Biodiversity of leaf beetles (Coleoptera: Chrysomelidae) in a tropical montane rainforest ecosystem assessed with DNA barcoding

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When the distinguished British biologist J.B.S. Haldane, who found himself in the company of a group of theologians, was asked what one could conclude as to the nature of the Creator from a study of his creation, Haldane is said to have answered "An inordinate fondness for beetles".

Anecdote

Summary

The aim of the present study was the assessment of an unknown tropical insect fauna without traditional taxonomy. For this purpose, the diversity of leaf beetles (Coleoptera: Chrysomelidae) in the montane rainforest of the Reserva Biológica San Francisco (RBSF) and parts of the Podocarpus National Park in southern Ecuador was investigated. Beetles were sampled at three different elevations, '1000 m' (Bombuscaro; 1020–1075 m a.s.l.), '2000 m' (Estación Científica San Francisco – ECSF; 1913–2089 m a.s.l.), and '3000 m' (Cajanuma; 2805–2891 m a.s.l.) with a set of different collection methods. Beetles were mainly sampled with sweep netting, beating, and hand-collection from the lower understorey vegetation of 36 sampling plots (12 per elevation, six of them in the valleys, six on the ridges) following a standardized sampling protocol. A total of 4286 leaf beetles have been collected, 1775 of these (usually one of each morphospecies per sample) were sorted into 515 different morphospecies, DNA barcoded, and assigned to molecular operational taxonomic units (MOTUs).

The study covers aspects of community structure and its changes with increasing elevation. Methodological aspects of rapid biodiversity assessment are evaluated: Different collection methods and morphological and sequence-based methods for species delimitation are compared.

General leaf beetle diversity patterns in an Andean mountain forest

Leaf beetle assemblages showed patterns typical for tropical arthropods: They were species-rich, with few common species but a high percentage of rare species. 1583 specimens were sorted into 473 morphospecies, and for 1334 of them a DNA barcode could be obtained. They belong to 416 morphospecies and were grouped into 459 MOTUs. Species accumulation curves showed no saturation indicating a further increase in species numbers with additional sampling. Species number estimates ranged up to 916 morphospecies (chao2) for the 1583 analysed individuals, and 705 morphospecies, respectively 805 MOTUs for the 1334 barcoded individuals. The higher MOTU number compared to morphospecies number suggests a high level of potential cryptic diversity that was not recognized by the morphospecies approach alone. The leaf beetle community showed an uneven distribution of incidence and abundance with very few common morphospecies (5% found in more than ten samples, 10% represented by more than ten individuals) and a high percentage of uniques (morphospecies found in one single sample; 50% of all morphospecies), respectively singletons (one single individual found; 45% of all morphospecies). The singleton curve did not reach saturation. Most morphospecies were restricted to one single elevational level (91%), indicating a high turnover of communities with elevation. This pattern was even more apparent for MOTUs (96%) and haplotypes (99%). More than half of the morphospecies belonged to Alticinae (53%), 21% were Galerucinae, 14% Eumolpinae, 5% Hispinae, and 4% Cassidinae. Criocerinae, Chrysomelinae, Lamprosomatinae, and Cryptocephalinae together accounted for 3% of all morpho-

species. Rank order remained the same when number of individuals was considered. Composition of the subgroups changed slightly with elevation.

Diversity patterns along an elevational gradient inferred with DNA barcode data

Leaf beetle assemblages from the 36 study plots were sampled and differences between the three elevations and the two microhabitats (forest on ridges and in valleys) were analysed based on DNA barcode data. The importance of small-scale topography for elevational diversity patterns was evaluated: It was tested whether elevational diversity differs between ridge and valley forests and if the species turnover between and within habitats varies with elevation and changes patterns of elevational diversity when scaling up from the local (sampling plot) to the regional (elevational belt) level. MOTUs were determined using PTP modelling and data was analysed using permutational MANOVA analysis and ordinary linear models.

When study sites of both habitats were pooled, local leaf beetle diversity showed a clear mid-elevational peak pattern. However, only leaf beetle diversity in ridge forests peaked at mid-elevations, while the diversity in valley forests was similarly high at 1000 and 2000 m a.s.l. and declined at highest elevations. When scaling up to the regional scale, levels of diversity were generally similar at the two lower elevations and declined at 3000 m a.s.l. The scale-dependent shift in diversity patterns was caused by a higher turnover of species communities between and within habitats at lower than at mid-elevations, suggesting more specialized herbivore communities in the more productive lower elevations. The study underscores the importance of topography and spatial scale for the inference of diversity patterns. Changes in ecosystem productivity but also area and temperature with elevation might also influence the genetic diversity within species, however, levels of genetic diversity (haplotype diversity per MOTU) did not differ among elevational levels. Biodiversity patterns along the elevational gradient were revealed by MOTUs and morphospecies in the same way.

Comparison of morphospecies sorting and DNA barcoding

1475 barcoded individuals were assigned to MOTUs and the results were compared with the morphospecies sorting. The barcode approach estimated 10% higher species numbers (448 morphospecies, 493 MOTUs). This was caused by a higher number of splittings than lumpings of morphospecies. The similar numbers of morphospecies and MOTUs arose partly due to the fact that splittings and lumpings compensated one another. However, the number of perfect matches was comparatively low: 63% of all morphospecies corresponded exactly with one MOTU. Most lumpings united individuals of two morphospecies in one MOTU (76%), in some cases, individuals of up to five morphospecies (4%) were lumped. Similarly, most splittings divided a morphospecies in two networks (69%), only once a morphospecies was split into six MOTUs (1%). The subgroups most challenging for morphospecies sorting were Galerucinae and especially Alticinae. Difficulties most probably arose due to the large number of specimens and species.

DNA barcoding showed to be a valuable tool in cases were morphospecies sorting is exacerbated by pronounced intraspecific variation in colour, shape, or size, and may reveal cryptic diversity. Especially in species that are small and/or lack conspicuous external characters barcoding is a useful tool to complement morphospecies sorting. Particularly in large, specimen- and species-rich data sets DNA barcoding can facilitate morphospecies sorting and can result into a more accurate species delimitation.

Influence of different species delimitation methods on species richness estimates

For a subset of 674 barcoded specimens, a set of four different DNA-based species delimitation methods and their influence on species richness estimates were compared. Distance-based clustering, statistical parsimony analysis, GMYC-, and PTP modelling led to highly similar results. The reason probably lies within the structure of the underlying data set: It is geographically restricted and undersampled with a high proportion of singletons what turns it insensitive against differences in species delimitation methods. Several cases of splittings and lumpings led to discrepancies between morphospecies and MOTU assignment and generally MOTU numbers were ~8% higher than morphospecies numbers.

Morphospecies sorting and DNA barcoding allow similar conclusions on leaf beetle diversity: The leaf beetle fauna is species-rich with a strong turnover among elevations. Most morphospecies where found only at a single elevational level, also when singletons and doubletons have been excluded. This pattern was even more visible for MOTUs and haplotypes. The high turnover between leaf beetle communities at the different elevations is also visible in the species accumulation curves: If to the specimens of one elevation the specimens of a second elevation where added, the curves showed once more a further increase.

Comparison of sampling methods

Within the present study a total of 1174 samples were taken. They varied considerably in size and effort as different sampling methods were used. The focus was on standardized sampling with sweep netting, beating, and hand-collection on the sampling plots. Malaise trapping, light trapping, and additional hand-collection completed the sampling.

In sweep netting-, beating-, hand-collection-, and light trap samples on average only few individuals and morphospecies were caught per single sample (less than five). In contrast, the Malaise traps were highly efficient on a per sample basis: They yielded a mean of 31 individuals and 15 morphospecies per sample. Collection efficiency for certain subgroups slightly differed between the different methods. Even after 298.5 sampling hours the species accumulation curve of the standardized plot samples showed no saturation indicating that a further increase of morphospecies number is expected with further sampling.

Contents

Chapter 1

General introduction

1.1 Background of the study

We are right in the middle of an anthropogenic mass extinction with rates of decline in biodiversity comparable to previous mass extinction events in the fossil record (Barnosky et al., 2011; Dirzo et al., 2014; Pimm et al., 1995). This rapid loss in biological diversity has been termed the global biodiversity crisis, and at least since the signature of the Convention on Biological Diversity (CBD) at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, the problem has been acknowledged by politics and entered public awareness (https://www.iucn.org). Biodiversity is threatened mainly by habitat loss and degradation, but also invasive alien species, over-exploitation of natural resources, pollution and diseases, and climate change (Bradshaw et al. (2009); Primack (2014); https://www.iucn.org). Human activity is responsible for most of those perils.

Most biodiversity concentrates in tropical habitats (Bradshaw et al., 2009; Dirzo and Raven, 2003). Especially tropical rainforests are among the most species-rich and ecologically complex ecosystems: Although they cover only seven percent of the Earth's surface, it is estimated that they harbour more than half of all existing species on the planet (Bradshaw et al., 2009; Primack, 2014; Wilson, 1988). Threats to tropical forests are manifold. The rapidly progressing deforestation with fragmentation and overexploitation entails a string of adverse consequences that interact and create negative synergisms (Laurance, 1999; Laurance and Peres, 2006).

Whereas the gravity of habitat destruction and biodiversity loss as well as the urgent need for action are unmistakable, we are still not even able to specify the global number of species. It lies probably within the range of five to 15 million (Chapman, 2009; May, 2000, 2010; Mora et al., 2011; Wilson, 2003). The best known and most intensively studied components of tropical rainforests are mammals, birds, and higher plants that make up only a small fraction, probably less than one percent of the total number of species (Corlett and Primack, 2011). In contrast, most of those groups that account for the majority of biodiversity remain clearly understudied. Invertebrates, and especially insects, are the dominant animals of the rainforest contributing the majority of species, individuals, and biomass (Corlett and Primack, 2011; Primack, 2014). Unfortunately, the so-called taxonomic impediment is especially severe in those groups: Most species cannot be identified and millions are still undescribed due to a shortage of trained taxonomists and curators and a lack of simple-to-use identification guides (http://www.cbd.int).

To alleviate the problem of rapid biodiversity-loss with the concurrent gaps in our taxonomic knowledge, an acceleration of biodiversity assessment is necessary. One possible way is the integration of DNA barcoding for exploring unknown biodiversity. On the one hand it can help to discover and describe species, a task that has never been more urgent (Frézal and Leblois, 2008; Hebert et al., 2003a; Scheffers et al., 2012). On the other hand it can reveal patterns of biodiversity and community ecology while the long lasting process of thorough taxonomic identification and formal description of new species is postponed (Smith et al., 2005; Tänzler et al., 2012). Initially developed as a global species identification system, during the last decade it has proven to be very useful in various fields of research and has also been used successfully in beetle communities (Baselga et al., 2013; Papadopoulou et al., 2013; Tänzler et al., 2012).

In the present study, DNA barcoding is used to investigate the unknown leaf beetle fauna (Coleoptera: Chrysomelidae) in a tropical montane rainforest in Ecuador. DNA barcode data is used along with a morphospecies approach. It is tested, how the methods agree and which conclusions they allow about the diversity and change of leaf beetle communities along an elevational gradient. For that purpose Neotropical Chrysomelidae are particularly attractive study organisms as they are megadiverse and hitherto taxonomically considerably understudied. As an integral component of the herbivorous insect fauna in rainforests they have important functions within ecosystems and are of great relevance for ecosystems' diversity (Andrew and Hughes, 2004; Basset, 2001; Coley and Barone, 1996; Janzen, 1970; Price, 2002; Wagner, 2000).

