

IDENTIFICATION OF ECONOMIC WIREWORMS USING TRADITIONAL  
AND MOLECULAR METHODS

by

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August 2013

DEDICATION

This work is dedicated to my mother, father, and sister for always lending an ear even when they didn't understand what I was talking about. For that, I am forever grateful.

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## ABSTRACT

Interest in wireworms has grown in the past decade due to their increasing pest status, largely due to the removal of effective seed treatments from the market. Currently, there is no effective Integrated Pest Management (IPM) strategy to control for wireworms, due to the diverse number of species that make up complexes in cropland. The purpose of this study was to determine what wireworm species are present in Montana's croplands and develop tools to make species concepts accessible to non-specialists. This was done using DNA barcoding to associate wireworms with adults. DNA barcoding was done by amplifying the Cytochrome-Oxidase I (COI) region of the mitochondrial genome. Twenty-nine (29) species were successfully sequenced and 13 species had adult and larval associations made, including three new associations. In addition, a LUCID pictorial key was also created to help identify species occurring in Montana. A LUCID key is a computer-based key where a user identifies a specimen with the help of pictures of each character. During the wireworm study, one species-group in the genus *Limonius* was found to include many economic species, including two that are important in Montana. This group needed to be reevaluated due to controversies raised in a recent revision, many of which dealt with economic species. With the combined use of morphological characters and DNA data, eight species are now recognized as belonging to the group. All of these subprojects show the combined use of DNA and morphology as essential to fully understanding wireworm species. With a more precise knowledge of the species that make up the complexes in Montana's croplands, we can focus on developing IPM strategies for efficient control.

## CHAPTER 1 – INTRODUCTION

The larval stage of the beetles in the family Elateridae (Coleoptera) are commonly called wireworms. Since the 19<sup>th</sup> century, wireworms have been of interest to agriculturalists, due primarily to the damage that they cause to many grain and root crops, as well as some fruit crops. Studies of these larvae, for both taxonomic and control interests, began in earnest in the early 20<sup>th</sup> century. However, by the 1960s reports of crop damage due to wireworms had diminished significantly in some areas (Wilkinson 1963). Due to this drop, support for the study of wireworms dwindled in the latter half of the 20<sup>th</sup> century. Now interest in wireworms has grown again due to multiple factors, the main one being the lack an effective method for control.

Since the spate of wireworm studies that occurred from the 1920s to the 1940s many things have changed, especially in ways insect pests are controlled. Today insect control is part of a process called Integrated Pest Management (IPM). IPM strategies limit pesticide use by targeting key points in a pest's lifecycle to maximize effectiveness. However, there are many challenges to effective wireworm IPM strategies. These include the facts that there is a complex of species involved in each field and that this complex of species differs depending on the locality. Also, species of potential economic importance belong to many subfamilies and genera, further compounding the issue of control (Vernon and Van Herk 2013). Some species are reported to be nearly identical morphologically (Glen 1944, Becker 1956, Riley and Keaster 1979), again complicating the problem.



Another factor adding to the difficulty of wireworms is their confusing taxonomic history. Many economically important species have been moved many times to different genera, leading some of the older literature to be buried. In order to clarify this confusion, the history of elaterid classification, in relation to wireworms, is presented here. While Europe has a long history of work on wireworms, North America has always been somewhat behind in our understanding of our species. The initial papers in North America at the end of the 19<sup>th</sup> century dealt only with the identification of pest species (e.g. Comstock and Slingerland 1891), with most of the focus being on control. James A. Hyslop (1917) was one of the first to see value in using wireworm characters to split the Family Elateridae into subfamilial and tribal rankings. He explained which characters he deemed important for determining group relatedness, and split Elateridae into three subfamilies based on larval type, and further subdivided these into well defined tribes. Hyslop's (1917) classification was very different from that used for adults, highlighting problems in finding a coherent elaterid classification.

After Hyslop, the majority of the work was on descriptions of new species (see Glen 1950 for a detailed review). Robert Glen and his colleagues (Glen et al. 1943) published a key to wireworms of the Prairie Provinces of Canada, the first modern key to species using wireworm morphology. Later, he also focused a paper on distinguishing the sister genera of *Dalopius* and *Agriotes* (Glen 1944). However, in his largest publication, Glen focused on species within the defunct tribe Lepturoidini, the genera of which currently belong to the subfamilies Dendrometrinae Gistel 1848, Oxynopterinae Candèze 1857, and Negastrinae Nakane and Kishii 1956 (Bouchard 2011). The main focus was on

the genera that fall within the subfamily Dendrometrinae, and specifically on the composite genus *Ctenicera* (= *Ludius*), *sensu actorum*. In total, Glen covered 93 species in 11 genera, one of the largest and most comprehensive works on wireworms. Glen did a very good job of differentiating the genera and hypothesizing generic relationships. He examined species from Europe, North America, and Australia, and covers both economic and non-economic species.

While extremely useful for many species associations and for the presence of clear and accurate drawings, there are some problems with Glen's work, as is expected from such an ambitious work. The genera other than *Ctenicera sensu lato* are often not keyed out to species in a useful and practical manner. This means that his generic concepts are very good, but the species concepts are consistently reliable in only one genus. Also, only 37 of the 93 species have clear associations that the author made himself, with the others assigned to three stages of reliability. Unlike most other works, however, Glen highlights the accuracy of these associations so the reader can know the strength of the identifications. Despite these few problems, Glen's work remains relevant today and is usually the most current key available for these species.

Glen's colleague, Horace P. Lanchester, (1946) published a key to six economically important wireworms of the genus *Limonius*. This key is better than Glen's key at separating the species of this subgroup of *Limonius*. These six species occur only in North America, so it is useful in local keying but not for broader taxonomic purposes, yet it does help lay a ground work for the relationships between the species covered. Also during this period, Henry Dietrich (1945) published the Elateridae of New York State. In

this work, he briefly covered the known wireworms of that state. His key for wireworms, unlike those for the adults, goes only to genus level, but he notes the species in the state with described wireworms under each genus.

The next author to deal with North American wireworm associations was Edward C. Becker (1956) with his revision of the genus *Agriotes*. He covered all of the known larvae in the genus in North America (10 of 35 species). Becker created species groups for his adults, laying a frame-work for new species associations at the larval stage. In 1963, Alfred T. S. Wilkinson created a key to the wireworms of cultivated land of British Columbia. He looked at 27 species in nine genera. He updated Glen's earlier keys (Glen et al. 1943, Glen 1950) with then current taxonomy, including the use of *Ctenicera* instead of *Ludius*. He included short entries describing each larva and also some of their habits. Nine of the species were therein described for the first time. However, the key is only useful for a limited geographic area and difficulties are likely to arise in other regions.

The next author to look at a larger taxonomic scope was Jeffrey N. L. Stibick. He revised the subfamily Hypnoidinae (currently tribe Hypnoidini) of the world, published from 1976 to 1980. He included keys to both adults and larvae. He is the first author to key the genera that were once placed together under *Hypolithus* or *Cryptohypnus*, as well as provide keys to species for each genus. Many of his characters require dissection and a compound scope, so it is sometimes difficult to distinguish between species, but it remains the best resource for this group (although not very useful to non-specialists).

Although world-wide in scope, the keys are limited to geographic regions for practical use, making it useful over a broad range.

In 1979, Thomas J. Riley and Armon J. Keaster published a key to nine species of *Melanotus* that are considered pests of corn in Missouri. A few years later (1981), they produced a short pictorial key to wireworms attacking corn in the Midwest. They covered the nine species of *Melanotus* as well as five other species that are also commonly collected in corn fields.

The next major key to North American wireworms appeared in 1991 as a chapter in *Immature Insects Vol.2*, written by Becker, and a key by James R. Dogger, which only goes to the genus level. Unfortunately, the key used outdated taxonomy. The generic names used in the key do not take into account many new generic changes of the late '70's and early '80's. It also separates some genera into different parts, without explaining the species within each part, so it is not useful beyond the generic level. However, it provides a useful resource in determining how the genera are split in North America.

Since it wasn't the focus of this research, the economic literature was not examined in depth. Edgar H. Strickland (1933) states that many early papers cover wireworms as a single entity, with no mention of the species involved. He continues that this is due to difficulties with correct identifications and not due to any laziness. Following Hyslop's (1917) paper, wireworm identification was attempted and usually more specific. However, the identities were not always accurate. These difficulties were clearly demonstrated in the limited publications dealing with wireworms in Montana.

The first report of wireworms in Montana occurred in the 13<sup>th</sup> Annual Report of the State Entomologist (Cooley 1916, Morrill 1983). It was a brief paragraph stating that there were many reports of problems due to wireworms across the state and that they were being sent to a specialist. Brief mention of wireworms continued in later publications, with most stating that they continued to be a problem for cereal crops and some noting novel attacks, such as peas (Cooley 1918), and flax and alfalfa (Cooley 1921). No species names were given until 1930 when *Ludius aeripennis* (= *Selatosomus aeripennis*) and *Ludius inflatus* (auct. = *Hadromorphus glaucus*) were mentioned, as well as reports of *Limonius* sp. attacking some wheat fields (Cooley 1930). Later Reports mention reports of wireworm damage, but do not get any more detailed (covered in detail in Morrill 1983).

The next work on wireworms in Montana was reported by Hastings and Cowan in 1954. Their paper was focused on seed treatments for wireworm control, but they mention wireworms collected from a farm in Denton. These wireworms were identified the identification service is Washington D.C.. Most were given the dubious identification of “probably *Athous* sp.” and one was identified as a *Limonius*. Published records of species of wireworms are absent until Morrill did a study in a wheat field in Hill County (1984). He records *Aeolus mellillus*, *Ctenicera destructor* (= *Selatosomus destructor*) and *Ctenicera glauca* (= *Hadromorphus glaucus*) as occurring in the wheat field, with *C. destructor* being the most common. There is doubt, however, that these identifications are accurate for the wireworms collected. This is due to the identifications being made by Becker, who worked primarily with adult Elaterids and very little with wireworms. There

is no doubt that the adults that Becker saw were these species, but it is unknown if the corresponding wireworms match.

The most recent work dealing with this family was completed in 1993 by Catherine Seibert. She conducted a survey of the elaterids of Montana. While focused only on the adults, it was a very extensive work, recording around 150 species occurring in the state, many of which were new records. She also included a list of 22 species and one species complex that had been recorded as economically important in the literature. This provided a starting point to begin research on the wireworms that occur in Montana, as well as a very convenient subset to concentrate on.

Most wireworm associations in the past were made through rearing. Rearing involves keeping the wireworm until it pupates, and describing characters from the exuviae, or shed skin of the larvae, or other wireworms that were collected from the same site and immediately preserved. Rearing may be easy if you collect larvae right before they are about to pupate (Glen 1950), but others often report difficulty (Strickland 1933, Jewett 1946). These difficulties can arise from lack of biological information, particularly with specimens collected from rotting wood, which can lead to the death of the larvae and even the lack of pupation after an extended period of time.

However, in the past decade, new methods have become available to make accurate adult and larval associations. These methods are genetics based and they use highly conserved regions of DNA. Research has been done on wireworm associations using the cytochrome oxidase I (COI) (Lindroth and Clark 2009; Staudacher et al. 2010) and 16S (Benfer et al. 2012) regions of the mitochondria. These proved to be very useful

in making associations, especially when dealing with morphologically difficult to distinguish species. COI was chosen to examine the wireworms of Montana, because it has the largest number of available sequences, having been chosen as the international “barcode” for a species. Many COI sequences are now available on the Barcode Of Life Data (BOLD) System website, and many, if not most, of these sequences are associated with voucher specimens and photographs to aid in accurate identifications. This provides a library already in place with which to associate larvae.

The knowledge of Montana’s wireworms is clearly limited, with only a few species published for the state, as mentioned above. However, Seibert’s (1993) unpublished thesis has a list of potentially economically important species, providing a starting point to determining what species are in Montana’s cropland. With keys to wireworms available for the three Canadian Provinces touching Montana, there are morphological tools to aid in species identification. In addition, there are genetic tools that have been shown to be effective and efficient at associating wireworms with adults for accurate identification of species.

The major goal of this study is to determine which species make up the wireworm complex in Montana’s cropland and undisturbed land. This will enable producers to know which species are causes for concern, and which have a passive or beneficial presence. The knowledge of species composition in Montana’s cropland also provides a framework for understanding species’ life histories and ecologies for efficient and effective control strategies.

In order to accomplish this main overarching goal, three subprojects were conducted. The first was to DNA barcode wireworms collected from across Montana and some surrounding states. The second was to develop a computer-based pictorial key to aid in the identification of wireworms occurring in Montana. And the third was a review of the *Limoniuss canus* species-group in order to better understand this important group of economic species. Each of these projects has their own set of goals.

DNA barcoding was chosen to make wireworm and adult associations, because it was faster and more efficient than traditional rearing in gaining a broad understanding of what species occur in the state. One goal of this study is to create a base DNA reference library of the 22 potential pest species (Seibert 1993). With COI mtDNA data available for these species, wireworms collected in agricultural fields and natural environments could then be compared to this library. In some cases, the wireworms belonged to a different species than those on the list, so sampling of adults was increased to encompass this. All together, these associations allowed us to test the current literature and to determine which areas should be expanded or improved.

Once the wireworms collected during the study were identified, a LUCID key was produced. This is a pictorial key to Montana's wireworms, with a focus on commonly encountered species of economic importance. This is a user friendly key to enable Montana's producers to determine the actual species that infest their croplands. This will also enable others to accurately determine species, especially those dealing with specific control measures for wireworms.



Prior to this study, the genus *Limonius* was revised in the Nearctic region (Al Dhafer 2009). The *L. canus* species-group had many new synonymies proposed in that revision. This species group contains all of the species in *Limonius* that are economically important in the Pacific Northwest and Mountain West regions. Many of the species synonymized had disjunct distributions, and a preliminary review of the species group was undertaken. It combined morphology of adults and wireworms, as well as CO1 mtDNA data to reevaluate the species limits and to see if the new synonymies held up to an in-depth examination. By knowing what species are present, more targeted control methods can be implemented. A new key was also created to aid in the correct identification of the species in this group.

These three things, DNA barcoding of wireworms, the creation of an easy to use key, and a better understanding of an important group of pests, will all help to lay a solid foundation to our understanding of Montana's wireworms.

CHAPTER 2

DNA BARCODING TO IMPROVE THE SPECIES LEVEL MANAGEMENT OF  
WIREWORMS

Contribution of Authors and Co-Authors

Manuscripts in Chapters 2 and 4

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Contributions: Implemented the study design. Collected and analyzed DNA data. Identified all specimens to species level. Wrote first draft of the manuscript.

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Contributions: Helped conceive the study design. Provided feedback on early drafts of the manuscript and funding for the research.

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Contributions: Helped conceive the study design. Provided feedback on early drafts of the manuscript and funding for the research.

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**Abstract**

Economically important species of wireworms (Coleoptera: Elateridae) were successfully associated with adults using cytochrome-oxidase I (COI) barcoding, demonstrating the usefulness of this technique to associate life stages in taxonomically difficult pest groups. Previously unrecognized and morphologically difficult, even indistinguishable, pest larvae were shown to be identifiable using this technique. This is a critical step toward discovering effective species-based IPM strategies for this resurgent pest group following the loss of Lindane seed treatments due to regulatory action. Three new adult-larval associations were discovered for *Hadromorphus callidus* (Brown), *Hemicrepidius carbonatus* (LeConte) and *Metanomus insidiosus* (LeConte). *Hypnoidus bicolor* (Eschscholtz) was shown to comprise multiple divergent lineages at a level usually considered different species, indicating that the population structure of some pest species requires more investigation. The status of the Prairie Wireworm, *Selatosomus destructor* (Brown) as a full species or as a subspecies of *Selatosomus aeripennis* (Kirby) is called into question.

Keywords: wireworms, Elateridae, pest-complex, DNA barcoding

Wireworms are the larval stage of beetles in the family Elateridae (Coleoptera). Since the late 19<sup>th</sup> century, wireworms have been recognized as a serious pest of US agriculture (Comstock and Slingerland 1891). Pest species belong to at least four subfamilies (Johnson 2002), but systematically wireworms have proven to be difficult to work with. The reasons for their difficulty are numerous, including the poorly known taxonomy of adults, high species diversity across regions, soil-dwelling habitat of the larvae which makes them difficult to collect, long immature life-cycle making them difficult to rear, unknown life histories, and subtle interspecific variation (Comstock and Slingerland 1891, Hyslop 1916, Strickland 1933, Lanchester 1946). Consequently, wireworms were usually treated as a single undifferentiated pest complex when control methods were considered, despite the fact that the ecological knowledge was limited to only a few, often unspecified, species.

In the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, there were only a few significant reports of wireworm control, life history, and taxonomy (Comstock and Slingerland 1891, Hyslop 1916, Hyslop 1917). However, research in the 1920s - 40s increased and several western species had their larvae described particularly from the Prairie Provinces of Canada (Glen et al. 1943, Glen 1950) and Washington State (Lane 1925, Lanchester 1946). In a few cases, life histories were examined (Lane 1925, Stone 1941, Stone 1944), albeit from very limited geographic areas. All of these studies were initially dependent on rearing specimens to adulthood for larval identification. The rearing process itself is time consuming, often taking years to obtain adults, and was noted as being impractical for rapidly expanding scientific knowledge (Strickland 1933, Lanchester 1946). For some

species, rearing is close to impossible (Stone 1941, Jewett 1946). During this period, some larvae of different species were also found to have indistinguishable morphologies as wireworms (Glen 1944).

During and after World War II (WWII), modern pesticide studies were conducted (Stone 1941, Stone 1944), and agricultural practices changed drastically, resulting in increasing yields through efficiency and agrochemical advances. Pest control also saw a new shift in the next few decades, with Integrated Pest Management (IPM) strategies becoming more important after 1972 (Dent 1995). IPM uses aspects of each specific pest's biology and ecology to optimize economic impact while limiting pesticide use. In the case of wireworms, however, organophosphates and organochlorides, notably Lindane seed treatments (Lange Jr. et al 1949), virtually eliminated wireworm damage. The result was that new knowledge about wireworms, including species identity, was no longer a priority. These sources of control did not last, with DDT being removed from the US pesticide market in 1972, and Lindane limited in 2002 and removed from agricultural use in 2007 (Edwards 2006). Without effective controls, interest in wireworms is again on the rise (Vernon and van Herk 2013, Vernon et al. 2009, and references therein). IPM strategies are needed, but they require knowledge of the species in question, in order to conduct biological research at the species level and to determine specific economic impacts. The complex of species and the differences in their impacts must first be untangled before effective IPM can be conducted.

Since the complex of species differs depending on the crop, soil type, and geographic area, knowledge of local faunas is required. Critical to this work are

taxonomic tools that allow identification of wireworms. Existing tools are both geographically and taxonomically limited in usefulness. The majority of available larval keys to species were developed in the 30's and 40's, and targeted for specific regions. These keys are not comprehensive in their coverage and portions are now out-of-date taxonomically.

New genetic methods have become available to help differentiate larvae. All of these methods utilize DNA, although different genes are used by different authors (Lindroth and Clark 2009; Staudacher et al. 2011, Benefer et al. 2012). The two primary genes used are mitochondrial cytochrome oxidase I (COI) (Lindroth and Clark 2009; Staudacher et al. 2011) and 16s (Benefer et al. 2012). The COI studies matched the adults to larvae with great success, and the 16s study demonstrated significant genetic diversity amongst morphologically identical larvae, suggesting possible cryptic species and reinforcing the difficulties in using morphology alone to identify larvae.

We tested these molecular methods to identify the wireworms of economic importance in Montana. Montana provides a unique geography, where traditionally recognized eastern and western species both occur. The state includes aspects of the Pacific Northwest forests, the Rocky Mountains, the Great Plains, and even portions of the Eastern hardwood forests, making use of regional keys problematic. There is little published information on the individual species involved in Montana pest complexes. Only three publications dealing with wireworms in Montana mention identified species (Cooley 1930, Hastings and Cowan 1954, Morrill 1984). Fortunately, an unpublished study of Montana's adult-stage elaterids included a list of species that have been reported

in the literature to be economically damaging (Seibert 1993). This list included 22 species and one species complex (Table 2.1).

We used COI DNA sequences to associate field collected wireworms with identified museum adults, focusing on potential pest species that have been collected as adults in Montana (Table 2.1). The barcode region of the COI gene was chosen, since it is a conserved region of the gene and there are already protocols for its use (Lindroth and Clark 2009, Folmer et al. 1994). This particular region of DNA has been shown to be very good for separating specimens at a species level, even when there is cryptic morphology (Hebert et. al 2004, Murray 2008). In addition, there is a current international initiative for barcoding species, the Consortium for the Barcode of Life (CBOL), and data collected by various collaborators are deposited in the Barcode Of Life Database (BOLD) system (Ratnasingham and Hebert 2007). This serves as a useful reference library to further the range and number of species of elaterids available for comparison.

There were three main goals for this study. The first was to create a reference library of COI sequences for the 22 potential pest species known to occur in Montana (Siebert 1993) using identified adult museum specimens (Table 2.1). The next was to sequence COI from wireworms and adults collected in cropland to determine if these specimens match the expected species. Finally, we determined if some of the determinations in the existing literature based on morphology are confirmed with COI barcoding. Montana is fortunate in that the three Canadian provinces that border the state



possess keys to their economic wireworm species, something that is lacking for the majority of the United States (Glen et. al 1943, Glen 1950, and Wilkinson 1963).

## **Materials and Methods**

### **Sampling and Taxonomy**

The majority of adults were specimens deposited in the Montana Entomological Collection (MTEC) and were previously identified by Seibert (1993). Additional adult specimens were freshly collected in 2010 and 2011 from various sites in Montana. Although there was a focus on the 22 agricultural pest species other supposed non-economic species were included to expand the reference library.

Wireworms were obtained from canister traps (Gill 2013) set throughout Montana and a few areas in Idaho and North Dakota in 2010, 2011 and 2012. Specific counties sampled and the number of traps from each is listed in Table 2.2. Wireworm and fresh adult specimens collected from each site were individually separated into vials containing 95% ethanol, assigned a unique identifier in the form of a physical barcode, and stored at room temperature. Larvae were tentatively identified using the existing literature (Glen et al. 1943, Glen 1950, Wilkinson 1963, Becker 1956, Lanchester 1946, and Stibick 1976, 1978, 1980). Voucher specimens are deposited in the Montana Entomology Collection, Montana State University, Bozeman.

### **Molecular Techniques**

Larval specimens used for extracting DNA were cut between the second and third abdominal segment. For adults, the abdomen was removed at the base. Extraction was whole body, following the Qiagen® (Hilden, Germany) DNeasy® spin column protocol

or the protocol with Promega® (Madison, Wisconsin) Wizard® Genomic DNA kit. The samples were lysed over night at 56°C in a Benchmark Scientific (Edison, New Jersey) Multitherm™ shaker (Model H5000-H). Following completion of the extraction process, each sample was assayed using a NanoDrop™ 2000 spectrometer to determine the quality and quantity of DNA present by the UV light absorbance ratio of 260nm/280nm being at or close to two. The barcode region of the COI gene was amplified using the Polymerase Chain Reaction (PCR) on an Eppendorf® (Hamburg, Germany) Mastercycler® using the GoTaq® Green Mastermix (Promega®). Primers LCO1490 and HCO2198 from Folmer *et al.* (1994) were used with the following cycler protocol: an initial 3 min. at 94°C; 6 cycles of 94°C for 1 min., 45°C for 1:30 min., and 72°C for 2:30 min.; 36 cycles of 94°C for 1 min., 51°C for 1:30 min., and 72°C for 2:30 min., followed by a final 5 min. at 72°C. The PCR product was analyzed on a 1% agarose gel. Successful products were purified by precipitation. To 14µL of PCR product, 22.75µL of dH<sub>2</sub>O, 12.25µL 2M NaClO<sub>4</sub>, and 27.0µL of Isopropanol were added in a 0.5mL centrifuge tube, vortexed, and centrifuged for 15 min at room temp at 14,000 rpm. The supernatant was aspirated and 150µL of 70% ethanol added to the pellet, centrifuged for 5 min., at room temp, at 14,000 rpm and the supernatant aspirated. The pellet was allowed to air dry for 10- 15 minutes and then re-suspended in 10µL of LoTE, which is a mix of 3mM Tris pH8.0 and 0.2mM EDTA. The purified DNA was sent to MCLabs (South San Francisco, California) for sequencing in both directions. To control for possible laboratory contamination, a set of eight negative PCRs (no template DNA added) was run periodically. After extraction, each specimen was washed with distilled water, followed

by a rinse of 95% ethanol. Larval specimens with their individual barcode were returned to individual vials filled with 95% ethanol. Extracted adults had their abdomens glued on, with the aedeagus for males glued on a cardboard card pinned under the specimen. The glue used was Elmer's® white glue to enable simple removal of both genitalia and abdomens in potential later studies.

### **Data Analysis**

The sequence chromatographs were analyzed using Chromas Lite (Chromas software, Technelysium Pty Ltd. [1998-2005]; Gene Codes Corporation, Ann Arbor, MI, USA [2000]) for quality assessment. Quality forward and reverse sequences from each sample were aligned manually, and the consensus sequence was taken from the area of overlap between the two strands. The consensus sequences were aligned using MAFFT (Kato 2011). An unrooted Neighbor-Joining tree using the Jukes-Cantor Substitution model was created, with boot-strap values calculated from 500 runs.

Unidentified adults were identified to species using the appropriate literature (Johnson 2002, Brown 1935, Brown 1936, Becker 1956, 1979, Lane 1971, Stibick 1976, 1978, 1980, and Al Dhafer 2009). Locality and sequence information for all specimens was uploaded to BOLD and is available on the BOLD website (NCBI GenBank #s KF549671 - KF549902).

### **Results**

A total of 831 specimens representing 40 species (Table 2.3) were examined (Museum identifiers MTEC007248 to MTEC008111), of which 194 were adults and 637

were larvae. The larvae collected from 29 counties in four states were identified using current taxonomic keys. The majority keyed to *Limonius californicus* (Mannerheim) (54.5%), with *Aeolus mellilus* (Say) (12.5%), *Selatosmus aeripennis* (Kirby) (8.4%), and *Hypnoidus bicolor* (Eschscholtz) (7.4%) being the next most common species. DNA was extracted from 423 specimens, including all 194 adults and 230 larvae. Table 2.3 lists the numbers of adult and wireworm specimens examined for each species. Of the extracted specimens, a total of 246 specimens were successfully sequenced. Thirty of the forty species examined had specimens that produced sequences (Table 2.3). Ten of these were represented by adults only, and six were represented by larval specimens only. *Athous sierrae varius* Lane, *Melanotus longulus oregonensis* (LeConte), *Hadromorphus glaucus* (Germar), and *Hemicrepidius memnonius* (Herbst) yielded DNA from only one life stage, so we were unable to confirm associations between morphologically associated adults and larvae. Both adult and larval specimens of the remaining 14 species were sequenced.

An unrooted neighbor-joining tree was constructed using the 246 COI sequences (Supplementary Figure 2.1). The sequences cluster into 29 distinct groups with 98 - 100 % bootstrap support, n = 500 repetitions. Individual branches within each species group were collapsed (Fig. 2.1) for clarity.

Significantly, all species identified using taxonomic keys formed unique COI groups that are well separated from closely related species (Fig. 2.1). The interspersions of wireworms and adult sequences in the 13 species where both are present demonstrates that COI is a very useful tool for associating larvae with adults (Supplementary Figure 2.1).

Several species clades exhibited surprising sequence diversity (Figs. 2.2 to 2.4). The *Hypnoidus bicolor* clade (Fig. 2.2) formed two distinct groups, “population A” with 30 individuals and “population B” with 8 individuals (100% and 96% bootstrap support, respectively). A single individual, while contained within the clade (99% bootstrap support), was an outlier from populations A and B. Each of these three groups is separated by at least 3% sequence divergence. Significantly, populations A and B include both wireworm and adult sequences, while the third is represented by a single wireworm collected from Beaverhead County, Montana.

The *Hadromorphus* clade (Fig. 2.3) also exhibited surprising diversity. Specimens in this genus, initially all thought to be *H. glaucus*, came out into three crown-groups. One group containing Montana wireworms and an adult male were well separated from two other groups represented by four Washington wireworms and a lone Idaho wireworm. The adult male from Montana was re-examined closely, and the reason for the large separation of this group became clear. This specimen was *Hadromorphus callidus* (Brown), a cryptic species often confused with the more common *H. glaucus*.

Interestingly, the *Selatosomus aeripennis* clade had less diversity than expected, since it includes two closely related species, sometimes referred to as subspecies, *S. aeripennis* and the Prairie Wireworm, *S. destructor* (Brown) (Fig. 2.4). Fig. 4 includes 19 larvae sampled from Montana and Idaho, and five adults from Montana. Based on morphology, three adults key out to *S. aeripennis* and two to *S. destructor*. However, there is less than 1.7% nucleotide diversion within the entire group. Of particular note are a few specimens obtained from a high alpine meadow in the Beartooth Mountain Range,

two adults, male and female, and two wireworms. The male was very small, with a subtle metallic-blue color on his elytra, more typical of *S. aeripennis* despite its small size, while the female was morphologically more of a typical *S. destructor*. However, the COI sequences from these specimens, despite coming from a unique environment, are not unique from specimens sampled from more typical habitats across MT (Figure 2.4).

### **Discussion**

Of the 22 target species and the species group determined by Seibert (1993) as potentially economically important in Montana (Table 2.1), 11 were successfully sequenced as adults. Four species from the list were tested unsuccessfully, six were represented in the collection by a single specimen, and the remaining two were too old to attempt extraction.

The current morphological keys for wireworms were shown to be very useful, but not practical for use by a non-specialist. In order to key out all species discovered in the study, multiple keys had to be used, with well-educated guesses to cover gaps. Without expert knowledge of elaterid taxonomy, it would have been difficult to identify the wireworm species present. However, for the most part, associations of wireworms to adults proved to be very accurate, particularly in the works of Glen (1944, 1950). DNA barcoding did demonstrate some limitations of traditional keys, including possible cryptic species as well as allowing new associations to be made between larvae and adults. Using COI barcoding in conjunction with morphology will enable larval keys to be expanded and improved, as well as make the information in the older literature more accessible to non-specialists.

DNA barcoding has shown the potential for the discovery of cryptic wireworm species. Although there is no firm rule for COI nt diversity between species, 3% diversity levels are often indicative of species level divergence across multiple phyla (Kartavtsev 2011). The *H. bicolor* group showed clear evidence for the potential existence of two cryptic species and perhaps a third that was represented only by a single individual. The two crown groups with adults are particularly interesting because they were morphologically identical and did not separate further using existing keys. Interestingly, in his revision of the Hypnoidinae (now Hypnoidini), Stibick (1978) noted a few variants in this species, two of which are stated to occur in Montana. However, one of these forms (Form C) is much less common than the typical form (Form A). Additionally, Zacharuk (1958) noted that there were sexual and parthenogenetic populations in Southern Saskatchewan. Montana lies in the area of overlap between these two populations (Seibert 1993). All adults examined in detail in this study were females, so the possibility of parthenogenetic populations is likely.

The *H. bicolor* COI sequences were also compared to sequences from the BOLD website. The larger population A (Fig. 2.2) matched *H. bicolor* specimens coming from Alaska, British Columbia, Alberta, and Manitoba, with an average 99.93% nucleotide (nt) identity, while population B was only 94% similar. The lone *H. bicolor* wireworm (Fig. 2.2) was 98% similar to a single *H. bicolor* specimen in BOLD from Ontario, Canada, but no other data could be obtained for this entry. The lone wireworm did not match other species within the genus *Hypnoidus* that have been entered into BOLD. Interestingly, this distinct genetic difference within populations across Canada was also noted by Benerfer et

al. (2012) within the 16s gene. Collectively, these data suggest the existence of several genetically distinct groups within *H. bicolor* across its range that may coincide with morphological forms identified by Stibick (1978). Additionally, there is some indication that the split between the sexual and parthenogenic populations may be leading to a speciation event. Further studies, such as correlating genotypes with ecological data and mating populations, are required to determine if these groups actually represent new cryptic species. This is expected to play a huge role in determining methods for control since Benefer et al. (2012) concluded that *H. bicolor* is emerging as the dominate agricultural pest in Canada.

The *Hadromorphus* species-group provides another example of the value of DNA barcoding, in both new associations and possible cryptic species (Fig. 2.3). With *H. callidus*, the associated wireworms, morphologically very similar to *H. glaucus*, represent the first association for this species. This was only made possible through COI data. The Washington populations of *H. glaucus* and the single Idaho wireworm were all morphologically indistinguishable, but have a large degree of nt divergence, again, suggestive of a possible undescribed cryptic species. Of the four species known to occur in the genus (Brown 1936), only *H. callidus* and *H. glaucus* are known to occur in Montana and the surrounding region. Due to the lack of an adult associated with either population, the identity of *H. glaucus* cannot be firmly associated with either. However, morphologically both populations match the description of *H. glaucus* wireworms. The finding of two possible species that are morphologically identified as *H. glaucus* may even play a role in determining pest status. *Hadromorphus glaucus* is considered to be a



foliage pest in the Canadian Prairie Provinces (Brooks 1960), a soil pest in Washington (Lane 1925), or rarely of economic importance in British Columbia (Wilkinson 1963). These apparent differences in pest type and status mixed with the above DNA diversity demonstrate that there is still much more to learn about this group of species.

Rather than suggesting the existence of cryptic species based on genetic COI data, the lack of genetic diversity among *Selatosomus aeripennis* and *Selatosomus destructor*, identified based on morphology, questions whether they are in fact separate species. *Selatosomus destructor* is considered to be a major pest of wheat, but can only be separated by its all black coloration from *S. aeripennis*, which has distinctly metallic, often green or green-blue elytra. *Selatosomus destructor* was originally described as a subspecies of *S. aeripennis*, but Brooks (1960) considered them to be separate species, based on differences in habitat. A few years later, Zacharuk (1962) studied these two in detail. He confirmed a preference for different soil types and attempted hybridization of the two. While he was not successful in his attempts, they were few in number and there were probably many confounding factors in his observations. Seibert (1993) covered these two as separate species in her survey of Montana elaterids, and found *S. aeripennis* to be mainly in the western part of the state and *S. destructor* mainly in the eastern part, with overlap of the two in the middle of the state. However, intermediate specimens have been known since their descriptions. The wireworms are likewise virtually indistinguishable, except that *S. destructor* tends to be smaller than *S. aeripennis*.

This study found no significant COI difference in specimens, both adults and wireworms, from across the state (Fig. 2.4). Benefer et al. (2012) also found no

separation of 16S between these two species in specimens from across Canada. Together, these two studies suggest that there may only be one species, represented by two color forms. However, there is evidence (Maddison 2008) that at least COI does not always detect species differences, so this cannot be considered conclusive. Therefore, this problem requires more study, with hybridization studies, rearing under different conditions, and the addition of more genes being obvious avenues.

In addition to the association made for *Hadromorphus callidus* larvae, other species had first associations established. Wireworms were successfully matched to an adult male *Hemicrepidius* sp. nr. *carbonatus* LeConte. A more accurate species identification of the male could not be made, because the genus is in much need of revision. However, this shows the technique's usefulness in future taxonomic work. Wireworms were also matched to *Metanomus insidiosus* LeConte. Based on the existing literature, these wireworms were originally keyed to the genus *Pseudanostirus*. *Metanomus*, once part of *Ctenicera*, has no known associated wireworms in North America, so the literature cannot lead to the correct identity (Johnson 1992, Majka and Johnson 2008). A formal description of the wireworm will follow in a subsequent publication.

Another potential use of this technique is to help in unraveling difficult Elaterid genera. In this study, species of *Dalopius* were found to be very difficult to key to species as adults and nearly identical as larvae (Glen 1944). Most identifications are only possible through adult males, and we were unable to sequence adult males. Due to the difficulties of this genus' taxonomy, an in-depth analysis was not done for this complex.

However, the limited CO1 barcoding done shows potential to unravel species concepts in this difficult group (Fig. 2.3).

The sequencing of CO1 mtDNA has advanced the understanding of Montana's wireworms. The three goals of this study were partially met as we were able to obtain sequence information on half of the species listed by Seibert (1993). The species sequenced are the beginnings of a reference library of important wireworm pest species infesting Montana's cropland. Towards this we added 246 COI barcode sequences, representing 30 species, to the BOLD database as a resource for future research. Additional sequences from geographically diverse locations entered on the BOLD database will provide a valuable tool for studying genetic diversity of wireworm species. This library can be used to aid in the proper identification of wireworms by producing the correct associations with adults. Of the 22 potentially economic species, half were successfully sequenced, one is likely to not actually occur in the state at the present time, and four are only known from incidental specimens and may never have economically important populations in Montana. This leaves six species needed to fully complete the reference library.

These associations have provided the foundation to survey Montana's cropland to determine the abundance of specific wireworm species (A. Morales et al. unpublished), which is only made possible by having accurate identifications. Sequencing has also shown some interesting insights in elaterid taxonomy. It has exposed the very high genetic diversity in *Hypnoidus bicolor*, led to the recognition of a newly recognized candidate pest species in the genus *Hadromorphus*, and supported the potential for

synonymy of *S. aeripennis* and *S. destructor*. It has also allowed new associations between adults and previously unrecognized wireworms.

This proof-of-concept work indicates that the use of COI barcoding holds promise for future advances. These range from use as taxonomic tools for difficult taxa to the discovery and expansion of the number of known pest wireworm species

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Table 2.1. Wireworm species of potential economic importance in Montana. From Seibert 1993.

Potential Montana Pest Species	Potential Montana Pest Species (cont.)
<i>Aeolus mellillus</i> (Say)	<i>Hypnoidus bicolor</i> (Eschscholtz)
<i>Agriotes criddlei</i> Van Dyke	<i>Hypnoidus impressicollis</i> (Mannerheim)
<i>Agriotes lineatus</i> (Linnaeus)	<i>Limonius californicus</i> (Mannerheim)
<i>Agriotes mancus</i> (Say)	<i>Limonius canus</i> LeConte
<i>Agriotes pubescens</i> Melsheimer	<i>Limonius infuscatus</i> Motschulsky
<i>Anchastus cinereipennis</i> (Eschscholtz)	<i>Limonius ursinus</i> Van Dyke
<i>Conoderus auritus</i> (Herbst)	<i>Melanotus longulus oregonensis</i> (LeConte)
<i>Conoderus vespertinus</i> (Fabricius)	<i>Melanotus similis</i> (Kirby)
<i>Dalopius spp.</i> Eschscholtz	<i>Paradonus beckeri</i> Stibick
<i>Glyphonyx recticollis</i> (Say)	<i>Selatosomus aeripennis</i> (Kirby)
<i>Hadromorphus glaucus</i> (Germar)	<i>Selatosomus destructor</i> (Brown)
<i>Hypnoidus abbreviatus</i> (Say)	

Table 2.2. Montana counties sampled for wireworms and the number of traps placed in each county. References are given if the specimens were also part of another study. This does not include material from Broadwater, Fergus, Flathead, Gallatin and Pondera Counties, Montana from A. Morales (unpublished).

State	County	Year	Number of Traps
Idaho	Bonneville Co.	2011	2
Idaho	Boundary Co	2011	1
Idaho	Fremont Co.	2011	2
Montana	Beaverhead Co.	2011	11
Montana	Blaine Co.	2011	5
Montana	Daniels Co.	2011	9
Montana	Deerlodge Co.	2011	2
Montana	Fergus Co.	2011	3
Montana	Gallatin Co.	2010-2011	Gill 2013
Montana	Garfield Co.	2011	4
Montana	Granite Co.	2011	3
Montana	Hill Co.	2011	14
Montana	Liberty Co.	2011	2
Montana	Madison Co.	2011	2
Montana	McCone Co.	2011	4
Montana	Missoula Co.	2011	3
Montana	Ravalli Co.	2011	2
Montana	Richland Co.	2011	6
Montana	Roosevelt Co.	2011	4
Montana	Valley Co.	2011	4
North Dakota	Williams Co.	2011	4
Washington	Benton Co.	2011	1
Washington	Lincoln Co.	2011	6
Washington	Whitman Co.	2011	3
Washington	Yakima Co.	2011	1

Table 2.3. Total number of specimens and species with DNA extracted and with successful COI sequences. N/A indicates no specimens were successfully sequenced, ? indicates placement is based solely on the available literature, and asterisk (\*) indicates *Selatosomus destructor* larvae are morphologically identical to *S. aeripennis* larvae and are included in that species' count.

Species Name	# of adults extracted	# of larvae extracted	# of adults sequenced	# of larvae sequenced
<i>Aeolus mellilus</i>	9	10	1	1
<i>Agriotes criddlei</i>	6	0	2	0
<i>Agriotes ferruginipennis</i>	4	0	N/A	N/A
<i>Agriotes</i> sp. nr. <i>sparsus</i>	0	3	0	3
<i>Ampedus brevis</i>	3	0	N/A	N/A
<i>Ampedus</i> sp. 1	0	1	0	1
<i>Ampedus</i> (?) sp. 2	0	1	0	1
<i>Athous rufiventris</i>	4	0	2	0
<i>Athous sierra varius</i>	3	3?	2	0
<i>Corymbitodes lobata</i>	1	0	N/A	N/A
<i>Dalopius</i> spp.	6	10	2	9
<i>Glyphonyx reticollis</i>	3	0	N/A	N/A
<i>Hadromorphus calidus</i>	2	2	1	2
<i>Hadromorphus glaucus</i>	22	9	0	5
<i>Hemicrepidius brevicollis</i>	2	0	2	0
<i>Hemicrepidius memnonius</i>	2	2	0	2
<i>Hemicrepidius</i> sp. nr. <i>carbonatus</i>	1	4	1	4
<i>Hypnoidus bicolor</i>	21	21	19	19
<i>Hypnoidus impressicollis</i>	6	0	2	0
<i>Hypnoidus leei</i>	4	3	1	2
<i>Limonius aegar</i>	3	1	1	1
<i>Limonius agonus</i>	7	0	1	0
<i>Limonius anceps</i>	2	0	N/A	N/A
<i>Limonius californicus</i>	24	106	4	82
<i>Limonius canus</i>	9	4	5	4
<i>Limonius infuscatus</i>	9	24	5	19
<i>Limonius subauratus</i>	4	0	N/A	N/A
<i>Limonius ursinus</i>	1	0	N/A	N/A
<i>Megapenthes angularis</i>	4	0	1	0
<i>Melanotus longulus oregonensis</i>	2	1?	1	0
<i>Melanotus similis</i>	1	0	N/A	N/A
<i>Metanomus insidiosus</i>	4	2	2	2
<i>Psudanostirus nigricollis</i>	3	0	3	0
<i>Psudanostirus pudica</i>	3	0	1	0

Table 2.3. (continued)

Species Name	# of adults extracted	# of larvae extracted	# of adults sequenced	# of larvae sequenced
<i>Psudanostirus propola</i>	1	0	N/A	N/A
<i>Selatosomus aeripennis</i>	7	20*	3	20*
<i>Selatosomus destructor</i>	6	*	2	*
<i>Selatosomus pruininus</i>	0	1	0	1
<i>Selatosomus semimetallicus</i>	4	2	2	2



Figure 2.1. Neighbor-Joining tree of 250 COI sequences, representing 246 specimens. Individual branches within species groups supported by bootstrap analysis have been collapsed. The number next to each species name is the number of specimens with a successful sequence. Branch lengths do not represent nt divergence.

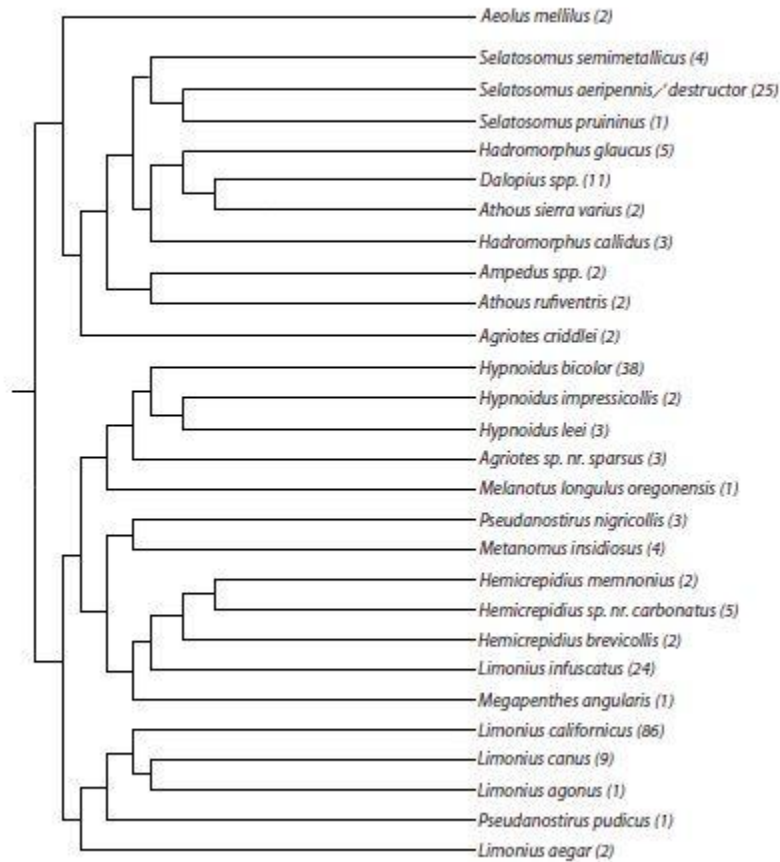


Figure 2.2. Full *Hypnoidus bicolor* clade from the collapsed simplified tree in Fig. 1. Scale bar represents a 3% nt difference between sequences. Numbers on branches represent bootstrap values from 500 runs. Three populations are represented, population A, population B, and a lone larva from Idaho. An 'A' indicates an adult specimen and an 'L' indicates a larval specimen.

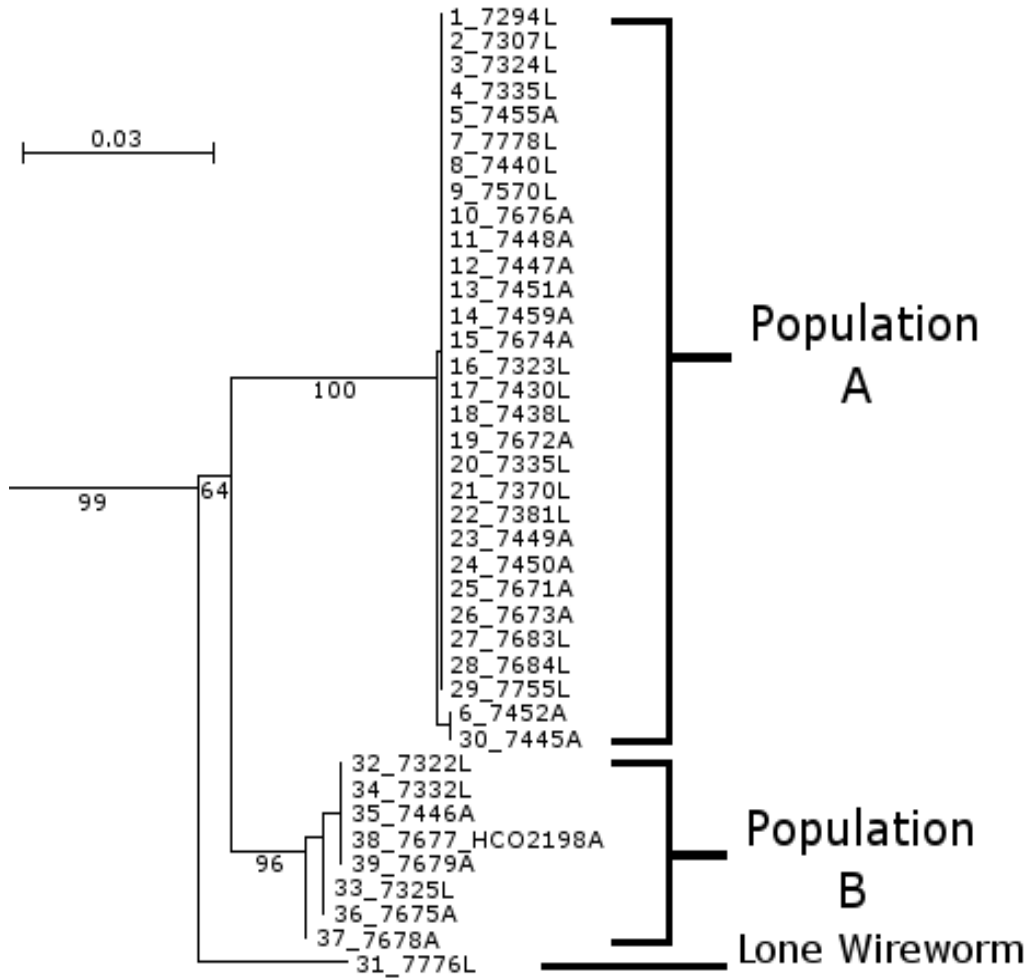


Figure 2.3. *Hadromorpus* spp. and *Dalopius* spp. clades. The *Dalopius* and *H. glaucus* clades are collapsed into one branch, each, in the simplified tree (Fig. 1). Scale bar represents a 3% difference between sequences. Numbers on branches represent bootstrap values from 500 runs. An ‘A’ indicates an adult specimen and an ‘L’ indicates a larval specimen.

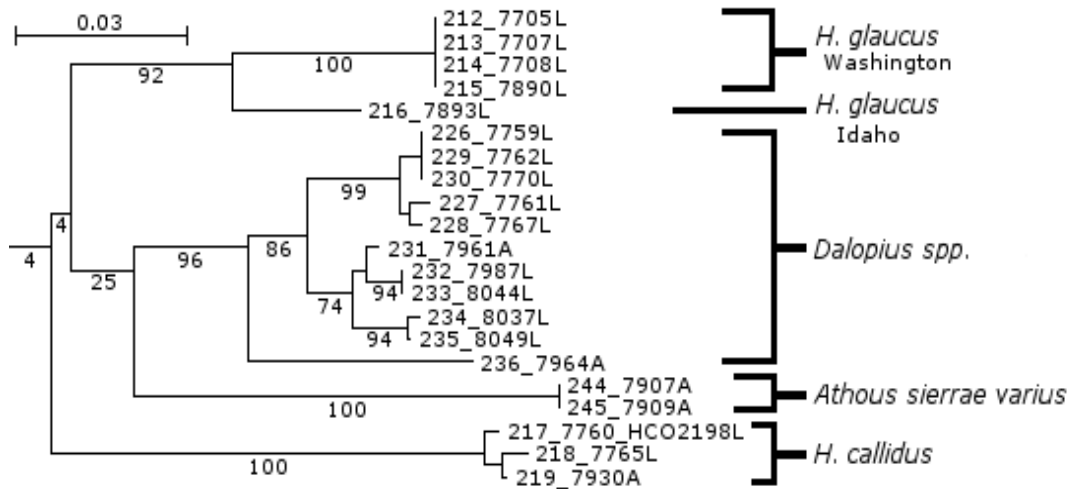
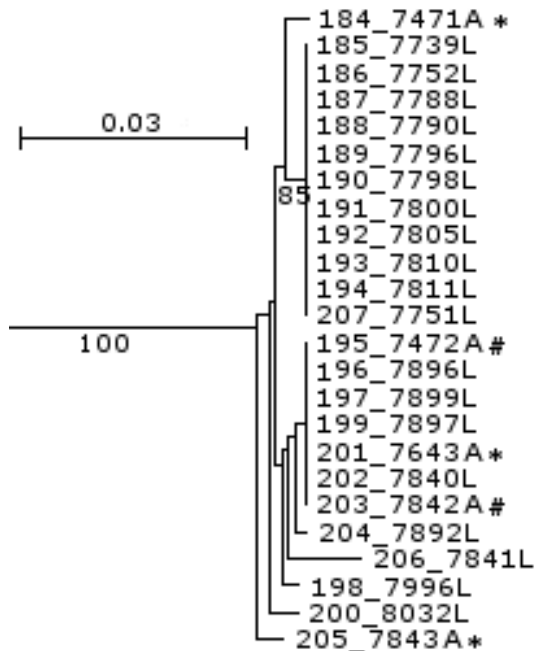
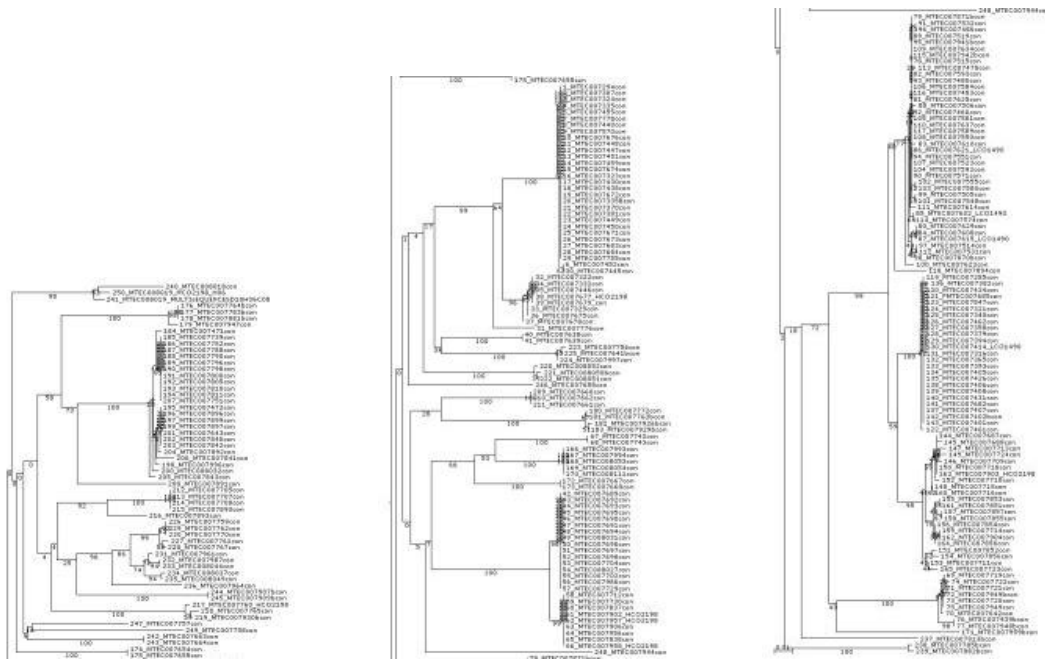


Figure 2.4. *Selatosomus aeripennis* and *S. destructor* clade. An asterisk (\*) denotes an adult identified as *S. aeripennis* and a pound sign (#) denotes an adult identified as *S. destructor*. Scale bar represents a 3% difference between sequences. Numbers on branches represent bootstrap values from 500 runs. An ‘A’ indicates an adult specimen and an ‘L’ indicates a larval specimen.



Supplementary Figure 2.1. Unrooted Neighbor-joining tree of 500 runs, constructed using the MAFFT website. Numbers on branches indicate bootstrap values from the 500 runs. The scale bar on lower left represents a 1% sequence divergence. The clades, from top to bottom and left to right, represent the species *Aeolus mellilus*, *Selatosomus semimetallicus*, *S. aeripennis/destructor*, *S. pruininus*, *Hadromorphus glaucus* Washington, *H. glaucus* Idaho, *Dalopius* spp. complex 1, *Dalopius* spp. complex 2, *Dalopius* sp., *Athous sierra varius*, *H. callidus*, *Ampedus* sp.1, *Ampedus* sp. 2, *Athous rufiventris*, *Agriotes criddlei*, *Hypnoidus bicolor* population A, *H. bicolor* population B, *H. bicolor* Idaho, *H. impressicollis*, *H. lei*, *Agriotes* sp. nr. *sparsus*, *Melanotus longulus oregonensis*, *Pseudanostirus nigricollis*, *Metanomus insidiosus*, *Hemicrepidius memnonius*, *H. sp. nr. carbonatus*, *H. brevicollis*, *Limonium infuscatus*, *Megapenthes angularis*, *Limonium californicus* population 1, *L. californicus* population 2, *L. californicus* population 3, *L. canus*, *L. agonus*, *Pseudanostirus pudicus*, *Limonium aegar*.



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## CHAPTER 3 – KEYS TO MONTANA WIREWORMS

Wireworms are considered a major crop pest and have been noted for their difficulty of identification (Strickland 1933, Benefer et al. 2012). In order to help many producers and extension agents identify what was present in their fields, attempts were made to create keys to the species of particular areas. While Montana currently lacks a key to species, there are regional keys to species for British Columbia (Wilkinson 1963) and the Canadian Prairie provinces (Glen et al. 1943), providing a starting point for the development of a key for the state.

In addition to the regional keys, there are keys to select groups. The genera of North America have mostly appeared together (Becker and Dogger 1991), but the lack of a species list can make this key difficult to use. Members of the genera *Agriotes* (Becker 1956) and *Limonius* (Lanchester 1946), and portions of the subfamily Dendrometrinae (Glen 1950) all have more specialized keys which cover all of North America. Glen 1950 is the most thorough treatment of North American wireworms available.

All of the above keys are traditional dichotomous keys and can be difficult to use for non-specialists. Recently, there has been an increasing interest in programs that use pictures to allow the keying of species of various groups. These keys allow the user to start at any character and often provide a picture for each character and species covered. This allows the user to become familiar with what certain terms mean as well as giving them a visual for the character, which is often lacking in traditional dichotomous keys. These keys also bring this information to a wider audience, as characters will be shown instead of described, which makes it easier for non-specialists to use. Picture keys for

wireworms, however, are almost non-existent. The only one is Riley and Keaster (1981?) and is limited to the wireworms that are in corn fields east of 104°W, with a focus on species in the genus *Melanotus*. However, unlike modern picture keys, this key only focuses on a few characters.

Another factor that makes the current keys difficult to use is that the majority are now out of date taxonomically. A major change to have occurred in the past 20 years is the splitting of the genus *Ctenicera* into many smaller genera (Majka and Johnson 2008 and references therein). The older keys (pre-1951) use the pre-occupied name *Ludius* for species in these genera, while the later keys use the broad sense of *Ctenicera*. These keys are also often incorrect in their treatment of *Hypnoidus* since they are before Stibick's revision of the tribe *Hypnoidini* (1975, 1976, and 1980). Unfortunately, the most recent key to genera (Becker and Dogger 1991) continues the improper treatment of *Hypnoidus*. As no key is available for Montana, if one wants to identify wireworms here, they need to know the taxonomic history of multiple genera and have access to multiple keys.

In order to make this information more accessible to Montana's producers, a pictorial key and traditional dichotomous key were made for the state. The information included is up to date taxonomically, and the two types of keys make it so the user has a few options to choose from. These keys focus on species that are of potential economic importance in Montana, as well as some species that have limited or no distribution in the stat, but are important in the Pacific Northwest, are also covered.

### Characters Used in LUCID Key

The list of characters used for the identification of wireworms are adapted from Glen et al. 1943, Becker and Dogger 1991, and Johnson 1992, with species of *Agriotes* and *Hypnoidus* following Becker 1956 and Stibick 1975, 1976 respectively. Characters are given a '0' where previous authors have treated them as being an ancestral state, but this classification is not followed here due to the lack of specimens. The broad taxonomic coverage and few studied species prevent any implied phylogeny from being developed. Members of the subfamily Cardiophorinae, of which there are about 12 species in Montana, are not covered here. This subfamily has a host of unique characters that will readily distinguish them from other wireworms. Wireworms of this subfamily lack a caudal notch, are weakly sclerotized, possess pseudo-segmentation, and have anal lobes on the 10<sup>th</sup> abdominal segment.

The genera *Ligmargus* and *Margaiostus* are not keyed out in the pictorial key despite having described wireworms, but are treated in the dichotomous key. *Ligmargus funebris* has described wireworms (Stibick 1975) and is found in western Montana. *Margaiostus glacialis* has described wireworms (Stibick 1976) and is found in north-western Montana. These species are not considered to be economically important

#### Characters of the Ninth Abdominal (A9) Segment:

Character 1: Caudal Notch: 0 – present, urogomphi present (Fig. 3.1); 1 – absent, ninth abdominal segment is often rounded or pointed, lacking urogomphi (Fig. 3.2).

In mature larvae, this character is quite obvious and comes in various sizes. However, in some first instar larvae (*Conoderus* spp.), there is only a carina running where the notch will eventually form (Rabb 1963). This carina is apparently obvious and these specimens would code as possessing a caudal notch. Urogophi is a term limited to the projections that are adjacent to the opening. Characters two through four are limited to those species that lack a caudal notch, while characters five through ten are limited to those that possess a caudal notch

Character 2: Shape of A9 Without Caudal Notch (Fig 3.2): 0 – pointed (Fig. 3.3); 1 – broadly rounded (Fig. 3.4); 2 – rounded with sharp point at tip (Fig. 3.2); 3 – scalloped (Fig. 3.5).

These states are usually quite distinct. Confusion might be possible between pointed and rounded with a sharp tip. Pointed (as in *Dalopius* spp.) begins at the base and narrows gradually towards the apex. The rounded with a sharp tip state is very gradual until the apex. Here there is a distinct nipple-like or spine-like projection at the tip. If a distinct projection is on the apex, then it belongs in this character state.

Character 3: Muscular Impressions (“Eyespots”) on A9: 0 – absent; 1 – present (Fig. 3.6).

These are very distinct. They are called eyespots in some of the older literature, but Becker (1956) corrected this term. They are only known to occur in species in the genus *Agriotes*, although not all members of this genus possess this character.

Character 4: Whorls of Setiferous Tubercles: 0 – absent; 1 – present (Fig 3.3).

This character refers to tubercles that occur in a circular pattern towards the apex of the ninth segment. These tubercles bear prominent setae. This character appears to be limited to species that possess a pointed ninth segment.

Character 5: Caudal notch: 0 – large (Fig. 3.1); 1 – small, often a keyhole shape (Fig. 3.7).

A large caudal notch is defined as having the urogomphi subparallel, and the notch being ‘V’- or ‘U’- shaped. A small caudal notch has the urogomphi curve towards each other, and the notch being nearly circular.

Character 6: Urogomphi: 0 – “divided”, bearing dorsal tubercles (Fig. 3.8); 1 – “undivided”, smooth, lacking dorsal tubercles (Fig. 3.9).

The dorsal tubercles come off of the urogomphi and are often a distinct prong-like projection, although some may be much reduced. An “undivided” urogomphi will be entirely smooth, lacking any sign of tubercles.

Character 7: Dorsal Tubercles: 0 – distinct, “prong”-like (Fig. 3.8); 1 – reduced to tubercles (Fig. 3.10).

Dorsal tubercles are considered distinct if they differ in shape from the lateral tubercles on the ninth abdominal segment. If they do not, they are considered to be reduced.

Character 8: Dorsal Tubercle Shape: 0 – different shape than urogomphi (Fig. 3.11); 1 – similar shape to urogomphi (Fig. 3.12).

A different shape for the dorsal tubercle is distinct, and one would not be confused with the other. If you are unsure, code as being similar in shape.

Character 9: Dorsal Tubercle Angle: 0 – projecting caudodorsally, straight (Fig. 3.13); 1 – distinctly curving anteriorly (Fig. 3.14); 2 – distinctly curving posteriorly (Fig. 3.15).

The curve of the dorsal tubercle is clear when viewed laterally. If the dorsal tubercle is not distinctly curved and only curves at the very tip, it is coded as being straight.

Character 10: Length of Dorsal Tubercles: 0 – longer than urogomphi (Fig. 3.11); 1 – subequal to urogomphi (Fig. 3.16); 2 – smaller than urogomphi (Fig. 3.17).

These lengths should be determined from multiple angles of the ninth abdominal segment. If either the urogomphi or dorsal tubercles are just slightly longer than the other, code as being subequal. The relative lengths are quite distinct.

Character 11: Hooks on A10: 0 – absent; 1 – present (Fig. 3.18).

These are present on the segment ventral to A9. This segment bears the anal opening. These hooks are often called anal armature in the older literature.

Character 12: Lateral Margin of A9: 0 – smooth (Fig. 3.2); 1 – blunt protuberances (Fig. 3.7); 2 – sharp protuberances (Fig. 3.8).

A smooth lateral margin lacks any distinct markings on the lateral side. Blunt protuberances have a clearly broad and rounded tip, while sharp protuberances come to a distinct point. The sharp protuberances are often heavily sclerotized as well.

Character 13: Dorsotergal Setae on A9: 0 – present, more than two (Fig. 3.19); 1 – present, pair (Fig. 3.20); 2 – absent.

The dorsotergal area is the margined dorsal area on A9 in species possessing a caudal notch and the area past the two apical rows of setae on species where A9 lacks a caudal notch.

Character 14: Mediodorsal Groove: 0 – absent; 1 – present (Fig. 3.21).

This character refers only to a medial impression present on the dorsal surface of A9. There may be lateral impressions, but these are not coded here. This character is often difficult to see, and should only be used as a supplemental character.

### Characters of the Head

Character 15: Nasale Type: 0 – tridentate (Fig. 3.22); 1 – one, single pointed tooth (Fig. 3.23); 2 – one, triple pointed tooth (Fig. 3.24).

The terms tridentate and one, triple-pointed tooth are often used interchangeably in the literature. Here, tridentate refers to having three teeth with distinct bases, while one triple pointed tooth is defined as three points sharing a base.

Character 16: Submentum Shape: 0 – rectangular (Fig. 3.25); 1 – triangular (Fig. 3.26).

The submentum is found on the ventral side of the head. A rectangular submentum may have the posterior end rounded, but the lateral edges are always subparallel.

Character 17: Eyes: 0 – present (Fig. 3.27); 1 – absent.

Eye presence is often very easy to determine. However, near molt specimens can have the eyespot become clear. In this case, however, this clear spot can be detected and should be coded as having an eyespot.

Character 18: postepicranial setae: 0 – present (Fig. 3.28); 1 – absent.

This refers to the setae that are immediately adjacent to the epicranial region. These are often difficult to see.

#### Characters of the Abdomen and Thorax

Character 19: Prosternum: 0 – divided, distinct (Fig. 3.29); 1 – divided, partial (Fig. 3.30); 2 – undivided (Fig. 3.31).

The prosternum is located on the first thoracic segment behind the head. A divided prosternum can be split into three or four parts, with the main suture running down the middle. An undivided prosternum lacks sutures and is one entire piece. A partially divided prosternum may be hard to detect, and is defined by the suture fading before it reaches the opposite side. The partially divided prosternums may be confused with either of the other two, so extra care should be taken on small specimens.

Character 20: Punctures: 0 – indistinct (Fig. 3.32); 1 – distinct (Fig. 3.33).



These punctures are best seen on the abdominal segments. Distinct punctures are large and can be seen under low magnification. If there is a doubt about the presence of distinct punctures, code as indistinct.

Character 21: Anterolateral Impression: 0 – absent; 1 – present (Fig. 3.34).

This is a darkened spot often bearing longitudinal striations occurring on the anterior lateral side of each abdominal segment. It is most often found on species in the subfamily Elaterinae.

Character 22: Medial Anterotergal Setae: 0 – present (Fig. 3.35); 1 – absent.

These setae are immediately adjacent to the medial line and occur on the anterior part of each segment.

Character 23: Anterolateral Carinae: 0 – absent; 1 – present (Figs. 3.36 and 3.37).

These carinae occur on each abdominal segment. They are curved lines with a portion subparallel to the lateral side and a portion subparallel to the posterior edge of the segment in front of it. They are not found on the ninth or tenth abdominal segments.

Character 24: Anterolateral Carinae: 0 – not reaching midline (Fig. 3.36); 1 – reaching midline (Fig. 3.37).

This character is only accurate for abdominal segments two through four. The other segments have been shown to be variable within species, especially in *Limonius*.

Character 25: Spine-like Setae on the Episterna of Meso- and Metathorax: 0 – absent; 1 – present (Fig. 3.38).

These setae are similar in appearance to those found on the legs of most wireworms. They may be numerous or may only occur as one or two setae. Species with a small number of these setae may be difficult to detect.

### Information About the Species and Coded Characters

Forty-five species are listed. Some only go to the genus level for this study. Species not examined by myself are often grouped together due to very specific characters that are used for differentiation. Species with specimens examined by me are marked with an asterisk (\*) after their name. A ‘-‘ is a placement for a character that cannot be coded for that species.

*Aeolus mellillus* (Say) (Fig. 3.39)\*; *Conoderus auritus* (Herbst); *Conoderus vespertinus* (Fabricius)

Code: 0---?011011210010110010-0

The size of caudal notch is not given, because these two genera have different sized notches. *Aeolus mellillus* has a large v-shaped notch, while the *Conoderus* spp. have smaller notches. In earlier instars, these *Conoderus* spp. often have the notch closed, with only a carina or impression to show where the urogomphi will eventually form. More on *Conoderus* can be read in Rabb 1963. These species also have well sclerotized heads which are darker than the rest of the body. *Aeolus mellillus* is the most common of these species, being found across the state of Montana. *C. auritus* is also found across the state, but no larvae were found in this study. *C. vespertinus* is found only in the eastern part of the state and is known only from one specimen.

*Agriotes criddlei* Van Dyke

Code: 1001-----0020200120000-0

This species is most similar to *Dalopius* larvae. It can be differentiated by the lack of setae on the central dorsal area. This species is found across the state, but no wireworms were found in this study. More about this species and other *Agriotes* can be read in Becker 1956.

*Agriotes lineatus* (Linnaeus)

Code: 1010-----002020012?000-0

This species is known from one suspect specimen in Montana. The date of collection and locality falls well out of its known distribution. It is a major agricultural pest in Europe, Newfoundland, Vancouver Island, and has recently spread to Washington State (Vernon et al. 2001). It is presented here to aid in its identification in new areas.

*Agriotes mancus* (Say)

Code: 1110-----002020012?000-0

This species is reported as being economically important in wheat fields in eastern U.S. and Canada. In Montana, it is known from one specimen from Custer County, which is the most southeastern County. No wireworms were discovered in this study. A related species, *A. pubescens*, is stated to have similar wireworm morphology, but it has only been described in one paper and no other authors have seen more wireworms of this species (Becker 1956).

*Agriotes* sp. nr. *sparsus* (LeConte) (Fig. 3.40)\*

Code: 1210-----0020201121000-0

This species is known from three wireworms collected in an Alfalfa field in Gallatin County, Montana. The lack of eyes suggests that these specimens belong to the *sparsus* species group in Becker's revision (1956). *A. oregonensis* Becker is reported from Montana (Seibert 1993) and is a likely candidate for this species.

*Ampedus* sp. 1 (Fig. 3.41)\*

Code: 1200-----0020101121110-0

The wireworms of this genus are poorly understood. In North America, there are five described wireworms, all of which occur in the Eastern Woodlands (Ramberg 1979). Due to this issue, a more specific placement could not be attempted based on morphology. There are 22 species known to occur in the state, none of which are known to be of economic importance, so DNA data was not obtained from most adults.

