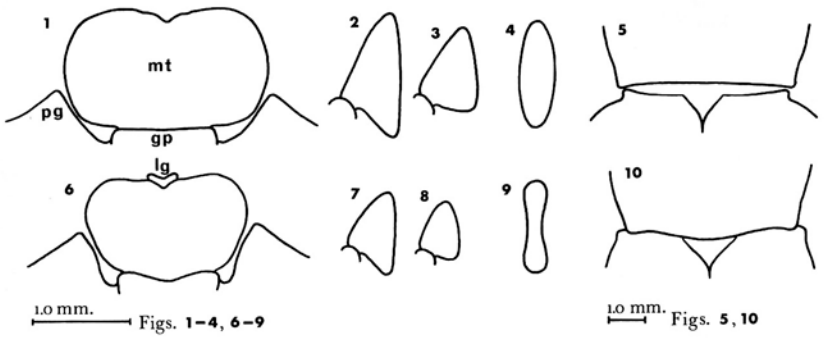


FIG. 1-5: *Philolithus carinatus* (LeConte). 1) mentum (mt), gular pedestal (gp), postgenal process (pg). 2) apical segment of maxillary palpus, male. 3) same, female. 4) eye. 5) pronotum-elytra junction. FIG. 6-10: *Pelecyphorus mexicanus* Solier. 6) mentum, ligula (lg), gular pedestal, postgenal process. 7) apical segment of maxillary palpus, male. 8) same, female. 9) eye. 10) pronotum-elytra junction.

Pelecyphorus mexicanus Sol.

Philolithus actuosus (Horn)

Syste
Entom

Systematic Entomology (2013), DOI: 10.1111/syen.12017

Phylogenetic revision of the North American Asidini (Coleoptera: Tenebrionidae)

AARON D. SMITH

International Institute for Species Exploration, School of Sustainability, Arizona State University, Tempe, AZ, U.S.A.

Aaron Smith bravely tackled the group Kirby struggled with for 40+ years. With a combination of genetic and morphological characters he resolved 3 major clades of Asidini in his 2013 paper. All of the Casey "genera" were subsumed into those 3 clades except *Heterasida* and *Litasida*.

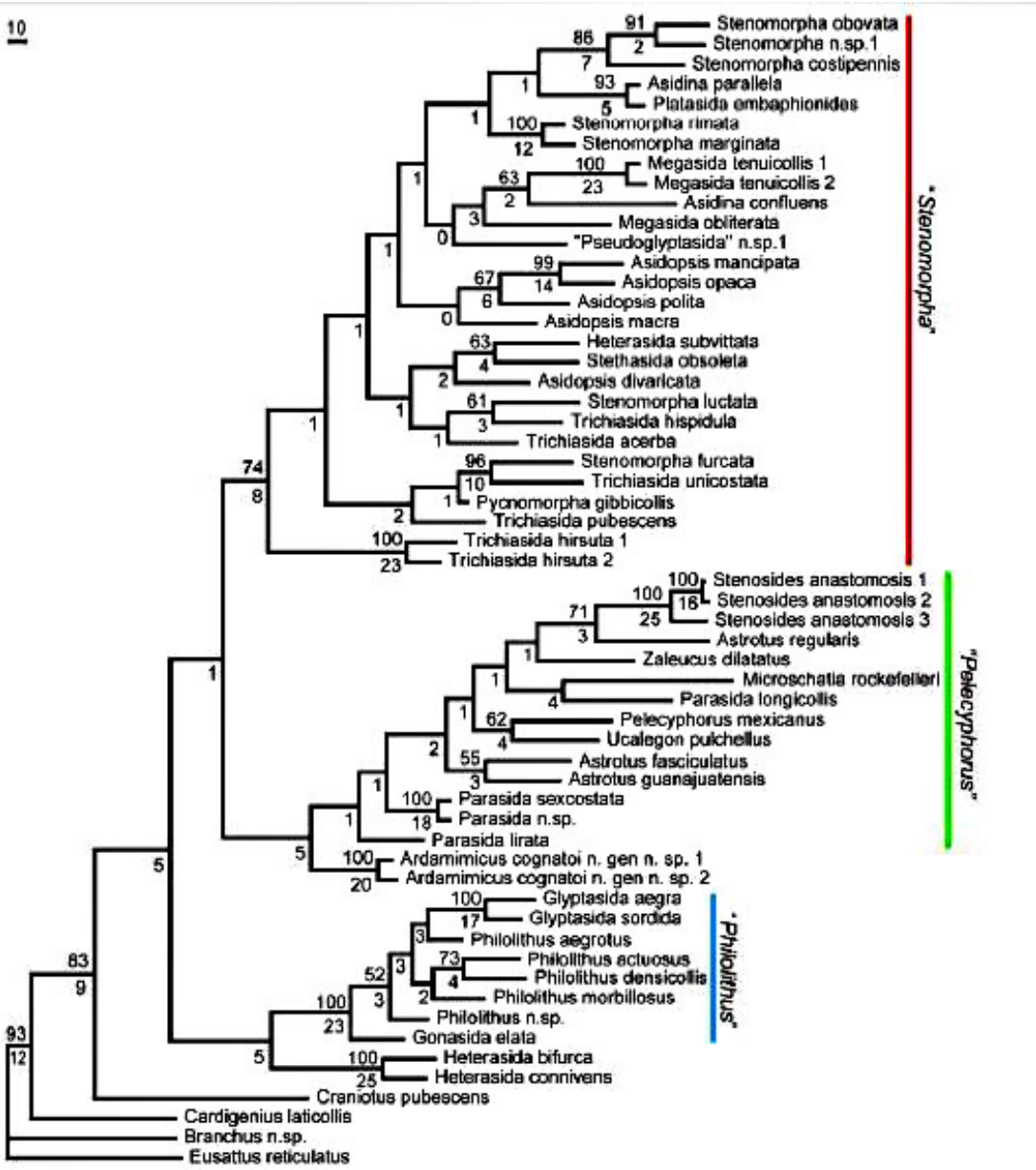
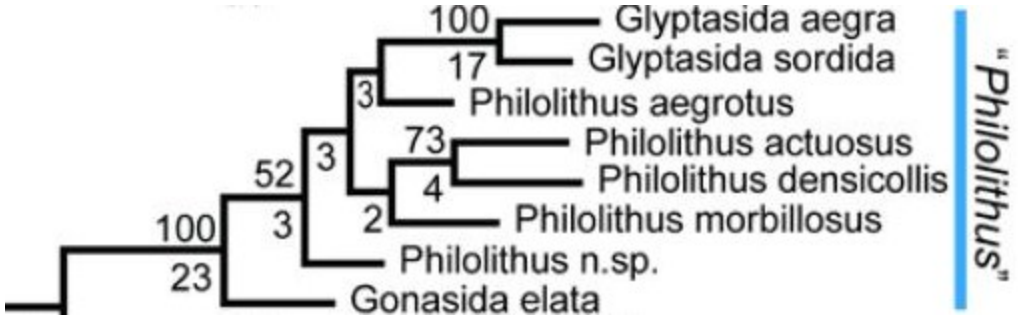
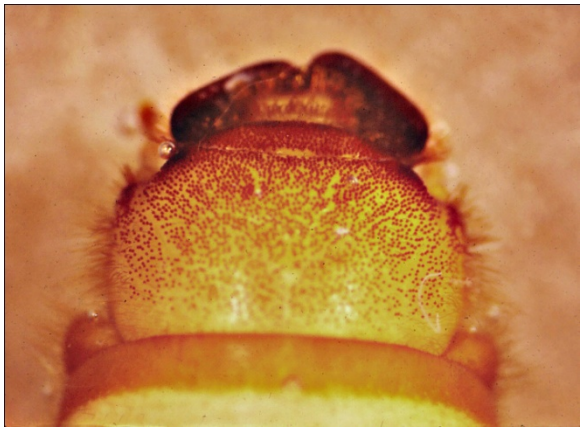


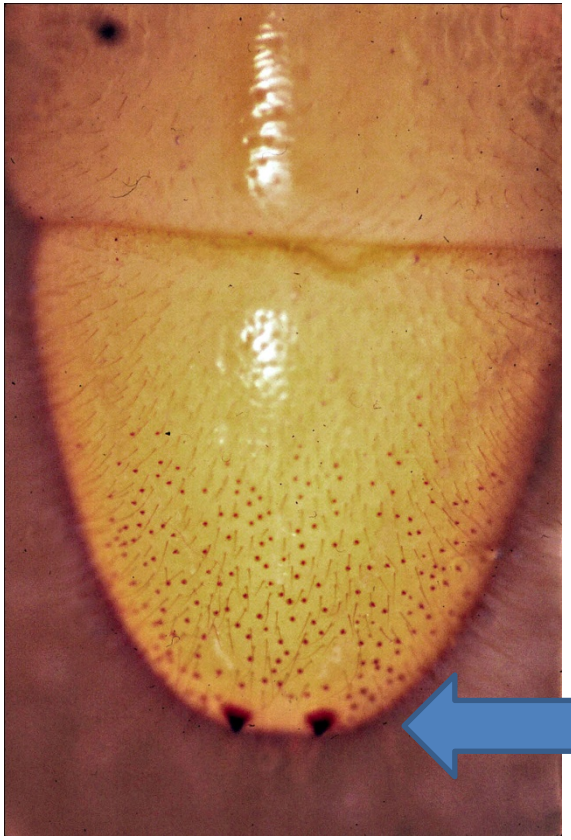
Fig. 2. Phylogeny of the North American Asidini based on 28S, COI, and adult morphology (58 OTUs, 1252 characters). One of four most parsimonious trees (L=3615, CI=0.22, RI=0.47) is shown with bootstrap values above branches and average partitioned Bremer support values below.



