A TAXONOMIC REVISION OF THE GENUS *AKALYPTOISCHION* ANDREWS

(COLEOPTERA: LATRIDIIDAE)

by

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(Under the Direction of Joseph V. McHugh)

ABSTRACT

The genus *Akalyptoischion* is revised to include 23 species, 15 of which are new. A taxonomic treatment of the genus is provided including a morphological study, new species descriptions, keys, illustrations, and notes on *Akalyptoischion* distribution and biology.

INDEX WORDS: Latridiidae, Cucujoidea, *Akalyptoischion*, morphology, phylogeny

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CHAPTER I

INTRODUCTION

The first part of this work is a review of the biology, morphology and classification of the Coleopteran family Latridiidae. Latridiidae is a family of small, cryptic, primarily mycophagous beetles. The family is composed of 29 genera and 1050 species and is found in all regions of the world except the arctic and antarctic.

Despite their wide distribution and long history amongst taxonomists, very little is known of the biology of these beetles. Latridiids are associated with leaf litter and dead, wilting vegetation where they feed on the conidia and hyphae of many different fungi. Almost all published records on latridiid feeding behavior come from beetles reared in the laboratory, so natural food preferences are not known for the majority of the species. The genera *Revelieria* and *Enicmus* include species that feed on the spores of Myxomycetes.

The last revision of the world fauna of Latridiidae was done by Belon (1897, 1900). Several significant changes have been made to the composition of the family since Belon's work. The most notable of these changes were made by Crowson (1955), who created the current concept of the family by removing the tribes Merophysiini, Holoparamecini, and Dasycerini. The remaining two tribes, Latridiini and Corticariini, were given subfamily status. The only recent taxonomic publications on the family have been regional studies and revisions of some genera. Due to the lack of a modern revision, several nomenclatural mistakes persist in the literature and in collections. Generic names within the family have been very unstable, and there remains a great deal of uncertainty as to the definition and composition of many genera. The

family needs a phylogenetic framework to clarify the generic definitions and to bring the classification into the modern age.

The second part of this study is a taxonomic revision of the North American latridiid genus *Akalyptoischion* Andrews of the subfamily Latridiinae. This genus is limited to Western North America, occuring from Western Texas to California and from Southern Oregon and Idaho to Baja California. *Akalyptoischion* is associated primarily with broadleaf deciduous leaf litter and is most commonly collected from oak duff, though records exist from many other hardwoods, conifers and shrubs. They are also readily collected from litter within nests of wood rats in the genus *Neotoma*. *Akalyptoischion* species eat the conidia of various mold fungi. The conidia can often be observed in the alimentary canal of cleared and slide-mounted beetles. The immature stages are unknown, but they are presumed to occupy the same habitats as the adults and to feed on the same fungi. All known *Akalyptoischion* species are flightless, and thus they are best collected through Berlese extraction of leaf litter or with pitfall traps.

Akalyptoischion was described by Andrews (1976) for 8 species. This study revises the genus to include 23 species and includes new characters and redefinitions of some existing species. *Akalyptoischion* is clearly recognized within the Latridiidae by its open procoxal cavities. Other diagnostic characters are the trapezoidal head with small eyes situated at the posterior corners, the large, laterally expanded labrum, and the large, well sclerotized mandibles. The most valuable characters for species determinations are the density and form of the body setation, the size and number of foveae on the first abdominal ventrite and elsewhere on the body, the shape of the labrum, the size and shape of the mandibles, and the size and number of facets composing the eyes.

A unique morphological aspect of *Akalyptoishion* involves the structure of the tarsi. A 3-3-3 tarsal formula has been considered a diagnostic character for the Latridiidae (Andrews 2002, Crowson 1955), but in *Akalyptoischion*, an intermediate state between 3-3-3 and 4-4-4 exists. This state is present in every *Akalyptoischion* species and has not been observed in any other latridiid genus. This condition is not known in any taxa that are considered close relatives to the Latridiidae.

REFERENCES CITED

Andrews, F.G. 1976. *Akalyptoischion*, A new genus of Lathridiidae from Western North America (Coleoptera). *Occasional Papers in Entomology*, Number 22, 23 pp.

Andrews, F. G. 2002. 95. Latridiidae Erichson 1842. Pp. 395-398 *in* Arnett, R. H., Jr. & Thomas, M. C. (eds.), *American Beetles*. Volume 2. Polyphaga: Scarabaeoidea through Curculionoidea. CRC Press. Boca Raton, Florida.

Belon, M. J. 1897. Essai de classification générale des Lathridiidae avec le Catalogue systématique et alphabétique de toutes les espèces du Globe. *Revue d'Entomologie, France*, 16: 105-221.

Belon, M. J. A propos des travaux récents sur les Lathridiidae notes supplémentaires à l'Essai de Classification. *Revue d'Entomologie, France*, 19: 75-122.

Crowson, R. A. 1955. *The natural classification of the families of Coleoptera*. Nathaniel Lloyd. London, 187 pp.

CHAPTER 2

LITERATURE REVIEW

Latridiidae is a family of small, cryptic, primarily mycophagous beetles. The family is composed of 29 genera and 1050 species and is found in all regions of the world except the arctic and antarctic. Latridiidae is classified in the superfamily Cucujoidea and was placed within the highly derived cluster of cucujoid families known as the Cerylonid Series by Crowson (1955). The family displays a large amount of diversity and lacks clear diagnostic characters to hold it together other than small body size and a 3-3-3 tarsal formula. Thus it currently is only presumed to be monophyletic and is in need of a phylogenetic framework to clarify the generic definitions and to bring the classification into the modern age.

The nomenclatural history of *Akalyptoischion* is complex. In his revision of the Latridiidae of North America, Fall (1899) described a unique species that did not closely resemble any known Latridiidae. He placed this species in the genus *Cartodere* under the name *Cartodere quadrifoveolata*. In describing this species, Fall made note of the characteristic "nondilated epistoma" and the eyes, which he says are "minute, composed of few lenses, and situated very near to the hind angles, which are nearly right," but he made no mention of the open procoxal cavities that would have immediately distinguished this species from all known latridiids at that time. Walkley erected the genus *Microgramme* to include several members of *Cartodere*, including *C. quadrifoveolata*. Andrews (1976) described the genus *Akalyptoischion* to include *Microgramme quadrifoveolata* and seven new species. He derived the name of the genus from the Greek words "akalypto-" meaning "open" and "ischion" meaning "hip" referring

to the open procoxal cavities that are diagnostic for the genus. There has been no further work on the genus since this original descriptive paper.

Andrews (1976) summarizes the only known biological data for this genus. *Akalyptoischion* is collected from the leaf litter of a wide variety of trees and shrubs. It is most commonly collected from oak duff, but records exist from many other hardwood genera such as *Ilex* and *Rhus.* Some records also exist from *Pinus* and other conifers. There are also many examples of *Akalyptoischion* collected from litter within nests of wood rats in the genus *Neotoma*. All known *Akalyptoischion* species are flightless, and thus Berlese extraction of leaf litter or pitfall trapping are the only methods that can be used to collect them.

Despite the family's long history, the study of the Latridiidae is still in its infancy. The aim of this study is to provide the first step towards bringing the classification of the Latridiidae into the modern age. This revision of the genus *Akalyptoischion* includes 15 new species, which nearly triples the size of the genus. It is reasonable to expect that similar discoveries will be made in other latridiid genera as they are systematically examined and their undescribed diversity is revealed.

REFERENCES CITED

Andrews, F.G. 1976. *Akalyptoischion*, A new genus of Lathridiidae from Western North America (Coleoptera). *Occasional Papers in Entomology*, Number 22, 23 pp.

Crowson, R. A. 1955. *The natural classification of the families of Coleoptera*. Nathaniel Lloyd. London, 187 pp.

Fall, H.C. 1899. Revision of the Lathridiidae of boreal America. *Transactions of the American Entomological Society*, 26:101-190.

Walkley, L.M. 1948. Notes on nomenclature in the Lathridiini. *Proceedings of the Entomological Society of Washington*, 50:149-150.

CHAPTER 3

BIOLOGY, MORPHOLOGY, AND CLASSIFICATION OF THE LATRIDIIDAE (COLEOPTERA)[1]

[1] Hartley, Christopher S. and J.V. McHugh. To be submitted to *Handbook of Zoology*: *Coleoptera II*. R.A.B. Leschen & R.G. Beutel Eds.

Abstract

The current knowledge on the world fauna of the Coleopteran family Latridiidae is summarized. The distribution, biology, ecology, adult morphology, larval morphology and classification of the family are discussed. References to specific genera are given where needed to illustrate unique habits and morphological characters, and major publications on the family are cited.

Latridiidae Erichson, 1842

Distribution. Latridiidae is a cosmopolitan family that includes 29 genera and 1050 species (Andrews 2002). The family is thought to be most diverse in temperate parts of the world because the fauna there has been best studied, but many recent studies in the tropics are beginning to reveal the diversity of latridiids there (e.g., Andrews 1994, 1995, 1998; Dajoz 1970a, 1970b; Sen Gupta 1976, 1983). *Corticaria*, *Corticarina*, and *Melanophthalma* are the largest genera and have very widespread distributions. Other genera such as *Dienerella, Latridius, Stephostethus*, and *Metophthalmus* also have remarkably large ranges, occurring in both the Old and New World. Several species in the genera *Adistemia*, *Aridius*, *Cartodere*, *Dienerella*, *Latridius*, and *Metophthalmus* have been spread throughout the world due to their association with stored products (Hinton 1941; Kingsolver and Andrews 1991). *Akalyptoischion* and *Fuchsina* are restricted to Western North America. The genus *Adistemia*, with the exception of the cosmopolitan *A. watsoni*, is found only in Central and South America. *Rethusus* is restricted to New Zealand. Important regional studies include: Dajoz (1967, 1974); Fall (1899); Hatch (1962); Hetschko (1926); Peez (1967); Rücker (1989); Vincent (1990); Walkley (1952); and Watt (1969).

Biology and Ecology. Most adults of the subfamily Latridiinae are found in the leaf litter of various trees and shrubs, but some can be found by beating vegetation. Adults of the subfamily Corticariinae are usually encountered by beating dead or wilting vegetation. Some latridiids are occasionally found in the air conditioning systems of houses or in cellars where damp, moldy

conditions prevail. Grasses, vines, dead leaves either on a tree or on fallen branches, seedpods, haystacks, and other moldy vegetation are other likely habitats. In Western North America, certain genera (e.g., *Akalyptoischion*, *Metophthalmus*) are often collected through Berlese extraction of the litter in nests of wood rats in the genus *Neotoma*. A few latridiid species come to lights, but the majority must be sought in their native habitats. Larval habits are largely unknown, but most are presumed to share the same habitats as the adult since they feed on the same foods. Certain genera such as *Adistemia* and *Akalyptoischion* are entirely flightless, and others such as *Corticarina* include both flying and flightless species.

Most Latridiidae feed on the conidia and hyphae of various fungi as adults and larvae. Food preferences are unknown for the majority of species, but those that have been reared in the laboratory feed on fungi representing various genera including *Aspergillus*, *Penicillium*, *Mucor*, *Helminthosporium*, *Alternaria*, and *Botrytis* (Chandler 1983; Hinton 1941; Kerr and McLean 1956; pers. obs.). Lawrence (1977) collected *Enicmus maculatus* that had fed on conidia of *Hypoxylon*. Gordon (1938) reports *Dienerella* (*Cartodere*) *filum* eating spores of *Ustilago avenae* and *U. hordei*, and he notes that some of the spores were able to germinate after passing through the digestive system. *Revelieria californica* and many members of the genus *Enicmus* feed on the spores of Myxomycetes.

Adults in the subfamily Latridiinae are covered by a waxy substance that is secreted upon emergence from the pupal skin. Hammad (1953) describes the life history of *Metophthalmus serripennis* and notes that the wax is present on the body immediately upon adult emergence, long before the body has melanized to its normal dark color. This waxy exudate is quite thick in some genera (e.g., *Aridius* and *Metophthalmus*), but it is barely noticeable in others (e.g., *Enicmus*). It is not found amongst the Corticariinae. This exudate obscures many important

surface features of the body and must be removed for accurate identification. The wax can be manually removed with minuten pins or small dissecting needles, but Andrews (1976) gives a safer and more reliable method for chemical removal.

Morphology, Adult. Length about 1.0-3.0 mm. Body elongate to elongate oval, flattened to moderately convex; body rugosely sculptured (most Latridiinae) or not rugose (most Corticariinae); body glabrous (most Latridiinae) or pubescent (most Corticariinae). Head prognathus, not concealed from above by pronotum, broadening posteriorly; temples absent or up to two times longer than eye width; longitudinal carinae or foveae sometimes present. Eyes normally developed, slightly to strongly protuberant; or eyes normal size but very coarsely faceted, facet number moderately reduced to very reduced (with only a few facets); eyes lacking in some species. Antennal insertions exposed; antennal bases widely separated, inserted on frons anterior to eyes and slightly above base of mandibles. Frontoclypeal suture indistinct, clypeus on same plane as frons (Corticariinae) or frontoclypeal suture distinctly impressed, clypeus on a lower plane than frons (Latridiinae). Subgenae sometimes laterally explanate or with ridges produced on ventral head. Antennae 10 or 11-segmented, scape large and globular or bowl-shaped, pedicel enlarged and elongate, apical two or three antennomeres form a sensilla-bearing club. Labrum at least slightly visible from above, short and truncate to large and laterally expanded, embracing sides of clypeus in some genera (e.g., *Revelieria*). Mandible mostly membranous usually; large and well-sclerotized in some genera (e.g., *Akalyptoischion*, *Dienerella*); mola well-developed, apical teeth usually very small, occasionally large; prostheca well-developed to highly reduced. Maxillae with lacinia usually present but often highly reduced and indistinct, galea normally developed; maxillary palp with four palpomeres, basal palpomere small, apical palpomere cylindrical to acuminate. Labial palps two-segmented or appearing one-

segmented, with first segment vestigial. Prothorax widest anteriorly or at middle; sides evenly arcuate (Fig. 3.1), sinuate, or emarginate (Fig. 3.2), sharply narrowed posteriorly in a few (Fig 3.3). Pronotum of Latridiinae with sharp or rounded dorsal longitudinal carinae, round or transverse fovea, or unmarked, explanate sides in some; pronotum of Corticariinae usually smooth, round or transverse foveae present on posterior half in some. Pronotal punctation coarse or fine. Prosternum evenly convex, convex with fovea anterior to coxae, or with depressed areas between and surrounding coxae. Prosternal process complete or lacking, in some genera keel-like and projecting above procoxae (e.g. *Enicmus*); apex acute, sometimes expanded. Procoxal cavities circular, narrowly separated or contiguous, usually closed posteriorly, rarely open (*Akalyptoischion*). Procoxae projecting or not, with concealed lateral expansions in most species. Elytra wider than pronotum at base. Elytra cover abdomen completely except in a few species, apex rounded, truncate, or rarely acuminate, suture may be fused in flightless species; punctate in regular striae or irregularly punctate, intervals between striae may be raised or carinate; humeral angle acute in several genera; epipleura complete, narrowing posteriorly or incomplete in apical third. Scutellum small and triangular or hidden. Mesoventrite evenly convex and unembellished or with variously shaped fovea. Mesocoxal cavities circular, closed laterally, narrowly to broadly separated. Mesocoxae moderately projecting. Metaventrite with long to very short discrimen; often with foveae, sometimes foveae very deep with smaller furrows radiating from them. Metacoxae transverse, extending laterally to meet or nearly meet elytra, narrowly to moderately separated. Metathoracic wings present or absent, venation reduced to short costal and cubital veins; anal vein of variable length present in some. Trochanters conical, obliquely joined to femur or slender and elongate, perpendicularly joined to femur. Tarsi 3-3-3; in *Akalyptoischion* an intermediate state between 3-3-3 and 4-4-4 exists (Fig.

3.4). Tarsomeres usually unmodified, tarsomere I with tubercle-like projections in some; tarsomere I with densely pubescent ventral lobe, lobe as long as tarsomere II in some (e.g., *Corticarina*); claws simple, appendiculate in *Rethusus*. Abdomen with five or six ventrites, ventrite 1 with or without postcoxal lines, intercoxal process rounded or broadly truncate, fovea often present between or posterior to coxae, less often in middle of ventrite I. Aedeagus highly variable, generally a large, simple, curved tube; accessory appendages highly reduced or lost. Female genitalia are unstudied.

Morphology, Larvae. This description is derived largely from that of Lawrence (1991). Mature larvae 1-3 mm long; elongate to elongate oval. Dorsal surfaces usually lightly pigmented or with few protergal maculae, head often darker; vestiture of long scattered setae or short blunt setae with tip expanded. Head protracted and prognathous, stemmata 4 or fewer on each side, sometimes absent; antennae 3-segmented, 2nd and 3rd segments subequal and twice length of 1st, or 2nd antennomere longer than 1st or 3rd; frontoclypeal suture absent; labrum free; mandibles with apices rounded, bearing up to 4 teeth, unsclerotized except for base or base and apex, rarely sclerotized completely (e.g., *Eufallia*), sometimes with 2 long setae arising from outer edge, prostheca hyaline, rounded or acute, and fixed, mola large and tuberculate; maxillae with 3-segmented palps, lacinia rarely present, mala obtuse; mouthparts moderately to strongly protracted; labium usually with mentum and submentum fused, ligula present or absent, labial palps 1 or 2-segmented; legs well-developed, 5-segmented, tarsungulus with 1 claw; spiracles inconspicuous, annular, not raised on tubes, borne on segments 1-8; urogomphi and sclerotized abdominal tergites lacking. [Andrews 2001; Bøving and Craighead 1930; Lawrence 1991]

Phylogeny and Classification. Latreille (1825) included the Latridiidae in his family Xylophagi of the Tetramera. Gyllenhal (1827) recognized the true trimerous state of the family, but several

authors would continue to list the Latridiidae as having 4 tarsomeres into the 1840's. Curtis (1829) described a family Corticariidae, which has priority over Latridiidae but is now considered as a subfamily. Erichson (1842) was the first person to recognize a family called Latridiidae. Latridiidae has been used universally since its creation, and is maintained now because of its familiarity, although no formal proposal has been submitted to the ICZN. Belon (1897, 1902) treated the world fauna of Latridiidae. At that time, most authors divided the family into four tribes: Dasycerini, Merophysiini, Lathridiini, and Corticariini, though Belon (1897) included the Dasycerini in the Lathridiini. A fifth tribe, the Holoparamecini, was separated from the Merophysiini by Belon (1902). Crowson (1955) placed the family within the Cerylonid Series of Cucujoidea. In the same work, Crowson also moved the Merophysiini and Holoparamecini to the family Merophysiidae, elevated Dasycerini to family status, and raised the remaining two tribes to subfamily status. Currently, Merophysiidae is included in Endomychidae, and Dasyceridae is now in Staphylinidae. Latridiidae as currently defined contains two distinct subfamilies: Latridiinae and Corticariinae.

Belon (1897, 1900) was the last worker to review the generic relationships within the Latridiidae. Other workers since then have described many new latridiid genera and have synonomized some existing genera. Several genera have also been moved to other families, but the only taxonomic publications on this group have been regional studies and revisions of some genera. Due to the lack of a modern comprehensive revision for the family, several nomenclatural mistakes persist in the literature and in collections. The most common of these mistakes for the Latridiinae are described by Walkley (1948, 1952). The Corticariinae have received no treatments as a whole, but several authors have published regional works dealing with some corticariine genera (Dajoz 1966; Johnson 1972, 1974, 1977, 1989; Rücker 1987).

Ślipiński and Pakaluk (1991) comment that the family appears natural, but this question is by no means settled. The family displays a large amount of heterogeneity, and currently is only presumed to be monophyletic. The family lacks clear diagnostic characters to hold it together other than small body size and a 3-3-3 tarsal formula. Generic names within the family have been very unstable, and there remains a great deal of uncertainty as to the definition and composition of many genera. Certain genera, such as *Dienerella*, are quite heterogeneous, while many other genera have been created based on little more than a slight dissimilarity to the known species of established genera. With no phylogenetic hypothesis available for the family, the monophyly of the genera has not been established. The family needs a phylogenetic framework to clarify the generic definitions and to bring the classification into the modern age.

References Cited

Andrews, F. G. (1976): A revision of the North American species of *Metophthalmus* (Coleoptera: Lathridiidae). – *The Coleopterists Bulletin* 30 (1): 37-56.

Andrews, F. G. (1994): New species of *Metophthalmus* Wollaston from the West Indies (Coleoptera: Lathridiidae: Lathridiini). – *The Coleopterists Bulletin* 48 (2): 191-197.

Andrews, F. G. (1995): An atypical new species of *Corticarina* from the Clarion Islands, Mexico (Coleoptera: Lathridiidae: Corticariini). – *Pan-Pacific Entomologist* 71 (2): 110-112.

Andrews, F. G. (1998): A new species of *Adistemia* (Coleoptera: Latridiidae) from Costa Rica. – *Pan-Pacific Entomologist* 74 (3): 174-177.

Andrews, F. G. (2002): 95. Latridiidae Erichson 1842. Pp. 395-398 *in* Arnett, R. H., Jr. & Thomas, M. C. (eds.), *American Beetles*. Volume 2. Polyphaga: Scarabaeoidea through Curculionoidea. CRC Press, Boca Raton, Florida.

Belon, M. J. (1897): Essai de classification générale des Lathridiidae avec le Catalogue systématique et alphabétique de toutes les espèces du Globe. – *Revue d'Entomologie, France* 16: 105-221.

Belon, M. J. (1900): A propos des travaux récents sur les Lathridiidae notes supplémentaires à l'Essai de Classification. – *Revue d'Entomologie, France* 19: 75-122.

Belon, M. J. (1902): Fam. Lathridiidae. Pp. 1-40 *in* Wystman, P. (ed.) *Genera Insectorum*. Wystman, Brussels, Genera Insectorum, Cranheim.

Bøving, A. G. & Craighead, F. C. (1930): G. Cucujoidea. Key to families and subfamilies *in* An illustrated synopsis of the principle larval forms of the order Coleoptera *Entomologica Americana* 11(1-2): 33-42, pl. 25.

Chandler, D. S. (1983): Larvae of wrack Coleoptera in the families Corylophidae, Rhizophagidae, and Lathridiidae. – *Psyche* 90: 287-296.

Crowson, R. A. (1955): The natural classification of the families of Coleoptera. 187 pp. N. Lloyd, London.

Curtis, J. (1829): 311. Latridius elongatus. *in* British Entomology, being Illustrations and Descriptions of the Genera of Insects found in Great Britain and Ireland, … L. Reeve & Co., London.

Dajoz, R. A. (1966): Étude du genre *Migneauxia* (Coléoptères, Lathridiidae) et description de trois espèces nouvelles. – *Revue d'écologie et de biologie du sol* 3: 625-629.

Dajoz, R. A. (1967): Contribution a l'étude des Coléoptères Lathridiidae du Chili. – *Biologie de l'Amérique Australe* 3: 587-609.

Dajoz, R. A. (1970a): Coléoptères Lathridiidae nouveaux ou peu connus de la région néotropicale et catalogue des espèces de cette région. – *Bulletin du Muséum National d'Histoire Naturelle*, 2^{e} sér. 42 (4): 644-661.

Dajoz, R. A. (1970b): Étude des Coléoptères Lathridiidae de l'Afrique Intertropicale. – *Annales Musee Royale de l'Afrique Centrale, Serie in-8, Sciences Zoologiques* 184: 1-49.

Dajoz, R. A. (1974): Révision des *Adistemia* et *Aridius* (Col. Lathridiidae) d'Amérique du Sud. – *Annales de la Société entomologique de France* (N. S.) 10 (3): 675-687.

Erichson, W. F. (1842): Beitrag zur Insecten-Fauna van Vandiemensland, mit besonderer Berücksichtigung der geographischen Verbreitung der Insecten. – *Archiv für Naturgeschichte* 8: 122.

Fall, H. C. (1899): Revision of the Lathridiidae of boreal America. - *Transactions of the American Entomological Society* 26: 101-190, pls. 3-5.

Gordon, H. D. (1938): Note on a rare beetle, *Cartodere filum* Aubé, eating fungus spores. – *Transactions British Mycological Society* 21: 193-197, pl. 12.

Gyllenhal, L. (1827): Insecta Suecica, Classis I. Coleoptera sive Eleuterata. Vol. I, Part 4., Lipsiae.