The investigated region is located in southern Ecuador in the Tropical Andes, a designated biodiversity hotspot for various taxa (Brummitt and Lughadha, 2003; Myers et al., 2000). In tropical mountains, the peaking species richness at low latitudes is enhanced by a high species turnover along elevational gradients (Brühl et al., 1999; Gaston, 2000; Smith et al., 2014). This leads to the exceptional species numbers of tropical montane rainforests that can even exceed those of lowland rainforests (Beck and Kottke, 2008; Rodriguez-Castaneda et al., 2010). With some exceptions (e.g. Brehm and Fiedler (2003, 2004); Brehm et al. (2003a,b); Escobar et al. (2007, 2005, 2006); Hilt et al. (2006, 2007); Janzen et al. (1976); Moret (2009); Olson (1994)), the insect diversity of the Tropical Andes is still understudied and comparatively little is known about diversity patterns in Andean montane forests (for an overview see Larsen et al. (2011)). Montane rainforests face many of the same threats as other tropical forests, however, especially cloud forests are particularly susceptible to climate change due to their unique ecology and their location on mountain slopes (Bubb et al., 2004; Hamilton et al., 1995). Ecuador is a megadiverse country: On a comparatively small area, it harbours an outstanding variety of habitats along pronounced elevational and wet–dry gradients. High beta-diversity along these gradients favours an enormous biological diversity (Brehm et al., 2008a; Dangles, 2009). It shelters one of the most species-rich but also most endangered insect faunas on Earth (Dangles, 2009). Ecuador's dense population (55 inhabitants/km^2) puts strong pressure on its natural ecosystems (Dangles, 2009). The country suffers the highest annual deforestation rate (-1.9%) in South America (FAO, 2010), mainly caused by conversion of forest into agropastoral land (Mosandl et al., 2008).

1.2 DNA barcoding

DNA barcoding as a global identification system based on a standard molecular method was proposed by Hebert et al. in 2003 in order to accelerate species discovery and identification, and to overcome the limitations of morphological identification (Hebert et al., 2003a). However, the term 'DNA barcodes' was already used by Arnot et al. (1993) and use of DNA sequence differences for identification and discrimination of species has been established for many years for morphologically scarcely identifiable groups such as viruses, bacteria, protists, or fungi (Allander et al., 2001; Bruns et al., 1991; Hamels et al., 2001; Nanney, 1982; Pace, 1997).

Also for higher organisms a DNA based practice approach to taxa recognition is highly expedient and beneficial (Savolainen et al., 2005). It can help to lighten the taxonomic impediment, the lack of taxonomic expertise to effectively identify and describe the remaining biodiversity on Earth. This problem is especially pressing in the light of the rapid biodiversity loss and notably severe with highly diverse arthropod taxa (Cardoso et al. (2011); Evenhuis (2007); CBD Guide to the Global Taxonomy Initiative, http://www.cbd.int). The traditional means of studying biodiversity depend on expert knowledge from taxonomists with years of education and training. This knowledge is limited to certain taxa and furthermore, the identification of species is time intensive (Harris and Bellino, 2013). The focus of taxonomic expertise is biased towards vertebrates, flowering plants, or certain insect taxa, whereas in contrast many important groups as e.g. nematodes, mites, or diatoms, are neglected (Tautz et al., 2003). Several authors claimed that traditional taxonomy will not be able to cover all requested identification of biodiversity, but that new approaches are needed to modernize taxonomy (Frézal and Leblois, 2008; Godfray, 2002; Hebert et al., 2003a; Stoeckle, 2003).

DNA barcoding represents the idea of a unique DNA sequence for each species in analogy to industrial 'barcodes', universal product codes which can be used to identify retail products (Hebert et al., 2003a,b; Savolainen et al., 2005). A fragment of the mitochondrial gene cytochrome *c* oxidase I (COI) established as a standard marker for animal species identification (more information about COI as barcode marker is given in Chapter 2.4). This fragment can be amplified with universal markers across a broad range of species (Folmer et al., 1994; Hebert et al., 2003a). The principle of DNA barcoding has been extended to other organisms like fungi (Begerow et al., 2010; Schoch et al., 2012; Seifert, 2009; Seifert et al., 2007) and plants (Chase et al., 2007; Dunning and Savolainen, 2010; Kress and Erickson, 2007; Kress et al., 2005; Pennisi, 2007; Rubinoff et al., 2006) where the search for a universal barcode marker turned out to be difficult.

In 2004, the Consortium for the Barcode of Life (CBOL, http://www.barcodeof life.org) was founded as an international initiative for promoting the development of DNA barcoding as a global standard for species identification with numerous member organizations such as natural history museums, zoos, herbaria, botanical gardens, university departments, as well as private companies and governmental organizations. Major CBOL projects are e.g. the All Birds Barcoding Initiative (ABBI), the Bee Barcode of Life Initiative (Bee-BOL), the Mosquito Barcode Initiative (MBI), or the International Network for Barcoding Invasive and Pest Species (INBIPS).

The objective of the international Barcode of Life project (iBOL, http://www.barcodeoflife.org) is the creation of large numbers of barcodes with a construction of a barcode reference library and the development of instruments and informatics tools for application. The library, Barcode of Life Data Systems (BOLD, http://www.boldsystems.org), is also a public workbench for researchers who can assemble, test, and analyse their data in BOLD. iBOL has members in 25 nations and different working groups are devoted to certain taxonomic groups or habitat types (e.g. vertebrates, land plants, fungi, marine bio-surveillance, polar life).

DNA barcoding claims being a rapid and cost-efficient method that moreover is potentially applicable by everyone irrespective of their background training (Hebert and Gregory, 2005; Stoeckle, 2003; Stoeckle et al., 2003). It is also supposed to help in cases where phenotypic plasticity or intraspecific variability impede morphological identification and to facilitate discovery of cryptic diversity (Hebert et al., 2003a). It is applicable to all life forms (whereas keys are often only for one particular life stage or gender) as well as processed or parts of organisms (Hebert et al., 2003a; Stoeckle, 2003; Stoeckle et al., 2003).

Indeed, a vast number of studies within the last decade affirmed the value of DNA barcoding across a broad range of possible applications: It has been shown to be especially useful in difficult groups where morphological traits do not clearly discriminate species. These include very small organisms where body-size precludes visual identification (meio- and micro-fauna, zooplankton), species only distinguishable by subtle or geographically variable morphological characters, as well as species with polymorphic life cycles and/or pronounced phenotypic plasticity (Blaxter et al., 2004; Bucklin et al., 2007; Decaëns et al., 2013; Frézal and Leblois, 2008; Plaisance et al., 2009; Vences et al., 2005). It has also helped in studying cryptic diversity (Hebert et al., 2004; Smith et al., 2006) and has been successfully used for identifying immature stages (e.g. eggs, larvae, seedlings) and assort them to adults (Ahrens et al., 2007; Janzen et al., 2005; Vences et al., 2005). Barcoding of gut contents can give information about an organism's diet (Blankenship and Yayanos, 2005; Zeale et al., 2010). This variety of applications makes barcoding a useful tool in ecology, forensics, and biosecurity (Armstrong and Ball, 2005; Besansky et al., 2003; Chen et al., 2004; Joly et al., 2014; Valentini et al., 2008; Wells and Sperling, 2001). The identification of damaged or processed organisms or fragments is important for food safety and consumer protection as well as for conservation issues as it can help preventing poaching and illegal trade of endangered species (Ardura et al., 2010; Dalton and Kotze, 2011; Eaton et al., 2010; Galimberti et al., 2013; Wong and Hanner, 2008; Yan et al., 2013). It has successfully supported biodiversity inventories and can substitute or complement taxonomically valid species or morphospecies in community ecology studies of unknown faunas (Janzen et al., 2005; Tänzler et al., 2012).

Despite a broad acceptance and utilization of DNA barcoding, since its beginnings it has aroused criticism as well (DeSalle et al., 2005; Moritz and Cicero, 2004; Will et al., 2005; Will and Rubinoff, 2004). On the one hand there is criticism on the part of taxonomists that are apprehensive of competition or being booted out by barcoding (Ebach and Holdrege, 2005; Lipscomb et al., 2003; Wheeler, 2004). Another point where criticism tackles is the premise that genetic variation among species is normally lower than between species (Hebert and Gregory, 2005; Hebert et al., 2003b). That phenomenon is called the 'barcoding gap', however, in practice there may be overlap between inter- and intraspecific distances, or the barcoding gap may be artificially exaggerated by inappropriate sampling: It has been argued that DNA barcoding fails when a comprehensive sampling exists, i.e. when the whole genetic variance of a species across a broad geographic range is assessed and many closely related species are included. Intra- and interspecific distance can overlap, on the one hand because the intraspecific distances are larger than when only analysing a narrow cut-out of all intraspecific distances, and on the other hand increasing geographical scale of sampling decreases the interspecific divergence due to encountering more closely related, allopatrically distributed species in a geographically expanding data set (Bergsten et al., 2012; Meyer and Paulay, 2005; Wiemers and Fiedler, 2007). In contrast, the barcoding gap is more pronounced on a local scale and for data sets lacking large numbers of closely related species (Moritz and Cicero, 2004).
Certain aspects concerning the use of COI as single marker that require cautiousness are explained in Chapter 2.4.

Methodological approaches that are demarcated from DNA barcoding sensu strictu, but still closely tied to the concept of DNA barcoding and partly overlapping are DNA taxonomy, reverse taxonomy, and integrative taxonomy:
DNA taxonomy sets the DNA based identification in the focus of taxonomy with DNA being the scaffold of a taxonomic reference system (Tautz et al., 2003). In contrast to DNA barcoding that can be understood as a means of identifying *a priori* entities by sequence similarity, DNA taxonomy concerns the circumscription and delineation of species using evolutionary species concepts (Vogler and Monaghan, 2006).
Reverse taxonomy is a sequence-based approach to access unknown diversity. Taxa are at first only identified via their signature sequences that can be re-identified unequivocally in future collections, but are not yet morphologically analysed and formally described (Markmann and Tautz, 2005). Reverse taxonomy can be based on COI sequences but often other markers have been used (Markmann and Tautz, 2005; Randrianiaina et al., 2011).
Integrative taxonomy aims at delimiting species boundaries from multiple and complementary perspectives. Traditional morphology-based taxonomy is combined with e.g. molecular, behavioural, developmental, or ecological data (Dayrat, 2005). In

many studies COI is included, often in combination with other markers (Damm et al., 2010; Gibbs, 2009; Heethoff et al., 2011; Mengual et al., 2006; Roe and Sperling, 2007).
In the context of DNA barcoding and DNA taxonomy, often the *MOTU concept* appears (Blaxter, 2004; Floyd et al., 2002). MOTU signifies 'molecular operational taxonomic unit', i.e. a group of specimens defined by sequence identity: If two specimens yield sequences that are identical within some defined cut-off, they are assigned to the same MOTU (Blaxter, 2004). In this study, the term MOTU is used in a broader sense meaning a group of specimens that is delimited by any molecular species delimitation method (e.g. a GMYC-, PTP-, distance-cluster, or a haplotype network). Different methods of molecular species delimitation are explained in Chapters 2.5 and 6.

1.3 Chrysomelidae Latreille, 1802

1.3.1 Biology and ecology

General biology and ecology

Chrysomelidae (leaf beetles; Coleoptera: Polyphaga: Cucujiformia: Chrysomeloidea) belong with Cerambycidae (longhorn beetles) to Chrysomeloidea that together with the Curculionoidea (weevils) make up the megadiverse lineage of 'Phytophaga' that constitute about 40% of all known beetle species (Farrell, 1998; Gómez-Zurita et al., 2007; Riley et al., 2002). With over 37,000 described species and more than 2,000 genera Chrysomelidae are one of the largest beetle families (Jolivet et al., 1988). The total number of existing leaf beetle species is probably 60,000 or higher (Jolivet, 1988; Reid, 1995). Chrysomelidae have a worldwide distribution (except arctic regions) with the by far greatest diversity found in the tropics (Riley et al., 2002).