The "*Philolithus*" clade is well defined. Four genera are reduced in rank to sub-genera of *Philolithus.*

Glyptasida Casey 1912
Gonasida Casey 1912
Herthasida Wilke 1921
Tisamenes Champion 1884





The newly constituted genus *Philolithus* is not only well supported by adult morphology and genetic characters but by larval morphology. Unlike other Asidini, and most Tenebrionidae, the urogomphi are greatly reduced.

Very reduced urogomphi

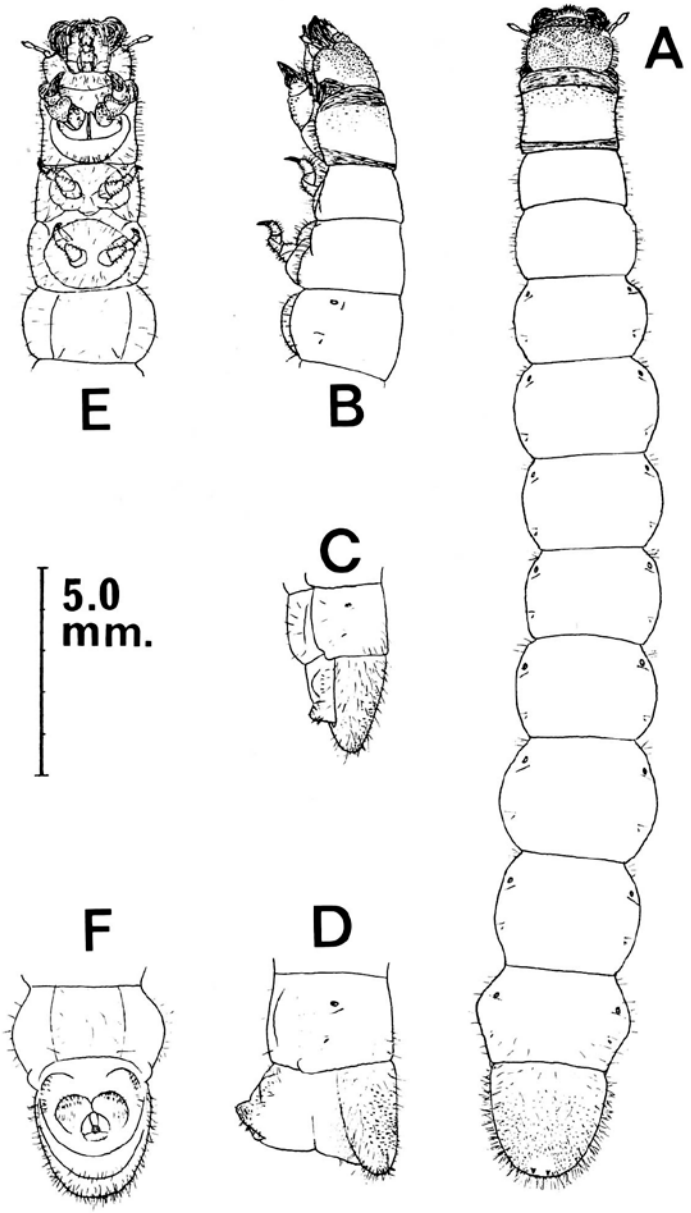


FIG. 2. *Philolithus densicollis*, mature larva: A) overall, dorsal view; B) anterior, lateral view; C) posterior, lateral view, ventral segments retracted; D) same, ventral segments extended; E) anterior, ventral view; F) posterior, ventral view.

Philolithus larvae, like all Asidini are soft bodied and adapted for a strict subterranean existence. The mandibles and fore-legs work in opposition to burrow through the soil. The terminal abdominal segment expands to act as an anchor to push forward. They filter organic matter as they burrow. Larval life is one year or more. Adults are typically short lived.

THE CAST OF CHARACTERS

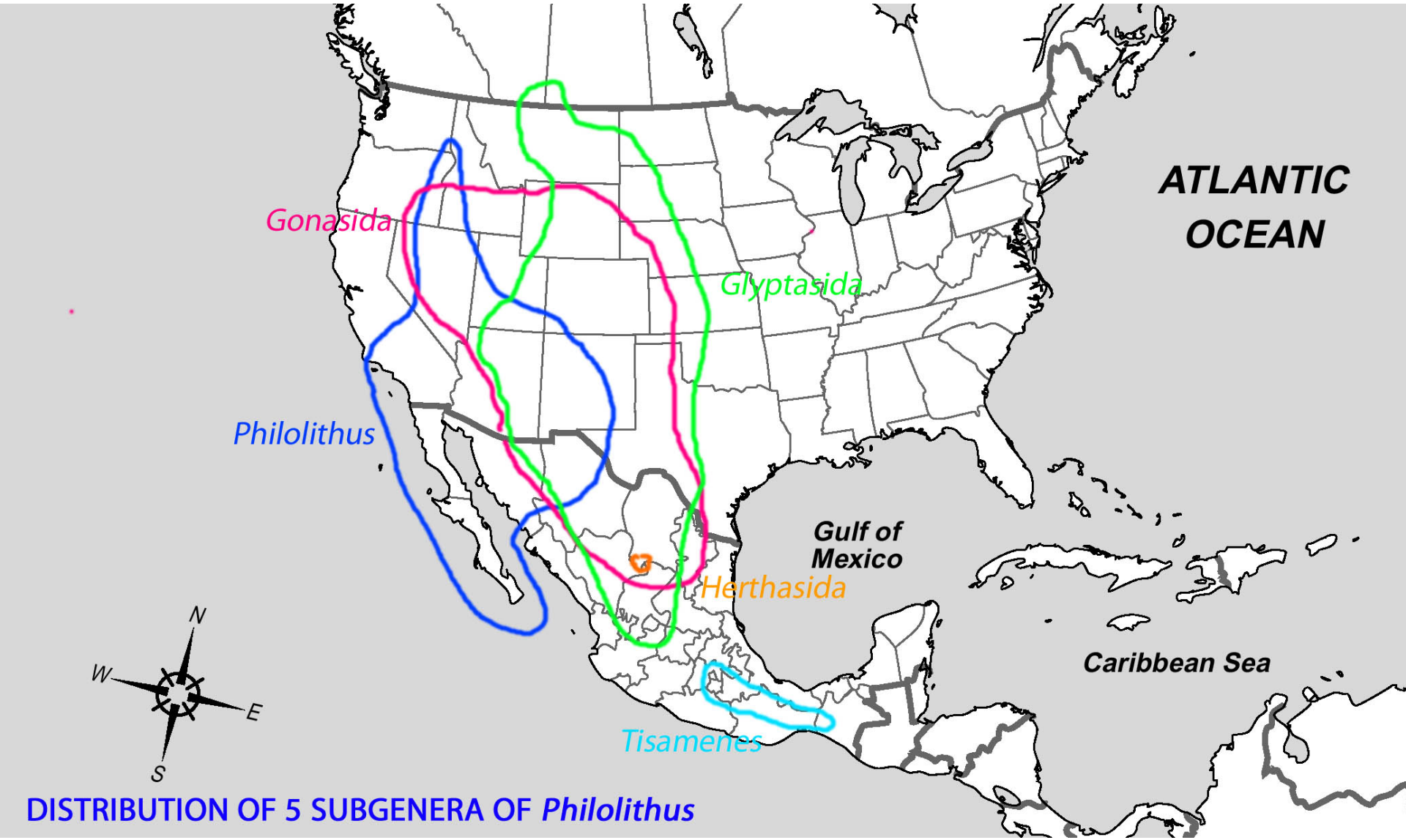
Subgenus *Philolithus*
26 species

Subgenus *Glyptasida*
3 species

Subgenus *Gonasida*
6 species

Subgenus *Herthasida,* 1 sp.