*Ampedus* sp. 2 (Fig. 3.42)\*

Code: 1200-----0020200120?00-0

This specimen is from Granite County. There are dark spots where anterolateral impressions would be, but they don't seem to be true impressions. This was originally thought to be a member of *Magapenthes* based on using Becker and Dogger 1991, but comparing it to illustrations of that genus in Jewett 1946 proved that this identification was in error. DNA data also placed this specimen very close to the other *Ampedus* wireworm, and was distinctly different from the most common member of *Megapenthes* in Montana, *M. angularis* LeConte.

*Anchastus cinereipennis* (Eschscholtz)

Code: 1200-----002010?12?0?0-0

This species is known in Montana from only one specimen from Toole County (Seibert 1993). Wireworms for this species are known, but haven't been formally described (Stone 1941). Wireworms of other species belonging to this genus have been described outside of the U.S. (Johnson 1993). This species was coded using both sources, but many gaps still remain.

*Athous* sp. nr. *sierrae varius* Lane (Fig. 3.43)\*

Code: 0---100010012020112101101

This wireworm is known from specimens obtained in an Alfalfa field in Gallatin County, Montana. The species identification is expected to be accurate, but DNA sequences were not obtained from the wireworms extracted. In older literature, this species is called *A. pallidipennis* (Mannerheim). Wilkinson (1963) states that wireworms of this species have sharp tubercles on the lateral margins of A9, but this detail was not confirmed by Glen (1950) or me.

*Dalopius* spp. (Fig. 3.44)\*

Code: 1001-----0010200120000-0

The species of this genus are nearly identical as wireworms (Glen 1944). They are most similar to *Agriotes criddlei* and can be differentiated by the presence of a pair of dorsal tergal setae in the 3<sup>rd</sup> row of setae from the apex of A9.

*Hadromorphus glaucus* (Germar) (Fig. 3.45)\* and *Hadromorphus callidus* (Brown) (Fig. 3.46)\*

0---000121022010010101101

The adults of these species are found across the Pacific North West and Northern Great Plains. Wireworms of *H. glaucus* were only obtained from fields in Washington and Idaho, however, while wireworms of *H. callidus* were found across Montana. The wireworms of *H. callidus* are a new association for this species, which was only made possible through CO1 mtDNA data. Based on this preliminary analysis, these wireworms can be distinguished from those of the closely related *H. glaucus* by having the urogomphi curved anteriorly and slightly inwards, while *H. glaucus* has straight urogomphi (see couplet # below). It is unknown at the moment if this is a product of different stages of development, or represents an actual difference between species. Since the character used to separate these two species is not coded in the LUCID key, they key out together.

*Hemicrepidius memnonius* (Herbst) (Fig. 47)\*

Code: 0---?00001012120?12101111

These specimens were collected from a sugar beet field in Richland County, Montana. The specimens examined were given this species name based on a DNA match with sequences in BOLD. They do not match the description of the species given by Glen in 1950. This may be due to Glen's description being based only on near mature larvae or that this genus has not been revised in North America since the late 19<sup>th</sup> century, so the adult in one of these sources was identified incorrectly. These specimens have medium sized caudal notches, with the urogomphi curving towards each other. Due to the combination of character states, they are coded with a '?'. There also appear to be clear spots, which suggest eyespots are present. Glen states that this genus lacks eyes in near mature wireworms. The specimens examined are quite small and may represent an earlier

instar, and the eyespots may disappear as the wireworm matures. Due to the unusual nature of this character and the speculation surrounding it, it is coded with a ‘?’ to represent all known stages.

*Hemicrepidius* sp. nr. *carbonatus* (LeConte) (Fig. 3.48)\*

Code: 0---000101012120112101111

These specimens were obtained from an alfalfa field in Gallatin County, Montana. These matched an adult male also collected at the site with CO1 mtDNA data. These wireworms appear to have more similarities to the drawings of *H. memnonius* given in Glen 1950 than the wireworms above, but the associated male is closer to *H. carbonatus*. Again, a more accurate identification of the adult could not be made due to the lack of a recent revision of the genus.

*Hypnoidus abbreviatus* (Say)

Code: 0---00011100002000??0?10?

This species is known from four specimens in Montana from Gallatin and Hill Counties (Seibert 1993). No wireworms were discovered in this study. A more thorough treatment of this species is given in Stibick 1976.

*Hypnoidus bicolor* (Eschscholtz) (Fig. 3.49)\*

Code: 0---000102011020001000101

This species is a fairly common species in Montana’s wheat fields. Adults have been collected throughout western Montana. These wireworms are very similar to those of *H. leei* Stibick. Stibick stated that they can be differentiated based on head shape, but I have found this character to be difficult to use, especially on shrunken specimens. An

examination of the episterna showed a few spike-like setae (1-2) present in *H. bicolor* and absent in *H. leei*. Due to the preliminary nature of this study, it has not been confirmed to be a consistent character. However, the consistency in other species suggests that this may be a useful character to use.

*Hypnoidus impressicollis* (Mannerheim)

Code: 0---0001120?002000??0?10?

The adults of this species have been collected throughout Western Montana. No wireworms were discovered in this study. More on this species can be read in Stibick 1976. Due to the incomplete coverage of this species by Stibick (1976), many of the characters used to code the species remain unknown.

*Hypnoidus leei* Stibick\*

Code: 0---000102011020001000100

This species was collected in an alfalfa field in Gallatin County, Montana and a trap in Fremont County, Idaho. Adults are known from the central and west regions of Montana. These wireworms are very similar in appearance to *H. bicolor*. A possible way to distinguish the two species is discussed under *H. bicolor*.

*Limonius aeger* LeConte (Fig. 3.50)\*; *Limonius ursinus* Van Dyke?

Code: 0---1010-2012020112001111

Adults of *L. aeger* are known from across western Montana. Only one wireworm from Beaverhead County was discovered in this study. It is differentiated from other common *Limonius* wireworms by lacking a prominent dorsal tubercle on the urogomphi.



Based on adult morphology, it is expected that *L. ursinus* may have similar larvae. *L. ursinus* is known from counties in Southeast Montana.

*Limonius californicus* (Mannerheim) (Fig. 3.51)\*

Code: 0---100002012020112101111

This species is the most common species in wheat fields in western Montana. It can be differentiated from *L. canus* LeConte by its more robust ninth abdominal segment and the anterolateral carinae reaching the midline. It can be differentiated from *L. infuscatus* Motschulsky by the straight dorsal tubercles of the urogomphi.

*Limonius canus* LeConte (Fig. 3.52)\*; *Limonius subauratus* LeConte

Code: 0---100002012020112101101

Adults of *L. canus* have been collected throughout western Montana, but wireworms have only been collected for this study in eastern Washington. *L. subauratus* occurs in this area as well, but no wireworms were collected in this study. Based on the literature, these species can be differentiated based on differences in A9 shape and the size of the caudal notch. Since these could not be confirmed, they are coded as the same here.

*Limonius infuscatus* Motschulsky (Fig. 3.53)\*

Code: 0---100012012020112101111

Adults of this species are extremely common throughout western Montana. Wireworms have been collected in Gallatin County, Montana and in Eastern Washington. They can be easily distinguished from other *Limonius* wireworms by the presence of distinctly anterior curving dorsal tubercles.

*Metanomus insidiosus* (LeConte) (Fig. 3.54)\*

Code: 0---000110022010010101110

This is a new association. These are very similar wireworms of the genus *Pseudanostirus*, but *M. insidiosus* has sharp protuberances on the sides of A9, while *Pseudanostirus* has blunt protuberances (Glen 1950).

*Melanotus longulus oregonensis* (LeConte) (Fig. 3.55)\*; *Melanotus similis* (Kirby)

Code: 1300-----012010112011110

One wireworm was examined from Gallatin County. No DNA sequence was obtained from this specimen. Based on its locality in Western Montana, it is expected to be *M. longulus oregonensis*. No differentiation could be made between this species and *M. similis*, because no work of literature treats both species as wireworms and illustrations of the two look very similar. However, in the dichotomous key below, they are separated based on relative length and width of A9, based on available illustrations. It is unknown if this will hold up when actual specimens are compared.

*Microhypnus(Migiwa) dubius* (Horn)

Code: 0---01----00000?112?010-0

The adults of this species are found across the state, mostly in the Western part of the state. No wireworms were found in this study. This species can be distinguished from others in Montana by the smooth urogomphi and the lack of any tubercles on A9. Two generic names are given due to the unknown placement of this species. Siebert (1993) treats this species as part of *Microhypnus*, while Johnson (2002) treats this species as belonging to *Migiwa*.

*Nitidolimonius respelendens* (Eschscholtz)

Code: 0---100001012120012001111

The adults of this species are found in the western part of the state. These wireworms are very similar to *Limonius* wireworms, but the presence of eyes and a mediodorsal groove on A9 can differentiate this species. A more detailed discussion of this species is given in Glen 1950.

*Prosternon bombycinus* (Germar); *Prosternon viduus* (Brown)

Code: 0---000112012020010?01100

The adults of this species are found throughout western Montana. No wireworms were examined for this species. They are most similar to wireworms of *Pseudanostirus*. A more detailed study of these two species is given in Glen 1950.

*Pseudanostirus nebraskensis* (Bland); *Pseudanostirus triundulatus* (Randall)

Code: 0---000101012010010001110

These species are found across Montana, mostly in the eastern part. No wireworms were collected for this study. A more detailed study is given in Glen 1950.

*Pseudanostirus propola* (LeConte); *Pseudanostirus pudicus* (Brown)

Code: 0---000110012010010001100

Adults of these species have been collected mostly in the western parts of the state. No wireworms were collected for this study. A more detailed study and separation of the two are given in Glen 1950.

*Selatosomus aeripennis* (Kirby)\*; *Selatosomus destructor* (Brown) (Fig. 3.56)\*

Code: 0---000120012110010101101

Adults of these species are found across the state. No differentiation could be made between wireworms of these two species, either morphologically or with CO1 data. While reported as the biggest agricultural pest in the state, they are absent from most fields and are only a minority in fields where they do occur.

*Selatosomus pruininus* (Horn) (Fig. 3.57)\*

Code: 0---000101020110010101101

Only one wireworm from Washington was examined. This species is not known to occur in Montana. The wireworm was unable to be matched to an adult with CO1 data, due to the lack of adult specimens. However, it was morphologically the same as that described in Glen 1950.

*Selatosomus semimetallicus* (Walker) (Fig.58)\*

Code: 0---000121011010010001101

Adults in Montana are found across the western portion of the state. They are most similar to wireworms of *S. aeripennis* and can be differentiated by a pair of setae on the dorsal surface of A9.

*Selatosomus festivus* (LeConte); *Selatosomus sexualis* (Brown)

Code: 0---000121010010?10101101

Adults of these two species are found in western Montana. Glen 1950 has a more thorough treatment of these species, including how to separate them. Since no wireworms matching these species was discovered in this study, they are not treated further.

*Selatosomus semivittatus* (Say)

Code: 0---000120010010?10?01???

Adults are only known in Montana from Gallatin County. A single wireworm was examined by Glen for his 1950 paper. The coding was done based on his incomplete account, due to the quality of the specimen, and may not represent this particular species.

*Sylvanelater* spp.

Code: 0---100002010020112?01111

These species are very similar to *Limonius*. The wireworms can be differentiated by sharp tubercles on the lateral margins of A9.

Dichotomous Key to Wireworm Species  
Found in Montana Agricultural Fields

(Adapted from Glen et al. 1943, Jewett 1946, Lanchester 1946, Glen 1950, Becker 1956, Stibick 1975, 1976, and Becker and Dogger 1991)

- 1. Caudal notch not present on 9<sup>th</sup> abdominal (A9) segment . . . . . 2
- 1'. Caudal notch present on A9 segment . . . . . 10
  
- 2.(1) Sides of A9 scalloped; A9 often dorso-ventrally flattened . . . . .(*Melanotus* spp.) 3
- 2'. Sides of A9 smooth or with tubercles near the apex, not scalloped; A9 often convex, and not flattened dorso-ventrally . . . . . 4
  
- 3.(2) A9, when measured lengthwise from anterior part of anterolateral impressions to apex and widthwise at widest part, approximately as wide as long . . . . .  
 . . . . . *Melanotus longulus oregonensis*
- 3'. A9 about 1.5 times longer than wide . . . . . *Melanotus similis*

4. (2') A9 with muscular impressions, often referred to as "eyespot" . . . . . 5
- 4'. A9 without muscular impressions . . . . . 7
5. (4) Head with definite eyespot at base of antennae . . . . . 6
- 5'. Head without definite eyespot at base of antennae . . . . . *Agriotes* sp. nr. *sparsus*
6. (5) Apex of A9 broadly rounded; first eight abdominal segments without minute setae  
in front of each of the lateral and spiracular anterotergal setae . . . *Agriotes mancus*
- 6'. Apex of A9 more or less pointed; first eight abdominal segments with minute  
setae in front of each of the lateral and spiracular anterotergal setae . . . . .  
. . . . . *Agriotes lineatus*
7. (4') A9 with setiferous tubercles; A9 gradually narrowed to a blunt point . . . . . 8
- 7'. A9 without setiferous tubercles; A9 ending in a distinct "spine" . . . . . 9
8. (7) A9 with a pair of dorsal-tergal setae . . . . . *Dalopius* spp.
- 8'. A9 without a pair of dorsal-tergal setae . . . . . *Agriotes criddlei*
9. (7') Abdominal segments with antero-lateral impressions . . . . . *Ampedus* spp.
- 9'. Abdominal segments without antero-lateral impression . . . . .  
. . . . . *Anchastus cinneripennis*

10. (1') Urogomphi without dorsal tubercles; sides of A9 smooth, without tubercles . . . . .  
 . . . . . *Microhypnus (Migiwa) dubius*
- 10'. Urogomphi with dorsal tubercles, often prong-like . . . . . 11
11. (10') "Anal armature", or anal hooks, on A10; nasale tridentate . . . . . 12
- 11'. Lacking "anal armature", or anal hooks, on A10; nasale variable . . . . . 13
12. (11) Frons tapering to a blunt point, cone-shaped . . . . . *Aeolus mellilus*
- 12'. Frons truncate at posterior end, rectangular in shape . . . . .  
 . . . . . *Conoderus auritus, Conoderus vespertinus* (nearly identical)
13. (11') Head with posteroepicranial setae; thorax and first eight abdominal segments  
 bearing medial antero-tergal setae . . . . . 14
- 13'. Head without posteroepicranial setae; thorax and first eight abdominal segments  
 usually lacking medial antero-tergal setae . . . . . 19
14. (13) Basal segment of labial palpus without any setae . . . . . (*Hypnoidus spp.*) 15
- 14'. Basal segment of labial palpus with one to four setae . . . . . 18
15. (14) Urogomomphi subequal in length to dorsal tubercles . . . . . 16
- 15'. Urogomphi longer than dorsal tubercles . . . . . 17

16. (15) Galea with one prominent setae . . . . . *Hypnoidus abbreviatus*
- 16'. Galea with five to seven prominent setae . . . . . *Hypnoidus impressicollis*
17. (15') One to two spine-like setae present on episternae of meso- and metathorax;  
subnasale with three denticles . . . . . *Hypnoidus bicolor*
- 17'. No spine-like setae present on episternae of meso- and metathorax; subnasale  
with four denticles . . . . . *Hypnoidus leei*
18. (14') Nasale with several small denticles on each side of base of median tooth . . . . .  
. . . . . *Ligmargus funebris* (Candèze)
- 18'. Nasale consisting of one triple-pointed tooth . . . . .  
. . . . . *Margaiostus glacialis* (Van Dyke)
19. (13') Prosternum divided into two or more sclerites . . . . . 20
- 19'. Prosternum undivided, one large triangular sclerite . . . . . 34
20. (19) Spinelike setae present on episternae of meso- and metathorax; tip of dorsal  
tubercle inclined backwards . . . . . 21
- 20'. Spinelike setae not present on episternae of meso- and metathorax; tip of dorsal  
tubercle inclined upward, inward, or forward . . . . . 28
21. (17) Urogomphi and dorsal tubercle subequal in size and similar in shape, resembling  
grappling hooks; eyes usually small and indistinct . . . . . 22



- 21'. Urogomphi and dorsal tubercle not similar in shape, although they may be subequal in length; eyes usually clearly visible . . . . . 24
22. (21) Pleurites of first abdominal segment practically as long as sternal plate . . . . .  
. . . . . *Selatosomus semivittatus*
- 22'. Pleurites of first abdominal segment less than three-fourths as long as sterna plate . . . . . 23
23. (22') Urogomphi and dorsal tubercles relatively straight, with short, curved tips; full-grown larvae exceed 20mm in length . . . . . *Selatosomus festivus*
- 23'. Urogomphi and dorsal tubercles curved, with long, curved tips; full-grown larvae do not exceed 16mm in length . . . . . *Selatosomus sexualis*
24. (21') Urogomphi and dorsal tubercles relatively short and thick . . . . . 25
- 24'. Urogomphi and dorsal tubercles relatively long and slender . . . . . 27
25. (24) Setae present on central dorsal area of A9 . . . . . 26
- 25'. Setae not present on central dorsal area of A9 . . . . .  
. . . . . *Selatosomus aeripennis, Selatosomus destructor* (Identical)
26. (25) Two pairs of setae (four total) present on central dorsal area of A9 . . . . .  
. . . . . *Selatosomus pruininus*

- 26'. One pair of setae (two total) present on central dorsal area of A9 . . . . .  
. . . . . *Selatosomus semimetallicus*
27. (24') Urogomphi relatively straight, with a slight upward curve at tip . . . . .  
. . . . . *Hadromorphus glaucus*
- 27'. Urogomphi distinctly curved, curving forward and slightly inwards . . . . .  
. . . . . *Hadromorphus callidus*
28. (20') Dorsal tubercles with sharp tips curving forward; urogomphi and dorsal  
tubercles subequal or dorsal tubercles longer . . . . . 29
- 28'. Dorsal tubercles of a different type; urogomphi and dorsal tubercles subequal or  
urogomphi longer . . . . . 31
29. (28) Abdominal segments two through five with antero-lateral carinae reaching the  
midline . . . . . *Metanomus insidiosus*
- 29'. Abdominal segments two through five with antero-lateral carinae not reaching the  
midline . . . . . 30
30. (29') Dorsal tubercles three times as long as urogomphi . . . . . *Pseudanostirus pudicus*
- 30' Dorsal tubercles not more than twice as long as urogomphi . . . . .  
. . . . . *Pseudanostirus propola*

- 31. (28') Abdominal segments two through five with antero-lateral carinae reaching the  
midline; nasale one single-pointed tooth . . . . . 31
- 31'. Abdominal segments two through five with antero-lateral carinae not reaching  
midline; nasale one triple-pointed tooth . . . . . 32
  
- 32. (31) Dorsal tubercle standing erect, forming an angle of approximately 90° where it  
attaches to the urogomphi . . . . . *Pseudanostirus nebraskensis*
- 32'. Dorsal tubercle projecting caudodorsally, forming an angle of approximately 130°  
where it attaches to the urogomphi . . . . . *Pseudanostirus triundilatus*
  
- 33. (31') Six "sensory" appendices on second segment of antennae . . . *Prosternon viduus*
- 33'. Five "sensory" appendices on second segment of antennae . . . . .  
. . . . . *Prosternon bombycinus*
  
- 34. (19') Caudal notch small . . . . . 35
- 34' Caudal notch large . . . . . 42
  
- 35. (34) Dorsal tubercle small, similar in size to lateral tubercles of A9 . . . . .  
. . . . . *Limonius aeger*
- 35'. Dorsal tubercle larger and distinct from lateral tubercles of A9 . . . . . 36
  
- 36. (35') Dorsal tubercle subequal in length to urogomphi . . . . . 37

- 36'. Dorsal tubercle much longer than urogomphi; abdominal segments with distinct punctures; eyes absent . . . . . *Athous* sp. nr. *sierra varius*
37. (36) Ninth abdominal segment with a distinct medio-dorsal groove; eyes present . . . . .  
 . . . . . *Nitidolimonius resplendens*
- 37'. Ninth abdominal segment without distinct medio-dorsal groove; eyes absent . . 38
38. (37') A9 with blunt lateral tubercles . . . . . 39
- 38'. A9 with sharp lateral tubercles . . . . . *Sylvanelater* spp.
39. (38) Abdominal segments two through four with antero-lateral carinae reaching the  
 midline . . . . . 40
- 39'. Abdominal segments two through four with antero-lateral carinae not reaching  
 midline . . . . . 41
40. (39) Dorsal tubercles curved anteriorly . . . . . *Limonius infuscatus*
- 40'. Dorsal tubercles not curved, projecting caudodorsally . . . . . *Limonius californicus*
41. (39') Width of caudal notch approximately one-half distance between tips of dorsal  
 tubercles; A9 convex dorsally . . . . . *Limonius canus*
- 41'. Width of caudal notch approximately one-third distance between tips of dorsal  
 tubercles; A9 flattened dorsally . . . . . *Limonius subauratus*

42. (34') Urogomphi sharp, curving anteriorly at tips; caudal notch roughly 'V'-shaped . .  
..... *Hemicrepidius* sp. nr. *carbonatus*
- 42'. Urogomphi blunt, projecting medially; caudal notch 'U'-shaped .....  
..... *Hemicrepidius memnonius*

Figure 3.1. Caudal notch present on the ninth abdominal (A9) segment. The arrow points to the notch. This is also an example of a large caudal notch. The species shown is *Selatosomus aeripennis*.

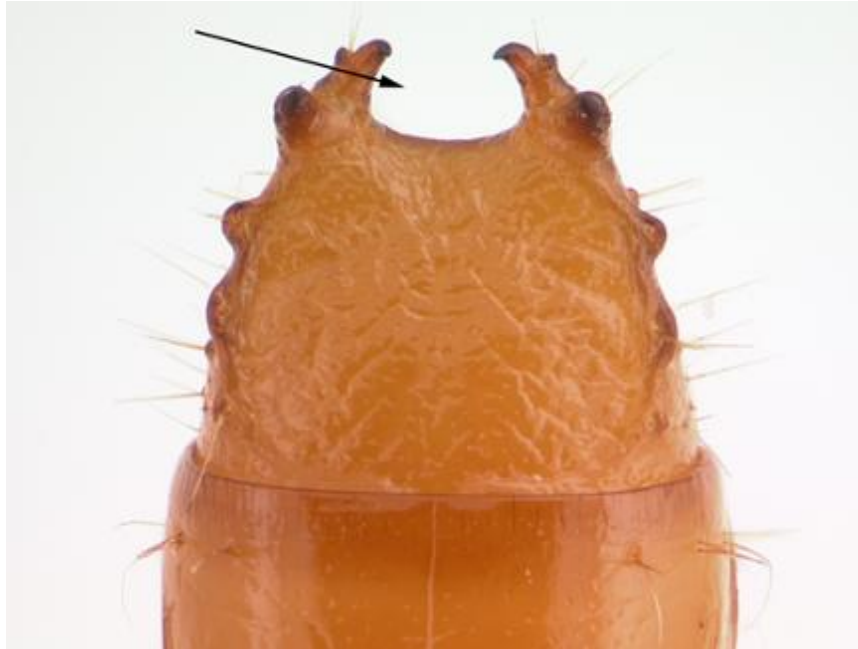


Figure 3.2. Caudal notch absent on A9. This is also an example of a broadly rounded with a sharp point-shaped A9. The species shown is an unidentified *Ampedus*.



Figure 3.3. The shape of A9 is pointed. This specimen also bears whorls of setiferous tubercles, which are indicated by arrows. The specimen shown is an unidentified *Dalopius*.



Figure 3.4. The shape of A9 is broadly rounded. The specimen shown is *Agriotes mancus* (Fig. 62 in Becker 1956)

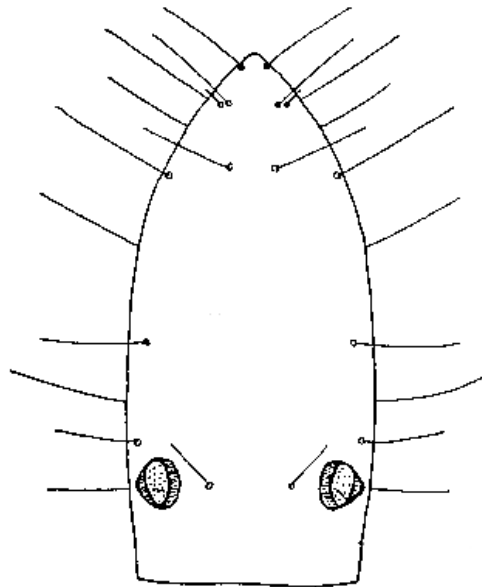


Figure 3.5. The shape of A9 is scalloped along its edges. The specimen shown is *Melanotus longulus oregonensis*.



Figure 3.6. Muscular impressions are on A9, with arrow pointing to them. The specimen shown is *Agriotes* sp. nr. *sparsus*.

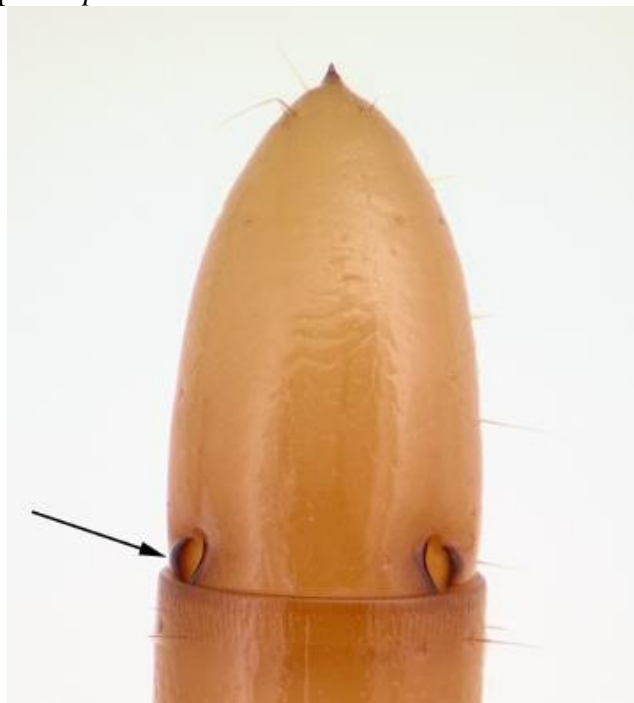




Figure 3.7. A small caudal notch, appearing “key-hole” shaped. This also shows blunt protuberances along the lateral edges of A9. The specimen shown is a *Limonius infuscatus*.



Figure 3.8. Urogomphi “divided”, each bearing a distinct dorsal tubercle. Arrows indicate which is called an urogomphus and which is a dorsal tubercle. This also shows sharp protuberances along the lateral edges of A9. The specimen shown is a *Metanomus insidiosus*.

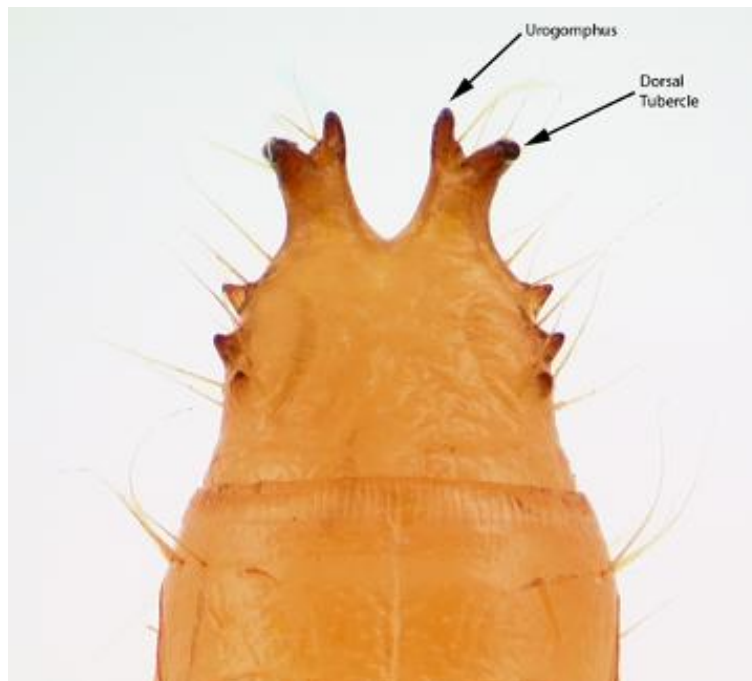


Figure 3.9. An “undivided” urogomphus, lacking dorsal tubercles. The drawing depicts *Microhypnus dubius* (from Glen 1950, Figure 10b, as *Hypnoidus dubius*).

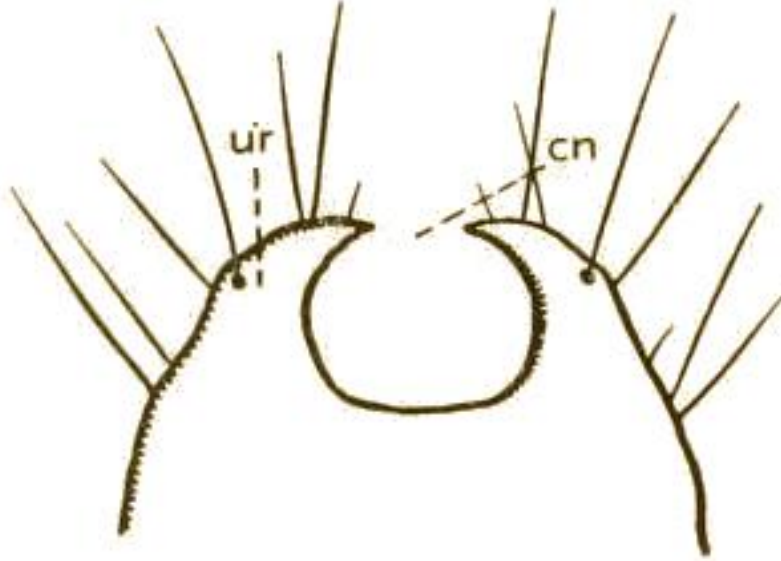


Figure 3.10. Dorsal tubercles reduced, similar in size and shape to the lateral tubercles. The dorsal tubercle is indicated by the arrow. The specimen shown is a *Limonium aeger*,



Figure 3.11. The dorsal tubercle is a different form than the urogomphi. The dorsal tubercles are also larger than the urogomphi. Specimen shown is an *Athous sierrae varius*



Figure 3.12. The dorsal tubercle is similar in form to the urogomphi. Specimen shown is a *Selatosomus semimetallicus*.



Figure 3.13. The dorsal tubercle projects caudodorsally and is straight. The specimen shown is a *Limonius canus*.



Figure 3.14. The dorsal tubercles curve anteriorly. The specimen shown is a *Metanomus insidosus*.



Figure 3.15. The dorsal tubercles curve posteriorly. The specimen shown is a *Hadromorphus callidus*.



Figure 3.16: The dorsal tubercles are subequal in length to the urogomphi. The drawing is of *Selatosomus festivus* (From Glen 1950, Figure 16c, as *Ludius cruciatus festivus*)

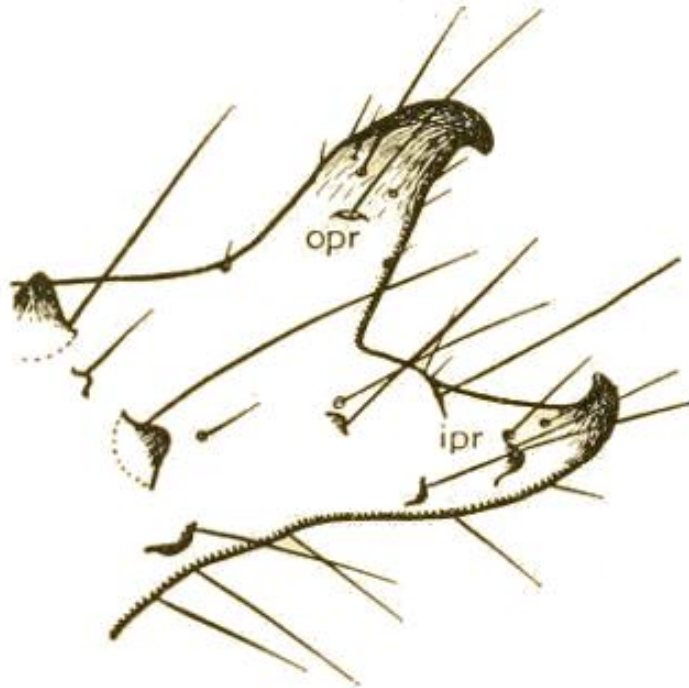


Figure 3.17: The dorsal tubercles are smaller than urogomphi. Specimen shown is a *Hypnoidus bicolor*



Figure 3.18. Anal hooks, or anal armature, present on the tenth abdominal segment, which are indicated by the arrow. The specimen shown is an *Aeolus mellillus*.

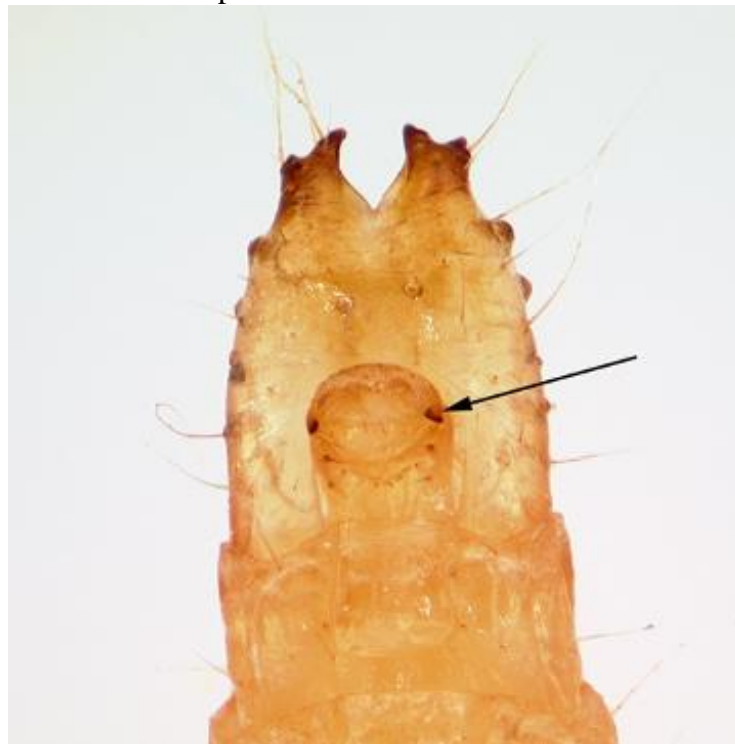




Figure 3.19. More than two dorsal tergal setae present on A9. Arrows indicate each pair. Specimen shown is a *Selatosomus pruininus*.

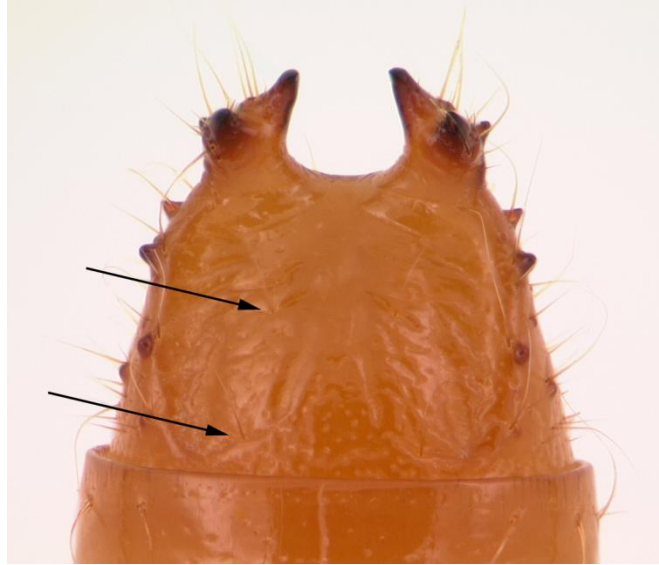


Figure 3.20: A pair of dorsal-tergal setae present on A9. A) Setae on a specimen with a caudal notch; *Aeolus mellillus*. B) Setae on a specimen without a caudal notch; *Dalopius* sp.

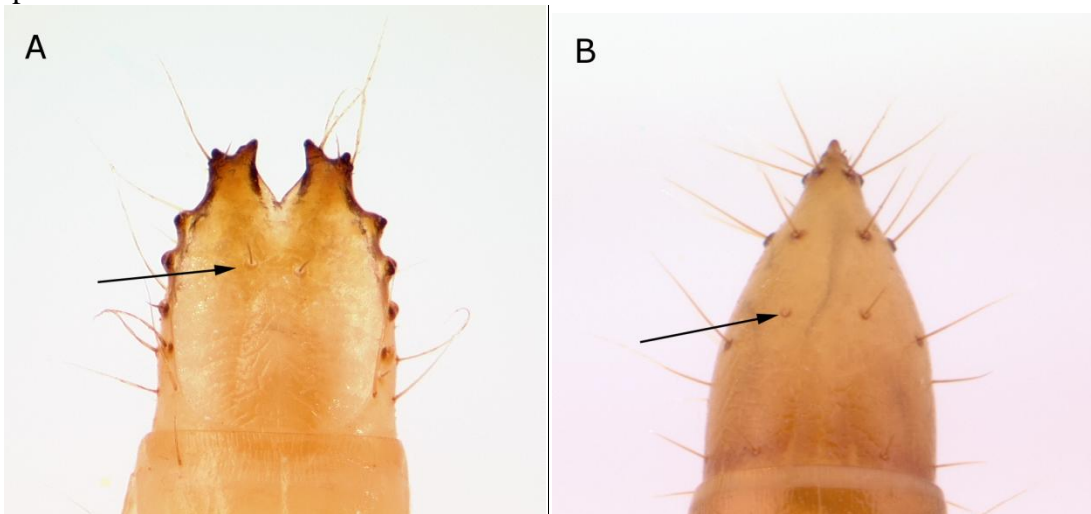


Figure 3.21: Mediodorsal groove present on A9. Drawing is of *Nitidolimonius resplendens* and the groove is indicated by 'mg' (From Glen 1950, Figure 11b, as *Ludius resplendens*)

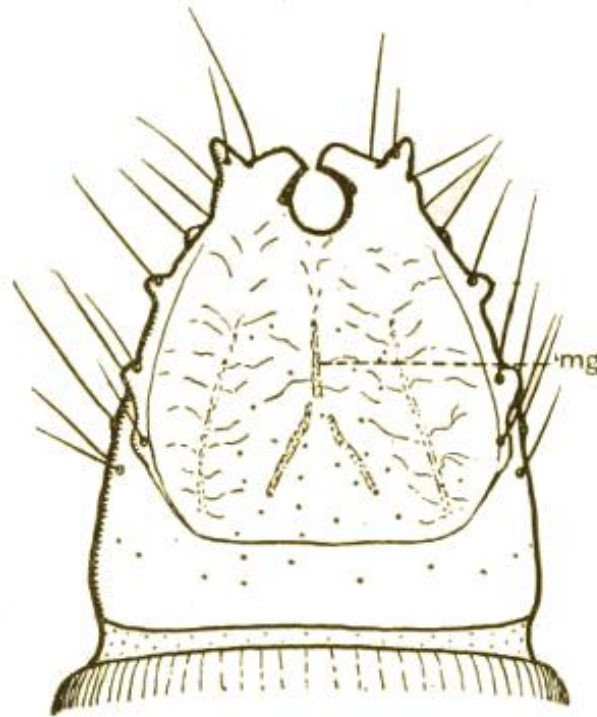


Figure 3.22. Nasale tridentate, area indicated by the arrow. Specimen shown is an *Aeolus mellillus*.





Figure 3.23. Nasale is a single pointed tooth, indicated by the arrow. The specimen shown is a *Selatosomus aeripennis*.



Figure 3.24. The nasale is a triple-pointed tooth in which the points share on base, area indicated by the arrow. The specimen shown is a *Hemicrepidius memnonius*.



Figure 3.25. Submentum rectangular, indicated by the arrow. The lateral edges are subparallel. The specimen shown is a *Hemicrepidius memnonius*.



Figure 3.26. Submentum triangular, indicated by the arrow. The lateral edges come together posteriorly, forming a point. The specimen shown is an *Aeolus mellilus*.



Figure 3.27. Eyes present, indicated by the arrow. These may sometimes appear as white or clear dots on near molt specimens. The specimen shown is a *Hadromorphus callidus*.



Figure 3.28. Postepicrainial setae present on the head. The arrow indicates where these occur. The specimen shown is a *Hypnoidus bicolor*.

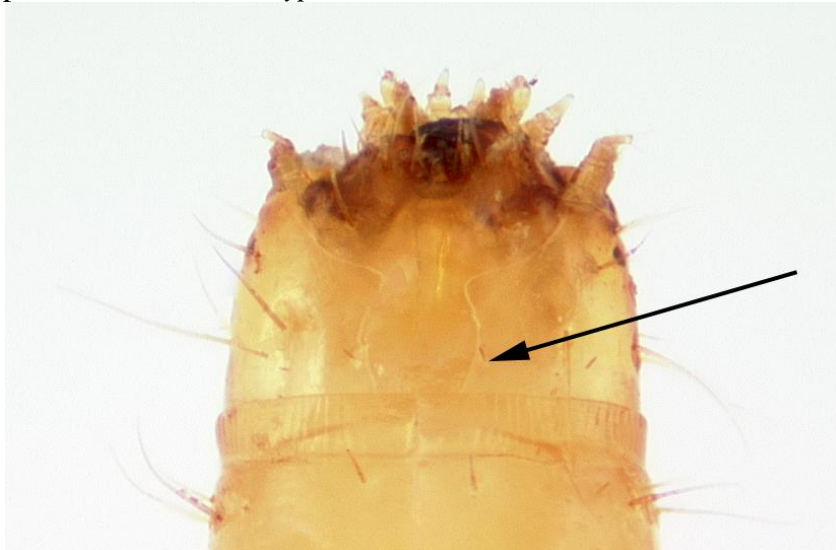


Figure 3.29. Prosternum divided, either in three or four parts, area indicated by the arrow. Specimen shown is a *Selatosomus aeripennis*.

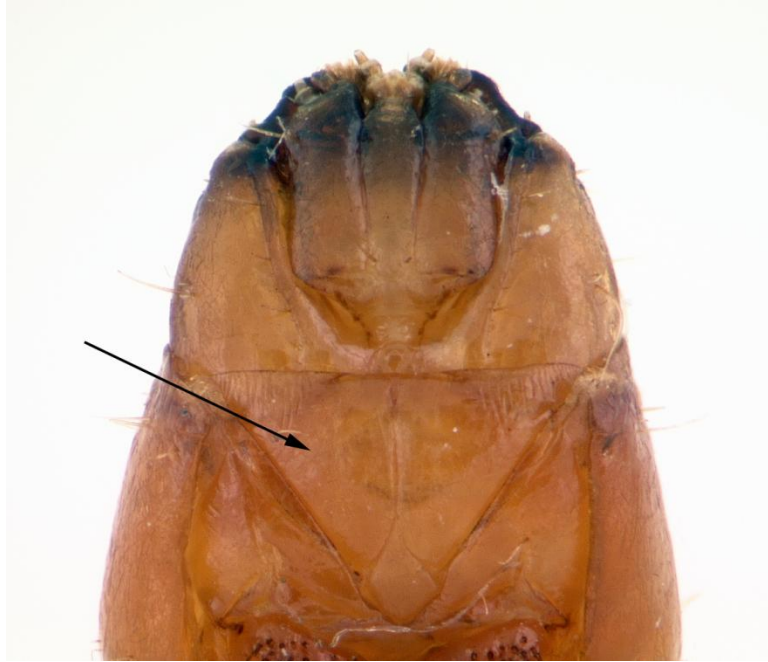


Figure 3.30. Prosternum partially divided, often difficult to see. Drawing is of a species not covered here and is used as an example (from Glen 1950, Figure 13a, of *Ludius nitidulus* (LeConte)).

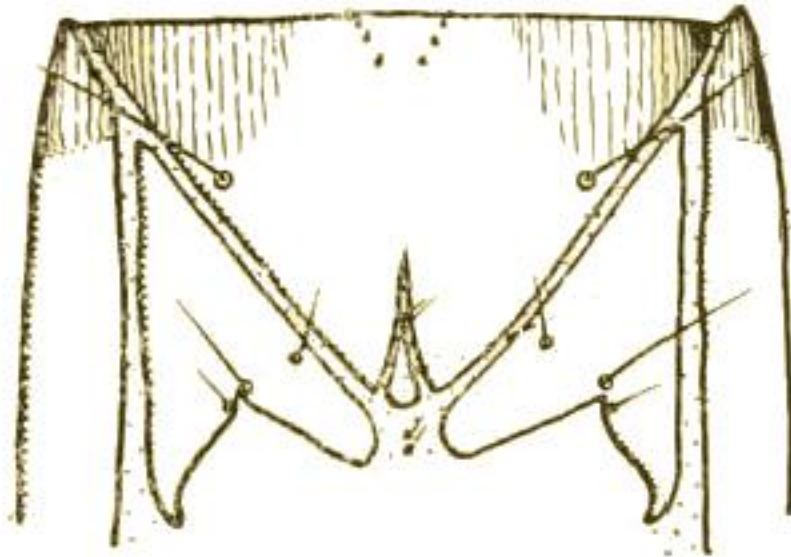


Figure 3.31. Prosternum undivided, being one large triangular or semicircular piece, area is indicated by an arrow. The specimen shown is a *Limonius californicus*.



Figure 3.32. Punctures on abdomen and thorax indistinct. Specimen shown is a *Selatosomus pruininus*.





Figure 3.33. Punctures on abdomen and thorax distinct. Specimen shown is a *Hemicrepidius* sp. nr. *carbonatus*.



Figure 3.34. Anterolateral impressions on each abdominal segment. The specimen shown is an unidentified *Ampedus*.



Figure 3.35. Medial anterotergal setae present on each segment, indicated by the arrow. The specimen shown is an unidentified *Dalopius*.

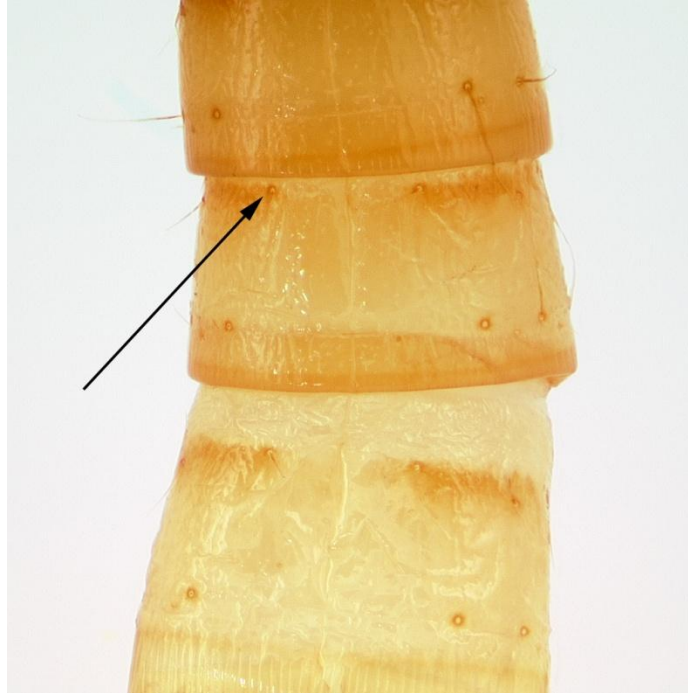


Figure 3.36. Anterolateral carinae present on the abdominal segments, but do not reach the midline. Arrows indicate the lateral portion of the carina and near where the anterior portion ends. The specimen shown is a *Selatosomus aeripennis*.



Figure 3.37. Anterolateral carinae present on the abdominal segments, and reaching the midline. The specimen shown is a *Limonius infuscatus*.



Figure 3.38. Spine-like setae present on the episternae of the meso- and meta-thorax. Arrows indicate where the episternae are located. Fewer setae may be present in some species than what is shown. The specimen shown is a *Limonius canus*.

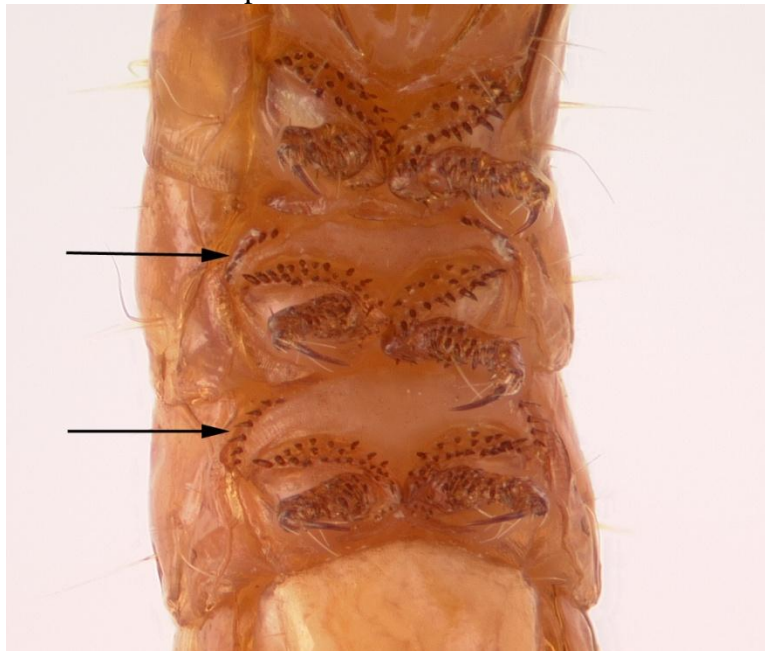




Figure 3.39. *Aeolus mellillus* (Say). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 2 – 5; f) A9, dorsal; g) A9, lateral; h) A9, ventral

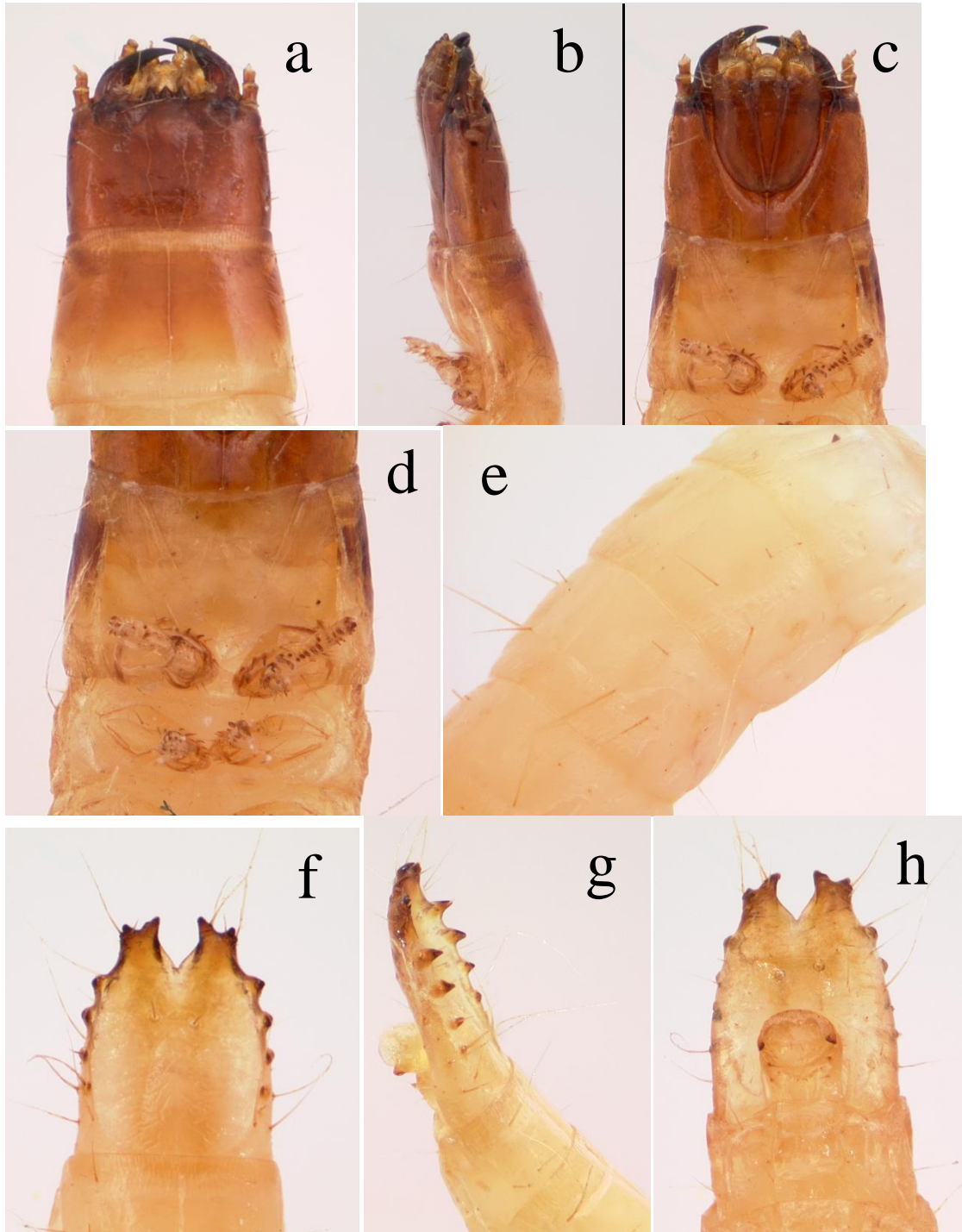


Figure 3.40. *Agriotes* sp. nr. *sparsus* (LeConte). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 2 – 4; f) A9, dorsal; g) A9, lateral; h) A9, ventral

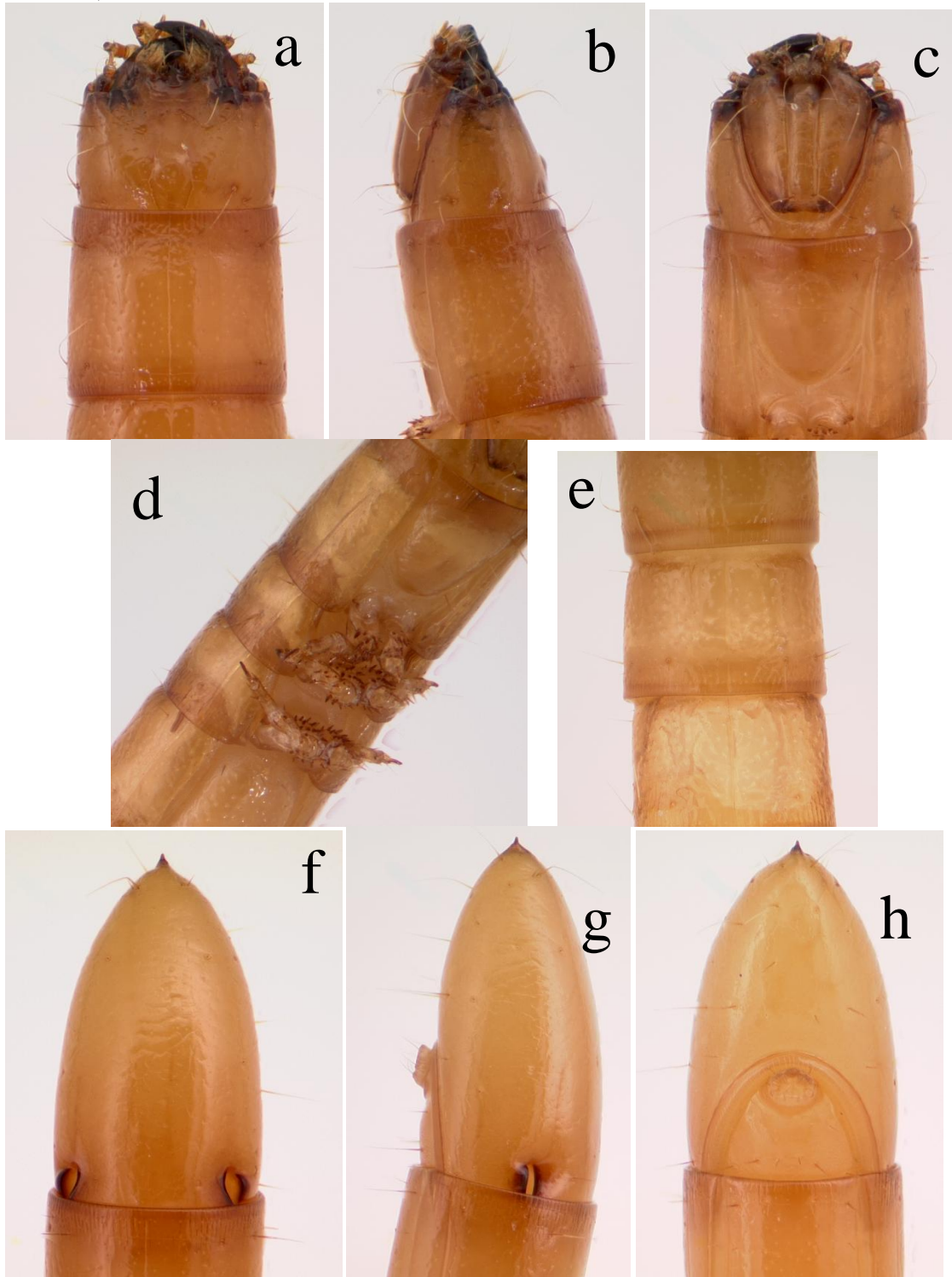


Figure 3.41. *Ampedus* sp. 1. a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 2 – 4; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

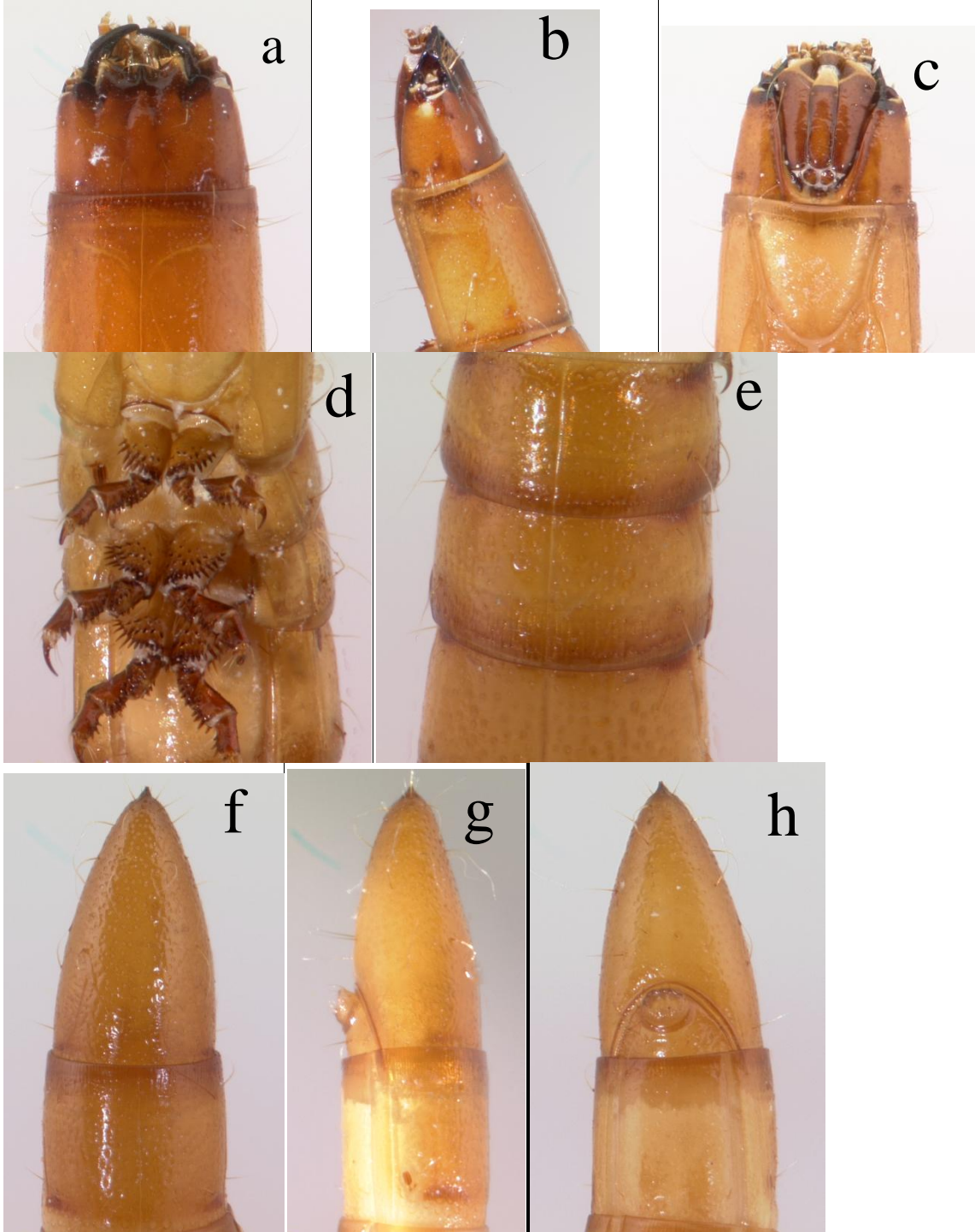




Figure 3.42. *Ampedus* sp. 2. a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 3 and 4; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

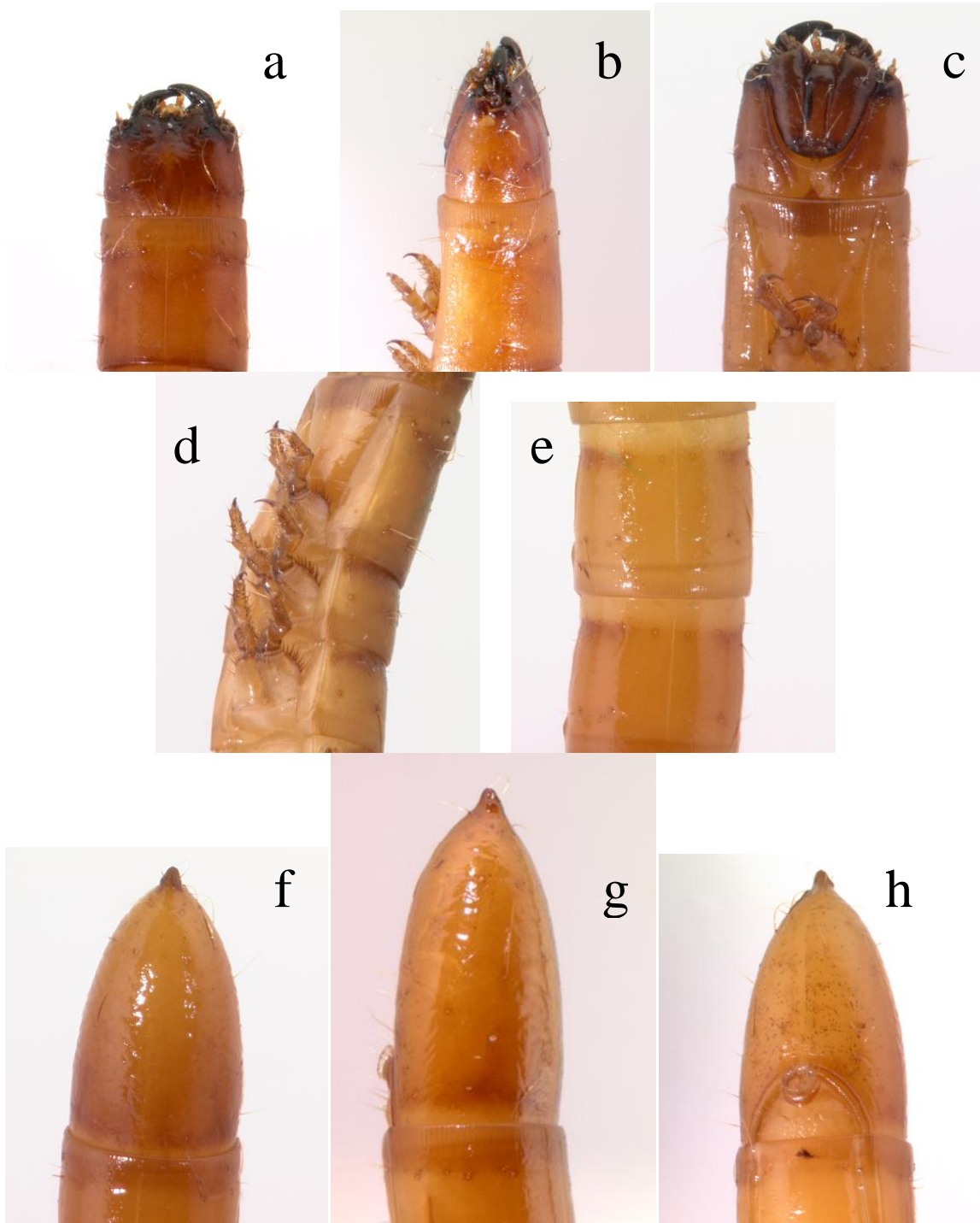


Figure 3.43. *Athous* sp. nr. *sierrae varius* Lane. a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 2 – 4; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

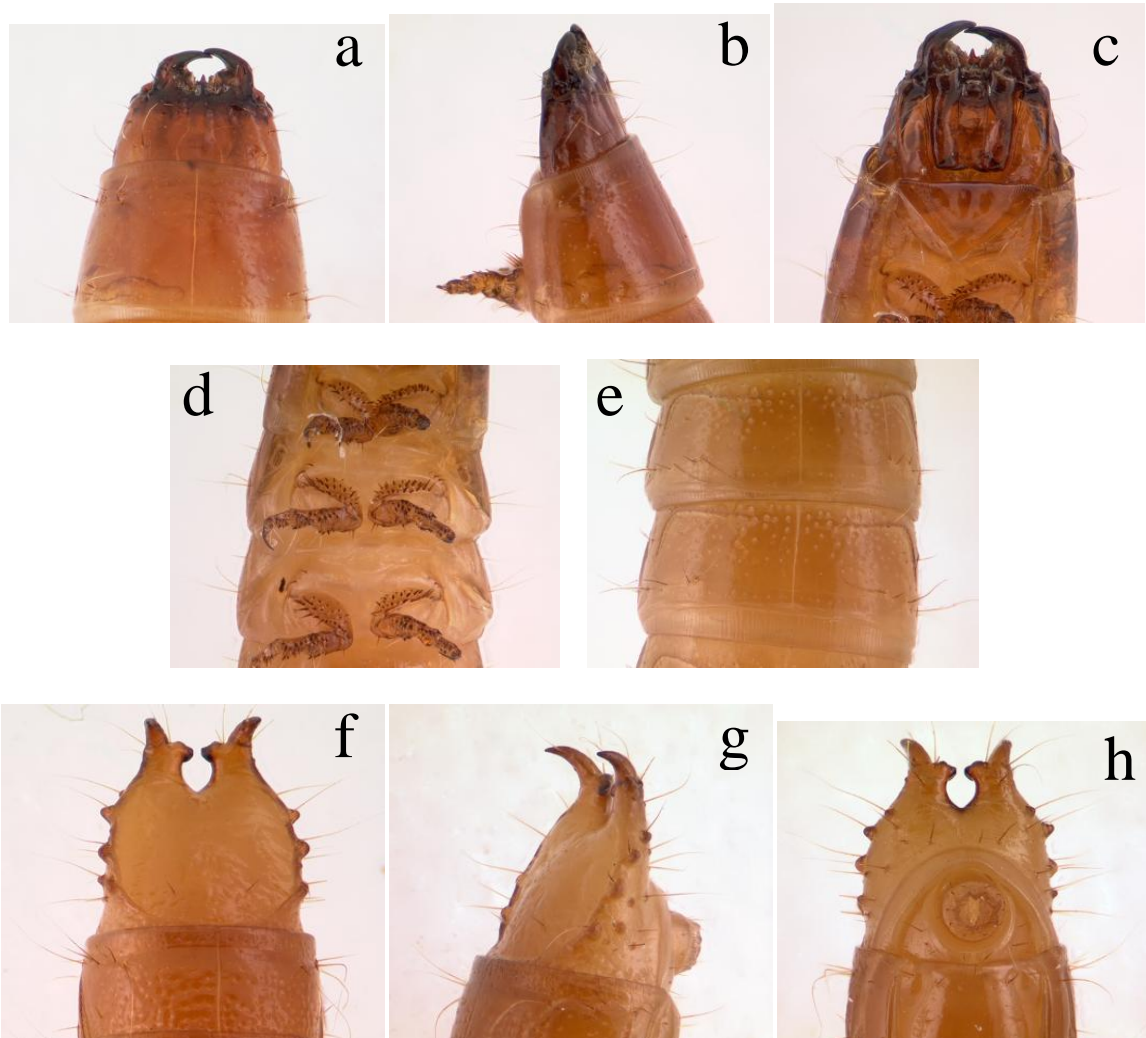


Figure 3.44. *Dalopius* sp. a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 2 – 4; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

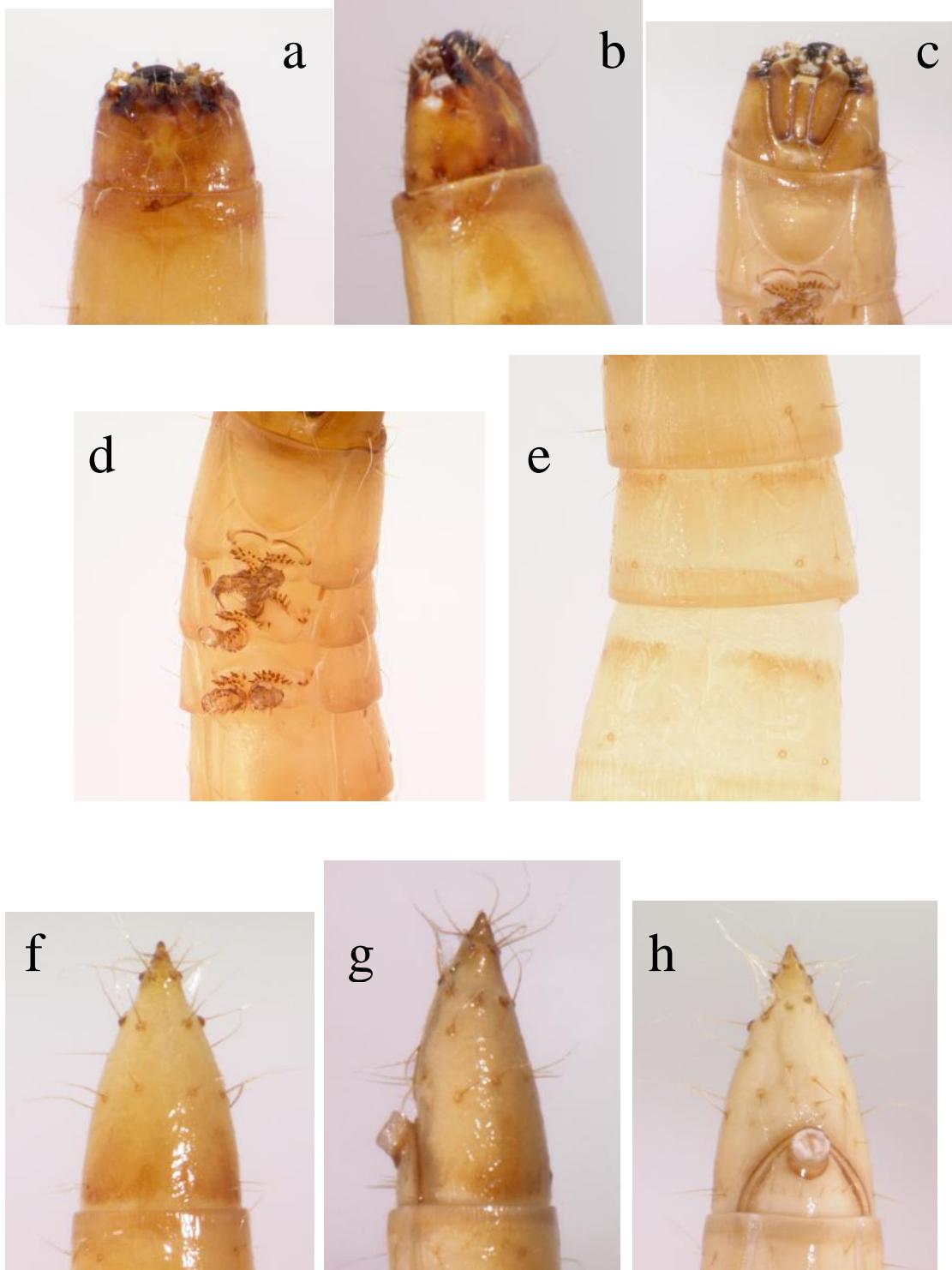


Figure 3.45. *Hadromorphus glaucus* (Germar). a) Head, dorsal; b) Head, ventral; c) Thorax, ventral; d) Abdominal segments 2 – 4; e) A9, dorsal; f) A9, lateral; g) A9, ventral.