Hammad, S. M. (1953): The immature stages of *Metophthalmus serripennis* Broun (Coleoptera: Lathridiidae). – *Proceedings of the Royal Entomological Society of London* (A) 28: 133-138.

Hatch, M. H. (1962): The Beetles of the Pacific Northwest. Part III. Pselaphidae and Diversicornia I. ix + 503 pp. University of Washington Press. Seattle.

Hetschko, A. (1926): Coleopterorum Catalogus. Pars 85. Lathridiidae. 86 pp. W. Junk, Berlin.

Hinton, H. E. (1941): The Lathridiidae of economic importance. – *Bulletin of Entomological Research* 32: 191-247.

Johnson, C. (1972): Studies on the genera *Corticarina* Reitter and *Melanophthalma* Motschulsky (Col., Lathridiidae). – *Nouvelle Revue d'Entomologie* 2: 185-199.

Johnson, C. (1974): Studies on the genus *Corticaria* Marsham (Col., Lathridiidae). Part 1. – *Annales Entomologici Fennici* 40: 97-107.

Johnson, C. (1977): Studies on the genus *Corticaria* Marsham, Part 2 (Col., Lathridiidae). – *Entomologist's Monthly Magazine* 112: 213-226.

Johnson, C. (1989): Studies on the genus *Corticaria* Marsham (Coleoptera: Latridiidae), Part 3. – *Entomologist's Gazette* 40: 79-90.

Kerr, T. W. & McLean, D. L. (1956): Biology and Control of Certain Lathridiidae. – *Journal of Economic Entomology* 49 (2): 269-270.

Kingsolver, J. M. & Andrews, F. G. (1991): 10. Minute Brown Scavenger Beetles (Lathridiidae, Coleoptera). Pp. 179-184 *in* Gorham J. R. (ed.), *Insect and mite pests in food : an illustrated*

key, Vol. 1, U.S. Department of Agriculture, Agricultural Research Service, Washington, DC.

Latreille, P. A. (1825): Familles Naturelles du Règne Animal. 570 pp. Baillière. Paris.

Lawrence, J. F. (1977): Coleoptera associated with an *Hypoxylon* species (Ascomycetes: Xylariaceae) on oak. – *The Coleopterists Bulletin* 31 (4): 309-312.

Lawrence, J. F. (1991): Lathridiidae (Cucujoidea). Pp. 497-498 *in* Stehr, F. (ed.), *Immature Insects*, Vol. 2, Kendall/Hunt Publishing Co., Dubuque, Iowa.

Peez, A. v. (1967): 58. Familie: Lathridiidae. Pp. 168-190 *in* Freude, H., Harde, K. W. & Lohse G. A. (eds.), *Die Käfer Mitteleuropas*. Band 7, Clavicornia. Goeke and Evers, Krefeld, Germany.

Rücker, H. W. (1987): Neue Arten der Gattung *Melanophthalma* Motschulsky aus der neotropischen Region (*Coleoptera: Latridiidae*). - *Entomologische Blätter* 83 (1): 1-12.

Rücker, H. W. (1989): Beitrag zur systematischen Einteilung der Familien *Merophysiidae*, *Latridiidae*, und *Dasyceridae* (*Coleoptera*). - *Entomologische Blätter* 85(1-2): 99-111.

Sen Gupta, T. (1976): Lathridiinae (Coleoptera: Lathridiidae) from India. – *Oriental Insects* 10 (1): 113-135.

Sen Gupta, T. (1983): Revision of the Indian *Stephostethus* Le Conte (Coleoptera, Lathridiidae). – *Entomologica Basiliensia* 8: 342-368.

Ślipiński, S. A. & Pakaluk, J. (1991): Problems in the classification of the Cerylonid series of Cucujoidea (Coleoptera). Pp. 79-88 *in* Zunino, M. et al. (eds.), *Advances in Coleopterology*, European Association of Coleopterology, Silvestrelli and Cappelletto, Torino.

Vincent, R. (1990): Contribution á l'étude de quelques espèces françaises de genre *Dienerellla* Reitter, 1911 [*Coleoptera, Latridiidae*]. - *Revue française d'entomologie* (N.S.) 12 (1): 29-36.

Walkley, L. M. (1948): Notes on nomenclature in the Lathridiini (Coleoptera, Lathridiidae). - *Proceedings of the Entomological Society of Washington* 50(6): 149-150.

Walkley, L. M. (1952): Revision of the Lathridiini of the state of Washington. - *Proceedings of the Entomological Society of Washington* 54(5): 217-235.

Watt, J. C. (1969): Keys to genera and some species of New Zealand Lathridiidae (Coleoptera). – *New Zealand Entomologist* 4:49-67.

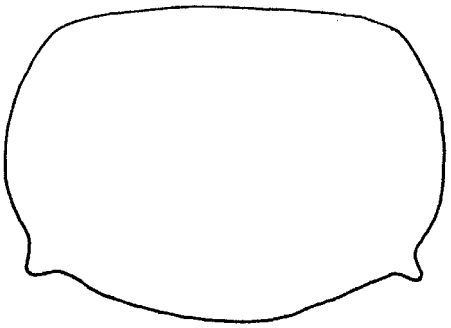
FIGURE LEGENDS

3.1. *Corticarina longipennis* pronotal outline.

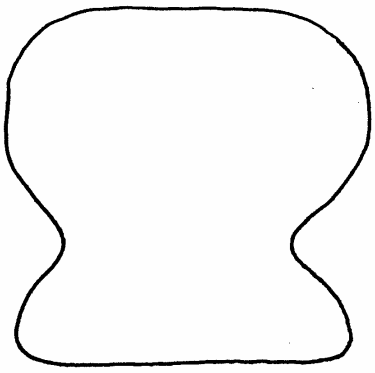
3.2. *Aridius nodifer* pronotal outline.

3.3. *Metophthalmus americana* pronotal outline.

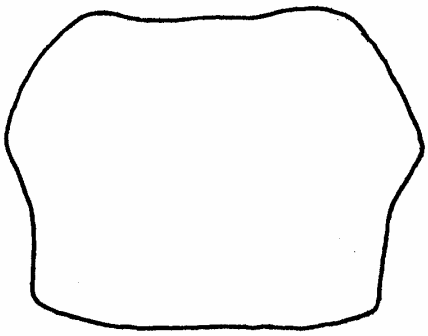
3.4. *Akalyptoischion atrichos* mesothoracic tibia and tarsus showing the pseudosegmentation of tarsomere I.



3.1



3.2



3.3

3.4

CHAPTER 4

A TAXONOMIC REVISION OF THE GENUS *AKALYPTOISCHION* ANDREWS (COLEOPTERA: LATRIDIIDAE)[2]

[2] Hartley, Christopher S., F.G. Andrews and J.V. McHugh. To be submitted to *The Coleopterist's Bulletin*.

Abstract

The genus *Akalyptoischion* Andrews is revised to include 23 species, 15 of which are new. A taxonomic treatment of the genus is provided including a morphological study, new species descriptions, keys, illustrations, and notes on the distribution and biology of *Akalyptoischion*.

Species included: *A. anasillos* Andrews, USA, CA; *A. atrichos* Andrews, USA, CA; *A. bathytrematos* sp.n., Mexico, Baja California; *A. chandleri* Andrews, USA, AZ; *A. delotretos* sp.n., USA, CA, NV; *A. diadeletron* sp.n., USA, OR, ID; *A. dyskritos* sp.n., USA, UT; *A. echinos* sp.n., USA, CA; *A. gigas* sp.n., USA, CA; *A. giulianii* Andrews, USA, CA; *A. hadromorphus* sp.n., USA, CA; *A. heptalocos* sp.n., Mexico, Baja California; *A. heterotrichos* sp.n., USA, CA; *A. hormathos* Andrews, USA, CA; *A. lasiosus* sp.n., USA, CA; *A. leptosoma* sp.n., USA, CA; *A. parechinos* sp.n., USA, CA; *A. pogonias* sp.n., USA, CA; *A. polytremetron* sp.n., USA, AZ; *A. prionotus* sp.n., USA, CA; *A. quadrifoveolata* (Fall), USA, CA; *A. sleeperi* Andrews, USA, CA; *A. tomeus* Andrews, USA, CA.

Introduction

Latridiidae is a poorly known family comprising 29 genera and 1050 species worldwide. Crowson (1955) included the family in the Cerylonid Series of the superfamily Cucujoidea. Latridiidae currently contains two subfamilies: Latridiinae and Corticariinae.

Latridiidae is in need of considerable study to bring its classification into the modern age. The family is fraught with synonyms, and the lack of a modern revision leads to specimens being misidentified or residing under old names in many collections. Very few genera have been revised, so nomenclatural confusion, overlap and flux remain in the family as a whole. These difficulties are compounded by the small size of latridiid beetles, which contributes to their poor representation in most collections and to the relatively little attention that they have received from systematists. This study is intended to resolve one aspect of the confusion within the Latridiidae.

The focus of this study is the North American genus *Akalyptoischion* Andrews of the subfamily Latridiinae. This genus is distributed throughout the Western parts of North America. Andrews (1976a) summarizes the available biological information. *Akalyptoischion* is associated primarily with broadleaf deciduous leaf litter. It is most commonly collected from oak duff, but records exist from many other hardwood genera such as *Ilex* and *Rhus*. Some records also exist from the duff of *Pinus* and other conifers. All known *Akalyptoischion* species are flightless, and thus they can only be collected through Berlese extraction of leaf litter or with

pitfall traps. There are also many examples of *Akalyptoischion* collected from litter within nests of wood rats in the genus *Neotoma*. The immature stages are not known.

Akalyptoischion species have limited dispersal abilities, and many are restricted to isolated patches of forest in unique or threatened habitats including National Forests and National Monuments. Because of these factors, the group is of potential interest to conservation biologists and biogeographers. Many species are also of interest because of the commensal relationship they have with *Neotoma* species.

Little is known about the food preferences of *Akalyptoischion*, but their habits and observations from other latridiids that have been successfully reared in the laboratory suggest that the majority feed on the conidia of various fungi as adults and larvae. Conidia can often be observed in the alimentary canals of cleared and slide-mounted specimens. Several latridiid genera have been successfully reared from fungi in the classes Phycomycetes, Deuteromycetes, and Ascomycetes (Hinton 1941, Hammad 1953, Andrews 1976b, Lawrence 1977). Because these records are of latridiids that have been reared in the laboratory, it can be said that they are able to develop successfully on these fungi, but it cannot be assumed that these fungi comprise their preferred natural food. Most species of the genus *Enicmus* and *Revelieria californica* feed on the spores of Myxomycetes.

The nomenclatural history of *Akalyptoischion* is complex. In his revision of the Latridiidae of North America, Fall (1899) described a unique species that did not closely resemble any known Latridiidae. He placed this species in the genus *Cartodere* under the name *Cartodere quadrifoveolata*. In describing this species, Fall made note of the characteristic "nondilated epistoma" and the eyes, which he says are "minute, composed of few lenses, and situated very near to the hind angles, which are nearly right," but he made no mention of the

open procoxal cavities that would have immediately distinguished this species from all known latridiids at that time. Walkley erected the genus *Microgramme* to include several members of *Cartodere*, including *C. quadrifoveolata*. Andrews (1976) described the genus *Akalyptoischion* to include *Microgramme quadrifoveolata* and seven new species. He derived the name of the genus from the Greek words "akalypto-" meaning "open" and "ischion" meaning "hip" referring to the open procoxal cavities that are diagnostic for the genus. There has been no further work on the genus since this original descriptive paper.

Materials and Methods

Specimens were initially examined using a Leica Wild M10 stereoscopic microscope. This microscope, equipped with an ocular micrometer, was used to generate the morphometrics. Slide-mounts are crucial to correctly interpret some characters, especially the mandibular measurements and those involving the punctation of the submental fovea, metasternum, abdomen and body, in general. Specimens to be slide-mounted were removed from their points by immersion in 75% ethyl alcohol or ethylene glycol depending on the glue used to secure them to the points. These specimens were then immersed in a weak potassium hydroxide solution to clear any remaining internal body tissue and to remove external debris. Removal of the debris and wax that often coats these beetles is necessary for examination of fine structures. Any debris that is not removed by soaking in potassium hydroxide can be removed by gently brushing the specimen with a fine camelhair brush or a small dissecting needle while it soaks in the potassium hydroxide solution. Cleared beetles were dehydrated by moving through a series of ethanol baths, 75%, 95% and finally 100%. Beetles were dissected in 100% ethanol then slide-mounted

in glycerin jelly for ease of subsequent manipulation. Illustrations were made using a Leica Leitz DMRB compound microscope fitted with a camera lucida.

The following institutions and individuals have graciously loaned material for this study:

CASC – Department of Entomology, California Academy of Sciences, San Francisco, CA, USA

CDAE – California Department of Food and Agriculture, Sacramento, CA, USA

CIDA – Albertson College of Idaho Collection, Caldwell, ID, USA, William Clark

EMEC – Essig Museum of Entomology, Department of Entomological Sciences, University of California, Berkeley, CA, USA, Cheryl Barr

FMNH – Field Museum of Natural History, Chicago, IL, USA, James Boone and Alfred Newton

FSCA – Florida State Collection of Arthropods, Gainesville, FL, USA, Paul Skelley

IRCW – Insect Research Collection, Department of Entomology, University of Wisconsin, Madison, WI, USA, Steven Krauth

SBMN – Santa Barbara Museum of Natural History, Santa Barbara, CA, USA, Michael Caterino

SEMC – Snow Entomological Museum, University of Kansas, Lawrence, KS, USA, Brian Beatty and James S. Ashe

UCDC – The Bohart Museum of Entomology, University of California, Davis, CA, USA, Steve Heydon

USNM – National Museum of Natural History, Smithsonian Institution, Washington, D. C., USA, Natalia Vandenberg and David Furth

Characters and Terminology

General anatomical terms used here follow the definitions presented in the Torre-Bueno Glossary of Entomology (Nichols & Schuh 1989), however, *Akalyptoischion* presents many unique characters that require additional clarification and discussion.

Setation. The setation of the entire body is a very useful character for determining the species of *Akalyptoischion*, but it also has great potential to be misinterpreted. Throughout this paper, setae will be described as either erect or decumbent. Erect setae project outwards from the body at a near perpendicular angle. They give a bristling look much like the hairs of a bottlebrush, and they may be straight to their tips or bent and recurved at their tips (Fig. 4.22). These erect setae are only found in three places: the posterior margin and rarely the lateroventral margin of the head, the lateral margin of the prothorax, and on the raised intervals and the lateral margin of the elytra. Decumbent setae may be very long, but they are much less stout than the erect setae and are recurved (Fig 4.23) or tousled. Some species have decumbent setae on the anterior part of the elytra, but the setae become erect near the elytral apex. Several species have both erect and decumbent setae interspersed. Species described as glabrous in the text actually possess microscopic setae that can only be seen on slide preparations or on scanning electron micrographs. All known species of *Akalyptoischion* have at least these microscopic setae.

Head. The head is densely punctate in most species, and the heads of species with dense punctation have a rugose appearance. The density of the punctures, especially ventrally and in the gular area, is useful for species determinations. Dorsally, there is a pair of foveae (Fig. 4.1) that are of taxonomic value. As in all members of the subfamily Latridiinae, the frontoclypeal suture is distinctly impressed and the clypeus is set at a slightly lower plane than the frons. The

clypeus narrows much more quickly than the lateral sides of the frons and is truncate anteriorly. Just posterior to the frontoclypeal suture, between the antennae, there is a broad arcuate to subrectangular fovea that is referred to as the clypeal fovea (Figs. 4.1, 4.25-4.29). Ventrally, there is a large fovea on the submentum, the submental fovea, just posterior to its juncture with the mentum (Figs. 4.31-4.35). The submental fovea is usually adorned with several large punctures and micropunctures (Fig. 4.19) that are useful for distinguishing species.

Eyes. The eyes are composed of 2-6 facets, but they vary greatly in size and may be large and prominent (Figs. 4.25, 4.27, 4.28) or small and appressed to the head (Figs. 4.26, 4.29). In some specimens, the eyes are very small and unpigmented and are thus easily overlooked. No known species of *Akalyptoischion* is eyeless.

Mouthparts. The labrum is large and projects anteriorly. Laterally, it is wider than the clypeus. The anterior margin of the labrum varies from weakly emarginate (Fig. 4.4) to deeply emarginate (Fig. 4.20), and this character is very useful for species determinations. The setation of the labrum is very long in all species, and the lateral setae are often twice the length of the median setae (Fig. 4.4). This pattern of setation can make the interpretation of the anterior labral margin difficult on point-mounted specimens. The shape of the mandibles, and the mandibular apex in particular, varies within the genus and is useful for differentiating between the species (Figs. 4.5, 4.21). The maxillae and the labium have few useful taxonomic characters.

Prothorax. The most notable characters on the prothorax are the strongly raised median portion of the pronotum and the laterally explanate sides (Fig. 4.1). The size of the median portion of the pronotum was given as a fraction of the total pronotal width by Andrews (1976a), and that approach is followed here. The length of the explanate sides is a very useful character as is the sharpness of the anterior and posterior angles of the pronotum. The pronotum bears a pair of

foveae anteriorly and a second pair posteriorly. The size and shape of these foveae is useful for distinguishing species. The prosternum has few useful characters, and the prosternal punctation is fairly uniform within the genus.

Mesosternum and Metasternum. The mesosternum is nearly devoid of characters except in a few species where it bears a distinct Y-shaped carina extending anteriorly from the mesocoxal process. The metasternum possesses a distinct fovea between the mesocoxae and a fovea posterior to each mesocoxa. These foveae all vary in size and shape. There are also arcuate or oval foveae anterior to each metacoxa. The median surface of the metasternite may be impunctate or may have scattered punctures varying in density (Figs. 4.8, 4.15).

Elytra. Other than the aspects of the setation given above, the elytra have strial interspaces 3, 5, and occasionally 1 gently raised and rounded or carinate. The term "humerus" as used in this paper refers to the most anterior lateral angle of the elytra, which may be lobed or evenly rounded.

Abdominal Ventrites. Abdominal ventrite I has a wealth of useful taxonomic characters. The intercoxal process usually has a pair of circular fovea at its anterior corners. Posterior to the metacoxae, there are two postcoxal foveae that vary greatly in size and shape (Figs. 4.43, 4.44, 4.45, 4.47, 4.48). The median surface of ventrite I may be impunctate (Fig. 4.17) or may possess many different patterns of punctures (Figs. 4.12, 4.16, 4.44). Ventrites II-V possess remarkable basal depressions that are unique within the Latridiidae (Fig. 4.12) though some other genera such as *Dienerella* possess reduced versions of them (Fig. 4.24). These basal depressions are of no use in determining species except in the singular instance of *Akalyptoischion diadeletron*.

Akalyptoischion Andrews 1976

Diagnosis. *Akalyptoischion* is distinct from all other Latridiidae in having posteriorly open procoxal cavities (Fig. 4.2). Other diagnostic characters are the large, protruding, laterally expanded labrum (Figs. 4.1, 4.25 - 4.29); small eyes situated at the posterior corners of the head (Figs. 4.1, 4.25 - 4.29); and large, well-sclerotized mandibles (Figs. 4.5, 4.21, 4.31, 4.34) .

Description. Length 0.95-1.80 mm; width 0.22-0.62 mm. Body shape elongate; dorsoventrally compressed with somewhat convex elytra (Fig. 4.1). Subglabrous to densely setose. Color uniformly light brown or reddish brown to nearly black, occasionally with head and prothorax darker than elytra.

Head prognathous, trapezoidal, narrowing anteriorly, widest posteriorly with an acute constriction posterior to eyes; frontoclypeal suture distinct. Dorsal surface densely and irregularly punctate, punctures coarse or fine. Usually a pair of distinct dorsal foveae at midline. Clypeus (Figs. 4.1, 4.25-4.29) narrowing sharply anterior to antennal insertions, truncate anteriorly, with a large crescent-shaped fovea posteriorly. Eyes (Figs. 4.1, 4.25-4.29) small, composed of 2-6 large or small facets, situated at posterior corners of head. Antennae (Fig. 4.3) eleven-segmented; antennomere I large, irregularly shaped, subglobular; II subglobular or elongate oval; III-VIII elongate, parallel sided or as long as wide, submoniliform; IX-XI enlarged to form a densely pubescent, sensilla bearing club; IX globular or elongate and widening apically, conical; X about as wide as long; XI wider than long, subrectangular or trapezoidal. Labrum large, projecting anteriorly, laterally expanded, wider than clypeus; densely setose, setae often twice length of labrum; lateral margins arcuate to slightly truncate, anterior margin slightly emarginate (Fig. 4.4) to deeply emarginate (Fig. 4.20). Mandible (Figs. 4.5,

4.21) with narrow, pointed apex with an apical tooth and up to 5 apical teeth (Fig. 4.5) or broad apex with large apical tooth and up to 3 bicuspid subapical denticles (Fig. 4.21); prostheca membranous with a fringe of long setae that are bifid subapically. Maxilla (Fig. 4.6) with lacinia distinct but highly reduced, bearing several long setae in a medial longitudinal row and at apex, galea broad, with setose apex; maxillary palp 4-segmented; palpomere I elongate, slender, curved, II large, asymmetrically inflated and round, III large and oval, IV elongate, subrectangular or acuminate. Undersurface of head usually punctate, a large transverse fovea usually apparent on the submentum immediately adjacent to its joint with the mentum (Figs. 4.19, 4.30 - 4.35). Mentum (Fig. 4.7) trapezoidal with various foveae; ligula small, undivided; labial palpi 1-segmented, palpomere large, narrowing apically with apical setose area.

Pronotum convex, median portion elevated, lateral edges explanate, sometimes greatly so; densely and irregularly punctate on elevated medial part; with 2 pairs of foveae, one anterior and one posterior, present on lateral edges and base of raised area (Figs. 4.36 - 4.41); anterior and posterior margins evenly arcuate, lateral margins arcuate to straight sided, with tubercles usually bearing setae; anterior angles gently rounded (Figs. 4.36, 4.39 - 4.41), 90° (Figs. 4.13, 4.37, 4.38), or slightly lobed (Fig 4.14); prosternum with a lateral line of punctures anteriorly and with scattered punctures posteriorly, prosternal process narrow, keeled and elevated above coxae; procoxal cavities widely open posteriorly (Fig. 4.2).

Pterothorax narrow anteriorly, gradually broadening posteriorly; mesosternum with sinuate anterior edge, usually punctate, sometimes with carinae, division between sternum and pleura very distinct posteriorly, becoming less distinct anteriorly (Fig. 4.8), mesosternal process keeled and elevated; metasternum visibly convex, inflated, usually with a deep fovea between mesocoxae, a deep fovea posterior to each mesocoxa, an oval to arcuate fovea anterior to each

metacoxa, and a long transverse fovea between metacoxae for reception of abdominal intercoxal process; median surface of metasternum may be irregularly punctate (Fig. 4.15) or without punctures (Fig. 4.42). Procoxa appearing round with concealed lateral expansions (Figs. 4.2, 4.9), mesocoxa (Fig. 4.10) and metacoxa rounded (Fig 4.11); trochanters heteromerous, femur reaching coxa; femur sparsely setose, femur of prothoracic leg deeply grooved ventrally to receive tibia (Fig. 4.9), femora of meso and metathoracic legs less deeply grooved (Figs. 4.10, 4.11); tibia narrowest and slightly curved basally, sparsely setose with a U-shaped ring of short, stout setae at apex (Figs. 4.9 - 4.11); tarsi intermediate between 3-3-3 and 4-4-4, tarsomere I apparently a composite of 2 fused segments with pseudosegmentation indicated by an annulation and by the pattern of setation (Fig. 4.18); tarsomeres otherwise simple, apical tarsomere as long as others combined, basal 2 tarsomeres with paired stout setae ventrally, apical tarsomere moderately clothed with simple setae, tarsal claws simple. Scutellum very small, triangular, hidden beneath elytra. Elytra wider than prothorax, covering entire abdomen, flattened dorsally, evenly rounded posteriorly; elytral suture connate; dorsal surface usually with 6 rows of large, single punctures, a seventh row rarely present; strial interspaces usually bear erect or decumbent setae, strial interspaces 1, 3, and 5 may be flat, gently convex or sharply carinate; metathoracic wings lacking.