Leaf beetles have a highly variable body shape from elongate-cylindric to oval-convex or depressed (Riley et al., 2002). Size varies from less than one to ~27 mm (Jolivet and Petitpierre, 1981; Jolivet et al., 1988). They show various colours, commonly bright or metallic, often dorsally bicoloured and formed into distinctive patterns (Riley et al., 2002).

Chrysomelidae bear five tarsomeres and are characterized by a bilobed third tarsomere that hides the reduced fourth tarsomere (pseudotetramerous condition). Also typical are large ventral tarsal pads with adhesive hairs that likely aid attachment and locomotion on plants (Fig. 1.1). Antennae are generally short to medium-length with usually eleven antennomeres (Jolivet et al., 1988; Riley et al., 2002).

Chrysomelidae are phytophagous during larval and adult stage (Jolivet and Petitpierre, 1981). Adult chrysomelids usually feed on green parts of plants. Some groups secondarily feed on pollen, flowers, roots, seeds, and ant nests debris. Also leaf beetle larvae have a variety of feeding habits: Besides feeding on leaves or subterranean parts of plants there are also leaf-miners or consumers of dead plant material (Riley et al., 2002).

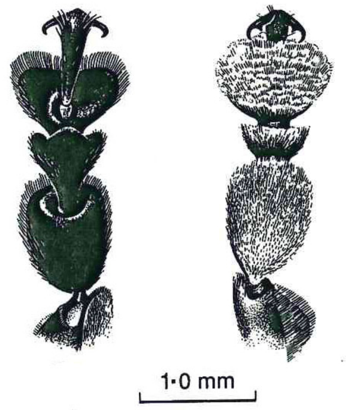


Figure 1.1: **Dorsal and ventral view of the tarsus of a typical leaf beetle (Chrysomelinae) with pilose tarsal pads (Lawrence and Britton, 1994).**

Traditionally, a restriction of tropical rainforest herbivorous insects to a narrow set of host plants is assumed (Coley and Barone, 1996; Erwin, 1982) and indeed a lot of species seem to be specialists for a certain species, genus, or family (Barone, 1998; Janzen, 1988). However, there is growing evidence that many tropical insects are less specialized than was previously thought (Basset, 1992; Descampe et al., 2008; Novotny et al., 2002b). Assumptions about host plant range that are derived from field observations are often skewed towards specialization as often only a fraction of a (geographical) broader range of host plants is observed (Descampe et al., 2008). In contrast, insects often only sit on plants for resting, shelter, sun-basking, or sexual display, but without feeding on them (Descampe et al., 2008; Moran and Southwood, 1982; Novotny and Basset, 2000).

For leaf beetles, food plant records are estimated to exist for ~30% of described species, especially well studied and important chrysomeline, alticine, and galerucine genera (Jolivet, 1988; Jolivet and Hawkeswood, 1995). A broad variety of plant families are selected by Chrysomelidae (several are discussed in detail by Jolivet and Hawkeswood (1995)). They mainly belong to angiosperms, both monocotyledons ($\geq$ 28 families) and dicotyledons ($\geq$ 120 families) with most leaf beetle subfamilies preferring dicotyledons. However, also gymnosperms and even pteridophytes are chosen, mostly by Alticinae (Jolivet and Hawkeswood, 1995; Riley et al., 2002). There is scarce evidence for leaf beetles (only alticines) feeding on bryophytes (Jolivet and Hawkeswood, 1995; Konstantinov et al., 2013; Konstantinov and Chamorro-Lacayo, 2006). Among the dicotyledon families that are most often recorded in the literature as host plants are Asteraceae, Convolvulaceae, Brassicaceae, Cucurbitaceae, Lamiaceae and Verbenaceae, Fabaceae (and other legumes), Rosaceae, and Solanaceae (Jolivet and Hawkeswood, 1995).

Some Chrysomelidae feed on myrmecophilous plants and developed protective adaptations against the ants e.g. avoiding contact with the ants, mining into the leaf, toxicity, reflex bleeding, stomach discharges, or larval cycloalexy (circular defence; Jolivet et al. (1990)) (Jolivet and Hawkeswood, 1995). Generally, many defensive strategies have evolved within Chrysomelidae, probably in adaptation to their life on the leaf surface where they are prone to numerous biotic and abiotic perils (predation, desiccation, plant chemical and physical defences; Vencl et al. (2004)). These defensive mechanisms range from crypsis (e.g. cassidines), mechanical devices (e.g. spines of hispines), and sudden escape (Alticinae) to chemical defence in many brightly coloured, aposematic species (Pasteels et al., 1988). An interesting behaviour in leaf beetles is the defensive use of faecal material. Adults and immature stages of species in several subfamilies developed elaborate faecal constructions that are used as camouflage, clubs, and protective covers (Chaboo, 2007; Chaboo et al., 2008; Furth, 1982a, 2004; Müller and Hilker, 2004; Riley et al., 2002). Larval egg cases from faecal material may also serve as protection against desiccation (Furth, 1982a, 2004).

Chrysomelidae have a broad range of reproduction ways. Whereas laying of eggs is most common there is also viviparity and intermediate ways with laying eggs containing more or less developed embryos (Jolivet and Petitpierre, 1981). In some species of Cassidinae and Chrysomelinae a kind of parental care has been observed where females sit on top of the eggs, larvae, and pupae in order to protect them (Buzzi, 1988; Chaboo, 2007; Windsor and Choe, 1994).

Significance for humans: Chrysomelidae as pests and biological control agents

Many leaf beetles are serious pests of agricultural crops and forests, especially in the subfamilies of Criocerinae, Eumolpinae, Galerucinae, Alticinae, Hispinae, and Chrysomelinae (Jolivet et al., 1988). One of the most well-known and destructive agricultural insect pests worldwide is the Colorado potato beetle (*Leptinotarsa decemlineata* Say, Chrysomelinae) (Alyokhin, 2009; Bishop and Grafius, 1996; Hare, 1990; Weber, 2003). Originating in Mexico, populations quickly spread throughout North America from the 1800's and throughout Eurasia since 1922 (Alyokhin, 2009; Bishop and Grafius, 1996). Adults and larvae of the Colorado potato beetle severely damage potato crops by defoliation (Alyokhin, 2009; Bishop and Grafius, 1996). The species has an impressive ability to evolve insecticide resistance (Alyokhin et al., 2008; Forgash, 1985).

Many significant pests of North American agriculture belong to the diabroticine group of Galerucinae. *Diabrotica virgifera virgifera* LeConte (western corn rootworm), *Diabrotica barberi* Smith & Lawrence (northern corn rootworm), and *Diabrotica undecimpunctata howardi* Barber (southern corn rootworm) are major pests of cultivated corn, *Zea mays* L., with their larvae feeding on the roots (Ciosi et al., 2008; Roehrdanz et al., 2003). Corn rootworms also attack additional crops as cucurbits and legumes (Krysan, 1986; Metcalf, 1986). They are native to North America but the highly invasive *D. virgifera* is also a serious threat of European agriculture (Ciosi et al., 2008; Gray et al., 2009; Miller et al., 2005; Moeser and Vidal, 2004). Other diabroticite pests are the Mexican corn rootworm (*D. virgifera zeae* Krysan & Smith), the banded cucumber beetle (*D. adelpha* Harold) and the western spotted cucumber beetle (*D. undecimpunctata undecimpunctata* Mannerheim), and the bean leaf beetle (*Cerotoma trifurcata* Forster and other *Cerotoma* species), feeding on a variety of leguminous host plants, especially soybean (Kogan et al., 1980;

Krysan, 1986; Lam and Pedigo, 2004). Among Alticinae there are to name several pests in the genus *Epitrix*: the potato or tuber flea beetles (*E. cucumeris* Harris, *E. similaris* Gentner, *E. tuberis* Gentner) that attack potato tubers and foliage (Gentner 1944), and the tobacco flea beetle *E. hirtipennis* Melsheimer. Other serious pests, especially of crucifer field crops, are found within the genus *Phyllotreta*, e.g. the cabbage or crucifer flea beetle *P. cruciferae* Goeze, and the striped flea beetle *P. striolata* Fabricius. Especially among Hispinae, there are found important pests of palm trees (Mariau, 2004). Numerous species live off oil and coconut palms (Mariau, 2004). The coconut hispine beetle or coconut leaf beetle (*Brontispa longissima* Gestro) is a serious pest of palms, especially *Cocos nucifera* L. It has enormously expanded and is listed in the Global Invasive Species Database (2010) (Takano et al., 2011, 2012). The hispine *Coelaenomenodera lameensis* Berti & Mariau, the most serious oil palm pest throughout West Africa has caused severe defoliation over wide areas of oil palm distribution (Mariau, 2004). The tortoise beetle *Paropsis atomaria* Olivier represents an emergent pest of *Eucalyptus* plantations in Australia (Schutze et al., 2006). Economically important Criocerinae that damage cereals are the cereal leaf beetle *Oulema melanopus* L., the rice leaf beetle *O. oryzae* Kuwayama, and the cereal pest *O. gallaeciana* von Heyden (Wellso and Hoxie, 1988). Among Eumolpinae, there are some cacao pests in Brasil (Ferronatto, 1988) and several species attacking sweetpotato, e.g. *Typophorus nigritus viridicyaneus* Crotch, *Colasposoma dauricum* Mannerheim, and *C. sellatum* Baly (Alaijos and Lee, 2005; Jackson et al., 2003; Reid and Storey, 1993). Eumolpinae of the genus *Eucolaspis* cause economic loss on apple orchards (Doddala et al., 2013) and the eumolpine *Tricliona nigra* Jacoby has been recently reported to cause severe feeding damage on pomegranate in India (Jayanthi and Verghese, 2014).

On the other hand, benefit can be derived from the chrysomelids' herbivory and host-specificity: Several leaf beetle species are used for biological control of imported noxious weeds that can cause enormous ecological and economical damage (Jolivet et al., 1988).

Several invasive species of Asian saltcedars (*Tamarix* sp.) cause great damage of riparian ecosystems in the western United States. The galerucine *Diorhabda elongata* Brullé *deserticola* Chen from Asia has been introduced as biological control agent (DeLoach et al., 2003; Lewis et al., 2003). The common ragweed (*Ambrosia artemisiifolia* L., Asteraceae) is a harmful agricultural weed that is native in North America. Its pollen are highly allergenic. It has invaded Europe as contaminant of agricultural products and spread first slowly but booming since the 1990's facilitated by socio-economic factors (Kiss, 2007). *Ophraella communa* LeSage, a galerucine from North America, is the most promising biocontrol agent of ragweed (Kiss, 2007). Several species of European *Aphthona* flea-beetles (Alticinae) have been introduced into North America to control leafy spurge (*Euphorbia esula* L.), a weed introduced from Eurasia that is very persistent and invades a variety of habitats (Gassmann et al., 1996; Kirby et al., 2000; Lym and Nelson, 2000). In an attempt to control *Lantana camara* L. (Verbenaceae) (and allied *Lantana* species), an aggressive, vigorously growing weed that has become a plague over most of the tropics (Sharma et al., 2005), Hispinae (e.g. *Octotoma scabripennis* GUÉRIN-MÉNEVILLE, *Uroplata girardi* PIC) have been introduced into several regions of the world (Broughton, 2001; Cilliers and Neser, 1991; Harley, 1969). *Chrysolina quadrigemina* SUFFRIAN (Chrysomelinae; released in California to control Klamath weed *Hypericum perforatum* L., Clusiaceae), *Uroplata girardi* PIC (a hispine leaf-miner supposed to control *Lantana camara* L. in Australia), and *Zygogramma bicolorata* PALLISTER (released in India for control of the parthenium weed *Parthenium hysterophorus* L., Asteraceae) belong to the very few recorded examples of biocontrol agents attacking also non-target plant species (McFadyen, 1998).