Subgenus *Tisamenes*, 1 sp.



DISTRIBUTION OF 5 SUBGENERA OF *Philolithus*

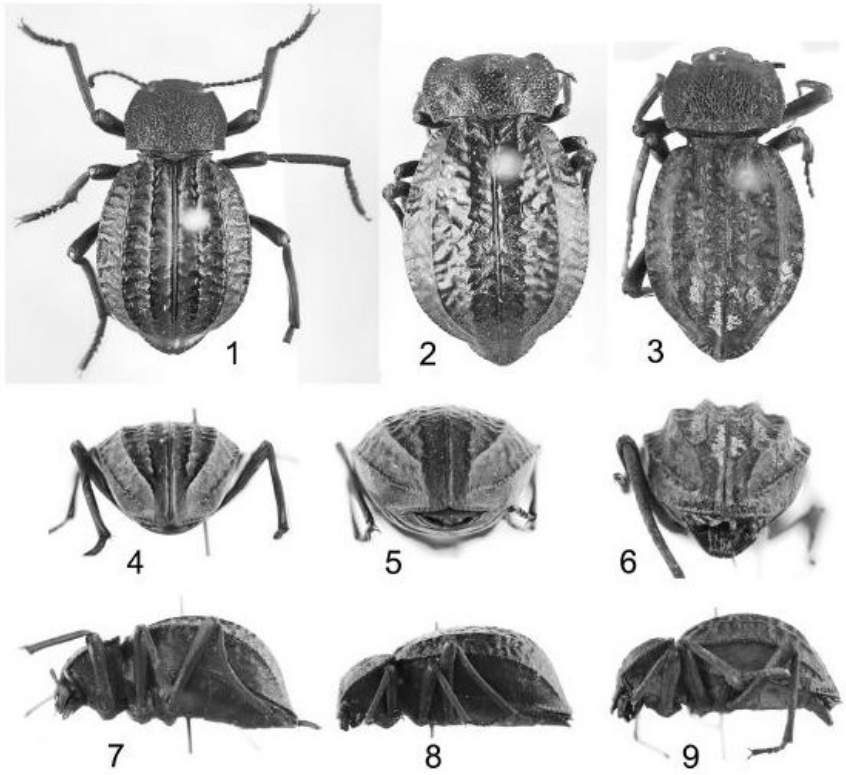
Zootaxa 2023: 1–27 (2009)
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

A review of the genus *Glyptasida* Casey (Coleoptera: Tenebrionidae: Asidini)

STEPHANIE A. LOCKWOOD[1] & DARREN A. POLLOCK[2]
[1]*Department of Biological Sciences, Texas Tech University, Lubbock, TX USA 79409. E-mail: stephanie.horne@ttu.edu*
[2]*Department of Biology, Eastern New Mexico University, Portales, NM USA 88130. E-mail: darren.pollock@enmu.edu*



FIGURES 1–9. Habitus. Dorsal view: 1, 2, 3) Posterior view: 4, 5, 6) Lateral view: 7, 8, 9) Images of *G. sordida* (1, 4, 7); total length = 18.0 mm. Images of *G. aegra* (2, 5, 8); total length = 20.6 mm. Images of *G. rugosissima* (3, 6, 9); total length = 19.3 mm.

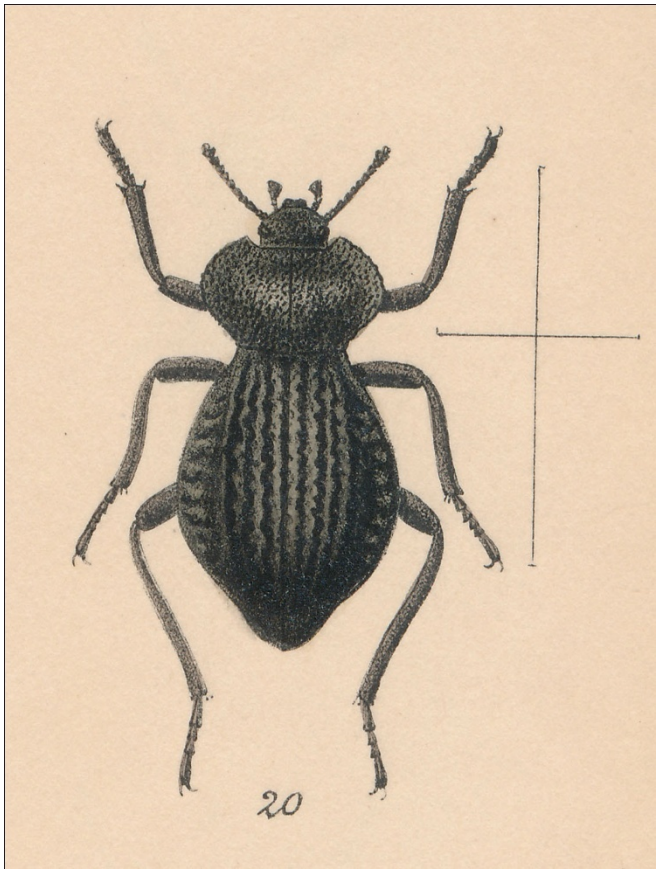
Glyptasida was recently revised (when it was still a genus) by Lockwood and Pollock. They reduced it from 15 to 3 species. It has the largest range of the genus, from central Mexico to southern Canada, mostly Sonoran Desert and Great Plains.

Glyptasida is the most “boring” subgenus with relatively little variation over a huge geographic range.

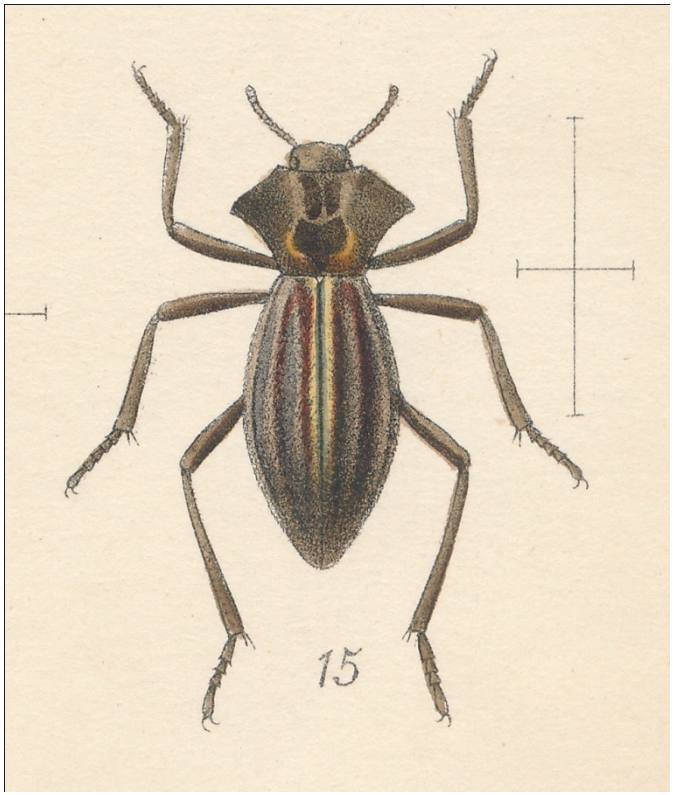
An intriguing case of apparent “mimicry” between two unrelated genera of Asidini, neither of which is protected. Perhaps there is an *Eleodes* species that both are mimicking. They both occur in Texas.

Philolithus (Glyptasida) aegra *Stenomorpha (“Pseudoglyptasida”)* n.sp.

The subgenus *Herthasida* contains one species, *Philolithus (Herthasida) ingens* (Champion). It is still only known from 2 specimens collected 150 years ago in northern Mexico. It looks like an oversized *Glyptasida.*



The subgenus *Tisamenes* also contains one species, *Philolithus (Tisamenes) truquii* (Champion). The type locality is Mexico City, but recent collections are around Tehuantepec, the southern-most occurrence of Asidini in North America. It is also the most attractive species.



The subgenus *Gonasida* ranges over a large area from northern Mexico to southern Idaho, mainly Sonoran Desert and the Great Plains.

A POPULATION APPROACH TO COMPUTER TAXONOMY

WITH APPLICATIONS IN THE GENUS GONASIDA

(Coleoptera: Tenebrionidae)

by

Kirby William Brown

A dissertation submitted in partial satisfaction of the

requirements of a graduate program in Entomology

for the degree of Doctor of Philosophy

March, 1971

University of California, Riverside

Gonasida was the subject of Kirby's Ph.D. thesis which is still unpublished. His phenetic morphometric methodology got swamped by the wave of cladism. There is intriguing geographic variation over its large range.