Abdomen with 5 ventrites, ventrite I twice length of remaining ventrites, with a large fovea posterior to each metathoracic coxa and usually bifoveolate on intercoxal process (Figs. 4.12, 4.16), medial surface with punctures (Figs. 4.12, 4.16, 4.44) or unmarked (Fig. 4.17, 4.43, 4.45 - 4.47); ventrites II-V with a deep basal depression extending nearly across ventrite (Fig. 4.12); male genitalia a simple curved tube, accessory appendages lost.

Distribution. *Akalyptoischion* is limited to western North America, though its exact limits remain unclear. It is currently known from California to western Texas and from Baja California Sur to southern Oregon and Idaho. The new data reported here represent a significant range expansion for the genus over that originally reported by Andrews (1976a). More extensive Berlese sampling in the western United States and Mexico may further increase the known range of the genus.

Remarks. This genus superficially resembles *Dienerella*, *Metophthalmus*, and *Adistemia* in that they have small eyes composed of few facets and distinct elytral striae with large strial punctures. *Akalyptoischion* is easily distinguished from these genera and from all other Latridiidae by its open procoxal cavities and its pseudosegmented basal tarsomere.

A Key to the Species of *Akalyptoischion*

1. Antenna with a 2-segmented club 2
- Antenna with a 3-segmented club 6

2.(1) Lateral pronotal margin and dorsal surfaces of head and pronotum glabrous; elytron with very short decumbent setae on interspaces 1, 3, 5 and lateral margin only .... *A. leptosoma*

- Lateral pronotal margin and dorsal surfaces of head and pronotum setose; all elytral interspaces setose, setae short to very long 3

3.(2) Elytron and lateral pronotal margin with only short decumbent setae; setae all the same length and appressed to body ..... *A. chandleri*

- Elytron and lateral pronotal margin with much longer setae that are conspicuous and not appressed to body; elytral setae on raised interspaces longer than setae on non-raised interspaces 4

4.(3) Labrum anterior margin deeply emarginate, apex of mandibles often visible dorsally from beneath labrum ..... *A. giulianii*

- Labrum anterior margin not or slightly emarginate, mandibles not visible from dorsal view 5

5.(4) Elytron with long erect setae on interspaces 1, 3, 5 and lateral margin ..... *A. heterotrichos*

- Elytron without erect setae ..... *A. sleeperi*

6.(1) Dorsal surface of head, pronotum and elytra subglabrous, setae microscopic, visible only under high magnification (100X) 7

- Dorsal surface of head, pronotum and elytra setose, setae short or long but easily seen at low magnification (10X) 12

7.(6) Pronotum subsquare, sides not converging greatly posteriorly; pronotal foveae indistinct, 2 shallow furrows reaching across entire width of pronotum; abdominal ventrites II-V with a pair of foveae basally at midline ..... *A. diadeletron*

- Pronotum with rounded anterior corners and sides converging posteriorly (Figs. 4.2, 4.36, 4.37, 4.38); with 4 distinct pronotal foveae, abdominal ventrites II-V without foveae 8

8.(7) Ventrite I with one or two deep, conspicuous punctures on median surface (Figs. 4.12, 4.44) 9

- Ventrite I without conspicuous punctures (Figs. 4.43, 4.45) or with more than 2 faint, scattered punctures visible only on cleared, slide-mounted specimens (Fig. 4.16)) 10

9.(8) Pronotum laterally explanate with lobed anterior corners; mandibles large and visible dorsally; ventrite I with several distinct punctures on median surface .....*A. gigas*

- Pronotum only slightly explanate with evenly rounded anterior angles; mandibles smaller, not visible dorsally; ventrite I with a single puncture at midline (Fig. 4.12) .....*A. atrichos*

10.(8) Labrum anterior margin deeply emarginate (Fig. 4.26); median surface of metasternum without punctures (Fig. 4.42) ..... *A. hormathos*

- Labrum anterior margin not emarginate; median surface of metasternum with scattered punctures 11

11.(10) Ventrite I with many faint, scattered punctures on median surface visible only on cleared and slide-mounted specimens (Fig. 4.16) ..... *A. polytremetron*

- Ventrite I without punctures on median surface ..... *A. delotretos*

12.(6) Elytron with seven striae ..... *A. heptalocos*

- Elytron with six striae 13

13.(12) Elytra with erect setae on raised intervals (Fig. 4.22) 14

- Elytra without erect setae on raised intervals (Fig. 4.23) 22

14.(13) Head with erect setae present at least at posterior corners near eyes (Figs. 4.1, 4.27) 15

- Head without erect setae (Figs. 4.28, 4.29) 17

15.(14) Abdominal ventrite I impunctate on median surface; erect setae present at posterior corners of head and along lateroventral sides of head; dorsal surface of head glabrous ..... *A. pogonias*

- Abdominal ventrite I with a pair of punctures on median surface (Fig. 4.44); erect setae present only at posterior corners of head (Fig. 4.27); dorsal surface of head densely setose (Fig. 4.27) 16

16.(15) Pronotum with wide, explanate lateral sides and sharp, 90° anterior corners (Figs. 4.13, 4.37); antennomere III narrow and 2 times longer than wide, antennal club loose and club segments elongate ..... *A. hadromorphus*

- Pronotum with short lateral sides and gently rounded anterior corners (Fig. 4.36); antennomere III short, sides arcuate, antennal club shorter, club segments not distinctly elongate ..... *A. anasillos*

17.(14) Ventrite I with a pair of punctures on median surface (Fig. 4.44) 18

- Ventrite I impunctate on median surface (Figs. 4.43, 4.45) 19

18.(17) Erect setae on elytra long, stout and not recurved at the tip; eyes large and prominent (Fig. 4.28) ..... *A. dyskritos*

- Erect setae on elytra short and recurved at the tip; eyes smaller, not prominent (e.g., Fig. 4.29) .....*A. prionotus*

19.(17) Labrum anterior margin deeply emarginate (Fig. 4.29); mandibles large and often visible dorsally 20

- Labrum anterior margin not emarginate; mandibles smaller, not visible dorsally.....21

20.(19) Dorsal surface of head sparsely punctate and sparsely setose, with 2 deep, conspicuous circular foveae (Fig. 4.29); lateral pronotal margin with 2 long erect setae anteriorly and one posteriorly; elytral setation long ..... *A. tomeus*

- Dorsal surface of head densely punctate, head foveae shallower and less distinct; lateral pronotal margin without setae; elytral setation short ..... *A. echinos*

21.(19) Eye 2-faceted; elytra with both long, stout, erect setae and short decumbent setae ..... *A. bathytrematos*

- Eye 4-faceted; elytra with only short, erect setae, the tips strongly recurved ..... *A. parechinos*

22.(13) Elytra sparsely setose with very short decumbent setae all of the same length .....*A. quadrifoveolata*

- Elytra densely setose; setae longer, tousled and variable in length .....*A. lasiosus*

Akalyptoischion anasillos Andrews

Akalyptoischion anasillos Andrews 1976a: 13

Diagnosis. The elytra with long erect and decumbent setae and the erect setae on the posterior margin of the head distinguish this species.

Description. Length 1.25-1.40 mm. Width 0.35-0.45 mm. Body elongate, subparallel, uniformly brown; uniformly setose, setae long and dense. Head narrower than anterior pronotum by size of one eye facet, sides sinuate, clypeus narrowing at 45° angle anterior to antennal insertions; head foveae large, longitudinally elongate, size of eyes; head setation dense, long decumbent setae, erect setae present along posterior margin and at posterior corners near eyes; head punctation sparse and irregular, not dense; eyes 4-faceted, not or very slightly prominent; tempora length 1/2 to 3/4 eye width; hind angles acute, 90°; clypeal fovea length of antennomere II, 0.7 width of labrum; labrum anterior margin not to slightly emarginate; mandible apex pointed with 4 or 5 apical teeth, prostheca long; antennae with a 3-segmented club, antennae reach hind angles of pronotum; antennomere I irregular, wider than long, bearing a long, stout seta on its posterior face, II elongate oval, III-V slightly elongate, becoming progressively

rounder, VI-VIII globular, submonilliform, IX-XI form club, IX-X subequal, globular, XI larger than X, slightly longer than wide, subrectangular.

Pronotum widest anteriorly; anterior angles rounded, lateral margin straight-sided posteriorly and converging slightly; lateral margin slightly explanate with ~ 9 tubercles, each bearing a long erect seta; median 3/5 raised with dense, long decumbent setae; pronotal foveae transverse, distinct but shallow; pronotal punctation sparse and irregular.

Elytra subparallel, lateral flange weak, visible in anterior 1/2 only; 6 striae; humeral angle 90°; strial interspaces 3 and 5 strongly raised; dense long decumbent setae present on all interspaces, interspaces 1, 3, 5, and lateral margin also with long erect setae; epiplueron complete, narrowing apically.

Undersurface evenly setose, setae long; submental fovea deep and distinct, length of antennomere III, smooth and sparsely micropunctate; ventral head punctation even laterally, midline without punctures; gular punctation dense and concentrated in a posterior patch; prosternal punctation arranged in two lateral rows; mesosternum without sharp carinae; metasternum with a large, single fovea between mesocoxae and single foveae posterior to mesocoxae, transverse foveae anterior to metacoxae, median surface without punctures; abdominal ventrite I with 2 distinct, round foveae at anterior corners of intercoxal process, a transverse fovea posterior to each metacoxa, 2 single punctures on median surface situated below corners of intercoxal process; ventrites II-V unmodified.

Material Examined. PARATYPES, USA: label data: “Frazier Park, Los Angeles Co., Cal. I-13-1960”, “ex Berlesed from oak duff”, “E.L. Sleeper collector”, 2 on slide (6, CDAE); “Frazier Park, Los Angeles Co., Cal. I-14-1961”, “ex Berlesed from oak duff”, “E.L. Sleeper collector”, 2 on slide (4, CDAE).

Additional Material, “CALIF: Riverside Co. Bautista Canyon 4 mi. SE Valle Vista XII-16-1977 K.W. Cooper”, “ berlesed from Quercus litter at base of Yucca” (3, CDAE); “CALIF: Riverside Co 4mi SE Valle Vista II-19-78 K.Cooper debris base dead Yucca 78-56” (2, CDAE); “CALIF: Riverside Co 4mi SE Valle Vista II-1978 K.Cooper Oak litter 78-57”, 1 on slide (3, CDAE); “CALIF: Riverside Co 2mi SW Vail Lake IV-8-78 J.Moore Base of Oak 78-64” (4, CDAE); “CALIF: Riverside Co Bautista Canyon 79-103 7.7 mi. SE Valle Vista VI-1-1979 KWCooper”, “berlese Neotoma nest from exterior of fallen oak tree” (11, CDAE); “CALIF: Riverside co. Vail Lake IV-8-1980 KW Cooper & FG Andrews 80-155”, “berlese Neotoma nest at base of Quercus dumosa” (2, CDAE); “CALIF: Riverside Co. Vail Lake IV-22-1980 KW Cooper 80-162”, “Berlesed from Neotoma nest at base of Adenostoma” (2, CDAE); “CALIF: Riverside Co. Bautista Cny XII-30-1988 F.G. Andrews Berlesed from Neotoma nest (1, CDAE); “CALIF: Los Angeles Co. Bouquet Canyon 2 mi. NE Bouquet Reservoir IV-28-1982 K.W.Cooper & F.G.Andrews 82-229”, “berlese Neotoma nest in hollow of standing oak” (4, CDAE); “CALIF: Riverside Co. 2 mi. SW Vail Lake II-14-1981 81-192 J.A.Moore berlese litter base of oak”, 1 on slide (8, CDAE); “CALIF: Santa Barbara Co., New Cuyama VI-28-1975 ex Inland oak litter Hobza & Muldowney, colls.(2, CDAE); “CALIF: Riverside Co. El Carizo Oaks, Santa Rosa Mts. 3000’ VIII-24-1983 K.W. Cooper 83-256”, “Berlesed from Neotoma nest under oak” (2, CDAE); “CALIF: Santa Barbara Co. Figueroa Mt. 3400’ VIII-11-1983 K.W. Cooper 83-255”, “Neotoma nest on oak hillside” (4, CDAE); “CALIF: Riverside Co. Vail Lake XI-18-85 damp Neotoma nest under Quercus K.W. Cooper 83-260” (1, CDAE); “CALIF: Riverside Co. 2 mi. SW Vail Lake II-14-1981 81-192 J.A. Moore berlese litter base of oak” (2, CDAE); “CALIF: Kern Co. Havilah X-30-1984 Neotoma nest under oak Fred G. Andrews” (4, CDAE); “Trabuco Cyn Orange Co., Cal. 19 ”, “ex Berlesed oak duff”, “E.L. Sleeper collector” (5,

CDAE); Figueroa Mts Santa Barbara Co. 19 ", "E.L. Sleeper" (4, CDAE); "Figueroa P.C., Sta Barbara Co., Cal. V.21.1961", "E.L. Sleeper collector", 1 on slide (2, CDAE); "Cleveland Nat For. Orange Co Calif. VI-15-1957", "Ilex litter", "I. M. Newer Colr." (1, CDAE).

Remarks. This species closely resembles *A. hadromorphus* but can be distinguished by its narrower pronotum with rounded anterior angles, shorter antennomeres and shorter, more compact antennal club.

Akalyptoischion atrichos Andrews

Akalyptoischion atrichos Andrews 1976a: 10

Diagnosis. The glabrous body and abdominal ventrite I with only a single puncture on the median surface (Fig. 4.12) distinguish this species.

Description. Length 1.20-1.50 mm. Width 0.40-0.50 mm. Body elongate, subparallel, uniformly yellowish red or reddish brown to dark brown; glabrous. Head narrower than anterior pronotum by size of one eye facet, sides slightly sinuate, clypeus narrowing at 45° angle anterior to antennal insertions, clypeus densely setose; head foveae round, deep and distinct, size of eyes; head punctation very dense, conspicuous on point-mounted specimen, surface rugose; eyes large, 4 or 5 large facets, prominent; tempora size of one eye facet, hind angles obliquely angled, greater than 90°; clypeal fovea length of antennomere III, 0.6 times width of labrum; labrum anterior margin very slightly emarginate; mandible apex pointed with 5 or 6 teeth, apical tooth on a lower plane, prostheca long; antennae with a 3-segmented club, antennae reach posterior 1/3 of pronotum; antennomere I irregular, wider than long, II elongate oval, III-VIII longer than wide, becoming progressively rounder, IX-XI form club, IX elongate, conical, widening apically,

X trapezoidal, slightly wider than long, widening apically, XI parallel sided, elongate, trapezoidal.

Pronotum widest anteriorly; anterior angles rounded, lateral margin arcuate apically to parallel sided posteriorly; lateral margin explanate with ~ 12 tubercles bearing microscopic setae; median 2/3 raised; anterior pronotal foveae narrow and transverse, connected medially by a shallow transverse depression, posterior pronotal foveae broad ovals; pronotal punctation very dense like head, surface rugose.

Elytra wide, subparallel, lateral flange visible in anterior 1/2; 6 striae; humeral angle slightly lobed; strial interspace 1 gently raised, interspaces 3 and 5 strongly carinate, all interspaces glabrous; epipleuron complete, narrowing apically.

Undersurface glabrous; submental fovea deep, length of antennomere III, with 4 or 5 large punctures and few micropunctures; ventral head punctation even but sparser at midline; gular punctation even; prosternum irregularly punctate; mesosternum without sharp carinae; metasternum with a single fovea between mesocoxae and a large irregularly shaped fovea posterior to mesocoxae, a narrow, arcuate fovea anterior to metacoxae, median surface with very few scattered punctures; abdominal ventrite I with 2 distinct, circular foveae at anterior corners of intercoxal process, a transverse fovea posterior to each metacoxa, a single puncture at midline that may be circular, geminate or irregular in shape; ventrites II-V unmodified.

Material Examined. PARATYPES, USA: label data: “Seven Oaks San Bernardino Co., Cal. I.26.1963”, “Berlesed from Dry Oak Duff”, “I.M.Newell Coll.”, 1 on slide (4, CDAE).

Additional Material, “CALIF: Riverside Co. Whitewater Canyon XII-27-1979 KW Cooper 79-129”, “berlese Neotoma nest at base of Prosopia”, 2 on slide (80, CDAE): “79-125” (1, CDAE): “79-124, Rhus Ovata litter” (21, CDAE): “V-8-1977 berlese Rhus ovata litter”,

“Fred G. Andrews K.W. Cooper Collectors (2, CDAE): “IV-1-1977 Berlese-Neotoma nest K.W. Cooper” (2, CDAE); “CALIF: Riverside Co. Bautista Canyon 79-103 7.7 mi. SE Valle Vista VI-1-1979 KW Cooper”, “berlese Neotoma nest from exterior of fallen oak tree” (11, CDAE); “CALIF: Riverside Co. WhiteWater Canyon V-8-1977 berlese Rhus ovata litter”, “Fred G. Andrews K. W. Cooper Collectors” (115, CDAE); “CALIF: Riverside Co. 2 mi. SW Vail Lake II-14-1981 81-192 J.A. Moore berlese litter base of oak” (73. CDAE); “CALIF: San Bernardino Co. Redlands II-10-1980 KW Cooper 80-136”, “Berlesed from Neotoma nest” (97, CDAE); “CALIF: Riverside co. Vail Lake IV-8-1980 KW Cooper & FG Andrews 80-155”, “ berlese Neotoma nest at base of Quercus dumosa” (2, CDAE); “CALIF: Riverside Co. Bautista Canyon 7.9 mi. SE Valle Vista II-3-1980 KW Cooper 80-135”, “berlese litter under Adenostoma” (1, CDAE): “17 mi SE Valle Vista IV-30-1977 K.W. Cooper, coll.”, “Berlesed from Neotoma nest at base of oak and poison oak” (4, CDAE): 4 mi. SE Valle Vista XII-16-1977 K.W. Cooper”, “berlesed from Quercus litter at base of Yucca” (3, CDAE): “2 mi. Se Valle Vista X-2-1978 JA Moore 78-85” (2, CDAE): “12 mi. SE Valle Vista XII-16-1978 KW Cooper 78-88”, “berlese Neotoma nest in stump of cottonwood” (4, CDAE): “17 mi. SE Valle Vista 1-13-1977 K.W.Cooper F.G.Andrews”, “77-10” (1, CDAE); “CALIF: Riverside Co. 11.4 mi. SW Palm Desert V-8-1977 Fred G. Andrews & K.W. Cooper”, “Berlesed from Neotoma lepida nest in rocks” (1, CDAE); “CALIF: San Bernardino Co., Mt. San Jacinto, Strawberry Ck., W. of Mt. Center IV-3-1977 K.W. Cooper, coll.”, “Berlesed from Neotoma nest at base of oak and poison oak” (6, CDAE); “CALIF: Riverside Co. Palm Canyon Agua Caliente Reservation IV-28-1978 78-67 K.W. Cooper”, “berlese litter at base of Washingtonia filifera” (51, CDAE): “Agua Caliente Reservation XII-17-1977 K.W. Cooper” (1, CDAE); “CALIF: Riverside Co 4 mi. SE Valle Vista II-1978 K. Cooper Oak litter 78-64” (5, CDAE): “12 mi SE Valle Vista 1-30-1977

K.W. Cooper, coll.", "Oak tree hole" (4, CDAE): "12 mi SE Valle Vista 1-30-1977 K.W. Cooper, coll.", "berlesed from Neotoma nest at base of Manzanita" (2, CDAE): "2 mi. S Valle Vista XI-29-1981 K.W. Cooper 81-213", "berlese Neotoma nest in rocks under live oak" (1, CDAE): "2 mi. S Valle Vista XI-29-1981 K.W. Cooper 81-214 berlese oak litter" (1, CDAE); "CALIF: Riverside Co Bautista Canyon U.C. Reserve 78-58 III-17-78 J.Moore" (6, CDAE); "CALIF: Riverside Co. 2mi SW Vail Lake IV-8-78 J.Moore Base of Oak 78-64" (4, CDAE); "CALIF: Riverside Co. Bautista Canyon 7.9 mi. SE Valley Vista II-3-1980 KW Cooper 80-132", "berlese Neotoma nest at base of Rhus ovata" (5, CDAE); "CALIF: Riverside Co Palm Canyon VI-9-78 berlese palm litter K.W. Cooper 78-79" (4, CDAE); CALIF., Riverside Co. .5 mi S.E. Aguanga Chaparral Scrub El.2000 I-7-79 to XII-23-80 Rolf L. Aalbu col.", "Ethylene Glycol Can Trap rocky hillside" (5, CDAE); "CALIF: Riverside Co. Vail Lake III-14-1983 J. A. Moore Oak litter 83-250" (1, CDAE); "CALIF: Riverside Co. 4.4 mi. SE Sage VI-4-1983 2400' K.W. Cooper 83-254", "berlese Neotoma nest at base of Rhus ovata" (3, CDAE); "CALIF: SanBernardino Co., Wrightwood IV-15 1986 berlese Neotoma nest A.Hardy, Fred G. Andrews, T.D.Eichlin" (1, CDAE); "CALIF: Riverside Co. Bautista Cny XII-30-1988 F.G. Andrews Berlesed from Neotoma nest" (2, CDAE); "CALIF: San Bernardino Co. 2 mi. E Mentone V-15-1978 78-75 KW Cooper berlese Neotoma nest in alder" (1, CDAE); "Hemet 10 M E Riverside Co. Calif. 5-5-1984 Fred G. Andrews", "swallow nest", 1 on slide (2, CDAE); CALIF: Riverside Co. Bautista Canyon 8 mi SE Valle Vista IV-10-1977 K.W. Cooper, coll.", "Berlese Tree hole in oak" (1, CDAE); "CALIF: Inyo Co. Division Creek III-31-1981 D.giuliani antifreeze pit trap" (5, CDAE); "Cottonwood Cr. Inyo Co., Cal. X 1973", "Golden Oak", "Collector D. Giuliani" (1, CDAE); "CALIF: Inyo Co. George Ck., 6500' VI-11-1976 Berlese Quercus chrysolepis D. Giuliani, coll." (1, CDAE); "N.Fork Oak Creek Inyo Co., Cal 6000' IX.1972", "ex Black Oak

duff", "D. Giuliani collector", 1 on slide (3, CDAE): "II-27-1976", "Berlesed from Quercus Kelloggii duff", "D. Giuliani, Collector" (2, CDAE); "Angeles Crest Hwy 13.4 mi W Big Pine Ranger Sta L.A. Co., CALIF. VI.10.1957", "I. M. Newell Coll." (1, CDAE); "CALIF: San Diego Co., Borrego Sheep Cyn IV.27.55", "R. Schuster coll.", on slide (1,CDAE); "Borego San Diego Co. Calif. IV.27.55", "Sheep Cyn.", "R.O. Schuster Collector" (1, EMEC); "CALIF: Riverside Co. WhiteWater Canyon V-8-1977 berlese Rhus ovata litter", "Fred G. Andrews K. W. Cooper Collectors" (2, USNM).

Remarks. This species has a large range and has been collected in very large series. *A. atrichos* can be distinguished from all other glabrous species with a 3-segmented antennal club by the first abdominal ventrite. No other species has abdominal ventrite I with a single puncture at the midline.

Akalyptoischion bathytrematos new species

Diagnosis. The 2 faceted eyes, abdominal ventrite I with 2 small, deep foveae posterior to the metacoxae, and 6 elytral striae distinguish this species.

Etymology. Greek meaning "deep hole" referring to the small, deep postcoxal foveae on abdominal ventrite I.

Description. Length 1.30-1.50 mm. Width 0.40-0.50 mm. Body elongate, subparallel, surface shining, uniformly light amber to dark reddish brown; uniformly setose; head narrower than anterior pronotum by size of one eye facet, sides straight; head foveae distinct, deep, round, smaller than eyes; head setation dense, short decumbent setae; head punctation even, surface rugose; eyes 2 large facets, slightly prominent; tempora very short, size of one eye facet; hind angles sharp, 90°; clypeal fovea 1/2 length of scape, 0.7 times width of labrum; labrum anterior

margin slightly emarginate, mandibles slightly visible dorsally from beneath labrum; mandible apex pointed with an apical tooth and 4 subapical serrations, prostheca long; antennae with a 3-segmented club; antennae reach hind angles of pronotum; antennomere I irregular, wider than long, II elongate oval, III small, straight sided, slightly elongate, IV-V slightly longer than III, sides arcuate, VI-VIII submonilliform, IX-XI form loose club, IX large, oval, X larger than IX, oval, XI elongate, subrectangular.