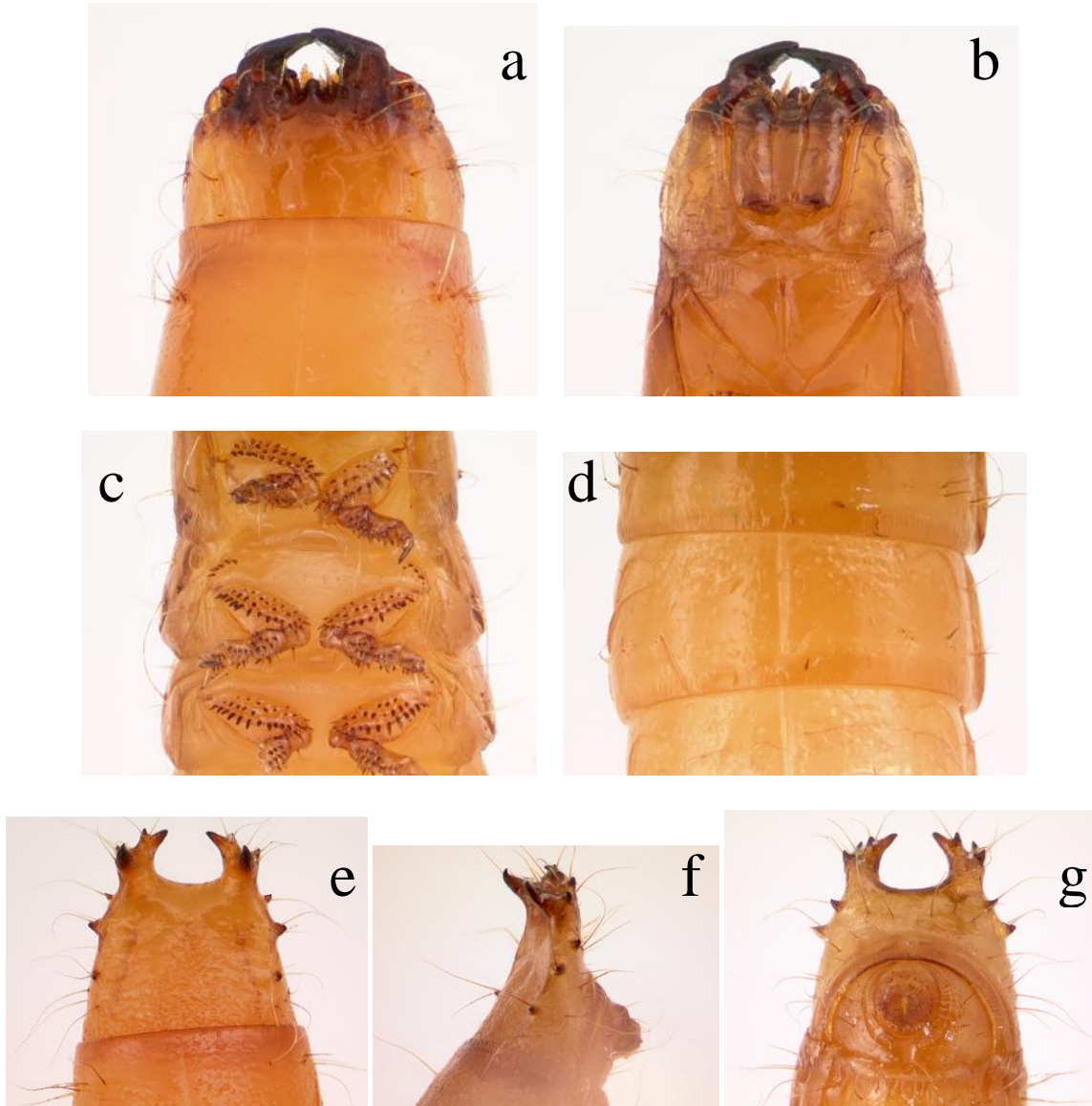




Figure 3.46. *Hadromorphus callidus* (Brown). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 3 – 5; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

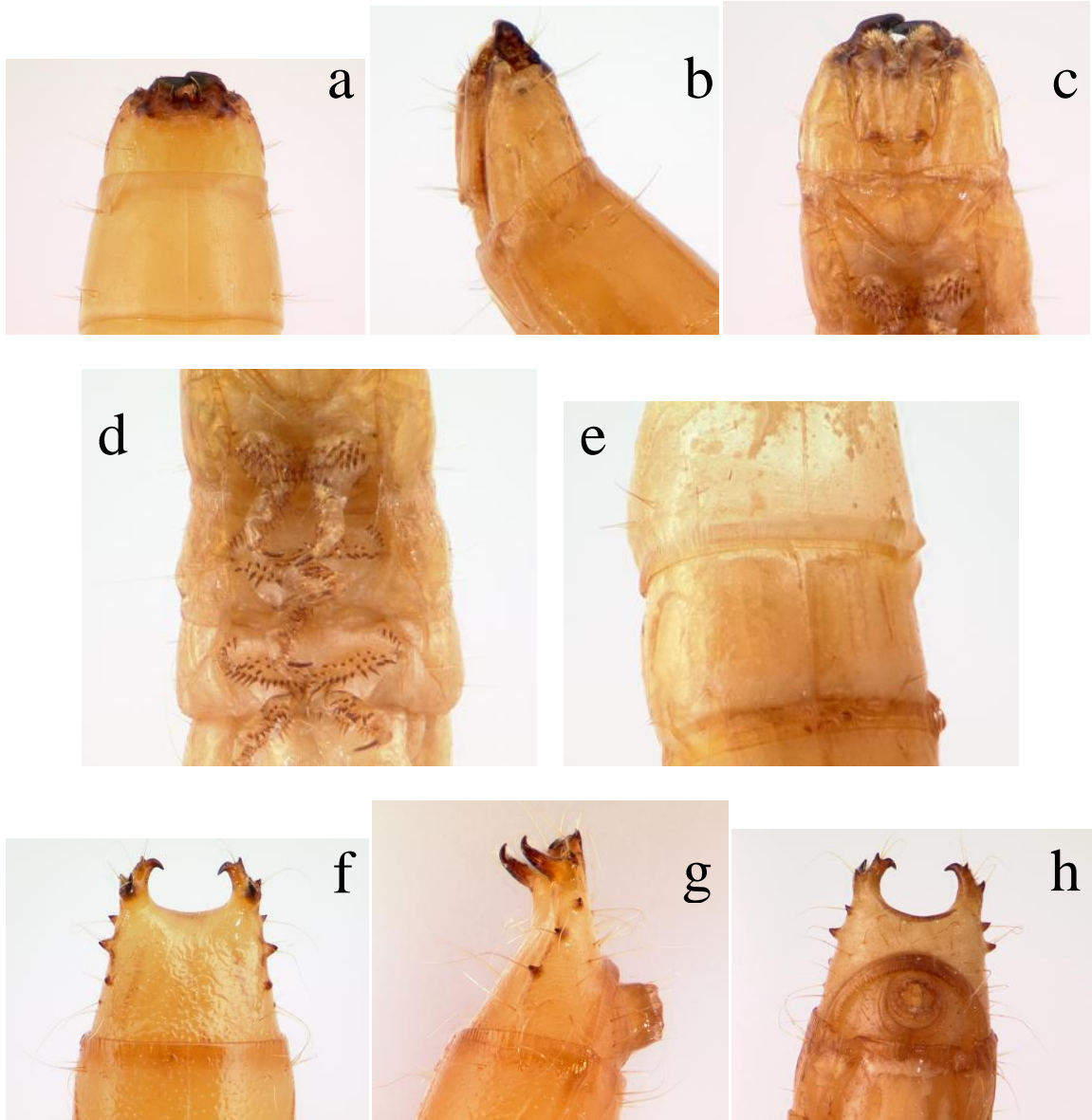




Figure 3.47. *Hemicrepidius memnonius* (Herbst). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 3 – 7; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

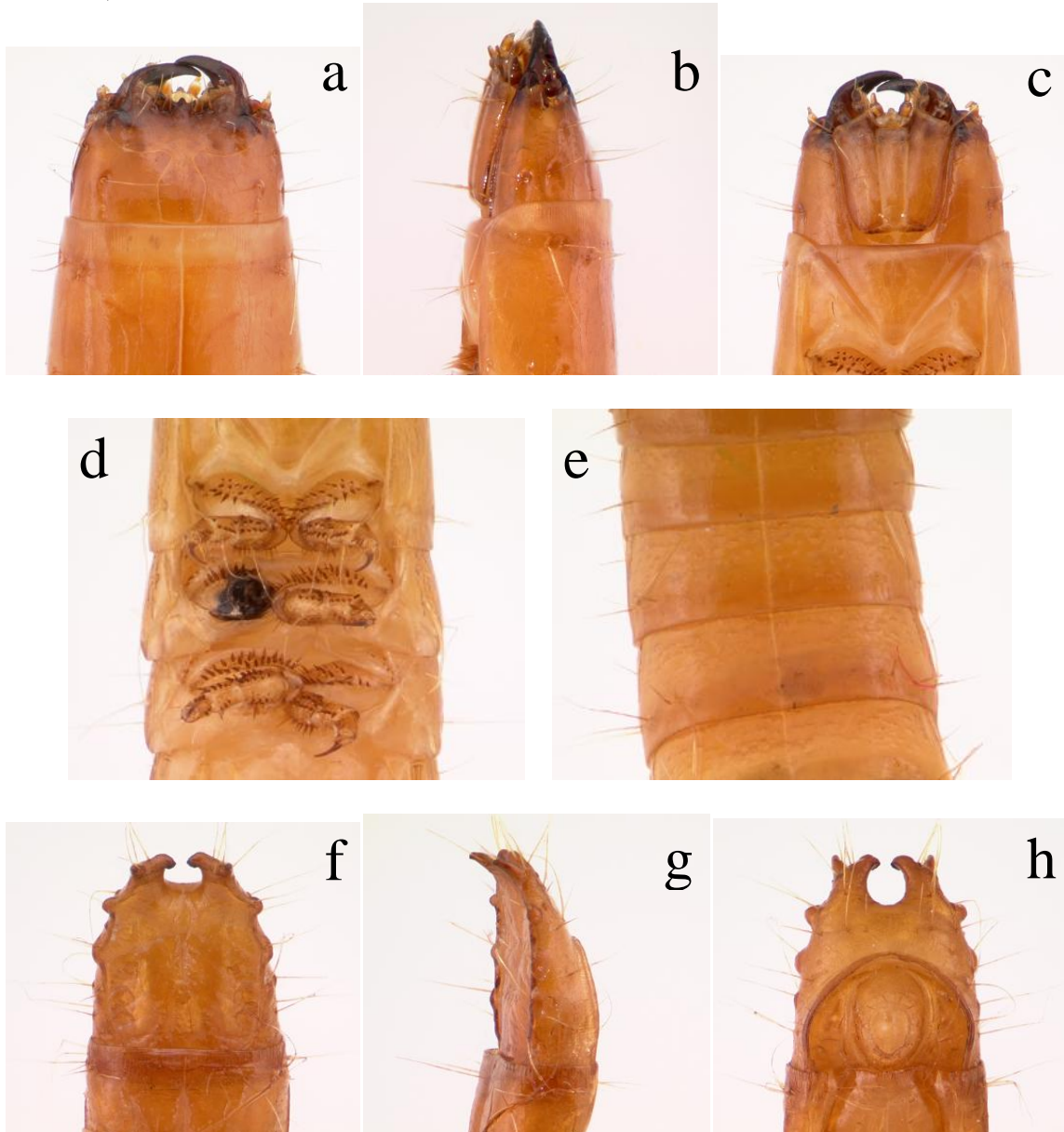


Figure 3.48. *Hemicrepidius* sp. nr. *carbonatus* (LeConte). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 3 – 5; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

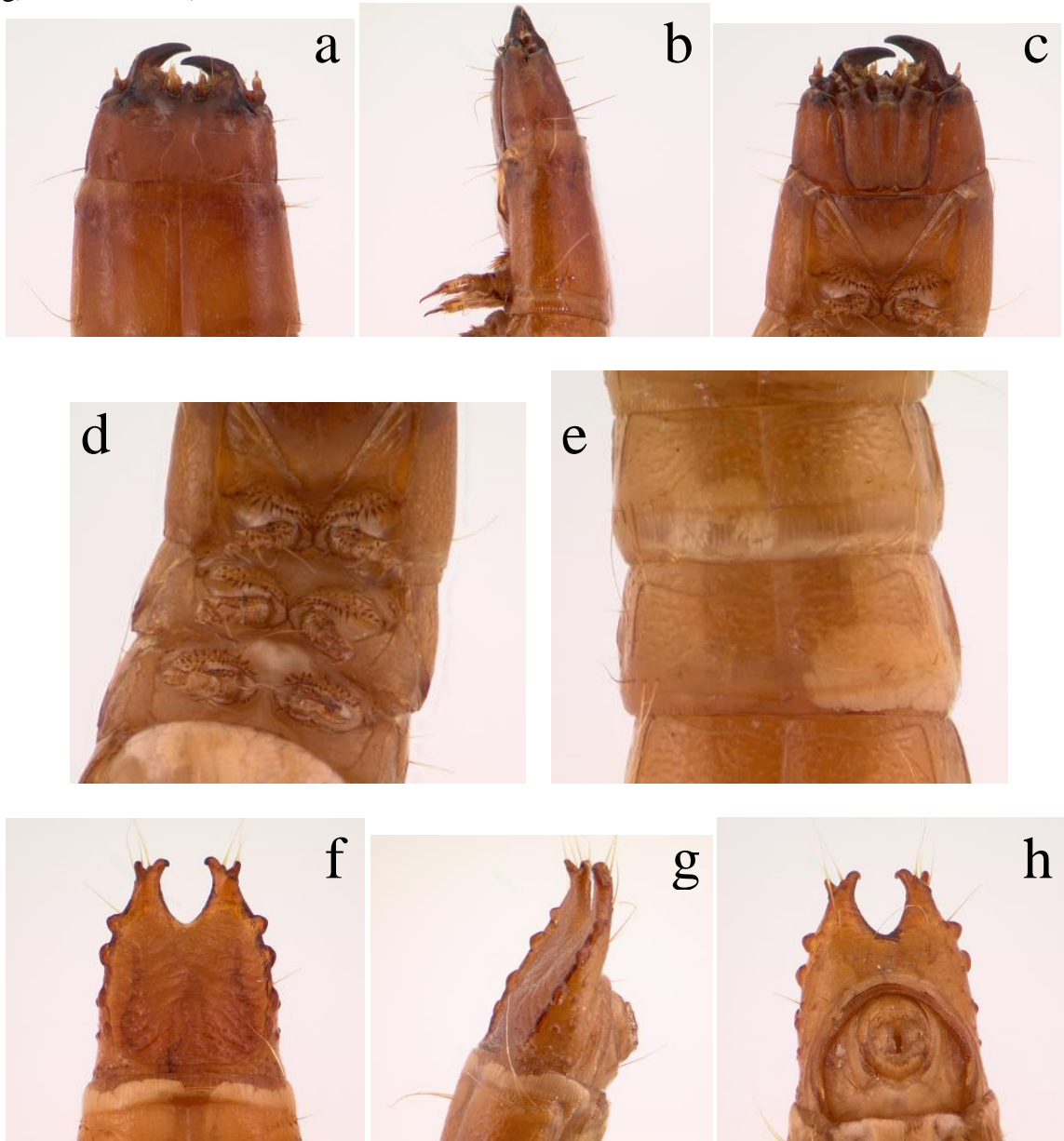


Figure 3.49. *Hypnoidus bicolor* (Eschscholtz). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 3 – 6; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

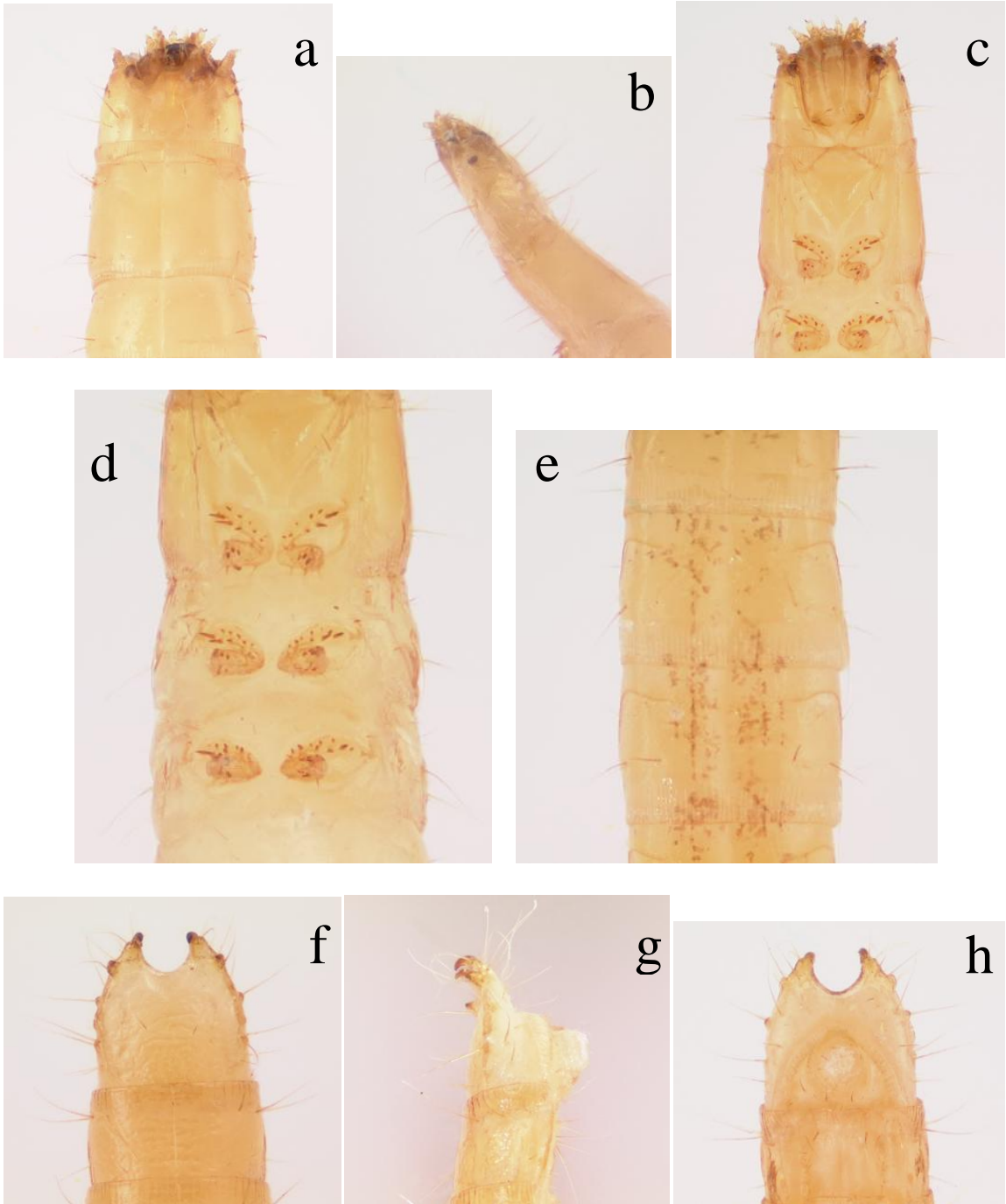


Figure 3.50. *Limonius aeger* LeConte. a) Head, dorsal; b) Head, ventral; c) Thorax, ventral; d) Abdominal segments 2 – 4; e) A9, dorsal; f) A9, lateral; g) A9, ventral.

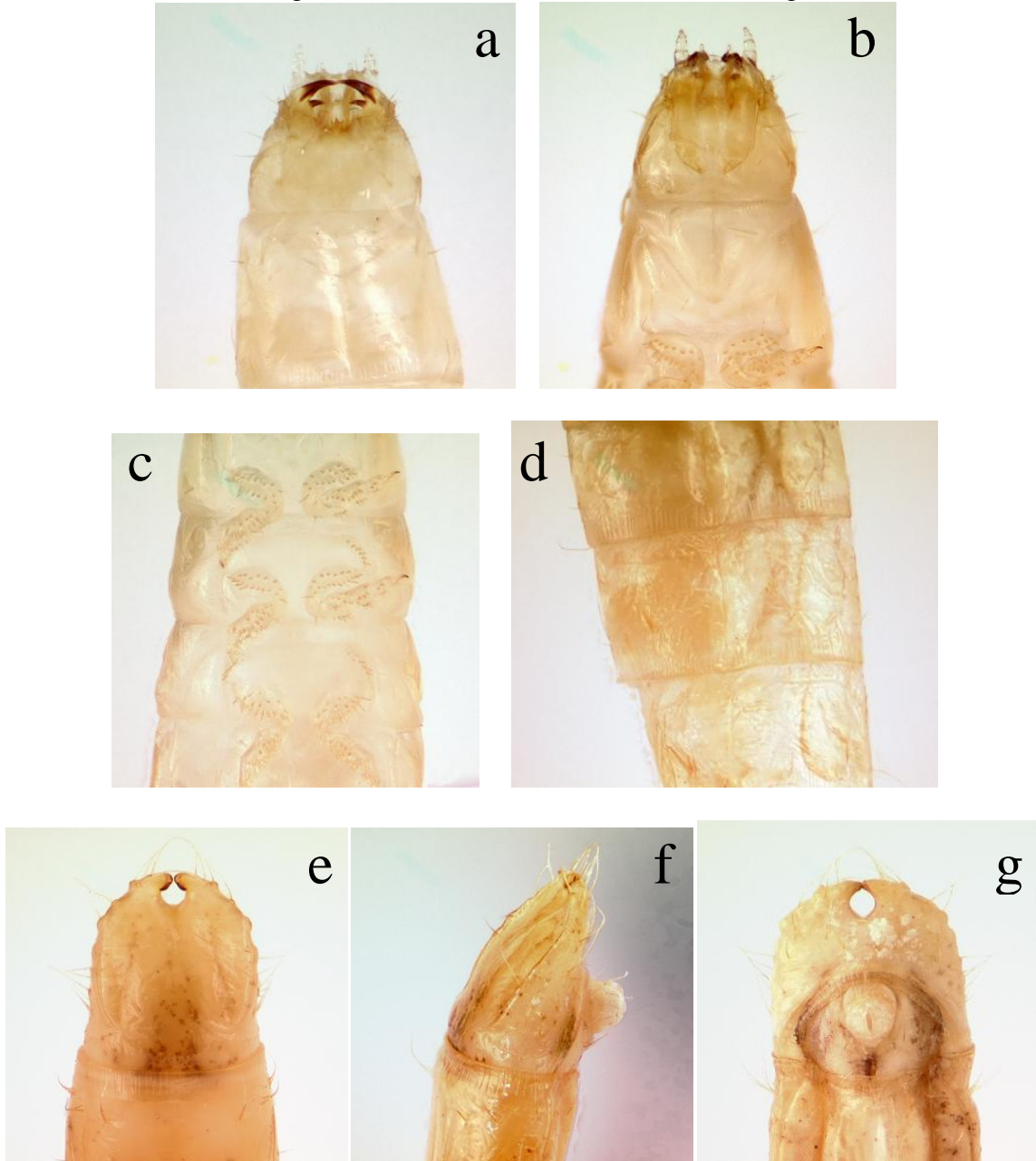




Figure 3.51. *Limonius californicus* (Mannerheim). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 3 and 4; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

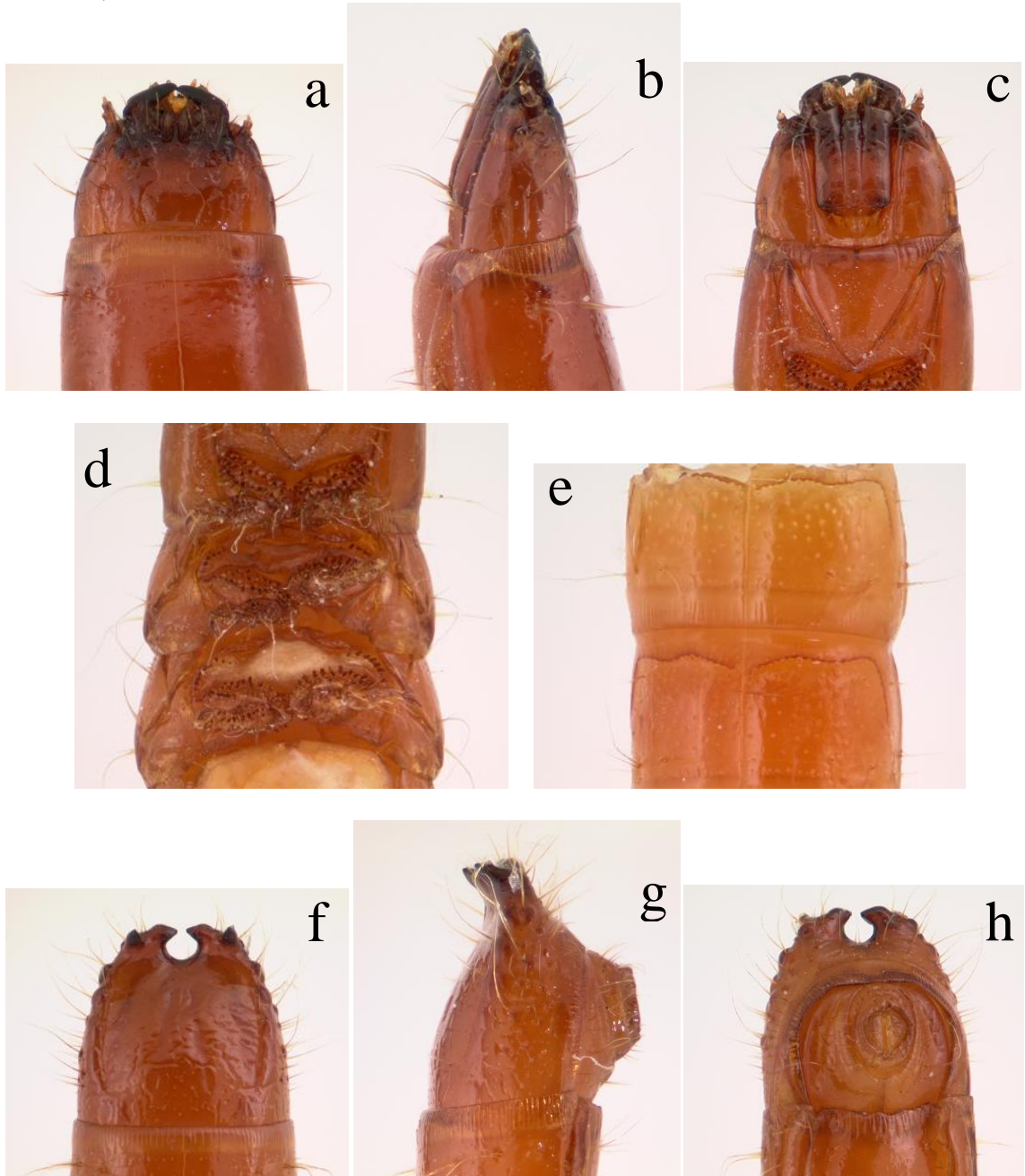


Figure 3.52. *Limonius canus* LeConte. a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 3 – 5; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

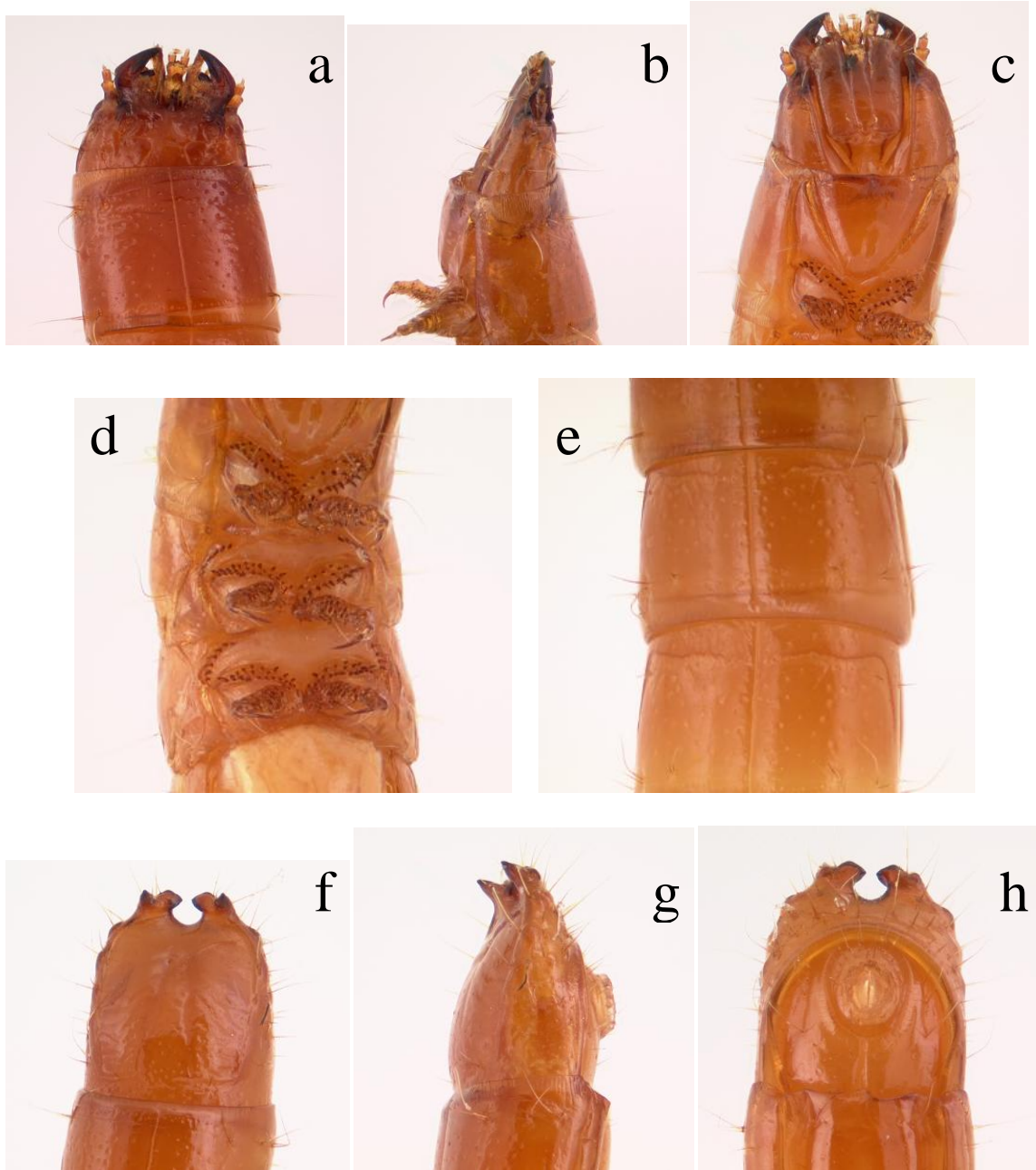


Figure 3.53. *Limonium infuscatus* Motschulsky. a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 2 – 4; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

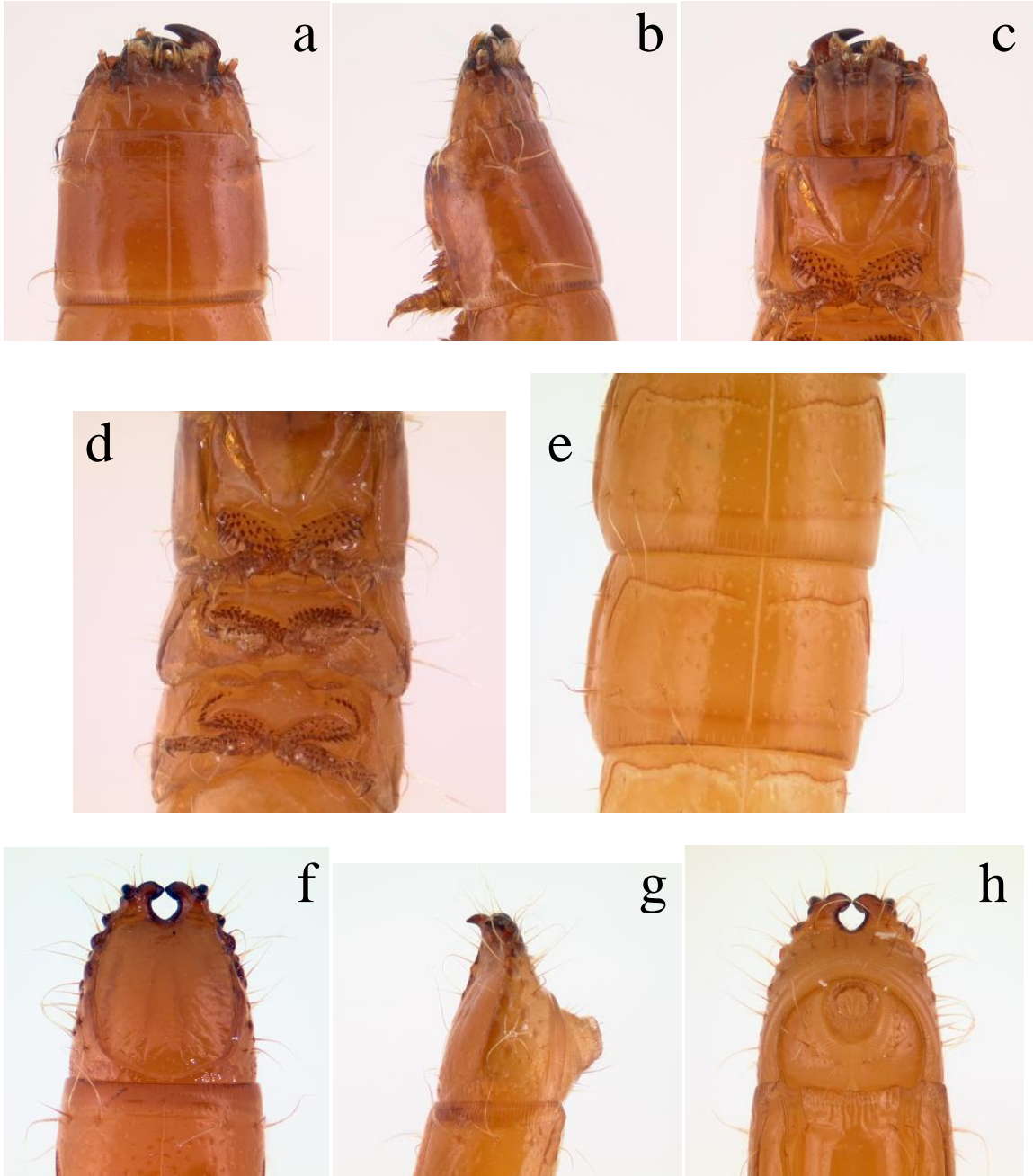


Figure 3.54. *Metanomus insidiosus* (LeConte). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 2 – 4; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

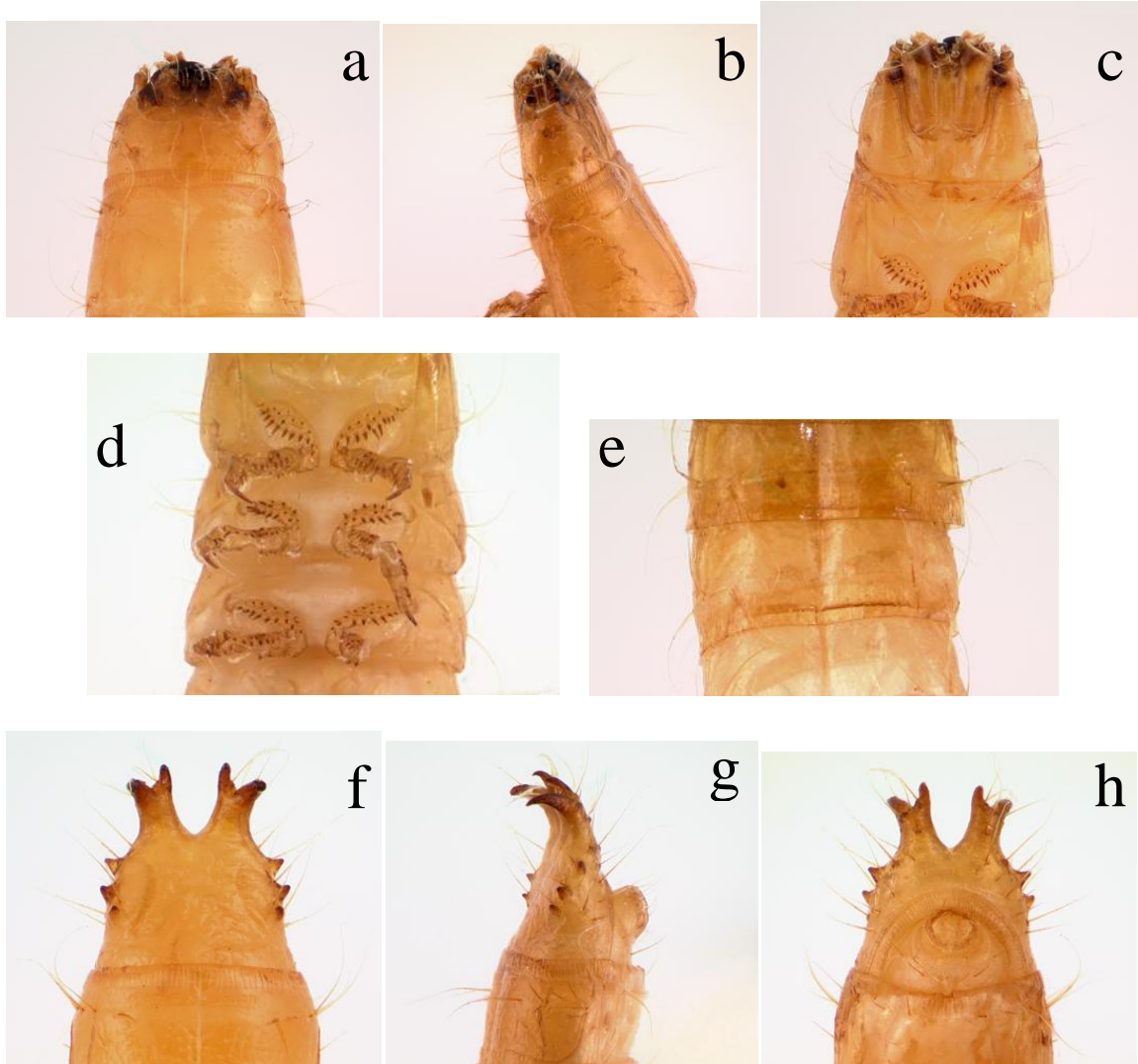




Figure 3.55. *Melanotus longulus oregonensis* (LeConte). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) A9, dorsal; e) A9, ventral.

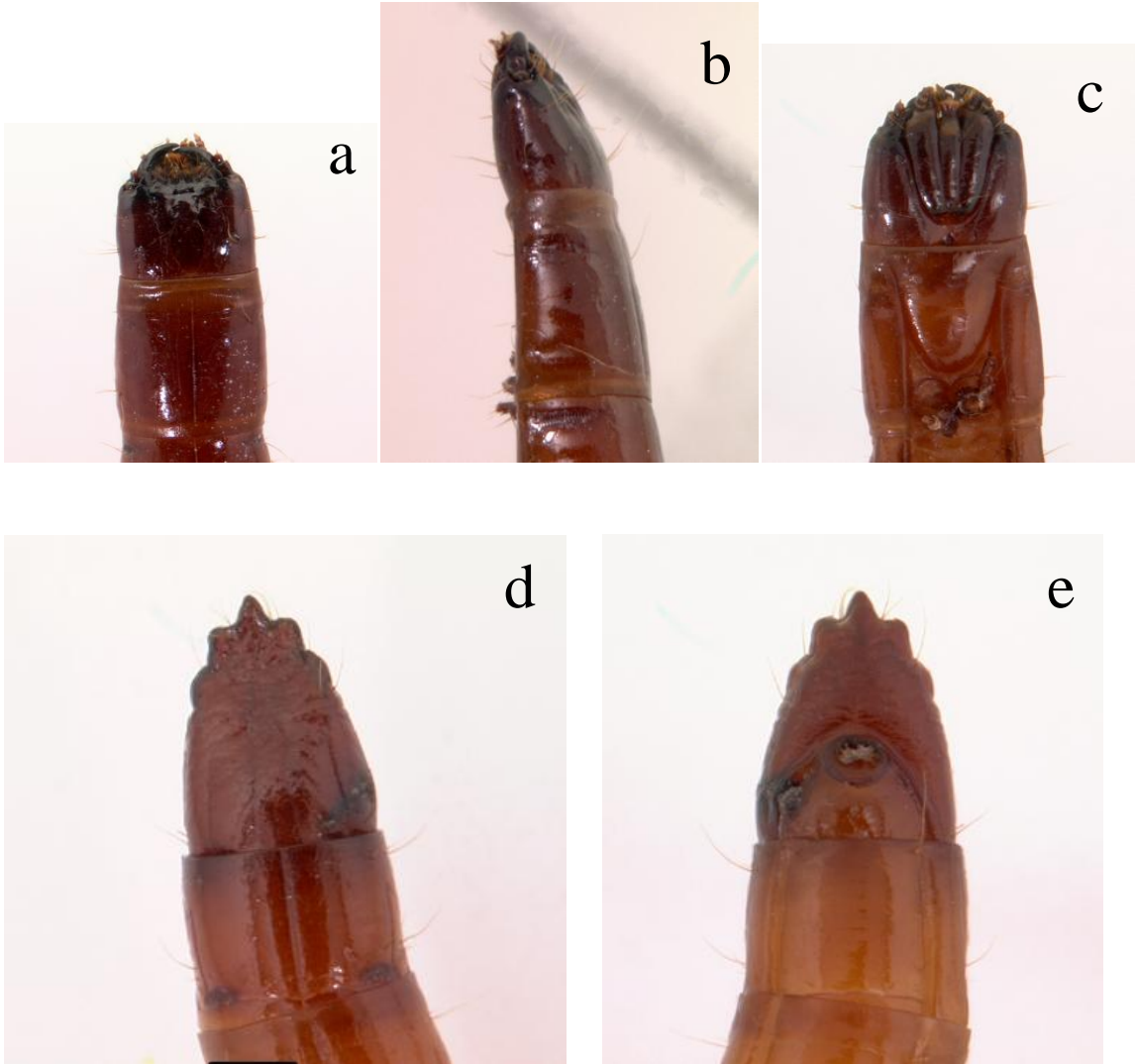


Figure 3.56. *Selatosomus aeripennis* (Kirby) and *S. destructor* (Brown). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 2 – 4; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

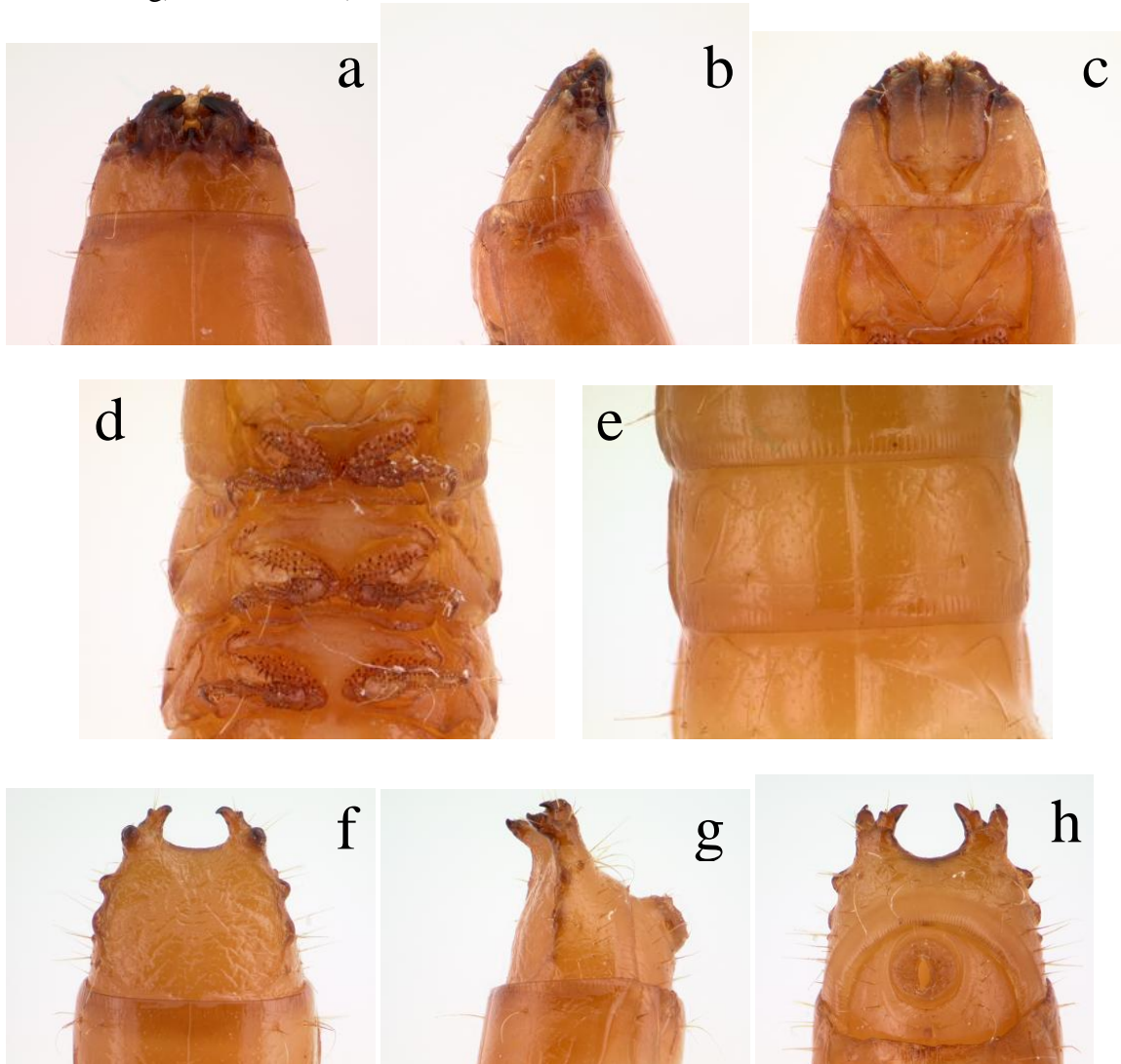


Figure 3.57. *Selatosomus pruininus* (Horn). a) Head, dorsal; b) Head, lateral; c) Head, ventral; d) Thorax, ventral; e) Abdominal segments 3 – 5; f) A9, dorsal; g) A9, lateral; h) A9, ventral.

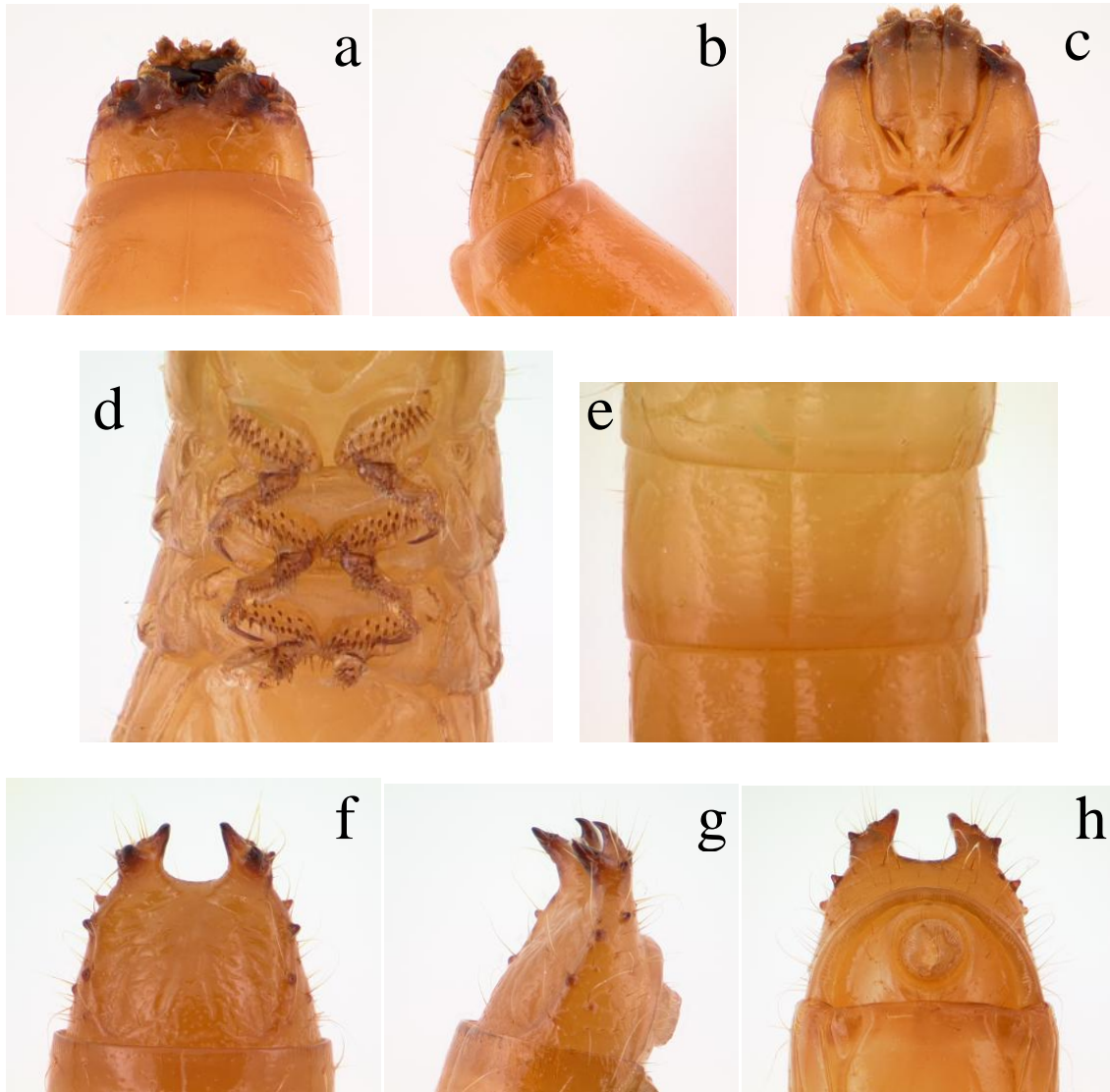
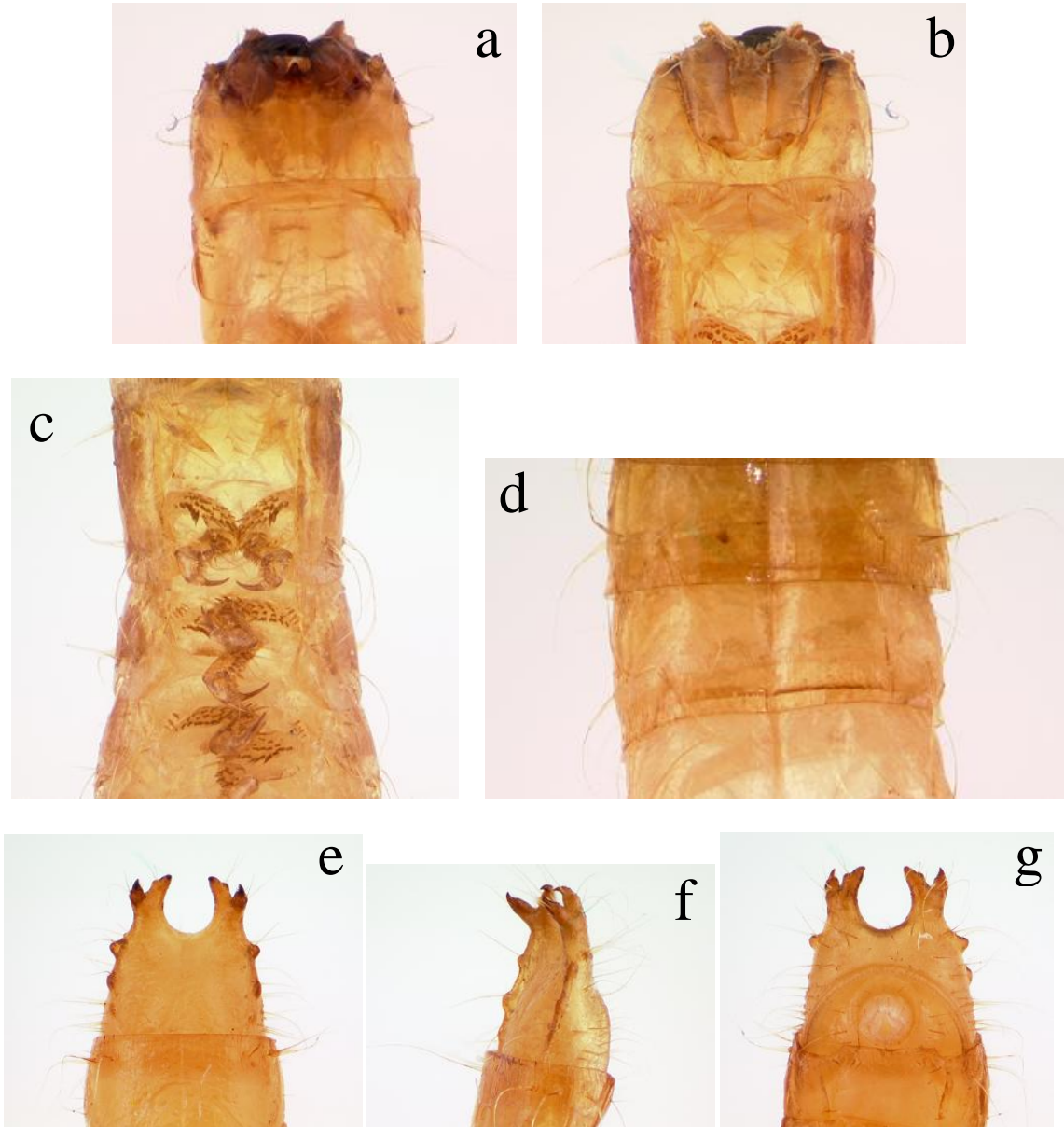


Figure 3.58. *Selatosomus semimetallicus* (Walker). a) Head, dorsal; b) Head, ventral; c) Thorax, ventral; d) Abdominal segments 2 – 4; e) A9, dorsal; f) A9, lateral; g) A9, ventral.



CHAPTER 4

REVIEW OF THE *LIMONIUS CANUS* LECONTE, 1853 (COLEOPTERA:  
ELATERIDAE)

Contribution of Authors and Co-Authors

Manuscripts in Chapters 2 and 4

Author: Frank E. Etzler

Contributions: Conceived and implemented the study design. Collected and analyzed DNA data. Identified all specimens to species level. Wrote first draft of the manuscript.

Co-Author: Dr. Michael A. Ivie

Contributions: Helped conceive the study design. Provided feedback on early drafts of the manuscript and funding for the research.

Manuscript Information Page

Frank E. Etzler and Michael A. Ivie

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**Abstract**

The genus *Limonius* Eschscholtz, 1829 was recently revised in North America north of Mexico. This recent revision made some new synonymies, including species of economic importance in some regions of North America. Most reportedly economic species were found to belong to the *Limonius canus* LeConte species-group, so an in-depth review of the group was conducted in order to determine species limits in the group. Analysis of species concepts was done using cytochrome-oxidase I (COI) DNA data, and adult and larval morphology. Eight species are now recognized as forming the species group, unified by characters of the female internal genitalia and, to a lesser extent, characteristics of the hypomeron and male genitalia. The species recognized in this paper as valid are: *Limonius agonus* (Say), 1839; *Limonius californicus* (Mannerheim), 1843; *Limonius canus* LeConte, 1853; *Limonius cf. dubitans* LeConte, 1853; *Limonius ectpus* (Say), 1839; *Limonius infuscatus* Motschulsky, 1859; *Limonius pilosulus* Candèze, 1891; and *Limonius subauratus* LeConte, 1853. *Limonius stigma* (Herbst), 1806 was found to not belong in this species-group and was removed and not treated in-depth here. A new key was produced to key out all recognized species and clarify areas of confusion in previous keys.

Wireworms, larval elaterids, are a major pest of wheat and potatoes in the Pacific North-West and Mountain West. In this region, one particular group of species in the genus *Limonius* Eschscholtz, 1829 are a major component of the fauna of affected fields (A. Esser and I. Milosavljevic pers comm.; Moralez et al. in prep). Elaterid adults and larvae are often difficult to determine to species, and species of *Limonius* are a prime example. Fortunately, there is a recent revision of the Nearctic species (Al Dhafer 2009). The key presented therein included all described species and two new species. However, the revision only treated adults, leaving problems with larval identification unresolved. The most recent larval keys for this genus are by Lanchester (1946) and Glen (1950).

Following Van Dyke (1932), Al Dhafer placed the North American fauna into two subgenera, *Limonius s. s.* and *Pheletes* Kiesenwetter, 1858. One species-group in *Pheletes* is of particular interest to economic entomologists, the *L. canus* species-group (LCSG). This group contains the majority of Nearctic *Limonius* considered to be economically important (Lanchester 1946) all but one of which has never been reported to be pestiferous.

While this group was not explicitly recognized by Al Dhafer (2009), the grouping of these 17 names (*Limonius agonus* (Say), *L. anceps* LeConte; *L. arminus* (Say), *L. californicus* (Mannerheim), *L. canus* LeConte, *L. discoideus* LeConte, *L. dubitans* LeConte, *L. ectypus* (Say), *L. hispidus* LeConte, *L. infuscatus* Motschulsky, *L. pilosus* LeConte, *L. pilosulus* Candèze, *L. occidentalis* Candèze, *L. stigma* (Herbst), *L. subauratus* LeConte, *L. subcostatus* Motschulsky, and *L. vernalis* Fall) have historically been placed together in the same group or genus in keys and catalogs (e. g. LeConte



1853, Candèze 1860). Glen (1950) referred to these species as the *L. canus* species group and Glen's name for the group is followed here. Al Dhafer (2009) pointed out that more questions were raised than answered in his treatment of the species in the *L. canus* species-group (LCSG), but he nicely set up the conditions that allowed this study.

The first published reference to the genus *Limonium* in North America was by David Ziegler (1845) in his description of *Limonium definitus* Ziegler and move of *L. quercinus* (Say) to the genus. However, it wasn't until 1853, when LeConte revised North American elaterids, that most American *Limonium* species were formally moved to that genus. All names in the canus species-group known at that time were placed in LeConte's group B (Table 4.1). In 1859, Motschulsky described two species from the Russian areas of North America, although they were overlooked for many years (Tables 4.1 and 4.2). Candèze (1860) revised the world elaterid fauna, synonymizing *Pheletes* with *Limonium* and providing a key to the known species of *Limonium* in which the canus species-group were grouped together (Table 4.1). In 1863, LeConte moved the species *L. dubitans* to its own genus, *Nothodes*. In 1879, Horn synonymized *L. agonus* with *L. ectypus*. Later, Candèze (1891) created a checklist of species, reflecting the changes that had occurred after his earlier monographs (Table 4.1).

The early part of the 20<sup>th</sup> century, saw many changes in classification. Schwarz (1906) raised *Pheletes* to full generic status and included North American species (Table 4.2). Leng (1920) continued Schwarz's usage, and included *L. subcostatus* in lists for the first time. In 1932, Van Dyke synonymized *Nothodes* LeConte and *Pheletes* with *Limonium*, stating that there were not enough differences in the North American species to

justify separate genera. He placed all species of the *L. canus* group in the subgenus *Pheletes*. Van Dyke's (1932) work produced the first modern key to this genus in North America and provided a bibliography for all 47 species then recognized. While no formal subgroups are proposed, he recognized eight species as valid in the *canus* subset of the key, and proposing four new synonymies. A few years later in 1934, Fall wrote a response to Van Dyke's 1932 work. He agreed with most of the synonymies, but felt that *L. discoideus*, *L. agonus*, and *L. pilosulus* were all valid species and should be treated as such. Van Dyke responded in 1943 and stated that he stood by his synonymies with *L. discoideus* and *L. pilosulus*, but made no comment on *L. agonus*.

For the remainder of the 20<sup>th</sup> century, there were only regional or specialized keys, with some of the first done by Dietrich (1945) for New York State and Lanchester (1946) for the larvae of six economic species. Both authors continued Fall's treatment of *L. agonus* and *L. ectypus* as distinct species. In 1950, Robert Glen did an important key to the larvae of the tribe *Lepturoidini*, which included the genus *Limonius*. While his work on *Limonius* was not the focus of the paper and closely followed Lanchester (1946), he provided support that the *L. canus* species-group was a distinct group within *Limonius*.

The genus was also briefly covered by Becker (1956), who wanted to demonstrate how the female genitalia could be used to form species groups and help in better phylogenetic understanding. While focused mostly on species of *Agriotes*, he did cover a fair bit of the *Limonius* species. In the following discussion, group numbers are provided for ease of reference, and represent the order that Becker covered the species groups. Becker placed most of the *L. canus* species-group (LCSG) into group 4, except for *L.*

*stigma*, which was placed in group 3, with other species with red humeral spots on their elytra. Becker also broke group 4 into another three subparts. All females in group 4 have similar internal structures, but differ based on the external structure of their ovipositor. Group 4a contained *L. anceps*, *L. discoideus*, *L. subcostatus*, *L. subauratus*, and *L. agonus*. Group 4b contained *L. californicus*, *L. canus*, and *L. dubitans*. Group 4c contained *L. infuscatus*, *L. pilosulus*, *L. vernalis*, and an unidentified species. The names *L. ectypus*, *L. hispidus*, and *L. occidentalis* were not mentioned. It should be noted that Becker stated that names were used for ease of use and do not represent actual removal from any previous synonymy.

Lane (1971) covered the genus within Hatch's Beetle's of the Pacific North West. He only treated the 23 species that occurred in the Pacific Northwest region, which included seven names of the *L. canus* species-group. He disregarded Van Dyke's subgeneric split, choosing to use *Gambrinus* LeConte and *Cidnopus* Thomson instead. Lane's definition of the subgenus *Cidnopus* included the canus species-group (LCSG). He considered the names *L. canus*, *L. subauratus*, *L. californicus*, *L. pilosulus*, and *L. infuscatus* as valid species. The last authors to key this group in the 20<sup>th</sup> century were Downey and Arnett (1996). However, they only focused on the North-Eastern United States and their key did not differ from Dietrich's (1945) key.

In the 21<sup>st</sup> century, Hatha Al Dhafer (2009) revised the *Limonius* of North America. He synonymized many of the species in the canus species-group (LCSG), reducing the number of recognized species to six. Many of these synonymies combined species that were traditionally considered to be eastern or western in distribution into a

transcontinental species with a gap in recorded distribution. The new synonymies proposed by Al Dhafer and the historical species confusion in this group suggest a thorough reexamination is needed. The fact that many of the canus-group species (LCSG) are considered pests and the continuing uncertainty on species limits calls for further work. The purpose of this paper is to examine the *L. canus* species-group (LCSG) in greater depth. Characters from morphology, distribution, and DNA will be taken into account to determine which names belong to each species concept. Recognized species and synonymies are given in table 4.3.

## **Methods**

Adult specimens used for extracting DNA had their abdomen removed, while larval specimens were cut between the second and third abdominal segments. Extraction was whole body, following the Qiagen® (Hilden, Germany) DNeasy® spin column protocol or the protocol with Promega® (Madison, Wisconsin) Wizard® Genomic DNA kit. The samples were lysed over night at 56°C in a Benchmark Scientific (Edison, New Jersey) Multitherm™ shaker (Model H5000-H). Following completion of the extraction process, each sample was assayed using a NanoDrop™ 2000 spectrometer to determine the quality and quantity of DNA present by the UV light absorbance ratio of 260nm/280nm being at or close to two. The barcode region of the COI gene was amplified using the Polymerase Chain Reaction (PCR) on an Eppendorf® (Hamburg, Germany) Mastercycler® using the GoTaq® Green Mastermix (Promega®). Primers LCO1490 and HCO2198 from Folmer *et al.* (1994) were used with the following cycler protocol: an initial 3 minutes at 94°C; 6 cycles of 94°C for 1 minute, 45°C for 1:30

minutes, and 72°C for 2:30 minutes; 36 cycles of 94°C for 1 minute, 51°C for 1:30 minutes, and 72°C for 2:30 minutes, followed by a final 5 minutes at 72°C. The PCR product was run on a 1% agarose gel to confirm that a product was obtained. Successful products were purified by precipitation, using the following method: to 14µL of PCR product, add 22.75µL of dH<sub>2</sub>O, 12.25µL 2M NaClO<sub>4</sub>, and 27.0µL of Isopropanol in a 0.5mL centrifuge tube; vortex to mix then Spin 15 min, at room temp, 14K rpm; aspirate supernatant being careful not to disturb pellet; add 150µL 70% ethanol and spin 5 min, at room temp, 14K rpm; aspirate supernatant, again not disturbing the pellet; let it air dry from 10- 15 minutes then re-suspend pellet in 10µL of LoTE, which is a mix of 3mM Tris pH8.0 and 0.2mM EDTA. The purified DNA was then sent to MCLab for sequencing. The sequence chromatographs were analyzed using Chromas Lite (Chromas software, Technelysium Pty Ltd. [1998-2005]; Gene Codes Corporation, Ann Arbor, MI, USA [2000]) for quality assessment. Clean sequences for a sample were aligned manually, and the consensus sequence was taken from the area of overlap between the two strands. To control for possible laboratory contamination, a set of eight negative PCRs was run every six months, which included everything except template DNA. Sequences were aligned with MAFFT (Kato 2011). An unrooted Neighbor-Joining tree using the Jukes-Cantor Substitution model was created, with boot-strap values calculated from 500 runs. After extraction, each specimen was washed first with distilled water, followed by a rinse of 95% ethanol. Extracted adults had their abdomens glued back on using Elmer's® white glue, while larvae were stored in vials of EtOH.

Morphological characters to distinguish members of the *Limonius canus* species group were observed through a dissecting stereo-microscope (Leica® Wild 3C) with a Leica® LUX1000 170W fiber optic illuminator. A custom built light diffuser was used, composed of dense foam in an L-shape and translucent plastic along one side, for ease of observation of punctures. Specimens and particular characters were photographed with a JVC® 3CCD KY-F750 digital camera mounted to a Leica® MS5 dissecting microscope with a Schott® Fostec DCR 111 fiber optic illuminator and a small foam bowl as a light diffuser. The camera is attached to an IB IntelliStation M Pro® and the images are processed using Syncroscopy Auto-Montage Pro® ver. 5.03 Beta and enhanced using GIMP® 2.6.2.

Genitalia were extracted through the terminal opening in the abdomen from specimens that had undergone DNA extraction, or from relaxed specimens. A pair of sharp forceps was inserted and the genital and apical abdominal segments were removed in males and the ovipositor exposed in some females. Some females had their entire genitalia removed, following Becker (1956). This was done by placing the whole abdomen, removed from the specimen, in cold 15% potassium hydroxide for one to two hours to dissolve any soft tissue. The abdomen was cut along the one edge of the tergites with sharp forceps or a pin and the internal genitalia carefully removed. The genitalia were stored in micro-vials containing glycerine and placed in distilled water to view. Male genitalia were glued to cards pinned under the insect.

A total of 319 adult specimens were examined. Specimens were compared to images of type specimens present on the Museum of Comparative Zoology Collection (MCZC) website in order to give as accurate as possible of a review.

Specimens from the following collections were examined:

CDFA – California Department of Food and Agriculture Collection

CMNC- Canadian Museum of Nature Collection

CNCI- Canadian National Collection of Insects and Arthropods

MTEC- Montana State Entomology Collection

Specimens identified by Edward C. Becker, Hathal Al Dhafer, and Merton C. Lane were used as references for species concepts of each of these authors. An error noted in Al Dhafer's (2009) paper is that all specimens that were stated as being located in the Canadian Museum of Nature Collection (CMNC) are in actuality located in the Canadian National Collection of Insects and Arthropods (CNCI). Both establishments were visited and Al Dhafer identification labels were only present at the later.

The morphological determination of larvae follows Lanchester (1946) and Glen (1950). In addition to the morphological characters used for adults by Al Dhafer (2009) and references therein, female genitalic characters were used following Becker (1956).

## **Results and Discussion**

The species with specimens extracted, with numbers of adults and larvae in parentheses, are: *L. agonus* (6, 0); *L. anceps* (2, 0); *L. californicus* (23, 82); *L. canus* (9, 4); *L. dubitans* (1,0); *L. infuscatus* (8, 16); *L. subauratus* (3, 0). The names given follow Fall's (1934) concepts. Of these, 119 specimens were successfully sequenced (Fig. 4.1).