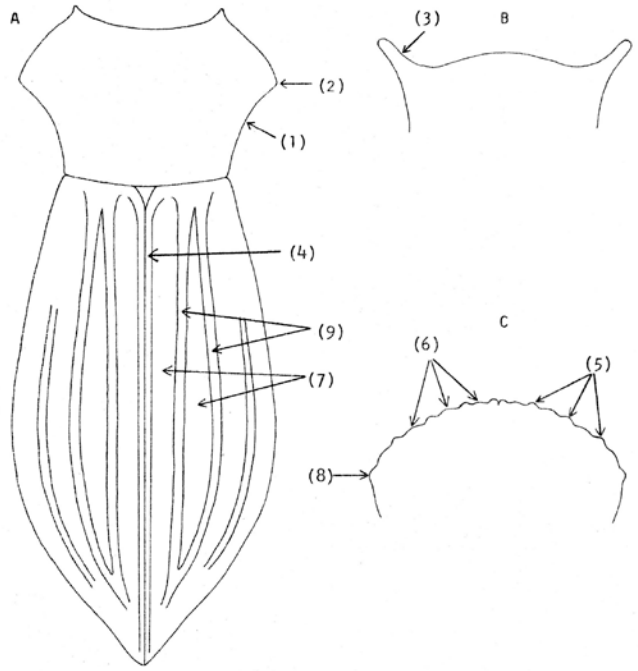


Figure 55. Outline drawing of a generalized specimen of Gonasida elata showing locations and viewing orientation of characters for taxometric analysis.
A. Dorsal view of pronotum and elytra.
B. Cross-section of pronotum at widest point.
C. Cross-section of elytra at widest point.

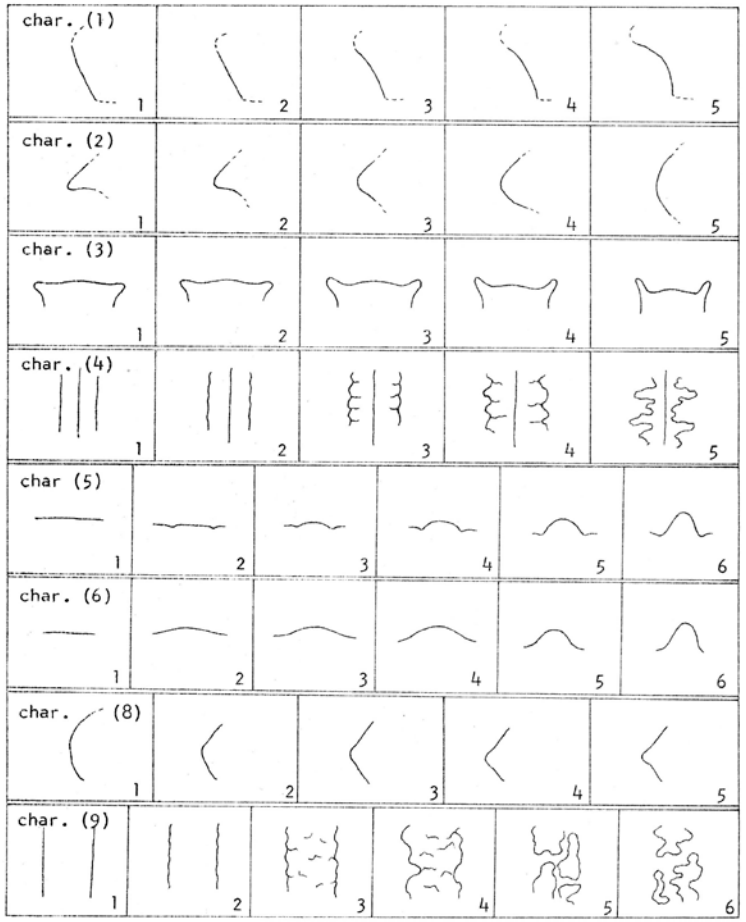


Figure 56. Illustrated guide to the quantitative states of eight of the characters used for taxometric analysis of Gonasida.

Kirby quantified 9 characters that encompassed most of the observable variation and statistically compared populations.

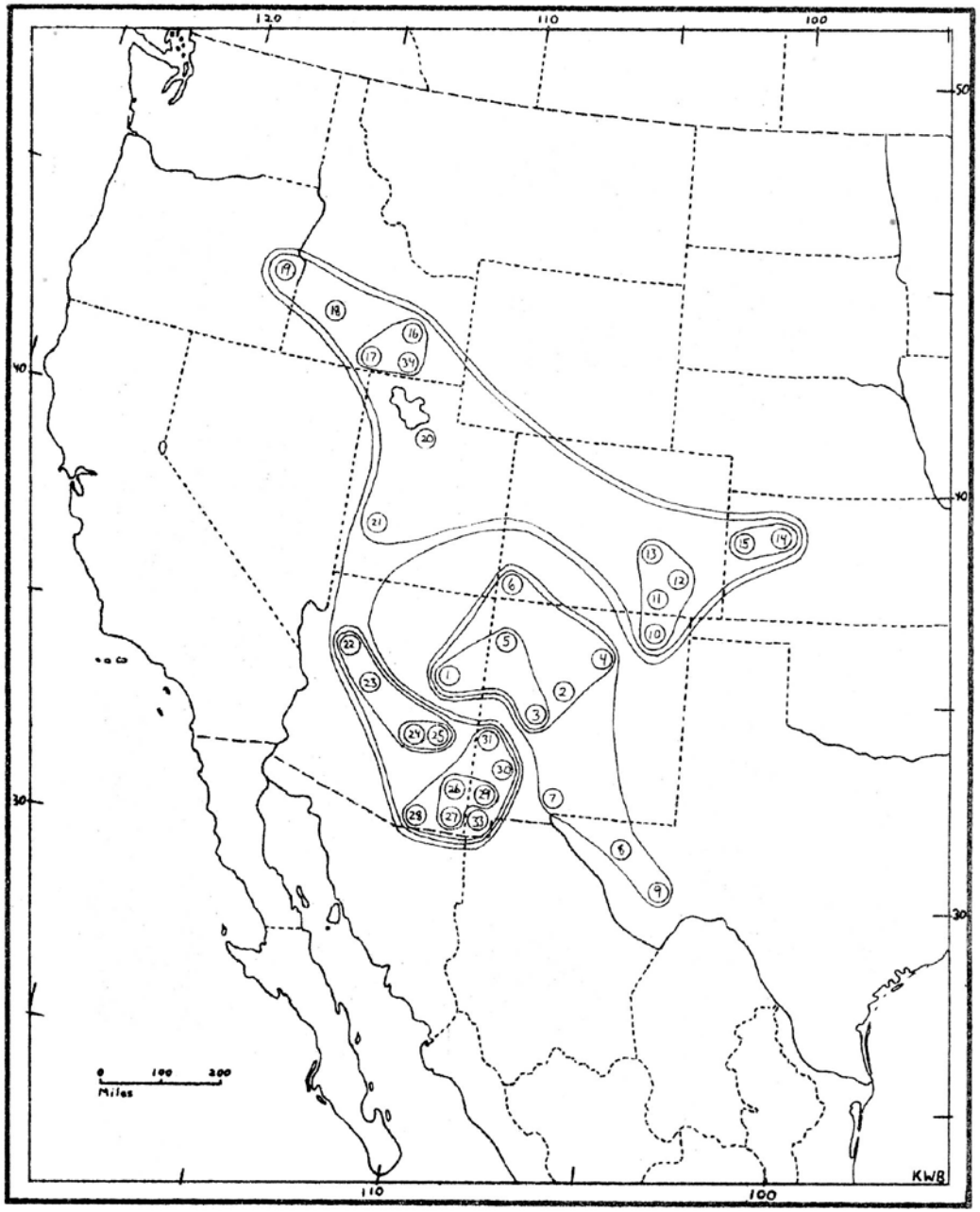


Figure 57. INTCOD study of Gonasida using all characters; contours showing geographic development of clusters.

The results were geographically very coherent, with the degree of morphological divergence directly related to geographic distance.

Kirby's conclusion was that *Gonasida* consisted only of one species that could be divided into four subspecies. Further work may show that the "subspecies" can only be considered population groups because there are almost no clear cut breaks in the pattern of geographical variation.