Pronotum widest anteriorly; anterior angles rounded, lateral margin arcuate, converging posteriorly; lateral margin slightly explanate with ~ 11 decumbent setae; median 3/4 raised with even decumbent setae; pronotal foveae distinct, transverse, anterior pair connected medially by a shallow furrow; pronotal punctation evenly punctate.

Elytra subparallel, lateral flange present in anterior 1/2; 6 striae; humeral angle evenly rounded; strial interspaces 1, 3 and 5 raised; erect setae present on interspaces 1, 3, 5 and lateral margin, these setae curved anteriorly and erect at elytral apex, other intervals with short decumbent setae; epipleuron complete, narrowing apically.

Undersurface evenly setose; submental fovea crescent shaped, length of antennomere III, densely micropunctate; ventral head punctation even laterally, no punctures at midline; gular punctation even; prosternum sparsely punctate; mesosternum without sharp carinae; metasternum with a distinct fovea between and posterior to mesocoxae; a small, indistinct fovea anterior to each metacoxa, median surface without punctures; abdominal ventrite I without foveae on intercoxal process, with a single, deep, circular fovea posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. HOLOTYPE, label data: “MEXICO, Baja California 12.7 km East El Rosario Lat. 30°04’15”N, Long. 115°37’10”W 180m”, “ETHYLENE GLYCOL PITFALL TRAP #1 1-IV-1985 TO 2-III-1986. W. H. CLARK P.E. BLOM COLLECTORS” (CIDA).

PARATYPES, same data as holotype (2, CIDA); “MEXICO, Baja California 11.7 km East El Rosario Lat. 30°04’30”N, Long. 115°37’55”W 180m”, “ETHYLENE GLYCOL PITFALL TRAP #3 1-IV-1985 TO 2-III-1986. W. H. CLARK P.E. BLOM COLLECTORS” (2, CIDA); “MEXICO, Baja California 14.7 km East El Rosario Lat. 30°04’10”N, Long. 115°36’00”W 190m”, “7 II 1984-2 IV 1985 PITFALL TRAP km 70 #1 ETHYLENE GLYCOL W.H. Clark & P. E. Blom”, on slide (1, CDAE).

Additional Material, “MEXICO, Baja California 12.7 km East El Rosario Lat. 30°04’15”N, Long. 115°37’10”W 180m”, “ETHYLENE GLYCOL PITFALL TRAP #1 1-IV-1985 TO 2-III-1986. W. H. CLARK P.E. BLOM COLLECTORS” (2, CIDA): 12.7 km East El Rosario Lat. 30°04’15”N, Long. 115°37’10”W 180m”, “7 II 1984-2 IV-1985” (1, CIDA): “11.7 km East El Rosario Lat. 30°04’30”N, Long. 115°37’55”W 180m” (7, CIDA): “11.7 km East El Rosario Lat. 30°04’30”N, Long. 115°37’55”W 180m”, “7 II 1984-2 IV 1985” (5, CIDA): “14.7 km East El Rosario Lat. 30°04’10”N, Long. 115°36’00”W 190m”, “3-20 March 1986” (2, CIDA): “14.7 km East El Rosario Lat. 30°04’10”N, Long. 115°36’00”W 190m”, “1-IV-1985 TO 2-III-1986” (15, CIDA): “14.7 km East El Rosario Lat. 30°04’10”N, Long. 115°36’00”W 190m”, “7 II 1984- 2 IV 1985” (6, CIDA): “14.7 km East El Rosario Lat. 30°04’10”N, Long. 115°36’00”W 190m”, “9 March 1991 To: 18 July 1991”, “William H., Mary H., Cynthia J., & Karen D. Clark, & Jane C. Luther Collectors” (1, CIDA): “14.7 km East El Rosario Lat. 30°04’10”N, Long. 115°36’W Elev. 190m.”, “22 VI 1990 To: 9 III 1991”, “William H. Clark Ellen M. Clark Collectors (1, CIDA): “9.7 km E El Rosario lat 30°05’15”N, Long 115°39’00”W

140m", "7 II 1984-2 IV-1985" (1, CIDA); "MEXICO, Baja California Sur, SE base of Mesa El Tecolote, Lat. 26°59'N Long. 113°26'W. El. 120m", "PITFALL TRAP ETHYLENE GLYCOL 16 March 1991 To: 8 July 1991", "William H., Mary H., Cynthia J., & Karen D. Clark, & Jane C. Luther Collectors" (1, CIDA).

Remarks. This species resembles *A. heptalocos*, which also has 2-faceted eyes and has similar elytral setation. It may immediately be distinguished by having 6 elytral striae instead of 7.

Akalyptoischion chandleri Andrews

Akalyptoischion chandleri Andrews 1976a: 7

Diagnosis. The very short decumbent elytral setation that is appressed to the body distinguishes this species from others with a 2-segmented antennal club.

Description. Length 1.10-1.25 mm. Width 0.35-0.40 mm. Body elongate, subparallel, uniformly light brown to dark brown; uniformly setose, short setae; head narrower than pronotum by size of one eye facet, sides slightly sinuate; clypeus narrowing gradually at less than 45° angle anterior to antennal insertions; head foveae distinct, elongate ovals, slightly smaller than eyes; head setation dense, short decumbent setae; head punctation dense, apparent on point-mounted specimen, surface rugose; eyes large, 3-4 facets, prominent; tempora lacking; hind angles acute, 90°; clypeal fovea length of antennomere III, 0.6 times width of labrum; labrum anterior margin slightly emarginate; mandible apex pointed with one apical tooth and 3-4 sharp subapical serrations, prostheca long; antennae with a 2-segmented club, antennae reach posterior 1/3 of pronotum; antennomere I wider than long, a slightly irregular oval, II elongate, egg-shaped, narrowing slightly apically, III small, elongate, parallel sided, IV subequal to III,

elongate, sides arcuate, V-VIII submonilliform, IX slightly larger than VIII, globular, X-XI form club, X large, parallel sided, XI larger than X, elongate, subrectangular.

Pronotum widest anteriorly, anterior angles rounded, lateral margin arcuate, converging slightly posteriorly; lateral margin slightly explanate with ~ 12 small, indistinct tubercles each bearing a short, decumbent seta; median 3/5 raised with uniform short, decumbent setae; pronotal foveae shallow and indistinct, anterior pair transverse, posterior pair broad ovals; pronotal punctation dense.

Elytra subparallel, widest anteriorly, lateral flange nearly lacking; 6 striae; humeral angle a small but sharp lobe; strial interspaces 3 and 5 very slightly raised; short decumbent setae present on all interspaces and lateral margin; epipleuron complete, narrowing apically.

Undersurface uniformly setose, submental fovea length of antennomere II with few large punctures and scattered micropunctures; ventral head punctation even but sparser at midline; gular punctation uniform; prosternal punctation uniform; mesosternum without sharp carinae; metasternum with a single round fovea between mesocaxae and a large transverse fovea behind each mesocoxa, a large, deep arcuate fovea anterior to each metacoxa, median surface with few scattered punctures; abdominal ventrite I with 2 round or slightly irregular foveae at anterior corners of intercoxal process, a large, deep fovea equal in size to metacoxae posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "Mt. Lemon Hwy 7600' Pima Co. Ariz. x-3-1971 DS Chandler colr", "Berlese Oak duff" (CDAE).

PARATYPES, USA, same data as holotype, 1 on slide (3, CDAE).

Additional Material, "Bear Cyn. Ariz. on Mt. Lemon Hwy. Pima Co. X-3-1971 5600' DS Chandler", "Berlese Sycamore duff" (2, CDAE); "Arizona: Santa Rita Mts. Box Cyn. Jan. 17

1969", 1 on slide (4, CDAE): "April 7 1968" (1, CDAE): "Nov. 17 1968" (3, CDAE); "Madera Cyn., Ariz Sta. Cruz Co. XI-20-1971 DS Chandler colr", "Berlese Sycamore duff", 1 on slide (4, UCDC).

Remarks. This species resembles *A. sleeperi*, but it may be distinguished by its much shorter elytral setation that is appressed to the body.

Akalyptoischion delotretos new species

Diagnosis. The large, conspicuous punctation of the head and thorax both dorsally and ventrally, and the impunctate median surface of abdominal ventrite I distinguish this species.

Etymology. Greek meaning "evidently punctured" referring to the dense, distinct punctation on the dorsal and ventral surfaces of the head and thorax.

Description. Length 1.10-1.40 mm. Width 0.35-0.45 mm. Body elongate, subparallel, surface shining, uniformly reddish brown; evenly setose, setae very short, visible only under high magnification; head narrower than pronotum by size of one eye facet, sides sinuate, clypeus narrowing at 45° angle anterior to antennal insertions; head foveae somewhat indistinct, very small, circular, much smaller than eyes; head setation even, very short decumbent setae; head punctation dense, irregular, conspicuous on pointed specimen; eyes large, 4 facets, prominent; tempora size of one eye facet; hind angles rounded, 90°; clypeal fovea length of antennomere IV, 0.7 times width of labrum; labrum anterior margin not emarginate; mandible apex pointed with a sharp apical tooth and 3 sharp subapical serrations, prostheca short; antennae with a 3-segmented club; antennae reach hind angles of pronotum; antennomere I irregular, subglobular with posterior side pointed, II elongate oval, III small, straight sided, trapezoidal, IV slightly elongate,

sides arcuate, V-VIII submonilliform, IX-XI form loose club, IX elongate, suboval, X slightly wider than long, subsquare, XI parallel sided, elongate trapezoid.

Pronotum widest anteriorly; anterior angles rounded, lateral margin arcuate, converging posteriorly; lateral margin slightly explanate with ~ 12 very small tubercles each bearing a short decumbent setae; median 2/3 raised with even, very short decumbent setae; pronotal foveae distinct, anterior pair narrow, transverse, posterior pair broad ovals; pronotal punctation dense, irregular, conspicuous on pointed specimen.

Elytra subparallel, lateral flange weak, present in anterior 1/3; 6 striae; humeral angle rounded; strial interspaces 3 and 5 very slightly raised; very short decumbent setae present on all intervals; epipleuron complete, narrowing apically.

Undersurface subglabrous, setae conspicuous on abdomen; submental foveae length of antennomere III with many large punctures and very few micropunctures; ventral head punctation dense, large punctures conspicuous on pointed specimen; gular punctation irregular, large, conspicuous punctures; prosternal punctation dense, large punctures; mesosternum evenly punctate, large conspicuous punctures, with a weak Y shaped keel extending anteriorly from mesocoxal process; metasternum with a large triangular fovea between mesocoxae, a small oval fovea posterior to each mesocoxa, a narrow arcuate fovea anterior to each metacoxa, median surface densely punctate, punctures large and conspicuous on pointed specimen; ventrite I with 2 small geminate or irregular punctures at anterior corners of intercoxal process, a large irregular fovea 1/2 size of metacoxae posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "CALIF: Mono Co. White, Mts S. Fork Cottonwood, Creek VIII-28-1984, to VI-11-1985 9200', D. Giuliani", "Collected in Ethylene glycol pit trap" (CDAE).

PARATYPES, USA, same data as holotype, 1 on slide (4, CDAE).

Additional Material, "CALIF: Mono Co. White, Mts S. Fork Cottonwood, Creek VIII-28-1984, to VI-11-1985 9200', D. Giuliani", "Collected in Ethylene glycol pit trap" (1, CDAE); "CALIF: Mono Co. 9200', White Mts. S. Fork, Cottonwood Ck. VI-28-1986, to X-10-1986 D. Giuliani, Antifreeze pit trap" (1, CDAE); "CALIF: Mono Co. White, Mts S. Fork Cottonwood, Creek VI-10-1984 to, VIII-28-1984 9200', D. Giuliani", "Collected in Ethylene glycol pit trap" (1, CDAE); "CALIF: Inyo Co., 3.5mi, S, 2.5mi W DeepSpring, College III to IX-1983, 5200' antifreeze pit, trap Derham Giuliani" (1, CDAE); "NEV: Esmeralda Co., 1 mi. S, 9 mi W, Silver Peak, Silver, peak Range VII-9-77, D. Giuliani", "Berlese Cercocarpus litter" (3, CDAE); "NEVADA: Nye Co., 5mi N, 10mi E Currant 7000', Currant Smt. X-1982, to IX-83 antifreeze, pittrap D. Giuliani" (1, CDAE).

Remarks. This species closely resembles *A. polytremetron*, but it may be distinguished by the impunctate median surface of its first abdominal ventrite.

Akalyptoischion diadeletron new species

Diagnosis. This species may be known from all others by the carinae on abdominal ventrite I and the unique, foveate basal depressions on abdominal ventrites II-V.

Etymology. Greek meaning "distinct abdomen" referring to the unique abdominal foveae of this species.

Description. Length 1.25-1.30 mm. Width 0.35-0.40 mm. Body elongate, subparallel, uniformly reddish brown; head and pronotum with very short setae, elytra glabrous; head short, narrower than pronotum by width of eye, sides slightly sinuate; head foveae very shallow, indistinct, small; head setation very short decumbent setae; head punctation irregular, conspicuous on pointed specimen, surface rugose; eyes small, 4 facets, not prominent; tempora 3/4 eye width; hind angles greater than 90°, rounded; clypeal fovea length of antennomere III, 0.6 times width of labrum; labrum anterior margin slightly emarginate; mandible apex pointed, an apical tooth and 3 small subapical serrations, prostheca short; antennae with a 3-segmented club; antennae reach posterior 1/3 of pronotum; antennomere I irregular, anterior face arcuate, posterior face with a strong point, II slightly elongate, oval, III small, straight sided, length equal to width, IV-VIII submonilliform gradually increasing in size, IX-XI form club, IX wider than long, oval, X slightly larger than IX, slightly flattened, XI straight sided, elongate trapezoid.

Pronotum subsquare, equal width throughout; anterior angles 90° but rounded, lateral margin subparallel; lateral margin slightly explanate with ~ 14 small tubercles each bearing a microscopic seta; median 2/3 raised with very short decumbent setae, width of raised area not decreasing posteriorly; pronotal foveae distinct, shallow, both anterior and posterior pair connected medially by a shallow furrow; pronotal punctation dense but irregular, conspicuous on pointed specimen, surface rugose.

Elytra subparallel, lateral flange weak, present in anterior 1/3 only; 6 striae; humeral angle a sharp, acute lobe; strial interspaces 1, 3 and 5 raised, 5 raised slightly higher; all interspaces glabrous; epipleuron complete, narrowing apically.

Undersurface subglabrous; submental fovea deep, length of antennomere IV, smooth with few micropunctures; ventral head punctation dense over entire head; gular punctation dense;

prosternum evenly punctate; mesosternum without sharp carinae; metasternum with a single fovea between mesocoxae, a large, irregular fovea posterior to each mesocoxa, a large, arcuate fovea anterior to each metacoxa, median surface densely punctate with scattered punctures; abdominal ventrite I with 2 prominent carinae on outer edges of intercoxal process, 2 vague foveae bounded by carinae at anterior corners of intercoxal process, a large, irregular fovea equal in size to metacoxae posterior to each metacoxa, median surface with few scattered punctures at midline only; ventrites II-V lack typical basal depressions, each ventrite bears 3 pairs of punctures, one pair medially, one pair laterally to each side of the body; lateral pairs vague, circular; median pairs with a distinct border medially, laterally fading into ventrite surface.

Material Examined. HOLOTYPE, USA: label data: "OR: Harney Co., 13 mi N, 3 mi E Burns, VI-13-1972 5000', ex Mtn. Mahogany duff, E. M. Benedict" (CDAE).

PARATYPES, USA, same data as holotype (1, CDAE); "OR: Harney Co., 13 mi N Burns, VI-13-72 5000', Ellen Benedict" on slide (1, CDAE).

Additional Material, "Boise Co., ID, Burn Crk, 14-13-1977 5000', A. J. Allen, funneled from Ponderosa duff" handwritten label (1, CDAE); "IDAHO: Boise Co., Idaho City, 10-mile, campground, 20.VII.1982", "ponderosa litter, A. Allen" (1, FMNH)

Remarks. The foveae that occur in the basal depressions of ventrites II-V are only apparent on slide-mounted specimens. The basal depressions of ventrites II-V are not completely obliterated but rather interrupted by each pair of foveae. The carinae on the intercoxal process of ventrite I are easily seen on pointed specimens. The densely punctate, square shaped pronotum with the raised median portion not decreasing in width posteriorly and the subglabrous body are also distinctive. Carinae are also found on ventrite I of *A. gigas*, but *A.*

diadeletron is immediately distinguishable from that species by its small size, and the characters given above.

Akalyptoischion dyskritos new species

Diagnosis. The long erect and decumbent setae on the elytra, wide pronotum with sharp 90° anterior and posterior angles, distinctly transverse pronotal foveae and the absence of erect setae on the head distinguish this species.

Etymology. Greek meaning "hard to determine" referring to its similarity to *Akalyptoischion hadromorphus*.

Description. 1.30-1.65 mm. Width 0.40-0.55 mm. Body elongate, subparallel, light brown to dark reddish brown; uniformly setose, setae long; head narrower than anterior pronotum and wider than posterior pronotum, sides slightly sinuate; clypeus narrowing slightly at less than 45° angle anterior to antennal insertions; head foveae oval, elongate, nearly size of eyes; head setation even, long decumbent setae; head punctation even but sparse, surface rugose; eyes large, 4-5 facets, prominent; tempora size of one eye facet; hind angles sharp, nearly 90°; clypeal fovea short, length of antennomere V, 0.7 times width of labrum; labrum anterior margin not emarginate; mandible apex pointed with 5 or 6 teeth, apical tooth on lower plane; antennae with a 3-segmented club; antennae reach hind angles of pronotum; antennomere I irregular, wider than long, II elongate oval, III elongate, 2 times longer than wide, IV elongate, slightly longer than III, V-VII elongate, becoming shorter and rounder, VIII globular, IX-XI form loose club, IX elongate, conical, broadening apically, X subsquare, XI longer than X, subrectangular.

Pronotum widest anteriorly; anterior angles rounded, slightly lobed apically, lateral margin arcuate, converging posteriorly with a sharp 90° angle at posterior corners; lateral margin

strongly explanate with ~ 11 tubercles each bearing a erect seta; median 3/5 raised with long decumbent setae; pronotal foveae deep, transverse, reaching from lateral margin to base of raised area, anterior pair connected medially by a shallow furrow; pronotal punctation sparse, surface rugose.

Elytra subparallel, lateral flange prominent in anterior 1/2 only; 6 striae; humeral angle evenly rounded, scarcely lobed; interspace 3 raised, 5 sharply carinate; short decumbent setae present on all interspaces, interspaces 1, 3, 5, and lateral margin also with long erect setae; epipleuron complete, narrowing apically.

Undersurface evenly setose; submental fovea distinct, length of antennomere V with micropunctures; ventral head punctation sparse and only on lateral sides; gular punctation concentrated in a posterior band, dense; prosternum evenly punctate; mesosternum without sharp carinae; metasternum with a small fovea between and posterior to mesocoxae, transverse, oval foveae anterior to metacoxae, median surface without punctures; ventrite I with 2 round foveae at anterior corners of intercoxal process, a transverse, oval fovea posterior to each metacoxa, median surface with 2 single punctures, widely separated, one below each coxa; ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "UTAH: San Juan Co., 8mi. E Bluff 4600', IX-1984 to III-1985, D. Giuliani", "Collected in Etylene glycol pit trap" (CDAE).

PARATYPES, USA, same data as type, 1 on slide (4, CDAE).

Additional Material, "UTAH: San Juan Co., 8mi. E Bluff 4600', IX-1984 to III-1985, D. Giuliani", "Collected in Etylene glycol pit trap" (6, CDAE); "UTAH: San Juan Co., 8mi E Bluff III-1984 to IX-1984 4600', D. Giuliani" (2, CDAE); "UTAH: San Juan Co., Bluff 4600' IX-84 to, III-1985 D. Giuliani, Antifreeze pit trap" (2, CDAE); "UTAH: Emery Co., 24mi N, 3mi E

Hanksville, 6000’ III to IX-1985, antifreeze pittrap, Derham Giuliani coll” (3, CDAE); UTAH: Emery Co. San, Rafael Desert 32mi N, 18mi E Hanksville III-1984 to IX-1984, D. Giuliani 4600’” (1, CDAE).

Remarks. This species closely resembles *A. hadromorphus* in general appearance. *Akalyptoischion dyskritos* lacks erect setae on its head and has far fewer setae and punctures on its head and pronotum than *A. hadromorphus*. Also, the antennomeres, especially antennomere III, are shorter in *A. dyskritos* than in *A. hadromorphus*. Distribution can also separate these two species since *A. dyskritos* is limited to Utah, and *A. hadromorphus* is found in Southern California. *Akalyptoischion anasillos* is also similar but can be distinguished by the long, erect setae on its head.

Akalyptoischion echinos new species

Diagnosis. The short, erect setae on the elytra, subglabrous head and pronotum and the deeply emarginate labrum distinguish this species.

Etymology. Greek meaning “spiny” referring to the short, erect hairs on the elytra.

Description. Length 1.2 mm. Width 0.35 mm. Body elongate, parallel sided, dark reddish brown; sparsely setose; head short, width equal to pronotum width, sides sinuate; clypeus narrowing at 45° angle anterior to antennal insertions; head foveae indistinct, elongate, with a faint anterior elongation reaching clypeal fovea; head setation uniform, very short decumbent setae; head punctation dense, conspicuous on pointed specimen; eyes small, 4 facets, not prominent; tempora 1/2 eye width; hind angles 90°; clypeal fovea length of antennomer II, 0.7 times width of labrum; labrum anterior margin deeply emarginate, mandibles visible dorsally from beneath labrum; mandible apex broad with a large apical tooth and 4 subapical serrations,

the 4th very small, prostheca short; antennae with a 3-segmented club; antennae reach hind angles of pronotum; antennomere I subglobular, slightly irregular, II elongate, sides slightly flattened, apex blunt, III small, globular, IV-VIII submonilliform, growing progressively larger, IX-XI form club, IX large, subglobular, X parallel sided, slightly flattened, wider than long, XI length equal to width, trapezoidal.

Pronotum slightly wider anteriorly; anterior angles rounded, lateral margin arcuate, converging slightly posteriorly; lateral margin explanate with ~ 9 small, indistinct, tubercles each bearing a short decumbent seta; median 2/3 raised with uniform very short decumbent setae; pronotal foveae transverse, equal in size; pronotal punctation dense, conspicuous on pointed specimen.

Elytra parallel sided, lateral flange weak, present in anterior 1/3 only; 6 striae, strial punctures large; humeral angle prominently lobed; strial interspace 1 slightly raised, interspaces 3 and 5 carinate; interspaces 1, 3, 5, and lateral margin with short erect setae, other interspaces with short decumbent setae; epipleuron complete, narrowing apically.

Undersurface evenly setose, setae very short; submental fovea deep, length of antennomere II with sparse large punctures and micropunctures; ventral head evenly punctate laterally, sparsely punctate at midline; gular punctation even, not dense; prosternal punctation sparse; mesosternum without sharp carinae; metasternum with an irregular fovea between mesocoxae, a transeverse fovea posterior to each mesocoxa, a narrow, transverse foveae anterior to each metacoxa, median surface with few, widely scattered punctures; abdominal ventrite I with 2 incomplete circular foveae at anterior corners of intercoxal process, a large, irregular fovea nearly size of metacoxae posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "CALIF: Merced Co., Los Banos Valley 800', III-26-1987 F. Andrews, A. Hardy & T. Eichlin, Berlese Quercus Litter" (CDAE).

PARATYPE, USA, same data as holotype, on slide (1, CDAE).

Remarks. This species resembles *A. tomeus*, from which it can be distinguished by its densely punctate head, lateral margin of the pronotum lacking setae, and shorter elytral setation.

Akalyptoischion gigas new species

Diagnosis. This species is easily distinguished from the other glabrous species by its large, robust body, large mandibles that are easily seen from beneath the labrum and unique head foveae that connect with the clypeal fovea forming a U shape.

Etymology. Greek meaning "giant" referring to this species' large body size and robust features.