Figure 4.1 was constructed based only on CO1 data and is used only for species level identities. Each crown group has the associated species name, the number of specimens with sequences, as well as the general localities of the specimens. A more detailed analysis of these groups will be discussed under each species below. No sequences were obtained for *L. anceps* and *L. subauratus*.

During the course of this study, it was determined that there needs to be a clearer definition of this species group. Further, the subgeneric concepts need to be re-examined, as a look at the world fauna presents a problem with the current classification. In the Palearctic region, *Pheletes* is considered a valid genus, distinct from *Limonius* (Cate 2007). The larva of the type species of *Pheletes*, *P. aeneoniger* (DeGeer, 1774), has been compared with North American species, and has more in common with species in *Limonius s. s.* (North American usage) than the species currently given this name in North America (Glen 1950). Due to the unknown placement of Nearctic species in relation to current Palearctic taxonomy, we suggest that the current Nearctic subgeneric concepts be abandoned, with the species groups proposed by Al Dhafer as a more appropriate starting point.

The first couplet in both Van Dyke's and Al Dhafer's keys fails to correctly place all members in the *L. canus* species-group (LCSG), particularly *L. infuscatus* and *L. canus* females with the *L. discoideus*-type coloration. This is due to that fact that these two species possess distinctly grooved, or excavate, prosternal sutures. The couplet used in the keys is also ambiguous, differentiating between "distinctly" and "not distinctly" grooved prosternal sutures. Most of the other species in the canus species-group also



possess weakly grooved prosternal sutures, making this couplet difficult for a non-specialist. The *L. canus* species-group is herein defined as *Limonius* that lack an emargination on the posterior margin of the hypomeron, a relatively large size (8 to 11 mm), and internal female genitalia that are c-shaped and possess two colleterial glands (Becker 1956, Fig. 13). Species recognized as valid members are: *L. agonus*, *L. californicus*, *L. canus*, *L. dubitans*, *L. ectypus*, *L. infuscatus*, *L. pilosulus*, and *L. subauratus* (Table 3). The emarginate hypomeron (H. Douglas, pers. comm.) and different female genitalia (Becker 1956) of *L. stigma* required its removal from this species group and was not examined in depth here.

**Notes on key and description terminology:**

In the key and descriptions, punctures are referred to as either simple, subumbilicate, or umbilicate for ease of reference. Morphologically it is expected that all punctures are truly umbilicate, but the size affects the ability to determine this. Therefore the above three terms are used to indirectly indicate puncture size. Observation at 160x power is expected to view these differences. Simple punctures appear so because they are small, subumbilicate are medium sized punctures, and umbilicate are large enough for the distinguishing characters of this punctuation type to be clearly seen, even under low to medium optical power.

Length is the combined measurement of the medial length of the pronotum and the length of the elytra from base to apex. Width is determined at the widest point of the pronotum.

The key below is an emendation to Al Dhafer's (2009) key and allows for easier identification of females, as well as including species not recognized in that work. In theory, the key replaces Al Dhafer's couplets 40 to 43. However, the first couplet of Al Dhafer's key is difficult due to the variable character of the prosternal suture and some individuals of the canus-group will not arrive at couplet 40. The majority of species in this group possess a slightly excavate prosternal suture, but it is never enough to receive an antennomere. However, two species may confuse non-specialists: *L. canus*, especially females; and *L. infuscatus*. Both possess prosternal sutures that may be able to receive one antennomere, which may lead non-experts to go the wrong direction in the first couplet. These two species can be correctly placed by noting that they lack an emargination on the posterior edge of the hypomeron and are  $\geq 8$  mm in length. Similar sized species in western North America possess an emarginate posterior edge of the hypomeron, while species that lack an emargination of the hypomeron are smaller than 8mm.

Some issues became apparent when constructing the current key. *Limonius infuscatus* and *L. pilosulus* are each keyed out twice, due to the presence of punctation along the edges of their pronota which approaches a lattice-like appearance in some specimens and may confuse users. Specimens from California, particularly from the southern Sierra Nevadas and the San Joaquin Valley, may present difficulties in the key. Some specimens will key to *L. californicus*, but will possess vague carinae on the posterior end of the elytra. Others will key to *L. canus*, but lack carina on the posterior

end of the elytra and often have antennomere 2 subequal in length to antennomere 3.

These should both be treated as *L. californicus*.

**Key to the species of the *Limonius canus* Species-Group**

- 1 Frontal margin distinct medially with carina linking superantennal carinae and interrupted by at most one or two punctures (Fig. 4.2a) . . . . . 2
- 1' Frontal margin indistinct medially without carina linking superantennal carinae and interrupted or obscured by many adjacent punctures (Fig. 4.2b) . . . . . 5
- 2(1) Pronotal punctures umbilicate, almost touching, forming lattice-like pattern along edges of pronotum (Fig. 4.3a) . . . . . 3
- 2' Pronotal punctures simple to subumbilicate, and while dense, not forming a lattice-like pattern along edges of pronotum (Fig. 4.3b) . . . . . 4
- 3(2) Pronotum subparallel posteriorly, rapidly narrowing anteriorly (Fig. 4.9); carinae often absent on apex of elytra (c.f. Fig. 4.6); female external genitalia as in Fig. 4.4b; male genitalia as in Fig. 4.10 . . . . .  
 . . . . . *Limonius californicus* (Mannerheim), 1843
- 3' Pronotum broadly rounded (Fig. 4.17); carinae always absent on apex of elytra (c.f. Fig. 4.6b); female external genitalia as in Fig. 4.4c; male genitalia as in Fig. 4.18 . . . . . *Limonius infuscatus* Motschulsky, 1859 (part)

- 4(2') Punctures on head simple, with impunctate areas (Fig. 4.5a); punctures on hypomeron simple throughout; abdominal mirrors visible only on ventrites 2 and 3; female unknown; male genitalia as in Fig. 4.18 . . . *Limonius ectypus* (Say), 1839
- 4' Punctures on head umbilicate, without impunctate areas (Fig. 4.5b); punctures on hypomeron simple, becoming subumbilicate anteriorly; abdominal mirrors visible on all ventrites; female external genitalia as in Fig. 4.4c; male genitalia as Fig. 4.18 . . . . . *Limonius infuscatus* Motschulsky, 1859 (part)
- 5(1') Pronotal punctures umbilicate, almost touching, forming lattice-like pattern along edges of pronotum (Fig. 4.3a) . . . . . 6
- 5' Pronotal punctures simple to subumbilicate, and while dense, not forming lattice-like pattern along edges of pronotum (Fig. 4.3b) . . . . . 7
- 6(5) Carinae present on apex of elytra (Fig. 4.6a); antennomere 2 often two-thirds length of antennomere 3; punctures on hypomeron all umbilicate; females with pronotum often light brown with black spot on the disc; female external genitalia as in Fig. 4.4a; male genitalia as in Fig. 4.12 . . . . .  
 . . . . . *Limonius canus* LeConte, 1853
- 6' Carinae absent on apex of elytra (Fig. 4.6b); antennomere 2 subequal in length to antennomere 3; punctures on hypomeron ranging from simple to subumbilicate; pronotum unicolorous; female external genitalia as in Fig. 4.4c; male genitalia as in Fig. 4.20 . . . . . *Limonius pilosulus* Candèze, 1891 (part)

- 7(5') Antennomere 2 rounded, about as wide as long; antennomeres 2 and 3 together subequal in length to antennomere 4 (Fig. 4.7); female external genitalia as in Fig. 4.4a; male genitalia as in Fig. 4.8 . . . . . *Limenius agonus* (Say), 1839
- 7' Antennomere 2 variable, often subcylindrical, longer than wide; if antennomere 2 nearly as wide as long, then antennomere 3 is subequal in length to 4; antennomeres 2 and 3 together variable, but often longer than antennomere 4; female external genitalia variable; male genitalia variable . . . . . 8
- 8(7') Lateral abdominal mirrors visible on all ventrites; antennomeres 2 and 3 subequal in length; antennomere 3 subcylindrical, not similar in shape to antennomere 4; female external genitalia variable; male genitalia variable . . . . . 9
- 8' Lateral abdominal mirrors at most visible on ventrites 2 through 4; antennomere 2 two-thirds length of antennomere 3; antennomere 3 often triangular, similar in shape and subequal to antennomere 4; female external genitalia as in Fig. 4.4a; male genitalia as in Fig. 4.22 . . . . . *Limenius subauratus* LeConte, 1853
- 9(8) Posterior medial impression on pronotum absent; antennae long and slender, extending past posterior edge of pronotum by two antennomeres in males; occurring in eastern Great Plains and northern Eastern Temperate forests; female external genitalia reported as in Fig. 4.4b, male genitalia as in Fig. 4.16 . . . . .  
 . . . . . *Limenius cf. dubitans* LeConte, 1853

- 9' Posterior medial impression on pronotum present; antennae more robust, extending past posterior edge of pronotum by only one antennomere at most in males; occurring along Pacific coast and northern Central Valley of California; female external genitalia as in Fig. 4.4c; male genitalia as in Fig. 4.20. . . . .  
 . . . . . *Limonius pilosulus* Candèze, 1891 (part)

**Treatment of species in the *Limonius canus* species group**

***Limonius agonus* (Say), 1839**

(Figs. 4.7 and 4.8)

*Elater agonus* Say, 1839: 171-172. Type apparently destroyed; type locality:

Massachusetts and Pennsylvania. Neotype male: Pennsylvania, Beaver Co., Phillipsburg, designated by Al Dhafer 2009

*Limonius agonus*; LeConte 1853: 434; Candèze 1860: 410; Fall 1934: 26; Dietrich 1945: 15; Lanchester 1946: 626; Al Dhafer 2009: 240.

Length: 9.00mm – 12mm. Width: 2.00mm – 2.25mm. Head piceous, bearing yellow setae; punctures dense dorsally, separated by less than diameter of puncture and appearing subumbilicate; frontal margin with distinct carina over antennal insertions, becoming obscured medially by adjacent punctures. Antennae brown, extending beyond posterior edge of pronotum by about length of two antennomeres (male) or failing to reach edge by approximately two antennomeres (female); antennomere 2 rounded in shape, about as long as wide and two-thirds length of antennomere 3; antennomere 3 subcylindrical, longer than wide, approximately one-half length of antennomere 4;

antennomeres 2 and 3 together subequal in length to antennomere 4 and less punctate than following segments; antennomeres 4 to 10 weakly serrate, about two times longer than wide in males, more serrate and about as wide as long in females; antennomere 11 oval in shape, slightly longer than preceding antennomere; antennomeres 4 through 11 covered in short appressed setae and bearing a ring of elongated setae on distal end. Pronotal lateral edges gradually narrowing anteriorly (males) or broadly rounded (females); pronotum about as wide as long, slightly longer in males; medio-posterior impression shallow, often obscured by setae (Fig. 4.7); color piceus with edges lighter brown color and covered in long appressed yellow setae; pronotal punctures dense, separated by less than a diameter of a puncture, and appearing simple; pronotal hind angles weakly pronounced, without dorsal carina. Hypomeron piceous with edges lighter brown color and covered with appressed yellow setae; punctures dense and appearing simple, posterior edge not emarginate. Prosternum piceous with edges brown; punctures dense (males) or moderately dense (females), appearing simple medially and approaching subumbilicate towards edges; anterior lobe broadly rounded, deflexed approximately  $45^{\circ}$  in males, less so in females, with distinct basal groove in males which is absent in females; prosternal process densely punctate, flat between procoxae and convex after, gently sloping; prosternal suture weakly excavate anteriorly, enough to receive one antennomere at most, less so in females. Scutellum piceous, flat, longer than wide, covered in long, dense yellow setae. Elytra brown, covered in short yellow setae; interstitial punctures smaller than stria punctures; posterior end often bearing distinct carinae, which are sometimes vague. Metasternum piceous, covered in dense simple

punctures and appressed yellow setae. Abdomen piceous with edges brown, covered in dense simple punctures and short appressed yellow setae; each ventrite bearing a distinct abdominal mirror laterally. Legs brown; tibia with spine-like setae, particularly along lateral edge; two spines present on distal end of tibia along inner edge (base of tarsomeres); tarsomeres covered in spine-like setae, tarsomeres 1 and 2 subequal in length, and progressively smaller to 4, with 5 longest; claws simple, lacking basal setae; empodia bearing two long setae, about as long as tarsal claws. Male genitalia as in Fig. 4.8. Female ovipositor heavily sclerotized (Fig. 4.4a).

**Specimens examined:** Nine specimens examined in total, seven from Quebec, Canada, and two from Dane Co., Wisconsin, USA.

**Larvae examined:** No larvae were examined in this study. This species is keyed in Lanchester (1946).

**Specimens extracted:** Six specimens were extracted, bearing the barcodes MTEC007844, MTEC007845, MTEC007919, MTEC007920, MTEC007922, and MTEC007923. No sequences were obtained, so comparisons to other species could not be made.

**Distribution:** Based on the specimen localities in Al Dhafer's (2009) treatment, this species appears to occur in the Eastern Temperate Forests ranging from Southern Quebec and Ontario in the north to Southern Georgia in the south.

**Diagnosis:** *Limonius agonus* is most similar to *L. dubitans* and *L. subauratus*. *Limonius agonus* can be separated from *L. subauratus* by the second and third antennomeres together subequal to the fourth, having the third antennomere being smaller than the



fourth, and by characteristics of the male genitalia. *Limonius agonus* can be separated from *L. dubitans* by having antennomeres 2 and 3 together subequal in length to 4; having a vague, but visible, medio-dorsal impression on the pronotum; having the elytra more pointed posteriorly and bearing carinae in some specimens; and lacking distinct lateral abdominal mirrors on all ventrites.

**Notes:** I am in agreement with Fall (1934), Dietrich (1945), Lancaster (1946), and Al Dhafer (2009) that *L. agonus* represents a distinct species from *L. ectypus*. The majority of specimens bearing the name *L. ectypus* in collections identified before Al Dhafer's (2009) work are expected to be *L. agonus*, based on Van Dyke's concept of the species. While the neotype has not been examined, I feel that it belongs to my concept of this species based on Al Dhafer's (2009) description. While the male genitalia are very similar, I disagree with Al Dhafer on the synonymy of *L. dubitans* with this species (see below).

***Limonius californicus* (Mannerheim), 1843**

(Figs. 4.9 and 4.10)

*Cardiophorus californicus* Mannerheim, 1843: 238-239. Type apparently in the

Zoological Museum, University of Moscow (ZMUM). Type locality: California.

*Limonius californicus*; Al Dhafer 2009: 258, Candèze 1860: 407; Van Dyke 1932: 340;

Lanchester 1946: 625; Brooks 1960: 29; Lane 1971: 23.

*Pheletes californicus*; Schwarz 1906: 195, Leng 1920: 168.

*Limonius hispidus* LeConte, 1853: 432, Candèze 1860: 407; Holotype # 2538 (MCZC).

Type locality: San Francisco, California. Synonymized by Candèze 1860: 407.

*Pheletes hispidus*; Schwarz 1906: 195, Leng 1920: 168.

*Limonius occidentalis* Candèze, 1860: 411. Syntypes: BMNH. Type locality: Oregon.

Synonymized by Van Dyke 1932: 354.

*Pheletes occidentalis*; Schwarz 1906: 195, Leng 1920: 168.

Length: 8.0mm – 12.5mm. Width: 1.75mm – 3.50mm. Head black, with frontal margin sometimes brown, bearing white setae; punctures umbilicate and dense, nearly touching; frontal margin distinct over antennal insertions and medially, interrupted medially by at most one or two punctures. Antennae dark brown, extending beyond posterior edge of pronotum by one to three antennomeres (male) or failing to reach edge by approximately two antennomeres (female); antennomere 2 subcylindrical, slightly longer than wide and subequal to (males) or two-thirds length of (female) antennomere 3; antennomere 3 subcylindrical, longer than wide, two-thirds length of (males) or subequal to (females) antennomere 4; antennomeres 2 and 3 together slightly longer than antennomere 4 and less punctate than following segments; antennomeres 4 to 10 serrate and about as wide as long, becoming longer than wide distally; antennomere 11 oval in shape, subequal to proceeding antennomere; antennomeres 4 through 11 covered in short appressed setae and bearing ring of elongated setae on distal end. Pronotal lateral edges subparallel basally and narrowing anteriorly or broadly rounded; pronotum as wide as long, although appearing longer than wide in some males; medio-dorsal impression moderate, visible under magnification (Fig. 4.9); color black and covered in long appressed white setae;

pronotal punctures dense, umbilicate, and nearly contiguous towards edges, forming lattice-like pattern; pronotal hind angles pronounced, bearing distinct dorsal carina running parallel to lateral edge. Hypomeron piceous, with anterior and posterior edges brown, covered with appressed white setae; punctures dense and umbilicate, posterior edge not emarginate. Prosternum piceous; punctures dense, less so medially, ranging from umbilicate to subumbilicate; anterior lobe broadly rounded, deflexed approximately  $45^{\circ}$ , with distinct basal groove in males which is less pronounced in females; prosternal process densely punctate, horizontally grooved (males) or flat (females) between procoxae, broadly convex after, gently sloping; prosternal suture weakly excavate anteriorly, enough to receive one antennomere at most. Scutellum black, flat, longer than wide, covered in long, dense white setae. Elytra brown, covered in short white setae; interstitial punctures smaller than striae punctures; posterior end lacking carinae. Metasternum black, covered in dense simple punctures and appressed white setae. Abdomen piceous with edges brown, covered in moderately dense simple punctures and short appressed white setae; each ventrite bearing distinct abdominal mirror laterally. Legs dark brown; tibia with spine-like setae, particularly along lateral edge; two spines present on distal end of tibia along inner edge (base of tarsomeres); tarsomeres covered in spine-like setae, tarsomeres 1 and 2 subequal in length, and progressively smaller to 4, with 5 longest; claws simple, lacking basal setae; empodia bearing two long setae, about as long as tarsal claws. Male genitalia as in Fig. 4.10. Female ovipositor heavily sclerotized and bearing two small apical lobes (Fig. 4.4b).

**Specimens examined:** 52 specimens examined in total. 17 specimens were from California if the following counties: Humboldt Co., Merced Co., Monterey Co., Plumas Co., and Sacramento Co. 31 specimens were from Montana in the following counties: Broadwater Co., Fallon Co., Fergus Co., Gallatin Co., Lincoln Co., Pondera Co., and Stillwater Co. One specimen was from Crook Co., Oregon. Two specimens were from Walla Walla Co., Washington, and one specimen was from Yellowstone National Park, Wyoming. 18 specimens from California were also examined that displayed a mixture of characters from other species. These specimens came from the following counties: Fresno Co., Inyo Co., Los Angeles Co., Mono Co., Sacramento Co., and Ventura Co.

**Larvae examined:** Approximately 333 larvae were examined, coming from Idaho, Montana, and Washington State. They were keyed using Lanchester (1946) and matched to adults with COI mtDNA. The characters used by Lanchester were supported by the DNA data.

**Specimens extracted:** A total of 86 specimens of 130 extracted were successfully sequenced, covering a mix of adults and larvae. There is a fair bit of genetic diversity in the specimens examined (Fig. 4.1). Four populations were discovered. Locations of heavily sampled fields are given in parentheses beside the county names. The first group mostly contains specimens collected in Broadwater Co. (Townsend), Montana and a few specimens from Fergus Co. (Denton), Montana. The second group contains a lone Idaho larva. The third group contains specimens from Pondera Co. (Conrad), Montana and a few from Fergus Co. (Denton), Montana. The final group contains specimens from Washington and Flathead Co. (Kalispell), Montana. Despite a fair bit of difference

between the first and last group, there is much less than 3% difference between adjacent groups.

**Distribution:** Using Al Dhafer (2009) as a guide, this species appears to be found throughout western North America, ranging from southern British Columbia to southern California and in the north, ranging eastward to Manitoba (Brooks 1960).

**Diagnosis:** *Limonius californicus* is most similar to *L. canus* and *L. infuscatus*. It can be separated from *L. canus* by having a complete frontal margin, lacking carinae on the posterior end of the elytra, and by the male and female genitalia. Female *L. californicus* are never yellowish-brown with a distinct pronotal spot, which is seen in some *L. canus* females. Male *L. californicus* are in general larger and robust than *L. canus* males and have broadly rounded posterior edges of the elytra. *Limonius californicus* can be separated from *L. infuscatus* by having denser and larger punctures on the disc of the pronotum and by the male and female genitalia.

**Notes:** This species is considered to be of economic importance throughout the western U.S. (Stone 1941). Life history studies were conducted on this species in Southern California in the late 1930s (Stone 1941), and is one of the most well-studied species in the group (Lane 1971, and references therein). The concept of *L. californicus*, as described above, seems to be well defined in the areas of study. Although there is a fair bit of COI variation in this species, no cryptic species were discovered. However, this may not hold up in the southern part of its range. The specimens from California have different shaped pronota, tending towards being broadly rounded; generally darker in color, having the pronotum and elytra being similar in color; and being more setaceous.

Some even seem to blend characters of *L. canus* with typical *L. californicus*. Due to timing issues and the age of many of these specimens, no DNA extractions were able to be done. Based on the amount of DNA variation existing in the studied specimens, it is likely that the California specimens may form a cryptic complex of species which cannot be unraveled in the present study. As such, the conservative approach will be taken and they will be treated as *L. californicus*.

***Limonius canus* LeConte, 1853**

(Figs. 4.11 and 4.12)

*Limonius canus* LeConte, 1853: 433; Van Dyke 1932: 340; Lanchester 1946: 626; Brooks 1960: 28; Lane 1971: 23. Type # MCZC (2539). Type locality: San Diego, California.

*Pheletes canus*; Schwarz 1906: 195; Leng 1920: 168

*Limonius subcostatus* Motschulsky, 1859: 370; Leng 1920: 168; Van Dyke 1932: 354.

Type locality: San Francisco, California. Synonymized by Van Dyke, 1932: 354.

*Limonius discoideus* LeConte, 1861: 348; Schwarz 1906: 194; Leng 1920: 168; Van

Dyke 1932: 340; Fall 1934: 25; Van Dyke 1943: 46-47. Type # MCZC (2528).

Type locality: Rocky Mountains, at the head of Missouri River. Synonymized by

Van Dyke 1932: 340.

Length: 8.0mm – 12.5mm. Width: 2mm – 3mm. Head piceous (males) or black basally and becoming yellow-brown anteriorly, bearing white or yellow setae; punctures umbilicate and dense, nearly touching; frontal margin distinct over antennal insertions

and becoming obscured medially by many adjacent punctures. Antennae piceous, extending beyond posterior edge of pronotum by about one to three antennomeres (male) or failing to reach edge by approximately two antennomeres (female); antennomere 2 nearly rounded, slightly longer than wide and two-thirds length of antennomere 3; antennomere 3 subcylindrical, longer than wide, approximately two-thirds length of antennomere 4; antennomeres 2 and 3 together subequal (males) to slightly longer (females) than antennomere 4 and less punctate than following segments; antennomeres 4 to 10 subserrate (males) to serrate (females) and longer than wide; antennomere 11 oval in shape, slightly longer than preceding antennomere; antennomeres 4 through 11 covered in short appressed setae and bearing ring of elongated setae on distal end. Pronotal lateral edges gradually narrowing anteriorly; pronotum as wide as long, but appearing longer than wide; medio-dorsal impression moderate, visible under magnification (Fig. 4.11); color piceous with brown edges (males) or yellow-brown with piceous patch on the disc (females) and covered in long appressed white or gold setae; pronotal punctures dense, umbilicate, and nearly contiguous towards edges, forming lattice-like pattern; pronotal hind angles pronounced, bearing distinct dorsal carina running parallel to lateral edge. Hypomeron piceous, with anterior and posterior edges brown (male), or yellow-brown (female), covered with appressed white setae; punctures dense and umbilicate, posterior edge not emarginate. Prosternum piceous (male) or yellow-brown (female); punctures dense, less so medially, ranging from umbilicate to subumbilicate; anterior lobe broadly rounded, deflexed approximately 30°, with basal groove interrupted medially; prosternal process densely punctate, flat between procoxae

and convex after, gently sloping; prosternal suture weakly excavate anteriorly, enough to receive one antennomere at most in males, and clearly excavate in females. Scutellum black (males) or brown (females), slightly convex, longer than wide, covered in long, dense white setae. Elytra brown (males) or yellow-brown (females), covered in short, sparse white setae; interstrial punctures smaller than stria punctures; posterior end with distinct carinae. Metasternum black (males) or light brown (females), covered in dense simple punctures and appressed white setae. Abdomen piceous with edges brown, last ventrite nearly all brown (males) or light brown, becoming yellow-brown posteriorly (females); ventrites covered in dense simple punctures and short appressed white setae; each ventrite bearing distinct abdominal mirror laterally. Legs brown, darker basally (males) or yellow-brown (females); tibia with spine-like setae, particularly along lateral edge; two spines present on distal end of tibia along inner edge (base of tarsomeres); tarsomeres covered in spine-like setae, tarsomeres 1 and 2 subequal in length, and progressively smaller to 4, with 5 longest; claws simple, lacking basal setae; empodia bearing two long setae, about as long as tarsal claws. Male genitalia as in Fig. 4.12. Female ovipositor heavily sclerotized, lacking lobes (Fig. 4.4a).

**Specimens examined:** 46 specimens were examined in total. Six specimens were examined from the following counties in California: Fresno Co., Sacramento Co., Sonoma Co., and Ventura Co. Six specimens were examined from the following counties in Idaho: Gem Co., Nez Perce Co., and Owyhee Co. 23 specimens were examined from the following counties in Montana: Carbon Co., Cascade Co., Flathead Co., Gallatin Co., Missoula Co., Park Co., Powell Co., and Ravalli Co. Four specimens were examined



from Umatilla Co., Oregon. Eight specimens were from the following counties in Washington: Benton Co., Klickitat Co., Walla Walla Co., and Whitman Co.

**Larvae examined:** A total of four larvae were examined, coming from Washington State. They were keyed using Lanchester (1946) and matched to adults with DNA. Characters used to define the larvae in Lanchester (1946) were confirmed.

**Specimens extracted:** A total of 13 specimens had their DNA extracted, bearing the barcodes MTEC007463, MTEC007464, MTEC007642, MTEC007719, MTEC007720, MTEC007721, MTEC007722, MTEC007910, MTEC007911, MTEC007912, MTEC007939, MTEC007948, MTEC007949. Four are larvae, and the rest are adults. Of these, eight were successfully sequenced, including a mix of adults and larvae. These sequences came from specimens collected in Montana, Oregon, and Washington. The Oregon sequences were slightly different from the others, but it fell well within the generally accepted 3% variance rule. (Fig. 4.1).

**Distribution:** Using Al Dhafer (2009) as a guide, this species ranges from southern British Columbia to southern California and into Western Montana and Southwestern Alberta.

**Diagnosis:** *Limonius canus* is most similar to *L. californicus* and *L. infuscatus*. It can be distinguished from both by having the frontal margin obscured medially, the presence of carinae on the posterior end of the elytra, and the male and female genitalia. *Limonius canus* females sometimes bear a unique coloration for the species group, being a yellowish-brown with a piceous spot on the pronotum.

**Notes:** Like *L. californicus*, this species is considered to be economically important in the west (Lane 1971 and references therein). While the specimens examined belong to a single species, it should be noted that Becker (1956) stated there was a difference in female external genitalia between *L. canus* and *L. discoideus*, with the former falling under the same category as *L. californicus*. The characteristics of the ovipositor appear to be consistent within a species, so this is an interesting observation. Fall (1934) also states there is a difference in male genitalia between *L. canus* and *L. discoideus* males, but this was not confirmed by either Al Dhafer (2009) or our study. As stated under *L. californicus*, there are some Californian specimens that seem to combine characteristics of both *L. californicus* and *L. canus*. Again, due to time limitations, no extractions were able to be conducted on Californian specimens. It is possible that there may be another complex of species here that this study cannot unravel. Van Dyke (1932, 1943), Lane (1971), and Al Dhafer (2009) all agree that *L. canus* and *L. discoideus* are the same species. Due to a lack of evidence suggesting otherwise, we agree with them.

***Limonius cf. dubitans* LeConte, 1853**

(Figs. 4.13 and 4.14)

*Limonius dubitans* LeConte, 1853: 433; Candèze 1860: 407; Van Dyke 1932: 340;

Dietrich 1945: 16; Lanchester 1946: 625. Syntype localities: (New York,

Maryland, New Jersey, Connecticut, and Pennsylvania).

*Nothodes dubitans*; LeConte 1861: 171; Candèze 1891: 174; Schwarz 1906: 278; Leng 1920: 433.

Length: 9.5mm. Width: 2.5mm. Head piceous bearing short white setae; punctures subumbilicate and dense, separated by less than diameter of puncture; frontal margin distinct over antennal insertions and nearly absent medially, obscured by many adjacent punctures. Antennae brown, darker basally, extending beyond posterior edge of pronotum by two and one half segments; antennomere 2 subcylindrical, longer than wide and subequal to antennomere 3; antennomere 3 subcylindrical, longer than wide, two-thirds length of 4; antennomeres 2 and 3 together slightly longer than antennomere 4 and less punctate than following segments; antennomeres 4 to 10 subserrate and longer than wide; antennomere 11 oval in shape, longer than preceding antennomere; antennomeres 4 through 11 covered in short appressed setae and bearing ring of elongated setae on distal end. Pronotal lateral edges gradually narrowing anteriorly; pronotum about as wide as long; medio-posterior impression absent (Fig. 4.13); color piceous with dark brown edges and covered in long appressed white setae; pronotal punctures dense, simple, separated by less than a diameter of puncture; pronotal hind angles moderately pronounced, lacking dorsal carina. Hypomeron piceous, with edges brown, covered with appressed white setae; punctures dense and simple, posterior edge not emarginate. Prosternum piceous; punctures dense, less so medially, simple; anterior lobe shorter relative to other species, nearly truncate anteriorly, deflexed greater than  $45^{\circ}$ , with distinct basal groove; prosternal process densely punctate, flat between procoxae and convex after, sloping sharply; prosternal suture at most weakly excavate anteriorly, not enough to receive one antennomere. Scutellum piceous, slightly convex, longer than wide, covered in long, dense white setae. Elytra dark brown, nearly piceous, and covered in short white setae;

interstitial punctures large, subequal to stria punctures; posterior end without carinae. Metasternum piceous, covered in dense simple punctures and appressed white setae. Abdomen piceous with edges dark brown; ventrites covered in dense simple punctures, less dense medially, and short appressed white setae; each ventrite bearing distinct abdominal mirror laterally. Legs brown, darker basally; tibia with spine-like setae, particularly along lateral edge; two spines present on distal end of tibia along inner edge (base of tarsomeres); tarsomeres covered in spine-like setae, tarsomeres 1 and 2 subequal in length, and progressively smaller to 4, with 5 longest; claws simple, lacking basal setae; empodia bearing two long setae, about as long as tarsal claws. Male genitalia as in Fig. 4.14. Female not examined, but reported as appearing like Fig. 4.4b (Becker 1956).

**Specimen examined:** One specimen from Sandusky Co., Ohio was examined.

**Larvae examined:** No larvae were available for examination. Lanchester (1946) keys out *L. dubitans* as a species distinct from *L. agonus*.

**Specimens extracted:** The one specimen examined, MTEC007959, was extracted and successfully sequenced. However, no other eastern specimens were successful, so comparisons could not be made.

**Distribution:** This species has been reported from New York, Pennsylvania, Ohio, Indiana, Illinois, Iowa, and Nebraska. It is unclear if this represents the actual range.

**Diagnosis:** *Limonius* cf. *dubitans* is most similar to *L. agonus*. It can be distinguished by having abdominal mirrors visible laterally on all ventrites; having the elytra broadly rounded posteriorly and lacking carinae; lacking a medio-dorsal impression; and having antennomeres 2 and 3 being slightly longer than antennomere four. The photograph of the

syntype female in the MCZC shows antennomeres 2 and 3 together as distinctly longer than 4, but the other characters couldn't be confirmed.

**Notes:** This specimen should be compared to the type specimens of *Limonius dubitans*. While the aedeagus is very similar to that of a typical *L. agonus*, it is different enough that, in conjunction with the other characters, it should be placed as a separate species. We link it to *L. dubitans* due to the complete lack of the frontal margin medially, a defining character of that species. While this male could easily be confused with *L. agonus*, the female syntype at the MCZC is distinct enough that by examining just the photo, it is not *L. agonus*. It is of my opinion that more specimens will cement the differences between *L. agonus* and *L. dubitans*. *Limonius dubitans* is also the type species of the genus *Nothodes* LeConte, which may be a more appropriate name for the subgenus. However, *Nothodes* is recognized in the Palearctic as a distinct genus from *Limonius*, but how the species placed there relate to the *L. canus* species group remains unknown.

***Limonius ectypus* (Say), 1839**

(Figs. 4.15 and 4.16)

*Elater ectypus* Say, 1839: 167. Type apparently destroyed. Type locality: United States.

*Limonius ectypus*, LeConte 1853: 433; Candèze 1860: 409; Candèze 1891: 149; Van

Dyke 1932: 341; Fall 1934: 26, Dietrich 1945: 15, Al Dhafer 2009: 280. Neotype male, Iowa, Fayette Co., Clermont, A.R. Rolfs, (CUIC), designated by Al Dhafer 2009.

*Pheletes ectypus* Schwarz 1906: 195; Leng 1920: 168

Length: 11mm. Width: 3mm. Head piceous, becoming brown on frontal margin, and bearing short white setae; punctures at most subumbilicate, with impunctate areas medially and anteriorly; frontal margin distinct over antennal insertions and medially, shelf-like. Antennae dark brown, lighter basally, extending beyond posterior edge of pronotum by over one antennomere; antennomere 2 subcylindrical, longer than wide and subequal to antennomere 3; antennomere 3 subcylindrical, longer than wide and subequal to antennomere 4; antennomeres 2 and 3 together clearly longer than antennomere 4 and less punctate than following segments; antennomeres 4 to 10 subserrate and longer than wide; antennomere 11 oval in shape, slightly longer than preceding antennomere; antennomeres 4 through 11 covered in short appressed setae and bearing ring of elongated setae on distal end. Pronotal lateral edges gradually narrowing anteriorly with base subparallel; pronotum about as wide as long, but appearing longer than wide; medio-dorsal impression not present (Fig. 4.15); color piceous with brown edges and covered in short appressed white setae; pronotal punctures dense, simple, separated by approximately one diameter of puncture, but closer towards edges; pronotal hind angles pronounced, bearing distinct dorsal carina running parallel to lateral edge. Hypomeron piceous, with edges brown, covered with appressed white setae; punctures dense and simple, posterior edge not emarginate. Prosternum piceous; punctures dense, simple but becoming subumbilicate anteriorly; anterior lobe broadly rounded, nearly truncate anteriorly, deflexed approximately  $45^{\circ}$ , with basal groove; prosternal process densely punctate, flat between procoxae and broadly convex after, gently sloping; prosternal suture clearly excavate anteriorly, enough to receive one antennomere. Scutellum black

with brown center, slightly convex, longer than wide, covered in long, dense white setae. Elytra dark brown, covered in short, sparse white setae; interstrial punctures large, subequal to stria punctures; posterior end without carinae. Metasternum piceous, covered in dense simple punctures and appressed white setae. Abdomen piceous with edges brown, covered in dense simple punctures and short appressed white setae; lateral abdominal mirrors distinct only on ventrites 2 through 4. Legs brown to rufous, darker basally; tibia with spine-like setae, particularly along lateral edge; two spines present on distal end of tibia along inner edge (base of tarsomeres); tarsomeres covered in spine-like setae, tarsomeres 1 and 2 subequal in length, and progressively smaller to 4, with 5 longest; claws simple, lacking basal setae; empodia bearing two long setae, about as long as tarsal claws. Male genitalia as in Fig. 4.16. Female unknown.

**Specimen examined:** One specimen from Tippecanoe Co., Indiana was examined.

**Larvae examined:** Accurately identified larvae are unknown for *L. ectypus* (Lanchester 1946), but it is doubtful that they will share the curved dorsal tubercles on the urogomphi that is unique to *L. infuscatus* in this species group, as that character would have been quickly noted by previous workers.

**Specimens extracted:** Due to the age of the available specimen, extractions were not done.

**Distribution:** Due to the lack of specimens, the distribution of this species cannot be determined at this time. It is likely that all eastern specimens under Al Dhafer's (2009) concept of this species match my concept of this species.

**Diagnosis:** *Limenius ectypus* is most similar to *L. infuscatus*. It can be distinguished by having simple puncture and impunctate areas on the head; simple punctures throughout on the pronotum and the hypomeron; and having abdominal mirrors vaguely visible only on ventrites two through four. *Limenius ectypus* also appears to occur purely east of the central Great Plains, not making it past the Eastern Great Plains. The thickened medial lobe of the aedeagus, unobscured medially frontal margin, and relatively long antennomeres two and three, both subequal in length to four, readily distinguish *L. ectypus* from the other Eastern species.

**Notes:** Al Dhafer (2009) united *L. infuscatus* with this species. While we agree with him that *L. ectypus* is a distinct species from *L. agonus*, we disagree with his choice to synonymize *L. infuscatus* with *L. ectypus*. Both *L. ectypus* and *L. infuscatus* share thickened medial lobes of the aedeagus, a unique character of the group, which explains Al Dhafer's reasoning for uniting the two. However, there are enough other characters that are different between the two that they should be considered separate species. The neotype male designated by Al Dhafer (2009) is expected to match our concept of *L. ectypus*, but this has not been determined. An examination of more eastern specimens would, in our opinion, cement the uniqueness of these two species.



***Limenius infuscatus* Motschulsky, 1859**

(Figs. 4.17 and 4.18)

*Limenius infuscatus* Motschulsky, 1859: 371-372; Horn 1871: 315-316; Schwarz 1906: 194; Leng 1920: 168; Van Dyke 1932: 341; Fall 1934: 27; Van Dyke 1943: 47-48; Lanchester 1946: 625; Lane 1971: 23. Type Locality: California.

*Limenius vernalis* Fall, 1910: 129-130; Leng 1920: 168; Schenking 1925: 297; Van Dyke 1932: 341. Type # 24360 (MCZC). Type Locality: Pasadena, California.

Synonymized by Van Dyke 1932, 341.

Length: 8.5mm – 11.5mm. Width: 2mm – 3mm. Head piceous, becoming brown along frontal margin, bearing short yellow setae; punctures subumbilicate and dense, separated by less than diameter of puncture, larger in females; frontal margin distinct over antennal insertions and medially, shelf-like, occasionally interrupted by one or two punctures.

Antennae piceous, lighter basally, extending beyond posterior edge of pronotum by one antennomere (males) or failing to reach posterior edge by length of one or two antennomeres (females); antennomere 2 subcylindrical, longer than wide and two-thirds length of antennomere 3; antennomere 3 subcylindrical, longer than wide, subequal to antennomere 4; antennomeres 2 and 3 together longer than antennomere 4 and less punctate than the following segments; antennomeres 4 to 10 subserrate and longer than wide (males) or nearly as wide as long, becoming longer distally (female); antennomere 11 oval in shape, subequal to preceding antennomere; antennomeres 4 through 11 covered in short appressed setae and bearing ring of elongated setae on distal end.

Pronotal lateral edges broadly; pronotum about as wide as long (females and some males)

or longer than wide (some males), always appearing longer than wide; medio-dorsal impression weak, often vague (Fig. 4.17); color piceous with dark brown edges and covered in long appressed yellow setae; pronotal punctures variable, ranging from nearly simple to nearly umbilicate along edges, less dense medially but nearly touching along edges; pronotal hind angles moderately pronounced, acute, with distinct dorsal carina subparallel to lateral edge. Hypomeron piceous, with edges brown, covered with appressed white setae; punctures dense and simple to subumbilicate, posterior edge not emarginate. Prosternum piceous with edges brown; punctures dense, less so medially, simple to nearly umbilicate anteriorly; anterior lobe long relative to other species, rounded anteriorly, deflexed shallowly, with basal groove nearly absent; prosternal process densely punctate, flat between procoxae and convex after, sloping sharply in males and gently in females; prosternal suture weakly grooved anteriorly, more so in females, not enough to receive one antennomere. Scutellum piceous, flat, longer than wide, covered in long, dense yellow setae. Elytra brown, covered in yellow setae; interstitial punctures smaller than stria punctures; posterior end without carinae. Metasternum piceous, covered in dense simple punctures and appressed white setae. Abdomen piceous with edges dark brown; ventrites covered in dense simple punctures, less dense medially, and short appressed white setae; each ventrite bearing distinct abdominal mirror laterally. Legs brown, darker basally; tibia with fine setae, not spine-like, lateral spines smaller than in other species; two spines present on distal end of tibia along inner edge (base of tarsomeres); tarsomeres covered in spine-like setae, finer dorsally; tarsomeres 1 and 2 subequal in length, and progressively smaller to 4, with 5

longest; claws simple, lacking basal setae; empodia bearing two long setae, about as long as tarsal claws. Male genitalia as in Fig. 4.18. Female ovipositor lightly sclerotized with two long lobes bearing a seta each (Fig. 4.4c).

**Specimens examined:** A total of 169 specimens were examined. Three specimens were examined from the following counties in California: Riverside Co. and Ventura Co. One specimen was examined from Latah Co., Idaho. 152 specimens were examined from the following counties in Montana: Beaverhead Co., Broadwater Co., Flathead Co., Fergus Co., Gallatin Co., Granite Co., Hill Co., Jefferson Co., Lake Co., Lewis and Clark Co., Lincoln Co., Madison Co., Missoula Co., Park Co., Phillips Co., Ravalli Co., and Rosebud Co. One specimen was examined from Benton Co., Oregon. Two specimens were examined from Walla Walla Co., Washington. Ten specimens were examined from the following counties in Wyoming: Park Co., Teton Co., and Yellowstone National Park.

**Larvae examined:** Approximately 30 larvae were examined, coming from Idaho, Montana, and Washington State. They were keyed using Lanchester (1946) and matched to adults with COI mtDNA. The characters used by Lanchester were supported by the DNA data.

**Specimens extracted:** A total of 24 specimens of 33 extracted resulted in successful sequences (Fig. 4.1). There were two distinct populations found. The first group, found east of the Continental Divide, contains specimens from Gallatin and Jefferson counties in Montana. The second group, found west of the Continental Divide, contained specimens from Granite and Flathead counties in Montana, as well as larvae from Idaho

and Washington. This difference is much less than 3% and these two populations belong to the same species.

**Distribution:** Using Al Dhafer (2009) as a guide, this species appears to range from southern British Columbia to Southern California, and along the eastern edge of the Rocky Mountains in Montana and Alberta.

**Diagnosis:** *Limonius infuscatus* is most similar to *L. californicus*, *L. ectypus*, and *L. pilosulus*. It can be separated from *L. californicus* by having smaller and less dense punctures on the disc of the pronotum, and by the male and female genitalia. It can be separated from *L. ectypus* by having large umbilicate to subumbilicate punctures on the head, which are dense and nearly touching; simple to nearly umbilicate punctures towards the edges of the pronotum and the hypomeron; and having abdominal mirrors visible on all ventrites. It can be separated from *L. pilosulus* by having a frontal margin that is not obscured medially, a more rounded pronotum with a smaller medio-dorsal impression, and the male genitalia.

**Notes:** As noted by Fall (1934) and Van Dyke (1943), this species is morphologically variable, especially in regards to setal color and the size and density of pronotal punctation. While the species is morphologically variable, there is very little genetic variability of the mtDNA, especially when compared to the more morphologically conservative species *L. californicus*. This variability has made it difficult to define this species, especially since the type specimen may be missing (Fall 1934). This name has often included members of *L. pilosulus* (Van Dyke 1932, 1943) and was synonymized

recently under *L. ectypus* (Al Dhafer 2009), but there are enough morphological differences between all three that they should be regarded as separate species.

***Limonius pilosulus* Candèze, 1891**

(Figs. 4.19 and 4.20)

*Limonius pilosulus* LeConte, 1853: 431; Candèze 1860: 405; Candèze 1891: 149. Holotype # 2537 (MCZC). Type Locality: San Diego, California. Renamed by Candèze 1891: 149.

*Limonius pilosulus* Candèze 1891: 149; Van Dyke 1932: 340; Fall 1934: 29; Lane 1971: 23. Type Locality: California.

*Pheletes pilosulus* Schwarz 1906: 195; Leng 1920: 168.

Length: 10.5mm – 12.5mm. Width: 3.00mm – 3.25mm. Head piceous, becoming dark brown along frontal margin, bearing long white setae; punctures simple to subumbilicate and dense, separated by less than diameter of puncture, larger and closer in females; frontal margin distinct over antennal insertions, less so medially, slightly obscured by many adjacent punctures. Antennae brown, lighter basally, extending beyond posterior edge of pronotum by one to two antennomeres (males) or just reaching posterior edge (females); antennomere 2 subcylindrical, longer than wide and subequal to antennomere 3; antennomere 3 subcylindrical, longer than wide, subequal to antennomere 4; antennomeres 2 and 3 together longer than antennomere 4 and less punctate than following segments; antennomeres 4 to 10 serrate and longer than wide (males) or nearly as wide as long, becoming longer distally (female); antennomere 11 oval in shape,

slightly longer than (males) or subequal to (females) the preceding antennomere; antennomeres 4 through 11 covered in short appressed setae and bearing ring of elongated setae on distal end. Pronotal lateral edges broadly rounded to subparallel, appearing almost quadrate; pronotum about as wide as long; medio-dorsal impression well defined, visible without scope (Fig. 4.19); color ranging from dark brown to piceous and covered in long appressed white setae; pronotal punctures dense, simple to nearly subumbilicate along edges in females, less dense medially but nearly touching along edges; pronotal hind angles moderately pronounced, lacking distinct dorsal carina running parallel to lateral edge in males, but present in females. Hypomeron brown to piceous, covered with appressed white setae; punctures dense and simple, posterior edge not emarginate. Prosternum brown to piceous; punctures fairly dense along edges, sparse medially, simple to nearly subumbilicate anteriorly; anterior lobe broadly rounded anteriorly, deflexed shallowly, with basal groove indistinct medially in males and absent in females; prosternal process sparsely punctate and flat between procoxae, and more punctate after and remaining nearly flat; prosternal suture at most weakly excavate anteriorly, not enough to receive one antennomere. Scutellum brown with edges piceous or just piceous, slightly convex, longer than wide, covered in long, dense white or yellow setae. Elytra brown to dark brown, covered in yellow setae; interstitial punctures subequal to slightly smaller than stria punctures, both less impressed than other species; posterior end without carinae. Metasternum brown to piceous, covered in moderately dense simple punctures and appressed white setae. Abdomen brown to piceous; ventrites covered in dense simple punctures, and long appressed white setae; each ventrite bearing

a distinct abdominal mirror laterally. Legs brown, darker basally; tibia with fine setae, not spine-like, making lateral spines distinctive in males, more typical and spine-like in females; two spines present on distal end of tibia along inner edge (base of tarsomeres); tarsomeres covered in spine-like setae, finer dorsally; tarsomeres 1 and 2 subequal in length, and progressively smaller to 4, with 5 longest; claws simple, lacking basal setae; empodia bearing two long setae, about as long as tarsal claws. Male genitalia as in Fig. 4.20. Female ovipositor lightly sclerotized with two long lobes bearing a seta each (Fig. 4.4c).

**Specimens examined:** Six specimens were examined in total. Five of the specimens were from the following counties in California: Mendocino Co., Sacramento Co., Sonoma Co., and Yo-Solano Co. One specimen was examined from Washington Co., Oregon.

**Larvae examined:** No larvae are known to be associated with *L. pilosulus*.

**Specimens extracted:** No specimens were extracted in this study.

**Distribution:** This species appears to occur along the Pacific Coast of North America (Lane 1971), and makes its way into the northern Central Valley of California. It is unknown which specimens examined by Al Dhafer (2009) from the western states and provinces under *L. ectypus* would represent this species.

**Diagnosis:** *Limenius pilosulus* is most similar to *L. infuscatus*. It can be distinguished by having the frontal margin obscured medially, the form of the male genitalia, a distinct medio-posterior impression, and by being, in general, more robust and larger.

**Notes:** *Limonium pilosulus* Candèze is a replacement name for LeConte's species, necessitated by the secondary homonymy with the European *Elater pilosus* Leske, 1785 when Candèze placed both species in *Limonium*. Leske's species is currently in *Cidnopus* Thomson, removing the homonymy but under ICZN Art. 59.3 LeConte's name is permanently rejected because *L. pilosulus* is in use and not a cause of confusion.

We are in agreement with Fall (1934) and Lane (1971) that *L. pilosulus* is a distinct species from *L. infuscatus*. It is morphologically very similar to *L. infuscatus*, suggesting a close affinity with it, but the male genitalia and the characteristic of the frontal margin serve to separate this species.

***Limonium subauratus* LeConte, 1853**

(Figs. 4.21 and 4.22)

*Limonium subauratus* LeConte, 1853: 432; Candèze 1860: 406; Van Dyke 1932: 341;

Lanchester 1946: 626; Lane 1971: 23; Al Dhafer 2009. Holotype # 2536 (MCZC).

Type locality: Oregon.

*Pheletes subauratus* Schwarz 1906: 195; Leng 1920: 168.

*Limonium anceps* LeConte, 1853: 433; Candèze 1860: 408; Van Dyke 1932: 341; Fall

1934: 172; Dietrich 1945: 16; Brooks 1960: 28. Holotype # 2540 (MCZC). Type

locality: New York. Synonymized by Al Dhafer 2009.

*Pheletes anceps* Schwarz 1906: 195; Leng 1920: 168.

Length: 7.5mm – 10.5mm. Width: 1.75mm – 2.00mm. Head black, bearing short white setae; punctures subumbilicate and dense, separated by less than diameter of puncture,



larger and closer in females; frontal margin distinct over antennal insertions, obscured medially by many adjacent punctures. Antennae piceous, extending beyond posterior edge of pronotum by one and one half antennomeres (males) or just reaching posterior edge (females); antennomere 2 subcylindrical, longer than wide and two-thirds length of antennomere 3; antennomere 3 subtriangular, wider distally but longer than wide in males, subcylindrical in females, greater than two-thirds length of antennomere 4; antennomeres 2 and 3 together longer than antennomere 4 and less punctate than the following segments; antennomeres 4 to 10 subserrate and longer than wide (males) or serrate, nearly as wide as long, becoming longer distally (female); antennomere 11 oval in shape, subequal to the proceeding antennomere; antennomeres 4 through 11 covered in short appressed setae and bearing a ring of elongated setae on distal end. Pronotal lateral edges subparallel basally then gently narrowing anteriorly; pronotum longer than wide; medio-posterior impression shallow, often vague on males (Fig. 4.21); color black and covered in short appressed white setae; pronotal punctures dense, simple to nearly subumbilicate along edges, separated by the less than the diameter of puncture, less dense medially; pronotal hind angles pronounced, lacking a distinct dorsal carina. Hypomeron piceous, nearly black, with posterior edges dark brown; covered with appressed white setae; punctures dense and simple, nearly touching; posterior edge not emarginate. Prosternum piceous, nearly black, with posterior edges dark brown; punctures fairly dense along edges, sparse medially, simple to nearly subumbilicate anteriorly; anterior lobe short relative to other species, nearly truncate anteriorly, deflexed approximately 30°, with basal groove indistinct medially in males and complete in females; prosternal

process densely punctate and flat between procoxae, broadly convex and gently sloping after in males, nearly flat in females; prosternal suture at most weakly excavate anteriorly, not enough to receive one antennomere. Scutellum black, flat, longer than wide, covered in long, dense white setae. Elytra brown, covered in yellow setae; interstitial punctures fine, smaller than striae punctures; posterior end with at most vague carinae. Metasternum black, covered in moderately dense simple punctures and appressed white setae. Abdomen black; ventrites covered in dense simple punctures, and short appressed white setae; lateral abdominal mirrors vague, partially visible on ventrites 2 through 4, nearly absent on some females. Legs brown, darker basally; tibia with fine setae, not spine-like, making lateral spines distinctive in males, more typical in females; two spines present on distal end of tibia along inner edge (base of tarsomeres); tarsomeres covered in spine-like setae, finer dorsally; metatarsomeres 1 and 2 subequal in length, and progressively smaller to 4, with 5 longest; claws simple, lacking basal setae; empodia bearing two long setae, about as long as tarsal claws. Male genitalia as in Fig. 4.22. Female ovipositor heavily sclerotized, lacking lobes (Fig. 4.4a).

**Specimens examined:** 15 specimens in total were examined. Five specimens were examined from Quebec, Canada and bore *L. anceps* labels. Seven specimens were examined that bore *L. subauratus* labels. One of these came from Ventura Co., California. Two specimens came from Granite Co. and Mineral Co., Montana. Four specimens came from Benton Co. and Columbia Co., Washington. Three specimens were examined from British Columbia, Canada and bore *L. sp. nr. subauratus* labels.

**Larvae examined:** No larvae were discovered for these two species, and accurately identified *L. anceps* larvae are unknown (Lanchester 1946), so no comparisons can be made for this stage.

**Specimens extracted:** A total of five adult specimens had DNA extracted, bearing the barcodes MTEC007921, MTEC007924, MTEC007936, MTEC007937, and MTEC007938. The first two are eastern, labeled *L. anceps*, and the later are western, labeled *L. subauratus*. No sequences were obtained for any of these specimens, so comparisons could not be done on a molecular level.

**Distribution:** As stated by Al Dhafer (2009), this species has a disjunct distribution. This species is known to occur across Canada, with a gap in Alberta (Al Dhafer 2009, Brooks 1960, Majka and Johnson 2008). It is recorded in the Northeastern U.S. and the Great Lakes Region, as well as the Pacific Northwest and into California. Al Dhafer (2009) reports one specimen from Mississippi, but this should be reexamined.

**Diagnosis:** *Limenius subauratus* is most similar to *L. agonus*. It can be distinguished from this species by having antennomere 3 subequal in length to antennomere 4, and by the male genitalia.

**Notes:** Careful study of specimens from east and west did not reveal any character to consistently separate *L. anceps* from *L. subauratus*. The male genitalia seemed to have some subtle differences between east and west, but were also variable within each population, so differences could just be variation (Fig. 4.22). Due to this, we accept Al Dhafer's synonymy of the two species. Successful DNA sequences could confirm the synonymy or return the two names to independent species, but that remains. It is

hypothesized that *L. subauratus* is limited to pine forests, and a link between the two populations could be found in northern Alberta. The specimens from Mississippi examined by Al Dhafer also deserve a second look. Specimens labeled *L. sp. nr. subauratus* seemed to be typical *L. subauratus*. It is unknown what Becker (1956) is referring to when he mentions “an unknown species near *subauratus*”, but this may indicate that there may be a cryptic complex in the Western population of this species. Two female specimens from the western part of the range are much larger and robust than other specimens, being 11.5mm and 12mm in length. Since these measurements form outliers to the majority of measurements as well as Al Dhafer’s, we have not included them in the above range. Since they are morphologically similar to the rest, their unique sizes are most likely due to sampling error.

## **Conclusions**

This preliminary review of the *L. canus* species-group examined some of the synonymies proposed by Al Dhafer in his 2009 review of the genus. The species group has been redefined based on characteristics of the hypomeron and female internal genitalia. *Limenius stigma* is removed from the group and eight species are recognized in the group. Male genitalia were examined, focusing on the ventral side for more characters. More study on the *L.canus* and *L.discoideus* pair is needed and additional specimens from across each species’ range, especially eastern larvae, are needed for further progress.

Table 4.1. Generic and specific treatment of *Limonium canus* species-group species names in selected 19<sup>th</sup> Century works. “N/A” is placed for species not described after the work was published.

Name	LeConte 1853	Candèze 1860	Candèze 1891
<i>L. agonus</i> (Say)	<i>Limonium</i>	<i>Limonium</i>	Syn. of <i>L. ectypus</i>
<i>L. anceps</i> LeConte	<i>Limonium</i>	<i>Limonium</i>	<i>Limonium</i>
<i>L. arminus</i> (Say)	<i>Gambrinus</i>	Syn. of <i>L. stigma</i>	Syn. of <i>L. stigma</i>
<i>L. californicus</i> (Mannerheim)	Not Mentioned	<i>Limonium</i>	<i>Limonium</i>
<i>L. canus</i> LeConte	<i>Limonium</i>	<i>Limonium</i>	<i>Limonium</i>
<i>L. discoideus</i> LeConte	N/A	N/A	<i>Limonium</i>
<i>L. dubitans</i> LeConte	<i>Limonium</i>	<i>Limonium</i>	<i>Nothodes</i>
<i>L. ectypus</i> (Say)	<i>Limonium</i>	<i>Limonium</i>	<i>Limonium</i>
<i>L. hispidus</i> LeConte	<i>Limonium</i>	Syn. of <i>L. californicus</i>	Not Mentioned
<i>L. infuscatus</i> Motschulsky	N/A	Not Mentioned	<i>Limonium</i>
<i>L. pilosus</i> LeConte	<i>Limonium</i>	<i>Limonium</i>	Syn. of <i>L. pilosulus</i>
<i>L. pilosulus</i> Candèze	N/A	N/A	<i>Limonium</i>
<i>L. occidentalis</i> Candèze	N/A	<i>Limonium</i>	<i>Limonium</i>
<i>L. stigma</i> (Herbst)	Not Mentioned	<i>Limonium</i>	<i>Limonium</i>
<i>L. subauratus</i> LeConte	<i>Limonium</i>	<i>Limonium</i>	<i>Limonium</i>
<i>L. subcostatus</i> Motschulsky	N/A	Not mentioned	Not Mentioned
<i>L. vernalis</i> Fall	N/A	N/A	N/A

Table 4.2. Generic and specific treatment of *Limonius canus* species-group species in selected 20<sup>th</sup> and 21<sup>st</sup> Century works. “N/A” marks species described after the work was published.

Name	Schwarz 1906	Leng 1920	Van Dyke 1932	Dhafer 2009
<i>L. agonus</i> (Say)	Syn. of <i>L. ectypus</i>	Syn. of <i>L. ectypus</i>	Syn. of <i>L. ectypus</i>	<i>Limonius</i>
<i>L. anceps</i> LeConte	<i>Pheletes</i>	<i>Pheletes</i>	<i>Limonius</i>	Syn. of <i>L. subauratus</i>
<i>L. arminus</i> (Say)	Syn. of <i>L. stigma</i>	Syn. of <i>L. stigma</i>	Syn. of <i>L. stigma</i>	Syn. of <i>L. stigma</i>
<i>L. californicus</i> (Mannerheim)	<i>Pheletes</i>	<i>Pheletes</i>	<i>Limonius</i>	<i>Limonius</i>
<i>L. canus</i> LeConte	<i>Pheletes</i>	<i>Pheletes</i>	<i>Limonius</i>	<i>Limonius</i>
<i>L. discoideus</i> LeConte	<i>Limonius</i>	<i>Limonius</i>	Var. of <i>L. canus</i>	Syn. of <i>L. canus</i>
<i>L. dubitans</i> LeConte	<i>Nothodes</i>	<i>Nothodes</i>	<i>Limonius</i>	Syn. of <i>L. agonus</i>
<i>L. ectypus</i> (Say)	<i>Pheletes</i>	<i>Pheletes</i>	<i>Limonius</i>	<i>Limonius</i>
<i>L. hispidus</i> LeConte	<i>Pheletes</i>	<i>Pheletes</i>	Syn. of <i>L. californicus</i>	Syn. of <i>L. californicus</i>
<i>L. infuscatus</i> Motschulsky	<i>Limonius</i>	<i>Limonius</i>	<i>Limonius</i>	Syn. of <i>L. ectypus</i>
<i>L. pilosus</i> LeConte	Syn. of <i>L. pilosulus</i>	Syn. of <i>L. pilosulus</i>	Syn. of <i>L. pilosulus</i>	Syn. of <i>L. ectypus</i>
<i>L. pilosulus</i> Candèze	<i>Pheletes</i>	<i>Pheletes</i>	Var. of <i>L. infuscatus</i>	Syn. of <i>L. ectypus</i>
<i>L. occidentalis</i> Candèze	<i>Pheletes</i>	<i>Pheletes</i>	Var. of <i>L. californicus</i>	Syn. of <i>L. californicus</i>

Table 4.2. (continued)

Name	Schwarz 1906	Leng 1920	Van Dyke 1932	Dhafer 2009
<i>L. stigma</i> (Herbst)	<i>Pheletes</i>	<i>Pheletes</i>	<i>Limonius</i>	<i>Limonius</i>
<i>L.subauratus</i> LeConte	<i>Pheletes</i>	<i>Pheletes</i>	<i>Limonius</i>	<i>Limonius</i>
<i>L.subcostatus</i> Motschulsky	Not Mentioned	Syn. of <i>L. vernalis</i> ?	Syn. of <i>L. canus</i>	Syn. of <i>L. canus</i>
<i>L. vernalis</i> Fall	N/A	<i>Limonius</i>	Var. of <i>L. infuscatus</i>	Syn. of <i>L. ectypus</i>

Table 4.3. Synoptic table of species in the *Limonius canus* species-group

*L. agonus* (Say, 1839)

*L. californicus* (Mannerheim, 1843)

*L. hispidus* LeConte, 1853

*L. occidentalis* Candèze, 1860

*L. canus* LeConte, 1853

*L. subcostatus* Motschulsky, 1859

*L. discoideus* LeConte, 1861

*L. dubitans* LeConte, 1853

*L. ectypus* (Say, 1839)

*L. infuscatus* Motschulsky, 1859

*L. vernalis* Fall, 1910

*L. pilosulus* Candèze, 1891

*L. pilosus* LeConte, 1853

*L. subauratus* LeConte, 1853

*L. anceps* LeConte, 1853



Figure 4.1. Unrooted neighbor-joining tree of 500 runs, using the Jukes-Cantor method. Locality and species names are given.