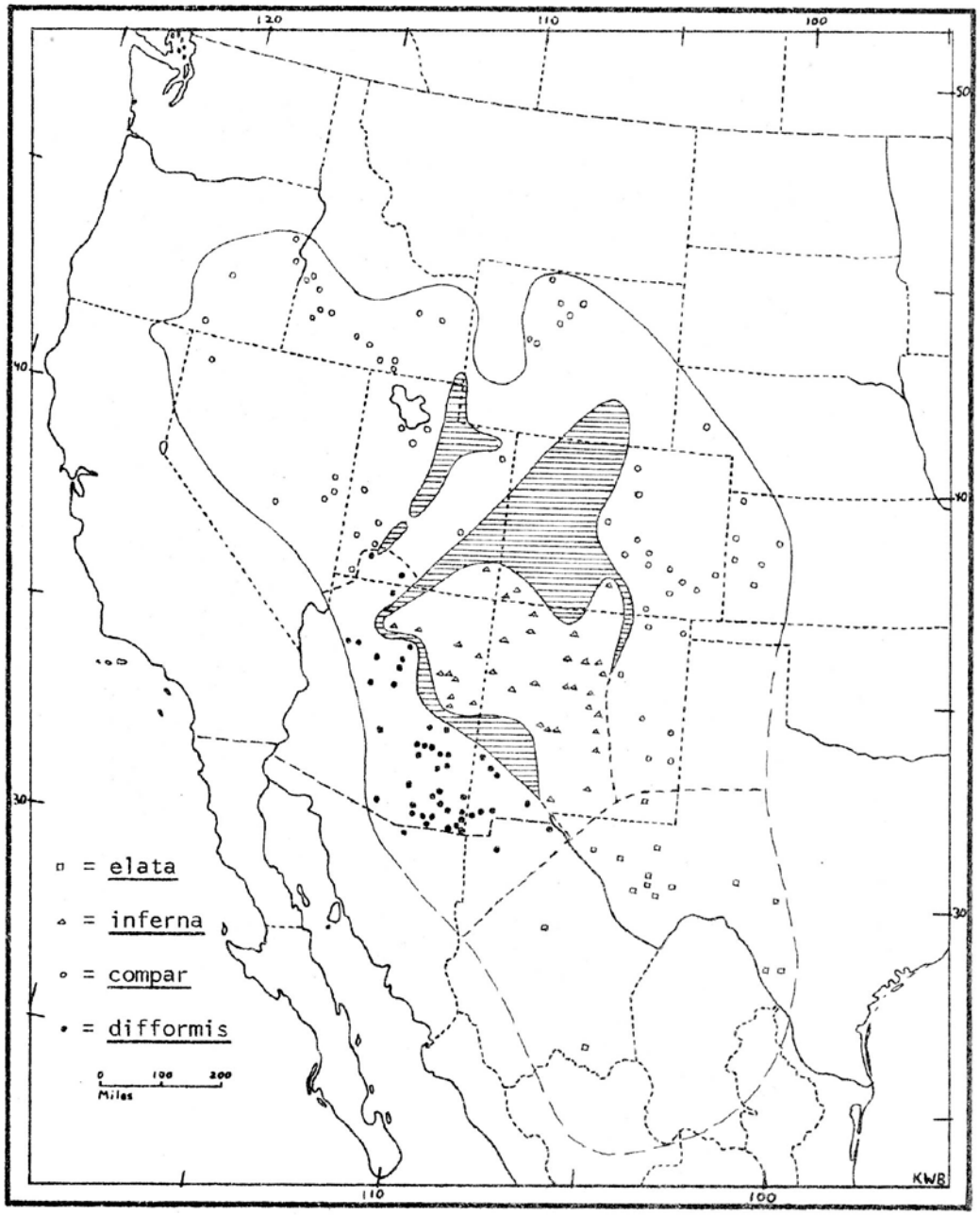


Figure 79. Distribution of the subspecies of Gonasida elata.

P. (Gonasida) elata

P. (Gonasida) inferna

P. (Gonasida) difformis

P. (Gonasida) compar [southern]

P. (Gonasida) compar [northern]

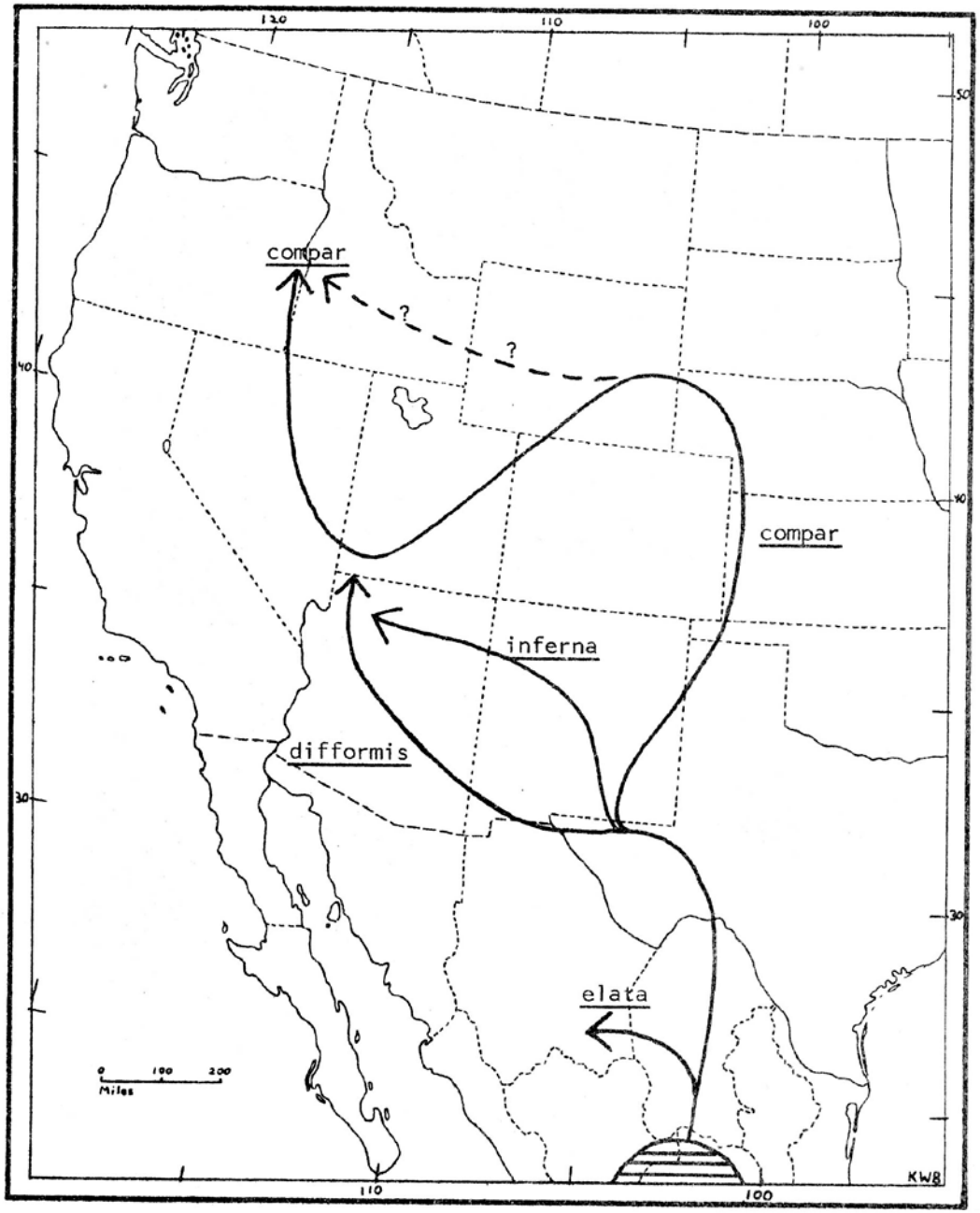
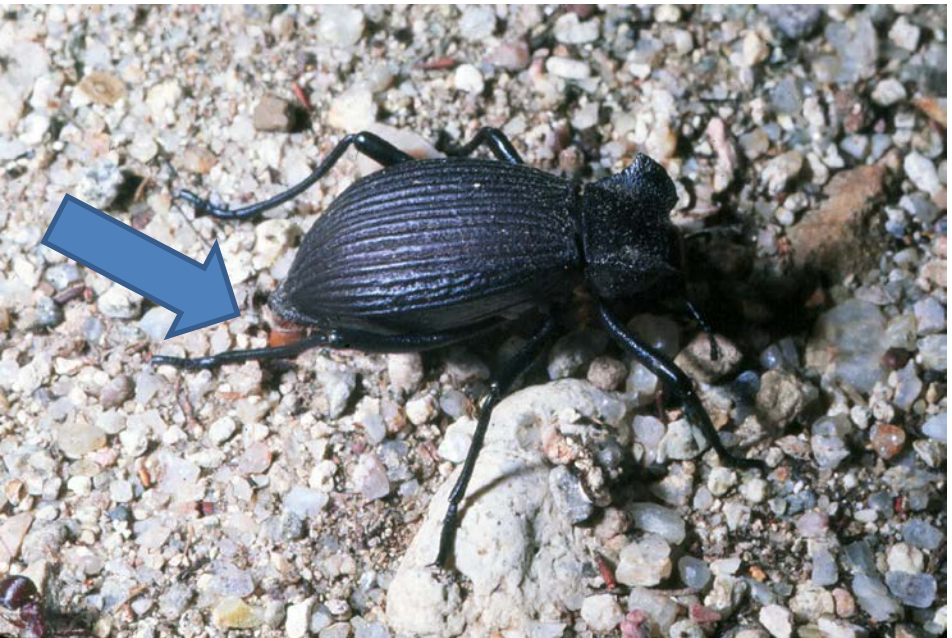


Figure 84. Hypothetical post-Wisconsin dispersal routes of the subspecies of Gonasida elata.