Description. Length 1.70-1.75 mm. Width 0.55-0.62 mm. Body elongate, robust, subparallel, uniformly dark reddish brown to nearly black; glabrous; head narrower than pronotum by 1/2 eye width, sides sinuate; clypeus narrowing at 45° angle anterior to antennal insertions; head foveae distinct, very narrow, elongate, connecting anteriorly with clypeal fovea to form a large U shaped fovea; head punctation dense, surface rugose; eyes large, irregularly shaped, 6 large facets, prominent; tempora lacking; hind angles short, rounded, near 90°; clypeal fovea short, deep, 1/2 length of antennomere III, 0.8 times width of labrum; labrum anterior margin slightly emarginate, laterally broad and somewhat truncate; mandibles large, easily visible dorsally from beneath labrum, apex with a large apical tooth and a subapical protuberance bearing 3 blunt teeth, prostheca long; antennae with a 3-segmented club; antennae reach hind angles of pronotum; antennomere I slightly flattened, oval, sides arcuate, II an elongate, narrow

oval, sides nearly straight, III-VIII elongate, subparallel, widening slightly apically, IX-XI form a loose club, IX large, elongate, cone-shaped, widening greatly apically, X elongate, shorter than IX, trapezoidal, widening slightly apically, XI longer than X, elongate trapezoid.

Pronotum widest anteriorly; anterior angles rounded, slightly lobed, lateral margin straight sided, converging posteriorly; lateral margin explanate with ~ 11 small, indistinct tubercles each bearing a microscopic seta; median 3/4 raised, glabrous; pronotal fovea distinct, shallow and broad; pronotal punctation dense, surface rugose.

Elytra subparallel, 2 times wider than posterior pronotum, lateral flange apparent in anterior 1/3; 6 striae; humeral angles broadly lobed; strial interspace 1 slightly raised, interspaces 3 and 5 carinate, 5 stronger than 3; elytra glabrous.

Undersurface glabrous; submental fovea large, deep, length of antennomere I with few large punctures and dense micropunctures; ventral head punctation even laterally, sparse medially; gular punctation dense but irregular; prosternal punctation even, a distinct fovea anterior to each procoxa, a sharp Y-shaped carina extends anteriorly from prosternal process; mesosternum with a sharp Y-shaped carina extending anteriorly from mesocoxal process; metasternum with a large, triangular fovea between mesocoxae, a small, oval fovea posterior to each mesocoxa, an arcuate fovea anterior to each metacoxa, median surface evenly punctate; abdominal ventrite I with 2 carinae on outer edges of intercoxal process, 2 large, geminate foveae bounded by carinae at anterior corners of intercoxal process, a large, indistinctly bordered, irregular fovea posterior to each metacoxa, median surface with several large punctures, irregularly spaced; ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "CALIF: Inyo Co. Inyo Mts., Middle Lead Canyon VI-4-80 to IX-12-80 D. Giuliani coll.", "Antifreeze pit trap in grassy riparian side canyon" (CDAE).

PARATYPE, ♂, USA: label data: "CALIF: Inyo Co. Inyo Mts., Upper Lead Canyon VI-4-80 to IX-12-80 D. Giuliani coll.", "Antifreeze pit trap in willows on bank above stream", on slide (1, CDAE).

Additional material, "Tin Mtn. Inyo Co., Cal. VII.19.1975", "D. Giuliani Collector" (1, CDAE).

Remarks. This species resembles *A. atrichos* but is easily distinguished by its large, visible mandibles and many punctured abdominal ventrite I.

Akalyptoischion giulianii Andrews

Akalyptoischion giulianii Andrews 1976a: 6

Diagnosis. The very long elytral setae and lateral pronotal setae, small eyes, emarginate labrum and 2-segmented antennal club distinguish this species.

Description. 1.10-1.30 mm. Width 0.35-0.40 mm. Body elongate, parallel, light yellowish brown to dark brown, pronotum and head often one shade darker than elytra; densely setose; head broad, narrower than pronotum by one eye width, sides sinuate, anterior head width equals 1/2 posterior head width; clypeus narrowing gradually at less than 45° angle anterior to antennal insertions; head foveae large, broad, shallow ovals, larger than eyes; head setation dense, long decumbent setae; head punctation even and dense, surface rugose; eyes small, 3 or 4 facets, not prominent, appressed to head; tempora size of one eye facet; hind angles 90° but rounded and long; clypeal fovea length of antennomere II, 0.6 times width of labrum; labrum

anterior margin evenly and deeply emarginate, mandibles often visible dorsally from beneath labrum; mandible apex pointed with an apical tooth and 4 large subapical serrations, prostheca long; antennae with a 2-segmented club; antennae reach hind angles of pronotum; antennomere I irregular, wider than long, II elongate oval, III small, length equals width, IV-V slightly elongate, VI-VIII submonilliform, IX slightly larger, globular, X-XI form club, X large, subglobular, XI larger than X, parallel sided, elongate trapezoid.

Pronotum widest anteriorly, anterior angles rounded but 90°, lateral margin straight sided and converging posteriorly; lateral margin explanate with ~ 12 very small tubercles each bearing a long decumbent seta, one pair of setae anteriorly and one pair posteriorly twice the length of the others; median 2/3 raised with dense, long decumbent setae; pronotal foveae shallow and indistinct, anterior pair transverse, posterior pair broad ovals; pronotal punctation even, not dense, surface rugose.

Elytra parallel, lateral flange not apparent except at very basal part; 6 striae; humeral angle rounded, slightly lobed; strial interspaces 3 and 5 raised, interspace 5 stronger than 3; long decumbent setae present on every interspace, setae on interspaces 3, 5 and lateral margin very long, some erect but with recurved tips, not stout; epipleuron complete, narrowing apically.

Undersurface evenly setose, setae long, decumbent; submental fovea deep, length of antennomere III, sparse micropunctures only; ventral head punctation even on entire head; gular punctation uniform but more concentrated posteriorly; prosternal punctation even; mesosternum without sharp carinae; metasternum with a single fovea between mesocoxae and a small fovea posterior to each mesocoxa, a large transverse fovea anterior to each metacoxa, median surface with scattered punctures laterally but none at midline; abdominal ventrite I with 2 very small, indistinct punctures at anterior corners of intercoxal process, a large, deep fovea equal in size to

metacoxae posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. PARATYPES, USA: label data: “Independence Creek Inyo Co., Cal. XII.1972”, “Berlesed from Black Oak Duff”, “D. Giuliani Collector”, 1 on slide (2, CDAE).

Additional Material, “Independence Creek Inyo Co., Cal. XII.1972”, “Berlesed from Black Oak Duff”, “D. Giuliani Collector” (1, CDAE); “Coyote Cr 7 mi SW Bishop, Cal. Inyo Co 7500’ XI.1972”, “Berlesed from Pinon duff”, “D. Giuliani Collector” (1, CDAE); “2 mi SW Big Pine, Cal Inyo County XI.1972”, “Berlesed from Ceanothus duff”, “D. Giuliani Collector” (1, CDAE); “Division Creek Inyo Co., Cal. IX-1972 5800’”, “Berlesed from Oak Duff”, “D. Giuliani coll.” (1, CDAE); “CALIF: Inyo Co. Division Creek 5000’ VI-17-1980 D. Giuliani F80-26”, “Berlese Neotoma nest at base of Quercus kelloggii”, 1 on slide (19, CDAE); “III-31-1981 to VII-23-1981 D. Giuliani antifreeze pit trap” (4, CDAE); “5700’ Sierra Nevada Mts. VII-23-81/XI-22-1981 D. Giuliani”, “Antifreeze pit trap in oak woodland” (1, CDAE); “N. Fork Oak Creek Inyo Co. Cal 6000’ IX.1972”, “ex Black Oak Duff”, “D. Giuliani collector”, 1 on slide (3, CDAE); “Piñon Creek Inyo Co., Cal. VI-11-1976”, “Berlesed from Quercus chrysolepis duff”, “D. Giuliani Collector” (1, CDAE); “Cottonwood Creek 5600’ Inyo Co., Cal. X-1972”, “Berlesed from Golden Oak Duff”, “D. Giuliani Collector” (1, CDAE); “Last Chance Mts Inyo Co., Cal. VI-20-1973”, “ex Piñon 8000’”, “Collector D. Giuliani” (1, CDAE); “CALIF: Inyo Co. 2 mi SW Big Pine II-6-1976 D.Giuliani, coll.” (2, CDAE); “CALIF: Inyo Co. 2 mi. W Lone Pine 4400’, Alabama Hills III-31/IX-11-1981 D. Giuliani, pit trap” (1, CDAE); “CALIF: Inyo Co. White Mts 4miN,4miE Big Pine VIII-28-1984 to VI-11-1985 5000’ D.Giuliana”, “Collected in Ethylene Glycol pit trap” (2, CDAE): “6.5miN7.5miE Big Pine VIII-28-1984 to VI-11-1985 7000’ D.Giuliani”, “Collected in Ethylene Glycol pit trap” (3, CDAE); “CALIF: Inyo Co. White

Mts. Cedar Flat, 7300' 11 mi. NE Big Pine, VIII-16-1992, D.Giuliani Pinus monophylla duff" (2, CDAE); "CALIF: InyoCo. Saline Valley Grapevine Canyon XI-23-1983 to I-10-1985 5000' D.Giuliani", "Collected in Ethylene glycol pit trap" (1, CDAE); "CALIF: InyoCo., 1.5mi N, 6.5mi N Independence , Willow Springs Cyn 4600' I-3-84 to VI-1-84 D.Giuliani", "Collected in Ethylene glycol pit trap" (1, CDAE); " CALIF: Inyo Co. Deep Springs Valley, near Buckthorn Springs 4950' VI-27-1984 to V-9-1986 D. Giuliani", "Antifreeze pit trap" (1, CDAE); "CALIF: Mono Co. Owens River Gorge 6640' X-24-1982toX-18-1983 D.Giuliani Antifreeze Pittrap" (1, CDAE); "CALIF: Mono Co. 1.5mi E Toms Place X-24-1982 to X-18-1983 7000' Sandy habitat D.Giuliani", "Collected in Ethylene glycol pit trap" (1, CDAE).

Remarks. The setae in this species are among the longest found in the genus, and the setae borne on the elytra may be both erect and decumbent. See remarks under *A. heterotrichos* for further discussion of erect versus decumbent setae.

This species is similar to *A. heterotrichos* and *A. sleeperi*. It may be distinguished from *A. heterotrichos* by its emarginate labrum, wide head, smaller eyes that are not prominent, and denser setation and punctation on the head and pronotum. It may be distinguished from *A. sleeperi* by its much longer setae, especially on the elytra and the lateral margin of the pronotum.

Akalyptoischion hadromorphus new species

Diagnosis. The long, erect and decumbent setae on the elytra, erect setae on the head and the wide pronotum with sharp 90° anterior and posterior angles distinguish this species.

Etymology. Greek meaning "well-developed shape" referring to the large, robust body and the long, erect and decumbent setae present on the dorsal surface.

Description. Length 1.40-1.80 mm. Width 0.50-0.60 mm. Body elongate, subparallel, uniformly reddish brown; uniformly setose, setae long; head narrower than pronotum by one eye width, sides sinuate; clypeus narrowing at 45° anterior to antennal insertions; head foveae deep, oval, size of eyes; head setation dense, long decumbent setae, stout, erect setae present at posterior corners near eyes; head punctation even, surface rugose; eyes large, 4 or 5 facets, prominent; tempora short, size of one eye facet; hind angles sharp, 90°; clypeal fovea length of antennomere I, 0.6 times width of labrum; labrum anterior margin not emarginate, mandibles slightly visible dorsally from under labrum; mandible pointed with 6 teeth, the 6th small, apical tooth on a lower plane, prostheca short; antennae with a 3-segmented club; antennae reach hind angles of pronotum; antennomere I subglobular, bearing a long stout seta on its posterior face, II elongate oval, III narrow, 3 times longer than wide, IV-VII elongate, sides arcuate, VIII subglobular, IX-XI form loose club, IX large, elongate, broadening apically, X subequal to IX, sides arcuate, XI elongate, subrectangular.

Pronotum wider than long, anterior angles sharp, 90° to slightly lobed, lateral margin arcuate, posterior angles sharp, 90°; lateral margin strongly explanate with ~15 distinct tubercles all bearing setae, 5 stout, erect setae interspersed with decumbent setae; median 3/5 raised with dense, decumbent setae; pronotal foveae distinct, transverse, occupying all of explanate area; pronotal punctation dense.

Elytra subparallel, lateral flange present in anterior 1/3 only; 6 striae; humeral angle moderately lobed; strial interspaces 3 and 5 carinate; every interspace with long decumbent setae, interspaces 1, 3, 5 and lateral margin also with long erect setae interspersed; epipleuron complete, narrowing apically.

Undersurface evenly setose; submental fovea large, length of antennomere II, scarcely micropunctate; ventral head punctation even laterally, no punctures at midline; gular punctation even; prosternum evenly punctate; mesosternum with a weak Y shaped carina extending anteriorly from mesocoxal process; metasternum with a small fovea between and posterior to mesocoxae, a narrow, arcuate fovea anterior to each metacoxa, median surface with very few scattered punctures; abdominal ventrite I with 2 small, round foveae at anterior corners of intercoxal process, a transverse fovea posterior to each metacoxa, median surface with a pair of round or geminate punctures, one situated below each coxa; ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "CALIF: San Bernardino Co., Mexican Mine 4200' XII-31-78 to VI-16-79 R. L. Aalbu, coll." (CDAE)

PARATYPES, USA, same data as holotype (4, CDAE); "CALIF: SanBernardinoCo., J.T.N.M., 49 Palms, (PalmOasis), El.2800', R.L.Aalbu", "VII-II-75 to X-26-75", "ETHYLENE GLYCOL CAN TRAP (Dow) 6", on slide (1, CDAE).

Additional Material, "CALIF: San Bernardino Co., Mexican Mine 4200' XII-31-78 to VI-16-79 R. L. Aalbu, coll." (8, CDAE); "CALIF: Riverside Co. Corn Springs 80-172 V-22-1980 K.W. Cooper 80-172", "berlese Neotoma nest at margin of wash" (15, CDAE); "CALIF: Riverside Co. 13 mi. NE Desert Center V-22-1980 K.W. Cooper 80-171", "berlese Neotoma nest at base of Prosopis", 1 on slide (6, CDAE); "CALIF: SanBernardinoCo., J.T.N.M., 49 Palms, (PalmOasis), El.2800', R.L.Aalbu", "VII-II-75 to X-26-75", "ETHYLENE GLYCOL CAN TRAP (Dow) 6" (4, CDAE): "X-26-75 to II-15-76", "ETHYLENE GLYCOL 17 CAN TRAP (DuPont)" (2, CDAE): "X-26-75 to II-15-76", "ETHYLENE GLYCOL 22 CAN TRAP (UnionCarb.), 1 on slide (2, CDAE): "II-15-76 to V-28-76", "ETHYLENE GLYCOL 5 CAN TRAP (DuPont)" (13, CDAE); "49 Palms, JTNM San Bernardino Co., Cal (Palmoasis) 2800'

R.L. Aalbu", "V-28-76 to IX-25-76", "ETHYLENE GLYCOL 5 CAN TRAP (DuPont)" (1, CDAE); " CALIF: San Brdno Co. Providence Mts. St. Rec. Area, Medicine Cave Survey VI-20 to XI-27-1988 trap # 6 Rolf L. Aalbu coll.", "Antifreeze pit trap" (1, CDAE); "CALIF: San Brdno Co. Providence Mts. St. Rec. Area-Mitchell Caverns area V-8 to VIII-10-81 Rolf L. Aalbu col.", "Ethylene glycol pit trap" (1, CDAE); "CALIF: San BernardinoCo Joshua Tree Nat. Park Hidden Valley 81-216 K.W.Cooper XII-9-1981", "berlese Neotoma nest from beneath large boulder" (1, CDAE); "CALIF., JTNM Plsnt. Vlly, Fried Liver Wsh XII-3-66", "Ground Trap 3", "E.L. Sleeper S.L. Jenkins Collr." (1, CDAE); "CAL: San Bernardino Co.Mitchell Caverns V-24 to VIII-26-78 R.L. Aalbu El.4400'", "Ethylene glycol pit trap" (1, CDAE): "VIII-26 to XII-31-78" (10, CDAE): "XII-31-78 to III-17-1979" (3, CDAE): "III-17 to VI-16-1979" (2, CDAE); "Hunter Cyn. Inyo Mts Inyo Co., Cal. VI.30 1976", "Berlesed from Maidenhair Fern duff", "D. Giuliani Collector" (3, CDAE).

Remarks. This species closely resembles *A. dyskritos* but can be distinguished by the erect setae at the posterior corners of its head. *Akalyptoischion hadromorphus* also resembles *A. anasillos* from which it can be distinguished by its wide pronotum with long explanate sides and a sharp anterior and posterior angle.

Akalyptoischion heptalocos new species

Diagnosis. This species can be known from all other *Akalyptoischion* by its seven elytral striae.

Etymology. Greek meaning "seven furrows" referring to the seven punctate elytral striae.

Description. Length 1.30-1.50 mm. Width 0.45-0.50 mm. Body elongate, subparallel, surface shining, light to dark brown, head and prothorax often one shade darker than elytra; uniformly setose; head narrower than anterior pronotum, sides straight; clypeus narrowing gradually at less than 45° angle anterior to antennal insertions; head foveae large, deep, round, slightly smaller than eyes; head setation dense, decumbent setae; head punctation even, surface rugose; eyes 2 large facets, slightly prominent; tempora short, size of one eye facet; hind angles nearly 90°; clypeal fovea nearly length of antennomere I, 0.8 times width of labrum; labrum anterior margin slightly emarginate; mandible apex pointed an apical tooth and 3 or 4 large subapical serrations, prostheca short; antennae with a 3-segmented club; antennae reach posterior 1/3 of pronotum; antennomere I irregular, wider than long, bearing 2 stout setae on its posterior face, II elongate oval, III small, straight sided, width equal to length, IV-VII slightly elongate, becoming progressively shorter, VIII small, globular, IX-XI form loose club, IX large, elongate oval, X elongate, wider than IX, suboval, XI larger than X, elongate oval.

Pronotum widest anteriorly; anterior angles rounded, lateral margin arcuate, converging posteriorly; lateral margin slightly explanate with ~ 14 tubercles each bearing a decumbent seta; median 4/5 raised with dense decumbent setae; pronotal foveae transverse, distinct, anterior pair connected medially by a shallow furrow; pronotal punctation even, surface rugose.

Elytra subparallel, lateral flange weak, present in anterior 1/3 only; 7 striae, interspaces 1 and 2 fusing at apex; humeral angle weakly lobed; strial interspace 1 slightly raised, interspaces 4 and 6 weakly carinate; short decumbent setae present on every intespace, setae on each interspace become erect at elytral apex; epipleuron complete, narrowing apically.

Undersurface sparsely setose; submental fovea large, subrectangular, length of antennomere IV, densely micropunctate; ventral head punctation sparse but even over entire

head; gular punctation even; prosternum evenly punctate; mesosternum without sharp carinae; metasternum with a distinct fovea between and posterior to mesocoxae, a small, indistinct fovea anterior to each metacoxa, median surface without punctures; abdominal ventrite I without fovea on intercoxal process, with a small, deep, single puncture posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. HOLOTYPE, label data: "MEXICO, Baja California Norte, 9km NW Rancho Santa Ines, Lat 29°46'N Long 114°46'W El. 550m", "PITFALL TRAP #18 ETHYLENE GLYCOL 22 March 1991 to 17 July 1991", "William H., Mary H., Cynthia J., & Karen D. Clark, & Jane C. Luther Collectors" (CIDA).

PARATYPES, MEXICO, same data as holotype, 1 on slide (7, CIDA).

Additional Material, "MEXICO, Baja California Norte, 9km NW Rancho Santa Ines, Lat 29°46'N Long 114°46'W El. 550m", "PITFALL TRAP #18 ETHYLENE GLYCOL 22 March 1991 to 17 July 1991", "William H., Mary H., Cynthia J., & Karen D. Clark, & Jane C. Luther Collectors" (16, CIDA); "MEXICO, Baja California Norte, Mesa Palmarito Lat. 29°47'N, Long. 114°44'W Elevation 800m", "PITFALL TRAP #1 ETHYLENE GLYCOL 21 June 1990 To 22 March 1991", "William H. Clark, Ellen M. Clark Collectors (2, CIDA); "MEXICO, Baja California 14.7 km East El Rosario Lat. 30°04'10"N Long. 115°36'00"W 190m", "PITFALL TRAP #2 ETHYLENE GLYCOL 9 March 1991 To 18 July 1991", "William H., Mary H., Cynthia J., & Karen D. Clark, & Jane C. Luther Collectors" (1, CIDA); "MEX: Baja Norte 7.7mi NW Catavina VII-3-79 to III-24-1981 antifreeze pit trap F. G. Andrews" (1, CDAE).

Remarks. This species superficially resembles *A. bathytrematos* and *A. hadromorphus*, but it is easily recognized by the 7 punctate striae on its elytra.

Akalyptoischion heterotrichos new species

Diagnosis. The very long erect setae on the elytra combined with the small, narrow body and labrum not emarginate, distinguish this species.

Etymology. Greek for "different hairs" referring to the mixture of erect and decumbent setae on the elytra.

Description. Length 0.95-1.15 mm. Width 0.30-0.35 mm. Body elongate, parallel sided, surface shining, uniformly dark reddish brown; densely setose; head narrower than anterior pronotum, sides straight, narrowing anteriorly; clypeus narrowing at 45° anterior to antennal insertions; head foveae small, deep, irregularly shaped, smaller than eyes; head setation dense, long decumbent setae; head punctation sparse, irregular, more concentrated medially and at posterior margin; eyes 4 faceted, slightly prominent; tempora lacking; hind angles rounded; clypeal fovea short, length of antennomere IV; labrum anterior margin very slightly emarginate; mandible apex sharply pointed, a large apical tooth and 3 small subapical serrations, prostheca long; antennae with a 2-segmented club; antennae reach posterior 1/3 of pronotum; antennomere I wider than long, subglobular, slightly irregular, II elongate oval, III small, subglobular, IV slightly elongate, sides arcuate, V-IX submonilliform, X-XI form club, X globular, XI elongate, larger than X, subrectangular.

Pronotum widest anteriorly; anterior angles rounded, lateral margin arcuate, converging posteriorly; lateral margin explanate, explanate sides growing shorter posteriorly, with ~ 10 small tubercles each bearing a long, strongly curved seta; median 3/4 raised, evenly setose, setae long and decumbent; pronotal foveae shallow, subcircular; pronotal punctation sparse, most concentrated anteriorly.

Elytra parallel sided, lateral flange weak, present in anterior 1/3 only; 6 striae, strial punctures large; humeral angle rounded; strial interspaces 3 and 5 slightly raised; long decumbent setae present on every interspace, interspaces 1, 3, 5, and lateral margin also with very long, erect setae interspersed between decumbent setae, usually stouter setae near elytral apex; epipleuron complete, narrowing apically.

Undersurface evenly setose; submental fovea length of antennomere IV, with several large punctures and scattered micropunctures; ventral head punctation sparse but even over entire head; gular punctation sparse but even; prosternum sparsely punctate; mesosternum without sharp carinae; metasternum with a distinct single fovea between and behind mesocoxae, a small, inconspicuous fovea anterior to each metacoxa, median surface without punctures; abdominal ventrite I with 2 circular foveae at anterior corners of intercoxal process, a large, deep, oval fovea posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "CALIF: San Bernardino, Co., 4mi N Yucca, Valley V-21-82 4000', K. W. Cooper 82-235", "berlese Neotoma nest under Prunus" (CDAE).

PARATYPES, USA, same data as holotype, 1 on slide (3, CDAE).

Additional Material, "CALIF: San Bernardino, Co., 4mi N Yucca, Valley V-21-82 4000', K. W. Cooper 82-235", "berlese Neotoma nest under Prunus" (3, CDAE); "CALIF: San Bernardino, Co. 4 mi. S Hesperia, V-2-1978 K. W. Cooper, berlese Neotoma, nest-ceanothus 78-70" (1, CDAE).

Remarks. The elytral setation of this species is unique in that it presents a type of setation in between typical erect and decumbent setae. The setae have much less body than typical erect setae, and some of the setae on the elytra of dried specimens may be erect but

stongly recurved or deformed at their tips. In addition, the erect setae usually only occur in small patches with those to either side clearly decumbent. Specimens in alcohol show continuous rows of long, erect setae.

This species very closely resembles *A. giulianii* and *A. sleeperi*. It differs from *A. giulianii* in having a narrower head, larger eyes, and sparser setation on the head, thorax and abdomen. It differs from *A. sleeperi* in having longer setae, especially on the lateral margin of the pronotum and the elytra. Also, some of the setae on the elytra are erect whereas in *A. sleeperi* the setae are all decumbent.