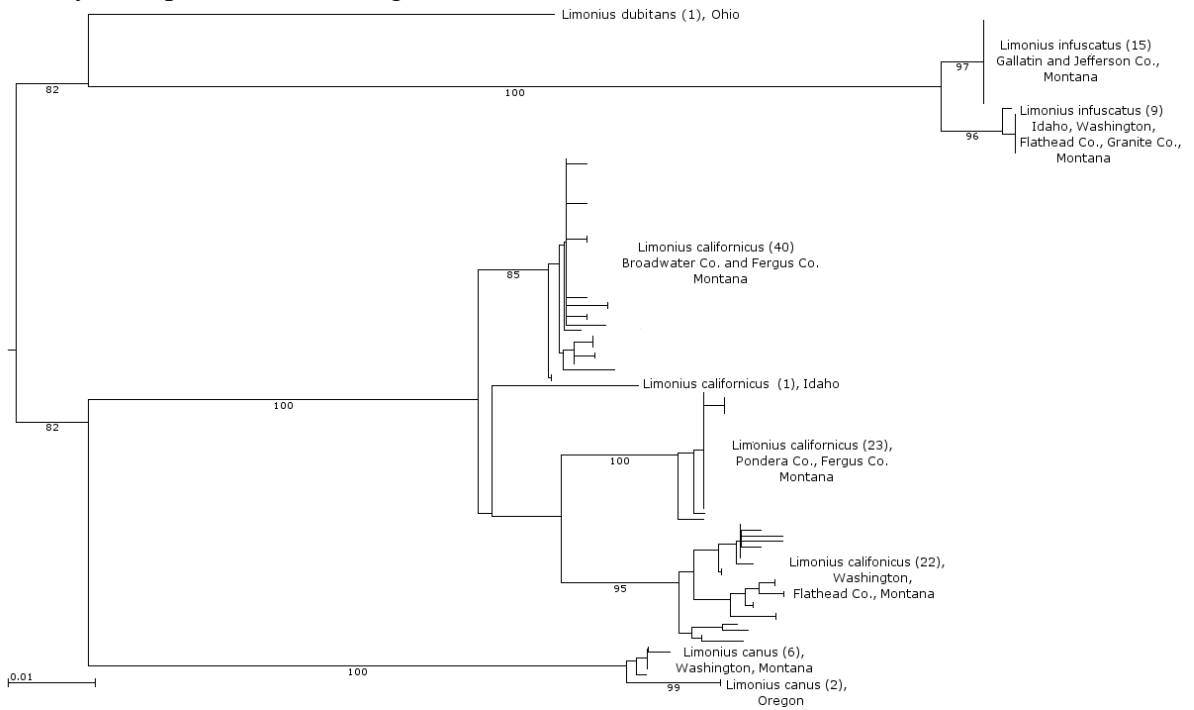


Figure 4.2. Frontal margin, a) distinct medially, not obscured by punctures (*Limonius californicus*); b) indistinct medially, obscured by punctures (*Limonius cf. dubitans*)

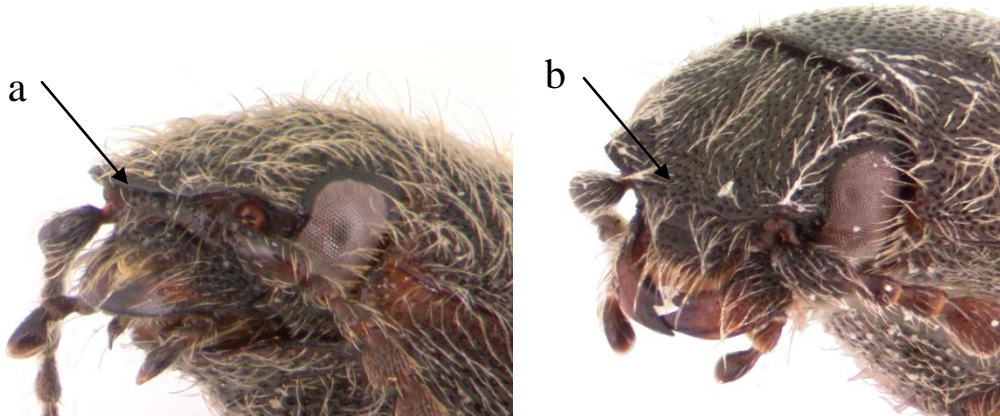


Figure 4.3. Lattice-like punctures on edges of pronotum, a) present; b) absent

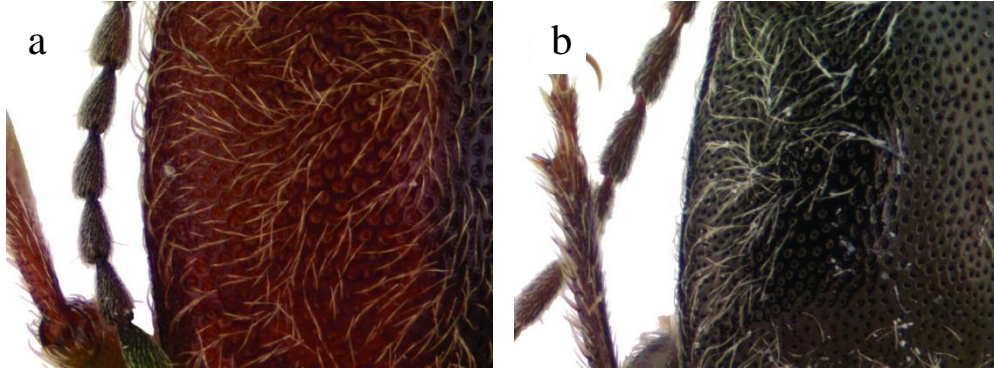


Figure 4.4. Female external genitalia/ ovipositor types, a) heavily sclerotized, lacking lobes; b) sclerotized, with small apical lobes bearing few setae each; c) weakly sclerotized, with long apical lobes bearing many setae each

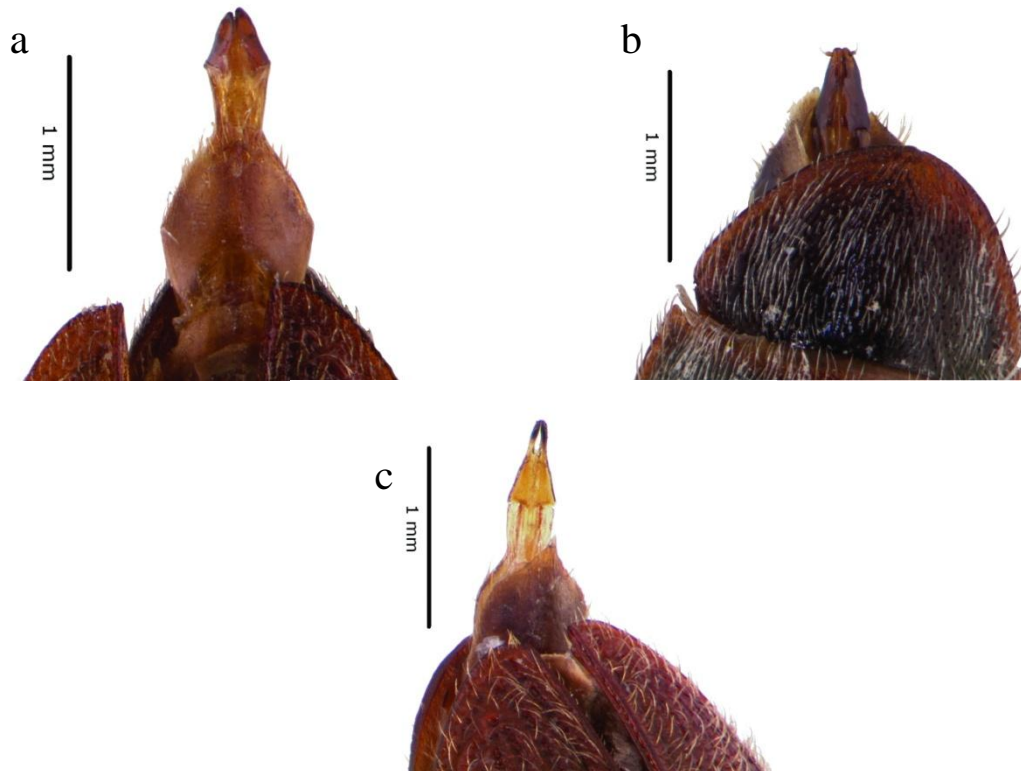


Figure 4.5. Punctures on the head, dorsal, a) simple, with areas of impunctation; b) umbilicate and dense



Figure 4.6. Carina on apex of elytra, a) present; b) absent



Figure 4.7. *Limonius agonus* pronotum, dorsal view, a) male; b) female

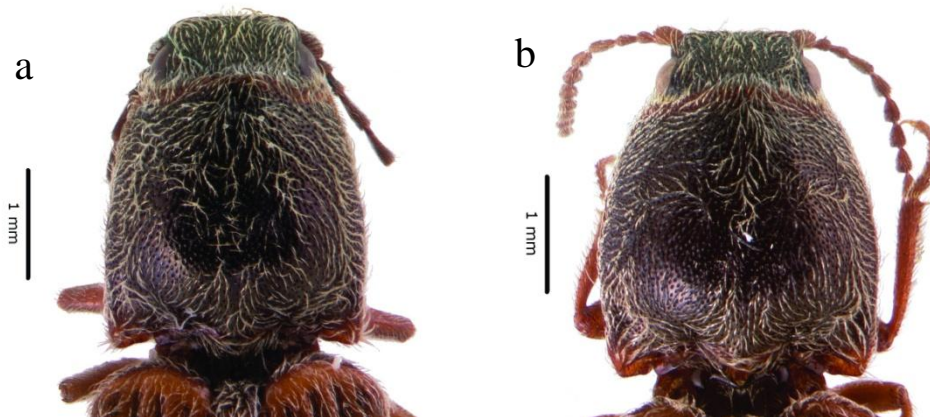


Figure 4.8. *Limonius agonus* adeagus, ventral view, a) Al Dhafer 2009 Fig. 19; b) MTEC007919 from Quebec

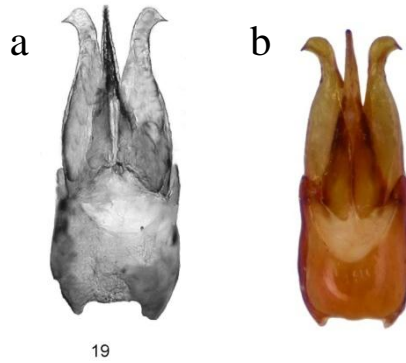


Figure 4.9. *Limonius californicus* pronotum, dorsal view, a) male; b) female

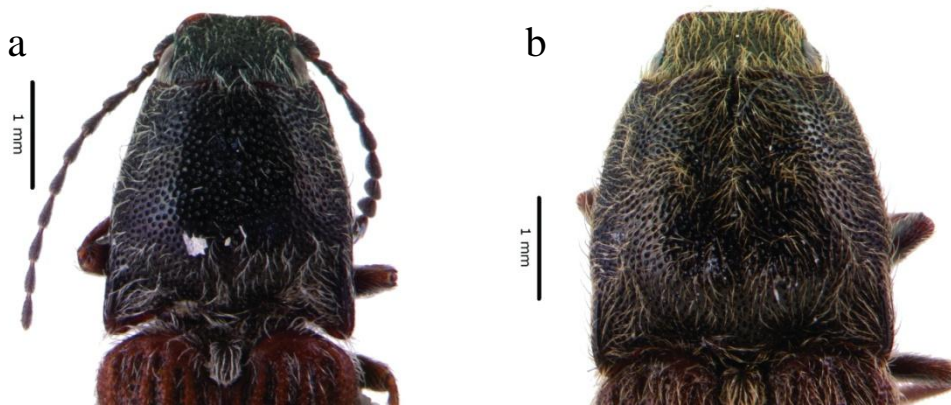


Figure 4.10. *Limonius californicus* adeagus, ventral view, a) Al Dhafer 2009 Fig. 25; b) Montana; c) Compton, CA

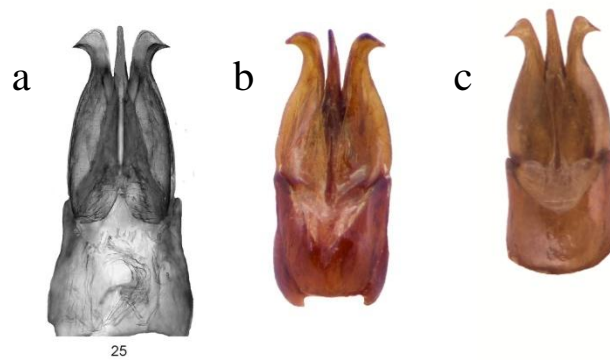




Figure 4.11. *Limonium canus* pronotum, dorsal view, a) male; b) female

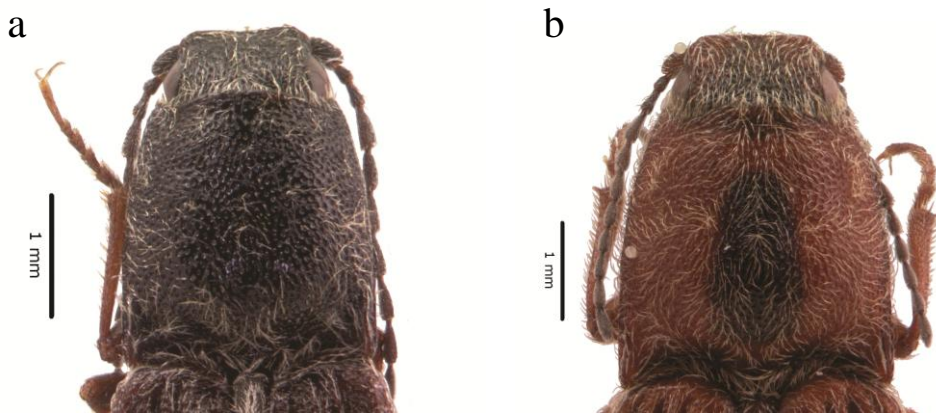


Figure 4.12. *Limonium canus* adeagus, ventral view, a) Al Dhafer 2009 Fig. 26; b) Montana

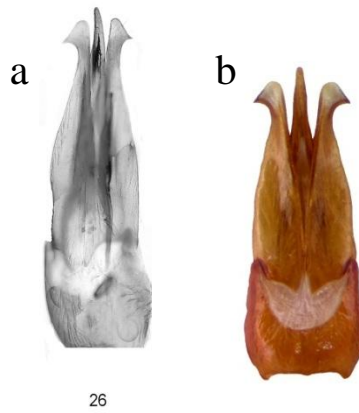


Figure 4.13. *Limonium* cf. *dubitans* pronotum, dorsal view, male



Figure 4.14. *Limonium* cf. *dubitans* adeagus, ventral view



Figure 4.15. *Limonium ectypus* pronotum, dorsal view, male



Figure 4.16. *Limonium ectypus* adeagus, ventral view



Figure 4.17. *Limonium infuscatus* pronotum, dorsal view, a) male; b) female

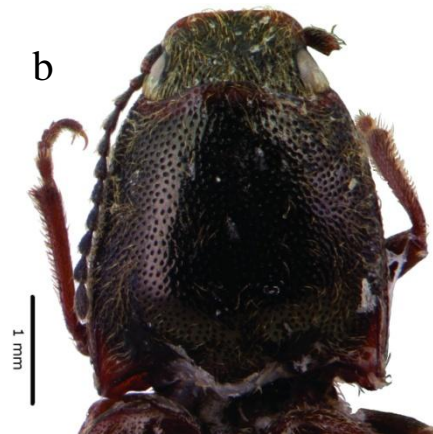


Figure 4.18. *Limonium infuscatus* adeagus, ventral view, a) Al Dhafer 2009 Fig. 33; b) Montana

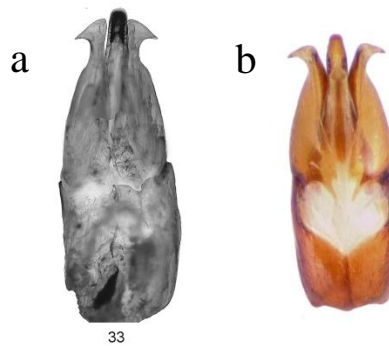


Figure 4.19. *Limonium pilosulus* pronotum, dorsal view, a) male; b) female

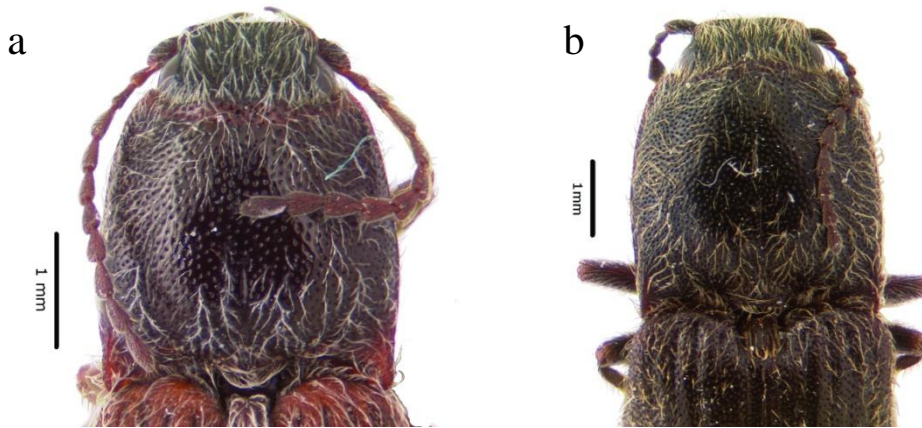


Figure 4.20. *Limonium pilosulus* adeagus, ventral view, Sacramento Co, CA



Figure 4.21. *Limonium subauratus* pronotum, dorsal view, western population, a) male; b) female

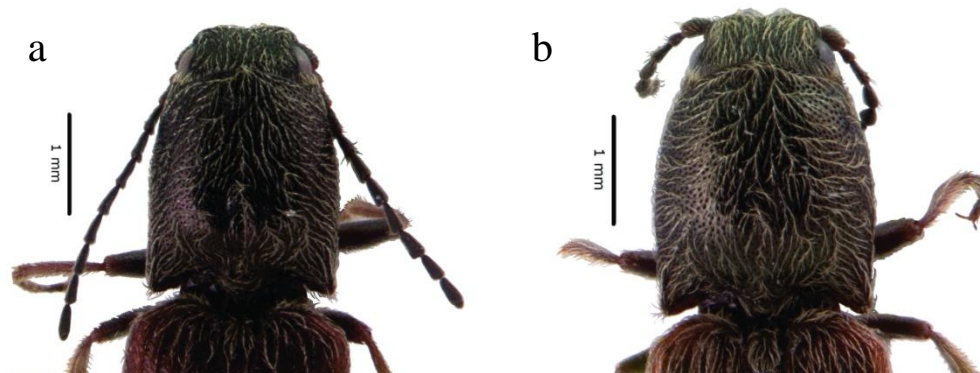


Figure 4.22. *Limenius subauratus* adeagus, ventral view, a) Al Dhafer 2009 Fig. 61; b) Quebec; c) Quebec; d) Washington; e) Washington; f) MTEC007950, Montana





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## CHAPTER 5 – CONCLUSION

This preliminary survey of the wireworms of Montana has greatly increased the knowledge base of the fauna in the state. Before this study, the identities of the wireworms that occurred in Montana's cropland were not well known, with species recorded only from a limited number of studies and counties. As a starting point, a list of potentially economically important species compiled in a previous study (Seibert 1993) was used.

Through the use of COI barcoding, wireworms collected throughout the state were able to be accurately identified. This was accomplished by making a base "library" of sequences extracted from identified museum adults belonging to the economically important species from the Seibert (1993) list, and expanded to include freshly collected adults. Sequences obtained from wireworms collected from Montana and areas of Idaho and Washington, were compared to the adult sequences. This allowed associations to be made between the two life stages. These associations turned out to be very clear and were done with a high degree of accuracy. This limited mistakes due to gaps in the literature and sped up the process of association from years to months.

The usefulness of the DNA barcoding method was discovered to address a host of other issues. Previously, knowledge of most wireworm morphology was limited to nearly mature larva, due to rearing methods. A very small minority of species had been studied from eggs to adulthood, and these sometimes showed different morphologies at different instars. COI barcoding, not being limited by ideal living conditions, can help expand this knowledge to less studied species. A limit of this method, however, is that the exact instar

would be unknown. In this same vein, this method could also show which characters are variable within species and which represent good species indicators. This method also allowed new associations to be made, with three new ones being discovered.

Using this new knowledge of species occurring in Montana, a LUCID key was created. A LUCID key is a user friendly key that allows users to start at any character and has pictures that show an example of each character. The created key allows the separation of most of the species in Montana with described wireworms. Some species were not separated from closely related species in the LUCID key due to very specific characters that were needed. In addition, a traditional dichotomous key was created that allows the separation of all species with described wireworms. While focused on Montana, these keys could easily be used for eastern Washington, Idaho, western North Dakota, southern Alberta, and southern Saskatchewan. While not comprehensive, it is the first key of its kind for wireworms and is a starting point to a greater understanding of Montana's species.

During this study, species of the genus *Limonius* were shown to be the most common in wheat fields in western Montana. This genus was recently revised (Al Dhafer 2009). In the revision, there were some unprecedented synonymies, especially in the species-group that contained most of the economic species of *Limonius*. These synonymies combined species with distinct eastern and western distributions. A preliminary study of this species-group was done, suggesting that the group was more complex than presented in the previous review. This was done using a combination of morphological data and COI mtDNA data. A key was also constructed to aid in the

identification of females and the newly recognized species. Eight species were recognized as belonging to the canus species-group, and one species was removed from the group, up from a total of six in the previous review of the genus. This greater understanding of the species composing the group will allow more focused studies to be conducted in the future.

This study has clearly demonstrated how the use of COI data can help with many issues in entomology and wireworms in particular. Why still in a preliminary stage, the knowledge of Montana wireworms was greatly increased. With this knowledge, more effective species-specific controls can be developed. The ecology and biology of these species can also be examined in detail, due to the accurate identifications of these species. The new areas of research opened by combining DNA data and morphological data are numerous and the future studies of wireworms will increase our knowledge of species relationships, ecology, and effective-controls.

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APPENDICES

APPENDIX A

EXTRACTED SPECIMEN LOCALITY DATA AND COI SEQUENCES

Sample ID,Genus,Species,Life Stage,Sex,Collectors,Collection  
Date,Country,State/Province,Region,Exact Site,Latitude,Longitude,Elevation,Sequence

MTEC007275,Limonius ,californicus,adult,Female,A. Morales et. al,2010,United States  
of America,Montana,Pondera Co,Conrad,48.2901N,111.8883W,3532ft,

MTEC007276,Limonius ,californicus,larva,,A. Morales et. al,2010,United States of  
America,Montana,Pondera Co,Conrad,48.2901N,111.8883W,3532ft,

MTEC007278,Limonius ,californicus,larva,,A. Morales et. al,2010,United States of  
America,Montana,Pondera Co,Conrad,48.2901N,111.8883W,3532ft,

MTEC007279,Limonius ,californicus,larva,,A. Morales et. al,2010,United States of  
America,Montana,Pondera Co,Conrad,48.2901N,111.8883W,3532ft,

MTEC007282,Limonius ,californicus,larva,,A. Morales et. al,2010,United States of  
America,Montana,Pondera Co,Conrad,48.2901N,111.8883W,3532ft,

MTEC007285,Limonius ,californicus,larva,,A. Morales et. al,2010,United States of  
America,Montana,Pondera  
Co,Conrad,48.2901N,111.8883W,3532ft,CATCCTTAAGACTCTTGATTCGGGCAGA  
ACTTGGAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG  
TCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATCG  
GTGGGTTTCGGAAACTGACTAGTTCCTACTAATATTGGGTGCTCCTGATATAGCC  
TTCCCTCGAATAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTT  
CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
ACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCCTTCC  
AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT  
C

MTEC007294,Hypnoidus ,bicolor,larva,,A. Morales et. al,2010,United States of  
America,Montana,Pondera  
Co,Conrad,48.2901N,111.8883W,3532ft,ATTAGGAACTTCCTTAAGAATCCTAATC  
CGTGCCGAACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACA  
ATGTAATTGTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATAACAA  
TTATAATTGGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCT  
GATATAGCATTCCCACGAATAACAACATAAGATTCTGATTTTTACCTCCTTC  
TCTATCACTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGT  
TGAACAGTATACCCTCCTTTATCAGCCAACATCGCCACAGAGGATCATCTGT  
TGACTTAGCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAG  
CAGTAAATTTTTATTCAACTGTAATCAATATACGATCAACGGGAATCAACTTT

GATCGTATACCATTATTTGTTTGAGCTGTaGCAATTACTGCACTTCTACTACTT  
 ATTTCACTTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAA  
 ACTTAAACACATCATTTTTTGATCCTGCTGGT

MTEC007304, *Hypnoidus* ,bicolor,larva,,A. Morales et. al,2010,United States of  
 America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007307, *Hypnoidus* ,bicolor,larva,,A. Morales et. al,2010,United States of  
 America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTTCCCTTAAGAATCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT  
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 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAA  
 CACATCATTTTTTGATCCTGCTGGT

MTEC007310, *Hypnoidus* ,bicolor,larva,,A. Morales et. al,2010,United States of  
 America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007311, *Limoni*us ,californicus,larva,,A. Morales et. al,2010,United States of  
 America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007316, *Limoni*us ,californicus,larva,,A. Morales et. al,2010,United States of  
 America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCCTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATCG  
 GTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
 ACCCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTATTAGCAGGAGCTATTACAATACTATTA ACTGACCGAAACCTAACACC  
 TCATTCTTCGACCCTGCCGA

MTEC007321, *Limoni*us ,californicus,larva,,A. Morales et. al,2010,United States of  
 America, Montana, Pondera



Co,Conrad,48.2901N,111.8883W,3532ft,CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCACCTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATCG  
 GTGGGTTTCGGAAACTGACTAGTTCACCTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAACAATATAAGATTCTGATTCTTACCCCCGTCCTTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
 ACCCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT  
 CATTCTTCGACCCTGCCGGAGGGGG

MTEC007322,Hypnoidus ,bicolor,larva,,A. Morales et. al,2010,United States of  
 America,Montana,Pondera

Co,Conrad,48.2901N,111.8883W,3532ft,CCrAACTCGGAAACCCTGGCTCTCTAATT  
 GGAAATGATCAAATCTACAATGTAATTGTAACAGCCCATGCATTCATTATAAT  
 TTTTTTCATAGTTATAACCAATTATGATTGGAGGATTTGGTAATTGATTAGTAC  
 CCCTCATACTAGGAGCACCTGATATAGCATTCCCACGAATAACAACrTAAGA  
 TTCTGATTTTTACCCCCTTCACTATCACTTCTACTTATAAGAAGAATTGTAGAA  
 AATGGAGCAGGAACTGGTTGAACAGTATACCCTCCTTTATCAGCTAATATTGC  
 CCACAGAGGCTCATCTGTTGACTTAGCAATTTTCAGTTTACATCTAGCTGGTA  
 TTTCGTCTATCCTAGGAGCAGTAAATTTTATTTCArCTGTAATCAATATACGAT  
 CAACAGGAATCACCTTTGATCGTATACCATTATTTGTTTGAGCTGTGGCAATC  
 ACTGCACTTCTACTACTCCTTTCACTTCCArTACTAGCAGGAGCAATTACTATA  
 TTAATAACAGACCGAAACTTAAATACATCATTTTTTTGAT

MTEC007323,Hypnoidus ,bicolor,larva,,A. Morales et. al,2010,United States of  
 America,Montana,Pondera

Co,Conrad,48.2901N,111.8883W,3532ft,CTTCCTTAAGAATCCTAATCCGTGCCGA  
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 GGGGGGTTTGGTAATTGATTAGTACCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAACAACATAAGATTCTGATTTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAG  
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 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
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 CACATCATTTTTTTGATCCTGCTGGTGGGGGAGA

MTEC007324,Hypnoidus ,bicolor,larva,,A. Morales et. al,2010,United States of  
 America,Montana,Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTTCCCTTAAGAATCCTAATCCGTGCCGA  
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 GTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATT  
 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAACTTAAA  
 CACATCATTTTTTGGATCCTGCTGGT

MTEC007325, *Hypnoidus*, *bicolor*, larva, A. Morales et. al, 2010, United States of  
 America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, TGATCAGGTATACTAGGAACTTCCTTAA  
 GTCTCCTAATCCGTGCCGAACCTCGGAAACCCTGGCTCTCTAATTGGAAATGAT  
 CAAATCTACAATGTAATTGTAACAGCCCATGCATTCATTATAATTTTTTTCAT  
 AGTTATAACCAATTATGATTGGAGGATTTGGTAATTGATTAGTACCCCTCATA  
 TAGGAGCACCTGATATAGCATTCCCACGAATAAACAACATAAGATTCTGATT  
 TTTACCCCTTCACTATCACTTCTACTTATAAGAAGAATTGTAGAAAATGGAG  
 CAGGAACTGGTTGAACAGTATACCCTCCTTTATCAGCTAATATTGCCACAGA  
 GGCTCATCTGTTGACTTAGCAATTTTCAGTTTACATCTAGCTGGTATTTTATCT  
 ATCCTAGGAGCAGTAAATTTTTATTTCAACTGTAATCAATATACGATCAACAGG  
 AATCACCTTTGATCGTATACCATTATTTGTTTGGAGCTGTAGCAATCACTGCAC  
 TTCTACTACTCCTTTCCTTCCAGTACTAGCAGGAGCAATCACTATATTA  
 ACTA  
 ACAGACCGAACTTAAATACATCATTTTTTG

MTEC007332, *Hypnoidus*, *bicolor*, larva, A. Morales et. al, 2010, United States of  
 America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTTCCCTTAAGTCTCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCTCTAATTGGAAATGATCAAATCTACAATGTAATTG  
 TAACAGCCCATGCATTCATTATAATTTTTTTCATAGTTATAACCAATTATGATTG  
 GAGGATTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGC  
 ATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCCCTTCACTATCAC  
 TTCTACTTATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGTTGAACAGT  
 ATACCCTCCTTTATCAGCTAATATTGCCACAGAGGCTCATCTGTTGACTTAG  
 CAATTTTCAGTTTACATCTAGCTGGTATTTTCGTCTATCCTAGGAGCAGTAAAT  
 TTTATTTCAACTGTAATCAATATACGATCAACAGGAAATCACCTTTGATCGTAT  
 ACCATTATTTGTTTGGAGCTGTGGCAATCACTGCACTTCTACTACTCCTTTCCT  
 TCCAGTACTAGCAGGAGCAATTA  
 ACTA  
 AACAGACCGAACTTAAAT  
 ACATCATTTTTTGGATCCTGCTGG

MTEC007333, *Hypnoidus* ,bicolor,larva,,A. Morales et. al,2010,United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007335, *Hypnoidus* ,bicolor,larva,,A. Morales et. al,2010,United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTTCCCTTAAGAATCCTAATCCGTGCCGA ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT GTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATT GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAG TATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTA GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAA CACATCATTTTTTGGATCCTGCTGGT

MTEC007340, *Limoni*us ,californicus,larva,,A. Morales et. al,2010,United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA ACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG TCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATCG GTGGGTTTCGGAAACTGACTAGTTCCTAATATTGGGTGCTCCTGATATAGCC TTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTT CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAAGTGGGTGAACAGTCT ACCCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTT ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCCTTCC AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT CATTCTTCGA

MTEC007342, *Limoni*us ,californicus,adult,Female,A. Morales et. al,2010,United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007344, *Limoni*us ,californicus,adult,Female,A. Morales et. al,2010,United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007348, *Limoni*us ,californicus,adult,Female,A. Morales et. al,2010,United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007349, *Limoni*us ,californicus,larva,,A. Morales et. al,2010,United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007357, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007358, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCACCTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTCTTTATAGTTATAACCAATCATAATCG  
 GTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAAGTGGGTGAACAGTCT  
 ACCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT  
 CATTCTTCGACCCTGCCGGAGGG

MTEC007365, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCACCTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTCTTTATAGTTATAACCAATCATAATCG  
 GTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAAGTGGGTGAACAGTCT  
 ACCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT  
 CATTCTTCGACCCTGCCGGA

MTEC007369, *Hypnoidus bicolor*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007370, *Hypnoidus bicolor*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTTCCCTTAAGAATCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT  
 GTAACAGCCCATGCTTTTATTATAATTTTTTTTCATAGTTATAACCAATTATAATT  
 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA

CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAACTTAAA  
 CACATCATTTTTTG

MTEC007371, *Limonius californicus*, adult, Female, A. Morales et. al, 2010, United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007372, *Limonius californicus*, adult, Female, A. Morales et. al, 2010, United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007379, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATCG  
 GTGGGTTTCGGAAACTGACTAGTTCCTACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
 ACCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACAC

MTEC007381, *Hypnoidus bicolor*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTTCCCTTAAGAATCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT  
 GTAACAGCCCATGCTTTTATTATAATTTTTTTTCATAGTTATAACCAATTATAATT  
 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAACTTAAA  
 CACATCATTTTTTG

MTEC007382, *Limonium californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTCTTTATAGTTATAACCAATCATAATTG  
 GTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAACAATATAAGATTCTGATTCTTACCCCGTCCCTATCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
 ACCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT  
 CATTCTTCGACCCTGCCGGA

MTEC007389, *Limonium californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007393, *Limonium californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTCTTTATAGTTATAACCAATCATAATCG  
 GTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
 ACCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT  
 CATTCTTCGACCCTGCCGGA

MTEC007394, *Limonium californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTCTTTATAGTTATAACCAATCATAATCG  
 GTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
 ACCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC

CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCAGAAACCTAAACACTT  
CA

MTEC007399, *Limonius californicus*, larva., A. Morales et. al, 2010, United States of  
America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007400, *Limonius californicus*, larva., A. Morales et. al, 2010, United States of  
America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007401, *Limonius californicus*, larva., A. Morales et. al, 2010, United States of  
America, Montana, Pondera  
Co, Conrad, 48.2901N, 111.8883W, 3532ft, AGAACTTGGTAACCCTGGGTCACTAATT  
GGAAATGACCAAATCTATAATGTAATTGTCACAGCTCACGCCTTCATCATAAT  
TTTCTTTATAGTTATAACCAATCATAATCGGTGGGTTTCGGAAACTGACTAGTTC  
CCCTAATATTGGGTGCTCCTGATATAGCCTTCCCTCGAATAAACAATATAAGA  
TTCTGATTCTTACCCCGTCCCTTTCTCTTCTTAATAAGAAGAATTGTAGAA  
AATGGAGCAGGAAGTGGGTGAACAGTCTACCCCTCTCTCAGCTAACATTG  
CCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGA  
ATTCATCCATCCTGGGAGCTGTTAATTTTATCTCAACTGTTATTAACATACG  
ATCTACCGGAATTACCTTCGACCGTATGCCCTATTTGTTTGAGCAGTAGCAA  
TACTGCCCTTCTCCTCTTGCTTTCACTTCCAGTATTAGCAGGAGCTATTACAA  
TACTATTAAGTACCAGAAACCTAAACACCTC

MTEC007402, *Limonius californicus*, larva., A. Morales et. al, 2010, United States of  
America, Montana, Pondera  
Co, Conrad, 48.2901N, 111.8883W, 3532ft, AACTTGGTAACCCTGGGTCACTAATTGG  
AAATGACCAAATCTATAATGTAATTGTCACAGCTCACGCCTTCATCATAATTT  
TCTTTATAGTTATAACCAATCATAATCGGTGGGTTTCGGAAACTGACTAGTTCCA  
CTAATATTGGGTGCTCCTGATATAGCCTTCCCTCGAATAAACAATATAAGATT  
CTGATTCTTACCCCGTCCCTTTCTCTTCTTAATAAGAAGAATTGTAGAAA  
ATGGAGCAGGAAGTGGGTGAACAGTCTACCCCTCTCTCAGCTAACATTGC  
CCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAA  
TTTCATCCATCCTGGGAGCTGTTAATTTTATCTCAACTGTTATTAACATACGAT  
CTACCGGAATTACCTTCGACCGTATGCCCTATTTGTTTGAGCAGTAGCAATT  
ACTGCCCTTCTCCTCTTGCTTTCACTTCCAGTATTAGCAGGAGCTATTACAATA  
CTATTAAGTACCAGAAACCTAAACACCTCA

MTEC007405, *Limonius californicus*, larva., A. Morales et. al, 2010, United States of  
America, Montana, Pondera  
Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
ACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG  
TCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATCG  
GTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC

TTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
 ACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT  
 CATTCTTCGACCCTGCCGGA

MTEC007406, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of  
 America, Montana, Pondera  
 Co, Conrad, 48.2901N, 111.8883W, 3532ft, TACTAGGAACATCCTTAAGACTCTTGAT  
 TCGGGCAGAACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTAT  
 AATGTAATTGTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCA  
 ATCATAATCGGTGGGTTCGGAACTGACTAGTTCCACTAATATTGGGTGCTCC  
 TGATATAGCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCCGT  
 CCCTTTCTCTTCTTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGG  
 GTGAACAGTCTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAG  
 TTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGA  
 GCTGTTAATTTTATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTC  
 GACCGTATGCCCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTG  
 CTTTCACTTCCAGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAA  
 CCTAAACACTTCATTCTTCGACCCTGCCGGAGGGG

MTEC007407, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of  
 America, Montana, Pondera  
 Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAATCG  
 GTGGGTTCGGAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
 ACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTATTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACwCC  
 T

MTEC007408, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of  
 America, Montana, Pondera  
 Co, Conrad, 48.2901N, 111.8883W, 3532ft, TACTAGGAACATCCTTAAGACTCTTGAT  
 TCGGGCAGAACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTAT  
 AATGTAATTGTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCA



ATCATAATCGGTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCC  
 TGATATAGCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCCGT  
 CCCTTTCTCTTCTTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGG  
 GTGAACAGTCTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAG  
 TTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGA  
 GCTGTTAATTTTATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTC  
 GACCGTATGCCCTATTTGTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTG  
 CTTTCACTTCCAGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAA  
 CCTAAACACTTCATTCTTCGACCCTGCCGGA

MTEC007414, *Limonium californicus*, larva, A. Morales et. al, 2010, United States of  
 America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007426, *Limonium californicus*, larva, A. Morales et. al, 2010, United States of  
 America, Montana, Pondera  
 Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCCGGGCAGA  
 ACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATCG  
 GTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCT  
 ACCCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT  
 CATTCTTCGACCCTGCCGGA

MTEC007428, *Limonium californicus*, adult, Female, A. Morales et. al, 2010, United States  
 of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007430, *Hypnoidus bicolor*, larva, A. Morales et. al, 2010, United States of  
 America, Montana, Pondera  
 Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTTCCCTTAAGAATCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT  
 GTAACAGCCCATGCTTTTATTATAATTTTTTTTCATAGTTATAACCAATTATAATT  
 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTCAC

TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAACAC

MTEC007431, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, TTAAGACTCTTGATTTCGGGCAGAACTTGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTGTCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATCGGTGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCCTTCCTCGAATAACAATATAAGATTCTGATTCTTACCCCCGTCCCTTTCTCTTCTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTTATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCCCCATTTTGTGTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCCAGTTTATAGCAGGAGCTATTACAATGCTATTAAGTACCGAAACCTAAACACTTCACTTTCGACCCGGA

MTEC007434, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTGTCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATCGGTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCCTTCCCTCGAATAACAATATAAGATTCTGATTCTTACCCCCGTCCCTTTCTCTTCTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCCCTATTTGTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCCAGTTTATAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTTC

MTEC007438, *Hypnoidus bicolor*, larva, A. Morales et. al, 2010, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTTCCCTTAAGAATCCTAATCCGTGCCGAACCTCGGAAACCCTGGGTCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATTGGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGCATTCCCACGAATAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCACTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAGTATACCCTCCTTTATCAGCCAACATCGCCACAGAGGATCATCTGTTGACTTAGCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA

TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTCAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAA  
 CACATC

MTEC007440,Hypnoidus ,bicolor,larva,,A. Morales et. al,2010,United States of  
 America,Montana,Pondera

Co,Conrad,48.2901N,111.8883W,3532ft,TAGGAACTTCCTTAAGAATCCTAATCCG  
 TGCCGAACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAAT  
 GTAATTGTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATACCAATT  
 ATAATTGGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGA  
 TATAGCATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTC  
 TATCACTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTG  
 AACAGTATACCCTCCTTTATCAGCCAACATCGCCACAGAGGATCATCTGTTG  
 ACTTAGCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCA  
 GTAAATTTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGA  
 TCGTATACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTAT  
 TTCACTTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAAC  
 TTAACACATCATTTTTTG

MTEC007441,Aeolus,mellillus,adult,,A. Morales et. al,2010,United States of  
 America,Montana,Broadwater Co,Townsend,46.0987N,111.5428W,4081ft,

MTEC007442,Aeolus,mellillus,adult,,A. Morales et. al,2010,United States of  
 America,Montana,Broadwater Co,Townsend,46.0987N,111.5428W,4081ft,

MTEC007443,Aeolus,mellillus,adult,,A. Morales et. al,2010,United States of  
 America,Montana,Broadwater Co,Townsend,46.0987N,111.5428W,4081ft,

MTEC007444,Aeolus,mellillus,adult,,A. Morales et. al,2010,United States of  
 America,Montana,Broadwater Co,Townsend,46.0987N,111.5428W,4081ft,

MTEC007445,Hypnoidus,bicolor,adult,,A. Morales et. al,2010,United States of  
 America,Montana,Broadwater

Co,Townsend,46.0987N,111.5428W,4081ft,CTTCCTTAAGAATCCTAATCCGTGCCG  
 AACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAAT  
 TGTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATACCAATTATAAT  
 TGGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGGGCACCTGATATAG  
 CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTCCTTATTTTCAC

TTCCAGTCCTGGCAGGAGCAATCACTATACTACTAACAGACCGAAACTTAAA  
CACATCATTTTTTG

MTEC007446, *Hypnoidus, bicolor, adult*, A. Morales et. al, 2010, United States of  
America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, CTTCCTTAAGTCTCCTAATCCGTGCCG  
AACTCGGAAACCCTGGCTCTCTAATTGGAAATGATCAAATCTACAATGTAATT  
GTAACAGCCCATGCATTCATTATAATTTTTTTCATAGTTATAACCAATTATGATT  
GGAGGATTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
CATTCCCACGAATAACAACATAAGATTCTGATTTTTACCCCTTCACTATCA  
CTTCTACTTATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGTTGAACAG  
TATACCCTCCTTTATCAGCTAATATTGCCACAGAGGCTCATCTGTTGACTTA  
GCAATTTTCAGTTTACATCTAGCTGGTATTTTCGTCTATCCTAGGAGCAGTAAA  
TTTTATTTCAACTGTAATCAATATACGATCAACAGGAATCACCTTTGATCGTA  
TACCATTATTTGTTTGAGCTGTGGCAATCACTGCACTTCTACTACTCCTTTCAC  
TTCCAGTACTAGCAGGAGCAATTAATACTAATACTAACAGACCGAAACTTAAA  
TACATCATTTTTTG

MTEC007447, *Hypnoidus, bicolor, adult*, A. Morales et. al, 2010, United States of  
America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, TCCTAATCCGTGCCGAACTCGGAAAC  
CCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCC  
ATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATTGGGGGGTTTG  
GTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGCATTCCCACGA  
ATAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCACTCCTGCTTATA  
AGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAGTATACCCTCCTT  
TATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTAGCAATTTTTAGA  
TTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTTATTTCAAC  
TGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTATACCATTATTTG  
TTGAGCTGTAGCAATTAATACTGCACTTCTACTACTTATTTCACTTCCAGTCCCTGG  
CAGGAGCAATCACTATACTACTGACAGGCCGAACTTAAACACATCATTTTTT  
G

MTEC007448, *Hypnoidus, bicolor, adult*, A. Morales et. al, 2010, United States of  
America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, GCCGAACTCGGAAACCCTGGCTCACT  
AATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCCATGCTTTCATTA  
TAATTTTTTTCATAGTTATAACCAATTATAATTGGGGGGTTTGTAATTGATTA  
GTACCCTCATACTAGGAGCACCTGATATAGCATTCCCACGAATAACAACA  
TAAGATTCTGATTTTTACCTCCTTCTCTATCACTCCTGCTTATAAGAAGAATTG  
TAGAGAATGGGGCAGGAACTGGTTGAACAGTATACCCTCCTTATCAGCCAA  
CATCGCCCACAGAGGATCATCTGTTGACTTAGCAATTTTTAGATTACATCTAG  
CTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTTATTTCAACTGTAATCAAT  
ATACGATCAACGGGAATCAACTTTGATCGTATACCATTATTTGTTTGAGCTGT

AGCAATTACTGCACTTCTACTACTTATTTCACTTCCAGTCCTGGCAGGAGCAA  
TCACTATACTACTGACAGACCGAACTTAAACACATCATTTTTTG

MTEC007449,Hypnoidus,bicolor,adult,,A. Morales et. al,2010,United States of  
America,Montana,Broadwater

Co,Townsend,46.0987N,111.5428W,4081ft,CTTCCTTAAGAATCCTAATCCGTGCCG  
AACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAAT  
TGTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAAT  
TGGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAG  
TATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTA  
GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
TACCATTATTTGTTTGGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAACTTAAA  
CACATCATTTTTTG

MTEC007450,Hypnoidus,bicolor,adult,,A. Morales et. al,2010,United States of  
America,Montana,Broadwater

Co,Townsend,46.0987N,111.5428W,4081ft,CTTCCTTAAGAATCCTAATCCGTGCCG  
AACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAAT  
TGTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAAT  
TGGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAG  
TATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTA  
GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
TACCATTATTTGTTTGGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAACTTAAA  
CACATCATTTTTTG

MTEC007451,Hypnoidus,bicolor,adult,,A. Morales et. al,2010,United States of  
America,Montana,Broadwater

Co,Townsend,46.0987N,111.5428W,4081ft,TCCTAATCCGTGCCGAACTCGGAAAC  
CCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCC  
ATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATTGGGGGGTTTG  
GTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGCATTCCCACGA  
ATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCACTCCTGCTTATA  
AGAAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAGTATACCCTCCTT  
TATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTAGCAATTTTTAGA  
TTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTTATTCAAC  
TGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTATACCATTATTTG

TTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTCACTTCCAGTCCTGG  
CAGGAGCAATCACTATACTACTGACAGACCGAACTTAAACACATCATTTTTT  
G

MTEC007452, *Hypnoidus, bicolor*, adult, A. Morales et. al, 2010, United States of  
America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, TCCTAATCCGTGCCGAACTCGGAAAC  
CCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCC  
ATGCTTTCATTATAATTTTTTTCATAGTTATACCAATTATAATTGGGGGGTTTG  
GTAATTGATTAGTACCCCTCATACTAGGGGCACCTGATATAGCATTCCCACGA  
ATAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCACTCCTGCTTATA  
AGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAGTATACCCTCCTT  
TATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTAGCAATTTTTAGA  
TTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTTATTTCAAC  
TGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTATACCATTATTTG  
TTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTCACTTCCAGTCCTGG  
CAGGAGCAATCACTATACTACTAACAGACCGAACTTAAACACATC

MTEC007453, *Aeolus, mellillus*, adult, A. Morales et. al, 2010, United States of  
America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007454, *Limonium, californicus*, adult, Male, A. Morales et. al, 2010, United States of  
America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007455, *Hypnoidus, bicolor*, adult, A. Morales et. al, 2010, United States of  
America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, TCCTAATCCGTGCCGAACTCGGAAAC  
CCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCC  
ATGCTTTCATTATAATTTTTTTCATAGTTATACCAATTATAATTGGGGGGTTTG  
GTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGCATTCCCACGA  
ATAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCACTCCTGCTTATA  
AGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAGTATACCCTCCTT  
TATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTAGCAATTTTTAGA  
TTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTTATTTCAAC  
TGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTATACCATTATTTG  
TTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTCACTTCCAGTCCTGG  
CAGGAGCAATCACTATACTACTGACAGACCGAACTTAAACACATCATTTTTT  
GATCCTGCTGGT

MTEC007456, *Limonium, californicus*, adult, Female, A. Morales et. al, 2010, United States  
of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007457, *Limonium, californicus*, adult, Female, A. Morales et. al, 2010, United States  
of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007458, *Limonius californicus*, adult, Female, A. Morales et. al, 2010, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007459, *Hypnoidus bicolor*, adult, A. Morales et. al, 2010, United States of America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, TCCTAATCCGTGCCGAACTCGGAAAC  
 CCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCC  
 ATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATTGGGGGGTTTG  
 GTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGCATTCCCACGA  
 ATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCACTCCTGCTTATA  
 AGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTGAACAGTATAACCCTCCTT  
 TATCAGCCAACATCGCCACAGAGGATCATCTGTTGACTTAGCAATTTTTAGA  
 TTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTTATTCAAC  
 TGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTATACCATTATTTG  
 TTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTCACTTCCAGTCCTGG  
 CAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAACACATCATTTTTT  
 G

MTEC007460, *Limonius californicus*, adult, Female, A. Morales et. al, 2010, United States of America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCCTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTTCTTTATAGTTATAACCAATCATAA  
 TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
 GTATACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACGGATCGAAACCTAA  
 ACACTTC

MTEC007461, *Limonius californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Fergus

Co, Denton, 47.2942N, 110.042183W, 3776ft, CATCCTTAAGACTCTTGATTTCGGGCGAG  
 AACTTGGTAACCCTGGGTCCTAATTGGAAATGACCAAATCTATAATGTAATT  
 GTCACAGCTCACGCCTTCATCATAATTTTTCTTTATAGTTATAACCAATCATAATC  
 GGTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGC  
 CTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCT  
 TCTTCTAATAAGAAGAATTGTAGAAAATGGGGCAGGAACTGGGTGAACAGTC  
 TACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGC  
 CATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTAAAT  
 TTATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATG

CCCCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTT  
CCAGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACA  
CTTC

MTEC007462, *Limonium californicus*, larva, A. Morales et. al, 2010, United States of America, Montana, Fergus Co, Denton, 47.2942N, 110.042183W, 3776ft, CATCCTTAAGACTCTTGATTTCGGGCAG AACTTGGTAACCCTGGGTCCTAATTGGAAATGACCAAATCTATAATGTAATT GTCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAATC GGTGGGTTTCGGAAACTGACTAGTTCCTAATATTGGGTGCTCCTGATATAGC CTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCT TCTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAAGTGGGTGAACAGTC TACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGC CATTTCAGTCTTCACCTAGCAGGAATTCATCCATCCTGGGAGCTGTTAATT TTATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATG CCCCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTT CCAGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACA CTTCATTCTTCGA

MTEC007463, *Limonium canus*, adult, Male, M.A. Ivie, 29-May-91, United States of America, Montana, Flathead Co, "Glacier National Park, S. Big Prairie", 3560ft,

MTEC007464, *Limonium canus*, adult, Male, D.L. Gustafson, 26-Jun-89, United States of America, Montana, Powell Co, "Blackfoot River, MT 141",

MTEC007465, *Hypnoidus leei*, adult, C.E. Seibert, 28 Jun to 24 Jul 1988, United States of America, Montana, Wheatland Co, "Two Dot, Musselshell River", 4600ft,

MTEC007466, *Hypnoidus leei*, adult, Female, C.E. Seibert, 30 May to 28 Jun 1988, United States of America, Montana, Wheatland Co, "Two Dot, Musselshell River", 4600ft,

MTEC007467, *Hypnoidus leei*, adult, Male, C.E. Seibert, 30 May to 1 Jul 1988, United States of America, Montana, Judith Basin Co, "Little Belt Mountains, S. fork Judith R., E of Indian Hill Water Gap", 5200ft,

MTEC007468, *Limonium ursinus*, adult, D.L. Gustafson, 25-May-88, United States of America, Montana, Bighorn Co, "Bighorn R., Ft. Smith",

MTEC007469, *Selatosomus aripennis*, adult, D.L. Gustafson, 4 Jun to 22 Jul 1989, United States of America, Montana, Madison Co, Hidden Lake Beach, 7400ft,

MTEC007470, *Selatosomus aripennis*, adult, Ray Wiger, 19-Sep-92, United States of America, Montana, Flathead Co, "Glacier National Park, S. shore Waterton Lake, Goat haunt",



MTEC007471, *Selatosomus, aeripennis*, adult, Male, M.A. Ivie, 18-May-94, United States of America, Montana, Flathead Co, "Glacier National Park, 1 mi S Polebridge R.S." ,,,3520ft, CTTCTCTTAGCCTTCTAATTTCGAGCTGAACTAGGTAATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGCCCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGAGGATTTCGGAAATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCACGTATAAACAATATAAGATTCTGATTCCCTCCACCCTCTCTATCACTTTTACTAATAAGAAGATCGTGAAAATGGGGCAGGAACAGGATGAACAGTTTACCCCCCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTTCAGATTACACCTAGCAGGAATCTCATCAATCCTAGGGGCTGTAAATTTTCATCTCAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTATTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTCCTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATACATCCTTTTTTTGA

MTEC007472, *Selatosomus, destructor*, adult, C.E. Seibert, 27-May-88, United States of America, Montana, Gallatin Co, "Hwy86, mile marker 86, on Rosa sp." ,,, CTTCTCTTAGCCTTCTAATTTCGAGCTGAACTAGGTAACCCCGGCTCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTAACAGCCCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATTTCGGAAATkGACTTGTACCCCTAATACTAGGAGCCCCTGATATAGCATTCCCACGTATAAACAATATAAGATTCTGATTCCCTCCACCCTCTCTATCACTTTTCTAATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGGTGAACAGTTTACCCCCCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTAGCAATTTTCAGATTACACCTAGCAGGAATCTCATCAATCCTAGGGGCTGTAAATTTTCATCTCAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTATTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTkCCAGTCCTGGCAGGAGCAATTACAATGTTACTAACCGATCGAAACCTAAATAC

MTEC007473, *Selatosomus, destructor*, adult, H.W. Ziolkowski, 15-Jun-89, United States of America, Montana, Wheatland Co, "Lewis and Clark National Forest, 3 mi NW Judith Gap" ,,,

MTEC007474, *Selatosomus, destructor*, adult, Male, M.A. Ivie and D.L. Gustafson, 31 Dec 1989 to 17 Jul 1990, United States of America, Montana, Carter Co, 5 mi. W of Alzada at Wyoming border, ,,,

MTEC007475, *Hypnoidus, impressicollis*, adult, Female, D.L. Gustafson, 21 Apr to 5 May 1987, United States of America, Montana, Gallatin Co, Gallatin River, ,,,4700ft,

MTEC007476, *Hypnoidus, impressicollis*, adult, Male, D.L. Gustafson, 22-Jun-87, United States of America, Montana, Gallatin Co, E. Gallatin River, ,,,4600ft,

MTEC007477, *Hypnoidus, impressicollis*, adult, Female, D.L. Gustafson, 26-Jun-89, United States of America, Montana, Powell Co, "Blackfoot River, MT 141" ,,,

MTEC007478, *Limonius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA GCCTTCCCTCGAATAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA GTATACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT CGCCATTTTCACCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA AC

MTEC007480, *Limonius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA GAACTTGGTAACCCTGGGTCACTAATTGGAAaCGACCAAATCTATAATGTTAT TGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAAT TGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAG CCTTCCCTCGAATAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTC TTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACAGT ATACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCG CCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAAT TTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGTAT GCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCACT CCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAAAC ACTTC

MTEC007482, *Limonius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007483, *Limonius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CTCTTGATTTCGGGCAGAACTTGGTAA CCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTATTGTTACAGCTC ACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATTGGTGGATTTCG GAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAGCCTTCCCTCrA ATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTTCTTCTAATA AGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACAGTATACCCCTC TCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGC

CTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAATTTTATCTCAAC  
 TGTTATTAATATACGATCTACCGGAATTACCTTCGACCGTATGCCTCTATTTGT  
 TTGAGCAGTAGCAATTACC<sub>g</sub>CTCTTCTCCTCTTACTTTCACTCCCAGTTTTGGC  
 A

MTEC007484, *Limonium californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007485, *Limonium californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007486, *Limonium californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAA  
 TTGGAGGATTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
 GTATAACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTC

MTEC007504, *Limonium californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007505, *Limonium californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAA  
 TTGGTGGATTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAACATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGCTGAACA  
 GTATAACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA

CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
ACACTTC

MTEC007506, *Limenius, californicus*, larva,, A. Morales et. al, 17-MAY to 02-JUNE-  
2011, United States of America, Montana, Broadwater  
Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAA  
TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
GTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGGGCAGTTA  
ATTTTATCTCAACTGTTATTAATATGCGATCTACCGGAATTACCTTCGACCGT  
ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
ACACTTCATTCTTCG

MTEC007514, *Limenius, californicus*, larva,, A. Morales et. al, 17-MAY to 02-JUNE-  
2011, United States of America, Montana, Broadwater  
Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAA  
TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
GTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATCACCTTCGACCGT  
ATGCCTCTATTTGTTTGAGCAGTAGCAATCACCGCTCTTCTCCTCTTACTTTCA  
CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
ACACTTC

MTEC007515, *Limenius, californicus*, larva,, A. Morales et. al, 17-MAY to 02-JUNE-  
2011, United States of America, Montana, Broadwater  
Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAA  
TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
GTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT

ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
ACACTTCA

MTEC007518, *Limenius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-  
2011, United States of America, Montana, Broadwater  
Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007519, *Limenius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-  
2011, United States of America, Montana, Broadwater  
Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
GAACTTGGTAACCCTGGGTCGCTAATTGGAAACGACCAAATCTATAATGTTA  
TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA  
TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
GCCTTCCCTCGAATAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
TCTTCTTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
GTATACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT  
ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
ACACTTCATTCTTCG

MTEC007521, *Limenius californicus*, adult, Female, A. Morales et. al, 17-MAY to 02-  
JUNE-2011, United States of America, Montana, Broadwater  
Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007523, *Limenius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-  
2011, United States of America, Montana, Broadwater  
Co, Townsend, 46.0987N, 111.5428W, 4081ft, ACTAGGAACATCCTTAAGACTCTTGA  
TTCGGGCAGAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTA  
TAATGTTATTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACC  
AATCATAATTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTC  
CTGATATAGCCTTCCCTCGAATAACAATATAAGATTCTGATTCTTGCCCCA  
TCACTTTCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGG  
ATGAACAGTATACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAG  
TTGACCTCGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGA  
GCAGTTAATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTT  
CGACCGTATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTT  
ACTTTCCTCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAA  
ACCTAAACACTTCATTCTTCGATCCTGCTGGGGGAGGTG

MTEC007527, *Limonius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007531, *Limonius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, AACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTATTGTTACAGCTCACGCCTTCATCATAATTTCTTTATAGTTATACCAATCATAATTGGTGGATTCGGAAACTGACTAGTTCACTAATATTGGGCGCTCCTGATATAGCCTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTCTTCTTAATAAGAAGAATTGTAGAAATGGTGCAGGAAGTGGATGAACAGTATACCCCCCTCTCTCAGCTAACATTGCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATCACCTTCGACCGTATGCCTCTATTTGTTTGAGCAGTAGCAATCACCGCTCTTCTCCTTACTTTCACTCCCAGTTTTGGCAGGAGCTATCACAACTACTATTAACAGATCGAAACCTAAACACTTCA

MTEC007532, *Limonius californicus*, larva, A. Morales et. al, 17-MAY to 02-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA GA ACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTATTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAATTGGAGGATTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAGCCTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAAGTGGATGAACAGTATACCCCCCTCTCTCAGCTAACATTGCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGTATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTTACTTTCACTCCCAGTTTTGGCAGGAGCTATCACAACTACTATTAACAGATCGAAACCTAAACACTTCATTCTTCG

MTEC007548, *Limonius californicus*, larva, A. Morales et. al, 02-JUNE to 14-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA GA ACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTATTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGATTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAGCCTCCCTCGAATAAACAACATAAGATTCTGATTCTTGCCCCATCACTTTCCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAAGTGGCTGAACAGTATACCCCCCTCTCTCAGCTAACATTGCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT

ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCATTCTTCGATCCTGCTGGGGGAGGTG

MTEC007550, *Limenius californicus*, larva, A. Morales et. al, 02-JUNE to 14-JUNE-  
 2011, United States of America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, ACTAGGAACATCCTTAAGACTCTTGA  
 TTCGGGCAGAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTA  
 TAATGTTATTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACC  
 AATCATAATTGGTGGATTTCGGAACTGACTAGTTCCACTAATATTGGGCGCTC  
 CTGATATAGCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCA  
 TCACTTTCTCTTCTTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGG  
 ATGAACAGTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAG  
 TTGACCTCGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGA  
 GCAGTTAATTTTATCTCAACTGTTATTAATATAACGATCTACCGGAATTACCTT  
 CGACCGTATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTT  
 ACTTTCCTCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAA  
 ACCTAAACACTTCATTCTTCG

MTEC007551, *Limenius californicus*, larva, A. Morales et. al, 02-JUNE to 14-JUNE-  
 2011, United States of America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA  
 TTGGTGGATTTCGGAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
 GTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATAACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTC

MTEC007555, *Limenius californicus*, larva, A. Morales et. al, 02-JUNE to 14-JUNE-  
 2011, United States of America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA  
 TTGGTGGATTTCGGAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
 GTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA

ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTTGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCATTCTTCGATCCTGCTGGGGGAGGTG

MTEC007570, *Limenius, californicus*, larva,, A. Morales et. al, 02-JUNE to 14-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, TAGGAACTTCCTTAAGAATCCTAATC  
 CGTGCCGAACTCGGAAACCCTGGCTACTAATTGGAAATGATCAAATCTACA  
 ATGTAATTGTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATACCAA  
 TTATAATTGGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCT  
 GATATAGCATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTC  
 TCTATCACTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGT  
 TGAACAGTATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGT  
 TGACTTAGCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAG  
 CAGTAAATTTTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTT  
 GATCGTATACCATTATTTGTTTGAGCTGTAGCAATACTGCCTTCTACTACTT  
 ATTTCACTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAA  
 ACTTAAACACATCATTTTTTG

MTEC007571, *Limenius, californicus*, larva,, A. Morales et. al, 02-JUNE to 14-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAA  
 TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
 GTATACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCATTCTTCG

MTEC007574, *Limenius, californicus*, larva,, A. Morales et. al, 02-JUNE to 14-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, TACTAGGAACATCCTTAAGACTCTTG  
 ATTCGGGCAGAACTTGTAACCCTGGGTCACTAATTGGAAACGACCAAATCT  
 ATAATGTTATTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAC  
 CAATCATAATTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCT  
 CCTGATATAGCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCC  
 ATCACTTCTCTTCTTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTG  
 GATGAACAGTATACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCA



GTTGACCTCGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGG  
 AGCAGTTAATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCT  
 TCGACCGTATGCCTCTATTTGTTTGAGCAGTAGCAATTACTGCTCTTCTCCTCT  
 TACTTTCACTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGA  
 AACCTAAACACTTC

MTEC007580, *Limenius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAA  
 TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
 GTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTTGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCATTCTTCGATCCTGCTGGGGGAGGTG

MTEC007581, *Limenius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAA  
 TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTACAGGAACTGGATGAACA  
 GTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCATTCTTCGATCCTGCTGGGGGAGGTG

MTEC007582, *Limenius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007584, *Limenius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA

TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA  
 TTGGTGGATTTCGGAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTACAGGAACTGGATGAACA  
 GTATAACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATAACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCATTCTTCGATCCTGCTGGGGGAGGTG

MTEC007585, *Limonius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007589, *Limonius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, CCTTAAGACTCTTGATTTCGGGCAGAA  
 CTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTATTGT  
 TACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATTGG  
 TGGATTTCGGAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAGCCT  
 TCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTCTTC  
 TTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACAGTATA  
 CCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTC<sub>s</sub>CCAT  
 TTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAATTTTA  
 TCTCAACTGTTATTAATATAACGATCTACCGGAATTACCTTCGACCGTATGCCT  
 CTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCACTCCCA  
 GTTTTGGCAGGAGCTATCACAAT

MTEC007592, *Limonius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-  
 2011, United States of America, Montana, Broadwater  
 Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA  
 TTGGTGGATTTCGGAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
 GTATAACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATAACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCATTCTTCGATCCTGCTGGGGGAGGTG

MTEC007593, *Limonius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA GAACCTTGGTAACCCTGGGTCACCTAATTGGAAACGACCAAATCTATAATGTTA TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA GTATAACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA ACACTTCATTCTTCGATCCTGCTGGGGGAGG

MTEC007602, *Limonius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007608, *Limonius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA GAACCTTGGTAACCCTGGGTCACCTAATTGGAAACGACCAAATCTATAATGTTA TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGCGCAGGAACTGGATGAACA GTATAACCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATCACCTTCGACCGT ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA ACACTTCATTCTTCGATCCTGCTGGGGGAGG

MTEC007610, *Limonius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA GAACCTTGGTAACCCTGGGTCACCTAATTGGAAACGACCAAATCTATAATGTTA TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA GTATAACCCCTCTCTCAGCTAATATTGCCCATAGAGGCTCTTCAGTTGACCT CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA

ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCATTCTTCGATCCTGCTGGGGGAGG

MTEC007614, *Limonium californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTAATTCGGGCA  
 GAACCTTGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA  
 TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTAGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACA  
 GTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCATTCTTCGATCCTGCTGGGGGA

MTEC007615, *Limonium californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007621, *Limonium californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft,

MTEC007623, *Limonium californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACCTTGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA  
 TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGCGCAGGAACTGGATGAACA  
 GTATACCCCCCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTAAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTC

MTEC007625, *Limonius, californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAATCCTGGGTCACCTAATTGGAAACGACCAAATCTATAATGTTAT  
 TGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAAT  
 TGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAG  
 CCTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTC  
 TTCTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAAGTGGATGAACAGT  
 ATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCG  
 CCATTTTCAGCCTTCACCTAGCAGGAATTCATCCATCCTGGGAGCAGTTAAT  
 TTTATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGTAT  
 GCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCACT  
 ACCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAAAC  
 ACTTCA

MTEC007629, *Limonius, californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, CATCCTTAAGACTCTTGATTTCGGGCA  
 GAACTTGGTAACCCTGGGTCACCTAATTGGAAACGACCAAATCTATAATGTTA  
 TTGTTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAA  
 TTGGTGGATTTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATA  
 GCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTC  
 TCTTCTTCTAATAAGAAGAATTGTAGAAAATGGCGCAGGAAGTGGATGAACA  
 GTATACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCT  
 CGCCATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTA  
 ATTTTATCTCAACTGTTATTAATATACGATCTACCGGAATCACCTTCGACCGT  
 ATGCCTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCA  
 CTCCCAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAA  
 ACACTTCA

MTEC007634, *Limonius, californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, GACTCTTGATTTCGGGCAGAACTTGGT  
 AACCTGGGTCACCTAATTGGAAACGACCAAATCTATAATGTTATTGTTACAGC  
 TCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATTGGTGGATT  
 CGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAGCCTTCCCTC  
 GAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTTCTTCTTCTAA  
 TAAGAAGAATTGTAGAAAATGGTGCAGGAAGTGGATGAACAGTATAACCCCC  
 TCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCA  
 GCCTTCACCTAGCAGGAATTCATCCATCCTGGGAGCAGTTAATTTTATCTCA  
 ACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGTATGCCTCTATT  
 TGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCACTCCCAGTTTT  
 GGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAAACACTTCATTC  
 TTCGATCCTGCTGGGGGA

MTEC007637, *Limonius californicus*, larva, A. Morales et. al, 15-JUNE to 28-JUNE-2011, United States of America, Montana, Broadwater

Co, Townsend, 46.0987N, 111.5428W, 4081ft, GACTCTTGATTCGGGCAGAACTTGGT  
 AACCTGGGTCACCTAATTGGAAACGACCAAATCTATAATGTTATTGTTACAGC  
 TCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGATT  
 CGGAAACTGACTAGTTCACCTAATATTGGGCGCTCCTGATATAGCCTTCCCTC  
 GAATAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTCTTCTTCTAA  
 TAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACAGTATACCCCC  
 TCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCA  
 GCCTTCACCTAGCAGGAATTCATCCATCCTGGGAGCAGTTAATTTTATCTCA  
 ACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGTATGCCTCTATT  
 TGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCCTCCAGTTTT  
 GGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAAACACTTCA

MTEC007638, *Hypnoidus impressicollis*, adult, D.L. Gustafson, 27-Jun-89, United States of America, Montana, Lake Co, Swan

River, 3100ft, CATCCTTAAGTCTCCTAATCCGTGCAGAACTCGGAAACCCTGGC  
 TCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCCACGCCTT  
 CATTATAATTTTCTTCATAGTTATACCAATCATAATTGGAGGATTCGGAAACT  
 GATTAGTACCTCTTATACTGGGAGCTCCTGATATAGCATTTCCTCCGAATAAAT  
 AACATAAGATTCTGATTTCTACCCCCATCACTGTCTCTTCTTCTTATAAGAAG  
 AATTGTAGAAAATGGTGCAGGAACTGGATGAACAGTTTACCCTCCACTCTCA  
 GCTAATATTGCTCATAGAGGATCATCCGTTGATTTAGCAATTTTATAGTTTACA  
 CTTAGCTGGAATCTCCTCTATTCTAGGAGCAGTAAATTTTATTTCTACCGTAA  
 TCAACATACGATCAACAGGAATTACTTTTGATCGAATACCATTATTTGTTTGA  
 GCCGTAGCAATTACTGCCCTTCTTCTTCTCCTTTCCTACTACCAGTACTAGCAGG  
 AGCAATCACTATATTATTAACAGATCGTAACTTAAATACATCCTTTTTTTGA

MTEC007639, *Hypnoidus impressicollis*, adult, D.L. Gustafson, 13-Jun-87, United States of America, Montana, Gallatin Co, Gallatin

River, 4700ft, CATCCTTAAGTCTCCTAATCCGTGCAGAACTCGGAAACCCTGGC  
 TCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCCACGCCTT  
 CATTATAATTTTCTTCATAGTTATACCAATCATAATTGGAGGATTCGGAAACT  
 GATTAGTACCTCTTATACTGGGAGCTCCTGATATAGCATTTCCTCCGAATAAAT  
 AACATAAGATTCTGATTTCTACCCCCATCACTGTCTCTTCTTCTTATAAGAAG  
 AATTGTAGAAAATGGTGCAGGAACTGGATGAACAGTTTACCCTCCACTCTCA  
 GCTAATATTGCTCATAGAGGATCATCCGTTGATTTAGCAATTTTATAGTTTACA  
 CTTAGCTGGAATCTCCTCTATTCTAGGAGCAGTAAATTTTATTTCTACCGTAA  
 TCAACATACGATCAACAGGAATTACTTTTGATCGAATACCATTATTTGTTTGA  
 GCCGTAGCAATTACTGCCCTTCTTCTTCTCCTTTCCTACTACCAGTACTAGCAGG  
 AGCAATCACTATATTATTAACAGATCGTAACTTAAATACATCCTTTTTTTGA

MTEC007640, *Hypnoidus, impressicollis*, adult, D.L. Gustafson, 27-Jun-89, United States of America, Montana, Lake Co, Swan River, 3100ft,

MTEC007641, *Hypnoidus, leei*, adult, Female, D.L. Gustafson, 01 Jun to 13 Jul 1988, United States of America, Montana, Gallatin Co, Bridger Creek, 4700ft, CCGwGCAGAACTAGGAAACCCTGGTTCACCTAATTGGGAATGATCAAATCTACAACGTAATTGTAACGGCCCATGCTTTCATTATAATTTTCTTCATAGTTATACCAATCATGATCGGTGGTTTCGGAAATTGATTAGTACCTTTAATAC TAGGAGCTCCCGACATAGCATTCCCTCGAATAAATAACATAAGATTTTGATTC TTACCCCTTCTCTGTCACTACTTTTAATAAGAAGAATCGTAGAAAATGGGGC AGGAACCGGATGAACCGTTTATCCCCCCTCTCAGCTAATATTGCCCATAGA GGCTCATCTGTTGATTTAGCAATCTTCAGTTTACACTTGGCTGGAATCTCATC AATTCTAGGAGCAGTAAATTTTATTTCAACCGTAATCAATATACGATCAACAG GAATCACCTTTGATCGAATACCGTTATTTGTTTGAGCTGTTGCAATTACAGCA CTTCTCCTCCTTCTTTTATTACCAGTATTAGCTGGAGCAATCACTATACTACTA ACAGACCGAAATTTAAATAC

MTEC007642, *Limonius, canus*, adult, Male, "R.F. Lang, J.P. Cuda", 10-May-88, United States of America, Montana, Flathead Co, Hungary Horse, CATCCCTAAGACTCTTGATTTCGTGCCGAACCTTGGTAACCCCGGCTCAC TAATCGGAAATGACCAAATTTACAATGTTATTGTTACAGCCCACGCCTTCATT ATAATTTTCTTTATAGTTATGCCGATCATAATTGGCGGTTTCGGAAACTGATT AGTGCCCTGATACTAGGAGCCCCTGATATAGCCTTCCCTCGAATAAACAAC ATGAGATTCTGATTCTACCCCGTCTCTTTCCCTCCTTCTAATAAGAAGAAT CGTAGAAAATGGTGCAGGAACCTGGATGAACAGTTTACCCCCCTCTATCAGCC AACATTGCACACAGAGGGTCATCAGTTGATCTTGCCATTTTCAGTCTTCACCT AGCAGGTATCTCTTCCATTCTAGGTGCAGTTAACTTCATCTCAACTGTTATTA ATATGCGATCCACAGGAATCACCTTTGACCGAATGCCTCTATTCGTTTGAGCA GTAGCAATTACTGCTCTACTCCTCCTTCTTTCTCTCCAGTCTTAGCAGGAGC AATTACAATATTATTGACAGATCGTAATCTAAACACCTC

MTEC007643, *Selatosomus, aripennis*, adult, R.T. Ryti, 01 to 22 Jul 1989, United States of America, Montana, Madison Co, Hidden Lake Beach, 7400ft, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGTAATCCCGGC TCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTAACAGCCCACGCCTT TATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATTCGGAAATT GACTTGTACCCCTAATACTAGGAGCCCCTGATATAGCATTCCCACGTATAAAC AATATAAGATTCTGATTCTACCACCCTCTCTATCACTTTTACTAATAAGAAG AATCGTGGAATAATGGGGCAGGAACAGGGTGAACAGTTTACCCCCCTCTCTCA GCCAATATTGCCCATAGAGGGTCATCAGTTGACCTAGCAATTTTCAGATTACA CCTAGCAGGAATCTCATCAATCCTAGGGGCTGTAAATTTTCATCTCAACAGTTA TTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTATTTGTATGG GCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTCTTGGCAGG

AGCAATTACAATGTTACTGACCGATCGAAACCTAAATACATCCTTTTTTCGACC  
CCGCGGGA

MTEC007644, *Selatosomus, aripennis*, adult, M.A. Ivie, 16 to 23 Jul 1991, United States of America, Montana, Flathead Co, "Glacier National Park, N. Fork Flathead area, 2mi S. Polebridge R.S." ,,, 3680ft,

MTEC007645, *Selatosomus, aripennis*, adult, D.S. Sikes, 7 to 15 Jun 1993, United States of America, Wyoming, Yellowstone N.P., "Lamar Valley, E. side of Yellowstone River, NE of Bridge near Tower Jctn." ,,, 6080ft,

MTEC007646, *Selatosomus, destructor*, adult, M.A. Ivie and D.L. Gustafson, 17-Jul-90, United States of America, Montana, Carter Co ,5 mi. W of Alzada at Wyoming border,,,,

MTEC007647, *Selatosomus, destructor*, adult, M.A. Ivie and D.L. Gustafson, 31 Dec 1989 to 17 Jul 1990, United States of America, Montana, Carter Co ,5 mi. W of Alzada at Wyoming border,,,,

MTEC007648, *Hadromorphus, glaucus*, adult, Male, D.L. Gustafson, 7 Jun to 4 Aug 1991, United States of America, Montana, Powder River Co ,Camps Pass,,,,

MTEC007649, *Hadromorphus, glaucus*, adult, Male, H.W. Ziolkowski, 6-Jun-89, United States of America, Montana, Gallatin Co ,3.5mi W of Bozeman,,,,

MTEC007650, *Hadromorphus, glaucus*, adult, Male, D.L. Gustafson, 28-Jun-86, United States of America, Montana, Gallatin Co ,"4 mi N of Bozeman, Bridger foothills" ,,, 5500ft,

MTEC007651, *Glyphonyx, recticollis*, adult, Female, D.L. Gustafson, 11-Jun-91, United States of America, Montana, Roosevelt Co ,Snowden Bridge blt,,,,

MTEC007652, *Glyphonyx, recticollis*, adult, Male, D.L. Gustafson, 11-Jun-91, United States of America, Montana, Roosevelt Co ,Snowden Bridge blt,,,,

MTEC007653, *Glyphonyx, recticollis*, adult, Female, D.L. Gustafson, 11-Jun-91, United States of America, Montana, Roosevelt Co ,Snowden Bridge blt,,,,

MTEC007654, *Agriotes, criddlei*, adult, Male, D.L. Gustafson, 25-May-88, United States of America, Montana, Bighorn Co , "Bighorn R., Ft. Smith" ,,, CATCATTAAGACTATTAATTCGTGCCGAAGCTAGGTAAyCCTGGCTCA  
CTAATTGGAAATGACCAAATTTATAATGTCATTGTAACAGCACATGCATTCAT  
CATAATTTCTTTATAGTAATACCAATTATAATTGGAGGATTTGGGAATTGAT  
TAGTTCCTAATATTAGGAGCCCCAGATATAGCATTCCCTCGAATAACAAT  
ATAAGATTTTGATTCTACCACCATCCCTATCTTTACTTCTTATAAGAAGAATT



GTAGAAAACGGTGCAGGAACAGGCTGAACAGTTTACCCTCCTCTATCAGCCA  
 ATATTGCCCATAGAGGCTCATCAGTAGACTTAGCAATTTTCAGGCTACATCTA  
 GCAGGAATTTTCATCAATTCTTGGAGCCGTAAACTTTATCTTAACAGTAATTA  
 CATACGATCAACTGGAATTACCTTTGACCGTATACCCTTATTTGTATGAGCAG  
 TAGCAATTACTGCCCTCCTTCTTATTATCACTACCrGTACTAGCAGGAGCCA  
 TTACCATGTTACTAACAGATCGTAATCTGAACACCTCATTCTTTGACCCAGC

MTEC007655,Agriotes,criddlei,adult,,M.A. Ivie,16-Jun-89,United States of  
 America,Montana,Fallon Co ,"16 mi N of Baker, 3.5 mi S. of county line on Hwy  
 7" ,,,,CATCATTAAGACTATTAATTCGTGCCGAAGTAACTAGGTAATCCTGGCTCACTA  
 ATTGGAAATGACCAAATTTATAATGTCATTGTAACAGCACATGCATTCATCAT  
 AATTTTCTTTATAGTAATACCAATTATAATTGGAGGATTTGGGAATTGATTAG  
 TTCCACTAATATTAGGAGCCCCAGATATAGCATTCCCTCGAATAAACAATATA  
 AGATTTTGATTCCCTACCACCATCCCTATCTTTACTTCTTATAAGAAGAATTGTA  
 GAAAACGGTGCAGGAACAGGCTGAACAGTTTACCCTCCTCTATCAGCCAATA  
 TTGCCCATAGAGGCTCATCAGTAGACTTArCAATTTTCAGGCTACATCTAGCA  
 GGAATTTTCATCAATTCTTGGAGCCGTAAACTTTATCTTAACAGTAATTAACAT  
 ACGATCAACTGGAATTACCTTTGACCGTATACCCTTATTTGTATGAGCAGTAG  
 CAATTACTGCCCTCCTTCTTATTATCACTACCGGTACTAGCAGGAGCCATT  
 ACCATGTTACTAACAGATCGTAATCTGAACACCTCATTCTTTGACCC