Kirby believes that the present distribution of *Gonasida* is very recent and that the present morphological variation has occurred within the last 12,000 years. A phylogeographic study would be very helpful with this question.

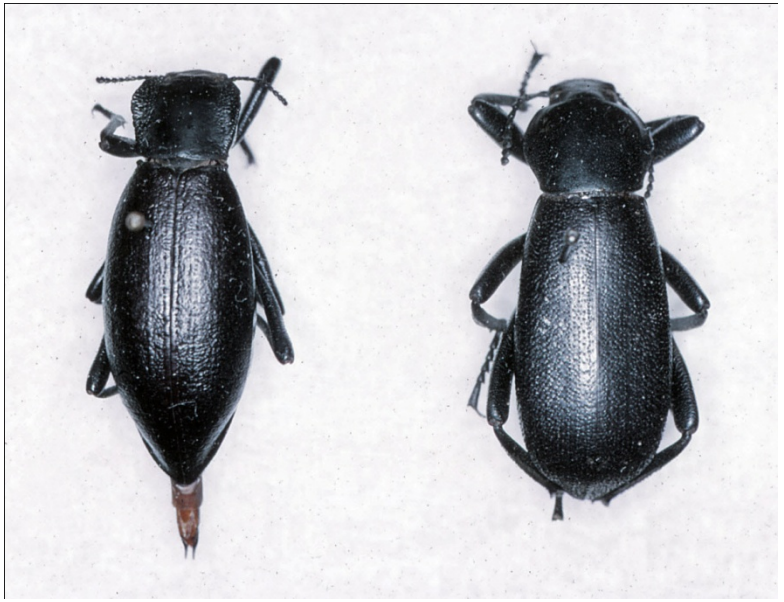


Unique for Philolithus, Gonasida is a myrmecophile, associated with *Pogonomyrmex* harvester ants. Adults forage around the nests and oviposit there. The arrow points to the ovipositor. Larvae burrow through the nest, probably feeding on food stored by the ants.

Gonasida is a superb mimic of *Eleodes obscurus* including not only appearance but imitating the head-standing behavior. It is probable that the mimicry is the driving force behind the dorsal morphological variation seen in *Gonasida.* The mimics and models shown are basically sympatric.

P. (Gonasida) difformis

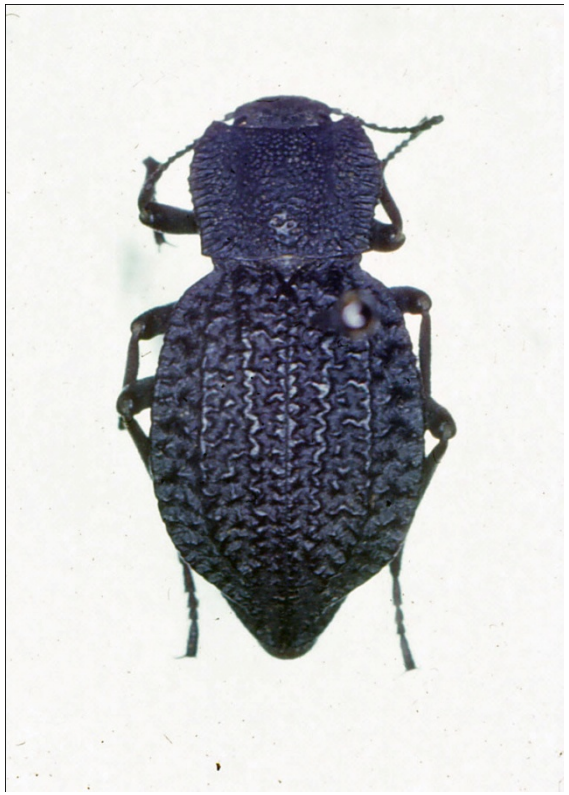
Eleodes obscurus sulcipennis



P. (Gonasida) inferna

Eleodes obscurus "dispersus"

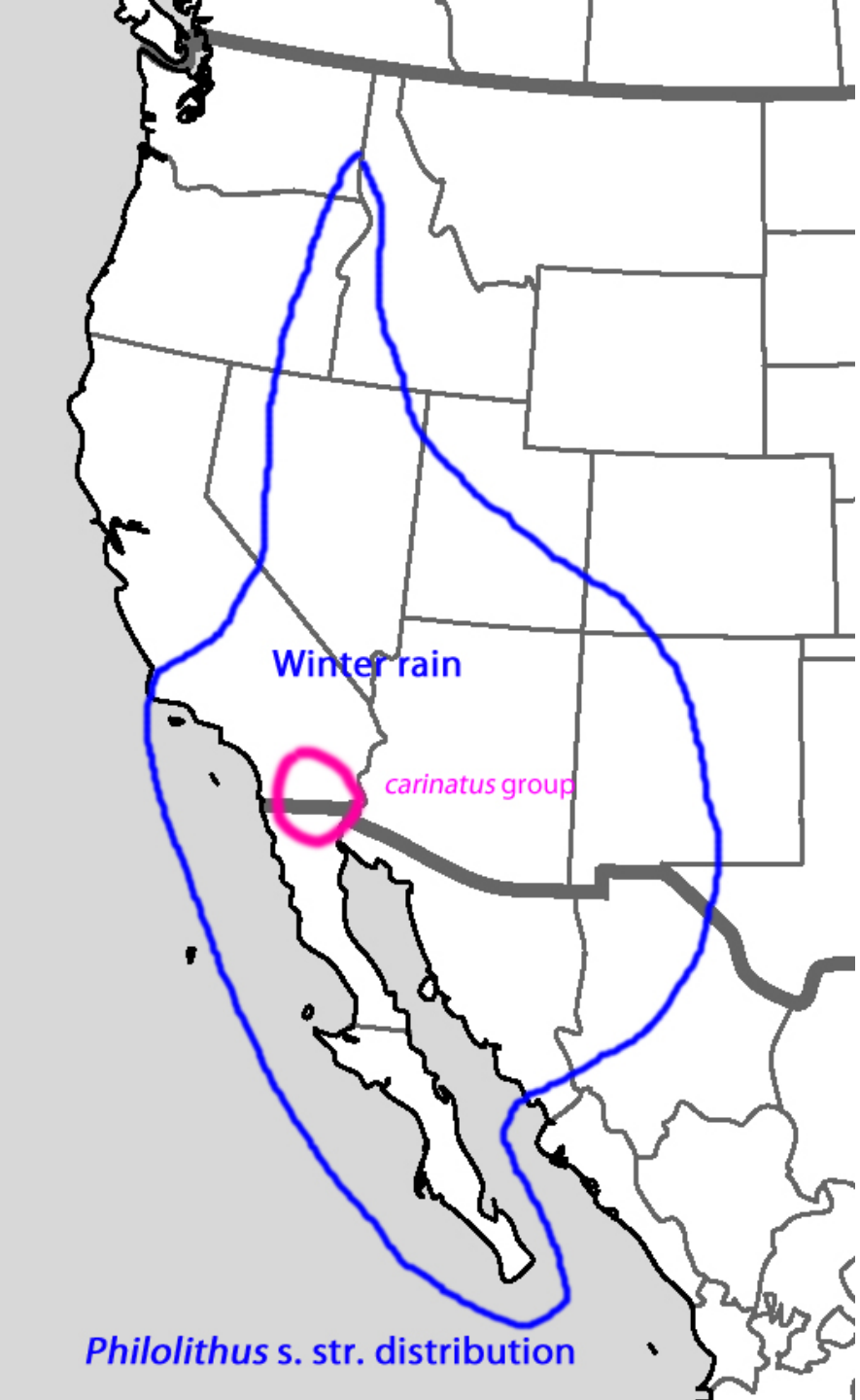
The subgenus *Philolithus* s.str. is the most diverse and outright interesting group. There are four distinct, geographically isolated species groups.