Akalyptoischion hormathos Andrews

Akalyptoischion hormathos Andrews 1976a: 9

Diagnosis. The small size, glabrous body, small eyes, and deeply emarginate labrum distinguish this species.

Description. Length 1.10-1.25 mm. Width 0.35-0.37 mm. Body elongate, subparallel, uniformly orange/brown to reddish brown; glabrous; head narrower than pronotum by one eye width, sides slightly sinuate, anterior head not much narrower than posterior head; clypeus narrowing at 45° angle anterior to antennal insertions; head foveae shallow, indistinct, size of eyes; head punctation irregular, not very dense, surface rugose; eyes small, sometimes indistinct, 4 or 5 small facets not prominent, appressed to head; tempora 1/2 to 3/4 eye width; hind angles rounded greater than 90°; clypeal fovea length of antennomere V, 0.7 times width of labrum; labrum anterior margin deeply and evenly emarginate; mandible apex pointed with an apical tooth and 3-4 subapical serrations decreasing in size basally, prostheca short; antennae with a 3-segmented club; antennae reach hind angles of pronotum; antennomere I wider than long, a

slightly irregular oval, II slightly longer than wide, oval, III small, slightly elongate, sides arcuate, IV-VIII small, submonilliform, IX-XI form club, IX large, globular, X larger than IX, sides parallel, XI larger than X, parallel sided, elongate trapezoid.

Pronotum widest anteriorly, anterior angles rounded, lateral margin straight sided and converging slightly posteriorly; lateral margin slightly explanate with ~ 10 small tubercles spaced far apart, each bearing a microscopic seta; median 2/3 raised; pronotal foveae indistinct, each oval shaped and limited to base of raised area; pronotal punctation irregular and not dense, surface rugose.

Elytra subparallel, lateral flange present in anterior 1/3 only; 6 striae, strial punctures large, abut each other; humeral angle evenly rounded, not lobed; strial interspaces 3 and 5 gently raised, not carinate; interspaces glabrous; epipleuron complete, narrowing apically.

Undersurface glabrous; submental fovea length of antennomere IV with few large punctures and sparse micropunctures; ventral head punctation even, not dense and sparser at midline; gular punctation very sparse and irregular; prosternum evenly punctate; mesosternum without sharp carinae; metasternum with a single fovea between mesocoxae and a small fovea posterior to each mesocoxa, an arcuate fovea anterior to each metacoxa, median surface without punctures; abdominal ventrite I with 2 small indistinct punctures at anterior corners of intercoxal process, a large irregular fovea nearly as large as metacoxae posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. PARATYPES, USA: label data: “2 mi SE Carmel Vly Monterey Co., Cal. III.31.1972”, “Berlesed from Oak Duff”, “Fred G Andrews KS Corwin Collectors”, 1 on slide (3, CDAE).

Additional Material, “2 mi SE Carmel Vly Monterey Co., Cal. III.31.1972”, “Berlesed from Oak Duff”, “Fred G Andrews KS Corwin Collectors” (1, CDAE); “CALIF: Monterey Co. 2-2mi W Bottchers Gap XII-8-1983 A.Gilbert berlese redwood duff” (1, CDAE); “CALIF: Monterey Co. 1.1mi W Bottchers Gap XII-8-83 berlese oak duff A.Gilbert” (1, CDAE); “CALIF: Monterey Co. 16 mi E Ganzales 1000’ IV-6-1977 Berlese-live oak litter R.Somerby”, 1 on slide (11, CDAE); “CALIF: Monterey Co. 2.3 mi S Arroyo Seco, 1500-2000 ft. IV-6-1977 R. E. Somerby,coll.”, “Berlesed from Oak Duff” (14, CDAE); “CALIF: Los Angeles Co Santa Barbara Island VI-6-1974 E.L. Paddock,R.F.Hobza et al.,colls.” (2, CDAE).

Remarks. This species resembles *A. atrichos* but can be immediately distinguished by its lack of punctures on the median surface of abdominal ventrite I.

Akalyptoischion lasiosus new species

Diagnosis. The very long exclusively decumbent setae on the dorsal and ventral surfaces identify this species.

Etymology. Greek meaning “woolly” or “shaggy” referring to the very dense, long setae on the dorsal and ventral surface of this species.

Description. Length 1.53-1.55 mm. Width 0.50 mm. Body elongate, subparallel, uniformly reddish brown; uniformly setose, setae long; head width slightly narrower than pronotum or equal to pronotum, sides straight, narrowing anteriorly; clypeus narrowing slightly, at less than 45° angle anterior to antennal insertions; head foveae shallow, indistinct, elongate ovals; head setation dense, long decumbent setae, some at posterior corners near eyes may be erect; head punctation dense, surface rugose; eyes large, 4 facets, prominent; tempora long, 3/4 eye width; hind angles long, making head wide posteriorly, 90°; clypeal fovea length of

antennomere V, 0.6 times width of labrum; labrum anterior margin slightly emarginate, mandibles visible dorsally from beneath labrum; mandible apex broad with a large apical tooth, 3 large subapical serrations and a small 4th serration, prostheca short; antennae with a 3-segmented club; antennae long, reach hind angles of pronotum; antennomere I slightly irregular, subglobular, bearing a long stout seta on its posterior face, II slongate oval, III long, 2 times longer than wide, IV-VIII elongate oval, sides arcuate, IX-XI form long, loose club, IX elongate, cone-shaped, broadening apically, X subequal in size to IX, elongate oval, XI straight sided, elongate trapezoid.

Prothorax small; pronotum slightly wider anteriorly; anterior angles lobed, lateral margin slightly arcuate, converging slightly posteriorly; lateral margin explanate with ~13 tubercles each bearing a very long ducembent seta; median 2/3 raised with dense, long decumbent setae; pronotal foveae indistinct, broad and shallow; pronotal punctation dense.

Elytra subparallel, widest anteriorly, lateral flange indistinct; 6 striae; humeral angle slightly lobed; strial interspaces 3 and 5 weakly carinate; long decumbent setae present on each interspace; epipleuron complete, narrowing apically.

Undersurface densely setose, setae long; submental fovea length of antennomere V, sparsely micropunctate; ventral head punctation even, not dense; gular punctation densely concentrated posteriorly, no punctures on anterior gula; prosternum evenly punctate, mesosternum densely setose, with a distinct Y-shaped carina extending anteriorly from mesocoxal process; metasternum with a single fovea between and posterior to mesocoxae, an arcuate fovea anterior to each metacoxa, median surface without punctures; abdominal ventrite I with 2 small, indistinct foveae on anterior corners of intercoxal process, a small, oval fovea

posterior to each metacoxa, median surface with 2 small punctures situated beneath coxae, connected medially by a very shallow furrow; ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "CALIF: San Diego Co., Anza Borrego Nat. Mon., Torote Canyon IV-20-82, K. W. Cooper 82-223", "berlese Neotoma nest at margin of wash" (CDAE).

PARATYPE, ♂, USA: label data: "Borego, San Diego Co., Calif. IV-27-55"; "Sheep Cyn."; "R. O. Schuster Collector" on slide (EMEC).

Additional Material, "Calif: San Bernardino, Co. Pioneertown 4,200', II-23-1983 83-247, K. W. Cooper", "Neotoma nest in clump of Joshua trees" (2, CDAE); "CALIF: Riverside Co., Deep Canyon, IV-16-1977, K. W. Cooper", "Berlesed from Neotoma nest" (1, CDAE).

Remarks. Some species with a 2-segmented antennal club have similar setation to *A. lasiosus*. The number of club segments easily separates these species. The only other species to possess a 3-segmented antennal club and have only decumbent setae is *A. quadrifoveolata*. *Akalyptoischion lasiosus* may easily be distinguished from this species by its much longer setae and wide head with long temporae.

Akalyptoischion leptosoma new species

Diagnosis. The glabrous body and small size distinguish this species from all other species having a 2-segmented antennal club.

Etymology. Greek meaning "thin body" referring to the small size and narrow form of this species.

Description. Length 1.0 mm. Width 0.3 mm. Body elongate, parallel sided, narrow, uniformly light brown; uniformly setose, setae short; head narrower than anterior pronotum by

size of one eye facet, sides straight, narrowing anteriorly; clypeus narrowing at 45° angle anterior to antennal insertions; head foveae deep, distinct, round, size of eyes; head glabrous; dorsal punctation dense, surface rugose; eyes 4 faceted, slightly prominent; tempora lacking; hind angles oblique, greater than 90°; clypeal fovea length of antennomere I, 0.7 times width of labrum; labrum anterior margin not emarginate; antennae with a 2-segmented club; antennae reach hind angles of pronotum; antennomere I irregular, wider than long, II slightly smaller than I, subglobular, III-IX small, submonilliform, X-XI form club, X large, subglobular, XI larger than X, slightly longer than wide, subrectangular.

Pronotum slightly wider anteriorly; anterior angles rounded, lateral margin arcuate converging slightly posteriorly; lateral margin slightly explanate with ~ 10 small tubercles each bearing a short decumbent seta; median 3/4 raised, glabrous; pronotal foveae distinct, anterior pair narrow, transverse, posterior pair circular, size of eyes; pronotal punctation dense.

Elytra parallel sided, lateral flange scarcely produced, visible in anterior 1/3 only; 6 striae; humeral angle rounded; strial interspaces 1, 3, and 5 raised; interspaces 1, 3, 5, and lateral margin with very short decumbent setae visible only under high magnification, other interspaces glabrous; epipleuron complete, narrowing apically.

Undersurface glabrous; submental fovea deep, length of antennomere III; ventral head punctation dense, conspicuous; gular punctation even, conspicuous; prosternal punctation a conspicuous anterior line and a large conspicuous fovea anterior to each procoxal; mesosternum without sharp carinae; metasternum with a large puncture between and posterior to mesocoxae, a small, arcuate fovea anterior to each metacoxa, median surface without punctures; abdominal ventrite I with a large fovea at anterior corners of intercoxal process, a large, deep fovea the size of metacoxae posterior to each metacoxa, median surface without punctures.

Material Examined. HOLOTYPE, USA: CALIFORNIA: label data: "Figueroa Mts, Santa Barbara Co. 19_", "E. L. Sleeper" (CDAE).

Remarks. This species is known from only one specimen, the holotype. It resembles *A. sleeperi* and *A. chandleri* but may be distinguished by having only microscopic setae on its elytra and by its glabrous head and prothorax.

Akalyptoischion parechinos new species

Diagnosis. The erect setae with strongly recurved tips on the elytra and the first abdominal ventrite without punctures on the median surface distinguish this species.

Etymology. Greek meaning "near echinos" for its close resemblance to *Akalyptoischion echinos*.

Description. Length 1.00-1.20 mm. Width 0.30-0.40 mm. Body elongate, parallel sided, uniformly reddish brown; uniformly setose; head narrower than pronotum by size of one eye facet, sides straight; clypeus narrowing at 45° anterior to antennal insertions; head foveae distinct, broad ovals; head setation uniform, short decumbent setae; head punctation dense, irregular; eyes large, 4 facets, prominent; tempora size of one eye facet; hind angles rounded, 90°; clypeal fovea length of antennomere IV, 0.7 width of labrum; labrum anterior margin not emarginate; mandible apex pointed with an apical tooth and 4-5 small subapical serration, the 5th very small when present, prostheca short; antennae with a 3-segmented club; antennae reach hind angles of pronotum; antennomere I wider than long, cup-shaped, widening apically, II elongate oval, III small, globular, IV-V slightly elongate, VI-VIII submonilliform, IX-XI form a gradual, loose club, IX large, globular, X larger than IX, straight sided, expanding slightly apically, XI parallel sided, elongate trapezoid.

Pronotum widest anteriorly; anterior angles rounded, lateral margin straight, converging posteriorly; lateral margin slightly explanate with ~ 11 tubercles each bearing a short decumbent seta; median 3/4 raised with very short decumbent setae; pronotal foveae distinct, anterior pair transverse, posterior pair broad ovals; pronotal punctation irregular, not dense.

Elytra parallel sided, narrow, lateral flange not apparent; 6 striae, strial punctures large; humeral angle rounded; strial interspaces 3 and 5 carinate; interspaces 1, 3, 5 and lateral margin with short decumbent setae, other intervals with only very short decumbent setae; epipleuron complete, narrowing apically.

Undersurface evenly setose; submental fovea length of antennomere IV, with many large punctures and micropunctures; ventral head punctures sparse but even, punctures large; gular punctation irregular; prosternal punctation even; mesosternum without sharp carinae; metasternum with a large, triangular fovea between mesocoxae, a small circular fovea posterior to each mesocoxa, a small oval fovea anterior to each metacoxa, median surface without punctures; abdominal ventrite I with 2 large, indistinct foveae at anterior corners of intercoxal process, a small, irregularly shaped fovea 1/3 size of metacoxae posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "CALIF: Los Angeles Co. Bouquet Canyon at SE. end Bouquet Reservoir IV-28-1982 K. W. Cooper & F. G. Andrews 82-226", "berlese Neotoma nest at base of oak same nest as 80-179" (CDAE).

PARATYPE, USA, same data as type, on slide (1, CDAE).

Additional Material, "CALIF: Los Angeles Co. Bouquet Canyon at SE. end Bouquet Reservoir IV-28-1982 K. W. Cooper & F. G. Andrews 82-226", "berlese Neotoma nest at base of oak same nest as 80-179" (7, CDAE); "CALIF: Los Angeles Co. Bouquet Reservoir IX-17-

1980 K. W. Cooper 80-179", "Berlesed from Neotoma nest under oak" (2, CDAE); "nr. Bodfish Kern Co. Calif. II.14.1976", "Berlesed from Cupressus nevadensis", "D. Giuliani Collector" (1, CDAE); "CALIF: Kern Co. Sawmill Piute Peak IV-4-1977 R. E. Somerby, coll.", "Berlesed from pine duff", on slide (1, CDAE).

Remarks. A slender species with large strial punctures, *A. parechinos* closely resembles *A. echinos* from which it can be distinguished by the recurved tips of its elytral setae and by its labrum, which is not emarginate. *Akalyptoischion parechinos* also resembles *A. prionotus* from which it can be distinguished by its lack of punctures on the median surface of ventrite I.

Akalyptoischion pogonias new species

Diagnosis. This species may be recognized by the erect setae on the lateroventral sides of the head, the large mandibles that are visible dorsally from beneath the labrum and ventrite I without punctures on its median surface.

Etymology. Greek meaning "bearded" referring to the long setae on the lateral margin of the head.

Description. Length 1.3 mm. Width 0.4 mm. Body elongate, subparallel, surface shining, uniformly reddish brown; uniformly setose, setae inconspicuous on head; head narrower than head by size of one eye facet, sides sinuate; clypeus narrowing sharply at greater than 45° angle anterior to antennal insertions; head foveae large, distinct, elongate ovals, twice size of eyes; head setation sparse but even, decumbent setae medially, stout, erect setae at posterior corners near eyes and stout, erect setae along lateral margin between eyes and anterior margin; head punctation very sparse, surface smooth; eyes small, 4 facets, not prominent; tempora long, equal eye width; hind angles sharp, nearly 90°; clypeal fovea length of antennomere III, 0.7

width of labrum; labrum anterior margin slightly emarginate, setation sparse; mandibles large, visible dorsally from beneath labrum; antennae with a 3-segmented club; antennae reach posterior 1/3 of pronotum; antennomere I wider than long, sides arcuate, widening apically, II elongate oval, 2 times longer than wide, III-V elongate, becoming progressively rounder, VI-VIII submonilliform, IX-XI form club, IX parallel sided, subsquares, X subequal to IX, XI larger than X, elongate, subrectangular.

Pronotum widest anteriorly; anterior angles rounded, near 90°, lateral margin straight, converging posteriorly; lateral margin slightly explanate with ~ 8 large tubercles, spaced far apart, each bearing a long, erect seta; median 3/5 raised with very sparse decumbent setae; pronotal foveae distinct, anterior pair transverse, connected medially by a shallow furrow, posterior pair broad, deep, not connected, a small single fovea present at midline between posterior foveae; pronotal punctation sparse, distinct anteriorly only.

Elytra subparallel, flange weak, present in anterior 1/3 only; 6 striae; humeral angle nearly 90°, not lobed; strial interspaces 3 and 5 raised; short decumbent setae present on every interspace, interspaces 1, 3, 5 and lateral margin also with long erect setae interspersed; epipleuron complete, narrowing apically.

Undersurface sparsely setose; submental fovea large, length of antennomere II; ventral head very sparsely punctate or impunctate; abdominal ventrite I with a large, deep fovea equal is size to metacoxae posterior to each metacoxa, median surface without punctures.

Material Examined. HOLOTYPE, USA: label data: “Calif: San Bernardino, Co. Pioneertown 4200’, IX-29-1982 82-241, K. W. Cooper”, “Neotoma nest in clump of Joshua trees” (CDAE).

Remarks. This species is known from only one specimen, the holotype. Having only one specimen prevented preparation of a slide mount and measurements of ventral characters. *Akalyptoischion pogonias* resembles *A. tomeus* superficially but can be recognized by the stout, erect setae present at the posterior corners and along the lateral margin of the head, the larger head foveae and the different pronotal foveae. *Akalyptoischion pogonias* also may be confused with *A. anasillos* and *A. hadromorphus*. It may be distinguished from these species by its lack of punctation on the median surface of abdominal ventrite I, its large, visible mandibles and the sparse setation of its head and pronotum.

Akalyptosichion polytremetron new species

Diagnosis. This species is unique in its many punctured abdominal ventrite I (Fig. 4.16).

Etymology. Greek for "many punctured abdomen" referring to the many, scattered punctures found on abdominal ventrite I.

Description. Length 1.10-1.40 mm. Width 0.35-0.45 mm. Body elongate, subparallel, light orange/brown to dark reddish brown; uniformly setose, setae short; head narrower than anterior pronotum by size of one eye facet, sides slightly sinuate; clypeus narrowing at 45° anterior to antennal insertions; head foveae inconspicuous, circular, slightly smaller than eyes; head setation even, short decumbent setae; head punctation dense, conspicuous on pointed specimen, surface rugose; eyes 4 faceted, slightly prominent; tempora size of one eye facet; hind angles 90°; clypeal fovea length on antennomere I, 0.6 width of labrum; labrum anterior margin slightly emarginate; mandible apex pointed with an apical tooth and 4 small subapical serrations, prostheca long; antennae with a 3-segmented club; antennae reach posterior 1/3 of pronotum; antennomere I irregular, wider than long, II large, smaller than I, globular, III small, wider than

long, somewhat flattened with a notably blunt basal edge, IV-VIII submonilliform, IX-XI form club, IX large, globular, X parallel sided, subsquare, XI elongate, subrectangular.

Pronotum widest anteriorly; anterior angles rounded, lateral margin arcuate, converging posteriorly; lateral margin slightly explanate with ~ 11 small tubercles each bearing a short decumbent seta; median 4/5 raised with short sparse decumbent setae; pronotal foveae shallow, subcircular; pronotal punctation dense.

Elytra subparallel, lateral flange not prominent, present in anterior 1/2 only, 6 striae; humeral angle evenly rounded; strial interspaces 3 and 5 slightly raised; short decumbent setae present on each interspace; epipleuron complete, narrowing apically.

Undersurface evenly setose; submental fovea with several large punctures, irregularly sized and spaced; ventral head punctation even over whole head, large punctures; gular punctation even, large punctures; prosternum evenly punctate; mesosternum without sharp carinae; metasternum with a single fovea between and posterior to mesocoxae, a narrow, arcuate fovea anterior to each metacoxa, median surface evenly punctate with small scattered punctures; abdominal ventrite I with 2 large, distinct, circular foveae at anterior corners of intercoxal process, a transverse fovea posterior to each metacoxa, median surface irregularly punctate with small scattered punctures; ventrites II-V may be very sparsely punctate, basal depressions normal.

Material Examined. HOLOTYPE, USA: label data: "ARIZ: Coconino Co., Grand Canyon Nat., Pk. X-14-85 ex, bark/ground cover, M. W. Sanderson" (CDAE).

PARATYPES, USA, same data as holotype, 1 on slide (4, CDAE).

Additional Material, "ARIZONA: Cochise, Co. Chiricahua, Mts. elev. 5500 ft, Oct. 5 1968" (4, CDAE); "Arizona, Chiricahua, Mts., 8000 ft., Oct. 6 1974, K. Stephan leg." (1,

CDAE); “ARIZONA: Cochise, Co. Chiricahua, Mts. near Portal, April 28 1968” (3, CDAE); “ARIZONA: St., Catalina Mts, elev. 7000 ft, April 5 1969” (1, CDAE); “ARIZONA: St., Catalina Mts, elev. 8000 ft, April 12 1969” (1, CDAE); “ARIZONA: St., Catalina Mts, elev. 7000 ft, April 14 1968” (2, CDAE); “ARIZONA: St., Catalina Mts, elev. 8000 ft, April 21 1968” (1, CDAE); “ARIZONA: St., Catalina Mts, elev. 8000 ft, June 16 1968” (5, CDAE).

Remarks. The characteristic punctures on ventrite I can only be seen on cleared and slide-mounted specimens. This species closely resembles *A. deletretos*, which differs by lacking punctures on abdominal ventrite I.

Akalyptoischion prionotus new species

Diagnosis. The straight sided pronotum with large, distinct tubercles, elytral setation of short, erect setae recurved at the tip, and head with only decumbent setae distinguish this species.

Etymology. Greek for “jagged” or “serrate” referring to the saw-toothed edges of the pronotum.

Description. Length 1.10-1.25 mm. Width 0.35-0.40 mm. Body elongate, subparallel, uniformly orange to reddish brown; evenly setose, setae short; head narrower than pronotum by size of one eye facet, sides straight, narrowing slightly anteriorly; clypeus narrowing at 45° angle anterior to antennal insertions; head foveae small but distinct, narrow, elongate ovals, head setation even, long decumbent setae; head punctation dense, surface rugose; eyes small, 4 facets, slightly prominent; tempora size of one eye facet; hind angles sharp, oblique, greater than 90°; clypeal fovea length of antennomere I, 0.6 times width of labrum; labrum anterior margin not emarginate; mandible apex sharply pointed with an apical tooth and 3 subapical serrations, prostheca long; antennae with a 3-segmented club; antennae reach hind angles of pronotum;

antennomere I irregular, wider than long, widening greatly apically, II elongate oval, III-VIII small, submonilliform, IX-XI form club, IX globular, twice length of VIII, X larger than IX, wider than long, subrectangular, XI larger than X, subsquare, length equals width.

Pronotum slightly wider anteriorly; anterior angles rounded, lateral margin distinctly serrate, straight sided or gently arcuate; lateral margin with ~ 12 large tubercles each bearing a long decumbent seta; median 2/3 raised with short decumbent setae; pronotal foveae distinct, anterior pair narrow, transverse, nearly reaching lateral margin, posterior pair round; pronotal punctation even, irregular.

Elytra subparallel, lateral flange short, present up to posterior 1/3; 6 striae, strial punctures large, abut one another; humeral angle rounded, scarcely lobed; strial interspaces 3 and 5 weakly carinate; interspaces 1, 3, 5, and lateral margin with erect setae, most recurved at the tip, not stout, other intervals with short decumbent setae; epipleuron complete, narrowing apically.

Undersurface evenly setose; submental fovea deep, length of antennomere II with 5 or 6 small punctures and scattered micropunctures; ventral head punctation sparse but even over entire head; gular punctation sparse but even; prosternum sparsely and irregularly punctate; mesosternum without sharp carinae; metasternum with single foveae between and posterior to mesocoxae, a small, deep, arcuate fovea anterior to metacoxae, median surface without punctures; abdominal ventrite I with 2 large, distinct punctures at anterior corners of intercoxal process, a transverse, oval fovea posterior to each metacoxa, median surface with a pair of single or geminate punctures situated below corners of intercoxal process, ventrites II-V unmodified.

Material Examined. HOLOTYPE, USA: label data: "CALIF: Kings Co., 8 mi. SSW Avenal, T23S-R16E-29 IV-17-, 1980 Andrews, Kuba, & Paddock F80-11", "berlesed from Neotoma nest among roots at base of oak" (CDAE).

PARATYPES, USA, same data as holotype (3, CDAE); "CALIF: Kings Co., 8 mi. SSW Avenal, T23S-R16E-29 IV-17-, 1980 Andrews, Kuba, & Paddock F80-13", "berlesed from Neotoma nest among roots at base of oak" on slide (1, CDAE).