MTEC007656,Agriotes,criddlei,adult,,C.E. Seibert,16-Apr-88,United States of  
 America,Montana,Fergus Co ,Lewistown,,,,

MTEC007657,Melanotus,longulus oregonensis,adult,,D.L. Gustafson,14 Apr to 20 Oct  
 1990,United States of America,Montana,Broadwater Co ,Toston Big Spring,,,,

MTEC007658,Melanotus,longulus oregonensis,adult,,D.L. Gustafson,24-Jun-90,United  
 States of America,Montana,Gallatin Co ,"Bozeman, at ""M""  
 trail" ,,,,CATCTCTAAGACTTCTAATTCGAGCAGAATTAGGAAACCCTGGTTCAC  
 TAATTGGAAATGACCAAATTTATAATGTTATTGTTACAGCTCACGCTTTTATT  
 ATAATTTTCTTTATAGTTATACCAATCATAATTGGAGGATTCGGAAATTGATT  
 AGTGCCACTTATACTAGGAGCCCCAGACATAGCCTTCCCACGAATAAACAAT  
 ATAAGATTCTGACTTCTACCCCCCTCATTATCACTCCTTCTTATAAGAAGAAT  
 TGTTGAAAATGGTGCAGGTACAGGATGAACAGTTTACCCCCCTCTCTGCTA  
 ATATTGCTCATAGAGGTTTCATCCGTAGATTTAGCCATTTTCAGTCTTCACTTA  
 GCTGGAATTTCTCTATTCTTGGTGCAGTAAATTTCAATTTCAACTGTAATTAAT  
 ATACGATCAACAGGTATTACATTTGACCGGATACCTTTATTCGTTTGAGCTGT  
 AGCAATCACTGCTCTTCTTCTTCTTCTTCACTCCCAGTTCTTGCAGGTGCTAT  
 TACTATACTCTTAACCGACCGAAATCTAAACAC

MTEC007659,Melanotus,similis,adult,,D.L. Gustafson,10 Aug to 11 Oct 1991,United  
 States of America,Montana,Rosebud Co ,Rosebud,,,,

MTEC007660, *Pseudanostirus, nigricollis*, adult, Male, P. Kraus et al., 24 Jul to 04 Oct 2010, United States of America, Montana, Powell Co, S of junction of Hwys 200 and 141, 46.93888N, 112.94923W, 4304ft, CTCCCTAAGCCTTCTAATTCGAGCCGAACT AGGAAATCCTGGATCTTTAATCGGAAATGATCAAATTTACAATGTAATTGTTA CAGCTCATGCCTTCATCATAATTTTCTTCATAGTAATACCAATTATAATTGGT GGATTTGGAACTGACTTGTTCCCCTAATGCTAGGTGCCCTGACATAGCATT CCCACGAATAAATAATATAAGATTCTGATTTTTACCACCTTCCCTATCCCTTCT TCTAATAAGAAGAATTGTTGAAAATGGAGCAGGAACAGGATGAACAGTGTA CCCCCACTTTCAGCAAATATTGCTCACAGAGGTTTCATCAGTAGACCTCGCAA TTTTAGACTTCATCTAGCTGGTATTTTCATCAATTCTAGGAGCAGTAAATTTTA TTTCAACTGTAATTAATATACGAACAACCTGGAATTACTTTTGACCGAATACCC CTATTCGTTTGAGCAGTAGTAATTACAGCACTTTTATTATTATTATCCTTACCA GTACTAGCAGGTGCAATCACAATACTATTAAGTACTGACCGAACTTAAATACAT CCTTCTTCGACCCCGCA

MTEC007661, *Pseudanostirus, nigricollis*, adult, P. Kraus et al., 25 Jul to 03 Oct 2010, United States of America, Montana, Flathead Co, "Polebridge, Hay Creek, Chadwick's", 48.74202N, 114.27177W, 3507ft, TAATTCGAGCCGAAcTAGGAAATCCT GGATCTTTAATCGGAAATGATCAAATTTACAATGTAATTGTTACAGCTCATGC CTTCATCATAATTTTCTTCATAGTAATACCAATTATAATTGGTGGATTTGGAA ACTGACTTGTTCCCTCTAATkCTAGGTGCCCTGACATAGCATTCCCACGAATA AATAATATAAGATTCTGATTTTTwCCACCTTCyTATCCCTTCTTyTAATAAGA AGAATTGTTGAAAATGGAGCAGGAACAGGATGAACAGTGTACCCCCACTTT CAGCAAATATTGCTCACAGAGGTTTCATCAGTAGACCTCGCAATTTTTAGACTT CATCTAGCyGGTATTTTCATCAATTCTAGGAGCAGTAAATTTTTATTTCAACTGT AATTAATATACGAACAACCTGGAATTACTTTTGaCCGAATACCCCTATTCGTTT GAGCAGTAGTAATTACAGCACTTTTATTATTATTATCCTTACCAGTACTAGCA GGTGCAATCACAATACTATTAAGTACTGACCGAACTTAA

MTEC007662, *Pseudanostirus, nigricollis*, adult, Female, P. Kraus et al., 25 Jul to 03 Oct 2010, United States of America, Montana, Flathead Co, "Polebridge, Hay Creek, Chadwick's", 48.74202N, 114.27177W, 3507ft, CTCCCTAAGCCTTCTAATTCGAGCC GAACTAGGAAATCCTGGATCTTTAATCGGAAATGATCAAATTTACAATGTAA TTGTTACAGCTCATGCCTTCATCATAATTTTCTTCATAGTAATACCAATTATAA TTGGTGGATTTGGAAACTGACTTGTTCCCCTAATGCTAGGTGCCCTGACATA GCATTCCCACGAATAAATAATATAAGATTCTGATTTTTACCACCTTCCCTATC CCTTCTTCTAATAAGAAGAATTGTTGAAAATGGAGCAGGAACAGGATGAACA GTGTACCCCCACTTTCAGCAAATATTGCTCACAGAGGTTTCATCAGTAGACCT CGCAATTTTTAGACTTCATCTAGCTGGTATTTTCATCAATTCTAGGAGCAGTAA ATTTTATTTCAACTGTAATTAATATACGAACAACCTGGAATTACTTTTGACCGA ATACCCCTATTCGTTTGAGCAGTAGTAATTACAGCACTTTTATTATTATTATCC TTACCAGTACTAGCAGGTGCAATCACAATACTATTAAGTACTGACCGAACTTAA ATACATCC

MTEC007663, *Athous rufiventris*, adult, Female, P. Kraus et al., 25 Jul to 03 Oct 2010, United States of America, Montana, Flathead Co, "Polebridge, Hay Creek, Chadwick's", 48.74202N, 114.27177W, 3507ft, CATCGCTAAGACTACTTATTCGTGCA GAACTAGGGAACCCTGGATCCCTTATTGGCAATGATCAAATCTATAACGTTAT TGTAACAGCACATGCCTTCATCATAATTTTCTTCATAGTTATAACCAATCATAA TTGGAGGATTCGGAAACTGACTAGTCCCTCTAATACTAGGAGCCCCAGATAT AGCCTTCCCACGAATAACAACATAAGATTCTGATTCCCTCCCCCTTCCCTGT CACTATTACTAATAAGAAGAATCGTAGAAAACGGAGCAGGAACCGGATGAA CCGTTTATCCCCCTCTCAGCAAATATTGCCCATAGAGGGTCTTCAGTAGAT CTTGCCATTTTCAGTCTTCACCTCGCAGGAATTTCCCTCAATTCTTGGTGCCGTA AATTCATCTCAACAGTAATCAATATACGCTCAACCGGAATCACATTTGACCG AATACCTTTATTTGTATGAGCAGTAGCTATTACCGCCCTACTACTTTTATTATC CCTACCTGTCTTAGCTGGAGCCATCACAATACTTCTTACTGACCGAAATTTAA ACACGTCATTCTTTG

MTEC007664, *Athous rufiventris*, adult, Female, P. Kraus et al., 25 Jul to 03 Oct 2010, United States of America, Montana, Flathead Co, "Polebridge, Hay Creek, Chadwick's", 48.74202N, 114.27177W, 3507ft, TATTCGTGCAGAACTAGGGAACCCT GGATCCCTTATTGGCAATGATCAAATCTATAACGTTATTGTAACAGCACATGC CTTCATCATAATTTTCTTCATAGTTATAACCAATCATAAATTGGAGGATTCGGAA ACTGACTAGTCCCTCTAATACTAGGAGCCCCAGATATAGCCTTCCCACGAAT AAACAACATAAGATTCTGATTCCCTCCCCCTTCCCTGTCACTATTACTAATAA GAAGAATCGTAGAAAACGGAGCAGGAACCGGATGAACCGTTTATCCCCCTT CTCAGCAAATATTGCCCATAGAGGGTCTTCAGTAGATCTTGCCATTTTCAGTC TTCACCTCGCAGGAATTTCCCTCAATTCTTGGTGCCGTAATTTTCATCTCAACA GTAATCAATATACGCTCAACCGGAATCACATTTGACCGAATACCTTTATTTGT ATGAGCAGTAGCTATTACCGCCCTACTACTTTTATTATCCCTACCTGTCTTAGC TGGAGCCATCACAATACTTCTTACTGACCGAAATTTAAACACGTCATTCTTTG

MTEC007665, *Athous rufiventris*, adult, Female, P. Kraus et al., 25 Jul to 03 Oct 2010, United States of America, Montana, Flathead Co, "Polebridge, Hay Creek, Chadwick's", 48.74202N, 114.27177W, 3507ft,

MTEC007666, *Athous rufiventris*, adult, Female, P. Kraus et al., 24 Jul to 04 Oct 2010, United States of America, Montana, Powell Co, S of junction of Hwys 200 and 141, 46.93888N, 112.94923W, 4304ft,

MTEC007667, *Hemicrepidius brevicollis*, adult, Female, P. Kraus et al., 27 Jun to 19 Sep 2010, United States of America, Montana, Dawson Co, Stream by Rd 242 off I94 exit 206, 47.04200N, 104.81924W, 2208ft, CTCATTAAGACTACTAATTCGAGCAGAACT TGGTAATCCCGGATCACTTATTGGGAATGACCAAATCTACAATGTCATTGTAA CAGCCCATGCTTTTATCATAATTTTTTTTATAGTTATAACCAATCATAATTGGGG GATTTGGAAATTGATTAGTCCCTTTGATACTAGGAGCTCCAGATATAGCTTTT CCTCGAATAAATAACATAAGATTTTGATTTTACCCTCATCTCTTTCTCTCCTA

CTAATAAGAAGAATCGTAGAAAACGGTGCAGGAACAGGATGAACTGTTTACC  
 CACCATTATCAGCAAATATTGCCCATAGAGGGTCCTCAGTAGATCTTGCCATT  
 TTTAGGTTACACCTAGCTGGGATCTCATCAATCCTAGGAGCAGTAAATTTTAT  
 TTCTACAGTTATTAATATACGATCAACTGGAATTACATTTGACCGAATACCCC  
 TATTTGTTTGAGCTGTTGTTATTACAGCACTCCTCTTGTTGCTTTCACTACCAG  
 TACTTGCAGGGGCAATCACCATACTTTTAACAGATCGAAATTTAAACACGTC  
 ATTTTTTGACCCTGCA

MTEC007668,Hemicrepidius,brevicollis,adult,Female,P. Kraus et al.,27 Jun to 19 Sep  
 2010,United States of America,Montana,Dawson Co ,Stream by Rd 242 off I94 exit  
 206,47.04200N,104.81924W,2208ft,CTTCATTAAGACTACTAATTCGAGCAGAACT  
 TGGTAATCCCGGATCACTTATTGGGAATGACCAAATCTACAATGTCATTGTAA  
 CAGCCCATGCTTTTATCATAATTTTTTTTTATAGTTATAACCAATCATAATTGGGG  
 GATTTGGAAATTGATTAGTCCCTTTGATACTAGGAGCTCCAGATATAGCTTTT  
 CCTCGAATAAATAACATAAGATTTTGATTTTTACCCCCATCTCTTTCTCTCCTA  
 CTAATAAGAAGAATCGTAGAAAACGGTGCAGGAACAGGATGAACTGTTTACC  
 CACCATTATCAGCAAATATTGCCCATAGAGGGTCCTCAGTAGATCTTGCCATT  
 TTTAGGTTACACCTAGCTGGGATCTCATCAATCCTAGGAGCAGTAAATTTTAT  
 TTCTACAGTTATTAATATACGATCAACTGGAATTACATTTGACCGAATACCCC  
 TATTTGTTTGAGCTGTTGTTATTACAGCACTCCTCTTGTTGCTTTCACTACCAG  
 TACTTGCAGGGGCAATCACCATACTTTTAACAGATCGAAATTTAAACACGTC  
 ATTTTTTGA

MTEC007669,Limonius,californicus,adult,Female,,May-75,United States of  
 America,Washington,Walla Walla Co,Half Hill,,,

MTEC007670,Limonius,californicus,adult,Female,L.T. Turner,20-Apr-33,United States  
 of America,Washington,Walla Walla Co,Walla Walla,,,

MTEC007671,Hypnoidus,bicolor,adult,,A. Morales et. al,14-MAY to 27-MAY-  
 2011,United States of America,Montana,Pondera  
 Co,Conrad,48.2901N,111.8883W,3532ft,CTTCCTTAAGAATCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT  
 GTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATT  
 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAAACACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAA  
 CACATCATTTTTTG

MTEC007672,Hypnoidus,bicolor,adult,,A. Morales et. al,14-MAY to 27-MAY-2011,United States of America,Montana,Pondera

Co,Conrad,48.2901N,111.8883W,3532ft,CTTCCTTAAGAATCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT  
 GTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATT  
 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAA  
 CACATC

MTEC007673,Hypnoidus,bicolor,adult,,A. Morales et. al,14-MAY to 27-MAY-2011,United States of America,Montana,Pondera

Co,Conrad,48.2901N,111.8883W,3532ft,CTTCCTTAAGAATCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT  
 GTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATT  
 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAA  
 CACATCATTTTTTG

MTEC007674,Hypnoidus,bicolor,adult,,A. Morales et. al,14-MAY to 27-MAY-2011,United States of America,Montana,Pondera

Co,Conrad,48.2901N,111.8883W,3532ft,TCCTAATCCGTGCCGAAGTCCGAAACCC  
 TGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCCAT  
 GCTTTCATTATAATTTTTTTCATAGTTATAACCAATTATAATTGGGGGGTTTGGT  
 AATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGCATTCCCACGAAT  
 AAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCACTCCTGCTTATAAG  
 AAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAGTATACCCTCCTTTA  
 TCAGCCAACATCGCCACAGAGGATCATCTGTTGACTTAGCAATTTTTAGATT  
 ACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTTATTTCAACTG  
 TAATCAATATACGATCAACGGGAATCAACTTTGATCGTATAACCATTATTTGTT  
 TGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTCACTTCCAGTCCTGGC  
 AGGAGCAATCACTATACTACTGACAGACCGAAACTTAAACACATCATTTTTT  
 G

MTEC007675,Hypnoidus,bicolor,adult,,A. Morales et. al,14-MAY to 27-MAY-2011,United States of America,Montana,Pondera Co,Conrad,48.2901N,111.8883W,3532ft,CTTCCTTAAGTCTCCTAATCCGTGCCGA ACTCGGAAACCCTGGCTCTCTAATTGGAAATGATCAAATCTACAATGTAATTG TAACAGCCCATGCATTCATTATAATTTTTTTCATAGTTATACCAATTATGATTG GAGGATTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGC ATTCCCACGAATAAACAAACATAAGATTCTGATTTTTACCCCTTCACTATCAC TTCTACTTATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGTTGAACAGT ATACCCTCCTTTATCAGCTAATATTGCCACAGAGGCTCATCTGTTGACTTAG CAATTTTCAGTTTACATCTAGCTGGTATTTTCGTCTATCCTAGGAGCAGTAAAT TTTATTTCAACTGTAATCAATATACGATCAACAGGAATCACCTTTGATCGTAT ACCATTATTTGTTTGAGCTGTAGCAATCACTGCACTTCTACTACTCCTTTCCT TCCAGTACTAGCAGGAGCAATTACTATATTACTAACAGACCGAACTTAAAT ACATCATTTTTTG

MTEC007676,Hypnoidus,bicolor,adult,,A. Morales et. al,14-MAY to 27-MAY-2011,United States of America,Montana,Pondera Co,Conrad,48.2901N,111.8883W,3532ft,TAGGAACTTCCTTAAGAATCCTAATCCG TGCCGAACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAAT GTAATTGTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATACCAATT ATAATTGGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGA TATAGCATTCCCACGAATAAACAAACATAAGATTCTGATTTTTACCTCCTTCTC TATCACTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACTGGTTG AACAGTATACCCTCCTTTATCAGCCAACATCGCCACAGAGGATCATCTGTTG ACTTAGCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCA GTAAATTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGA TCGTATACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTAT TTCCTTCCAGTCCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAAC TTAAACACATCATTTTTTG

MTEC007677,Hypnoidus,bicolor,adult,,A. Morales et. al,14-MAY to 27-MAY-2011,United States of America,Montana,Pondera Co,Conrad,48.2901N,111.8883W,3532ft,

MTEC007678,Hypnoidus,bicolor,adult,,A. Morales et. al,14-MAY to 27-MAY-2011,United States of America,Montana,Pondera Co,Conrad,48.2901N,111.8883W,3532ft,CTTCCTTAAGTCTCCTAATCCGTGCCGA ACTCGGAAACCCTGGCTCTCTAATTGGAAATGATCAAATCTACAATGTAATTG TAACAGCCCATGCATTCATTATAATTTTTTTCATAGTTATACCAATTATGATTG GAGGATTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGC ATTCCCACGAATAAACAAACATAAGATTCTGATTTTTACCCCTTCACTATCAC TTCTACTTATAAGAAGAATTGTAGAAAATGGAGCAGGAACTGGTTGAACAGT ATACCCTCCTTTATCAGCTAATATTGCCACAGAGGCTCATCTGTTGACTTAG

CAATTTTCAGTTTACATCTAGCTGGTATTTTCATCTATCCTAGGAGCAGTAAAT  
 TTTATTTCAACTGTAATCAATATACGATCAACAGGAATCACCTTTGACCGTAT  
 ACCATTATTTGTTTGAGCTGTAGCAATCACTGCACTTCTACTACTCCTTTCACT  
 TCCAGTACTAGCAGGAGCAATTACTATATTACTAACAGACCGAAACTTAAAT  
 ACATCATTTTTTTG

MTEC007679, *Hypnoidus, bicolor, adult*, A. Morales et. al, 14-MAY to 27-MAY-  
 2011, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, GTCTCCTAATCCGTGCCGAACTCGGAAA  
 CCCTGGCTCTCTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCC  
 ATGCATTATTATAATTTTTTTTCATAGTTATACCAATTATGATTGGAGGATTTG  
 GTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGCATTCCCACGA  
 ATAAACAACATAAGATTCTGATTTTTTACCCCTTCACTATCACTTCTACTTATA  
 AGAAGAATTGTAGAAAATGGAGCAGGAACTGGTTGAACAGTATACCCCTCCTT  
 TATCAGCTAATATTGCCACAGAGGCTCATCTGTTGACTTAGCAATTTTCAGT  
 TTACATCTAGCTGGTATTTTCATCTATCCTAGGAGCAGTAAATTTTATTTCAACT  
 GTAATCAATATACGATCAACAGGAATCACCTTTGATCGTATACCATTATTTGT  
 TTGAGCTGTGGCAATCACTGCACTTCTACTACTCCTTTCACTTCCAGTACTAG  
 CAGGAGCAATTACTATATTACTAACAGACCGAAACTTAAATACATCATTTTTTT  
 G

MTEC007680, *Hypnoidus, bicolor, adult*, A. Morales et. al, 14-MAY to 27-MAY-  
 2011, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007681, *Hypnoidus, bicolor, adult*, A. Morales et. al, 14-MAY to 27-MAY-  
 2011, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007682, *Limonius, californicus, larva*, A. Morales et. al, 14-MAY to 27-MAY-  
 2011, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, ACTCTTGATTTCGGGCAGAACTTGGTAAC  
 CCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTGTCACAGCTCA  
 CGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAATCGGTGGGTTTCG  
 GAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCCTTCCCTCGA  
 ATAAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTTCTTCTTAATA  
 AGAAGAATTGTAGAAAATGGAGCAGGAACTGGGTGAACAGTCTACCCCCCTC  
 TCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGT  
 CTTACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTTATCTCAAC  
 TGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCCCTATTG  
 TTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCCTTCCAGTTTTAG  
 CAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACAC

MTEC007683, *Hypnoidus, bicolor, larva,*, A. Morales et. al, 14-MAY to 27-MAY-2011, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTCCTTAAGAATCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT  
 GTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATACCAATTATAATT  
 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAA  
 CACATCATTTTTTG

MTEC007684, *Hypnoidus, bicolor, larva,*, A. Morales et. al, 14-MAY to 27-MAY-2011, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CTCCTTAAGAATCCTAATCCGTGCCGA  
 ACTCGGAAACCCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATT  
 GTAACAGCCCATGCTTTCATTATAATTTTTTTCATAGTTATACCAATTATAATT  
 GGGGGGTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAG  
 CATTCCCACGAATAAACAACATAAGATTCTGATTTTTACCTCCTTCTCTATCA  
 CTCCTGCTTATAAGAAGAATTGTAGAGAATGGGGCAGGAAGTGGTTGAACAG  
 TATACCCTCCTTTATCAGCCAACATCGCCACAGAGGATCATCTGTTGACTTA  
 GCAATTTTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAA  
 TTTTATTTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTA  
 TACCATTATTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTTAC  
 TTCCAGTCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAAACTTAAA  
 CACATCATTTTTTG

MTEC007685, *Hypnoidus, bicolor, larva,*, A. Morales et. al, 14-MAY to 27-MAY-2011, United States of America, Montana, Pondera

Co, Conrad, 48.2901N, 111.8883W, 3532ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCCTAATTGGAAATGACCAAATCTATAATGTAATTG  
 TCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATACCAATCATAATCG  
 GTGGGTTTCGGAAACTGACTAGTTCCACTAATATTGGGTGCTCCTGATATAGCC  
 TTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAAGTGGGTGAACAGTCT  
 ACCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTTT  
 ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC  
 CCTATTTGTTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTGCTTTCACTTCC  
 AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAAACACTT  
 C



MTEC007686, *Hypnoidus, bicolor*, larva,, A. Morales et. al, 14-MAY to 27-MAY-2011, United States of America, Montana, Pondera Co, Conrad, 48.2901N, 111.8883W, 3532ft,

MTEC007687, *Limonius, californicus*, larva,,, 26?-APR-2011, United States of America, Washington, Whitman

Co,,,,, CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGATCACT  
AATTGGAAATGACCAAATCTATAATGTTATTGTACAGCTCACGCCTTCATCA  
TAATTTTCTTTATAGTTATACCAATCATAATTGGTGGGTTTCGGAAACTGGCTA  
GTTCCACTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAATAT  
AAGATTCTGATTCTTACCCCCGTCCCTTTCTCTTCTTCTAATAAGAAGAATTGT  
TGAAAATGGTGCAGGAACTGGTTGAACAGTCTACCCCCCTCTCTCAGCTAAC  
ATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTAGC  
AGGAATTTTCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAATA  
TGCGATCTACCGGAATTACCTTCGACCGTATACCTCTGTTTGTGTTGAGCAGTA  
GCAATACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGGGCTATT  
ACAATACTATTAACAGATCGAAACCTAAACACTTC

MTEC007688, *Limonius, californicus*, larva,,, 26?-APR-2011, United States of America, Washington, Whitman

Co,,,,, CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGATCACT  
AATTGGAAATGACCAAATCTATAATGTTATTGTACAGCTCACGCCTTCATCA  
TAATTTTCTTTATAGTTATACCAATCATAATTGGTGGGTTTCGGAAACTGGCTA  
GTTCCACTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAATAT  
AAGATTCTGATTCTTACCCCCGTCCCTTTCTCTTCTTCTAATAAGAAGAATTGT  
TGAAAATGGTGCAGGAACTGGTTGAACAGTCTACCCCCCTCTCTCAGCTAAC  
ATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTGGC  
AGGAATTTTCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAATA  
TGCGATCTACCGGAATTACCTTCGACCGTATACCTCTGTTTGTGTTGAGCAGTA  
GCAATACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGGGCTATT  
ACAATACTATTAACAGATCGAAACCTAAACACTTC

MTEC007689, *Limonius, infuscatus*, larva,, A. Morales et. al, 24-MAY to 08-JUNE-2011, United States of America, Montana, Gallatin Co, Bozeman, 45.6728N, 111.1517W,,

MTEC007690, *Limonius, infuscatus*, larva,, A. Morales et. al, 24-MAY to 08-JUNE-2011, United States of America, Montana, Gallatin

Co, Bozeman, 45.6728N, 111.1517W,, ACTTGGTACATCCTTAAGACTCCTTATTCGA  
GCAGAGCTGGGAAATCCTGGCTCATTAATTGGAAATGACCAAATTTATAACG  
TAATTGTAACAGCACACGCTTTCATCATAATTTTCTTCATAGTAATACCAATT  
ATAATCGGTGGATTTGGAAACTGATTAGTACCCTTATACTAGGAGCCCCAG  
ACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCCTCCATCG  
CTTTCCCTTCTTCTCATAAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATG

AACTGTTTATCCACCCTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTG  
 ATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCA  
 GTAAACTTTATCTCCACCGTAATTAATATACGAACTACAGGAATCACTTTTGA  
 CCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCT  
 CTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAATC  
 TAAATACCTCATTTTTTG

MTEC007691, *Limonius, infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-  
 2011, United States of America, Montana, Gallatin

Co, Bozeman, 45.6728N, 111.1517W., ACTTGGTACATCCTTAAGACTCCTTATTCGA  
 GCAGAGCTGGGAAATCCTGGCTCATTAATTGGAAATGACCAAATTTATAACG  
 TAATTGTAACAGCACACGCTTTCATCATAATTTTCTTCATAGTAATAACCAATT  
 ATAATCGGTGGATTTGGAAACTGATTAGTACCACTTATACTAGGAGCCCCAG  
 ACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCCTCCATCG  
 CTTTCCCTTCTTCTCATAAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATG  
 AACTGTTTATCCACCCTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTG  
 ATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCA  
 GTAAACTTTATCTCCACCGTAATTAATATACGAACTACAGGAATCACTTTTGA  
 CCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCT  
 CTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAATC  
 TAAATACCTCATTTTTTG

MTEC007692, *Limonius, infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-  
 2011, United States of America, Montana, Gallatin

Co, Bozeman, 45.6728N, 111.1517W., TACTTGGTACATCCTTAAGACTCCTTATTCG  
 AGCAGAGCTGGGAAATCCTGGCTCATTAATTGGAAATGACCAAATTTATAAC  
 GTAATTGTAACAGCACACGCTTTCATCATAATTTTCTTCATAGTAATAACCAAT  
 TATAATCGGTGGATTTGGAAACTGATTAGTACCACTTATACTAGGAGCCCCA  
 GACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCCTCCATC  
 GCTTCCCTTCTTCTCATAAGAAGAATTGTAGAAAATGGTGCTGGTACAGGAT  
 GAAGTGTATCCACCCTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTT  
 GATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGC  
 AGTAAACTTTATCTCCACCGTAATTAATATACGAACTACAGGAATCACTTTTG  
 ACCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTT  
 CTCTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAA  
 TCTAAATACCTCATTTTTTG

MTEC007693, *Limonius, infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-  
 2011, United States of America, Montana, Gallatin

Co, Bozeman, 45.6728N, 111.1517W., TACTTGGTACATCCTTAAGACTCCTTATTCG  
 AGCAGAGCTGGGAAATCCTGGCTCATTAATTGGAAATGACCAAATTTATAAC  
 GTAATTGTAACAGCACACGCTTTCATCATAATTTTCTTCATAGTAATAACCAAT  
 TATAATCGGTGGATTTGGAAACTGATTAGTACCACTTATACTAGGAGCCCCA  
 GACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCCTCCATC

GCTTTCCTTCTTCTCATAAGAAGAATTGTAGAAAATGGTGCTGGTACAGGAT  
 GAACTGTTTATCCACCCTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTT  
 GATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGC  
 AGTAAACTTTATCTCCACCGTAATTAATATACGAACTACAGGAATCACTTTTG  
 ACCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTT  
 CTCTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAA  
 TCTAAATACCTCATTTTTTG

MTEC007694, *Limonius, infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-

2011, United States of America, Montana, Gallatin

Co, Bozeman, 45.6728N, 111.1517W., ACTTGGTACATCCTTAAGACTCCTTATTCGA  
 GCAGAGCTGGGAAATCCTGGCTCATTAATTGGAAATGACCAAATTTATAACG  
 TAATTGTAACAGCACACGCTTTCATCATAATTTTCTTCATAGTAATACCAATT  
 ATAATCGGTGGATTTGGAACTGATTAGTACCACTTATACTAGGAGCCCCAG  
 ACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCCTCCATCG  
 CTTTCCCTTCTTCTCATAAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATG  
 AACTGTTTATCCACCCTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTG  
 ATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCA  
 GTAAACTTTATCTCCACCGTAATTAATATACGAACTACAGGAATCACTTTTGA  
 CCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCT  
 CTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAATC  
 TAAATACCTCATTTTTTG

MTEC007695, *Limonius, infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-

2011, United States of America, Montana, Gallatin

Co, Bozeman, 45.6728N, 111.1517W., TACTTGGTACATCCTTAAGACTCCTTATTCG  
 AGCAGAGCTGGGAAATCCTGGCTCATTAATTGGAAATGACCAAATTTATAAC  
 GTAATTGTAACAGCACACGCTTTCATCATAATTTTCTTCATAGTAATACCAAT  
 TATAATCGGTGGATTTGGAACTGATTAGTACCACTTATACTAGGAGCCCCA  
 GACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCCTCCATC  
 GCTTTCCTTCTTCTCATAAGAAGAATTGTAGAAAATGGTGCTGGTACAGGAT  
 GAACTGTTTATCCACCCTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTT  
 GATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGC  
 AGTAAACTTTATCTCCACCGTAATTAATATACGAACTACAGGAATCACTTTTG  
 ACCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTT  
 CTCTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAA  
 TCTAAATACCTCATTTTTTG

MTEC007696, *Limonius, infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-

2011, United States of America, Montana, Gallatin

Co, Bozeman, 45.6728N, 111.1517W., GACTCCTTATTCGAGCAGAGCTGGGAAATC  
 CTGGCTCATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACA  
 CGCTTTCATCATAATTTTCTTCATAGTAATACCAATTATAATCGGTGGATTTG  
 GAACTGATTAGTACCACTTATACTAGGAGCCCCAGACATAGCATTCCCTCG

AATAAATAATATAAGATTCTGATTCCCTCCCTCCATCGCTTTCCTTCTTCTCAT  
 AAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATGAACTGTTTATCCACCC  
 TTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAG  
 TCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAAACTTTATCTCCA  
 CCGTAATTAATATACGAACTACAGGAATCACTTTTGACCGAATACCTTTATTT  
 GTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTT  
 GCTGGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTCATTTTT  
 TG

MTEC007697, *Limonium infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-  
 2011, United States of America, Montana, Gallatin

Co, Bozeman, 45.6728N, 111.1517W., GACTCCTTATTCGAGCAGAGCTGGGAAATC  
 CTGGCTCATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACA  
 CGCTTTCATCATAATTTTCTTCATAGTAATACCAATTATAATCGGTGGATTTG  
 GAAACTGATTAGTACCACTTATACTAGGAGCCCCAGACATAGCATTCCCTCG  
 AATAAATAATATAAGATTCTGATTCCCTCCCTCCATCGCTTTCCTTCTTCTCAT  
 AAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATGAACTGTTTATCCACCC  
 TTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAG  
 TCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAAACTTTATCTCCA  
 CCGTAATTAATATACGAACTACAGGAATCACTTTTGACCGAATACCTTTATTT  
 GTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTT  
 GCTGGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTCATTTTT  
 TG

MTEC007698, *Limonium infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-  
 2011, United States of America, Montana, Gallatin

Co, Bozeman, 45.6728N, 111.1517W., GACTCCTTATTCGAGCAGAGCTGGGAAATC  
 CTGGCTCATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACA  
 CGCTTTCATCATAATTTTCTTCATAGTAATACCAATTATAATCGGTGGATTTG  
 GAAACTGATTAGTACCACTTATACTAGGAGCCCCAGACATAGCATTCCCTCG  
 AATAAATAATATAAGATTCTGATTCCCTCCCTCCATCGCTTTCCTTCTTCTCAT  
 AAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATGAACTGTTTATCCACCC  
 TTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAG  
 TCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAAACTTTATCTCCA  
 CCGTAATTAATATACGAACTACAGGAATCACTTTTGACCGAATACCTTTATTT  
 GTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTT  
 GCTGGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTCATTTTT  
 TG

MTEC007699, *Limonium infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-  
 2011, United States of America, Montana, Gallatin Co, Bozeman, 45.6728N, 111.1517W.,

MTEC007700, *Limonium infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-  
 2011, United States of America, Montana, Gallatin Co, Bozeman, 45.6728N, 111.1517W.,

MTEC007701, *Aeolus, mellillus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-2011, United States of America, Montana, Gallatin Co, Bozeman, 45.6728N, 111.1517W,,

MTEC007702, *Limonium, infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-2011, United States of America, Montana, Gallatin Co, Bozeman, 45.6728N, 111.1517W,, GACTCCTTATTCGAGCAGAGCTGGGAAATCCTGGCTCATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACACGCTTTCATCATAATTTCTTCATAGTAATACCAATTATAATCGGTGGATTTGGAACTGATTAGTACCACTTATACTAGGAGCCCCAGACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCATCGCTTCCCTTCTTCTCATAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATGAACTGTTTATCCACCTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAACTTTATCTCCAACGTAATTAATATACGAACTACAGGAATCACTTTTGACCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTC

MTEC007703, *Aeolus, mellillus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-2011, United States of America, Montana, Gallatin Co, Bozeman, 45.6728N, 111.1517W,,

MTEC007704, *Limonium, infuscatus*, larva., A. Morales et. al, 24-MAY to 08-JUNE-2011, United States of America, Montana, Gallatin Co, Bozeman, 45.6728N, 111.1517W,, CAGAGCTGGGAAATCCTGGCTCATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACACGCTTTCATCATAATTTCTTCATAGTAATACCAATTATAATCGGTGGATTTGGAACTGATTAGTACCCTTATACTAGGAGCCCCAGACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCATCGCTTCCCTTCTTCTCATAAGAAGAATTGTAGAAATGGTGCTGGTACAGGATGAACTGTTTATCCACCCTTATCAGCAAACATTGCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAACTTTATCTCCACCGTAATTAATATACGAACTACAGGAATCACTTTTGACCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTCATTTTTTG

MTEC007705, *Hadromorphus, glaucus*, larva., K. Pike and G. Graf, 2-May-11, United States of America, Washington, Klickitat Co, "near Bickleton, Tex Brown Farm" ,,, CATCCCTTAGTCTACTGATCCGAGCTGAGCTAGGAAACCCCGGCTCTCTTATTGGAAACGACCAAATCTATAACGTCATTGTAACAGCCCATGCTTTCATATAATTTTCTTCATAGTAATACCTATCATAATTGGAGGATTCGGAACTGATTAGTTCCCCTAATACTAGGAGCTCCTGATATAGCATTCCCACGAATAACAACATAAGATTTTGGTTTCTACCCCCCTCTCTATCACTTCTCCTAATAAGAAGAATCGTAGAAAATGGAGCAGGAACTGGTTGAACAGTTTACCCTCCTCTATCAGCCAACATTGCCCATAGAGGATCATCAGTCGATTTAGCAATTTTTAGTTTACACCT

AGCAGGAATCTCATCAATCTTAGGAGCTGTAAATTTTCATTTCAACCGTAATCA  
 ACATACGATCAACTGGAATCACATTTGATCGAATACCTTTATTTGTTTGAGCA  
 GTAGCCATCACCGCCCTACTACTTCTATTATCCCTCCCCGTAICTCGCAGGAGC  
 AATTACAATACTATTAACAGATCGAACTTAAATAC

MTEC007706, Hadromorphus, glaucus, larva, K. Pike and G. Graf, 2-May-11, United States of America, Washington, Klickitat Co, "near Bickleton, Tex Brown Farm", ,,,

MTEC007707, Hadromorphus, glaucus, larva, K. Pike and G. Graf, 2-May-11, United States of America, Washington, Klickitat Co, "near Bickleton, Tex Brown Farm", ,,,  
 CATCCCTTAGTCTACTGATCCGAGCTGAGCTAGGAAACCCCGGCTCT  
 CTTATTGGAAACGACCAAATCTATAACGTCATTGTAACAGCCCATGCTTTCAT  
 TATAATTTTCTTCATAGTAATACCTATCATAATTGGAGGATTCGGAACTGAT  
 TAGTTCCCCTAATACTAGGAGCTCCTGATATAGCATTCCCACGAATAACAAC  
 ATAAGATTTTGGTTTCTACCCCCCTCTCTATCACTTCTCCTAATAAGAAGAAT  
 CGTAGAAAATGGAGCAGGAACTGGTTGAACAGTTTACCCTCCTCTATCAGCC  
 AACATTGCCCATAGAGGATCATCAGTCGATTTAGCAATTTTATGTTTACACCT  
 AGCAGGAATCTCATCAATCTTAGGAGCTGTAAATTTTCATTTCAACCGTAATCA  
 ACATACGATCAACTGGAATCACATTTGATCGAATACCTTTATTTGTTTGAGCA  
 GTAGCCATCACCGCCCTACTACTTCTATTATCCCTCCCCGTAICTCGCAGGAGC  
 AATTACAATACTATTAACAGATCGAACTTAAATAC

MTEC007708, Hadromorphus, glaucus, larva, K. Pike and G. Graf, 2-May-11, United States of America, Washington, Klickitat Co, "near Bickleton, Tex Brown Farm", ,,,  
 CATCCCTTAGTCTACTGATCCGAGCTGAGCTAGGAAACCCCGGCTCT  
 CTTATTGGAAACGACCAAATCTATAACGTCATTGTAACAGCCCATGCTTTCAT  
 TATAATTTTCTTCATAGTAATACCTATCATAATTGGAGGATTCGGAACTGAT  
 TAGTTCCCCTAATACTAGGAGCTCCTGATATAGCATTCCCACGAATAACAAC  
 ATAAGATTTTGGTTTCTACCCCCCTCTCTATCACTTCTCCTAATAAGAAGAAT  
 CGTAGAAAATGGAGCAGGAACTGGTTGAACAGTTTACCCTCCTCTATCAGCC  
 AACATTGCCCATAGAGGATCATCAGTCGATTTAGCAATTTTATGTTTACACCT  
 AGCAGGAATCTCATCAATCTTAGGAGCTGTAAATTTTCATTTCAACCGTAATCA  
 ACATACGATCAACTGGAATCACATTTGATCGAATACCTTTATTTGTTTGAGCA  
 GTAGCCATCACCGCCCTACTACTTCTATTATCCCTCCCCGTAICTCGCAGGAGC  
 AATTACAATACTATTAACAGATCGAACTTAAATAC

MTEC007709, Limonius, californicus, larva, A. Esser, 25-Apr-11, United States of America, Washington, Lincoln Co, "near Davenport, Sheffle Farm", ,,,  
 CATCCTTAAGACTCTTGATTCGGGCAGAACTTGGTAACCCTGGATCA  
 CTAATTGGAAATGACCAAATCTATAATGTTATTGTCACAGCTCACGCCTTCAT  
 CATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGGTTTCGGAACTGGT  
 TAGTTCCACTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAACAAT  
 ATAAGATTCTGATTCTTACCCCCGTCCTTTCTTCTTCTAATAAGAAGAAT  
 GTTGAATAATGGTGCAGGAACTGGTTGAACAGTCTACCCCCCTCTCTCAGCTA

ACATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTA  
 GCAGGAATTTTCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAA  
 TATGCGATCTACCGGAATTACCTTCGACCGTATACCTCTGTTTGTTTGAGCAG  
 TAGCAATTACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGGGCTA  
 TTACAATACTATTAACAGATCGAAACCTAAACACTTC

MTEC007710, *Limonius californicus*, larva, A. Esser, 25-Apr-11, United States of  
 America, Washington, Lincoln Co, "near Davenport, Sheffle

Farm" ,,,CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGATCA  
 CTAATTGGAAATGACCAAATCTATAATGTTATTGTCACAGCTCACGCCTTCAT  
 CATAATTTTCTTTATAGTTATACCAATCATAAATTGGTGGGTTCGGAAACTGGC  
 TAGTTCCACTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAAT  
 ATAAGATTCTGATTCTTACCCCCGTCCTTTCTCTTCTTCTAATAAGAAGAATT  
 GTTGAAAATGGGGCAGGAACTGGTTGAACAGTCTACCCCCCTCTCTCAGCTA  
 ACATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTA  
 GCAGGAATTTTCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAA  
 TATGCGATCTACCGGAATTACCTTCGACCGTATACCTCTGTTTGTTTGAGCAG  
 TAGCAATTACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGGGCTA  
 TTACAATACTATTAACAGATCGAAACCTAAACACTTCA

MTEC007711, *Limonius californicus*, larva, A. Esser, 28-Apr-11, United States of  
 America, Washington, Lincoln Co, "Wilber, Coffen

Farm" ,,,CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGGTCA  
 CTAATTGGAAATGACCAAATCTATAATGTTATTGTTACAGCTCACGCCTTCAT  
 CATAATTTTCTTTATAGTTATACCAATCATAAATTGGTGGGTTCGGAAACTGAC  
 TAGTTCCTCTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAAT  
 ATAAGATTCTGATTCTTACCCCCGTCCTTTCTCTTCTTCTAATAAGAAGAATT  
 GTTGAAAATGGTGCAGGAACTGGATGAACAGTCTACCCCCCTCTCTCAGCTA  
 ACATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTA  
 GCAGGAATTTTCATCCATTCTGGGAGCAGTTAATTTTATCTCAACCGTCATTAA  
 TATGCGATCTACCGGAATTACCTTCGACCGTATACCTCTGTTTGTTTGAGCAG  
 TAGCAATTACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGGGCTA  
 TTACAATACTATTAACAGATCGAAACCTAAACACTTCA

MTEC007712, *Limonius infuscatus*, larva, A. Esser, 28-Apr-11, United States of  
 America, Washington, Lincoln Co, "Wilber, Coffen

Farm" ,,,TACTTGGTACATCCTTAAGACTCCTTATTCGAGCAGAGCTGGGAAAT  
 CCTGGCTCATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCAC  
 ACGCTTTTATCATAATTTTCTTCATAGTAATACCAATTATAATCGGTGGATTG  
 GAACTGACTAGTACCGCTTATGCTAGGAGCCCCAGACATAGCATTCCCTCG  
 AATAAATAATATAAGATTCTGATTCTTCTCCTCCATCGCTTCCCTTCTTCTCAT  
 AAGAAGAATTGTAGAAAATGGTGCTGGCACAGGATGAACTGTTTATCCACCC  
 TTATCAGCAAACATCGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAG  
 TCTACATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAACTTTATCTCCA

CCGTAATTAATATGCGAACTACAGGAATCACTTTTGACCGAATACCTTTATTT  
 GTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCCTTACCAGTTCTT  
 GCCGGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTCATTTTT  
 TG

MTEC007713, *Limenius californicus*, larva, A. Esser, 28-Apr-11, United States of  
 America, Washington, Whitman Co, "Rosalia, Clawson

Farm" ,,,CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGATCA  
 CTAATTGGAAATGACCAAATCTATAATGTTATTGTCACAGCTCACGCCTTCAT  
 CATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGGGTTCGGAAACTGGC  
 TAGTTCCACTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAAT  
 ATAAGATTCTGATTCTTACCCCCGTCCTTTCTCTTCTTCTAATAAGAAGAATT  
 ATTGAAAATGGTGCAGGAACTGGTTGAACAGTCTACCCCCCTCTCTCAGCTA  
 ACATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTA  
 GCAGGAATTCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAA  
 TATGCGATCTACCGGAATTACCTTCGACCGCATAACCTCTGTTTGTTTGAGCAG  
 TAGCAATTACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGGGCTA  
 TTACAATACTATTAACAGATCGAAACCTAAACACTTC

MTEC007714, *Limenius californicus*, larva, A. Esser, 28-Apr-11, United States of  
 America, Washington, Whitman Co, "Rosalia, Clawson

Farm" ,,,CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAGCCCTGGATCA  
 CTAATTGGGAATGACCAAATCTATAATGTTATTGTCACAGCTCACGCCTTCAT  
 CATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGGGTTCGGAAACTGAC  
 TAGTTCCACTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAAT  
 ATAAGATTCTGATTCTTACCCCCGTCCTTTCTCTTCTTCTAATAAGAAGAATT  
 GTTGAAAATGGTGCAGGAACTGGGTGAACAGTCTACCCCCCTCTCTCAGCTA  
 ACATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTA  
 GCAGGAATTCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAA  
 TATGCGATCTACCGGAATTACCTTCGACCGTATAACCTCTGTTTGTTTGAGCAG  
 TAGCAATTACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCAGGGGGCTA  
 TTACAATACTATTAACAGATCGAAACCTAAACACTTCA

MTEC007715, *Limenius californicus*, larva, A. Esser, 4-May-11, United States of  
 America, Washington, Lincoln Co, "Davenport, DeWalt

Farm" ,,,CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGGTCA  
 CTAATTGGAAATGACCAAATCTATAATGTTATTGTCACAGCTCACGCCTTCAT  
 CATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGGGTTCGGAAACTGGC  
 TAGTTCCACTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAAT  
 ATAAGATTCTGATTCTTACCCCCGTCCTTTCTCTTCTTCTAATAAGAAGAATT  
 GTTGAAAATGGTGCAGGAACTGGTTGAACAGTCTACCCCCCTCTCTCAGCTA  
 ACATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTA  
 GCAGGAATTCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAA  
 TATACGATCTACCGGAATTACCTTCGACCGTATAACCTCTGTTTGTTTGAGCAG



TAGCAATTACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGGGCTA  
TTACAATACTATTAACAGATCGAAACCTAAACACTTC

MTEC007716, *Limonius californicus*, larva, A. Esser, 4-May-11, United States of America, Washington, Lincoln Co, "Davenport, DeWalt Farm" ,,,, GACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGGTCACTAATTGGA  
AATGACCAAATCTATAATGTTATTGTCACAGCTCACGCCTTCATCATAATTTT  
CTTTATAGTTATACCAATCATAATTGGTGGGTTTCGGAAACTGGCTAGTTCCAC  
TAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAATATAAGATTC  
TGATTCTTACCCCGTCCCTTTCTCTTCTTAATAAGAAGAATTGTTGAAAAT  
GGTGCAGGAACTGGTTGAACAGTCTACCCCTCTCTCAGCTAACATTGCCCA  
TAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAATTT  
CATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAATATGCGATCT  
ACCGGAATTACCTTCGACCGTATACCTCTGTTTGTGGAGCAGTAGCAATTAC  
TGCCCTTCTCCTTACTTTCACTACCAGTTTTGGCGGGGGCTATTACAATACT  
ATTAACAGATCGAAACCTAAACACTTC

MTEC007717, *Limonius californicus*, larva, A. Esser, 4-May-11, United States of America, Washington, Lincoln Co, "Davenport, WSU-Wilke Farm" ,,,,

MTEC007718, *Limonius californicus*, larva, A. Esser, 4-May-11, United States of America, Washington, Lincoln Co, "Davenport, WSU-Wilke Farm" ,,,, CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGATCA  
CTAATTGGAAATGACCAAATCTATAATGTTATTGTCACAGCTCACGCCTTCAT  
CATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGGTTTCGGAAACTGGC  
TAGTTCCACTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAAT  
ATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTTCTTAATAAGAAGAATT  
GTTGAAAATGGTGCAGGAACTGGTTGAACAGTCTACCCCTCTCTCAGCTA  
ACATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTA  
GCAGGAATTTATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTA  
TATGCGATCTACCGGAATTACCTTCGACCGTATACCTCTGTTTGTGGAGCAG  
TAGCAATTACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGGGCTA  
TTACAATACTATTAACAGATCGAAACCTAA

MTEC007719, *Limonius canus*, larva, A. Esser, 24-May-11, United States of America, Washington, Yakima Co, "Grandview, Lou Graf Farm" ,,,, TCTTGATTTCGTGCCGAACCTTGGTAACCCCGGCTCACTAATCGGAAAT  
GACCAAATTTACAATGTTATTGTTACAGCCACGCCTTCATTATAATTTTCTTT  
ATAGTTATGCCGATCATAATTGGCGGTTTCGGAAACTGATTAGTGCCCCTGAT  
ACTAGGAGCCCCTGATATAGCCTTCCCTCGAATAAACAACATGAGATTCTGA  
TTCCTACCCCGTCTCTTTCCCTCCTTCTAATAAGAAGAATCGTAGAAAATGG  
TGCAGGAACTGGATGAACAGTTTACCCCTCTATCAGCCAACATTGCACAC  
AGAGGGTCATCAGTTGATCTTGCCATTTTCAGCCTTCACCTAGCAGGTATCTC  
TTCCATTCTAGGTGCAGTTAACTTCATCTCAACTGTTATTAATATGCGATCCA

CAGGAATCACCTTTGACCGAATGCCTCTATTCGTTTGAGCAGTAGCAATTACT  
 GCTCTACTCCTCCTTCTTTCTCTCCCAGTCTAGCAGGAGCAATTACAATATTA  
 TTGACAGATCGTAATCTAAACACCTCATTCTTCGA

MTEC007720,Limonius,canus,larva,,A. Esser,24-May-11,United States of  
 America,Washington,Yakima Co,"Grandview, Lou Graf  
 Farm" ,,,,CATCCCTAAGACTCTTGATTTCGTGCCGAACCTGGTAACCCCGGCTCAC  
 TAATCGGAAATGACCAAATTTACAATGTTATTGTTACAGCCCACGCCTTCATT  
 ATAATTTTCTTTATAGTTATGCCGATCATAATTGGCGGTTTCGGAAACTGATT  
 AGTACCCCTGATACTAGGAGCCCCTGATATAGCCTTCCCTCGAATAAACAAC  
 ATGAGATTCTGATTCTACCCCGTCTCTTTCCCTCCTTCTAATAAGAAGAAT  
 CGTAGAAAATGGTGCAGGAACTGGATGAACAGTTTACCCCCCTCTATCAGCC  
 AACATTGCACACAGAGGGTCATCAGTTGATCTTGCCATTTTCAGCCTTCACCT  
 AGCAGGTATCTCTTCCATTCTAGGTGCAGTTAACTTCATCTCAACTGTTATTA  
 ATATGCGATCCACAGGAATCACCTTTGACCGAATGCCTCTATTCGTTTGAGCA  
 GTAGCAATTACTGCTCTACTCCTCCTTCTTTCTCTCCCAGTCTAGCAGGAGC  
 AATTACAATATTATTGACAGATCGTAATCTAAACACCTC

MTEC007721,Limonius,canus,larva,,A. Esser,24-May-11,United States of  
 America,Washington,Yakima Co,"Grandview, Lou Graf  
 Farm" ,,,,CATCCCTAAGACTCTTGATTTCGTGCCGAACCTGGTAACCCCGGCTCAC  
 TAATCGGAAATGACCAAATTTACAATGTTATTGTTACAGCCCACGCCTTCATT  
 ATAATTTTCTTTATAGTTATGCCGATCATAATTGGCGGTTTCGGAAACTGATT  
 AGTGCCCTGATACTAGGAGCCCCTGATATAGCCTTCCCTCGAATAAACAAC  
 ATGAGATTCTGATTCTACCCCGTCTCTTTCCCTCCTTCTAATAAGAAGAAT  
 CGTAGAAAATGGTGCAGGAACTGGATGAACAGTTTACCCCCCTCTATCAGCC  
 AACATTGCACACAGAGGGTCATCAGTTGATCTTGCCATTTTCAGCCTTCACCT  
 AGCAGGTATCTCTTCCATTCTAGGTGCAGTTAACTTCATCTCAACTGTTATTA  
 ATATGCGATCCACAGGAATCACCTTTGACCGAATGCCTCTATTCGTTTGAGCA  
 GTAGCAATTACTGCTCTACTCCTCCTTCTTTCTCTCCCAGTCTAGCAGGAGC  
 AATTACAATATTATTGACAGATCGTAATCTAAACACCTC

MTEC007722,Limonius,canus,larva,,A. Esser,24-May-11,United States of  
 America,Washington,Yakima Co,"Grandview, Lou Graf  
 Farm" ,,,,CATCCCTAAGACTCTTGATTTCGTGCCGAACCTGGTAACCCCGGCTCAC  
 TAATCGGAAATGACCAAATTTACAATGTTATTGTTACAGCCCACGCCTTCATT  
 ATAATTTTCTTTATAGTTATGCCGATCATAATTGGCGGTTTCGGAAACTGATT  
 AGTGCCCTGATACTAGGAGCCCCTGATATAGCCTTCCCTCGAATAAACAAC  
 ATGAGATTCTGATTCTACCCCGTCTCTTTCCCTCCTTCTAATAAGAAGAAT  
 CGTAGAAAATGGTGCAGGAACTGGATGAACAGTTTACCCCCCTCTATCAGCC  
 AACATCGCACACAGAGGGTCATCAGTTGATCTTGCCATTTTCAGCCTTCACCT  
 AGCAGGTATCTCTTCCATTCTAGGTGCAGTTAACTTCATCTCAACTGTTATTA  
 ATATGCGATCCACAGGAATCACCTTTGACCGAATGCCTCTATTCGTTTGAGCA

GTAGCAATTACTGCTCTACTCCTCCTTCTTTCTCTCCCAGTCCTAGCAGGAGC  
AATTACAATATTATTGACAGATCGTAATCTAAACACCTC

MTEC007723, *Limenius, californicus*, larva,, A. Esser, 4-Jun-11, United States of  
America, Washington, Lincoln  
Co, Dregger,,,, CTCTTGATTTCGGGCAGAACTTGGTAACCCTGGATCACTAATTGG  
AAATGACCAAATCTATAATGTTATTGTTACAGCTCACGCCTTCATCATAATTT  
TCTTTATAGTTATACCAATCATAATTGGTGGGTTTCGGAACTGACTAGTTCCT  
CTAATATTAGGAGCTCCTGATATGGCCTTCCCTCGAATAAACAATATAAGATT  
CTGATTCTTACCCCGTCCCTTTCTCTTCTTCTAATAAGAAGAATTGTTGAAAA  
TGGTGCAGGAACTGGATGAACAGTCTACCCCTCTCTCAGCTAACATTGCC  
ATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAATT  
TCATCCATTCTGGGAGCAGTTAATTTTATCTCAACCGTCATTAATATGCGATC  
TACCGGAATTACCTTCGACCGTATACCTCTGTTTGTGTTGAGCAGTAGCAATTA  
CTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGGGCTATTACAATAC  
TATTAACAGATCGAAACCTAAACACTTC

MTEC007724, *Limenius, californicus*, larva,, A. Esser, 4-Jun-11, United States of  
America, Washington, Lincoln  
Co, Dregger,,,, CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGA  
TCACTAATCGGAAATGACCAAATCTATAATGTTATTGTCACAGCTCACGCCTT  
CATCATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGGTTTCGGAACT  
GGCTAGTTCCACTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAAC  
AATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTCCTTCTAATAAGAAG  
AATTGTTGAAAATGGTGCAGGAACTGGTTGAACAGTCTACCCCTCTCTCAG  
CTAACATTGCCCATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCAC  
CTAGCAGGAATTTTCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCAT  
TAATATGCGATCTACCGGAATTACCTTCGACCGTATACCTCTGTTTGTGTTGAG  
CAGTAGCAATTACTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCGGGG  
GCTATTACAATACTATTAACAGATCGAAACCTAAACACTTC

MTEC007725, *Limenius, infuscatus*, larva,, A. Esser, 4-Jun-11, United States of  
America, Washington, Lincoln Co, W,,,

MTEC007726, *Limenius, infuscatus*, larva,, A. Esser, 4-Jun-11, United States of  
America, Washington, Lincoln Co, W,,,

MTEC007727, *Limenius, infuscatus*, adult, Female, "R.F. Lang, J.P. Cuda", 16-May-  
88, United States of America, Montana, Flathead Co, Kalispell,,,

MTEC007728, *Limenius, infuscatus*, adult, Male, H.W. Ziolkowski, 16-May-89, United  
States of America, Montana, Flathead Co, "Whitefish Lake, City Beach",,,

MTEC007729, *Limonius, infuscatus*, adult, Male, D.L. Gustafson, 22-Apr-87, United States of America, Montana, Jefferson Co, Lewis and Clark

Caverns,,,GrCTCCTTATTyGAGCAGArMTGGGAAATCCTGGCTCmwTAATTGGA  
AATGrmCAAATTTATwAmGTAATTGTAACArCACmCGCyTTCATCATAATTTTy  
TTCATAGTAATwCCAATTATAATCGGTGGATTTGGAAAmTGATTAGTwCCmCT  
TATwmTAGGARCCCAGACATArCmTTyCCTCGAATAAATAATATAAGATTyTG  
ATTCCTyCCTCCmTCsCTTTCCCTTCTTCTCATAAGAAGAATTGTAGAAAATGG  
TrsyrgTACAGGATGAACTGTTTATCCACCCTTATCArCAAACATTkCCCATAGA  
GGATCsTyCGTTGATTTGGCAATTTTCAGTCTGCmTyTArCAGGAATCTCATCA  
ATTcTAGGAGCAGTAACTTTATCTCCACCGTAATTAATATwCGAACTACAGG  
AATCACTTTTGrCCGAATwCCyTTATTTGkATGARcAGkTGCAATTACAGsTCTw  
CTATTACTTCTCTCCTTAyCAGkTCTT

MTEC007730, *Limonius, infuscatus*, adult, Male, "R.F. Lang, R.D. Richard", 6-Jun-91, United States of America, Montana, Flathead Co, Hungary

Horse,,,CTTATTCGAGCAGAGCTGGGGAATCCTGGCTCATTAAATTGGAAATGA  
CCAAATTTATAACGTAATTGTAACAGCACACGCTTTTATCATAATTTTCTTCA  
TAGTAATACCAATTATAATCGGTGGATTTGGAAACTGACTAGTACCGCTTATG  
CTAGGAGCCCCAGACATAGCATTCCCTCGAATAAATAATATAAGATTCTGAT  
TCCTTCCTCCATCGCTTTCCCTTCTTCTCATAAGAAGAATTGTAGAAAATGGT  
GCTGGCACAGGATGAACTGTTTATCCACCCTTATCAGCAAACATCGCCATA  
GAGGATCCTCCGTTGATTTGGCAATTTTCAGTCTACATCTAGCAGGAATCTCA  
TCAATTCTAGGAGCAGTAACTTTATCTCCACCGTAATTAATATGCGAACTAC  
AGGAATCACTTTTGACCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAG  
CTCTACTATTACTTCTCTCCTTACCAGTTCTTGCCGGAGCAATCACAATACTAT  
TAACAGACCGAAATCTAAATACCTCATTTTTTG

MTEC007731, *Limonius, infuscatus*, adult, Male, H.W. Ziolkowski, 16-May-89, United States of America, Montana, Flathead Co, "Whitefish Lake, City Beach", ,,,

MTEC007739, *Selatosomus, aeripennis*, larva, "C.Hart, A. Stavens", 15 MAY to 16 JUN 2011, United States of America, Montana, Sheridan Co, Mile 28 of Hwy

5,48.78922N,104.83690W,,CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGgTaA  
TCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGCCC  
ACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATTC  
GGAAATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCACG  
TATAAACAATATAAGATTCTGATTCCCTCCCACCCTCTCTATCACTTTTACTAAT  
AAGAAGAATCGTGGAAAATGGGGCAGGAACAGGATGAACAGTTTACCCCC  
TCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTTCA  
GATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCTCA  
ACAGTTATTAATATAACGATCAACTGGAATCACCTTTGACCGAATACCTTTATT  
TGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTCTT  
GGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATACATCCTTT  
TTTGACCCC

MTEC007742, *Hemicrepidius memnonius*, larva, "C.Hart, A. Stavens", 16 MAY to 16 JUN 2011, United States of America, Montana, Richland Co, "Sidney, MSU extension office, beet field", 47.73120N, 104.15210W, CTTCATTAAGACTATTAATTCGAGCAGAACTTGGTAACCCAGGATCACTTATTGGAAATGACCAAATCTACAATGTCATTGTAACAGCTCATGCTTTTATCATAATTTTCTTTATAGTAATACCAATTATAATTGGAGGATTCGGAAATTGATTAGTTCCCCTAATACTAGGAGCCCCAGATATGGCTTTCCCTCGAATAAATAATATAAGATTTTGGTTTCTACCTCCTTCCCTTTCTCTGTTACTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACAGGATGAACTGTTTATCCACCTCTATCAGCAAATATTGCCCATAGTGGTTCCTCAGTAGATCTTGCTATTTTAGTCTACACCTAGCAGGAATCTCATCAATTCTAGGAGCTGTAACTTTATTCTACAGTGATTAATATACGATCAACCGGAATTACATTTGATCGAATACCTTTATTTGTGTGAGCTGTTGTTATTACAGCCCTTCTATTACTTTTGTCTCTTCCCTGTTCTTGCAGGAGCAATCACTATACTTTTAAACAGATCGAAATCTAAATACCTCA

MTEC007743, *Hemicrepidius memnonius*, larva, "C.Hart, A. Stavens", 16 MAY to 16 JUN 2011, United States of America, Montana, Richland Co, "Sidney, MSU extension office, beet field", 47.73120N, 104.15210W, CTTCATTAAGACTATTAATTCGAGCAGAACTTGGTAACCCAGGATCACTTATTGGAAATGACCAAATCTACAATGTCATTGTAACAGCTCATGCTTTTATCATAATTTTCTTTATAGTAATACCAATTATAATTGGAGGATTCGGAAATTGATTAGTTCCCCTAATACTAGGAGCCCCAGATATGGCTTTCCCTCGAATAAATAATATAAGATTTTGGTTTCTACCTCCTTCCCTTTCTCTGTTACTAATAAGAAGAATTGTAGAAAATGGAGCAGGAACAGGATGAACTGTTTATCCACCTCTATCAGCAAATATTGCCCATAGTGGTTCCTCAGTAGATCTTGCTATTTTAGTCTACACCTAGCAGGAATCTCATCAATTCTAGGAGCTGTAACTTTATTCTACAGTGATTAATATACGATCAACCGGAATTACATTTGATCGAATACCTTTATTTGTGTGAGCTGTTGTTATTACAGCCCTTCTATTACTTTTGTCTCTTCCCTGTTCTTGCAGGAGCAATCACTATACTTTTAAACAGATCGAAATCTAAATACCTCA

MTEC007751, *Selatosomus aripennis*, larva, "C.Hart, A. Stavens", 26 MAY to 14 JUN 2011, United States of America, Montana, Hill Co, Fort Assiniboine extension office, 48.49846N, 109.8005W, GCCTTCTAATTCGAGCTGAACTAGGTAATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGCCCACGCCTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATTCGGAAATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCACGTATAAACAAATAAAGATTCTGATTCCCTCCCACCCTCTCTATCACTTTTACTAATAAGAA GAATCGTGGA AAAATGGGGCAGGAACAGGATGAACAGTTTACCCCCCTCTCTCAGCCAATATTGCCCATAGAGGGTCCATCAGTTGACCTGGCAATTTTTCAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCTCAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTATTTGTATGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTCCCTGGCAG

GAGCAATTACAATGTTACTGACCGATCGAAACCTAAATACATCCTTTTTTTGAC  
CCCGC

MTEC007752,*Selatosomus, aripennis*, larva, "C.Hart, A. Stavens", 26 MAY to 14 JUN  
2011, United States of America, Montana, Hill Co, Fort Assiniboine extension  
office, 48.49846N, 109.8005W, CTTCTCTTAGCCTTCTAATTTCGAGCTGAACTAGGT  
AATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGC  
CCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGAT  
TCGGAAATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCA  
CGTATAACAATATAAGATTCTGATTCCTCCCACCCTCTCTATCACTTTTACTA  
ATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGATGAACAGTTTACCCC  
CCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTT  
CAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCT  
CAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTA  
TTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTC  
CTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATACATCCT  
TTTTTGACCCCGC

MTEC007755,*Hypnoidus, bicolor*, larva, "C.Hart, A. Stavens", 5 JUN to 5 JUL  
2011, United States of America, Idaho, Fremont Co, "North of Island Park, Hwy 20,  
mi396", 44.54572N, 111.3326W, CTTCCCTTAAGAATCCTAATCCGTGCCGAACCTCG  
GAAACCCTGGCTACTAATTGGAAATGATCAAATCTACAATGTAATTGTAAC  
AGCCCATGCTTTCATTATAATTTTTTTCATAGTTATACCAATTATAATTGGGGG  
GTTTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGCATTCC  
CACGAATAACAACATAAGATTCTGATTTTTACCTCCTTCTCTACTCCTG  
CTTATAAGAAGAATTGTAGAGAATGGGGCAGGAACCTGGTTGAACAGTATAACC  
CTCCTTTATCAGCCAACATCGCCCACAGAGGATCATCTGTTGACTTAGCAATT  
TTTAGATTACATCTAGCTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTAT  
TTCAACTGTAATCAATATACGATCAACGGGAATCAACTTTGATCGTATACCAT  
TATTTGTTGAGCTGTAGCAATTACTGCACTTCTACTACTTATTTCACTTCCAG  
TCCTGGCAGGAGCAATCACTATACTACTGACAGACCGAACTTAAACACATC  
ATTTTTTG

MTEC007756,*Hypnoidus, leei*, larva, "C.Hart, A. Stavens", 5 JUN to 5 JUL 2011, United  
States of America, Idaho, Fremont Co, "North of Island Park, Hwy 20,  
mi397", 44.54572N, 111.3326W, CCTCCTTAAGACTCCTAATCCGTGCAGAACTAG  
GAAACCCTGGTTCACTAATTGGGAATGATCAAATCTACAACGTAATTGTAAC  
GGCCCATGCTTTCATTATAATTTTCTTCATAGTTATACCAATCATGATCGGTG  
GTTTCGGAAATTGATTAGTACCTTTAATACTAGGAGCTCCCGACATAGCATT  
CCTCGAATAAATAACATAAGATTTTGATTATTACCCCTTCTCTGTCACTACTT  
TTAATAAGAAGAATCGTAGAAAATGGGGCAGGAACCGGATGAACCGTTTATC  
CCCCCTCTCAGCTAATATTGCCCATAGAGGCTCATCTGTTGATTTAGCAATC  
TTCAGTTTACTTGGCTGGAATCTCATCAATTCTAGGAGCAGTAAATTTTAT  
TTCAACCGTAATCAATATACGATCAACAGGAATCACCTTTGATCGAATACCGT

TATTTGTTTGAGCTGTTGCAATTACAGCACTTCTCCTCCTTCTTTTCATTACCAG  
TATTAGCTGGAGCAATCACTATACTACTAACAGACCGAAATTTAAATACATC

MTEC007757, *Ampedus*, sp1, larva, "C.Hart, A. Stavens", 7 JUN to 28 JUN 2011, United States of America, Montana, Granite Co, Rest Stop at mi143 on I90, 46.70355N, 113.34463W, GCTGAGCTAGGTAACCCAGGATCACTTATCGGAAATGACCAGATCTATAACGTTATCGTAACAGCACATGCTTTCATCATAATTTTCATCATAGTTATAACCAATCATAATTGGAGGATTTGGAAATTGATTAGTACCCTAATGCTAGGTGCCCTGATATAGCATTTCACGAATAACAACATAAGATTCGGTTCCTACCCCTTCATTATCCCTACTTCTAATAAGAAGAATCGTAGAAAA TGGAGCAGGAACAGGATGAACAGTATACCCGCCACTATCATCAAACATTGCCCACAGAGGATCATCAGTTGACCTAGCTATTTTCAGACTACACTTAGCAGGTATTCATCCATTCTAGGCGCCGTAACTTCATCTCAACAGTAATCAATATACGATCAACAGGAATTACCTTTGACCGAATACCTCTATTTGTATGAGCAGTAGCAATTACTGCCCTACTTCTACTCCTTTCACTTCCAGTTCTAGCAGGAGCTATCACCATACTACTCACAGACCGAAATCTAAACACATC

MTEC007758, *Ampedus*, sp2, larva, "C.Hart, A. Stavens", 7 JUN to 28 JUN 2011, United States of America, Montana, Granite Co, Rest Stop at mi143 on I90, 46.70402N, 113.33752W, TCCTAATCCGTGCCGAATTAGGCAACCCTGGTTCC TTAATTGGCAATGATCAAATTTACAACGTTATTGTTACTGCACATGCATTCATCATAATTTTCTTCATAGTTATAACCAATTATAATTGGAGGATTCGGAAATTGGC TAGTCCCATAACTGGGTGCCCCAGACATAGCCTTCCCCCGAATGAATAA CATAAGTTTCTGGCTTCTACCCCATCTTTAAGCCTCCTACTAATAAGAAGAA TTGTAGAAAACGGAGCAGGAACAGGATGAACAGTTTACCCACCCTATCATC CAACATTGCCACAGAGGTTCCCTCAGTTGATTTAGCAATTTTCAGCCTTCATC TAGCCGGAATCTCCTCAATTCTAGGCGCAGTAAATTTTCATCTCAACAGTAATT AATATACGATCAACAGGAATCACATTTGACCGTATACCACTATTTGTATGAGC AGTAGCAATTACAGCTCTATTACTCCTTCTATCATTACCAGTTCTAGCTGGTG CAATCACAATACTTCTAACAGACCGAAATCTAAATACCTCATTC