Evolution and fossil history

Despite an abundance of available material, the fossil history of Chrysomelidae is relatively poorly documented (Chaboo and Engel, 2009; Santiago-Blay, 1994). The great species diversity of leaf beetles and other phytophagous insects is commonly ascribed to their co-evolution with the rapidly radiating land plants in the Tertiary (Ehrlich and Raven, 1964; Farrell, 1998; Farrell et al., 1992). The phylogeny of Chrysomelidae is thought to reflect that of major lineages of angiosperms i.e. the available host plant lineages at that time (contemporaneous lineage diversification). The most basal lineages of Chrysomelidae are supposed to be associated with primitive cycads and conifers followed by a large diversification of lineages on di- and monocotyledonous angiosperms (Farrell, 1998; Farrell and Sequeira, 2004; McKenna and Farrell, 2006). Based on these assumptions, the origin of Chrysomelidae seems to be early- to mid-cretaceous leading to a discrepancy between the molecular calibrations and the fossil record (Gómez-Zurita et al. (2007) and references therein). The attribution of Jurassic fossils to Chrysomelidae (Santiago-Blay, 1994) is doubtful, and also in the Cretaceous chrysomelid fossils are essentially absent (Chaboo, 2007; Gómez-Zurita et al., 2007). Most appear only in the Eocene (34–56 Ma), representing most major subfamilies. An exception is a Canadian Mesozoic fossil dated to 72 Ma and identified as a primitive chrysomelid probably representing an early lineage which pre-dates the diversification of major extant subfamilies. The oldest clearly identifiable record is *Donacia wightoni* ASKEVOLD from the Canadian Palaeocene (~58 Ma; Askevold (1990)) (for an overview see Gómez-Zurita et al. (2007) and references therein). Feeding damage on fossil leaves that has been ascribed to hispines is dated $\geq$ 60 Ma and marks the beginning of the hispine/Zingiberales association (Wilf et al., 2000).

An alternative to the co-evolution hypothesis is a time-displaced diversification of the herbivores with radiation of herbivores being based on a pre-existing diversity of host plants (sequential evolution; Jermy (1976)). This scenario is supported by a study proposing a later origin of Chrysomelidae (end of the Cretaceous, 74–79 Ma) than the previous studies suggest and consequently a basal chrysomelid diversification substantially younger than the radiation of their hosts (Gómez-Zurita et al., 2007). A time lag between host radiation and the colonization by herbivores has been shown for several insects (Lopez-Vaamonde et al., 2006; McKenna et al., 2009).

Leaf beetle biology and ecology – State of the art

The qualities that distinguish Chrysomelidae as interesting study organisms are their species richness as well as their herbivorous mode of life. Herbivorous insects are an extremely species-rich feeding guild with important functions in ecosystems and great relevance for ecosystems' diversity (Coley and Barone, 1996; Janzen, 1970; Metcalfe et al., 2014; Price, 2002; Rinker and Lowman, 2004). According to the Janzen-Connell hypothesis host-specific herbivores maintain the high plant diversity of tropical forests (Clark and Clark, 1984; Connell, 1971; Janzen, 1970; Wright, 2002). Herbivorous insects are major consumers of plant material and in turn an important resource as prey or host for predators and parasitoids (Coley and Barone, 1996; Janzen, 1987; Mattson and Addy, 1975; Price, 2002). Especially herbivorous beetles, particularly Chrysomelidae, and their degree of host-specificity have played a fundamental role in species number estimates (Erwin, 1982; Novotny et al., 2002b; Ødegaard, 2000). In many habitats (e.g. tropical rainforest canopy) leaf beetles represent a large part of the herbivorous insect fauna (Andrew and Hughes, 2004; Basset, 2001; Wagner, 2000) and are essential for a true understanding of insect communities or plant-herbivore-interactions (Flowers and Hanson, 2003). An advantage is that they are easily collected and readily noticed even by non-specialists (Flowers and Hanson, 2003). Therefore, beside a multitude of studies on leaf beetle morphology and biology (e.g. Jolivet (1994); Jolivet et al. (1988); Schmitt (1994); Suzuki (1994)), a focus in Chrysomelidae research lies on their plant-herbivore-interactions (e.g. Adati and Matsuda (1993); Descampe et al. (2008); Flowers and Janzen (1997); García-Robledo et al. (2013a); Hawkeswood (1986); Jolivet (1999); McKenna and Farrell (2005); Meskens et al. (2008)).

Studies on diversity of leaf beetle communities usually address biodiversity of a certain region and often analyse the turnover along environmental gradients (e.g. Andrew and Hughes (2004); Aslan and Ayvaz (2009); Baselga and Novoa (2007); Şen and Gök (2009); Furth (2013); Gavrilović and Ćurčić (2013); Lesage et al. (2008); Linzmeier et al. (2006); Ohsawa and Nagaike (2006); Sánchez-Reyes et al. (2014)).

So far there have been comparatively few studies of leaf beetle diversity in Neotropical ecosystems (Flowers and Hanson (2003); e.g. Charles and Bassett (2005); Farrell and Erwin (1988); Furth (2013); Linzmeier et al. (2006); Linzmeier and Ribeiro-Costa (2009); Sánchez-Reyes et al. (2014)). As for Neotropical Chrysomelidae the poor taxonomic situation impedes species-level identification (see Chapter 1.4) methods postponing species-level identification and using morphospecies or MOTUs instead are standing to reason. Recently, DNA barcoding approaches have been used for studying leaf beetle diversity and ecology (e.g. García-Robledo et al. (2013a,b, 2015); Germain et al. (2013); Jurado-Rivera et al. (2009); Kubisz et al. (2012); Papadopoulou et al. (2013)).

1.3.2 Systematics and taxonomy

Chrysomelidae are considered monophyletic (Duckett et al., 2004; Gómez-Zurita et al., 2007; Reid, 1995), but basal relationships within Chrysomelidae are not yet ultimately agreed on (Gómez-Zurita et al., 2008). For recent phylogenies see e.g. Reid (1995), Farrell (1998), Duckett et al. (2004), Farrell and Sequeira (2004), and Gómez-Zurita et al. (2008). Orsodacnidae (Orsodacninae and Aulacoscelidinae) and Megalopodidae (Megalopodinae, Zeugophorinae and Palophaginae) that have been included in Chrysomelidae by several authors are currently considered to be basal Chrysomeloidea (Duckett et al. (2004); Reid (1995); overview in Gómez-Zurita et al. (2008)). In contrast to former classifications into up to 16 subfamilies (Seeno and Wilcox, 1982), there are currently 12 well delineated taxonomic groups: Bruchinae, Cassidinae (including hispines), Chrysomelinae, Criocerinae, Cryptocephalinae, Donaciinae, Eumolpinae, Galerucinae (including alticines), Lamprosomatinae, Sagrinae, Spilopyrinae, and Synetinae (Bouchard et al., 2011; Gómez-Zurita et al., 2007). Seed beetles (Bruchinae) have traditionally been treated as a separate family (Riley et al., 2002) and are not included in the present study. Protoscelidinae is an extinct subfamily (Bouchard et al., 2011).

The following taxa are relevant for the present study and therefore briefly described:

Galerucinae Latreille, 1802 and Alticinae Spinola, 1844
Galerucinae s.l. (= Galerucinae sensu Reid (1995), or 'Trichostoma') are morphologically diverse. Their monophyly is generally acknowledged and they are typically treated as two groups, Alticinae/Alticini and Galerucinae s.str./Galerucini (Duckett et al. (2004); Lingafelter and Konstantinov (1999); and references therein).

Alticinae (flea beetles; Fig. 1.2A) comprise around 8,000 species (Furth et al., 2003). Their body shape is compactly ovate and convex (Reid and Beatson, 2013). They are easily recognized by their thickened hind femora which contain the metafemoral spring (Furth, 1982b, 1988), an internal structure allowing the beetle to perform huge jumps to escape from predators (Maulik, 1929). It has been widely used as distinguishing character between Alticinae and Galerucinae (Furth, 1988). In contrast, Galerucinae s.str. (Fig. 1.2B) with ~6000 species (Ge et al., 2012; Jolivet, 1988) are more loosely elongate and depressed and lack the metafemoral spring (Reid and Beatson, 2013).

Galerucinae usually feed on dicotyledons (Mariau, 2004). They are basically Cucurbitaceae, Leguminosae, or Verbenaceae feeders and adapted to many plant families; host plants from almost 100 families have been recorded (Jolivet, 1988). A very large New World genus that includes several significant agricultural pests is *Diabrotica* with 300 (s.str.), respectively 600 (s.l.) species (Hammack and French, 2007; Jolivet, 1988). Alticinae have an especially complex food selection (Jolivet, 1988). Most are specialized and well-adapted to their host plant (Jolivet, 1988). It has been observed that Alticinae chew completely different plants at the end of the season (Jolivet, 1988).

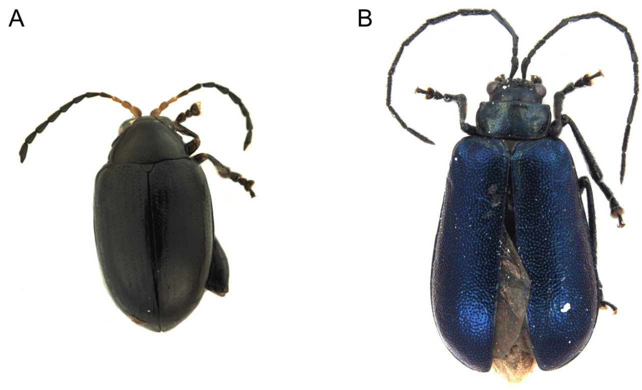


Figure 1.2: **Alticinae (A), Galerucinae (B).** Specimens 2050_Alticinae_sp_123 and 3438_Galerucinae_sp_031.

Relationships between the closely related Galerucinae s.str. and Alticinae are controversial (Duckett et al., 2004): Alticinae have been treated as a separate subfamily or as a tribe (Alticini) within Galerucinae (Furth and Suzuki, 1994; Lingafelter and Konstantinov, 1999; Reid, 1995; Seeno and Wilcox, 1982). The monophyly of either Alticinae and/or Galerucinae (i. Alticinae nested within Galerucinae: Lingafelter and Konstantinov (1999), ii. reciprocal monophyly of the two groups: Gómez-Zurita et al. (2008), or iii. monophyletic Galerucinae within flea beetles: Duckett et al. (2004); Kim et al. (2003); Reid (1995)) has been challenged by Ge et al. (2011, 2012) who included several problematic taxa considered 'incertae sedis' and propagated multiple origins of the complex jumping mechanism.

For a better understanding in this study the terms Galerucinae and Alticinae are retained (according e.g. Furth and Suzuki (1994); Jolivet and Petitpierre (1981); Seeno and Wilcox (1982)) keeping in mind that their status as subfamilies of equal rank and also their respective monophyly is in question (e.g. Crowson and Crowson (1996); Lingafelter and Konstantinov (1999); Reid (1995); for an overview see Lingafelter and Konstantinov (1999)).

Cassidinae GYLLENHAL, 1813 and Hispinae GYLLENHAL, 1813

Cassidinae s.l. (Cassidinae s.str. + Hispinae, or 'Cryptostoma') are noteworthy for their specialized plant associations with monocots and eudicots, diverse morphologies in immatures and adults, and a range of social behaviours from solitary to subsocial (Chaboo and Engel, 2009). They are cosmopolitan but primarily tropical, and most species are found in the Neotropics (Chaboo, 2007). New and Old World fauna show little overlap (Chaboo, 2007). They have a broad variation in host plant selection, from polyphagous to oligophagous or monophagous to plant species (Chaboo, 2007).