Additional Material, "CALIF: Kings Co., 8 mi. SSW Avenal, T23S-R16E-29 IV-17-, 1980 Andrews, Kuba, & Paddock F80-11", "berlesed from Neotoma nest among roots at base of oak" (6, CDAE); "CALIF: Kings Co., 8 mi. SSW Avenal, T23S-R16E-29 IV-17-, 1980 Andrews, Kuba, & Paddock F80-13", "berlesed from Neotoma nest among roots at base of oak" (23, CDAE); "CALIF: Kings Co., 10 mi. SW Avenal, II-6-1980, T235-R16E-29 3100', berlesed neotoma, nest A. Gilbert coll" (1, CDAE); "CALIF: Kings Co. 10 mi, S Avenal Sunflower, Valley 1000' I-9 to, II-6-80 pit trap in, Ribes-Oak A. Gilber" (1, CDAE).

Remarks. This species superficially resembles *A. anasillos* and *A. hadromorphus* from which it can be distinguished by its much shorter elytral setation and its lack of erect setae on the head. *Akalyptoischion prionotus* also resembles *A. parechinos*, but *A. parechinos* lacks punctures on the median surface of abdominal ventrite I.

Akalyptoischion quadrifoveolata (Fall)

Cartodere quadrifoveolata Fall 1899: 136

Microgramme quadrifoveolata Walkley 1948: 150

Akalyptoischion quadrifoveolata Andrews 1976a: 12

Diagnosis. The uniform, short decumbent setae, pronotum widest at the middle and a 3-segmented antennal club will distinguish this species.

Description. Length 1.25 mm. Width 0.40 mm. Body elongate, subparallel, uniformly reddish brown; uniformly setose, short setae; head narrower than pronotum by size of one eye facet, sides straight, narrowing slightly anteriorly; clypeus narrowing at 45° angle anterior to antennal insertions; head foveae shallow, indistinct, elongate ovals; head setation dense, short decumbent setae; head punctation even, surface rugose; eyes small, 4 small facets, slightly prominent; tempora equal to eye width; hind angles greater than 90°, sharp; clypeal fovea length of antennomere III, 0.7 times width of labrum; labrum anterior margin deeply and evenly emarginate; antennae with a 3-segmented club; antennae short reaching halfway down pronotum; antennomere I wider than long, an irregular oval with sides slightly pointed, II slightly longer than wide, subglobular, III small, somewhat flattened, sides straight, IV-VIII submonilliform, IX-XI form club, IX large, globular, X wider than long, straight sided, expanding slightly apically, XI an elongate trapezoid.

Pronotum widest at middle, anterior angles rounded, lateral margin evenly arcuate, scarcely explanate with ~ 12 small tubercles each bearing a short decumbent seta; median 4/5 raised with dense, short decumbent setae; pronotal foveae distinct, all 4 equal in size, extend from lateral margin to base of raised area; dorsal punctation even, surface rugose.

Elytra subparallel, lateral flange weak, visible in anterior 1/2; 6 striae; humeral angle a slight, weak lobe; strial interspaces 3 and 5 carinate, interspace 5 stronger than 3; very short decumbent setae present on every interspace and lateral margin; epipleuron complete and very narrow at apex.

Undersurface evenly setose, setae short, submental fovea length of antennomere I.

Material Examined. HOLOTYPE, USA: label data: "LosGatos Cal", "Coll Hubbard & Schwarz", "HCFall det.", "TYPE (underlined in red)" Type No. 4448 U.S.N.M.", "Cartodere 4 foveolata Fall (handwritten)" (USNM).

Remarks. The only known specimen of this species is the type specimen determined by Fall. Andrews (1976a) comments that extensive litter sampling in the Los Gatos area where the holotype was collected produced no new specimens. In the years since Andrews' study, no additional specimens have been collected. The lack of additional specimens prevented the preparation of a slide mount and the measurement of many characters. This species is very distinct, however. Amongst the species with a 3-segmented antennal club, none have only decumbent setae on the elytra except *A. lasiosus*. *Akalyptoischion quadrifoveolata* is easily distinguished from *A. lasiosus* by its very short, uniform setae.

Akalyptoischion sleeperi Andrews

Akalyptoischion sleeperi Andrews 1976a: 5

Diagnosis. The lack of erect setae on the elytra and the labrum not emarginate distinguish this species from all others having a 2-segmented antennal club.

Description. Length 1.05-1.30 mm. Width 0.35-0.40 mm. Body elongate, subparallel, reddish brown to dull brown; uniformly setose; head narrower than pronotum by 1/2 eye width, sides slightly sinuate; clypeus narrowing gradually at less than 45° angle anterior to antennal insertions; head foveae distinct, circular to oval, smaller than eyes; head setation even, short decumbent setae; head punctation sparse and irregular; eyes large, 4 facets, prominent; tempora size of one eye facet; hind angles rounded; clypeal fovea length of antennomere III, 0.7 times width of labrum; labrum anterior margin not emarginate; mandible apex pointed with a sharp

apical tooth and 4 small subapical serrations, prostheca long; antennae 11 segmented with a two segmented club; antennae reach posterior 1/3 of pronotum; antennomere I irregular, anterior edge rounded, posterior edge with a sharp point, II elongate, egg-shaped, narrower apically, III-IV slightly elongate, sides arcuate, V-IX globular, growing progressively larger, X-XI form club, X large, globular, XI elongate, straight sided, rectangular.

Pronotum slightly wider anteriorly; anterior angles rounded, lateral margin arcuate, converging slightly posteriorly, lateral sides slightly explanate with ~ 12 tubercles each bearing a long decumbent seta; median 3/4 raised with dense short decumbent setae; pronotal foveae distinct, anterior pair transverse, posterior pair broad circles; pronotal punctation sparse, most concentrated anteriorly.

Elytra subparallel, lateral flange not apparent; 6 striae; humeral angle evenly rounded; strial interspaces 3 and 5 gently raised; decumbent setae present on each interspace, setae on interspaces 1, 3, 5 and lateral margin longer; epipleuron complete, narrowing anteriorly.

Undersurface sparsely setose; submental fovea length of antennomere III with 3-4 large punctures; ventral head punctation even laterally, punctures lacking at midline; gular punctaion even; prosternum sparsely punctate; mesosternum without sharp carinae; metasternum with single or geminate punctures between and posterior to mesocoxae, a small oval puncture anterior to each metacoxa, median surface without punctures; abdominal ventrite I with 2 small, circular fovea at anterior corners of intercoxal process, occasionally fused with anterior margin of process, a transverse fovea posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. PARATYPES, USA: label data: “Frazier Pk, Los Angeles Co., Cal. I.14.1961”, “ex Berlesed from oak duff”, “E. L. Sleeper collector”, 3 on slide (8, CDAE);

"Frazier Mt #5, Ventura Co., Cal. I.14.1961", "Berlesed from oak duff", "E. L. Sleeper collector", 3 on slide (11, CDAE).

Additional Material, "Frazier Pk, Los Angeles Co., Cal. I.14.1961", "ex Berlesed from oak duff", "E. L. Sleeper collector" (4, CDAE); "Frazier Mt #5, Ventura Co., Cal. I.14.1961", "Berlesed from oak duff", "E. L. Sleeper collector" (2, CDAE); "11 mi W Frazier Pk, Kern Co., Cal. I-13-1961", "ex Berlesed from oak duff", "E. L. Sleeper collector" (1, CDAE); "CALIF: Kern Co. Frazier Park I.13.1961 E.L.Sleeper" (2, CDAE); "S. Fork San Gabriel Cyn. Los Angeles Co., Calif. V.14.1966", "Neotoma nest", "R. Hardy" (1, CDAE); "San Dimas Los Angeles Co., Calif. II-14-1960", " Collector E. L. Sleeper", 1 on slide (3, CDAE); "Blue Ridge near Guffy 700'", "Angeles Natl Forest Los Angeles Co., Calif. VI.10.1957", "I.M. Newell coll.", 1 on slide (2, CDAE); "CALIF: SanBernardino Co., Wrightwood IV-15-1986 berlese Neotoma nest A.Hardy, Fred G. Andrews, T.D. Eichlin", 1 on slide (2, CDAE); "CALIF: SanBernardino Co., Pioneer Town IV-19-86 berlese Neotoma nest K.W. Cooper coll." (1, CDAE); "CALIF: Los Angeles Co. 1 mi. W Wrightwood XI-8-1984 AJ Gilbert Berlese evergreen oak litter" (1, CDAE).

Remarks. *A. sleeperi* may be distinguished from *A. giulianii* and *A. heterotrichos* by its shorter setation and lack of erect setae on the elytra. *A. sleeperi* may be distinguished from *A. chandleri* by its much longer setae that are not appressed to the body as they are in *A. chandleri*.

Akalyptoischion tomeus Andrews

Akalyptoischion tomeus Andrews 1976a: 11

Diagnosis. The long, erect setae on the elytra, deeply emarginate labrum, large mandibles and distinct head foveae easily distinguish this species.

Description. Length 1.23-1.35 mm. Width 0.35-0.40 mm. Body elongate, subparallel, surface shining, bright orange/red to dark reddish brown; setose, setae on elytra much longer; head elongate, narrower than anterior pronotum by size of one eye facet, sides slightly sinuate, narrowing anteriorly; clypeus narrowing only slightly anterior to antennal insertions; head foveae distinct, elongate ovals, slightly larger than eyes; head setation sparse, short decumbent setae, setae light and inconspicuous; head punctation very sparse, concentrated posteriorly between eyes; eyes 4 faceted, variable from small to large and not to slightly prominent; tempora 1/4 to 1/2 eye width; hind angles rounded, nearly 90°; clypeal fovea length of antennomere IV, 0.7 times width of labrum; labrum small and narrow, anterior margin deeply emarginate, laterally broad and truncate, not expanded past antennal insertions; mandibles easily visible dorsally from beneath labrum; mandibles large, apex broad with a large apical tooth, 3 large subapical serrations and a 4th small serration, prostheca short; antennae 11 segmented with a 3 segmented club; antennae reach posterior 1/3 of pronotum; antennomere I slightly irregular, subglobular, II elongate oval, III small, subglobular, IV slightly elongate, sides arcuate, V-VII submonilliform, IX-XI form a gradual, loose club, IX larger than VIII, globular, X larger than IX, sides parallel, subsquare, XI parallel sided, an elongate trapezoid.

Pronotum widest anteriorly; anterior angles rounded, lateral margin slightly sinuate, converging posteriorly; lateral margin very slightly explanate with ~ 10 tubercles, tubercles 1, 3 and posteriormost tubercle bear a long erect seta, all other tubercles bear short decumbent setae; median 3/4 raised with even short decumbent setae; pronotal foveae small, circular, limited to base of raised area; pronotal punctation very sparse, irregular.

Elytra subparallel, lateral flange small, present in anterior 1/3 only; 6 striae; humeral angle rounded; strial interspaces 3 and 5 moderately raised; long, erect setae present on

interspaces 1, 3, 5 and lateral margin only, other interspaces with only microscopic setae; epipleuron complete, narrowing apically.

Undersurface sparsely setose; submental fovea large, deep, length of antennomere II, with numerous micropunctures, some confluent to form larger punctures; ventral head punctaion very sparse to impunctate; gular punctaion very sparse and irregular; a pair of large irregularly shaped foveae, sometimes confluent, present on anterior gula near posterior tentorial pits; prosternum usually with only an anterior lateral row of large single or geminate punctures and a geminate or transverse puncture anterior to procoxae, may have scattered punctures on median surface of sternite; mesosternum without sharp carinae; metasternum with a large fovea between and posterior to mesocoxae, arcuate foveae anterior to metacoxae, median surface without punctures; abdominal ventrite I lacking punctures on intercoxal process, with a large, irregularly shaped fovea 1/2 the size of metacoxae posterior to each metacoxa, median surface without punctures; ventrites II-V unmodified.

Material Examined. PARATYPES, USA: label data: “20.9 mi E San Lucas Monterey Co., Cal. III.24.1972”, “Berlesed from Heteromeles duff”, “Collected by E. A. Kane Berlesed by Fred G. Andrews”, 1 on slide (2, CDAE); “19.8 mi E San Lucas Monterey Co., Cal. X.28.1971”, “ex Heteromeles duff”, “Fred G. Andrews collector”, on slide (1, CDAE).

Additional Material, “CALIF: Fresno Co. 11mi NE Auberry III-14-85 T.D.Eichlin and Fred G. Andrews”, “Berlesed from Neotoma nest under Quercus”, 1 on slide (20, CDAE): “12.5mi NE Auberry III-15-1985 T.Eichlin and Fred. G. Andrews”, “Berlese Neotoma nest under Quercus and Aesculus” (4, CDAE); “CALIF: Fresno Co. Tollhouse XII-11-80 berlesed from alder oak duff A.Gilbert” (12, CDAE); “CALIF: Fresno Co. Ciervo Hills 18 air mi SW Mendota III-16-1975 J.T. Doyen”, “Burlesed Ex Atriplex/Guiterrezia litter” (1, EMEC);

“CALIF: Kings Co. 10mi SW Avenal II-6-1980 T23S-R16E-3100’ berlesed oak-juniper duff A. Gilbert coll.” (6, CDAE): “8 mi SSW Avenal T23S-R16E-29 IV-17-1980 Andrews, Kuba & Paddock F80-13”, “berelsed from Neotoma nest among roots at base of oak” (13, CDAE); “CALIF: Napa Co., 23mi SE Lower Lake I-7-1986 T.Eichlin, F.G. Andrews Neotoma nest at base of Quercus (3, CDAE); “CALIF: Marin Co. Pt.Reyes, Sir Francis Drake Hwy at Vinson Overlook Rd. III-18-1981 S.Kuba F81-38”, “berlese Neotoma nest at base of oak & poison oak on moist hillside” (6, CDAE); “CALIF: Kern Co., 5.5 mi NE Caliente Oiler Cyn. IV-4-1977 R. E. Somerby, coll.”, “Berlese Sycamore litter” (1, CDAE); “CALIF: Lake Co., 8 mi SE Lower Lake I-7-1986 T.Eichlin, F.G. Andrews Neotoma nest under Quercus” (6, CDAE); “12.4 mi N Rumsey Colusa Co. Cal V.1.1970”, “ex oak litter”, “Collector F. L. Blano” (1, CDAE); “ CALIF: Shasta Co., Platina VI-6-1975 R.E. Somerby (4, CDAE); “Solano Lake Solano Co Calif II-28-71”, “Colr D S Chandler” (1, CDAE); “3 mi NW Rumsey Cache Creek Yolo Co Calif II-3-1971”, “Colr D S Chandler”, “Berlese Maple & Cottonwood” (2, CDAE); “Putah Cn Yolo Co Cal V-16-1950”, “In nests of Wood Rat”, “A. T. McClay Collector” (3, CDAE): “Putah Cyn Cal Yo-Solano Co V-16-1950” (1, CDAE); “CALIF: Los Angeles Co. Bouquet Canyon at base Vasquez Valley 82-224 IV-28-1982 K.W. Cooper & F.G. Andrews”, “berlese Neotoma nest under Prunus same nest as 80-178” (4, CDAE); “9 mi E Clearlake Oaks Lake Co., Cal. III.29.1973”, “Berlesed from Oak Duff”, “T.R. Haig Collector” (1, CDAE); “CALIF: Mendocino Co., U.C. Hopland Field Station. 3.VII.1968 J. P. Anderson, P. Rubtzoff M. Winter,colls.”, 1 on slide (2, CASC)

Remarks. This species varies in body shape and eye size across its large range. Abdominal ventrite I usually lacks foveae on the intercoxal process, but some specimens have faint foveae present (Fig. 4.43). The combination of very sparsely setose head and pronotum,

elytra with long erect setae and no decumbent setae, deeply emarginate labrum, deep, distinct head foveae and large mandibles instantly distinguish it from all other species though. *Akalyptoischion tomeus* most closely resembles *A. pogonias*, but it lacks the erect setae on the head that are found in *A. pogonias*.

Discussion

Akalyptoischion species possess a variety of characters with taxonomic importance. The first abdominal ventrite presents a diverse array of patterns of foveae and punctures that are diagnostic. The foveae present on the median surface of ventrite I are especially diverse, and these foveae may vary somewhat within a species. It is fairly common to observe slight differences in the size and position of the mid-ventrite foveae in specimens taken from different areas within a species' range. Despite these slight variations, the patterns of foveae are constant for each species and are thus taken to be among the most diagnostic characters.

Perhaps the most striking character discovered in *Akalyptoischion* is the pseudosegmentation of the first tarsomere of each leg. This character is consistent throughout the genus and is thus of no use in species determinations, but it does represent a unique state unparalleled in the Latridiidae. This division represents an intermediate state between 3 and 4-segmented tarsi, but without a cladogram, it is impossible to comment on the directionality of this change.

The extremely small size and flightless state of *Akalyptoischion* species could be presumed to greatly limit their ability to disperse and colonize new areas. This hypothesis is not well supported by the actual distribution data, however. Some species of *Akalyptoischion* have

very wide ranges and occur not only over large distances but across mountain ranges and other geographic barriers. It is possible that the nominal species possessing the widest ranges are actually composed of several cryptic species, but the morphological data do not support this conclusion. There are, of course, many ways for the beetles to travel passively and enlarge their ranges. Until additional data are gathered, the morphological data collected from the available beetle specimens must be the primary source for determining the species composition of *Akalyptoischion*.

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References Cited

Andrews, F.G. 1976a. *Akalyptoischion*, A new genus of Lathridiidae from Western North America (Coleoptera). *Occasional Papers in Entomology*, Number 22, 23 pp.

Andrews, F.G. 1976b. A revision of the North American species of *Metophthalmus* (Coleoptera: Lathridiidae). *The Coleopterist's Bulletin*: 30(1):37-56.

Crowson, R.A. 1955. *The natural classification of the families of Coleoptera*. Nathaniel Lloyd. London, 187 pp.

Fall, H.C. 1899. Revision of the Lathridiidae of boreal America. *Transactions of the American Entomological Society*, 26:101-190.

Hammad, S.M. 1953. The immature stages of *Metophthalmus serripennis* Broun (Coleoptera: Lathridiidae). *Proceedings of the Royal Entomology Society London*. Series A, 28:133-138.

Hinton, H.E. 1941. The Lathridiidae of economic importance. *Bulletin of Entomological Research*, 32:191-247.

Lawrence, J.F. 1977. Coleoptera associated with *Hypoxylon* Species (Ascomycetes: Xylariaceae) on oak. *Coleopterists Bulletin*, 31: 309-312.

Nichols, S. W., & R. T. Schuh. 1989. The Torre-Bueno Glossary of Entomology. Revised edition of a glossary of entomology by J.R. de la Torre-Bueno, including Supplement A by G.S. Tulloch. New York Entomol. Soc. xvii + 840 pp.

Walkley, L.M. 1948. Notes on nomenclature in the Lathridiini. *Proceedings of the Entomological Society of Washington*, 50:149-150.

FIGURE LEGENDS

4.1. *Akalyptoischion hadromorphus*, habitus, dorsal view.

4.2. *A. atrichos*, male, prothorax, ventral view.

4.3. *A. atrichos*, male, left antenna, dorsal view.

4.4. *A. atrichos*, male, labrum, dorsal view.

4.5. *A. atrichos*, male, right mandible, dorsal view.

4.6. *A. atrichos*, male, right maxilla, dorsal view.

4.7. *A. atrichos*, male, labium, ventral view.

4.8. *A. atrichos*, male, pterothorax, ventral view.

4.9. *A. atrichos*, male, prothoracic leg, anterior view.

4.10. *A. atrichos*, male, mesothoracic leg, anterior view.

4.11. *A. atrichos*, male, metathoracic leg, anterior view.

4.12. *A. atrichos*, male, abdominal ventrites, ventral view.

4.13. *A. hadromorphus*, male, pronotum outline.

4.14. *A. lasiosus*, male, pronotum outline.

4.15. *A. polytremetron*, female, pterothorax, ventral view.

4.16. *A. polytremetron*, female, abdominal ventrite I.

4.17. *A. tomeus*, female, abdominal ventite I.

4.18. *A. atrichos*, mesothoracic tarsus, SEM.

4.19. *A. heptalocos*, head, ventral view.

4.20. *A. tomeus* labrum, dorsal view, setae removed.

4.21. *A. tomeus* left mandible, dorsal view, prostheca removed.

4.22. *A. tomeus* elytra, laterodorsal view, diagrammatic.

4.23. *A. chandleri* elytra, laterodorsal view, diagrammatic.

4.24. *Dienerella filum*, abdominal ventrites, ventral view.

4.25. *A. atrichos* head, dorsal view, SEM.

4.26. *A. hormathos* head, dorsal view, SEM.

4.27. *A. hadromorphus* head, dorsal view, SEM.

4.28. *A. dyskritos* head, dorsal view, SEM.

4.29. *A. tomeus* head, dorsal view, SEM.

4.30. *A. atrichos* head, ventral view, SEM.

4.31. *A. hormathos* head, ventral view, SEM.

4.32. *A. anasillos* head, ventral view, SEM.

4.33. *A. giulianii* head, ventral view, SEM.

4.34. *A. tomeus* head, ventral view, SEM.

4.35. *A. bathytrematos* head, ventral view, SEM.

4.36. *A. anasillos* prothorax, dorsal view, SEM.

4.37. *A. hadromorphus* prothorax, dorsal view, SEM.

4.38. *A. dyskritos* prothorax, dorsal view, SEM.

4.39. *A. giulianii* prothorax, dorsal view, SEM.

4.40. *A. sleeperi* prothorax, dorsal view, SEM.

4.41. *A. heterotrichos* prothorax, dorsal view, SEM.

4.42. *A. hormathos* metasternum, ventral view, SEM.

4.43. *A. tomeus* metasternum and abdominal ventrite I, ventral view, SEM.

4.44. *A. hadromorphus* abdominal ventrite I, ventral view, SEM.

4.45. *A. bathytrematos* abdominal ventrite I, ventral view, SEM.

4.46. *A. giulianii* abdominal ventrite I, ventral view, SEM.

4.47. *A. heterotrichos* abdominal ventrite I, ventral view, SEM.