“EAT”

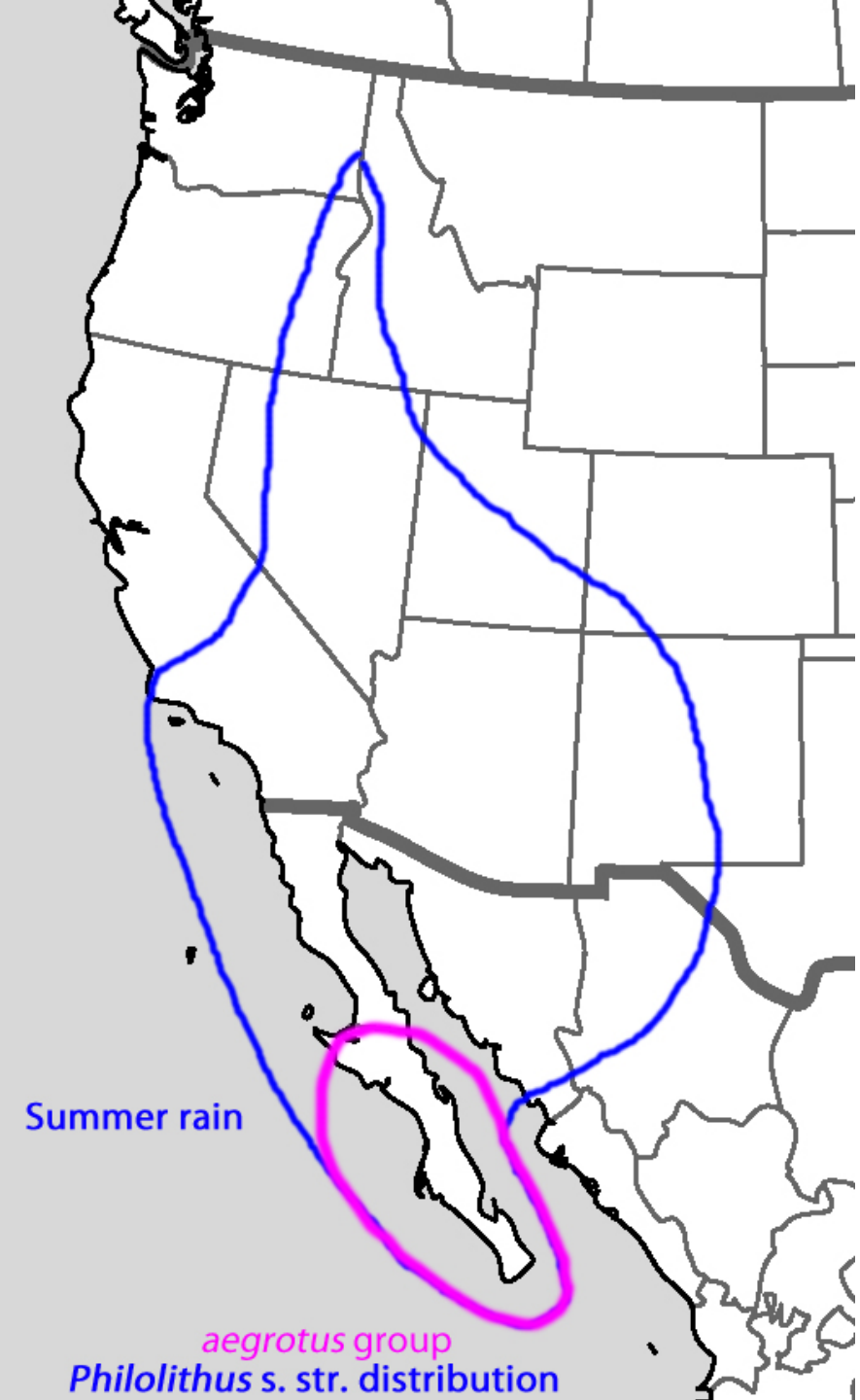
“MATE”

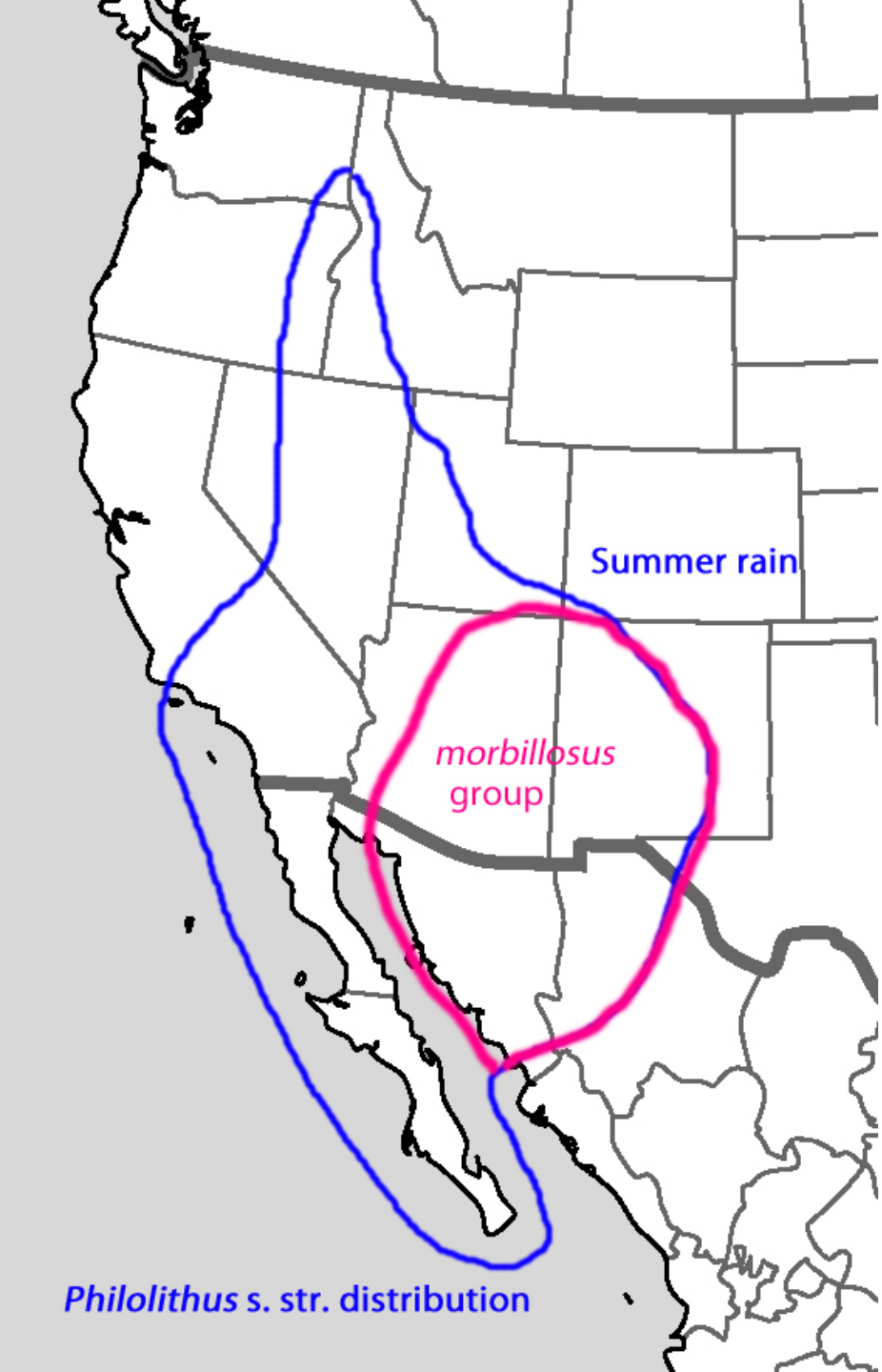
While very diverse, all species of *Philolithus* have adult occurrence in the Fall, and have a very short adult life averaging about a month. They are facultative scavengers and herbivores and can be said to live only to EAT and MATE.