Until recently, two groups of Cassidinae s.l. have been treated as two subfamilies by most authors (e.g. Farrell (1998); Seeno and Wilcox (1982); Verma (1996)):

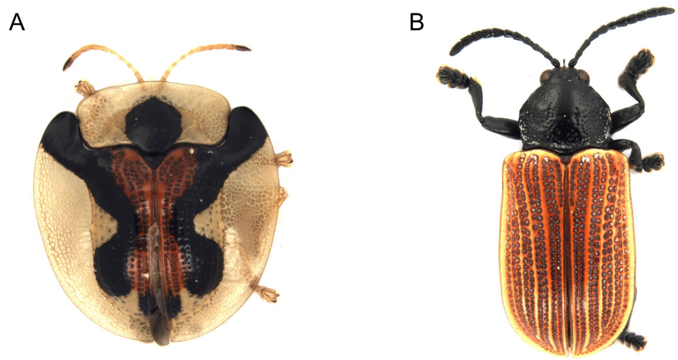


Figure 1.3: **Cassidinae (A), Hispinae (B).** Specimens 3861_Cassidinae_sp_015 and 4783_Hispinae_sp_016.

Hispinae Gyllenhal s.str. (leaf-mining beetles) and Cassidinae Gyllenhal s.str. (tortoise beetles). A detailed history of the classification of the two groups is given by Borowiec (1995) and Staines (2002) and research on their relationships is reviewed in Chaboo (2007). Morphologically and biologically there is no valid reason for retaining Hispinae and Cassidinae as separate subfamilies; intermediate forms (e.g. Cephaloleiini, Imatidiini) bridge the subfamilies (Borowiec, 1995; Staines, 2002). Currently, Cassidinae is the correct name for the clade Hispinae + Cassidinae with the hispine or hispiform genera being considered as a basal grade of Cassidinae (Borowiec, 1995; Chaboo, 2007; Chaboo and Engel, 2009; Staines, 2002). However, as the two groups reflect two characteristic, complex morphologies and ecological-behavioural forms and for a better understanding in this study the terms Hispinae and Cassidinae (meaning Cassidinae s.str.) are used.

There are ca. 3000 species (Jolivet, 1988) of Cassidinae s.str. (tortoise beetles). They are one of the most specialized chrysomelid subfamilies (Jolivet, 1988). They have a characteristic tortoise-like form induced by broadly expanded elytral and pronotal margins that frequently shield the heads (Chaboo and Engel (2009); Fig. 1.3A). They are reluctant flyers and there are brachypterous and wingless cassidine species (Chaboo, 2007). Tortoise beetles show an extremely diverse colouration, including metallic, iridescent, transparent, silver, and golden (Chaboo, 2007). Colour change and colour polymorphism occur frequently (Buzzi, 1988; Chaboo, 2007).

Although Cassidinae feed on 32 plant families, Convolvulaceae and Asteraceae are preferred (Borowiec and Świętojańska, 2014; Chaboo, 2007; Jolivet, 1988). Especially many tropical species feed on Convolvulaceae (Jolivet, 1988). Genera close to Hispinae (e.g. *Imatidium*) feed on palm trees (Jolivet, 1988).

Cassidinae show an interesting behavioural repertoire, especially concerning reproduction: Courtship behaviour has been described for several species and in some species post-copulatory attendance has been observed (Chaboo, 2007). Mating can last more than 24 hours (Chaboo, 2007). Some cassidine larvae construct a shield from faecal material and exuviae that is carried over the dorsum and is retained by some pupae (Chaboo, 2007; Chaboo and Engel, 2009). Those shields can be very sophisticated and show a remarkable variety of architectures (Chaboo, 2007). They protect the immature cassidines from predation and desiccation (Chaboo and Engel, 2009). In many cassidines larval gregariousness is common (Chaboo, 2007). For 17 cassidine species maternal care has been observed, a behaviour that is very rare in beetles and insects in general (Chaboo, 2007). Females have been observed sitting on top of the eggs, larvae, and pupae in order to protect them (Buzzi, 1988; Chaboo, 2007). They guard the immatures until the young adults emerge and attack threatening predators such as ants or reduviids (Chaboo, 2007). Females herd their larvae and, in the face of threats, even guide them to new leaves by prodding and pushing them (Chaboo, 2007).

Cassidinae are almost worldwide distributed, although they have a much greater diversity in the tropics, especially in tropical South America (Borowiec and Świętojańska, 2014). According to Blackwelder (1947) there are ~2000 Neotropical cassidine species. Ecuador's Cassidinae (s.str.) seem quite well studied compared to the other subfamilies (e.g. Borowiec (1998, 2000a,b); Flowers and Chaboo (2009); Sekerka and Windsor (2012)). A checklist of 200 species of Cassidinae recorded for Ecuador has been provided by Borowiec (1998) who estimated the total number of species living in Ecuador at ca. 250. The only chrysomelid type specimens deposited at the Invertebrate Section of the Museum of Zoology at the Pontifical Catholic University of Ecuador, Quito, are all Cassidinae (Donoso et al., 2009).

The approximately 3000 species of Hispinae (leaf-mining beetles) contain typically spiny or strongly sculptured beetles (Chaboo and Engel (2009); Jolivet (1988); Fig. 1.3B). Their immatures are broadly characterized as leaf-miners, although their biology ranges from leaf-tube scrapers to stem-miners, and even to open-leaf feeders (Chaboo, 2007; Chaboo and Engel, 2009). Most Hispinae feed on Monocotyledons, however others on Dicotyledons, in at least 37 plant families (Jolivet, 1988). Many Hispinae feed on palm trees (Jolivet, 1988). Noteworthy are the Neotropical 'rolled-leaf' hispine beetles (or 'hispoid Cassidinae', principally the tribe Cephaloleiini, >380 Neotropical species; Descampe et al. (2008)). They are found in tightly rolled apical leaves of monocots, mostly closely associated with Zingiberales, some with Arecaceae (Descampe et al., 2008; McKenna and Farrell, 2005). The close association of Hispinae with Zingiberales probably exists for >60 ma (Wilf et al., 2000). A review of the hispine/Zingiberales interaction was published by Staines (2004).

Seeno and Wilcox (1982) recorded 83 genera of hispines from the New World (Staines, 2002). There have been several regional revisions of New World hispines (e.g. Monrós and Viana (1947); Sanderson (1967); Staines (1996)), however none especially for Ecuador.

Eumolpinae HOPE, 1840

With more than 7000 species in 500 genera the subfamily Eumolpinae is the third in species diversity after Galerucinae s.l. and Cassidinae s.l. (Chaboo, 2007; Jolivet and Verma, 2008). They are worldwide distributed but basically a tropical group

Figure 1.4: **Eumolpinae with shiny, rugose, and hairy elytra (from left to right).** Specimens 0312_Eumolpinae_sp_021, 0719_Eumolpinae_sp_043, and 0553_Eumolpinae_sp_042.

where they are especially numerous (Jolivet and Verma, 2008). Their typical body forms are oblong, convex, and globose, but some are quite elongated. Antennae are usually filiform and insertions are not closely approximated. Eumolpinae have elytra with well-defined shoulders and are generally smooth, often shiny with metallic colours. In contrast, some are dull coloured, some rugose, and some have elytra and body densely hairy (Jolivet and Verma (2008); Fig. 1.4).

From a basic oligophagy on Asclepiadaceae, Apocynaceae and Convolvulaceae, Eumolpinae became in many genera polyphagous and feed on many wild and cultivated plants (Jolivet, 1988). Food plants are recorded from 116 plant families (Jolivet, 1988). Eumolpine larvae are root feeders (Jolivet and Verma, 2008). Neotropical eumolpine fauna is mostly constituted by the tribe Eumolpini (Flowers, 1999). Blackwelder (1947) lists 44 species for Ecuador. A new genus and several species have been described for Ecuador by Flowers (2004a,b, 2009a,b, 2004c).

Criocerinae Latreille, 1804

With ~1400 species Criocerinae (shining leaf beetles) is a relatively small subfamily (Schmitt, 1988; Vencl et al., 2004). Most species belong to five species-rich genera (*Crioceris*, *Lilioceris*, *Lema*, *Oulema*, and *Neolema*) (Matsumura et al., 2014). Criocerinae live in the temperate, subtropical, and tropical zones of all continents (Schmitt, 1988). They are glabrous with a brilliant metallic sheen (Vencl et al., 2004). They are typically narrow, elongate, depressed to cylindrical, with the pronotum medially or basally constricted ('hourglass-shape') and often differently coloured from the rectangular elytra (Cooter and Barclay, 2006; Reid and Beatson, 2013). Head and pronotum are narrower than the elytra (Fig. 1.5).

A characteristic of all Criocerinae is the ability to produce chirping sounds by means of an elytro-abdominal stridulatory apparatus (Schmitt, 1988). They probably use these sounds to deter predators (Schmitt, 1988; Schmitt and Traue,

Figure 1.5: **Criocerinae.** Specimen 4209_Criocerinae_sp_007.

1990). Detailed information about stridulation of Criocerinae is given in the study by Schmitt and Traue (1990).

Criocerinae are quite well-studied because of their economic interest, feeding on both Mono- (six plant families) and Dicotyledons (12 families) (Jolivet, 1988). The main feeding habit of both adults and larvae is leaf surface grazing (Vencl et al., 2004). For the New World, over 460 species are described (Vencl et al., 2004).

Chrysomelinae Latreille, 1802

Chrysomelinae comprise ca. 3000 species (Daccordi, 1996; Reid and Beatson, 2013). They are generally ventrally flattened and dorsally convex, with ovate body shape (Reid and Beatson (2013); Fig. 1.6). Neotropical chrysomelines comprise beside cassidines some of the largest and most colourful representatives of Chrysomelidae. In Costa Rica they are popularly known as 'confites con patas' (walking candies) (Flowers, 2004c).

Figure 1.6: **Chrysomelinae.** Specimen 0201_Chrysomelinae_sp_002.

For Chrysomelinae, 47 families of dicotyledonous host plants have been recorded (Jolivet, 1988). Most genera are monophagous or polyphagous on related host plants (Jolivet, 1988). In the New World, Solanaceae is the mostly selected family (Jolivet, 1988). In the Neotropical region chrysomelines are very numerous (Daccordi, 1996). A key for Chrysomelinae genera for Venezuela by Bechyné and Springlová de Bechyné (1965) was adapted for Costa Rica by Flowers (2004c).

Cryptocephalinae Gyllenhal, 1813 and Lamprosomatinae Lacordaire, 1848

Cryptocephalinae and Lamprosomatinae together with Clytrinae and Chlamisinae (often placed within Cryptocephalinae; Bouchard et al. (2011); Reid (1995)) share several morphological characters and are often referred to as 'Camptosomata' (Erber, 1988). They are also called 'case-bearers' because one common feature is a mantle, females cover their eggs with and that is worn as protective case by the larvae (Erber, 1988). As many camptosome species live cryptically or let themselves fall at the least disturbance, relatively little is known about their life-habits, e.g. feeding habits (Erber, 1988).

There are ~3900 species of Cryptocephalinae (Reid and Beatson, 2013). Cryptocephalinae have a cylindrical body that is obtusely rounded in front and behind, and almost circular in cross-section (Erber, 1988). The prothorax is in most cases at its base as broad as the elytra and joined to them without any suture and it tapers slightly in front (Erber, 1988). The head is placed closely against the prothorax, without a neck and hypognathous (Erber, 1988). Antennae are relatively short (Erber, 1988). Although colouring varies there are many shining metallic species (Erber (1988); Fig. 1.7A). Some cryptocephaline species feed on the leaves of woody plants, many on herbs, some feed on petals and there are even pollen-feeders (Erber, 1988).