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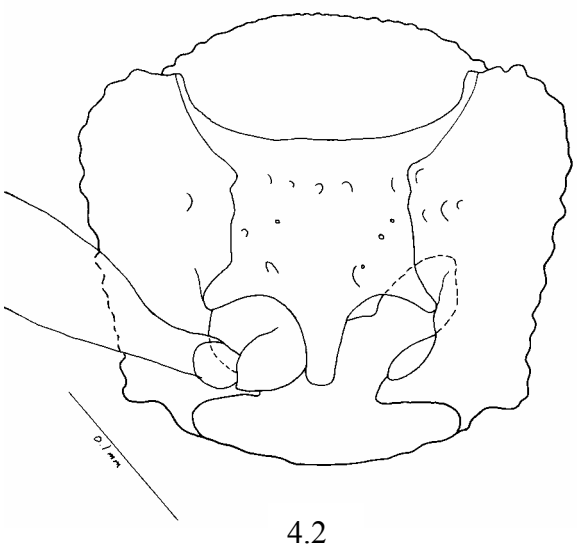

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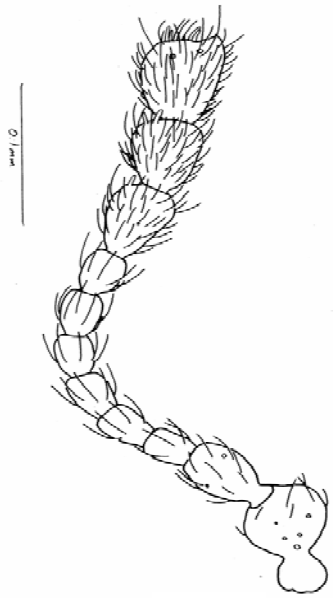

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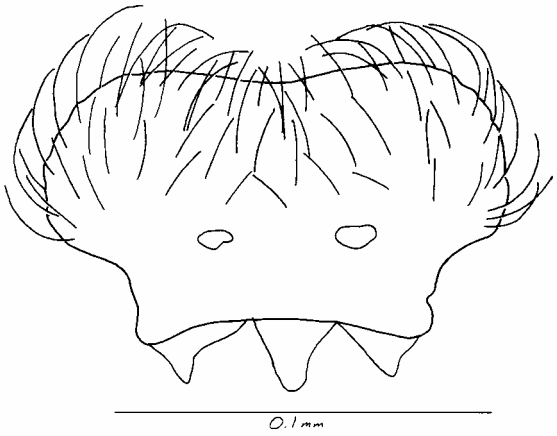

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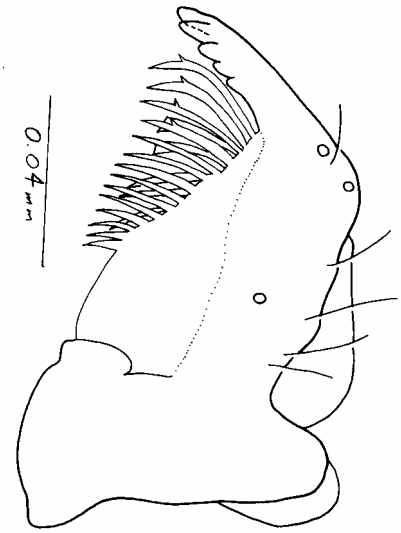

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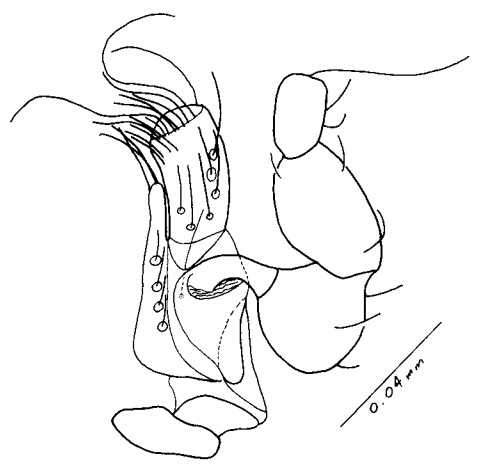

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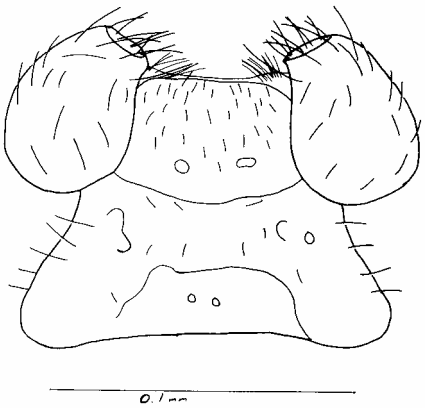

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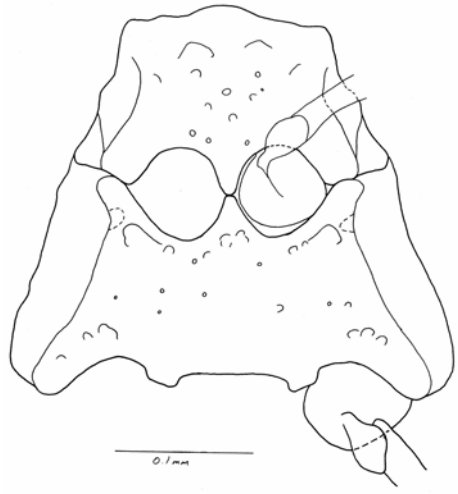

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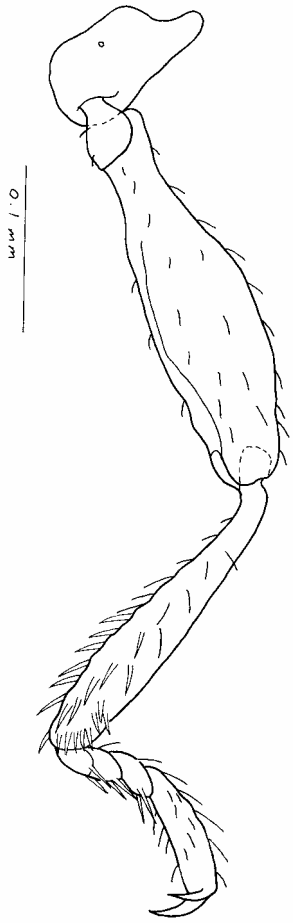

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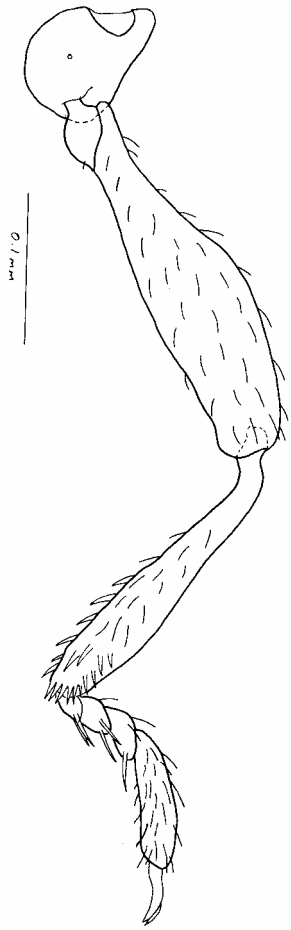

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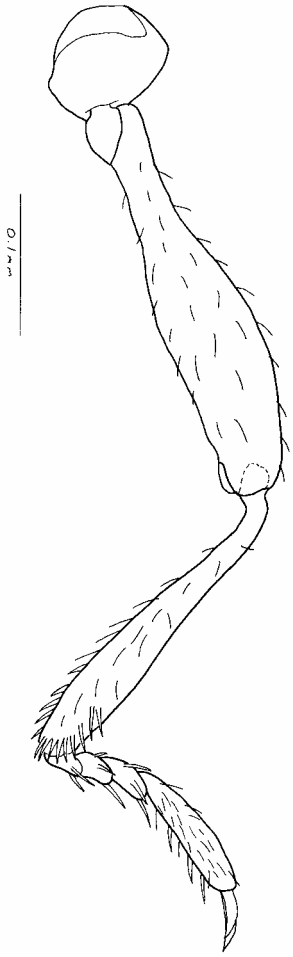

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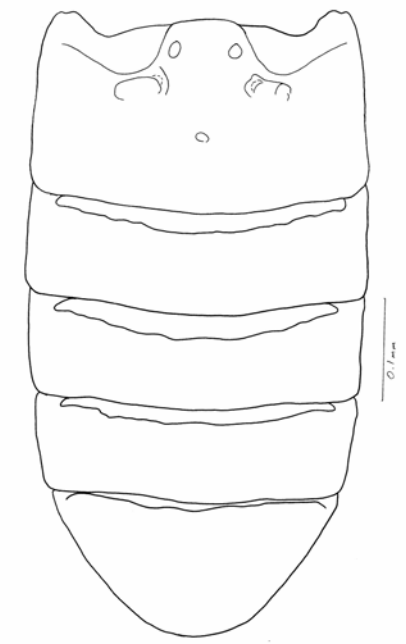

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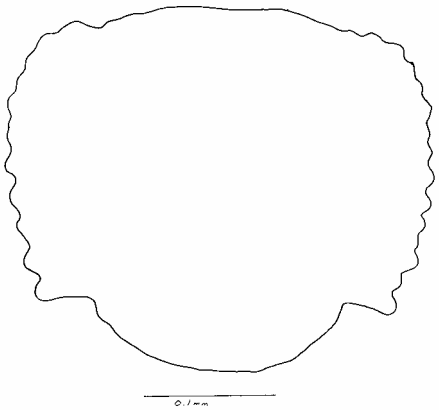

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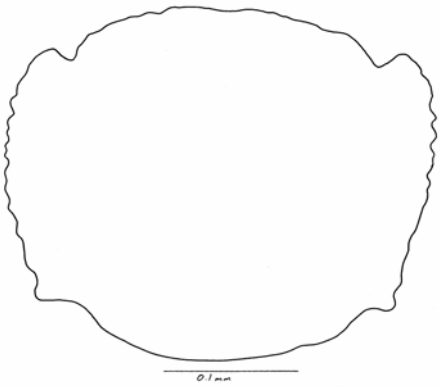

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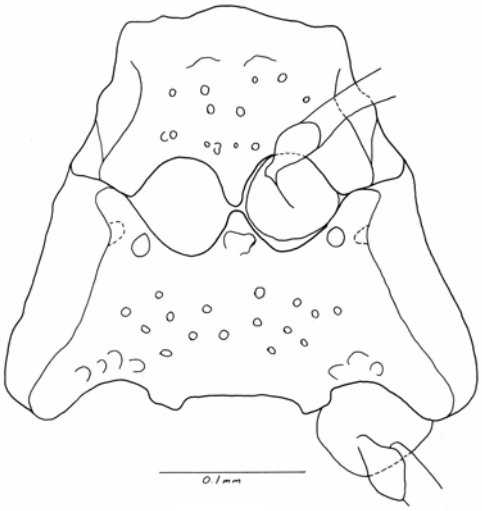

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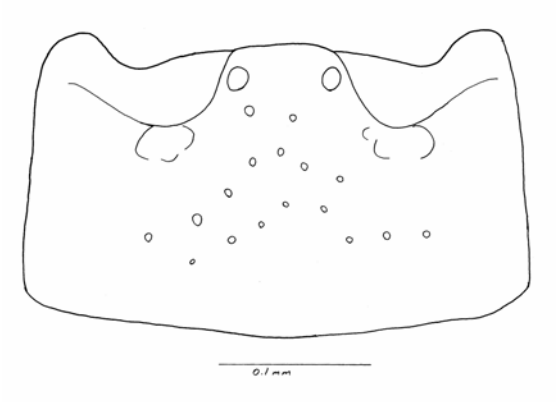

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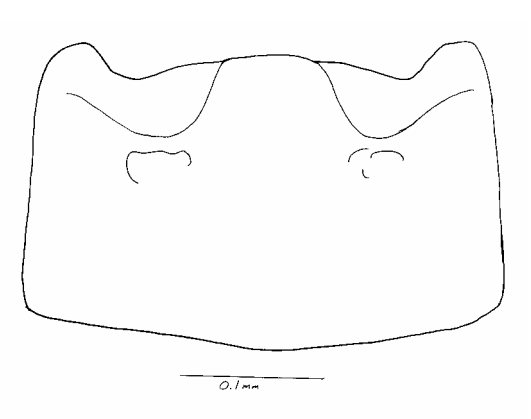

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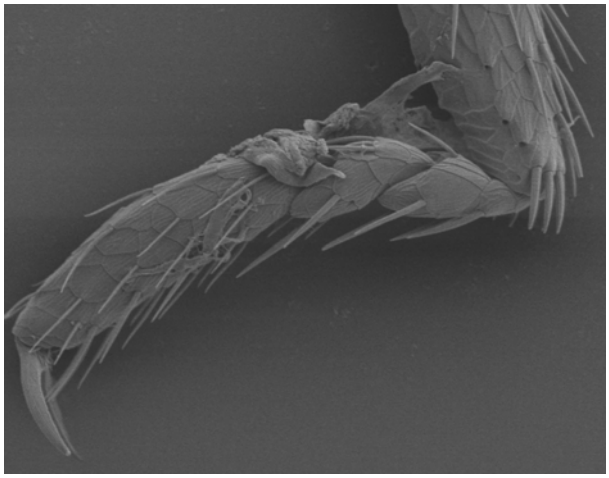

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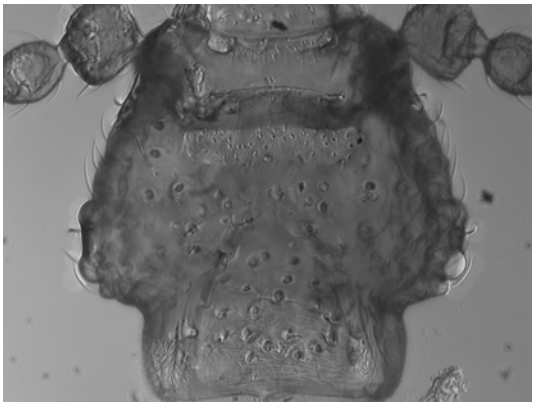

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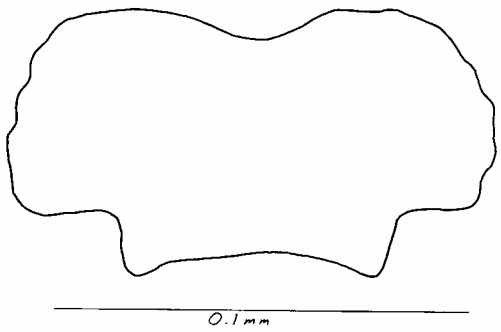

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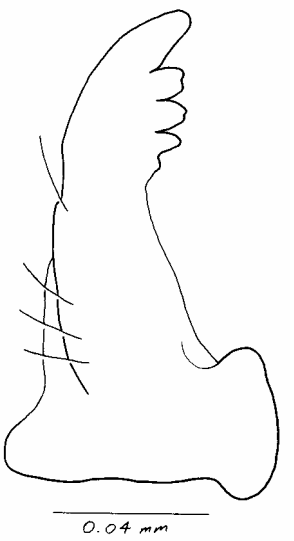

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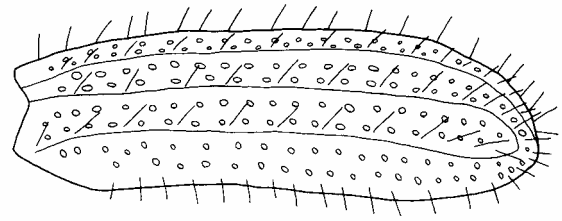

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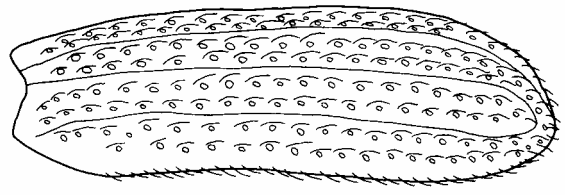

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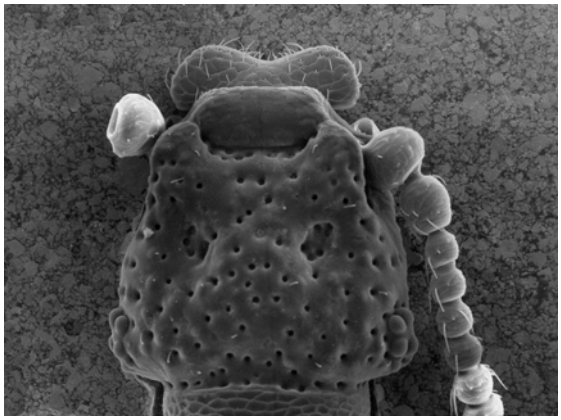

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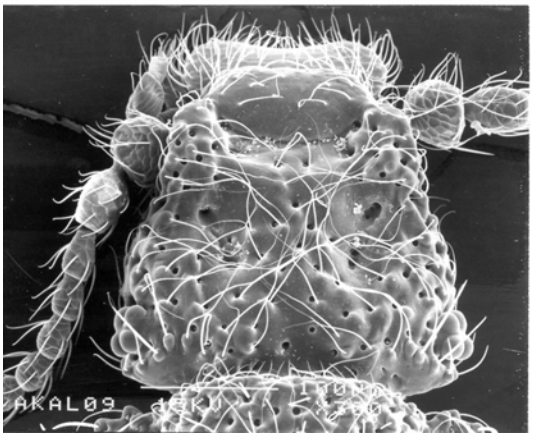

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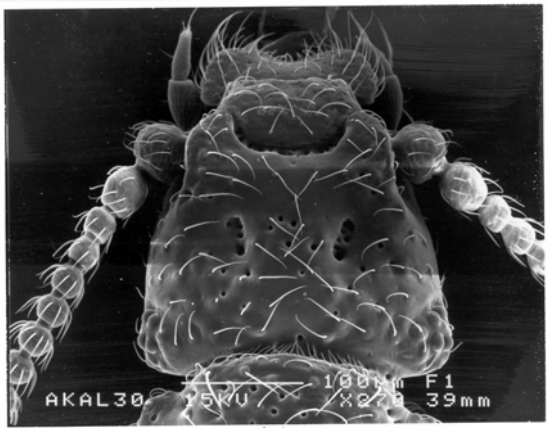

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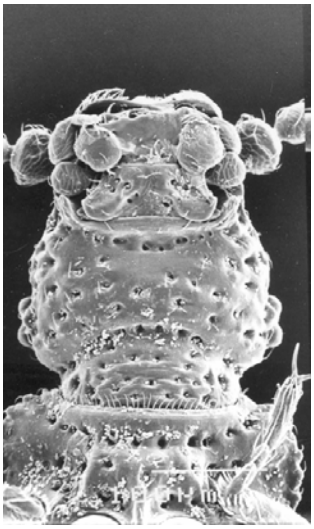

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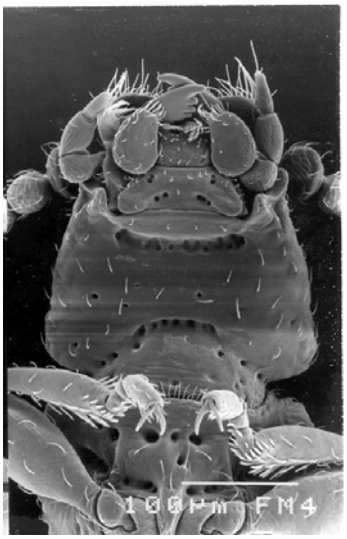

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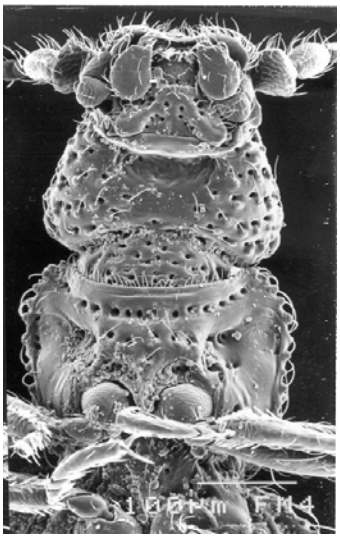

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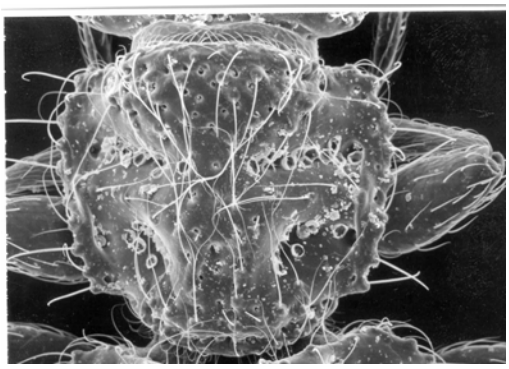

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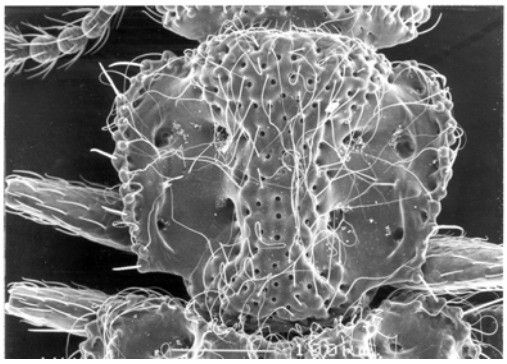

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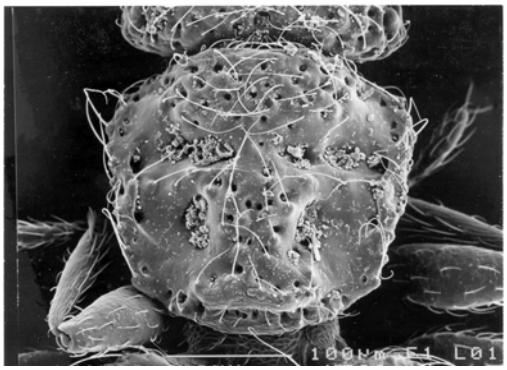

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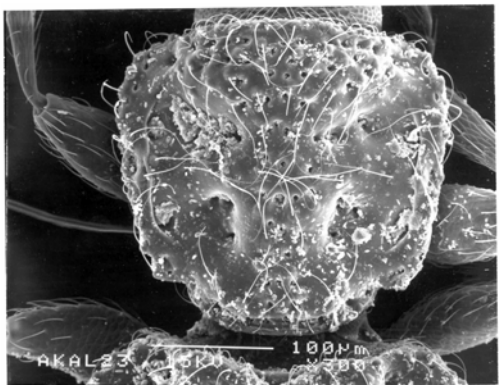

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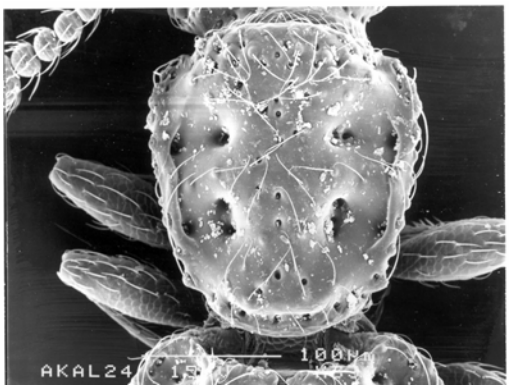

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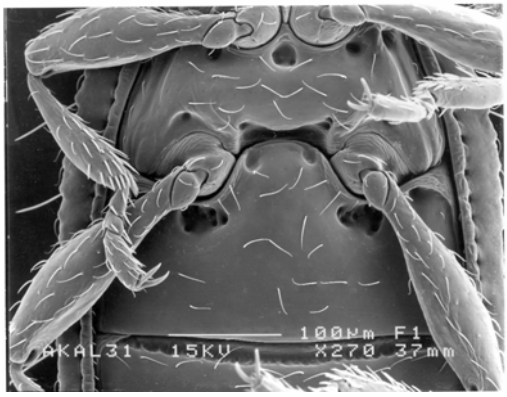

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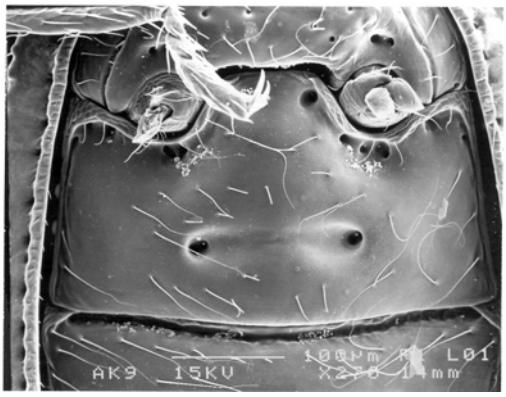

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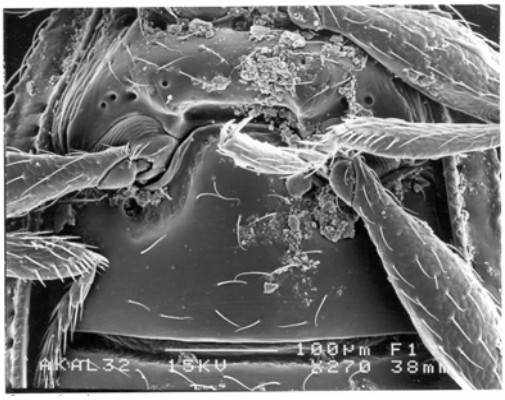

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CHAPTER 5

CONCLUSIONS

The taxonomy of the Latridiidae is still in its infancy. Descriptive taxonomy has been carried out for many genera, but this alpha-level work has not been done with respect to any phylogenetic hypotheses. This pattern of work has left many of the genera with uncertain definitions and in serious need of revision. In addition, the monophyly of the family is, at present, only presumed due to the lack of a phylogenetic framework and the lack of clear diagnostic characters other the small body size and a 3-3-3 tarsal formula.

The genus *Akalyptoischion* presents an ideal point at which to begin to bring the classification of the family into the modern age. The genus possesses clear diagnostic characters, open procoxal cavities and a pseudosegmented first tarsomere, which clearly define it within the Latridiidae. Its limited distribution in Western North America makes it an ideal candidate for study. This revision may provide useful insights into the classification of the family, for the unique characteristics found in *Akalyptoischion*, in particular the pseudosegmentation of the first tarsomere, challenge the current definition of the Latridiidae.

Progress in the natural sciences must begin with solid descriptive taxonomy, and the taxonomic understanding of any group is constantly evolving. The search for a thorough understanding of the Latridiidae will be a great challenge for future systematists, but the reward is a biologically meaningful classification that can contribute to the larger goal of understanding the natural hierarchy of the Cucujoidea and the Coleoptera.