MTEC007759, *Dalopius*, sp., larva, "C.Hart, A. Stavens", 7 JUN to 28 JUN 2011, United States of America, Montana, Granite Co, Rest Stop at mi143 on I90, 46.70402N, 113.33752W, CATCATTAAGATTACTAATTCGTGCTGAATTAGGT AACCCAGGATCATTAAATTGGAAATGATCAAATTTACAATGTTATTGTAACAG CACATGCATTCATTATAATTTTCTTCATAGTTATAACCTATCATAATTGGAGGA TTCGGAAATTGATTAGTCCCATTAATACTTGGAGCTCCAGATATAGCTTTCCC TCGAATAACAACATAAGATTCTGATTTTTACCACCTTCACTATCCCTTCTTCT AATAAGAAGAATTGTTGAAAATGGGGCAGGAACAGGATGAACCGTTTACCCT CCACTATCCTCAAATATTGCACATAGAGGCTCATCAGTTGATTTAGCAATTTT TAGTTTACACTTAGCTGGAATTTTCATCAATTTTAGGAGCTGTAAATTTTATTTC TACAGTGATTAATATACGATCAACTGGAATTACCTTTGATCGAATGCCTTTAT TTGTTTGAGCAGTTGCAATTACTGCCTTACTTTTATTACTTTCCTACTACCAGTAT

TAGCCGGAGCAATTACTATATTATTAACAGATCGAAACCTAAACACATCATT  
CTTTGACCCAG

MTEC007760, *Hadromorphus, callidus*, larva, "C.Hart, A. Stavens", 7 JUN to 28 JUN  
2011, United States of America, Montana, Granite Co, Rest Stop at mi143 on  
I90, 46.70402N, 113.33752W,,

MTEC007761, *Dalopius, sp.*, larva, "C.Hart, A. Stavens", 8 JUN to 28 JUN 2011, United  
States of America, Montana, Missoula Co, "Lolo Pass, Fort  
Fizzle", 46.74543N, 114.17193W,, CATCATTAAGATTACTAATTCGTGCTGAATTAG  
GTAACCCAGGATCATTAAATTGGAAATGATCAAATTTACAATGTTATTGTAACA  
GCACATGCATTATTATAATTTTCTTCATAGTTATAACCTATCATAATTGGAGG  
ATTCGGAAATTGATTAGTCCCATTAAACTTGGAGCTCCAGATATAGCTTTCC  
CTCGAATAAACAACATAAGATTCTGATTTTTACCACCTTCACTGTCCCTTCTTC  
TAATAAGAAGAATTGTTGAAAATGGGGCAGGAACAGGATGAACCGTTTACCC  
TCCACTATCCTCAAATATTGCACACAGAGGCTCATCAGTTGATTTAGCAATTT  
TTAGTTTACACTTAGCTGGAATTTTCATCAATTTTAGGAGCTGTAAATTTTATTT  
CTACAGTAATTAATATACGATCAACTGGAATTACCTTTGATCGAATGCCTTTA  
TTTGTGTTGAGCAGTTGCAATTACTGCCTTACTTTTATTACTTTCACTACCAGTA  
TTAGCCGGAGCAATTACTATATTATTAACAGATCGAAACCTAAACACATCA

MTEC007762, *Dalopius, sp.*, larva, "C.Hart, A. Stavens", 9 JUN to 29 JUN 2011, United  
States of America, Montana, Ravalli Co, Skalkaho Pass  
Rd, 46.16292N, 113.95837W,, CATCATTAAGATTACTAATTCGTGCTGAATTAGGT  
AACCCAGGATCATTAAATTGGAAATGATCAAATTTACAATGTTATTGTAACAG  
CACATGCATTATTATAATTTTCTTCATAGTTATAACCTATCATAATTGGAGGA  
TTCGGAAATTGATTAGTCCCATTAAACTTGGAGCTCCAGATATAGCTTTCCC  
TCGAATAAACAACATAAGATTCTGATTTTTACCACCTTCACTATCCCTTCTTCT  
AATAAGAAGAATTGTTGAAAATGGGGCAGGAACAGGATGAACCGTTTACCT  
CCACTATCCTCAAATATTGCACATAGAGGCTCATCAGTTGATTTAGCAATTTT  
TAGTTTACACTTAGCTGGAATTTTCATCAATTTTAGGAGCTGTAAATTTTATTT  
TACAGTGATTAATATACGATCAACTGGAATTACCTTTGATCGAATGCCTTTAT  
TTGTTGAGCAGTTGCAATTACTGCCTTACTTTTATTACTTTCACTACCAGTAT  
TAGCCGGAGCAATTACTATATTATTAACAGATCGAAACCTAAACACATCA

MTEC007763, *Metanomus, insidiosus*, larva, "C.Hart, A. Stavens", 9 JUN to 29 JUN  
2011, United States of America, Montana, Beaverhead Co, "Chief Joseph Pass, Tie  
Creek", 45.67052N, 113.69585W,, TTAGACTTCTGATTCGAGCAGAATTAGGAAATC  
CTGGATCATTAAATCGGAAATGACCAAATCTACAACGTAATCGTTACAGCTCA  
TGCTTTTATCATAATTTTTTTTATAGTTATAACCTATCATAATTGGAGGATTTGG  
AAATTGACTAGTTCCATTAATGCTTGGAGCCCCGACATAGCATTCCCCGAA  
TAAACAACATAAGATTCTGACTTTTACCACCATCACTATCCCTGCTTCTAATA  
AGAAGAATTGTAGAAAACGGAGCAGGAACAGGATGAACTGTCTACCCCCCTC  
TCTCAGCAAATATTGCTCACAGAGGTTTCATCTGTAGATCTCGCAATTTTTAGA



CTACCCCTTGCAGGAATTTCTCAATTCTAGGAGCAGTAACTTCATCTCTAC  
GGTAATCAATATACGATCAACTGGAATTACTTTTGACCGAATACCTTTATTCG  
TATGAGCCGTGGCTATCACAGCTTCTACTTCTCCTAAGACTTCCGGTCCCTC  
GCCGGAGCAATCACAATACTTCTAACAGACCGAACTT

MTEC007764, *Selatosomus, semimetallicus*, larva, "C.Hart, A. Stavens", 9 JUN to 29 JUN  
2011, United States of America, Montana, Beaverhead Co, "Hwy 43, Sawmill Gulch  
Trail", 45.75200N, 112.77806W, CTTCTCTTAGTCTTCTGATTGAGCTGAACTAGG  
TAACCCCGGCTCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTTACAG  
CCCATGCCTTTATTATAATTTTCTTTATAGTTATACCAATCATAATTGGAGGAT  
TCGGTAATTGACTCGTTCCTCTAATACTTGGAGCTCCTGACATAGCATTCCCA  
CGAATAAACACATAAGATTCTGGTTCCTACCACCTTCTCTGTCGCTTTTACT  
AATAAGAAGAATCGTAGAAAACGGGGCAGGAACAGGATGAACTGTTTACCC  
TCCCCTTTCAGCAAACATTGCTCACAGAGGGTCTTCAGTAGACCTGGCAATTT  
TTAGTTTACACCTAGCAGGAATTTTCATCAATTCTAGGAGCAGTAAATTTTCATT  
TCAACAGTAATTAACATACGATCAACTGGGATCACCTTCGACCGAATGCCTCT  
ATTTGTATGAGCAGTAGCCACTTACTGCCCTTCTCCTCCTTTTGTCCCTACCAGT  
ACTAGCTGGTGCAATTACAATGCTATTAACCGACCGAACTTAAACAC

MTEC007765, *Hadromorphus, callidus*, larva, "C.Hart, A. Stavens", 9 JUN to 29 JUN  
2011, United States of America, Montana, Deerlodge Co, "Hwy43, mile marker  
43", 45.82302N, 113.27215W, CATCCCTTAGACTTCTGATTGAGCTGAACTAGGT  
AACCAGGATCTCTCATTGGCAATGATCAAATCTACAACGTCATTGTTACAGC  
CCACGCTTTCATTATAATTTTCTTCATAGTAATACCTATCATAATTGGAGGATT  
CGGAAATTGATTAGTTCCCTAATACTCGGGGCTCCCGACATGGCCTTTCCAC  
GAATGAATAATATGAGATTCTGGTTTCTTCCCCCTTCTTTATCTTTACTCTTAA  
TAAGAAGAATTGTTGAAAATGGAGCAGGGACAGGATGAACTGTTTACCCTCC  
TCTGTCAGCCAATATCGCTCACAGAGGGTCATCAGTTGACTTAGCAATTTTAA  
GTCTACACCTAGCTGGAATTTTCATCAATTTTAGGAGCTGTAAATTTTATTTCA  
ACAGTAATTAACATACGATCAACCGGAATCACCTTTGACCGGATACCTCTATT  
TGTATGAGCTGTAGCCATTACAGCCCTCCTCCTTTTACTTTCTCTACCTGTACT  
TGCAGGAGCAATCACAATACTATTAACCGATCGAAACCTAAATACCTCCTTC

MTEC007767, *Dalopius, sp.*, larva, "C.Hart, A. Stavens", 28 JUN to 25 AUG 2011, United  
States of America, Montana, Missoula Co, "Lolo Pass, Fort  
Fizzle", 46.74543N, 114.17193W, CATCATTAAAGATTACTAATTCGTGCTGAATTAG  
GTAACCCAGGATCATTAAATTGGAAATGATCAAATTTACAATGTTATTGTAACA  
GCACATGCATTATTATAATTTTCTTCATAGTTATACCTATCATAATTGGAGG  
ATTCGGAAATTGATTAGTCCCATTAATACTTGGAGCTCCAGATATAGCTTTCC  
CTCGAATAAACACATAAGATTCTGATTTTACCACCTTCACTATCCCTTCTTC  
TAATAAGAAGAATTGTTGAAAATGGGGCAGGAACAGGATGAACTGTTTACCC  
TCCACTATCCTCAAATATTGCACACAGAGGCTCATCAGTTGATTTAGCAATTT  
TTAGTTTACACTTAGCTGGAATTTTCATCAATTTTAGGAGCTGTAAATTTTATTT  
CTACAGTAATTAATATACGATCAACTGGAATTACCTTTGATCGAATGCCTTTA

TTTGTTTGAGCAGTTGCAATTACTGCCTTACTTTTATTACTTTCACTACCAGTA  
TTAGCCGGAGCAATTACTATATTATTAACAGATCGAAACCTAAACACATCA

MTEC007770,*Dalopius*,sp.,larva,,"C.Hart, A. Stavens",28 JUN to 25 AUG 2011,United States of America, Montana, Missoula Co, "Lolo Pass, Fort Fizzle",46.74543N,114.17193W,,CATCATTAAGATTACTAATTCGTGCTGAATTAG GTAACCCAGGATCATTAAATTGGAAATGATCAAATTTACAATGTTATTGTAACA GCACATGCATTCATTATAATTTTCTTCATAGTTATACCTATCATAATTGGAGG ATTCGGAAATTGATTAGTCCCATTAATACTTGGAGCTCCAGATATAGCTTTCC CTCGAATAAACAAACATAAGATTCTGATTTTTACCACCTTCACTATCCCTTCTTC TAATAAGAAGAATTGTTGAAAATGGGGCAGGAACAGGATGAACCGTTTACCC TCCACTATCCTCAAATATTGCACATAGAGGCTCATCAGTTGATTTAGCAATTT TTAGTTTACACTTAGCTGGAATTTTCATCAATTTTAGGAGCTGTAAATTTTATTT CTACAGTGATTAATATACGATCAACTGGAATTACCTTTGATCGAATGCCTTTA TTTGTTTGAGCAGTTGCAATTACTGCCTTACTTTTATTACTTTCACTACCAGTA TTAGCCGGAGCAATTACTATATTATTAACAGATCGAAACCTAAACACATCA

MTEC007772,*Metanomus*,*insidiosus*,larva,,"C.Hart, A. Stavens",29 JUN to 25 AUG 2011,United States of America, Montana, Beaverhead Co, "Chief Joseph Pass, Tie Creek",45.67052N,113.88106W,,TTCCCTTAGACTTCTGATTCGAGCAGAATTAGG AAATCCTGGATCATTAAATCGGAAATGACCAAATCTACAACGTAATCGTTACA GCTCATGCTTTTATCATAATTTTTTTTATAGTTATACCTATCATAATTGGAGGA TTTGGAAATTGACTAGTTCCATTAATGCTTGGAGCCCCGACATAGCATTCCC CCGAATAAACAAACATAAGATTCTGACTTTTACCACCATCACTATCCCTGCTTC TAATAAGAAGAATTGTAGAAAACGGAGCAGGAACAGGATGAACTGTCTACC CCCCTCTCTCAGCAAATATTGCTCACAGAGGTTTCATCTGTAGATCTCGCAATT TTAGACTACACCTTGCAGGAATTTCCCTCAATTCTAGGAGCAGTAACTTCAT CTCTACGGTAATCAATATACGATCAACTGGAATTACTTTTGACCGAATACCTT TATTCGTATGAGCCGTGGCTATCACAGCTCTTCTACTTCTCCTAAGACTTCCG GTCCCTCGCCGGAGCAATCACAATACTTCTAACAGACCGAACTTAAACACCT CA

MTEC007776,*Hypnoidus*,*bicolor*,larva,,"C.Hart, A. Stavens",29 JUN to 3 AUG 2011,United States of America, Montana, Beaverhead Co, "Hwy 43, mile marker 19",45.62861N,113.59083W,,CTTCCTTAAGCCTCCTAATCCGTGCCGAACCTCGGA AACCTGGCTCACTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAG CCCACGCTTTCATTATAATTTTTTTTCATAGTTATACCGATTATGATTGGGGGAT TTGGTAATTGATTAGTACCCCTCATACTAGGAGCACCTGATATAGCATTCCCA CGAATAAACAAACATGAGATTCTGATTTTTTACCCCTTCACTATCACTCCTACT TATAAGAAGAATTGTAGAAAATGGTGCAGGAACCTGGTTGAACTGTCTACCCC CTTTTATCAGCTAACATTGCCACAGAGGTTTCATCCGTTGACTTAGCAATTTT CAGTTTACATCTAGCTGGTATCTCATCTATCCTAGGGGCAGTAAATTTTATTT CAACCGTAATTAATATACGATCAACAGGAATCACCTTTGATCGTATAACCATTA TTTGTTTGAGCTGTAGCAATTACTGCACTTCTACTACTTCTTTCACTTCCAGTC

CTAGCAGGAGCAATCACTATACTACTGACAGACCGAACTTAAATACATCAT  
TTTTTG

MTEC007778, *Hypnoidus, bicolor*, larva, "C.Hart, A. Stavens", 29 JUN to 3 AUG  
2011, United States of America, Montana, Beaverhead Co, "Hwy 43, mile marker  
19", 45.62861N, 113.59083W, TCCTAATCCGTGCCGAACCTCGGAAACCCTGGCTCA  
CTAATTGGAAATGATCAAATCTACAATGTAATTGTAACAGCCCATGCTTTTCAT  
TATAATTTTTTTCATAGTTATAACCAATTATAATTGGGGGGTTTGGTAATTGATT  
AGTACCCCTCATACTAGGAGCACCTGATATAGCATTCCCACGAATAAACAAC  
ATAAGATTCTGATTTTTACCTCCTTCTCTATCACTCCTGCTTATAAGAAGAATT  
GTAGAGAATGGGGCAGGAACTGGTTGAACAGTATACCCTCCTTTATCAGCCA  
ACATCGCCCACAGAGGATCATCTGTTGACTTAGCAATTTTTAGATTACATCTA  
GCTGGTATCTCATCTATCCTAGGAGCAGTAAATTTTTATTCAACTGTAATCAA  
TATACGATCAACGGGAATCAACTTTGATCGTATACCATTATTTGTTTGGAGCTG  
TAGCAATTACTGCACTTCTACTACTTATTTCACTTCCAGTCCCTGGCAGGAGCA  
ATCACTATACTACTGACAGACCGAACTTAAACACATC

MTEC007783, *Selatosomus, semimetallicus*, larva, "C.Hart, A. Stavens", 29 JUN to 24  
AUG 2011, United States of America, Montana, Beaverhead Co, "Divide Bridge, Sawmill  
Gulch  
Trail", 45.75200N, 112.77806W, GATTCGAGCTGAACTAGGTAACCCCGGCTCTCT  
CATTGGTAATGACCAAATTTACAACGTAATCGTTACAGCCCATGCCTTTATTA  
TAATTTTCTTTATAGTTATAACCAATCATAATTGGAGGATTCGGTAATTGACTC  
GTTCTCTAATACTTGGAGCTCCTGACATAGCATTCCCACGAATAAACAACAT  
AAGATTCTGGTTCCTACCACCTTCTCTGTGCTTTTACTAATAAGAAGAATCG  
TAGAAAACGGGGCAGGAACAGGATGAACTGTTTACCCTCCCCTTTCAGCAA  
CATTGCTCACAGAGGGTCTTCAGTAGACCTGGCAATTTTTAGTTTACACCTAG  
CAGGAATTTTCATCAATTCTAGGAGCAGTAAATTTCAATTTCAACAGTAATTAAC  
ATACGATCAACTGGGATCACCTTCGACCGAATGCCTCTATTTGTATGAGCAGT  
AGCCATTACTGCCCTTCTCCTCCTTTTGTCCCTACCAGTACTAGCTGGTGCAAT  
TACAATGCTATTAACCGACCGAACTTAAACAC

MTEC007785, *Limonius, aegar*, larva, "C.Hart, A. Stavens", 30 JUN to 25 AUG  
2011, United States of America, Montana, Beaverhead Co, "Polaris, Clark Creek  
Rd", 45.42515N, 113.09007W, ACTAGGCACATCACTAAGACTTCTAATCCGAGCC  
GAACTTGGTAACCCTGGCTCTCTAATTGGAAATGACCAAATCTATAACGTAAT  
TGTTACAGCTCACGCCTTTATCATAATTTTCTTCATAGTTATAACCAATCATAAT  
TGGAGGATTCGGAAATTGACTTGTCCCTCTTATACTAGGTGCTCCCGATATAG  
CATTTCCCTCGAATAAACAATATAAGATTTTGATTCCCTCCTCCTTCATTATCCT  
TGTTACTAATAAGAAGTATTGTAGAAAACGGAGCAGGAACAGGATGGACCGT  
TTACCCTCCTCTCTCAGCTAATATTGCTCATAGAGGGTCTCAGTAGACCTAG  
CTATTTTCAGTCTTCATCTAGCAGGAATTTTCGTCAATTCTAGGAGCAGTAAAC  
TTCATTTCAACTGTAATCAATATACGATCAACAGGAATCACTTTTGACCGTAT  
ACCTCTTTTTGTTTGGAGCAGTAGCTATTACAGCTCTTCTTCTTCTTGTCTCT

ACCTGTTCTTGCAGGAGCAATCACAATACTTCTTACAGACCGAAATCTTAATA  
CTTCATTCTTTGACCCAGCA

MTEC007788, *Selatosomus, aripennis*, larva, "C.Hart, A. Stavens", 26 JUL to 23 AUG  
2011, United States of America, Montana, Hill Co, Fort Assiniboine extension  
office, 48.49846N, 109.8005W, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGT  
AATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGC  
CCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGAT  
TCGGA AATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCA  
CGTATAACAATATAAGATTCTGATTCCTCCCACCCTCTCTATCACTTTTACTA  
ATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGATGAACAGTTTACCCC  
CCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTT  
CAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCT  
CAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTA  
TTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTC  
CTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATAC

MTEC007790, *Selatosomus, aripennis*, larva, "C.Hart, A. Stavens", 27 JUL to 18 AUG  
2011, United States of America, Montana, Valley Co, "Mile 525, Hwy 2, Tampico  
Rd", 48.38686N, 106.82424W, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGT  
AATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGC  
CCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGAT  
TCGGA AATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCA  
CGTATAACAATATAAGATTCTGATTCCTCCCACCCTCTCTATCACTTTTACTA  
ATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGATGAACAGTTTACCCC  
CCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTT  
CAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCT  
CAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTA  
TTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTC  
CTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATAC

MTEC007794, *Aeolus, mellillus*, larva, "C.Hart, A. Stavens", 27 JUL to 18 AUG  
2011, United States of America, Montana, Valley Co, "Mile 525, Hwy 2, Tampico  
Rd", 48.38686N, 106.82424W, ,

MTEC007796, *Selatosomus, aripennis*, larva, "C.Hart, A. Stavens", 27 JUL to 18 AUG  
2011, United States of America, Montana, Valley Co, "Mile 525, Hwy 2, Tampico  
Rd", 48.38686N, 106.82424W, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGT  
AATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGC  
CCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGAT  
TCGGA AATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCA  
CGTATAACAATATAAGATTCTGATTCCTCCCACCCTCTCTATCACTTTTACTA  
ATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGATGAACAGTTTACCCC  
CCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTT

CAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCT  
 CAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTA  
 TTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTC  
 CTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATAC

MTEC007798,*Selatosomus, aeripennis*, larva, "C.Hart, A. Stavens", 27 JUL to 18 AUG  
 2011, United States of America, Montana, Valley Co, "Mile 525, Hwy 2, Tampico  
 Rd", 48.38686N, 106.82474W, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGT  
 AATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGC  
 CCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGAT  
 TCGGAAATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCA  
 CGTATAACAATATAAGATTCTGATTCCCTCCCACCCTCTCTATCACTTTTACTA  
 ATAAGAAGAATCGTGGAATAATGGGGCAGGAACAGGATGAACAGTTTACCCC  
 CCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTT  
 CAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCT  
 CAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTA  
 TTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTC  
 CTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATAC

MTEC007800,*Selatosomus, aeripennis*, larva, "C.Hart, A. Stavens", 27 JUL to 19 AUG  
 2011, United States of America, Montana, Roosevelt Co, "Hwy 13 to Scobey, mile  
 34", 48.54693N, 105.43049W, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGT  
 AATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGC  
 CCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGAT  
 TCGGAAATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCA  
 CGTATAACAATATAAGATTCTGATTCCCTCCCACCCTCTCTATCACTTTTACTA  
 ATAAGAAGAATCGTGGAATAATGGGGCAGGAACAGGATGAACAGTTTACCCC  
 CCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTT  
 CAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCT  
 CAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTA  
 TTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTC  
 CTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATAC

MTEC007805,*Selatosomus, aeripennis*, larva, "C.Hart, A. Stavens", 27 JUL to 19 AUG  
 2011, United States of America, Montana, Sheridan Co, "Bolster Rd, W of Mile 28 of Hwy  
 5", 48.78922N, 104.83690W, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGTA  
 ATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGCC  
 CACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATT  
 CGGAAATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCAC  
 GTATAACAATATAAGATTCTGATTCCCTCCCACCCTCTCTATCACTTTTACTA  
 ATAAGAAGAATCGTGGAATAATGGGGCAGGAACAGGATGAACAGTTTACCCC  
 CCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTT  
 CAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCT  
 CAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTA

TTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTC  
CTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATAC

MTEC007810, *Selatosomus, aeriopennis*, larva, "C.Hart, A. Stavens", 27 JUL to 19 AUG  
2011, United States of America, Montana, Sheridan Co, "Bolster Rd, W of Mile 28 of Hwy  
5", 48.78884N, 104.83638W, CTTCTCTTAGCCTTCTAATTTCGAGCTGAACTAGGTA  
ATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGCC  
CACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATT  
CGGAAATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCAC  
GTATAACAATATAAGATTCTGATTCTCCACCCTCTCTATCACTTTTACTA  
ATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGATGAACAGTTTACCCC  
CCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTT  
CAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCT  
CAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTA  
TTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTC  
CTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATAC

MTEC007811, *Selatosomus, aeriopennis*, larva, "C.Hart, A. Stavens", 27 JUL to 19 AUG  
2011, United States of America, Montana, Sheridan Co, "Bolster Rd, W of Mile 28 of Hwy  
5", 48.78884N, 104.83638W, CTTCTCTTAGCCTTCTAATTTCGAGCTGAACTAGGTA  
ATCCCGGCTCTCTCATTGGTAACGACCAAATTTACAACGTAATCGTAACAGCC  
CACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATT  
CGGAAATTGACTTGTACCTCTAATACTAGGAGCCCCTGATATAGCATTCCCAC  
GTATAACAATATAAGATTCTGATTCTCCACCCTCTCTATCACTTTTACTA  
ATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGATGAACAGTTTACCCC  
CCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTGGCAATTTT  
CAGATTACACCTAGCAGGAATCTCATCAATCCTGGGGGCTGTAAATTTTCATCT  
CAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACCTTTA  
TTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTC  
CTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAATAC

MTEC007821, *Selatosomus, aeriopennis*, larva, "C.Hart, A. Stavens", 29 JUL to 20 AUG  
2011, United States of America, Montana, Fergus Co, Hwy 87/200 mile  
111, 47.04539N, 108.84438W,

MTEC007837, *Limonius, infuscatus*, larva, M. Hubbard, 16-Aug-11, United States of  
America, Idaho, Boundary Co., Bonners  
Ferry, TACATCCTTAAGACTCCTTATTCGAGCAGAGCTGGGGAATCCTGGCTC  
ATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACACGCTTTTA  
TCATAATTTTCTTCATAGTAATACCAATTATAATCGGTGGATTTGGAAACTGA  
CTAGTACCGCTTATGCTAGGAGCCCCAGACATAGCATTCCCTCGAATAAATA  
ATATAAGATTCTGATTCTTCCATCGCTTCCCTTCTTCTCATAAGAAGAA  
TTGTAGAAAATGGTGCTGGCACAGGATGAACTGTTTATCCACCCTTATCAGCA  
AACATCGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTTCAGTCTACATCT  
AGCAGGAATCTCATCAATTCTAGGAGCAGTAACTTTATCTCCACCGTAATTA

ATATGCGAACTACAGGAATCACTTTTGACCGAATACCTTTATTTGTATGAGCA  
GTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTTGCCGGAGCA  
ATCACAATACTATTAACAGACCGAAATCTAAATACCTCATTTTTTG

MTEC007838, *Limonium infuscatus*, larva, M. Hubbard, 16-Aug-11, United States of  
America, Idaho, Boundary Co., Bonners

Ferry, , , TTGGTACATCCTTAAGACTCCTTATTCGAGCAGAGCTGGGGAATCCTG  
GCTCATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACACGC  
TTTTATCATAATTTTCTTCATAGTAATACCAATTATAATCGGTGGATTTGGAA  
ACTGACTAGTACCGCTTATGCTAGGAGCCCCAGACATAGCATTCCCTCGAAT  
AAATAATATAAGATTCTGATTCCTTCCATCGCTTCCCTTCTTCTCATAAG  
AAGAATTGTAGAAAATGGTGCTGGCACAGGATGAACTGTTTATCCACCCTTA  
TCAGCAAACATCGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAGTCT  
ACATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAACTTTATCTCCACCG  
TAATTAATATGCGAACTACAGGAATCACTTTTGACCGAATACCTTTATTTGTA  
TGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTTGCC  
GGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTC

MTEC007839, *Limonium infuscatus*, larva, M. Hubbard, 16-Aug-11, United States of  
America, Idaho, Boundary Co., Bonners Ferry, , ,

MTEC007840, *Ctenicera aripennis*, larva, F.E. Etzler, 15-Aug-11, United States of

America, Montana, Carbon Co, "Beartooth Hwy, approx 1/4 mi N. MT-WY state  
line", 45.00649N, 109.40269W, 10044ft, CTTCTCTTAGCCTTCTAATTCGAGCTGAAC  
TAGGTAATCCCGGCTCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTA  
ACAGCCCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGG  
GGGATTCGGAAATTGACTTGTACCCCTAATACTAGGAGCCCCTGATATAGCA  
TTCCCACGTATAAACAATATAAGATTCTGATTCCTACCACCCTCTCTATCACT  
TTACTAATAAGAAGAATCGTGAAAATGGGGCAGGAACAGGGTGAACAGT  
TTACCCCCCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTAG  
CAATTTTCAGATTACACCTAGCAGGAATCTCATCAATCCTAGGGGCTGTAAAT  
TTCATCTCAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAAT  
ACCTTTATTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCT  
GCCAGTCCTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAAT  
ACATCCTTTTTCGA

MTEC007841, *Ctenicera aripennis*, larva, F.E. Etzler, 15-Aug-11, United States of

America, Montana, Carbon Co, "Beartooth Hwy, approx 1/4 mi N. MT-WY state  
line", 45.00649N, 109.40269W, 10044ft, CTTCTCTTAGCCTTCTAATTCGAGCTGAAC  
TAGGTAACCCCGGCTCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTA  
ACAGCCCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGG  
GGGATTCGGAAATTGACTTGTACCCCTAATACTAGGAGCCCCTGATATAGCA  
TTCCCACGTATAAACAATATAAGATTCTGATTCCTACCACCCTCTCTATCACT  
TTACTAATAAGAAGAATCGTGAAAATGGGGCAGGAACAGGGTGAACAGT

TTACCCTCCCCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTAG  
 CAATTTTCAGATTACACCTAGCAGGAATCTCATCAATCCTAGGGGCTGTAAAT  
 TTCATCTCAACAGTTATTAATATACGATCAACTGGAATCACCTTTGATCGAAT  
 ACCTTTATTTGTATGGGCGGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCT  
 ACCAGTCCTGGCAGGAGCAATTACAATGTTACTAACCGATCGAAACCTAAAT  
 AC

MTEC007842, *Ctenicera, aripennis*, adult, Female, F.E. Etzler, 15-Aug-11, United States of  
 America, Montana, Carbon Co, "Beartooth Hwy, approx 1/4 mi N. MT-WY state  
 line", 45.00649N, 109.40269W, 10044ft, CTTCTCTTAGCCTTCTAATTCGAGCTGAAC  
 TAGGTAATCCCGGCTCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTA  
 ACAGCCCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGG  
 GGGATTCGGAAATTGACTTGTACCCCTAATACTAGGAGCCCCTGATATAGCA  
 TTCCCACGTATAAACAATATAAGATTCTGATTCCTACCACCCTCTCTATCACT  
 TTTACTAATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGGTGAACAGT  
 TTACCCCCCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTAG  
 CAATTTTCAGATTACACCTAGCAGGAATCTCATCAATCCTAGGGGCTGTAAAT  
 TTCATCTCAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAAT  
 ACCTTTATTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCT  
 GCCAGTCCTGGCAGGAGCAATTACAATGTTACTGACCGATCGAAACCTAAAT  
 ACATCC

MTEC007843, *Ctenicera, aripennis*, adult, Male, F.E. Etzler, 15-Aug-11, United States of  
 America, Montana, Carbon Co, "Beartooth Hwy, approx 1/4 mi N. MT-WY state  
 line", 45.00649N, 109.40269W, 10044ft, CTTCTCTTAGCCTTCTAATTCGAGCTGAAC  
 TAGGTAACCCCGGCTCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTA  
 ACAGCCCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGG  
 GGGATTCGGAAATTGACTTGTACCCCTAATACTAGGAGCCCCTGATATAGCA  
 TTCCCACGTATAAACAATATAAGATTCTGATTCCTTCCACCCTCTCTATCACT  
 TTTACTAATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGGTGAACAGT  
 TACCCCCCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTAGC  
 AATTTTCAGATTACACCTAGCAGGAATCTCATCAATCCTAGGGGCTGTAAAT  
 TCATCTCAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATA  
 CCTTTATTTGTATGGGCAGTAGCAATCACAGCCCTCCTTCTACTCTTATCTCTG  
 CCAGTCCTGGCAGGAGCAATTACAATGTTACTAACCGATCGAAACCTAAATA  
 CATCC

MTEC007844, *Limonius, agonus*, adult, Male, A. Ramsdale, 17-Apr-98, United States of  
 America, Wisconsin, Dane Co, "Lower Wisconsin River State Wldlf Area, 3mi NNW  
 Mazomanie", ,,,

MTEC007845, *Limonius, agonus*, adult, Male, A. Ramsdale, 7-May-01, United States of  
 America, Wisconsin, Dane Co, "Lower Wisconsin River State Wldlf Area, Mazomanie", ,,,



MTEC007846, *Limenius californicus*, adult, Female, A. Morales et. al, Summer 2011, United States of America, Montana, Fergus Co ,Denton, 47.2942N, 110.042183W, 3776ft,

MTEC007847, *Limenius californicus*, adult, Female, A. Morales et. al, Summer 2011, United States of America, Montana, Fergus Co ,Denton, 47.2942N, 110.042183W, 3776ft, CATCCTTAAGACTCTTGATTCGGGCAGA ACTTGGTAACCCTGGGTCACTAATTGGAAATGACCAAATCTATAATGTAATTG TCACAGCTCACGCCTTCATCATAATTTCTTTATAGTTATACCAATCATAATCG GTGGGTTTCGGAACTGACTAGTTCCGCTAATATTGGGTGCTCCTGATATAGCC TTCCCTCGAATAACAATATAAGATTCTGATTCTTACCCCGTCCCTTTCTCTT CTTCTAATAAGAAGAATTGTAGAAAATGGAGCAGGAAGTGGGTGAACAGTCT ACCCCCTCTCTCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCC ATTTTCAGTCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCTGTTAATTT ATCTCAACTGTTATTAACATACGATCTACCGGAATTACCTTCGACCGTATGCC CCTATTTGTTTGAGCAGTAGCAATTAAGTCCCTTCTCCTCTTGCTTTCACTTCC AGTTTTAGCAGGAGCTATTACAATACTATTAAGTACCGAAACCTAACACTT C

MTEC007848, *Limenius californicus*, adult, Female, A. Morales et. al, Summer 2011, United States of America, Montana, Fergus Co ,Denton, 47.2942N, 110.042183W, 3776ft,

MTEC007849, *Limenius californicus*, larva,, A. Morales et. al, Summer 2011, United States of America, Montana, Fergus Co ,Denton, 47.2942N, 110.042183W, 3776ft,

MTEC007850, *Limenius californicus*, larva,, A. Morales et. al, Summer 2011, United States of America, Montana, Flathead Co, Kalispell, 48.2304N, 114.3951W, 3066ft, ACTTGGTAACCCTGGATCACTAATTGG AAATGACCAAATCTATAATGTTATTGTCACAGCTCACGCCTTCATCATAATTT TCTTTATAGTTATACCAATTATAATTGGTGGGTTTCGGAACTGACTAGTTCCA CTAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAACAATATAAGATT CTGATTCTTGCCCCCGTCCCTTTCTCTTCTTCTAATAAGAAGAATTGTTGAAAA TGGTGCAGGAAGTGGGTGAACAGTCTACCCCTCTCTCAGCTAACATTGCCC ATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAATC TCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAATATGCGATC TACCGGAATTACCTTCGACCGTATACCTCTGTTTGTTTGAGCAGTAGCAATTA CTGCCCTTCTCCTCTTACTTTCACTACCAGTTTTGGCAGGGGCTATTACAATAC TATTA

MTEC007851, *Limenius californicus*, larva,, A. Morales et. al, Summer 2011, United States of America, Montana, Flathead Co, Kalispell, 48.2304N, 114.3951W, 3066ft, ACTAGGAACATCCTTAAGACTCTTGAT TCGGGCAGAACTTGGTAACCCTGGATCACTAATTGGAAATGACCAAATCTAT

AATGTTATTGTCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCA  
 ATTATAATTGGTGGGTTCGGAACTGACTAGTTCCACTAATATTAGGAGCTCC  
 TGATATAGCCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCCGT  
 CCCTTTCTCTTCTTCTAATAAGAAGAATTGTTGAAAATGGTGCAGGAACTGGG  
 TGAACAGTCTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGATCTTCAGT  
 TGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAATCTCATCCATTCTGGGAG  
 CAGTTAATTTTATCTCAACTGTCATTAATATGCGATCTACCGGAATTACCTTC  
 GACCGTATACCTCTGTTTGTGTTGAGCAGTAGTAATTACTGCCCTTCTCCTCTTA  
 CTTTCACTACCAGTTTTGGCAGGGGCTATTACAATACTATTAACAGATCGAAA  
 CCTAAACACTTCA

MTEC007852, *Limenius californicus*, larva, A. Morales et. al, Summer 2011, United States of America, Montana, Flathead

Co, Kalispell, 48.2304N, 114.3951W, 3066ft, CATCCTTAAGACTCTTGATTTCGGGCAG  
 AACTTGGTAACCCTGGATCACTAATTGGAAATGACCAAATCTATAATGTTATT  
 GTCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATT  
 GGTGGGTTCGGAACTGACTAGTTCCACTAATATTAGGAGCTCCTGATATAG  
 CCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCCGTCCCTTTCTC  
 TTCTTCTAATAAGAAGAATTGTTGAAAATGGCGCAGGAACTGGATGAACAGT  
 CTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGATCTTCAGTTGACCTCG  
 CCATTTTCAGTCTTCACCTAGCAGGAATTCATCCATTCTGGGAGCAGTTAAT  
 TTTATCTCAACCGTCATTAATATGCGATCTACCGGAATTACCTTCGACCGTAT  
 ACCTCTGTTTGTGTTGAGCAGTAGCAATTACTGCCCTTCTCCTCTTACTTTCACT  
 ACCAGTTTTGGCGGGGGCTATTACAATACTATTAACAGACCGAAACCTAAAC  
 ACTTC

MTEC007853, *Limenius californicus*, larva, A. Morales et. al, Summer 2011, United States of America, Montana, Flathead

Co, Kalispell, 48.2304N, 114.3951W, 3066ft, CATCCTTAAGACTCTTGATTTCGGGCAG  
 AACTTGGTAACCCTGGATCACTAATTGGAAATGACCAAATCTATAATGTTATT  
 GTCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATTATAATT  
 GGTGGGTTCGGAACTGACTAGTTCCACTAATATTAGGAGCTCCTGATATAG  
 CCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCCGTCCCTTTCTC  
 TTCTTCTAATAAGAAGAATTGTTGAAAATGGTGCAGGAACTGGGTGAACAGT  
 CTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGATCTTCAGTTGACCTCG  
 CCATTTTCAGTCTTCACCTAGCAGGAATTCATCCATTCTGGGAGCAGTTAAT  
 TTTATCTCAACTGTCATTAATATGCGATCTACCGGAATTACCTTCGACCGTAT  
 ACCTCTGTTTGTGTTGAGCAGTAGTAATTACTGCCCTTCTCCTCTTACTTTCACT  
 ACCAGTTTTGGCAGGGGCTATTACAATACTATTAACAGATCGAAACCTAAAC  
 ACTTC

MTEC007854, *Limenius californicus*, larva, A. Morales et. al, Summer 2011, United States of America, Montana, Flathead

Co, Kalispell, 48.2304N, 114.3951W, 3066ft, CATCCTTAAGACTCTTGATTTCGGGCAG

AACTTGGTAACCCTGGATCACTAATTGGAAATGACCAAATCTATAATGTTATT  
 GTCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATTATAATT  
 GGTGGGTTTCGGAAACTGACTAGTTCCACTAATATTAGGAGCTCCTGATATAG  
 CCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCCGTCCCTTTCTC  
 TTCTTCTAATAAGAAGAATTGTTGAAAATGGTGCAGGAAGTGGGTGAACAGT  
 CTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGATCTTCAGTTGACCTCG  
 CCATTTTCAGTCTTCACCTAGCAGGAATCTCATCCATTCTGGGAGCAGTTAAT  
 TTTATCTCAACTGTCATTAATATGCGATCTACCGGAATTACCTTCGACCGTAT  
 ACCTCTGTTTGTGGAGCAGTAGCAATTAAGTCCCTTCTCCTCTTACTTTCACT  
 ACCAGTTTTGGCAGGGGCTATTACAATACTATTAACAGATCGAAACCTAAAC  
 ACTTC

MTEC007855, *Limnius californicus*, larva, A. Morales et. al, Summer 2011, United States of America, Montana, Flathead

Co, Kalispell, 48.2304N, 114.3951W, 3066ft, CATCCTTAAGACTCTTGATTTCGGGCAG  
 AACTTGGTAACCCTGGATCACTAATTGGAAATGACCAAATCTATAATGTTATT  
 GTAACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATTATAATT  
 GGTGGATTTCGGAAACTGACTAGTTCCACTAATATTAGGAGCTCCTGATATAG  
 CCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCCGTCCCTTTCTC  
 TTCTTCTAATAAGAAGAATTGTTGAAAATGGTGCAGGAAGTGGGTGAACAGT  
 CTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGATCTTCAGTTGACCTCG  
 CCATTTTCAGTCTTCACCTAGCAGGAATCTCATCCATTCTGGGAGCAGTTAAT  
 TTTATCTCAACTGTCATTAATATACGATCTACCGGAATTACCTTCGACCGTAT  
 ACCTCTGTTTGTGGAGCAGTAGTAATTAAGTCCCTTCTCCTCTTACTTTCACT  
 ACCAGTTTTGGCAGGGGCTATTACAATACTATTAACAGATCGAAACCTAAAC  
 ACTTCA

MTEC007856, *Limnius californicus*, larva, A. Morales et. al, Summer 2011, United States of America, Montana, Flathead

Co, Kalispell, 48.2304N, 114.3951W, 3066ft, CATCCTTAAGACTCTTGATTTCGGGCAG  
 AACTTGGTAACCCTGGATCACTAATTGGAAATGACCAAATCTATAATGTCATT  
 GTCACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATT  
 GGTGGATTTCGGAAACTGACTAGTTCCACTAATATTAGGAGCTCCTGATATAG  
 CCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTACCCCCGTCCCTTTCTC  
 TTCTTCTAATAAGAAGAATTGTTGAAAATGGCGCAGGAAGTGGATGAACAGT  
 CTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGATCTTCAGTTGACCTCG  
 CCATTTTCAGTCTTCACCTAGCAGGAATTCATCCATTCTGGGAGCAGTTAAT  
 TTTATCTCAACCGTCATTAATATGCGATCTACCGGAATTACCTTCGACCGTAT  
 ACCTCTGTTTGTGGAGCAGTAGCAATTAAGTCCCTTCTCCTCTTACTTTCACT  
 ACCAGTTTTGGCGGGGGCTATTACAATACTATTAACAGACCGAAACCTAAAC  
 ACTTCA

MTEC007857, *Limnius californicus*, larva, A. Morales et. al, Summer 2011, United States of America, Montana, Flathead

Co, Kalispell, 48.2304N, 114.3951W, 3066ft, CATCCTTAAGACTCTTGATTTCGGGCAG  
 AACTTGGTAACCCTGGATCACTAATTGGAAATGACCAAATCTATAATGTTATT  
 GTAACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATTATAATT  
 GGTGGATTTCGGAACTGACTAGTTCCACTAATATTAGGAGCTCCTGATATAG  
 CCTTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCCGTCCCTTTCTC  
 TTCTTCTAATAAGAAGAATTGTTGAAAATGGTGCAGGAACTGGGTGAACAGT  
 CTACCCCCCTCTCTCAGCTAACATTGCCCATAGAGGATCTTCAGTTGACCTCG  
 CCATTTTCAGTCTTCACCTAGCAGGAATCTCATCCATTCTGGGAGCAGTTAAT  
 TTTATCTCAACTGTCATTAATATACGATCTACCGGAATTACCTTCGACCGTAT  
 ACCTCTGTTTGTGGAGCAGTAGTAATTACTGCCCTTCTCCTTACTTTCACT  
 ACCAGTTTTGGCAGGGGCTATTACAATACTATTAACAGATCGAAACCTAAC  
 ACTTC

MTEC007858, *Limonium californicus*, larva, A. Morales et. al, Summer 2011, United States  
 of America, Montana, Flathead Co, Kalispell, 48.2304N, 114.3951W, 3066ft,

MTEC007859, *Hadromorphus glaucus*, adult, Male, D.L. Gustafson, 17-May-90, United  
 States of America, Montana, Gallatin Co, "Bozeman, at ""M"" trail", ,,,

MTEC007860, *Hadromorphus glaucus*, adult, Male, D.L. Gustafson, 24-Jun-90, United  
 States of America, Montana, Gallatin Co, "Bozeman, at ""M"" trail", ,,,

MTEC007861, *Hadromorphus glaucus*, adult, Female, D.L. Gustafson, 24-Jun-90, United  
 States of America, Montana, Gallatin Co, "Bozeman, at ""M"" trail", ,,,

MTEC007865, *Aeolus mellillus*, adult, Female, F.E. Etzler, 18-Jun-11, United States of  
 America, Montana, Gallatin Co, "Bozeman, Peet's Hill", 45.6736N, 111.0295W, 4860ft,

MTEC007866, *Aeolus mellillus*, adult, Male, F.E. Etzler, 18-Jun-11, United States of  
 America, Montana, Gallatin Co, "Bozeman, Peet's Hill", 45.6736N, 111.0295W, 4860ft,

MTEC007870, *Limonium californicus*, adult, Male, , 2011, United States of  
 America, Montana, , , , , , CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCC  
 TGGGTCACTAATTGGAAACGACCAAATCTATAATGTTATTGTTACAGCTCACG  
 CCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATTGGTGGATTTCGGA  
 AACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAGCCTTCCCTCGAAT  
 AAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTTCTTCTAATAAG  
 AAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACAGTATACCCCCCTCTC  
 TCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGCCT  
 TCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAATTTTATCTCAACTG  
 TTATTAATATACGATCTACCGGAATCACCTTCGACCGTATGCCTCTATTTGTTT  
 GAGCAGTAGCAATTACCGCTTCTCCTTACTTTCACTCCCAGTTTTGGCA  
 GGAGCTATCACAATACTATTAACAGATCGAAACCTAAGCACTTC

MTEC007871, *Limonius, californicus*, adult, Male, 2011, United States of America, Montana, ,, ,, , CATCCTTAAGACTCTTGATTCTGGGCAGAACTTGGTAACCC TGGGTCACTAATTGGAAACGACCAAATCTATAATGTTATTGTTACAGCTCACG CCTTCATCATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGATTTCGGA AACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAGCCTTCCCTCGAAT AAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTCTTCTTCTAATAAG AAGAATTGTAGAAAATGGTGCAGGAAGTGGATGAACAGTATACCCCCCTCTC TCAGCTAACATTGCCCATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGCCT TCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAATTTTATCTCAACTG TTATTAATATACGATCTACCGGAATTACCTTCGACCGTATGCCTCTATTTGTTT GAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCACTCCCAGTTTTGGCA GGAGCTATCACAATACTATTAACAGATCGAAACCTAAACACTTCA

MTEC007879, *Selatosomus, semimetallicus*, adult, Female, D.S. Sikes, 6 to 12 Jul 1993, United States of America, Wyoming, Yellowstone N.P., "Lamar Valley, NE of Slough Creek turnoff", 44.9167N, 110.4000W, 6320ft,

MTEC007880, *Selatosomus, semimetallicus*, adult, Female, M.A. Ivie, 20 to 27 May 1992, United States of America, Montana, Flathead Co, "Glacier National Park, N Fork Flathead area, Bowman-Akokola inst." ,, ,, 3600ft,

MTEC007881, *Selatosomus, semimetallicus*, adult, Male, M.A. Ivie, 23-May-90, United States of America, Montana, Lincoln Co, "30mi E. of Libby, milepost 53 on Hwy 2" ,, ,, , CTTCTCTTAGTCTTCTGATTCTGAGCTGAACTAGGTAACCCCGGCTCTCTCA TTGGTAATGACCAAATTTACAACGTAATCGTTACAGCCCATGCCTTTATTATA ATTTTCTTTATAGTTATACCAATCATAATTGGAGGATTCGGTAATTGACTCGT TCCTCTAATACTTGGAGCTCCTGACATAGCATTCCCACGAATAACAACATAA GATTCTGGTTCCTACCACCTTCTCTGTCGCTTTTACTAATAAGAAGAATCGTA GAAAACGGGGCAGGAACAGGATGAACTGTTTACCCTCCCCTTTCAGCAAACA TTGCTCACAGAGGGTCTTCAGTAGACCTGGCAATTTTTAGTTTACACCTAGCA GGAATTTTCATCAATTCTAGGAGCAGTAAATTTTCATTTCAACAGTAATTAACAT ACGATCAACTGGGATCACCTTCGACCGAATGCCTCTATTTGTATGAGCAGTAG CCATTACTGCCCTTCTCCTCCTTTTGTCCCTACCAGTACTAGCTGGTGCAATTA CAATGCTATTAACCGACCGAACTTAA

MTEC007882, *Limonius, aegar*, adult, Female, T.K. Philips, 15-Jun-88, United States of America, Montana, Gallatin Co, "Squaw Creek, Gallatin Canyon" ,, ,, , ACTAGGCACATCACTAAGACTTCTAATCCGAGCCGAACCTTGGTAAC CCTGGCTCTCTAATTGGAAATGACCAAATCTATAACGTAATTGTTACAGCTCA CGCCTTTATCATAATTTTCTTCATAGTTATACCAATCATAAATTGGAGGATTCG GAAATTGACTTGTCCCTCTTATACTAGGTGCTCCCGATATAGCATTTCCTCGA ATAAACAATATAAGATTTTGATTCTTCTCCTTCATTATCCTTGCTACTAATA AGAAGTATTGTAGAAAACGGAGCAGGAACAGGATGGACCGTTTACCCTCCTC TCTCAGCTAATATTGCTCATAGAGGGTCTCAGTAGACCTAGCTATTTTCAGT

CTTCATCTAGCAGGAATTTTCGTCAATTCTAGGAGCAGTAAACTTCATTTCAAC  
 TGTAATCAATATACGATCAACAGGTATCACTTTTGACCGTATACCTCTTTTTG  
 TTTGAGCAGTAGCTATTACAGCTCTTCTTCTTCTTGTCTCTACCTGTTCTTG  
 CAGGAGCAATCACAATACTTCTTACAGACCGAAATCTTAATACTTC

MTEC007883, *Limonius*, aegar, adult, Male, D.L. Gustafson, 20 May to 30 Jun 1990, United States of America, Montana, Madison Co ,Hidden Lake Bench,,7400ft,

MTEC007884, *Limonius*, aegar, adult, Male, D.L. Gustafson, 26-Jun-89, United States of America, Montana, Powell Co , "Blackfoot River, MT 141" ,,,

MTEC007885, *Hemicrepidius*, *memnonius*, adult, Male, D.L. Gustafson, 18-Jul-90, United States of America, Montana, Rosebud Co ,Rosebud area,,,

MTEC007886, *Hemicrepidius*, *memnonius*, adult, Male, C.E. Seibert, 2 JUL to 14 AUG 1988, United States of America, Montana, Fergus Co , "9 mi. NW Lewistown, Spring Creek" ,,,3800ft,

MTEC007889, *Aeolus*, *mellillus*, larva,, K. Pike, 27-Apr-12, United States of America, Washington, Klickitat Co, "Bickleton, Tex/Nei Brown Farm" ,,, TACTTGGTACATCCTTAAGACTCCTTATTCGAGCAGAGCTGGGAAAT  
 CCTGGCTCATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCAC  
 ACGCTTTCATCATAATTTTCTTCATAGTAATACCAATTATAATCGGTGGATTT  
 GGAAACTGATTAGTACCACTTATACTAGGAGCCCCAGACATAGCATTCCCTC  
 GAATAAATAATATAAGATTCTGATTCCCTCCATCGCTTTCCCTTCTTCTCA  
 TAAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATGAACTGTTTATCCACC  
 CTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCA  
 GTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAACTTTATCTCC  
 ACCGTAATTAATATACGAACTACAGGAATCACTTTTGACCGAATACCTTTATT  
 TGTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCT  
 TGCTGGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTCATTTT  
 TTG

MTEC007890, *Hadromorphus*, *glaucus*, larva,, K. Pike, 27-Apr-12, United States of America, Washington, Klickitat Co, "Bickleton, Tex/Nei Brown Farm" ,,, CATCCCTTAGTCTACTGATCCGAGCTGAGCTAGGAAACCCCGGCTCT  
 CTTATTGGAAACGACCAAATCTATAACGTCATTGTAACAGCCCATGCTTTCAT  
 TATAATTTTCTTCATAGTAATACCTATCATAATTGGAGGATTCGGAAACTGAT  
 TAGTTCCCCTAATACTAGGAGCTCCTGATATAGCATTCCCACGAATAACAAC  
 ATAAGATTTTGGTTTCTACCCCCCTCTCTATCACTTCTCCTAATAAGAAGAAT  
 CGTAGAAAATGGAGCAGGAACTGGTTGAACAGTTTACCCTCCTCTATCAGCC  
 AACATTGCCCATAGAGGATCATCAGTCGATTTAGCAATTTTATGTTTACACCT  
 AGCAGGAATCTCATCAATCTTAGGAGCTGTAAATTTCAATTTCAACCGTAATCA  
 ACATACGATCAACTGGAATCACATTTGATCGAATACCTTTATTTGTTTGGAGCA

GTAGCCATCACCGCCCTACTACTTCTATTATCCCTCCCCGTA CT CGCAGGAGC  
AATTACAATACTATTAACAGATCGAACTTAAATACATCCTTCTTTGA

MTEC007891, *Selatosomus, pruininus*, larva, K. Pike, 7-May-12, United States of  
America, Washington, Benton Co., "Horse Heaven Hills,  
Sellards" ,,,,CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGAAACCCCGGCTC  
TCTCATTGGTAACGACCAAATCTACAACGTAATCGTAACAGCCCACGCCTTC  
ATTATAATTTTCTTCATAGTAATACCAATCATAATTGGAGGATTTGGAAATTG  
ACTCGTACCTCTAATACTAGGAGCCCCTGACATAGCATTCCCACGAATAAAC  
AACATAAGATTCTGATTTCTCCCACCTTCGCTGTCCCTCTTACTAATAAGGAG  
AATCGTAGAAAACGGAGCAGGAACAGGATGGACAGTATACCCCCCTCTCA  
GCCAATATTGCCCATAGAGGGTCTCAGTCGACCTAGCAATTTTCAGACTACA  
TCTAGCTGGAATCTCATCAATCCTGGGAGCAGTAAATTTTCATCTCAACAGTAA  
TCAATATACGATCAACTGGAATTACCTTTGACCGAATACCTCTTTTCGTATGA  
GCAGTAGCTATTACAGCCCTACTCTTACTTTTGTTCATTACCAGTCCTGGCTGG  
GGCTATTACAATACTACTA ACTGATCGAAATCTTAATAC

MTEC007892, *Selatosomus, aripennis*, larva, J. Marshall, 15-May-12, United States of  
America, Idaho, Bonneville Co., "Ririe, Antelope  
Flats" ,,,,CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGTAATCCCGGCTCTC  
TCATTGGTAATGACCAAATTTACAACGTAATCGTAACAGCCCACGCCTTTATT  
ATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATTCGGAAATTGACT  
TGTACCCCTAATACTAGGAGCCCCTGATATAGCATTCCCACGTATAACAATA  
TAAGATTCTGATTCCTACCACCCTCTCTATCACTTTTACTAATAAGAAGAATC  
GTGGAAAATGGGGCAGGAACAGGGTGAACAGTTTACCCCCCTCTCTCAGCCA  
ATATTGCCCATAGAGGGTCATCAGTTGACCTAGCAATTTTCAGATTACACCTA  
GCAGGAATCTCATCAATCCTAGGGGCTGTAAATTTTCATCTCAACAGTTATTAA  
TATACGATCAACTGGAATCACCTTTGACCGAATACCTTTATTTGTGTGGGCAG  
TAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTCCTGGCAGGAGCA  
ATTACAATGTTACTAACCGATCGAAACCTAAATACATCC

MTEC007893, *Hadromorphus, glaucus*, larva, J. Marshall, 15-May-12, United States of  
America, Idaho, Bonneville Co., "Ririe, Antelope  
Flats" ,,,,CATCACTTAGTCTACTAATCCGAGCTGAACTAGGAAACCCGGGATCT  
CTTATTGGAAACGACCAAATTTATAACGTTATTGTAACAGCTCATGCTTTCAT  
TATAATTTTCTTCATAGTAATACCAATCATAATTGGAGGATTCGGAAACTGAT  
TAGTCCCCTTAATACTAGGAGCTCCTGATATAGCATTCCCACGAATAACAAT  
ATAAGATTTTGAATTTCTTCTCCTTCTCTATCCCTTCTCCTAATAAGAAGAATT  
GTAGAAAACGGAGCAGGA ACTGGTTGAACAGTTTACCCCCCTCTCTCAGCCA  
ACATTGCCACAGAGGGTCATCAGTCGATTTAGCAATTTT TAGTCTACACCTA  
GCAGGAATCTCATCAATCTTAGGAGCCGTAAATTTCAATTTCAACTGTAATTAA  
TATACGATCAACTGGAATCACATTTGATCGCATACTTTATTTGTTTGAGCAG  
TAGCCATCACTGCCCTACTACTCCTATTATCTCTTCTGTACTCGCAGGAGCA  
ATTACAATATTATTA ACTGATCGAAATTTAAA

MTEC007894, *Limonius californicus*, larva, J. Marshall, 15-May-12, United States of America, Idaho, Bonneville Co., "Ririe, Antelope Flats" ,,, CATCCTTAAGACTCTTGATTTCGGGCAGAACTTGGTAACCCTGGGTCAC TAATTGGAAATGACCAAATCTATAATGTTATTGTTACAGCTCACGCCTTCATC ATAATTTTCTTTATAGTTATACCAATCATAATTGGTGGGTTTCGGAACTGACT AGTTCCACTAATATTGGGCGCTCCTGATATAGCCTTCCCTCGAATAACAATA TAAGATTCTGATTCTTGCCACCATCACTTTCTCTTCTTAATAAGAAGAATTG TAGAAAATGGCGCAGGAACTGGGTGAACAGTCTACCCCCCTCTCAGCTAA CATTGCACATAGAGGCTCTTCAGTTGACCTCGCCATTTTCAGCCTTCACCTAG CAGGAATTTTCATCCATCCTGGGAGCAGTTAATTTTATCTCAACTGTTATTAAT ATACGATCCACCGGGATTACCTTCGACCGTATGCCTCTATTTGTTTGAGCAGT AGCAATTACTGCTCTTCTCCTATTACTTTCCTCCCGTTTTGGCAGGAGCTAT TACAATACTATTAACAGATCGAAACCTAAACACTTCA

MTEC007895, *Limonius infuscatus*, larva, K. Pike, 31-May-12, United States of America, Washington, Whitman Co., "Near Colflax, Intersection of Endicott and Morlet Rds" ,,,

MTEC007896, *Selatosomus aripennis*, larva, J. Marshall, 6-Jun-12, United States of America, Idaho, Bonneville Co., "Ririe, Antelope Flats" ,,, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGTAACCCCGGCTCTC TCATTGGTAATGACCAAATTTACAACGTAATCGTAACAGCCCACGCCTTTATT ATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATTTCGGAAATTGACT TGTACCCCTAATACTAGGAGCCCCTGATATAGCATTCCCACGTATAACAATA TAAGATTCTGATTCTTCCACCCTCTCTATCACTTTTACTAATAAGAAGAATC GTGGAAAATGGGGCAGGAACAGGGTGAACAGTTTACCCCCCTCTCTCAGCCA ATATTGCCCATAGAGGGTCATCAGTTGACCTAGCAATTTTCAGATTACACCTA GCAGGAATCTCATCAATCCTAGGGGCTGTAAATTTTCATCTCAACAGTTATTA TATACGATCAACTGGAATCACCTTTGACCGAATACCTTTATTTGTATGGGCAG TAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTCCTGGCAGGAGCA ATTACAATGTTACTAACCGATCGAAACCTAAATAC

MTEC007897, *Selatosomus aripennis*, larva, J. Marshall, 6-Jun-12, United States of America, Idaho, Bonneville Co., "Ririe, Antelope Flats" ,,, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGTAATCCCGGCTCTC TCATTGGTAATGACCAAATTTACAACGTAATCGTAACAGCCCACGCCTTTATT ATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATTTCGGAAATTGACT TGTACCCCTAATACTAGGAGCCCCTGATATAGCATTCCCACGTATAACAATA TAAGATTCTGATTCTTACCACCCTCTCTATCACTTTTACTAATAAGAAGAATC GTGGAAAATGGGGCAGGAACAGGGTGAACAGTTTACCCCCCTCTCTCAGCCA ATATTGCCCATAGAGGGTCATCAGTTGACCTAGCAATTTTCAGATTACACCTA GCAGGAATCTCATCAATCCTAGGGGCTGTAAATTTTCATCTCAACAGTTATTA TATACGATCAACTGGAATCACCTTTGACCGAATACCTTTATTTGTATGGGCAG



TAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTCCTGGCAGGAGCA  
ATTACAATGTTACTGACCGATCGAAACCTAAATAC

MTEC007898, *Hadromorphus, glaucus*, larva,, J. Marshall, 6-Jun-12, United States of  
America, Idaho, Bonneville Co., "Ririe, Antelope Flats" ,,,

MTEC007899, *Selatosomus, pruininus*, larva,, J. Marshall, 6-Jun-12, United States of  
America, Idaho, Bonneville Co., "Ririe, Antelope  
Flats" ,,, CTTCTCTTAGCCTTCTAATTCGAGCTGAACTAGGTAACCCCGGCTCTC  
TCATTGGTAATGACCAAATTTACAACGTAATCGTAACAGCCCACGCCTTTATT  
ATAATTTTCTTCATAGTAATACCAATCATAATTGGGGGATTTCGGAAATTGACT  
TGTACCCCTAATACTAGGAGCCCCTGATATAGCATTCCCACGTATAAACAATA  
TAAGATTCTGATTCCCTTCCACCCTCTCTATCACTTTTACTAATAAGAAGAATC  
GTGGAAAATGGGGCAGGAACAGGGTGAACAGTTTACCCCCCTCTCTCAGCCA  
ATATTGCCCATAGAGGGTCATCAGTTGACCTAGCAATTTTCAGATTACACCTA  
GCAGGAATCTCATCAATCCTAGGGGCTGTAAATTTTCATCTCAACAGTTATTA  
TATACGATCAACTGGAATCACCTTTGACCGAATACCTTTATTTGTATGGGCAG  
TAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCCAGTCCTGGCAGGAGCA  
ATTACAATGTTACTAACCGATCGAAACCTAAATAC

MTEC007900, *Limonius, californicus*, larva,, J. Marshall, 6-Jun-12, United States of  
America, Idaho, Bonneville Co., "Ririe, Antelope Flats" ,,,

MTEC007901, *Limonius, californicus*, larva,, A. Esser, 15-Apr-12, United States of  
America, Washington, Lincoln Co., "Near Wilbur, Coffman Farm" ,,,

MTEC007902, *Limonius, infuscatus*, larva,, A. Esser, 15-Apr-12, United States of  
America, Washington, Lincoln Co., "Near Wilbur, Coffman Farm" ,,,

MTEC007903, *Limonius, californicus*, larva,, A. Esser, 15-Apr-12, United States of  
America, Washington, Lincoln Co., "Near Davenport, Dewald Farm" ,,,

MTEC007904, *Limonius, californicus*, larva,, A. Esser, 15-Apr-12, United States of  
America, Washington, Lincoln Co., "Near Davenport, Wilke  
Farm" ,,, GACTCTTGATTTCGGGCAGAACTTGGTAGCCCTGGATCACTAATTGGG  
AATGACCAAATCTATAATGTTATTGTACAGCTCACGCCTTCATCATAATTTT  
CTTTATAGTTATACCAATCATAATTGGTGGGTTTCGGAACTGACTAGTTCCAC  
TAATATTAGGAGCTCCTGATATAGCCTTCCCTCGAATAAACAATATAAGATTC  
TGATTCTTACCCCGTCCCTTTCTCTTCTTAATAAGAAGAATTGTTGAAAAT  
GGTGCAGGAACCTGGGTGAACAGTCTACCCCCCTCTCTCAGCTAACATTGCC  
ATAGAGGATCTTCAGTTGACCTCGCCATTTTCAGTCTTCACCTAGCAGGAATC  
TCATCCATTCTGGGAGCAGTTAATTTTATCTCAACTGTCATTAATATGCGATC  
TACCGGAATTACCTTCGACCGTATACCTCTGTTTGTGAGCAGTAGCAATTA

CTGCCCTTCTCCTTACTTTCACTACCAGTTTTGGCAGGGGCTATTACAATAC  
TATTAACAGATCGAAACCTAAACAC

MTEC007905, *Limonium californicus*, larva, A. Esser, 15-Apr-12, United States of America, Washington, Lincoln Co, "Near Davenport, Scheffels Farm", ,,,

MTEC007906, *Limonium infuscatum*, larva, A. Esser, 15-Apr-12, United States of America, Washington, Lincoln Co, "Near Davenport, Scheffels Farm", ,,,  
TTGGTACATCCTTAAGACTCCTTATTCGAGCAGAGCTGGGGAATCCT  
GGCTCATTAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACACG  
CTTTTATCATAATTTTCTTCATAGTAATACCAATTATAATCGGTGGATTTGGA  
AACTGACTAGTACCGCTTATGCTAGGAGCCCCAGACATAGCATTCCCTCGAA  
TAAATAATATAAGATTCTGATTCCCTCCATCGCTTTCCCTTCTTCTCATAA  
GAAGAATTGTAGAAAATGGTGCTGGCACAGGATGAACTGTTTATCCACCCTT  
ATCAGCAAACATCGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAGTC  
TACATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAACTTTATCTCCACC  
GTAATTAATATGCGAACTACAGGAATCACTTTTGACCGAATACCTTTATTTGT  
ATGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTTGC  
CGGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTCATTTTTTTG

MTEC007907, *Athous sierrae varius*, adult, Female, T.K. Philips, 28-Jun-88, United States of America, Montana, Gallatin Co, Chestnut Mt. near Grouse Creek, ,,,  
GATTATTAATTTCGAGCCGAATTAGGAAACCCTGGATCCTTAATTGGCA  
ATGACCAAATTTACAATGTTATTGTAACAGCCCATGCTTTTATTATAATTTTCT  
TCATAGTTATAACCAATTATAATTGGAGATTTGGTAACTGGTTAGTTCCATTA  
ATACTAGGAGCACCAGATATAGCATTCCCCCGAATAAACAACATAAGATTCT  
GGTTTCTTCCACCTTCTCTATCACTTCTACTAATAAGAAGAATTGTTGAAAAT  
GGAGCAGGAACAGGATGAACAGTTTATCCACCTCTCTCAGCAAATATTGCC  
ATAGAGGCTCATCTGTAGATTTAGCAATTTTACTTCACTTAGCTGGAATC  
TCCTCAATTCTGGGAGCTGTAACTTCATTTCCACGGTAATTAATATACGATC  
AACAGGAATTACATTTGATCGAATACCCTTATTTGTATGAGCCGTAGTAATTA  
CCGCTTTACTTTTACTTTTATCCTTACCTGTCTTAGCAGGAGCTATCACAATAT  
TATTAACCTGATCGAA

MTEC007908, *Athous sierrae varius*, adult, Male, D.L. Gustafson, 30 Jun to 17 Aug 1990, United States of America, Montana, Madison Co, Hidden Lake Bench, ,,, 7400ft,

MTEC007909, *Athous sierrae varius*, adult, Male, D.L. Gustafson, 28-Jun-86, United States of America, Montana, Gallatin Co, "4 mi. N of Bozeman, Bridger foothills", ,,, 5500ft,  
CCTCTTAAAGATTATTAATTTCGAGCCGAATTAGGAAACCCTG  
GATCCTTAATTGGCAATGACCAAATTTACAATGTTATTGTAACAGCCCATGCT  
TTTATTATAATTTTCTTCATAGTTATAACCAATTATAATTGGAGATTTGGTAA  
TGGTTAGTTCCATTAATACTAGGAGCACCAGATATAGCATTCCCCCGAATAA  
ACAACATAAGATTCTGGTTTCTTCCACCTTCTCTATCACTTCTACTAATAAGA

AGAATTGTTGAAAATGGAGCAGGAACAGGATGAACAGTTTATCCACCTCTCT  
 CAGCAAATATTGCCCATAGAGGCTCATCTGTAGATTTAGCAATTTTTAGACTT  
 CACTTAGCTGGAATCTCCTCAATTCTGGGAGCTGTAAACTTCATTTCCACGGT  
 AATTAATATACGATCAACAGGAATTACATTTGATCGAATACCCTTATTTGTAT  
 GAGCCGTAGTAATTACCGCTTTACTTTTACTTTTATCCTTACCTGTCTTAGCAG  
 GAGCTATCACAATATTATTAAGTATCGAAATCTTAATACTTCATTTTTTG

MTEC007910, *Limonius, canus*, adult, Female, 25-May-83, United States of  
 America, Montana, Missoula Co, Missoula, , , ,

MTEC007911, *Limonius, canus*, adult, Female, 26-May-83, United States of  
 America, Montana, Missoula Co, Missoula, , , ,

MTEC007912, *Limonius, canus*, adult, Female, B. Zupan, 29-May-78, United States of  
 America, Montana, Cascade Co, , , , ,

MTEC007913, *Pseudanostirus, pudica*, adult, Female, K. Philips & S. Clark, 25-May-  
 88, United States of America, Montana, Jefferson Co, 0.5mi E  
 Lahood, , , , CTTCCTTAAGCCTACTAATTCGAGCCGAATTAGGAAACCCTGGATCT  
 TTAATTGGAAATGACCAAATCTATAATGTTATTGTCACAGCACACGCTTTTTAT  
 CATAATTTCTTCATAGTTATACCAATTATAAATTGGTGGATTCGGAAATTGAC  
 TTGTACCCCTAATGCTAGGAGCCCCTGATATAGCATTCCCACGAATAAATAAC  
 ATAAGATTTTGATTTTTACCCCTCTCTCTCTCTCTACTAATAAGAAGAATT  
 GTTGGAAAATGGAGCAGGAACAGGATGAACAGTGTACCCCCACTGTCAGCCA  
 ATATTGCCCATAGAGGTTTCATCAGTTGATCTTGCAATTTTTAGTCTTCATCTAG  
 CAGGAATCTCTTCAATTCTTGGTGCAGTTAACTTCATTTCAACTGTAATTAAT  
 ATACGAACA ACTGGAATTACTTTTGACCGAATGCCTCTATTTGTCTGAGCTGT  
 AGTAATTACAGCCCTGCTATTATTATTATCTCTTCCTGTTTTAGCAGGAGCAA  
 TCACCATACTTTTAACTGATCGAAATCTTAATACATCATTCTTTGA

MTEC007914, *Pseudanostirus, pudica*, adult, Male, D.L. Gustafson, 4-Jun-87, United States  
 of America, Montana, Gallatin Co., Bozeman Creek, , , 6000ft,

MTEC007915, *Pseudanostirus, pudica*, adult, Male, H.W. Ziolkowski, 15-Jun-89, United  
 States of America, Montana, Wheatland Co , "Lewis and Clark National Forest, 3mi NW  
 Judith Gap" , , ,

MTEC007916, *Ampedus, brevis*, adult, Female, C.E. Seibert, 21 May to 25 Jun 1988, United  
 States of America, Montana, Granite Co, "SE of Maxville, S Boulder Creek" , , , 5400ft,

MTEC007917, *Ampedus, brevis*, adult, Female, M.A. Ivie, 15-22 Jul 1991, United States of  
 America, Montana, Flathead Co, "Glacier National Park, N. Fork Flathead area, S of Big  
 Prairie" , , , 3560ft,

MTEC007918, *Ampedus brevis*, adult, Male, 27 Jul to 13 Aug 1984, Canada, British Columbia, "Prospect Creek, W. of Merritt" ,,,