Lamprosomatinae are a small subfamily with ~120 species (Reid and Beatson, 2013). The body-outline from Lamprosomatinae tapers in front and behind and is oval, like an egg (Erber, 1988). In side-view they are strongly convex, tapering away posteriorly, and they are ventrally flattened (Chamorro and Konstantinov, 2011; Erber, 1988). They are shiny and usually iridescent (Chamorro and Konstantinov (2011); Fig. 1.7B). Lamprosomatine diet seems to be restricted to herbs (Erber, 1988).

1.4 Chrysomelidae research in Ecuador

Ecuador, situated within the peak of species richness at tropical low latitudes, is considered a megadiverse country. On a comparatively small area it harbours pronounced elevational and wet–dry gradients with a large variety of habitats and high beta-diversity (Brehm et al., 2008a). The Ecuadorian leaf beetle fauna can be expected to be megadiverse, however has hitherto scarcely been studied.

Although entomology has a long history in Ecuador as in South America in

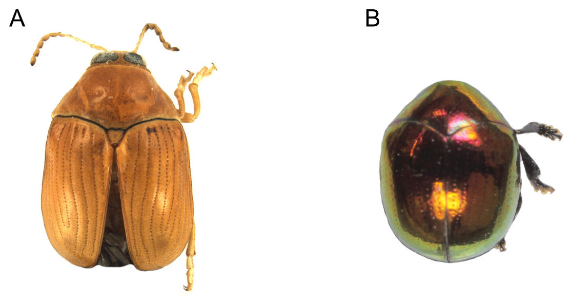


Figure 1.7: **Cryptocephalinae (A), Lamprosomatinae (B).** Specimens 0924_Cryptocephalinae_sp_001 and 1242_Lamprosomatinae_sp_003.

general (Barragan et al., 2009), with respect to the knowledge of its invertebrate fauna it remains like many other tropical countries a white spot on the map (Beck and Kottke, 2008). Whereas the diversity of certain charismatic groups such as plants, birds, and frogs has been the focus of numerous publications, data on the entomological fauna in Ecuador are scarce (Dangles, 2009). The Ecuadorian research in entomology was dominated by taxonomic studies during the past decades.

In general, Neotropical beetle fauna with exception of certain taxa such as Cerambycidae or Scarabaeoidea is considerably understudied and there are no general books or treatises about that region (Costa, 2000). Accordingly, also the available data records for Ecuadorian chrysomelid fauna is very sparse: Blackwelder's 'Checklist of the coleopterous insects of Mexico, Central America, the West-Indies, and South America' (1947) compiled between 1944 and 1957 (complemented by Bechyné (1952)) is still regarded as standard reference for South American beetle diversity and was only complemented by extensions and revisions for certain taxa or countries (e.g. Bechyné (1953): Eumolpinae, Maes and Staines (1991): Chrysomelidae of Nicaragua, Furth and Savini (1996): Alticinae, Borowiec (1998): Cassidinae). Explicitly for Ecuador, Blackwelder lists ~450 chrysomelid species (another ~100 listed for tropical or South America; Blackwelder (1947)). This number is certainly far below the true species number. Furth et al. (2003) claim that 'all central American countries certainly have a much higher actual diversity than is recorded in the literature'. This surely applies as well to South America in general and Ecuador in particular. A recent review particularly for Ecuador exists only for Cassidinae (Borowiec, 1998) with 200 recorded and ~250 estimated species.

In the Neotropics, a few regions experienced an extensive collecting and research activity. For example, in the 1960s, the entomologists Jan and Bohumila Bechyné who studied Neotropical leaf beetles more extensively than most previous workers collected intensively in Venezuela and described over 90 alticine genera as well as hundreds of species (Furth and Savini, 1996). Mainly due to their work, the collection of the Museo del Instituto de Zoología Agrícola 'Francisco Fernández Yepez', Venezuela, is one of the most important collections of Neotropical Chrysomelidae, especially Alticinae. It harbours more than 1100 alticine species, giving an idea of the true species richness of the South American countries. Another example of a better study situation compared to most Neotropical countries is Costa Rica that during the last years became a focus area for Neotropical biodiversity research resulting in a lot of publications, a number of them about Chrysomelidae (e.g. Flowers (1991); Flowers and Janzen (1997); Furth et al. (2003); Staines (2011)). In a study about Alticinae in Costa Rica, the species number recorded in literature was more than doubled resulting in a total of ~350 known species for the whole country (and maybe a total number of 1000 species appearing realistic; Furth et al. (2003)). However, these examples of well-studied countries are exceptions. A similar high diversity as in those countries should be expected for Ecuador, however, Blackwelder lists only ~65 species of alticines (Halticinae) for Ecuador and a recent review is lacking. Most Neotropical countries' leaf beetle diversity remains barely explored.

Although Chrysomelidae are attractive study organisms (see Chapter 1.3), the sheer diversity of the family presents a challenge for studying their diversity in tropical ecosystems. Species-level identification is often impossible. For Neotropical Chrysomelidae, the few existing keys are mostly quite dated: The only key to Neotropical alticine genera by Scherer is from 1962 (Furth et al., 2003; Scherer, 1962); the first revised key for New World genera of Hipines since Weise (1911) was only in 2002 published by Staines. Others are restricted to certain regions (Flowers, 2004c; Staines, 2009), genera (Flowers, 2004a,b; Staines, 2013), or small groups of related genera (Furth, 1992; Konstantinov and Konstantinova, 2011). An exception is the interactive manual 'Cassidinae of the World' (Borowiec and Świętojańska (2014); http://culex.biol.uni.wroc.pl/cassidae/katalog%20internetowy/index.htm) that provides a comprehensive key to cassidine genera worldwide. However, reliable identification keys to genera are still lacking for genera of some of the largest and most ubiquitous subfamilies of Neotropical Chrysomelidae (Flowers and Hanson, 2003). None exists particularly for Ecuadorian leaf beetle fauna.

Whereas most studies about Ecuadorian Chrysomelidae are records or descriptions of individual species or genera (e.g. Borowiec (1998, 2000a,b); Flowers (2009a,b); Sekerka and Windsor (2012); Staines and Zamorano (2012); Świętojańska and Borowiec (2000)) or host records (e.g. Flowers and Chaboo (2009)), there are no studies about the diversity of leaf beetle communities in Ecuador. Also a thorough inventory of mountain forests is missing.

The high discrepancy between recorded and true diversity is also reflected by its collections: The Invertebrate Section of the Museum of Zoology at the Pontifical Catholic University of Ecuador in Quito comprises with almost two million specimens Ecuador's largest collection of native taxa. It harbours 24,215 Chrysomelidae, most of them still awaiting identification. 10.83% of all specimens are determined to species, 13.6% to genus, but 75.56% have no identification at all (Clifford Keil, pers. comm.). There are only nine chrysomelid type specimens deposited, all of them belong to the subfamily of Cassidinae (Donoso et al., 2009). The distribution of type localities (for all invertebrates) showed that collection sites are clustered geographically with most of them found towards the northern region of Ecuador. Sites are mainly located in highly accessible areas near highways and towns (Donoso et al., 2009). Donoso et al. (2009) advise that 'future fieldwork should include localities in the southern region of Ecuador but also target less accessible areas'.

Concerning the study area of the present study, among insects only certain taxa of Lepidoptera (Bodner et al., 2010; Brehm et al., 2003a, 2005, 2003b; Fiedler et al., 2008; Häuser et al., 2008; Hilt and Fiedler, 2006) and Orthoptera (Braun, 2008) have been studied up to now. The large insect orders of Coleoptera, Hymenoptera and Diptera remain completely unstudied so far (Brehm et al., 2008b). Notably Chrysomelidae are mentioned by Brehm et al. (2008b) to be desirable to be studied in the study area as they have high impact on forest ecosystems. A first attempt of studying beetle diversity in the study area was made by Schmidl (2007–2008, pers. comm.). He confined himself on the bark-living fauna and reported ~50 morphospecies of Chrysomelidae.

1.5 Aims and structure of the dissertation

Objectives

This study aims at testing a combined morphological and molecular approach for assessing rapidly the biodiversity of an unknown leaf beetle fauna in a mountain forest in southern Ecuador. The performance of DNA barcodes as substitutes for Linnean taxonomic information is evaluated for identification of species-like units. In detail, the following questions are addressed:

1. How diverse are leaf beetles in the studied Andean mountain forest?
   How can barcode and morphospecies data characterize an unknown leaf beetle community? What assertions can be made about species richness, abundance, incidence, and subfamily composition of the community?

2. How do local and regional species richness change with elevation?
   Can barcode data analyse patterns of species richness, turnover, and community composition along an elevational gradient? Does DNA barcode data reveal diversity patterns in a comparable way as morphospecies do? Which ecological conclusions can be drawn from DNA barcode data?

3. How congruent are the morphospecies method and the DNA based identifications?
   Which discrepancies are there, in which taxa do they occur, and what are their reasons?

4. Which influence do different methods of species delimitation have on species richness estimates?
   How congruent are different DNA based species delimitation methods? How relevant is the choice of the species delimitation method?

5. How do different sampling methods perform?
   Which sampling methods are advisable in terms of sampled specimens and time efficiency?

Structure of the thesis

The 'Methods' section provides extensive and detailed general information about study area, sampling, and further handling of specimens as well as subsequent laboratory and data analyses. In the individual chapters, specific methodological information relevant for the respective part is given.

Each of the five chapters on leaf beetle biodiversity and ecology and methodological aspects of rapid biodiversity assessment represents a separate study and can be understood by itself. Each follows the standard structure for a scientific publication (introduction, methods, results, discussion, and conclusion) as they are meant to be published as separate publications in scientific journals. Therefore, some content is recurring throughout the thesis.

In the 'General discussion and future prospects' section, conclusions are drawn from the complete study and some future perspectives are outlined.

This thesis was conducted within the framework of the research programme 'ABA-Ecuador: Acceleration of biodiversity assessment – Development of tools and application in a tropical mountain ecosystem'. The project on Chrysomelidae was funded by the German Science Foundation (Deutsche Forschungsgemeinschaft, DFG), grant Wa 530/46-1.

Teamwork

Chapter 4 is prepared as a manuscript for publication in a scientific journal:

Thormann, Birthe; Ahrens, Dirk; Marín Armijos, Diego; Wagner, Thomas; Wägele, J. Wolfgang; Peters, Marcell K. **Topography effects on elevational alpha-, beta-, and gamma-diversity of Neotropical leaf beetles.**

B. Thormann, M.K. Peters, and J.-W. Wägele developed the study. B. Thormann conducted sampling, preparation of specimens, laboratory work, and data compilation. B. Thormann and Th. Wagner conducted morphospecies sorting. B. Thormann and D. Ahrens conducted molecular species delimitation. B. Thormann and M.K. Peters performed the statistical analyses and developed the first version of the manuscript.

The contents of Chapter 6 are supposed to be published as:

Thormann, B.; Ahrens, D.; Marín Armijos, D.; Peters, M.K.; Wagner, Th.; Wägele, J.-W. **Exploring the leaf beetle fauna (Coleoptera: Chrysomelidae) of an Ecuadorian mountain forest with DNA barcoding**.

B. Thormann, D. Ahrens, M.K. Peters, and J.-W. Wägele developed the study. B. Thormann conducted sampling, preparation of specimens, laboratory work, and data compilation. B. Thormann and Th. Wagner conducted morphospecies sorting. B. Thormann and D. Ahrens conducted molecular species delimitation. B. Thormann and M.K. Peters performed the statistical analyses. All co-authors provided ideas and suggestions for the text.