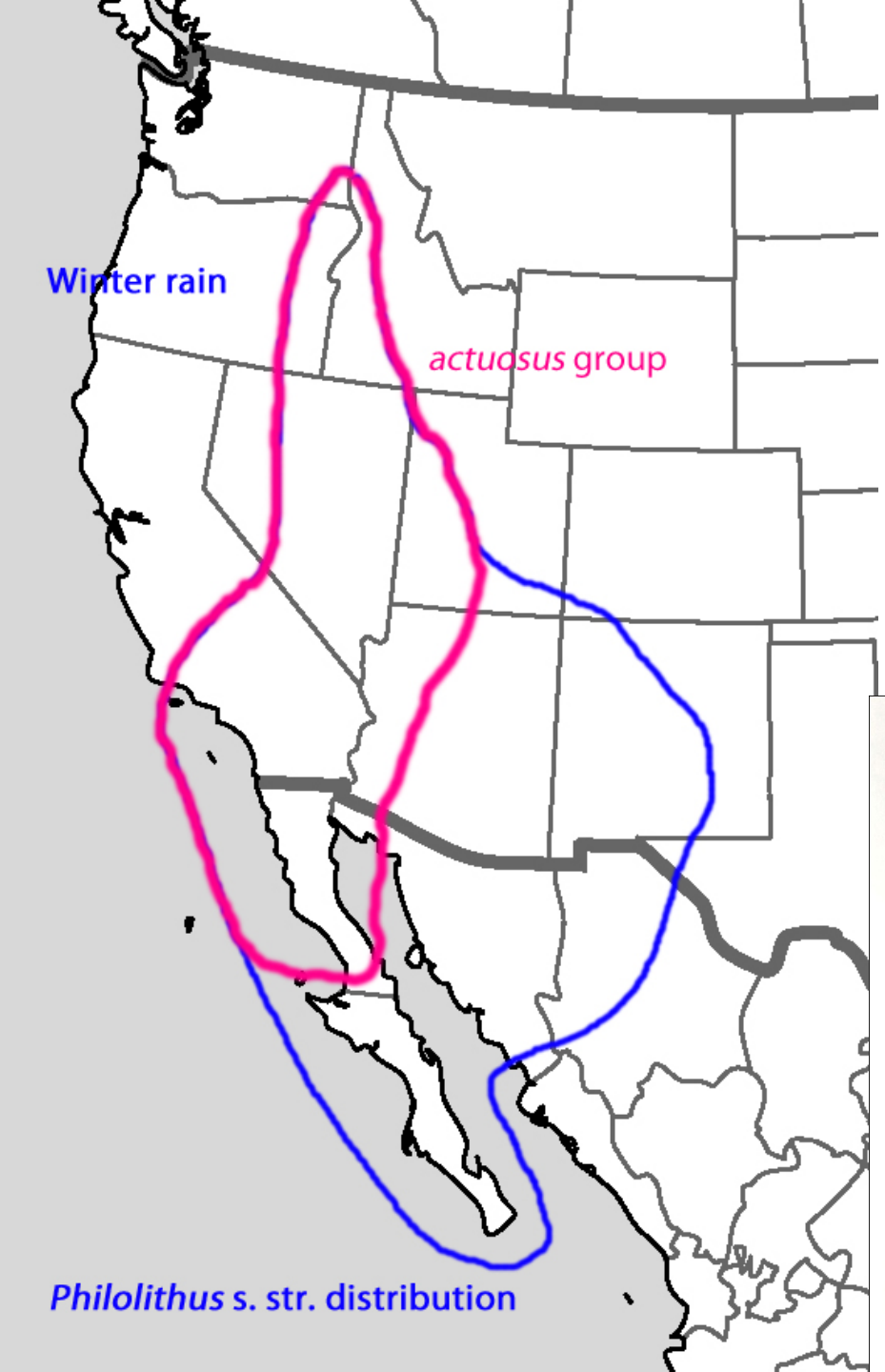
P. carinatus is the type species of *Philolithus.* There are currently 3 species in the *carinatus* group. They occupy a very small area compared to the other species groups.

The *aegrotus* group consists of 1 species confined to southern Baja California





The *morbillosus* group shows as much variation within one population as between distant populations yet presently has 10 species.

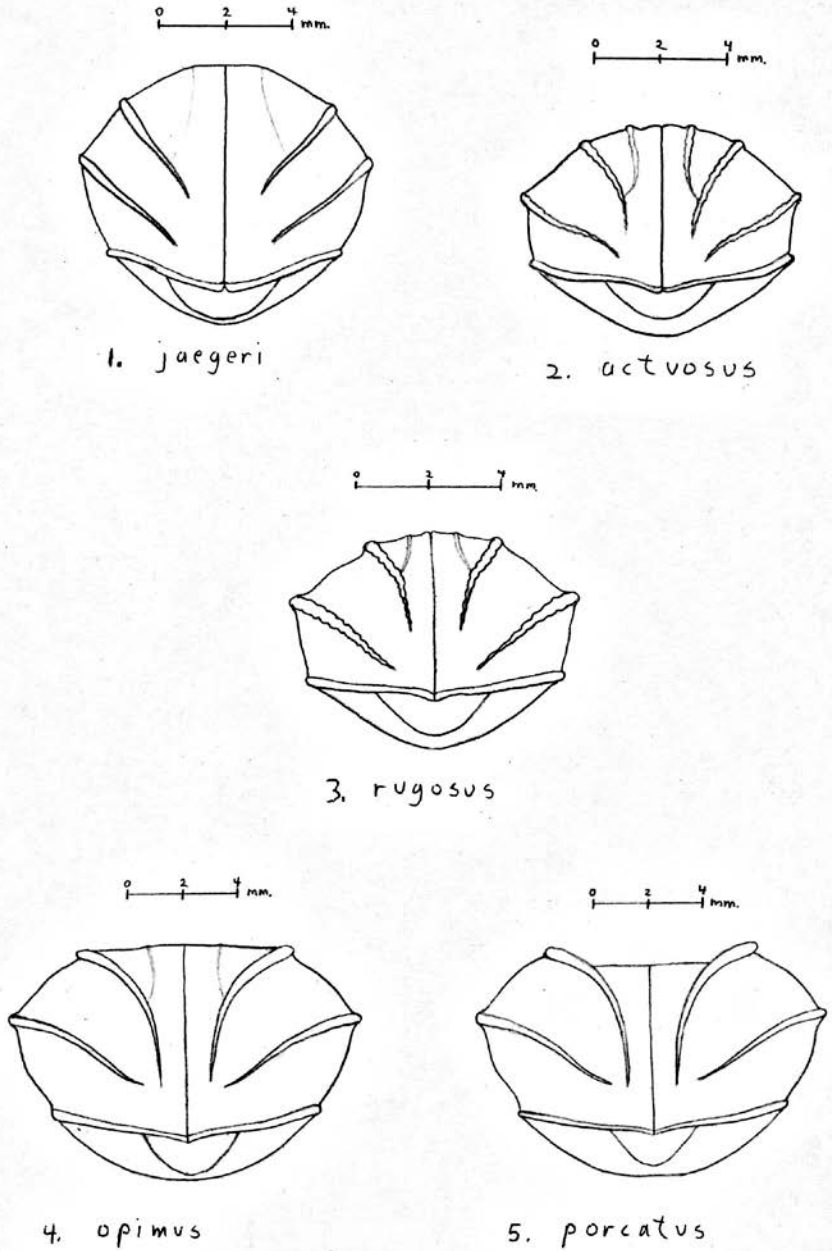


The *actuosus* group is by far the most variable, difficult and interesting group. It presently has 12 species.

N

The *actuosus* group shows a marked reduction in body size from south to north.

These drawings from Kirby's 1964 undergraduate paper on *Pelecyphorus* demonstrate the variability in elytral structure from highly inflated in *jaegeri* to flattened in *porcatus.*



Posterior view of elytra and abdomen of Pelecyphorus species. (after Papp, 1961)

The *actuosus* group is unique in the genus *Philolithus* in having enormous adult population outbreaks, a strategy that overwhelms predators. This phenomenon is so striking that it was posted on YouTube.

23 views

Why did the Philo cross the road?

running time: 00:17
added by: horseheavn
source: YouTube

Population bloom and mass migration of Philolithus densicollis, a variety of Darkling Beetle. This was shot in Benton County, Washington on September 22, 2008. In this shot, the camera is facing east, so it's clear the whole swarm is headed south, for whatever reason. This migration/bloom lasted at this level for about five weeks. This single event covered about ten acres, and there were reports of at least five other such events concurrently. It was almost biblical...

Tags:Philolithus, densicollis, darkling, beetle, migration, population, bloom, bugs, biblical, hitchcock, invasion, benton, kennewick

The *actuosus* group presents the greatest challenge. In addition to the existing 12 species there could be as many as 10 more undescribed species - - - - - - - - - - - - -

OR

perhaps it is all one big highly variable species. Some of the potential new species follow.

N. sp.? #1, Arizona

N. sp.? #2, Arizona

N. sp.? #3, Baja Cal. Norte

N. sp.? #4, Baja Cal. Norte

N. sp.? #5, Kern Co., CA

N. sp.? #6, Kern Co., CA

N. sp.? #7, Kern Co., CA

N. sp.? #8, Kern Co., CA

N. sp.? #9, Kings Co., CA

N. sp.? #10, L.A. Co., CA

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Charles Remington
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Ron Somerby
Chuck Triplehorn
Bill Warner

Here is the reason Kirby has not been active with tenebs for over 10 years. He is writing a book on his grandfather's pottery, California Faience, that operated in Berkeley from 1913 to 1959. Cheers!!