MTEC007919, *Limonius agonus*, adult, Male, J.F. Landry, 27-May-72, Canada, Quebec, "d.r Levis, St. Romuaid" ,,,

MTEC007920, *Limonius agonus*, adult, Male, J.F. Landry, 29-May-76, Canada, Quebec, "d.r. Levis, St. Entienne" ,,,

MTEC007921, *Limonius anceps*, adult, Male, 22-May-88, Canada, Quebec, "St. Mathieu du parc, St. Maurice" ,,,

MTEC007922, *Limonius agonus*, adult, Male, Yves-Pascal Dion, 12-May-90, Canada, Quebec, Arthabaska Co., St. Louis de Blanford, ,,,

MTEC007923, *Limonius agonus*, adult, Female, P. Belanger, 12-Jun-86, Canada, Quebec, "St. Entienne, Levis" ,,,

MTEC007924, *Limonius anceps*, adult, Male, P. Belanger, 4-Jun-85, Canada, Quebec, "Ste. Agathe, Lotbiniere" ,,,

MTEC007925, *Metanomus insidiosus*, adult, Male, T.K. Philips, 19 May to 10 Jun 1988, United States of America, Montana, Gallatin Co, "Bridger Canyon, Olson Creek" ,,,

MTEC007926, *Metanomus insidiosus*, adult, Male, K.A. Keating, 26-May-94, United States of America, Montana, Flathead Co, "Glacier National Park, N. Fork Flathead area, 100m N Trout Lake trail

head" ,,,965m, TAGGGACTTCCCTTAGACTTCTGATTCGAGCAGAATTAGGAAAT  
CCTGGATCATTAAATCGGAAATGACCAAATCTACAACGTAATCGTTACAGCTC  
ATGCTTTTATCATAATTTTTTTTATAGTTATACCTATCATAATTGGAGGATTTG  
GAAATTGACTAGTTCCATTAATGCTTGGAGCCCCGACATGGCATTCCCCCGA  
ATAACAACATAAGATTCTGACTTTTACCACCATCACTATCCCTGCTTCTAAT  
AAGAAGAATTGTAGAAAACGGAGCAGGAACAGGATGAACTGTCTACCCCC  
TCTCTCAGCAAATATTGCTCACAGAGGTTTCATCTGTAGATCTCGCAATTTTGA  
GACTACACCTTGCAGGAATTCCTCAATTCTAGGAGCAGTAACTTCATCTCT  
ACGGTAATCAATATACGATCAACTGGAATTACTTTTGACCGAATACCTTTATT  
CGTATGAGCCGTGGCTATCACAGCTCTTCTACTTCTCCTAAGACTCCCGGTAC  
TCGCCGGAGCAATCACAATACTTCTAACAGACCGAACTTAAACACCTC

MTEC007927, *Metanomus insidiosus*, adult, Female, K.A. Keating, 01 Jun to 01 Jul 1993, United States of America, Montana, Flathead Co, "Glacier National Park, McDonald Creek drainage, 340m SW West Entrance Station" ,,,980m,

MTEC007928, *Corymbitodes lobatus*, adult, M.A. Ivie, 29 May to 19 Jun 1991, United States of America, Montana, Flathead Co, "Glacier National Park. N. Fork Flathead area, N. Sullivan Meadow", 3560ft,

MTEC007929, *Metanomus insidiosus*, adult, Female, D.L. Gustafson, 20-Jun-90, United States of America, Montana, Gallatin Co, Bozeman Creek, 6200ft, CTGATTCGAGCAGAATTAGGAAACCCCGGATCATTAAATCGGAAATGACCAAATCTACAACGTAATCGTTACAGCTCATGCTTTTATCATAATTTTTTTATAGTTATACCTATCATAATTGGAGGATTTGGAAATTGACTAGTTCCATT AATGCTTGGAGCCCCCGACATGGCATTCCCCGAATAAACACATAAGATTC TGACTTTTACCACCATCACTATCCCTGCTTCTAATAAGAAGAATTGTAGAAAA CGGAGCAGGAACAGGATGAACTGTCTACCCCCCTCTCTCAGCAAATATTGCT CACAGAGGTTTCTGTAGATCTCGCAATTTTTAGACTACACCTTGCAGGAAT TTCCTCAATTCTAGGAGCAGTAACTTTATCTCTACGGTAATCAATATACGAT CAACTGGAATTACTTTTGACCGAATACCTTTATTCGTATGAGCCGTGGCTATC ACAGCTTCTACTTCTCCTAAGACTCCCGGTCTCGCCGGAGCAATCACAAT ACTTCTAACAGACCGAACTTAAACACCTC

MTEC007930, *Hadromorphus callidus*, adult, Male, "C.Hart, A. Stavens", 17 Jun to 28 Jul 2011, United States of America, Montana, Garfield Co, Mosby Rest Area, 46.9904N, 107.8609W, 2670ft, CATCCCTTAGACTTCTGATTCGAGCTGAACTA GGTAACCCAGGATCTCTCATTGGCAATGATCAAATCTACAACGTCATTGTTAC AGCCCACGCTTTCATTATAATTTCTTCATAGTAATACCTATCATAATTGGAG GATTCGGAAATTGATTAGTTCCCCTAATACTCGGAGCTCCCGACATGGCCTTT CCACGAATGAATAATATGAGATTCTGGTTTCTTCCCCCTTCTTTATCTTTACTC TTAATAAGAAGAATTGTTGAAAATGGAGCAGGGACAGGATGAACTGTTTACC CTCCTCTATCAGCCAATATCGCTCACAGAGGGTCATCAGTTGACTTAGCAATT TTTAGTCTACACTTAGCTGGAATTTTCATCAATTTTAGGAGCTGTAAATTTTATT TCAACAGTAATTAACATACGATCAACCGGAATCACCTTTGACCGGATACCTCT ATTTGTATGAGCTGTAGCCATTACAGCCCTCCTCCTTTTACTTTCTCTACCTGT ACTTGCAGGAGCAATCACAATACTATTAACCGATCGAAACCTAAAT

MTEC007931, *Hadromorphus callidus*, adult, Male, D.L. Gustafson, 7-Jun-96, United States of America, Montana, Stillwater Co, Reed Point FAS, , , ,

MTEC007932, *Hadromorphus glaucus*, adult, Female, USDA, 23 May to 19 Jun 2011, United States of America, Montana, Sweet Grass Co, Greycliffe, 45.7359N, 109.7571W, 3900ft,

MTEC007933, *Hadromorphus glaucus*, adult, Female, K.A. Keating, 26-Jun-99, United States of America, Montana, Glacier Co, "Glacier National Park, Windy Flats", 48.81051N, 113.60539W, 1492m,

MTEC007934, *Hadromorphus glaucus*, adult, Male, 15-May-97, United States of America, Montana, Broadwater Co, Kitto alfalfa 1, , , ,

MTEC007935, *Hadromorphus, glaucus*, adult, Female, D.L. Gustafson, 7-Jun-91, United States of America, Montana, Powder River Co ,5 mi W of Broadus,,,

MTEC007936, *Limonius, subauratus*, adult, Male, D. Broers, 29-Apr-03, United States of America, Washington, Benton Co., Plymouth,,,

MTEC007937, *Limonius, subauratus*, adult, Male, D. Broers, 29-Apr-03, United States of America, Washington, Benton Co., Plymouth,,,

MTEC007938, *Limonius, subauratus*, adult, Female, D. Broers, 30-Apr-03, United States of America, Washington, Benton Co., Plymouth,,,

MTEC007939, *Limonius, canus*, adult, Male, "D. Broers, M. Bayer", 31-Mar-10, United States of America, Oregon, Umatilla Co., Hermiston Potato Field  
 ,, ,CATCCCTAAGACTCTTGATTCGTCGCGAACTTGGTAACCCCGGCTCACTAA  
 TCGGAAATGACCAAATTTACAATGTTATTGTTACAGCCCACGCCTTCATTATA  
 ATTTTCTTTATAGTTATGCCGATCATAATTGGCGGTTTCGGAACTGATTAGT  
 GCCCCTGATACTAGGAGCCCCCTGATATAGCCTTCCCTCGAATAAACAACATG  
 AGATTCTGATTCTTACCCCCGTCCTCTCCCTCCTCCTAATAAGAAGAATCGT  
 AGAAAATGGTGCAGGAACTGGATGAACAGTTTACCCCCACTATCAGCCAAC  
 ATGCACACAGAGGATCATCAGTTGATCTTGCCATTTTCAGCCTTCACCTAGC  
 AGGTATCTCTTCCATTCTAGGTGCAGTTAACTTCATCTCAACTGTTATTAATAT  
 GCGGTCCACAGGAATCACCTTTGACCGAATGCCTCTATTTCGTTTGAGCAGTAG  
 CAATTACTGCTCTACTCCTCCTTCTTTCTCTCCCAGTCCTAGCAGGAGCAATTA  
 CAATATTATTGACAGATCGTAATCTAAACACCTCA

MTEC007940, *Limonius, californicus*, adult, Male, A. Morales et. al, 2011, United States of America, Montana, Fergus Co ,Denton, 47.2942N, 110.042183W, 3776ft,

MTEC007941, *Limonius, californicus*, adult, Male, A. Morales et. al, 2011, United States of America, Montana, Fergus Co  
 ,Denton, 47.2942N, 110.042183W, 3776ft, CATCCTTAAGACTCTTGATTCGGGCAGA  
 ACTTGGTAACCCTGGGTCACTAATTGGAAACGACCAAATCTATAATGTTATTG  
 TTACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATTG  
 GTGGATTCGGAAACTGACTAGTTCCACTAATATTGGGCGCTCCTGATATAGCC  
 TTCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCACTTTCTCTT  
 CTTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACAGTAT  
 ACCCCCCTCTCTCAGCTAACATTGCCATAGAGGCTCTTCAGTTGACCTCGCC  
 ATTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAATTT  
 TATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGTATGC  
 CTCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTCTTACTTTCACTCC  
 CAGTTTTGGCAGGAGCTATCACAATACTATTAACAGATCGAAACCTAAACAC  
 TTC

MTEC007942, *Limonius californicus*, adult, Male, A. Morales et. al, 2011, United States of America, Montana, Fergus Co ,Denton, 47.2942N, 110.042183W, 3776ft, CATCCTTAAGACTCTTGATTTCGdgCAGAACTTGGAACCCCTGGGTCACCTAATTGGAAACGACCAAATCTATAATGTTATTGT TACAGCTCACGCCTTCATCATAATTTTCTTTATAGTTATAACCAATCATAATTGG TGGATTTCGGAACTGACTAGTwCCCCTAATATTGGGCGCTCCTGATATAGCCT TCCCTCGAATAAACAATATAAGATTCTGATTCTTGCCCCATCwCTTTCTCTTC TTCTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACTGGATGAACAGTATA CCCCCCTCTCTCAGCTAACATTGCCATAGAGGCTCTTCAGTTGACCTCGCCA TTTTCAGCCTTCACCTAGCAGGAATTTTCATCCATCCTGGGAGCAGTTAATTTT ATCTCAACTGTTATTAATATACGATCTACCGGAATTACCTTCGACCGTATGCC TCTATTTGTTTGAGCAGTAGCAATTACCGCTCTTCTCCTyTTwCTTTCmCTCCC AGTTTTGGCAGGAGCTATTACAATACTATTAACAGATCG

MTEC007943, *Megapenthes angularis*, adult, Female, D.L. Gustafson, 16-Jul-90, United States of America, Montana, Rosebud Co , "Tongue R., Ashland" ,,,

MTEC007944, *Megapenthes angularis*, adult, Female, D.L. Gustafson, 9-Aug-91, United States of America, Montana, Fergus Co , "Missouri R., FRB" , 47.6287N, 108.6824W, 712m, TACTAGGGACATCTTTAAGTCTATTAATTTCGA GCAGAATTAGGAAACCCAGGTGCATTAATTGGAAACGACCAAATTTATAATG TAGTTGTAACCGCTCATGCTTTTATCATAATTTTCTTTATAGTAATACCTATCA TAATTGGGGGATTTCGGAAATTGATTAGTCCCCTTAATGCTAGGAGCTCCAGAT ATAGCATTCCCACGAATAAACAATATAAGATTTTGTATTTCTACCTCCTTCTCT TTCCCTTCTTTTAATAAGAAGAATTGTAGAAAGAGGAGCAGGAACAGGATGA ACTGTTTACCCACCTTTAGCATCAAACATTGCACATAGAGGATCCTCTGTAGA TTTAGCCATTTTGTAGCCTTCATTTAGCTGGAATCTCTTCCATCTTAGGGGCAGT TAATTTCAATTTCAACTGTGATTAACATACGATCCACAGGAATCTCCTTTGACC GAATACCTTTATTTGTTTGAGCTGTGGCAATCACTGCACCTTTACTTCTATTAT CTCTACCTGTACTTGCAGGAGCAATTACGATACTTTTAACAGATCGAAATCTA AACAC

MTEC007945, *Megapenthes angularis*, adult, Female, D.L. Gustafson, 7-Aug-93, United States of America, Montana, Richland Co, Missouri River at Culbertson, ,,,

MTEC007946, *Megapenthes angularis*, adult, Female, D.L. Gustafson, 16-Aug-96, United States of America, Montana, Fergus Co , "Missouri R., Fred Rob Br." , 47.6287N, 108.6824W, 712m,

MTEC007947, *Selatosomus semimetallicus*, adult, Female, "C.Hart, A. Stavens" , 29 Jun to 03 Aug 2011, United States of America, Montana, Ravalli Co, Blodgett Campground Rd, 46.2649N, 114.214041W, 4041ft, CTTCTCTTAGTCTTCTGATTTCGAGCTGAACTA GGTAACCCCGGCTCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTTAC

AGCCCATGCCTTTATTATAATTTTCTTTATAGTTATACCAATCATAAATTGGAG  
 GATTCGGTAATTGACTCGTTCCTTTAATACTTGGAGCTCCTGACATAGCATT  
 CCACGAATAAACAACATAAGATTCTGGTTCCTACCACCTTCTCTGTCGCTTTT  
 ACTAATAAGAAGAATCGTAGAAAACGGGGCAGGAACAGGATGAACTGTCTA  
 CCCTCCCCTTTTCAGCAAACATTGCTCACAGAGGGTCTTCAGTAGACCTAGCAA  
 TTTTATAGTTTACACCTAGCAGGAATTTTCATCAATTCTAGGAGCAGTAAATTT  
 ATTTCAACAGTAATTAACATACGATCAACTGGAATCACCTTCGACCGAATGC  
 CTCTATTTGTATGAGCAGTAGCCATTACTGCCCTTCTCCTCCTTTTGT

MTEC007948, *Limonius, canus*, adult, Male, "D. Broers, M. Bayer", 4-Apr-11, United States of America, Oregon, Umatilla Co., Hermiston Potato field,,,, CATCCCTAAGACTCTTGATTCGTGCCGAACCTTGGTAACCCCGGCTCACTAATCGGAAATGACCAAATTTACAATGTTATTGTTACAGCCCACGCCTTCATTA TAATTTTCTTTATAGTTATGCCGATCATAATTGGCGGTTTTCGGAACTGATTA GTGCCCTGATACTAGGAGCCCCTGATATAGCCTTCCCTCGAATAAACAACA TGAGATTCTGATTCTTACCCCGTCTCTCTCCCTCCTCCTAATAAGAAGAATC GTAGAAAATGGTGCAGGAACCTGGATGAACAGTTTACCCCCACTATCAGCCA ACATTGCACACAGAGGrTCATCAGTTGATCTTGCCATTTTCAGCCTTCACCTAG CAGGTATCTCTTCCATTCTAGGTGCAGTTAACTTCATCTCAACTGTTATTAATA TGCGGTCCACAGGAATCACCTTTGACCGAATGCCTCTATTCGTTTGAGCAGTA GCAATTACTGCTCTACTCCTCCTTCTTTCTCTCCAGTCCTAGCAGGAGCAATT ACAATATTATTGACAGATCGTAATCTAA

MTEC007949, *Limonius, canus*, adult,,,, 6-Apr-04, United States of America, Washington, Klickitat Co., Klickitat,,,, CATCCCTAAGACTCTTGATTCGTGCCGAACCTTGGTAACCCCGGC TCACTAATCGGAAATGACCAAATTTACAATGTTATTGTTACAGCCCACGCCTT CATTATAATTTTCTTTATAGTTATGCCGATCATAATTGGCGGTTTTCGGAACT GATTAGTGCCCCTGATACTAGGAGCCCCTGATATAGCCTTCCCTCGAATAAAC AACATGAGATTCTGATTCTTACCCCGTCTCTTTCCCTCCTTCTAATAAGAAG AATCGTAGAAAATGGTGCAGGAACCTGGATGAACAGTTTACCCCCCTCTATCA GCCAACATTGCACACAGAGGGTCATCAGTTGATCTTGCCATTTTCAGCCTTCA CCTAGCAGGTATCTCTTCCATTCTAGGTGCAGTTAACTTCATCTCAACTGTTAT TAATATGCCGATCCACAGGAATCACCTTTGACCGAATGCCTCTATTCGTTTGAG CAGTAGCAATTACTGCTCTACTCCTCCTTCTTTCTCTCCAGTCCTAGCAGGA GCAATTACAATATTATTGACAGATCGTAATCTAAACACCTC

MTEC007950, *Limonius, subauratus*, adult, Male, D.L. Gustafson, 8-Jun-94, United States of America, Montana, Lincoln Co, Yaak River Camp,,,,

MTEC007951, *Agriotes, ferruginipennis*, adult, Female, D.L. Gustafson, May - Sept 1988, United States of America, Montana, Gallatin Co, "Bozeman, Gallatin R." ,,,



MTEC007952, *Agriotes ferruginipennis*, adult, Male, H.W. Ziolkowski, 9-Jun-89, United States of America, Montana, Gallatin Co, "Gallatin R., Gallatin Gateway" ,,,

MTEC007953, *Agriotes ferruginipennis*, adult, Male, D.L. Gustafson, 6-Jun-90, United States of America, Montana, Flathead Co, Glacier National Park near Polebridge,,,  
 MTEC007954, *Agriotes ferruginipennis*, adult, Male, D.L. Gustafson, 13-Jun-87, United States of America, Montana, Gallatin Co, Gallatin R. ,,,4700ft,

MTEC007955, *Limonius infuscatus*, adult, Female, "R.F. Lang, J.P. Cuda", 16-May-88, United States of America, Montana, Flathead Co, Kalispell,,,

MTEC007956, *Limonius infuscatus*, adult, Male, G.J. McDermott, 5-May-90, United States of America, Montana, Granite Co, Nimrod Springs,,,  
 CCTTAAGACTCCTTATTCGAGCAGAGCTGGGGAATCCTGGCTCATT  
 ATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACACGCTTTTATCAT  
 AATTTTCTTCATAGTAATAACCAATTATAATCGGTGGATTTGGAACTGACTAG  
 TACCGCTTATGCTAGGAGCCCCAGACATAGCATTCCCTCGAATAAATAATAT  
 AAGATTCTGATTCCTTCCTCCATCGCTTTCCCTTCTTCTCATAAGAAGAATTGT  
 AGAAAATGGTGCTGGCACAGGATGAACTGTTTATCCACCCTTATCAGCAAAC  
 ATCGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAGTCTACATCTAGC  
 AGGAATCTCATCAATTCTAGGAGCAGTAACTTTATCTCCACCGTAATTAATA  
 TGCGAACTACAGGAATCACTTTTGACCGAATACCTTTATTTGTATGAGCAGTT  
 GCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTTGCCGGAGCAAT  
 CACAATACTATTAACAGACCGAAATCTAAATACCTCATTTTTTG

MTEC007957, *Limonius infuscatus*, adult, Male, "R.F. Lang, J.P. Cuda", 10-May-88, United States of America, Montana, Flathead Co, Hungary Horse,,,

MTEC007958, *Limonius infuscatus*, adult, Male, "R.F. Lang, J.P. Cuda", 10-May-88, United States of America, Montana, Flathead Co, Hungary Horse,,,

MTEC007959, *Limonius agonus*, adult, Male, "F. Etzler, C. Hart", 12-May-12, United States of America, Ohio, Sandusky Co., Outside Fremont on Hwy 6, 41.3573N, 83.1649W, 620ft, CATCCTTAAGACTCCTTGATTCGTGCAGAGCTAGGA  
 AACCTGGCTCACTAATCGGAAACGACCAAATTTATAACGTTATTGTTACAGC  
 CCACGCTTTTATTATAATTTCTTCATAGTAATAACCAATCATAATTGGTGGATT  
 CGGAAATTGACTAGTGCCTCTAATACTTGGAGCCCCTGATATAGCATTCCCTC  
 GAATAAATAATATAAGATTCTGATTCCTTCCTCCATCTCTTTCTCTACTTCTAA  
 TAAGAAGAATCGTAGAAAACGGTGCAGGTAAGTGGATGGACAGTATAACCCTCC  
 CCTCTCAGCTAACATCGCTCATAGAGGATCCTCAGTTGACCTTGCCATTTTCA  
 GCTTACACTTAGCAGGAATCTCATCTATCCTAGGTGCAGTAACTTTATTTCA  
 ACAGTTATTAATATACGATCTACAGGAATCACTTTTCGACCGTATAACCCTATT  
 TGTCTGAGCAGTAGCTATTACTGCTCTTCTTTTACTCTCCCTTCCAGTCCT  
 AGCAGGGGCAATTACAATACTATTAACAGACCGAAACCTAAACACTTCA

MTEC007960, *Aeolus, mellillus*, adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007961, *Dalopius*, sp., adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft, GGATCACTAATTGGAAATGAiCAAATCTAyA  
ACGTTATTGTAACAGCACAcGCaTTCATTATAATTTTCTTCATAGTTATACCTA  
TCATAATyGGAGGATTCGGAAAtTGATTAGTcCCAAtTAATAcTtGGAGCTCCAGA  
TATAGCCTTCCCTCGAATAAACAAyATAAGATTCTGATTtTTACCCCTTCacTa  
TCTCTTCTTCTaATAAGAAGAATTGTTGAAAATGGAGCAGGAACAGGtTGAACt  
GTTTACCCCCACTATCTTCAAATATTGCACAAtAGAGGcTCATCAGTTGATTTA  
GCAATTTTTAGTTTACACTTAGCTGGtATcTCrTCAATCTTAGGgGCTGTAAATT  
TTATTTCCACAGTAATTAATATACGATCAACTGGAATTACCTTTGACCGAATA  
CCTTTATTTGTTTGAGCAGTTGCAATTACTGCCtTACTttTATTACTTTCACTACC  
AGTATTAGC

MTEC007962, *Dalopius*, sp., adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007963, *Agriotes, criddlei*, adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007964, *Dalopius*, sp., adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft, CATCATTAAGACTACTAATTCGTGCTGAATT  
AGGTAACCCAGGATCATTAAATTGGAAATGATCAAATTTACAATGTTATTGTA  
ACAGCGCATGCATTATTATAATTTTCTTCATAGTTATACCTATCATAATTGG  
AGGATTTGGGAATTGATTAGTTCCACTAATACTAGGAGCTCCAGACATAGCC  
TTCCCTCGAATAAATAATATAAGATTCTGATTTTTACCCCTTCATTGTCCCTT  
CTTCTGATAAGAAGAATTGTTGAAAATGGAGCAGGAACAGGTTGAACTGTTT  
ATCCTCCACTGTCTTCAAATATTGCCACAGAGGATCGTCAGTTGATTTAGCA  
ATTTTTAGTTTACATTTAGCTGGTATCTCATCAATTCCTGGAGCTGTAAATTTT  
ATTTCTACAGTAATTAATATACGATCAACTGGAATCACCTTTGACCGAATACC  
TTTATTTGTTTGAGCAGTTGCAATTACCGCCCTACTTTTATTACTTTCGCTACC  
AGTACTAGCTGGGGCAATCACCATACTATTAACAGACCGAAATCTAAATACA  
TCATTTTTTG

MTEC007965, *Hadromorphus, glaucus*, adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007966, *Dalopius*, sp., adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007967, *Dalopius*, sp., adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007968, *Psudanostirus*, propola, adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007969, *Agriotes*, *criddlei*, adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007970, *Hadromorphus*, *glaucus*, adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007971, *Hadromorphus*, *glaucus*, adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007972, *Hadromorphus*, *glaucus*, adult., P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007973, *Dalopius*, sp., adult., P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007974, *Hadromorphus*, *glaucus*, adult., P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007975, *Hadromorphus*, *glaucus*, adult., P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007976, *Hadromorphus*, *glaucus*, adult., P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007977, *Hadromorphus, glaucus*, adult,, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007978, *Hadromorphus, glaucus*, adult,, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007979, *Agriotes, criddlei*, adult,, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007980, *Hadromorphus, glaucus*, adult,, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007981, *Hadromorphus, glaucus*, adult,, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007982, *Hadromorphus, glaucus*, adult,, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007983, *Athous, sierrae varius*, larva,, P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007986, *Limonius, infuscatus*, larva,, P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft, ACTTGGTACATCCTTAAGACTCCTTATTCGA GCAGAGCTGGGAAATCCTGGCTCATTAATTGGAAATGACCAAATTTATAACG TAATTGTAACAGCACACGCTTTCATCATAATTTCTTCATAGTAATACCAATT ATAATCGGTGGATTTGGAAACTGATTAGTACCACTTATACTAGGAGCCCCAG ACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCCTCCATCG CTTTCCCTTCTTCTCATAAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATG AACTGTTTATCCACCCTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTG ATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCA GTAAACTTTATCTCCACCGTAATTAATATACGA ACTACAGGAATCACTTTTGA CCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCT CTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAATC TAAATACCTC

MTEC007987, *Dalopius*, sp., larva, P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft, GCTGAATTAGGTAACCCAGGATCACTAATTGGAAATGATCAAATCTACAACGTTATTGTAACAGCACATGCATTCATTATAATTTCTTCATAGTTATACCTATCATAATTGGAGGATTCGGAAATTGATTAGTCCCATTAATACTTGGAGCTCCAGATATAGCCTTCCCTCGAATAAACAACATAAGATTCTGATTTTTACCCCTTCATTATCTCTTCTTATAAGAAGAATTGTTGAAATGGAGCAGGAACAGGTTGAACTGTTACCCCCACTATCTTCAAATATTGCACACAGAGGCTCATCAGTTGATTTAGCAATTTTAGTTTACTTTAGCTGGTATCTCGTCAATCTTAGGGGCTGTAAATTTATTCCACAGTAATTAATATACGATCAACTGGAATTACCTTTGACCGAATACCTTTATTTGTTTGAGCAGTTGCAATTACTGCCTTACTTTTATTACTTTCCTACTACCAGTATTAGCTGGAGCAATTACTATACTATTAACGGACCGAAATCTAAACACATCA

MTEC007991, *Dalopius*, sp., larva, P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC007993, *Hemicrepidius*, sp. nr. *carbonatus*, larva, P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft, CTTCATTAAGACTATTAATTCGAGCAGAAC TTGGTAATCCTGGATCACTTATTGGAAATGACCAAATCTACAATGTCATTGTAACAGCCCATGCTTTTATTATAATTTCTTTATAGTTATACCAATTATAATTGGGGATTTCGGAAATTGGTTAGTTCCCCTAATACTAGGAGCCCCAGACATGGCCTT TCCCCGAATAAACAACATGAGATTCTGATTTTTACCCCTTCTCTTTCCCTTTT ATTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACAGGATGAACTGTTTAT CCTCCTCTATCAGCAAATATTGCTCATAGAGGGTCCTCAGTAGACCTCGCTAT TTTCAGTTTACATTTAGCAGGAATCTCATCAATTCTAGGGGCAGTAAATTTTA TTCCACAGTAATTAATATACGATCTACCGGAATCACATTTGATCGTATGCCA TTATTTGTTTGAGCTGTTGTTATTACAGCCCTTCTATTACTACTTTCTCTACCT GTTCTTGCAGGAGCAATTACTATACTTTAACAGATCGAAATTTAAATACATC A

MTEC007994, *Hemicrepidius*, sp. nr. *carbonatus*, larva, P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft, CTTCATTAAGACTATTAATTCGAGCAGAAC TTGGTAATCCTGGATCACTTATTGGAAATGACCAAATCTACAATGTCATTGTAACAGCCCATGCTTTTATTATAATTTCTTTATAGTTATACCAATTATAATTGGGGATTTCGGAAATTGGTTAGTTCCCCTAATACTAGGAGCCCCAGACATGGCCTT TCCCCGAATAAACAACATGAGATTCTGATTTTTACCCCTTCTCTTTCCCTTTT ATTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACAGGATGAACTGTTTAT CCTCCTCTATCAGCAAATATTGCTCATAGAGGGTCCTCAGTAGACCTCGCTAT TTTCAGTTTACATTTAGCAGGAATCTCATCAATTCTAGGGGCAGTAAATTTTA TTCCACAGTAATTAATATACGATCTACCGGAATCACATTTGATCGTATGCCA

TTATTTGTTTGAGCTGTTGTTATTACAGCCCTTCTATTACTACTTTCTCTACCT  
 GTTCTTGCAGGAGCAATTACTATACTTTTAAACAGATCGAAATTTAAATACATC  
 A

MTEC007996, *Selatosomus, aeripennis*, larva,, P.S. Gill, 2010, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, CTTCTCTTAGCCTTCTAATTCGAGCTGAACT  
 AGGTAACCCCGGCTCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTAA  
 CAGCCCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGG  
 GGATTCGGAAATTGACTTGTACCCCTAATACTAGGAGCCCCTGATATAGCATT  
 CCCACGTATAACAATATAAGATTCTGATTCTCCACCCTCTCTATCACTTTT  
 ACTAATAAGAAGAATCGTGGAAAATGGGGCAGGAACAGGATGAACAGTTTA  
 CCCCCCTCTCTCAGCCAATATTGCCCATAGAGGATCATCAGTTGACCTAGCAA  
 TTTTCAGATTACACCTAGCAGGAATCTCATCAATCCTAGGGGCTGTAAATTC  
 ATCTCAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATACC  
 TTTATTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGCC  
 AGTCCTGGCAGGAGCAATTACAATGTTACTAACCGATCGAAACCTAAATAC

MTEC007997, *Hypnoidus, leei*, larva,, P.S. Gill, 2010, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, ACTCCTAATCCGTGCAGAACTAGGAAACCC  
 TGGTTCACTAATTGGAAATGATCAAATCTACAACGTAATTGTAACGGCCCAT  
 GCTTTCATTATAATTTTCTTCATAGTTATACCAATCATGATCGGTGGTTTCGGA  
 AATTGATTAGTACCTTTAATACTAGGAGCTCCCGACATAGCATTCCCTCGAAT  
 AAATAACATAAGATTTTGATTCTTACCCCTTCTCTGTCACTACTTTTAATAAG  
 AAGAATCGTAGAAAATGGGGCAGGAACCGGATGAACCGTTTATCCCCCCTC  
 TCAGCTAATATTGCCCATAGAGGCTCATCTGTTGATTTAGCAATCTTCAGTTT  
 ACACTTGGCTGGAATCTCATCAATTCTAGGAGCAGTAAATTTTATTTCAACCG  
 TAATCAATATACGATCAACAGGAATCACCTTTGATCGAATACCGTTATTTGTT  
 TGAGCTGTTGCAATTACAGCACTTCTCCTCCTTCTTTCATTACCAGTATTAGCT  
 GGAGCAATCACTATACTACTAACAGACCGAAATTTAAATACATC

MTEC008015, *Aeolus, mellillus*, larva,, P.S. Gill, 2010, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft,

MTEC008016, *Aeolus, mellillus*, larva,, P.S. Gill, 2010, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft,

MTEC008017, *Aeolus, mellillus*, larva,, P.S. Gill, 2010, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft,

MTEC008018, *Aeolus mellillus*, larva, P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft, CGTCATTGAGATTACTAATTCGAGCCGAAC TAGGTAACCCGGGTTCTTTAATTGGAAATGACCAAATCTATAACGTAATTGTA ACTGCACATGCATTTCATCATAATTTTCTTCATAGTTATGCCAATCATAATTGG AGGTTTTGGAAATTGATTAGTACCTCTAATGCTTGGAGCCCCAGATATGGCAT TTCCACGAATGAACAACATAAGATTCTGGCTTCTTCCTCCTTCTTTATCACTCC TTTAATGAGAAGAATTGTAGAAAATGGAGCAGGAACTGGTTGAACAGTTTA CCCTCCCTTATCAGCAAATATTGCCACAGTGGATCATCAGTCGACTTAGCCA TTTTAGTCTTCATTTAGCAGGTATTCGTC AATTCTAGGTGCAGTAAATTTCA TCTCAACAGTAATTAACATACGATCAACAGGAATTACATTTGATCGTATACCT CTATTTGTCTGAGCAGTAGTAATTACTGCCCTTCTACTTCTTCTATCCCTTCCA GTTTTAGCAGGAGCTATTACAATACTATTAACAGACCGAAATCTTAATACCAC

MTEC008019, *Aeolus mellillus*, adult, P.S. Gill, 2010, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft, CGAGCCGAACtAgGTAACCCgGGtTCtTAATT GGAAATGAcCAAATCTAtAATGTAATTGTAACaGCcCATGCaTTCATCATAATTT TcTTCATAGTTATgCCAATCATAATTGGAGGgTTTGGTAATTGATTAGTACCcCT AATaCTAGGAGChCCaGATATaGCATTcCCACGAATgAACAAACATAAGATTCTG ATTTtTTCCTCCTTCTcTATCACTCCTTcTAATaAGAAGAATTGTAGAAAATGGa GCAGGAACTGGTTGAACAGTaTACCCTCCTTTATCAGCaAAtATTGCCACAGA GGATCATCAGTTGACTTAGCCATTTTtAGtcTTCATtTAGCAGGTATTTTCGTC AA TtCTAGGAGCAGTAAATTTcATcTCAACaGTAATTAACATACGATCAACAGGAA TtACcTTTGATCGTATACCTcTATTTGTTTGGAGCAGTAGCAATTACTGCCCTTCT ACTTCTTCTaTCCCTTCCAGTTtTaGCAGGAGCTATtACAATACTATTAACAGAC CGAAAT

MTEC008020, *Melanotus longulus oregonensis*, larva, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC008021, *Athous sierrae varius*, larva, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC008022, *Athous sierrae varius*, larva, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft,

MTEC008027, *Limonius infuscatus*, larva, P.S. Gill, 2011, United States of America, Montana, Gallatin Co., Fort Ellis Experiment Station, 45.6692N, 110.9755W, 4987ft, CTCCTTATTCGAGCAGAGCTGGGAAATCCT GGCTCATTAAATTGGAAATGACCAAATTTATAACGTAATTGTAACAGCACACG

CTTTCATCATAATTTTCTTCATAGTAATACCAATTATAATCGGTGGATTTGGA  
 AACTGATTAGTACCACTTATACTAGGAGCCCCAGACATAGCATTCCCTCGAAT  
 AAATAATATAAGATTCTGATTCCCTCCCTCCATCGCTTTCCCTTCTTCTCATAAG  
 AAGAATTGTAGAAAATGGTGCTGGTACAGGATGAACTGTTTATCCACCCTTA  
 TCAGCAAACATTGCCCATAGAGGATCCTCCGTTGATTTGGCAATTTTCAGTCT  
 GCATCTAGCAGGAATCTCATCAATTCTAGGAGCAGTAACTTTATCTCCACCG  
 TAATTAATATACGAACTACAGGAATCACTTTTGACCGAATACCTTTATTTGTA  
 TGAGCAGTTGCAATTACAGCTCTACTATTACTTCTCTCCTTACCAGTTCTTGCT  
 GGAGCAATCACAATACTATTAACAGACCGAAATCTAAATACCTCATTTTTTG

MTEC008031, *Limonius, infuscatus*, larva., P.S. Gill, 2011, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, ACTTGGTACATCCTTAAGACTCCTTATTCGA  
 GCAGAGCTGGGAAATCCTGGCTCATTAAATTGGAAATGACCAAATTTATAACG  
 TAATTGTAACAGCACACGCTTTCATCATAATTTTCTTCATAGTAATACCAATT  
 ATAATCGGTGGATTTGGAACTGATTAGTACCACTTATACTAGGAGCCCCAG  
 ACATAGCATTCCCTCGAATAAATAATATAAGATTCTGATTCCCTCCCTCCATCG  
 CTTTCCCTTCTTCTCATAAGAAGAATTGTAGAAAATGGTGCTGGTACAGGATG  
 AACTGTTTATCCACCCTTATCAGCAAACATTGCCCATAGAGGATCCTCCGTTG  
 ATTTGGCAATTTTCAGTCTGCATCTAGCAGGAATCTCATCAATTCTAGGAGCA  
 GTAAACTTTATCTCCACCGTAATTAATATACGAACTACAGGAATCACTTTTGA  
 CCGAATACCTTTATTTGTATGAGCAGTTGCAATTACAGCTCTACTATTACTTCT  
 CTCCTTACCAGTTCTTGCTGGAGCAATCACAATACTATTAACAGACCGAAATC  
 TAAATACCTCATTTTTTG

MTEC008032, *Selatosomus, aeripennis*, larva., P.S. Gill, 2011, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, CTTCTCTTAGCCTTCTAATTCGAGCTGAACT  
 AGGTAATCCCGGCTCTCTCATTGGTAATGACCAAATTTACAACGTAATCGTAA  
 CAGCCCACGCCTTTATTATAATTTTCTTCATAGTAATACCAATCATAATTGGA  
 GGATTTCGAAATTGACTTGTACCCCTAATACTAGGAGCCCCTGATATAGCATT  
 CCCACGTATAAACAATATAAGATTCTGATTCCCTACCACCCTCTCTATCACTTT  
 TACTAATAAGAAGAATCGTGGAATAATGGAGCAGGAACAGGATGAACAGTTT  
 ACCCCCCTCTCTCAGCCAATATTGCCCATAGAGGGTCATCAGTTGACCTAGCA  
 ATTTTCAGATTACACCTAGCAGGAATCTCATCAATCCTAGGGGCTGTAAATTT  
 CATCTCAACAGTTATTAATATACGATCAACTGGAATCACCTTTGACCGAATAC  
 CTTTATTTGTATGGGCAGTAGCTATCACAGCCCTCCTTCTACTCTTATCTCTGC  
 CAGTCCTGGCAGGAGCAATCACAATGTTACTAACCGATCGAAACCTAAATAC

MTEC008037, *Dalopius, sp.*, larva., P.S. Gill, 2011, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, TCATTAAGACTACTAATTCGTGCTGAATTAG  
 GTAACCCAGGATCATTAAATTGGAAATGATCAAATTTACAACGTTATTGTAAC  
 AGCACATGCATTCATTATAATTTTCTTCATAGTTATACCTATCATAATTGGAG



GATTCGGAAATTGATTAGTCCCATTAATACTTGGAGCyCCAGATATAGCmTTC  
 CCTCGAATAAACAAyATAAGATTTTGATTTTTACCCCCCTCATTATCTCTTCTT  
 CTtATAAGAAGAATTGTTGAAAATGGAGCAGGAACAGGTTGAACCGTTTACC  
 CTCCACTATCTTCAAATATTGCACATAGAGGCTCATCAGTTGATTTAGCAATT  
 TTTAGTTTACACTTAGCTGGTATTTTCATCAATTTTAGGGGCTGTAAATTTTATT  
 TCCACAGTAATTAATATACGATCAACTGGAATTACCTTTGACCGaATACCTTT  
 ATTTGTTTGAGCAGTTGCAATTACTGCCTTACTTTTATTACTTTCACTACCAGT  
 ATTAGCcGGAGCAATTACTATACTATTAACAGACCGAAATCTAAACACATCA

MTEC008044,Dalopius,sp.,larva,,P.S. Gill,2011,United States of  
 America,Montana,Gallatin Co.,Fort Ellis Experiment  
 Station,45.6692N,110.9755W,4987ft,ATCATTAAAGACTACTAATTCGTGCTGAATTA  
 GGTAACCCAGGATCACTAATTGGAAATGATCAAATCTACAACGTTATTGTAA  
 CAGCACATGCATTCATTATAATTTTCTTCATAGTTATACCTATCATAATTGGA  
 GGATTCGGAAATTGATTAGTCCCATTAATACTTGGAGCTCCAGATATAGCCTT  
 CCCTCGAATAAACAAACATAAGATTCTGATTTTTACCCCCCTCATTATCTCTTCT  
 TCTTATAAGAAGAATTGTTGAAAATGGAGCAGGAACAGGTTGAACTGTTTAC  
 CCCCCACTATCTTCAAATATTGCACACAGAGGCTCATCAGTTGATTTAGCAAT  
 TTTTAGTTTACACTTAGCTGGTATCTCGTCAATCTTAGGGGCTGTAAATTTTAT  
 TTCCACAGTAATTAATATACGATCAACTGGAATTACCTTTGACCGAATACCTT  
 TATTTGTTTGAGCAGTTGCAATTACTGCCTTACTTTTATTACTTTCACTACCAG  
 TATTAGCTGGAGCAATTACTATACTATTAACGGACCGAAATCTAAACAC

MTEC008049,Dalopius,sp.,larva,,P.S. Gill,2011,United States of  
 America,Montana,Gallatin Co.,Fort Ellis Experiment  
 Station,45.6692N,110.9755W,4987ft,TCATTAAAGACTACTAATTCGTGCTGAATTAG  
 GTAACCCAGGATCAyTAATTGGAAATGATCAAATTTACAACGTTATTGTAAACA  
 GCACATGCATTCATTATAATTTTCTTCATAGTTATACCTATCATAATTGGAGG  
 ATTCGGAAATTGATTAGTCCCATTAATACTTGGAGCtCCAGATATAGCCTTCC  
 CTCGAATAAACAAcATAAGATTTTGATTTTTACCCCCCTCATTATCTCTTCTTC  
 TAATAAGAAGAATTGTTGAAAATGGAGCAGGAACAGGTTGAACCGTTTACCC  
 TCCACTATCTTCAAATATTGCACATAGAGGCTCATCAGTTGATTTAGCAATTT  
 TTAGTTTACACTTAGCTGGTATTTTCGTCAATTTTAGGGGCTGTAAATTTTATTT  
 CCACAGTAATTAATATACGATCAACTGGAATTACCTTTGACCGAATACCTTTA  
 TTTGTTTGAGCAGTTGCAATTACTGCCTTACTTTTATTACTTTCACTACCAGTA  
 TTAGCcGGAGCAATTACTATACTATTAACGGACCGAAATCTAAACACATCATT  
 C

MTEC008050,Agriotes,sp.nr. sparsus,larva,,P.S. Gill,2011,United States of  
 America,Montana,Gallatin Co.,Fort Ellis Experiment  
 Station,45.6692N,110.9755W,4987ft,TACTAATTCGAGCyGAGbTAGGTAACCCAG  
 GATCCCTAATTGGAAATGACCAGATTTACAACGTTATTGTAAACAGCTCATGCT  
 TTCATTATAATTTTCTTCATGGTTATGCCAATTATAATTGGGGGGTTCCGAAA  
 CTGATTAGTTCCCTAATACTAGGAGCCCCTGATATAGCATTCCCACGAATAA

ACAACATAAGATTCTGATTTTTACCCCCTTCCCTATCCCTCCTTCTAATGAGA  
 AGAATTGTTGAAAATGGTGCAGGAACAGGATGGACAGTGTACCCCCACTGT  
 CATCAAATATTGCCCATAGAGGATCTTCGGTAGATCTAGCAATTTTCAGTTA  
 CACTTAGCAGGAATCTCCTCAATCCTAGGAGCAGTAAACTTTATTTCAACAGT  
 AATCAATATACGATCAACGGGAATCACATTTGACCGTATACCTTTATTTGTTT  
 GAGCCGTAGCAATCACTGCATTATTACTACTTCTATCCTTACCAGTATTAGCA  
 GGAGCAATCACAATACTACTAACAGATCGAAACTTAA

MTEC008051, *Agriotes*, sp.nr. *sparsus*, larva., P.S. Gill, 2011, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, TAGGTAACCCAGGATCCyTAATTGGAAAyG  
 AcCAGATTTACAACGTTATTGTAACAGCTCATGCTTTCATTATAATTTTCTTCA  
 TGGTTATGCCAATyATAATTGGgGGGTTTCGGAAACTGATTAGTTCCcCTAATAC  
 TAGGAGCCcCTGATATAGCATTCCCACGAATAAACAACATAAGATTCTGATTT  
 TTACCcCCTTCCCTATCCCTCCTTCTAATGAGAAGAATTGTTGAAAATGGTGC  
 AGGAACAGGATGGACAGTGTACCCCCACTGTCATCAAATATTGCCCATAGA  
 GGATCTTCGGTAGAtCTAGCAATTTTCAGTTTACACTTAGCAGGAATCTCCTCA  
 ATCCTAGGAGCAGTAACTTTATTTCAACAGTAATCAATATACGATCAACGG  
 GAATCACATTTGACCGtATACCTTTATTTGTTTGAGCaGTAGCAATCACTGCAT  
 TATTACTCCTTCTATCCTTACCAGTATTAGCAGGAGCAATCACAATACTACTA  
 ACAGATCGAAACTTAAATACATCA

MTEC008052, *Agriotes*, sp.nr. *sparsus*, larva., P.S. Gill, 2011, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, cTAGGTAACCCAGGATCCCTAATTGGAAAyG  
 ACCAGATTTACAACGTTATTGTAACAGCTCATGCTTTCATTATAATTTTCTTCA  
 TGGTTATGCCAATTATAATTGGGGGGTTCGGAAACTGATTAGTTCCCCTAATA  
 CTAGGAGCCCCTGATATAGCATTCCCACGAATAAACAACATAAGATTCTGAT  
 TTTTACCCCCTTCCCTATCCCTCCTTCTAATrAGAAGAATTGTTGAAAATGGTG  
 CAGGAACAGGATGGACAGTGTACCCCCACTGTCATCAAATATTGCCCATAG  
 AGGrTCTTCGGTAGACCTAGCAATTTTCAGTTTACACTTAGCAGGAATCTCCTC  
 AATCCTAGGAGCAGTAACTTTATTTCAACAGTAATCAATATACGATCAACrG  
 GAATCACATTTGACCGTATACCTTTATTTGTTTGAGCCGTAGCAATCACTGCA  
 TTATTACTmCTTCTATCCTTACCAGTATTAGCAGGAGCAATCACAATACTACT  
 AACAGATCGAAACTTAAAT

MTEC008053, *Hemicrepidius*, sp.nr. *carbonatus*, larva., P.S. Gill, 2011, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, CTTTATTAAGACTATTAATTTCGAGCAGAAC  
 TTGGTAATCCTGGATCACTTATTGGAAATGACCAAATCTACAATGTCATTGTA  
 ACAGCCCATGCTTTTATTATAATTTTCTTTATAGTTATACCAATTATAATTGGG  
 GGATTTCGGAAATTGGTTAGTTCCCCTAATACTAGGAGCCCCAGACATGGCCTT  
 TCCCCGAATAAACAACATGAGATTCTGATTTTTACCCCCTTCTTTTCCCTTTT  
 ATTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACAGGATGAACTGTTTAT

CCTCCTCTATCAGCAAATATTGCTCATAGAGGGTCCTCAGTAGACCTCGCTAT  
 TTTCAGTTTACATTTAGCAGGAATCTCATCAATTCTAGGGGCAGTAAATTTTA  
 TTCCACAGTAATTAATATACGATCTACCGGAATCACATTTGATCGTATGCCA  
 TTATTTGTTTGAGCTGTTGTTATTACAGCCCTTCTATTACTACTTTCTCTACCT  
 GTTCTTGCAGGAGCAATTACTATACTTTTAAACAGATCGAAATTTAAATACATC  
 A

MTEC008054, *Hemicrepidius*, sp.nr. *carbonatus*, larva,, P.S. Gill, 2011, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, CTTCATTAAGACTATTAATTCGAGCAGAAC  
 TTGGTAATCCTGGATCACTTATTGGAAATGACCAAATCTACAATGTCATTGTA  
 ACAGCCCATGCTTTTATTATAATTTTCTTTATAGTTATACCAATTATAATTGGG  
 GGATTTCGGAAATTGGTTAGTTCCCCTAATACTAGGAGCCCCAGACATGGCCTT  
 TCCCCGAATAACAACATGAGATTCTGATTTTTACCCCTTCTCTTTCCCTTTT  
 ATTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACAGGATGAACTGTTTAT  
 CCTCCTCTATCAGCAAATATTGCTCATAGAGGGTCCTCAGTAGACCTCGCTAT  
 TTTCAGTTTACATTTAGCAGGAATCTCATCAATTCTAGGGGCAGTAAATTTTA  
 TTCCACAGTAATTAATATACGATCTACCGGAATCACATTTGATCGTATGCCA  
 TTATTTGTTTGAGCTGTTGTTATTACAGCCCTTCTATTACTACTTTCTCTACCT  
 GTTCTTGCAGGAGCAATTACTATACTTTTAAACAGATCGAAATTTAAATACATC  
 ATTC

MTEC008111, *Hemicrepidius*, sp.nr. *carbonatus*, adult,, P.S. Gill, 2011, United States of  
 America, Montana, Gallatin Co., Fort Ellis Experiment  
 Station, 45.6692N, 110.9755W, 4987ft, CTTCATTAAGACTATTAATTCGAGCAGAAC  
 TTGGTAATCCTGGATCACTTATTGGAAATGACCAAATCTACAATGTCATTGTA  
 ACAGCCCATGCTTTTATTATAATTTTCTTTATAGTTATACCAATTATAATTGGG  
 GGATTTCGGAAATTGGTTAGTTCCCCTAATACTAGGAGCCCCAGACATGGCCTT  
 TCCCCGAATAACAACATGAGATTCTGATTTTTACCCCTTCTCTTTCCCTTTT  
 ATTAATAAGAAGAATTGTAGAAAATGGTGCAGGAACAGGATGAACTGTTTAT  
 CCTCCTCTATCAGCAAATATTGCTCATAGAGGGTCCTCAGTAGACCTCGCTAT  
 TTTCAGTTTACATTTAGCAGGAATCTCATCAATTCTAGGGGCAGTAAATTTTA  
 TTCCACAGTAATTAATATACGATCTACCGGAATCACATTTGATCGTATGCCA  
 TTATTTGTTTGAGCTGTTGTTATTACAGCCCTTCTATTACTACTTTCTCTACCT  
 GTTCTTGCAGGAGCAATTACTATACTTTTAAACAGATCGAAATTTAAATACATC  
 ATTCTTTGACCCTGCAGGTGGAGGAGACCCTATTTTATACCAACATTTATTCT  
 GATTTTTTG

APPENDIX B

*LIMONIUS CANUS*-GROUP SPECIMEN LOCALITIES

***Limonius agonus* specimens examined:** Specimens with DNA extracted have an accompanying MTEC barcode. Nine specimens in total examined.

**Canada: Quebec:** Brome, 23 MAY 1938, W.J. Brown (CNCI); Becancour, 23 MAY 1900 Nic., C.Chantal (CNCI); Becancour, 23 MAY 1964 Nic., C.Aubé (CNCI\*^); d.r.Lévis St-Romuaid, 27 MAY 1972, J.F. Landry (CMNC\*, MTEC007919); d.r.Lévis St-Etienne, 29 MAY 1976, J.F.Lanry (CMNC, MTEC007920); St-Etienne Lévis, 12 JUNE 1986, P.Bélanger (CMNC, MTEC007922); Arthabaska Co. St-Louis-de-Blanford, 12 MAY 1990, Yves-Pascal Dion Coll. (CMNC, MTEC007923).

**United States: Wisconsin:** Dane Co., Lower WI River State Wldlf. Area 3mi. NNW Mazomanie, 17 APR 1998, A. Ramsdale (MTEC, MTEC007844); Dane Co., Mazomanie LWRSWA, 7 MAY 2001, A.S.Ramsdale (MTEC, MTEC007845).

***Limonius californicus* specimens examined:** 52 specimens examined.

**United States: California:** Altamont, 9?, 1913, W.B. Turner (CDFA); Humboldt Co., Orick, 4 FEB 1976, berlesed from redwood dust, T.R. Haig (CDFA); Merced Co., 2mi E. of Cressey, 17 APR 1978, swept from Meadow, Fred G. Andrews (9)(CDFA); Monterey Co., Monterey, 4 MAR 1986, B. Oliver and D. Williams, ex: turf (3)(CDFA); Plumas Co., Quincy, 5 JUL 1952, E.I. Schlinger (CDFA); Sacramento Co., Sacramento River Levee, Sacramento, 15 MAY 1970, Fred G. Andrews (CDFA); Sacramento, 14 MAR 1958, W.E. Simonds (CDFA); **Montana:** Broadwater Co., Townsend, 2010, A. Moralez (5)(MTEC, MTEC007454, MTEC007456, MTEC007457, MTEC007458, MTEC007460); Broadwater Co., Townsend, 17 MAY- 02 JUN 2011, A. Moralez (MTEC, MTEC007521); Fallon Co., Rush Hall Lake N. of Baker, 19 MAY 1994, K.B.

Miller (MTEC); Fergus Co., Denton, 2011, A. Moralez (21)(MTEC, MTEC007846, MTEC007847, MTEC007848, MTEC007870, MTEC007871, MTEC007940, MTEC007941, MTEC007942); Gallatin Co., 14 MAY 1955, Student Collector (MTEC); Gallatin Co., jct. Meadow Creek and Jackson Creek, 21 MAY 1988, S.M. Clark (MTEC); Gallatin Co., Bozeman, in house, 19 APR 1989, B. Gillespe (MTEC); Jefferson Co., 22 MAY 1926 (MTEC~); Lincoln Co., 30mi. E. Libby mm 53 on Hwy 7, 23 MAY 1990, M.A. Ivie (MTEC); Pondera Co., Conrad, 2010, A. Moralez (7)(MTEC007275, MTEC007342, MTEC007344, MTEC007348, MTEC007371, MTEC007372, MTEC007428); Stillwater Co., 3 MAY 1930 (MTEC~); **Oregon:** Prineville, 23 MAY 1963, G.T. Hagel, clover (MTEC); **Washington:** Walla Walla, 20 APR 1933, L.T. Turner (WSUC^, MTEC007670); Walla Walla, MAY 1975, halfhill (WSUC^, MTEC007669); **Wyoming:** Yellowstone N.P., 44°55'N, 110°24'W, Lamar Valley, 1993 ungulate carcass study, D.S. Sikes, 90 from SE corner of Trumpeter Lake, elev. 6080', bison carcass, pitfall trap IV, 15-22 JUN 1993 (MTEC)

**Specimens nr. *californicus*** 18 specimens examined in total

**United States: California:** Compton (3)(MTEC~); Fresno Co., Reason City, 1 MAR 1968, on *Hordeum vulgare*, H.V. Dunnegan; Inyo Co, S. end Owens Lake sand dunes, 23 FEB 1978, D. Guiliani, F.G. Andrews, A.R. Hardy, walking dunes at night (4)(CDFA); Inyo Co., 2mi N, 2mi W Lone Pine, Alabama Hills, elev. 4400ft, 19 MAR 1980 to 15 June 1980, D. Guiliani, Antifreeze pit trap in grassy riparian side canyon (CDFA); Mono Co., Fish Slough 10 mi. N Bishop sand dunes, 11 FEB 1984, D. Guiliani (2)(CDFA);

Oxnard, 9 MAR 1945, M.T. Osborn, ex: vetch and barley (6)(CDFA); Sacramento Co.,  
Sacramento River Levee, Sacramento, 11 MAR 1966, M.S. Wasbauer (CDFA)

***Limonium canus* specimens examined:** 46 specimens in total.

**United States: California:** Fresno Co., Needles, 28 FEB 1968, ex *Hordeum vulgare*,  
Dunnegan (CDFA); Fresno Co., Raisin City, 1 MAR 1968, ex *Hordeum vulgare*, H.V.  
Dunnegan (CDFA); Oxnard, 9 MAR 1945, M.T. Osborn, ex vetch and barley  
(2)(CDFA); Sacramento Co., American river nr. Hwy 80, 14 APR 1983, F. Andrews  
(CDFA); Sonoma Co., Dillon Beach, 17 May 1975, F.G. Andrews and L.E. Andrews  
(CDFA); **Idaho:** Lewiston (MTEC~); Emmett, 15 APR 1926 (CNCI^); Owyhee Co.,  
Bruneau Dunes, 26 FEB 1974, D. Giuliani (4) (CDFA); **Montana:** Cascade Co., 29  
MAY 1978, B. Zupan (MTEC, MTEC007912); Flathead Co., La Salle, 29 MAY 1933,  
W. L. Jellison (2)(MTEC); Flathead Co., Hungry Horse, 10 MAY 1988, R. F. Lang and J.  
P. Cuda (MTEC, MTEC007642); Flathead Co., Glacier National Park, N. Fork Flathead  
Area 1988 Red Beach Fire study, Big Prairie, elev 3560' 29 MAY 1991, M.A. Ivie  
(MTEC, MTEC007463); Hamilton, 1 JUL 1928 (MTEC~); Hamilton, 15 MAY 1935, On  
Cabbage (2)(MTEC~); Hamilton, 20 APR 1936, W. Schockley (2)(MTEC~); Livingston,  
12 APR 1962, E. Wiegand (MTEC); Missoula, 22-44 (2)(MTEC~); Missoula Co.,  
Missoula, 25 MAY 1983, on apple and pear blossoms (2)(MTEC, MTEC007910,  
MTEC007911); Missoula Co., Clark Fork River on *Salix exigua*, 4 JUN 1988, S. J.  
Harvey (MTEC); Mont. Exp. Sta. Bozeman, 20 MAY 1920 (MTEC~); Mont. Exp. Sta.  
Lo Lo, 10 JUN 1913 (MTEC~); Powell Co., Blackfoot R. MT 141, 26 JUN 1989, D.L.  
Gustafson (MTEC, MTEC007464); Ravalli Co., Laboratory, 7 MAY 1934, W. L. Jellison

(MTEC); Ravalli Co., 14 MAY 1931 (2)(MTEC~); Red Lodge, 25 JUN 1957, R. Bonfill (MTEC); **Oregon:** Freewater, 4mi N. Milton, 15 MAY 1963, J. A. Onsager (MTEC); Hermiston, 12 APR 2000, 131122 trap, Horton (WSUC); Umatilla Co., Hermiston, 31 MAR 2010, potato field trap, D. Broers and M. Bayer (WSUC, MTEC007939); Umatilla Co. Hermiston, 04 APR 2011, potato field trap, D. Broers and M. Bayer (WSUC, MTEC007948); **Washington:** Benton Co, Hanford Site sand dunes W of Columbia Riv., N46°31.369' W119°21.192', 29 JAN 1999, R. S. Zack and C. N. Looney, crawling on dunes (WSUC^); Klickitat Co., Klickitat, 06 APR 2004, cottonwood (2)(WSUC, MTEC007949); Pullman (MTEC~); Walla Walla, 17 MAY 1933, C.E. Woodowrth (WSUC^); **Washington?:** septa test, geranyl caprrate, rep 3, 4 APR 2002 (WSUC); actyl butyrate septae test, rep 1, 4 APR 2002 (WSUC); nonyl butyrate repta test, rep 2, 4 APR 2002 (WSUC)

***Limoni* cf. *dubitans* specimen examined:** One specimen.

**United States: Ohio:** Sandusky Co., Outside Fremont on Hwy 6, 41.5573°N, 83.1649°W, 12MAY 2012, elev. 620ft, C. Hart and F. Etzler (MTEC, MTEC007959)

***Limoni* *ectypus* specimen examined:** One specimen.

**United States: Indiana:** Lafayette, 12 JUN 1957, G.H. Nelson, Sweeping (CNCI\*)

***Limoni* *infuscatus* specimens examined:** 169 specimens were examined in total.

**United States: California:** Riverside Co., Poppett Flat, Mt. San Jaciato, 23 MAY 1976, K.W. Cooper (2)(CDFA); Ventura Co., Oxnard, 9 MAR 1945, M.T. Osborn, ex. vetch and barley (CDFA); **Idaho:** Latah Co., Lost Crk. 4 mi NNE Harvard, 30 MAY 1981, R. S. Zack (WSUC^); **Montana:** Beaverhead Co., Tepee Cr. flats area, 44.6688, -111.7482,



16 JUN 1995, 2027m, D.L. Gustafson (MTEC); Broadwater Co., 4.3 mi no. of Willow Creek, 12 APR 1985, R. F. Lang (MTEC); Broadwater Co., Hwy 287, Jefferson River 25 MAY 1988, S.M. Clark (MTEC); Broadwater Co., Confederate Gulch, 27 MAR 1990, D. L. Gustafson (MTEC); Big Fork, 16 JUN 1904 (MTEC~); Flathead Co., Hungary Horse, 10 MAY 1988, R. F. Lang, J. P. Cuda (13)(MTEC, MTEC007957, MTEC007958); Flathead Co., Hungary Horse, 6 JUN 1991, R. F. Lang and R. D. Richard (4)(MTEC, MTEC007730); Flathead Co., Kalispell, 16 MAY 1988, R. F. Lang, J. P. Cuda (19)(MTEC, MTEC007727, MTEC007955); Flathead Co., La Salle, 29 MAY 1933, W. L. Jellison (MTEC); Flathead Co., Whitefish Lake, City Beach, 16 MAY 1989, H. W. Ziolkowski (17)(MTEC, MTEC007728, MTEC007731); Fergus Co., 16.5mi NE Winifred, pitfall, 18 MAY 1983(MTEC); Fergus Co., Lewistown, pitfall 8-28 MAY 1988, 4200ft, C. E. Seibert (MTEC); Gallatin Co., elev. 5800, 16 JUN 1900, E. Koch (MTEC~); Gallatin Co., elev. 4800, 19 APR 1902, R. Benton (2)(MTEC~); Gallatin Co., elev. 4800, 26 APR 1902, R. Benton (4)(MTEC~); Bozeman, 31 MAY 1907 (MTEC); Mont. Exp. Sta. Bozeman, 6 MAY? 1912 (MTEC~); Gallatin Co., 30 MAY 1923 (MTEC~); Gallatin Co., 17 APR 1926 (MTEC~); Gallatin Co., 18 APR 1926 (MTEC~); Gallatin Co., 24 APR 1926, H.C. Donohoe (MTEC~); Bozeman, 2 JUN 1926 (MTEC); Bozeman, 15 MAY 1927, R. Hutchins (MTEC~); Bozeman, 25 APR 1928 (MTEC~); Gallatin Co., 25 APR 1928 (MTEC~); Gallatin Co. 16 MAY 1929 (MTEC~); Gallatin Co., 10 MAY 1939, J. Blanchard (MTEC); Gallatin Co., 4 APR 1947 (MTEC); Gallatin Co., 11 APR 1947 (MTEC); Gallatin Co., 24 APR 1953, Student Collector (MTEC); Bozeman, Bridger slopes, 2 MAY 1954, G. Roemhild (MTEC); Gallatin Co. 24 MAY

1954, Student Collector (MTEC); Gallatin Co., 2 MAY 1955, Student Collector (MTEC); Gallatin Co., 12 MAY 1955, Student Collector (MTEC); Gallatin Co., 19 MAY 1955, Student Collector (4)(MTEC); Gallatin Co., 12 MAY 1956, Student Collector (MTEC); Gallatin Co., 10mi N. Manhattan, 16 MAY 1956, J. Warren (MTEC); Gallatin Co., 14 MAY 1957, Student Collector (MTEC); Gallatin Co., 18 MAY 1957, Student Collector (MTEC); Gallatin Co., 20 MAY 1957, Student Collector (MTEC); Gallatin Co., 15 MAY 1970, D. McLean (MTEC); Gallatin Co., 16 MAY 1970, A. Parks (MTEC); Gallatin Co., 17 MAY 1970, A.M. Nixon (MTEC); Gallatin Co., 3 km NE of Bozeman, "The M", 7 MAY 1980, S.D. Rose (MTEC); Gallatin Co., 8mi W of Bozeman, 14 MAY 1980, S. Rose (2)(MTEC); Gallatin Co., Exp. St. Fm., 8km W Bozeman, 14 MAY 1980, S. Rose (MTEC); Gallatin Co., 23 APR 1983, MSU Ag. Exp. Station, Student Collector (MTEC); Gallatin Co., 10 MAY 1983, Student Collector (MTEC); Gallatin Co., 18 MAY 1984, Student Collector (MTEC); Gallatin Co., 1mi SW of Belgrade, 23 MAY 1987, R.F. Lang (2)(MTEC); Gallatin Co., Madison R., Beartrap Cyn. Cmpgd., 6 MAY 1989, C.E. Seibert (MTEC); Gallatin Co.. Madison Buffalo Jump St. Pk. 7 mi S Logan, 14 MAY 1989, M.A. and R.O. Ivie (MTEC); Gallatin Co., Belgrade, 01-25 JUN 1990, N.A. Poritz (MTEC); Gallatin Co., 3mi E Bozeman, 13 JUN 1991, H.W. Ziolkowski (MTEC); Gallatin Co., 5mi N Bozeman, Story Hills, 21 APR 1993, D.S. Sikes (MTEC); Gallatin Co., Ecton, Amsterdam, 26 MAY 1999, from alfalfa (3)(MTEC); Granite Co., 2mi SE Maxville, Deerlodge Nat. For., Boulder Ck, L.Funnel, elev. 5050ft, 8-20 MAY 1988, C.E. Seibert (MTEC); Granite Co., Nimrod Springs, 05 MAY 1990, G.J. McDermott (4)(MTEC, MTEC007956); Hill Co., Beaver Crk Park, 48.3866N, 109.6818W, 26 MAY-

14 JUN 2011, 3231ft, Hart et. al, L. Funnel 15 (MTEC); Jefferson Co., Lewis and Clark caverns, 22 APR 1987, D. L. Gustafson (5)(MTEC, MTEC007729); Jefferson Co., Lewis and Clark Cavern State Park, 22 APR 1987, R. F. Lang (MTEC); Jefferson Co., Lewis and Clark Cavern State Park, 29 APR 1987, A. E. R. Lang (2)(MTEC); Lake Co., 27 APR 1927 (MTEC~); Lake Co., 24 JUN 1927 (MTEC~); Lake Co., Moise Nat. Bison Range, 21-22 MAY 1988, T. K. Philips (MTEC); Lake Co., Swan R. Hwy 83, mi mark. 84, Swan Rg., 9 MAY 1989, H. W. Ziolkowski (MTEC); Lewis and Clark Co., MAY 1955 (MTEC); Lewis and Clark Co., Lyon's Crk 115 mi<sup>2</sup>, 46.9533°N, 112.1075°W, 12 MAY - 13 JUN 2011, 3759ft, Hart et. al, L. Funnel 1 (MTEC); Lincoln Co., 30mi E Libby, milepost 53 on Hwy 2, 23 MAY 1990, M.A. Ivie (7)(MTEC); Madison Co., May 1970, W. Yacus (MTEC); Madison Co., Beartrap Canyon, 25 APR 1987, D. L. Gustafson (3)(MTEC); Missoula Co., Clark Fork River, on Salix exigua, 4 JUN 1988, S. J. Harvey (MTEC); Park Co., 17 MAY 1956 (MTEC); Phillips Co., Malta, 23 MAY 1982, D. Lester (MTEC); Florence, 4 JUN 1912 (MTEC~); Ravalli Co., Moose Lake, 6 MAY 1934, W. L. Jellison (MTEC); Ravalli Co., 20 MAY 1934, W. L. Jellison (MTEC); Rosebud Co., Lane Deer- Ashland, 06 JUN 1991, D.L. Gustafson (2)(MTEC);

**Oregon:** Corvallis, 27 APR 1929, J. Wilcox (CNCI^); **Washington:** Walla Walla, 13 APR 1933, C. E. Woodworth (WSUC^); Probably Walla Walla, M. C. Lane collection (WSUC^); **Wyoming:** Yellowstone National Park, 110°24'W, 44°55'W, MAY 1978, control pitfall trap (2)(MTEC); Yellowstone National Park, 110°24'W, 44°55'W, 15 MAY 1978, control pitfall trap (MTEC); Yellowstone National Park, 110°24'W, 44°55'W, 25 - 29 MAY 1978, pitfall next to dead elk (MTEC); Yellowstone National

Park, 110°24'W, 44°55'W, 2 - 5 JUN 1978, control pitfall trap (MTEC); Yellowstone National Park, 110°24'W, 44°55'W, 2 - 5 JUN 1978, pitfall next to dead elk (MTEC); Park Co., Y.N.P. Dunravin, 07 JUN 1989, J. B. Johnson (2)(MTEC); Teton Co., Jackson Cache Ck., 05 JUN 1994, M. A. and L. L. Ivie (2)(MTEC)

***Limonius pilosulus* specimens examined:** Six specimens in total.

**United States: California:** Sacramento Co., 5 APR 1915, E. J. Vosler (2) (CDFA); Sonoma Co., Plantation, 16 MAY 1969, R.P. Allen (CDFA); Ukiah, 29 MAR 1936, H. Leech (CNCI); Yo-Solano Co., Putah Cyn, 25 JUN 1948, E. I. Schlinger (CDFA~); **Oregon:** Forest Grove, MAY 1917, from tanglft screen 17-25, J. F. Brimley (CNCI\*)

***Limonius subauratus* specimens examined:** 15 specimens in total.

*L. anceps* labeled: **Canada: Quebec:** Berthierville, 2 JUL 1979 (CNCI); St-Entienne, C. Lévis, 5 JUN 1972, C. Chantal (CNCI\*); 23 JUN 1932, Fr. Firmin (CNCI\*); St-Mathieu-du-parc, St-Maurice, 22 JUN 1988 (CMNC, MTEC007921); Ste-Agathe, Lotbinière, 4 JUN 1985, P.Bélanger (CMNC, MTEC007924)

*L. subauratus* labeled: **United States: California:** Oxnard, 9 MAR 1945, M.T. Osborn, ex: vetch and barley (CDFA); **Montana:** Granite Co., Nimrod Springs, 05 MAY 1990, G.J. McDermont (MTEC); Mineral Co., 6mi. SE St.Regis, 10 JUN 1987, elev. 2500', L.Russell (MTEC); **Washington:** Dayton, 30 MAY 1933, L. T. Turner (WSUC^); Benton Co., Plymouth, ex Salix, 29 APR 2003, D. Broers (3)(WSUC, MTEC007936, MTEC007937, MTEC007938)

*L. sp. nr. subauratus* labeled: **Canada: British Columbia:** Agassiz, 4 JUN 1927, R.

Glendenning (CNCI); Agassiz, 6 JUN 1927, H. H. Ross (CNCI); Summerland, 26 MAY

1932, A. N. Cartrell (CNCI)

APPENDIX C

LUCID KEY TO THE WIREWORMS OF MONTANA  
(ON CD)

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