The study was carried out in close cooperation with the Universidad Técnica Particular de Loja (UTPL), Ecuador.

Chapter 2

Methods

2.1 Study area

The study area is situated within the Reserva Biológica San Francisco (RBSF) and the adjacent Podocarpus National Park (NP) in southern Ecuador. The RBSF is a small private nature reserve (~11.2 km^2) owned by the foundation Nature and Culture International, NCI. It is located between the province capitals Loja and Zamora and harbours the research station 'Estación Científica San Francisco' (ECSF; 3°58'17.19"S, 79°4'44.06"W; Fig. 2.1). Podocarpus NP was created in 1982, comprises ~1463 km^2, and is part of the Podocarpus – El Condor Biosphere Reserve. Politically, the study area belongs to the provinces of Loja and Zamora-Chinchipe. The study sites are situated in three different areas: (i) ECSF area next to the research station, belonging to RBSF, (ii) Bombuscaro area in the Bombuscaro sector of Podocarpus NP, close to Zamora, and (iii) Cajanuma area in the Cajanuma sector of Podocarpus NP, close to Loja (Fig. 2.1). In Bombuscaro and Cajanuma are the two main entrances to Podocarpus NP.

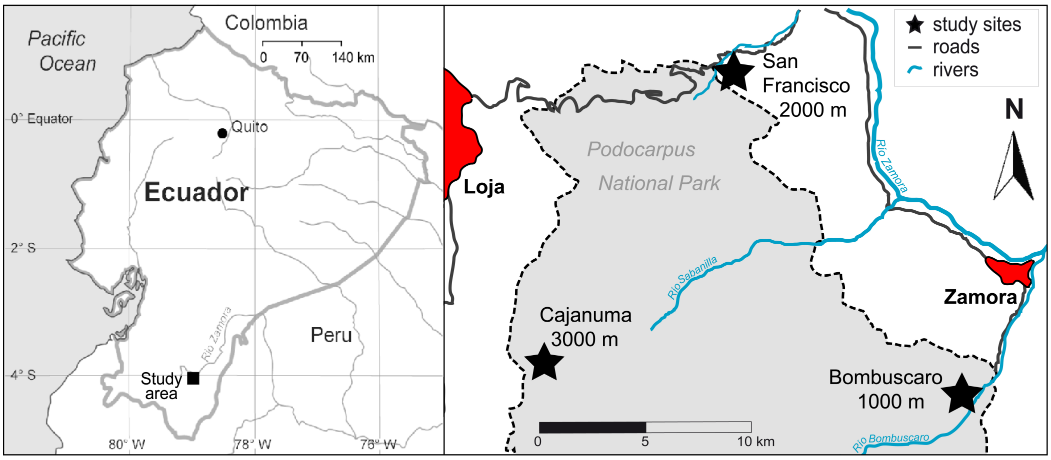


Figure 2.1: **Map of Podocarpus National Park, Ecuador, with location of study sites.** Bombuscaro (1000 m), ECSF (=San Francisco; 2000 m), Cajanuma (3000 m) (Homeier et al., 2012).

The region is located in the Cordillera Real or Eastern Cordillera of the Andes and is part of the Huancabamba depression. In contrast to central and north Ecuador with impressive volcanoes of up to 6000 m a.s.l. and above, in the Huancabamba depression there are no volcanoes, the crest of the Cordillera Real does not exceed 2800–3400 m a.s.l., and the treeline is comparatively low (Beck et al., 2008b; Richter et al., 2009, 2008). Eastern and Western Cordillera, the two main cordilleras forming the Ecuadorian Andes, are interconnected by transverse mountain bridges forming ten interandean basins. The complex topography creates a landscape with extreme climatic differences (Dangles et al., 2009).

The research area has a tropical humid climate with annual mean precipitation of 2230 mm in Bombuscaro, 1950 mm in ECSF, and up to 4500 mm in Cajanuma (Moser et al., 2007). Precipitation is high throughout the year, however with the main rainy season from April to August and a less humid period from September to December (Bendix et al., 2006, 2008). Annual mean air temperature decreases from 19.4°C in Bombuscaro and 15.7°C at ECSF to 9.4°C in Cajanuma (Moser et al. (2007); Tab. 2.1).

Table 2.1: **Temperature and precipitation at the three study sites (Moser et al., 2007).**

	Bombuscaro	**ECSF**	**Cajanuma**
Annual mean air temperature (°C)	19.4	15.7	9.4
Min.	11.5	7.9	3.1
Max.	30.2	29.4	18.8
Relative air humidity (%)	88,7	90,8	93,5
Min.	15.5	15.7	28.6
Max.	100	100	100
Soil moisture (vol %)	29.7	35.4	49.1
Min.	15.3	27.4	39.5
Max.	38.5	44.7	59.5
Annual mean precipitation (mm y^{-1})	2230	1950	4500

The study area is a rugged mountainous area with valleys and differently exposed slopes mostly covered with evergreen (pre-)montane rainforests. An overview of vegetation types of the region can be found in Homeier et al. (2008). Its steep elevational gradients and great topographic heterogeneity create a broad matrix of environmental conditions and a mosaic of different habitats in close proximity to each other leading to a high diversity of animals and plants (Homeier et al., 2010, 2008). This is reinforced by the geographic position of the area: Its location between the humid eastern Andean slope and the dry Inter-Andean region on the one hand, and between the Central and Northern Andes on the other hand allows an intermingling of the respective characteristic species pools (Homeier et al., 2010).

The region is part of a biodiversity hotspot, the Tropical Andes (Myers et al., 2000). It is ranked as a top hotspot of diversity of vertebrates and vascular plants (Brummitt and Lughadha, 2003). There exist only little information about its insect fauna but an exceptionally high level of diversity and endemism is certain (Larsen et al., 2011). The outstandingly high plant diversity has extremely high proportions of endemism (Barthlott et al., 2005; Richter et al., 2009; Weigend, 2002; Young and Reynel, 1997). In particular the flora of Podocarpus NP is known for its high endemism (Homeier et al., 2008). The tree diversity is higher than in comparable montane forests in northern Ecuador, and also for vascular epiphytes, bryophytes, and orchids extremely high species numbers have been recorded (see references in Brehm et al. (2008b)).

Knowledge of the region's fauna is still very incomplete. Podocarpus NP is one of Ecuador's most important bird areas with more than 550 species recorded (Rahbek et al., 1995). Among the most charismatic mammals of the area are the Spectacled Bear (*Tremarctos ornatus* CUVIER) and the Mountain Tapir (*Tapirus pinchaque* ROULIN). Podocarpus NP is one of the 137 most irreplaceable protected areas of the world (Le Saout et al., 2013).

For the RBSF there exist inventories of birds, bats, and parts of Lepidoptera, Orthoptera, and Arachnida showing high diversity of these taxa (Brehm et al., 2008b). Notably the diversity of geometrid moths (Lepidoptera: Geometridae) has been intensively studied by G. Brehm and colleagues. Besides analysing e.g. the diversity along elevational or successional gradients, their recorded species numbers are the highest ever counted in a single study on such a small spatial scale (e.g. Brehm (2002); Brehm et al. (2003a, 2005, 2003b); Hilt et al. (2006)). In contrast, amphibians, molluscs, and the vast majority of arthropods, including Coleoptera, Hymenoptera, and Diptera, have not been studied at all (Brehm et al., 2008b).

The manifold habitats of the region with their outstanding biodiversity are threatened by deforestation. Ecuador's dense population (55 inhabitants/km^2) puts strong pressure on natural ecosystems (Dangles et al., 2009). Ecuador suffers the highest deforestation rate (-1.9% per year) in South America (FAO, 2010). The main reason is the conversion of forest into agropastoral land (Mosandl et al., 2008).

2.2 Sampling methods and sampling design

Sampling was conducted in November and December 2010 and from 08.05.2011 to 26.04.2012. Mainly three different methods were used to collect leaf beetles from the lower to medium understorey vegetation: (i) sweep netting, (ii) beating of shrubs and smaller trees using a beating-tray, and (iii) hand-collection (picking up beetles individually from the vegetation). Those methods are widely used and promising for sampling of leaf beetles (Thomas Wagner, pers. comm.). All kind of vegetation within reach was sampled (up to ca. 2.5 m). In addition, Malaise- and flight interception-, as well as light-trapping was used. Pitfall traps have been tested but only in individual cases. The sampling methods are described in more detail in Chapter 7.

Sampling was conducted in three different areas within Podocarpus NP and RBSF (see Chapter 2.1): (i) Bombuscaro ('1000 m'; elevation 1020–1075 m a.s.l.; premontane rainforest), (ii) ECSF (in the vicinity of the Estación Científica San Francisco; '2000 m'; elevation 1913–2089 m a.s.l.; lower montane rainforest), and (iii) Cajanuma ('3000 m'; elevation 2805–2891 m a.s.l.; upper montane rainforest or

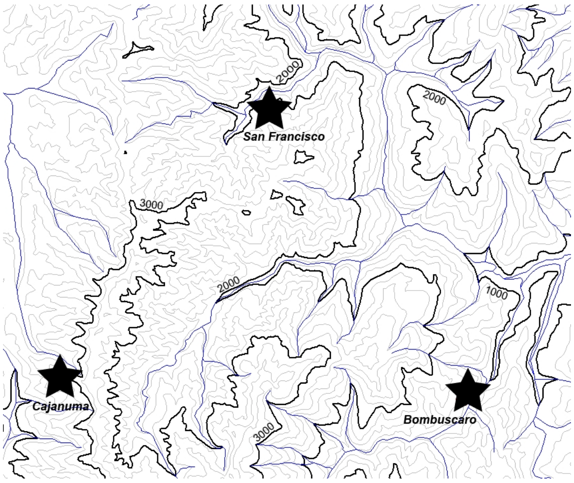


Figure 2.2: **Contour map of the study area.** Contour lines within the study area and location of the three sampling areas Bombuscaro, ECSF (San Francisco), and Cajanuma (Jantz et al., 2014).

cloud forest) (Classification of vegetation: Homeier et al. (2008); Fig. 2.2). Linear distance between each of the three sampling areas is ~20 km.

To analyse biodiversity and community patterns and make comparisons along the altitudinal gradient, most of the sampling was conducted in a standardized way on defined study sites: The study sites are the so called Matrix-Plots which have been established in 2007 by C. Leuschner and E. Veldkamp and colleagues (University Göttingen). They are 20 × 20 m squares situated within homogeneous mature forest representative for the elevation in question and without visible recent natural or human disturbance (Homeier et al., 2010). At each elevational area, 12 plots were studied, resulting in a total of 36 plots. At each elevational level, six plots are situated in the valley, near creeks, the so-called 'Lower slope plots' (L-Plots), and six near ridge crests ('Upper slope plots', U-Plots).

The two slope positions (U and L) correspond to two habitat types that differ in several environmental parameters and harbour two distinct forest types. Compared to ridge habitats, valley habitats have a higher productivity, are more nutrient-rich, have a minor organic layer thickness and a lower C:N ratio. The sites in valleys are vegetated with a forest which differs in species composition, has a smaller canopy openness, consists of higher trees, has a higher biomass and harbours a higher diversity of tree species (Homeier et al. (2010); Werner and Homeier (2015); Homeier pers. comm.). Figure 2.3 shows a typical ridge and a typical valley forest. Further information about the location and coordinates of the plots are given in Appendix Tab. B.1.

The sampling on the plots followed a standardized procedure carried out by a team of two persons: Sweep netting alongside two edges of the plot for 30 min by one person; simultaneous beating alongside the other two edges of the plot for 30

Figure 2.3: **Typical ridge forest (left) and valley forest (right) in the ECSF area.** Photos courtesy of F. Werner.

min by the other person; subsequent hand-collection within the plot for 30 min (by both persons simultaneously for 15 min). The standardized sampling on the plots was complemented with other sampling methods (see above) and additional hand-sampling. A sample is defined as the total of leaf beetles either caught by 30 min sweep netting, beating, or hand-collection on a plot (standardized samples), or by hand-collection during one sampling day (non-standardized hand-collection), or the content of a Malaise-, light-, flight interception- or pitfall trap when emptied.

Being killed and collected in 70% ethanol, beetles were subsequently transferred into 96% ethanol and stored at 4– -20°C to ensure optimal preservation of DNA.

2.3 Further handling of the specimens

For each sample, Chrysomelidae were sorted into preliminary morphospecies. Usually one specimen of each morphospecies of each sample was selected and used for the subsequent morphological and molecular analysis. In single cases up to three specimens have been analysed (the remaining individuals of a preliminary morphospecies are termed *duplicate specimens* hereafter and have been included in some analyses; see below, paragraph 'Morphospecies sorting').

Each selected individual was used for both, morphological classification and molecular analyses. For DNA extraction, one to three legs of the beetle were dissected, depending on its size. The specimen was then dry mounted and labeled to allow subsequent morphological investigation. Each sequence remains linked to its voucher specimen and all connected sampling information. Voucher specimens will be deposited in the collections of the Zoological Research Museum Alexander Koenig (ZFMK), Bonn, and the Universidad Técnica Particular de Loja (UTPL), Ecuador (Specimen List in the Appendix Tab. C.1). Photos of a number of the specimens will be available through the ZFMK collection database and all DNA samples are stored in the Biobank of the ZFMK. The sequences from Chapters 4 and 6 are available from GenBank (accession numbers KJ677272–KJ677945/KR424781–KR425417; see also Appendix Tab. C.1), the rest will also be submitted.

2.4 Laboratory protocols

The DNA barcode marker COI
The cytochrome *c* oxidase I (COI) gene is one of 13 protein-coding genes of the mitochondrial genome. The COI complex consists of several subunits and plays an important role in the respiratory chain (Steinke and Brede, 2006). A 658 base pair (bp) long fragment at the 5' half of the COI gene has established as the standard marker sequence for DNA barcoding of animals. Due to highly conserved sequence positions, this fragment can be amplified with so-called 'universal primers' in a wide variety of animal taxa (Folmer et al., 1994; Hebert et al., 2003a). In this study, the term 'COI' refers to this 658 bp long fragment of the cytochrome *c* oxidase I gene.

Advantages of mitochondrial genes are the lack of introns and the limited exposure to recombination as a result of the maternal mode of inheritance (Hebert et al., 2003a; Steinke and Brede, 2006). In contrast to the rRNA coding genes, the protein-coding genes usually do not contain indels that complicate analyses. The COI marker gene has a greater range of phylogenetic signal than other mitochondrial genes and is supposed to evolve rapidly enough to allow discrimination of not only closely allied species but also phylogeographic groups within a single species (Cox and Hebert, 2001; Hebert et al., 2003a,b; Wares and Cunningham, 2001).

Universal primers are necessary for identifying specimens that are not known *a priori*. Highly conserved sequence positions allow amplification of the COI marker with the universal primers LCO1490 and HCO2198 in a wide variety of animal taxa (Folmer et al., 1994; Hebert et al., 2003a; Zhang and Hewitt, 1997). However, often specific primers have been used for certain taxa and the use of more than one pair of primers can be necessary to derive sequences from all individuals of a taxonomic group (e.g. Hebert et al. (2004); Smith et al. (2005); Ward et al. (2005)). For degenerated DNA mini-barcodes of 100 to 250 bp have been developed (Meusnier et al., 2008).
There are several general problems of mitochondrial markers that must be considered:
Nuclear mitochondrial pseudogenes (numts): Numts are non-functional copies of mitochondrial DNA (mtDNA) sequences that have been translocated into the nuclear genome (Bensasson et al., 2001; Lopez et al., 1994). They can be amplified with conserved universal primers aimed at mitochondrial copies and can complicate or confound analyses in various taxa (Bensasson et al., 2001; Buhay, 2009; Richly and Leister, 2004; Song et al., 2008).
Wolbachia infections: DNA barcoding studies usually assume a lower sequence variation within species than between species and a monophyly of mitochondrial DNA within species. Infections with maternally inherited symbionts can have direct influence on reducing the diversity of mtDNA and lead to identical mtDNA sequences

among different species and so disrupt this pattern and confound DNA barcode data (Hurst and Jiggins, 2005). Especially to mention is *Wolbachia*, an intracellular bacterium that is widely spread among insects (Hurst and Jiggins, 2005; Werren and Windsor, 2000; Werren et al., 1995). Detailed information about the impact of *Wolbachia* on DNA barcoding is given by Smith et al. (2012). *Wolbachia* infections have also been reported for Chrysomelidae and there are propositions for *Wolbachia*-mediated pest control and -management (Clark et al., 2001; Keller et al., 2004; Kondo et al., 2011; Roehrdanz et al., 2006; Werren and Windsor, 2000; Werren et al., 1995).
Mitochondrial heteroplasmy: The mixture of more than one type of mitochondrial genome within a single individual, and therefore the coamplification of different heteroplasmic copies of mtDNA, can confound species numbers and lead to artificial clades (Hebert et al., 2004; Hulcr et al., 2007; Rubinoff et al., 2006).
Other problems that are linked with single-gene approaches and can complicate DNA barcoding are introgression and hybridization as well as incomplete lineage sorting (Chase et al., 2005; Funk and Omland, 2003; Meyer and Paulay, 2005; Rosenberg and Tao, 2008).

DNA-extraction, amplification and sequencing
Total genomic DNA was extracted from one to three legs of each specimen, using the Qiagen DNeasy® BloodTissue Kit or Qiagen Biosprint 96BS following the manufacturers‘ protocol. COI (658 bp) was amplified with the primers LCO1490 and HCO2198, or with LCO and Nancy (for primer information see Tab. 2.2) using the Qiagen® Multiplex PCR Kit. Amplification reactions were carried out in a 20 μl volume containing 10 μl QIAGEN Multiplex PCR Mastermix, 2 μl Q-Solution, 1.6 μl of each primer (both 10 pmol/μl), and 2.5 μl DNA template, and filled up to 20 μl with sterile H_2O. The PCR temperature profile consisted of an initial denaturation at 95°C (15 min), followed by 15 cycles at 94°C (35 s, denaturation), 55°C – 40°C (90 s, annealing temperature decreasing with every cycle about 1°C; Touch down-PCR), 72°C (90 s, extension), 25 cycles at 50°C annealing temperature, and a final extension at 72°C (10 min). Products were checked by electrophoresis on a 1.5% agarose gel containing GelRed^{TM} (Biotium Inc.). Successfully amplified DNA fragments were purified using Illustra^{TM} ExoStar (GE Healthcare) following the manufacturers‘ protocol. PCR products were sequenced in both directions by Macrogen Europe (Amsterdam, Netherlands; http://www.macrogen.com) using the same primers.

Table 2.2: **Primer information.**

Name	Sequence	Direction	Reference
LCO1490	5’- GGT CAA CAA ATC ATA AAG ATA TTG G -3’	forward	Folmer et al. (1994)
HCO 2198	5’- TAA ACT TCA GGG TGA CCA AAA AAT CA -3’	reverse	Folmer et al. (1994)
Nancy (C1-N-2191)	5’- CCC GGT AAA ATT AAA ATA TAA ACT TC -3’	reverse	Simon et al. (1994)

2.5 Analyses

All sequences were assembled and edited with Geneious version 5.4.4–version 7.1.5 (Biomatters Ltd.; http://www.geneious.com/). Detailed information about alignment of sequences and reconstruction of trees as well as programs used are given in the respective chapters. Statistical analyses were performed in R version 2.15.1–version 3.1.1. Detailed information is provided in the respective chapters. Data plottings were created in R, too, or with Microsoft Office Excel 2003–2010.

Species delimitation
For biodiversity analyses or ecological studies based on invertebrate data, species richness and species turnover are important measures (Oliver and Beattie, 1996). However, the aim of this study is the evaluation of rapid methods for the assessment of an unknown diversity of leaf beetles without existing species information. As a surrogate for species, morphological and molecular working units that are fast to apply are used. They are supposed to be proxies for species and therefore be at species level, but they do not have to correspond exactly to species. It is not the aim to infer true species limits as it is e.g. the aim of integrative taxonomy.

Morphospecies sorting
As the aim of this study is the evaluation of rapid methods for biodiversity assessment, a thorough taxonomic analysis was relinquished and instead a parataxonomic morphospecies approach was used as it is common in tropical arthropod biodiversity studies. The dry mounted voucher specimens were sorted into morphospecies that were revised and verified by Dr. Thomas Wagner who is an experienced taxonomist for Chrysomelidae with afrotropical Galerucinae being his focus of expertise (see e.g. Wagner (2004, 2007a,b); Wagner and Kurtscheid (2005)). Specimens were sorted considering only external characters, without the use of dissected parts and without identification literature. Characters for morphospecies delimitation are shape of head, pronotum and total body, surface structures, and hairs or spines. Body size or colours may be used carefully considering that they may vary e.g. due to recent ecdysis. More information about morphospecies sorting and the concept of parataxonomy is given in Chapter 5. Morphospecies received a subfamily name and a number. It is to note that Hispinae and Cassidinae (meaning Cassidinae s.str.) are treated as separate subfamilies although they both belong to the subgroup Cassidinae (s.l.). The same applies to Alticinae and Galerucinae: For a better understanding the traditional view of two distinct subfamilies is retained although their status as subfamilies of equal rank and also their respective monophyly is in question. For information about the relations between Cassidinae and Hispinae as well as Alticinae and Galerucinae see Chapters 1.3 and 3.

For certain analyses of general diversity and comparison of sampling methods (Chapters 3 and 7) the remaining individuals of the preliminary morphospecies (*duplicate specimens*, see above '2.3 Further handling of the specimens') that have not been dry mounted and sequenced have been used, too (data sets 2a and 3a). They have been assigned to the same morphospecies as the dry mounted and sequenced voucher specimen. It is to note that their classification to morphospecies is admittedly more superficial, but as the sorting of specimens of a single sample into preliminary morphospecies is quite reliable due to the small number of individuals and species per sample, it is likely that similar specimens of a sample were correctly classified as the same morphospecies. Furthermore, usually only one individual per morphospecies was found in one sample (~80%), in 12% there were two individuals and only in ~8% more than two (only in ten cases ten or more individuals of the same morphospecies were found in one sample). So the number of specimens affected is quite low and the error rate can be considered low (see also Chapter 7.3).

Molecular species delimitation

Four different molecular methods for species delimitation have been used:

Statistical parsimony analysis (Templeton, 2001; Templeton et al., 1992) as implemented in TCS v.1.21 (Clement et al., 2000) (95% connection limit) was used to group sequences into separate haplotype networks. The term network is used for all entities delimited by the program, also if they are no true networks or consist of only one sequence.

Distance-based clustering was based on the results obtained by SpeciesIdentifier v.1.7.7-dev3 (Meier et al., 2006) from the TaxonDNA package (http://taxondna.sourceforge.net/). The program generates clusters of sequences based on pairwise uncorrected distances at user-defined thresholds. All individuals that are connected directly to each other by distances below this threshold are grouped into a cluster (Meier et al., 2006).

Generalized mixed Yule-coalescent (GMYC) modelling (Monaghan et al., 2009; Pons et al., 2006) as implemented in the SPLITS package (https://www.r-forge.r-project.org/projects/splits/) for the R environment (R Development Core Team, 2009) was used to estimate species boundaries directly from the phylogenetic tree (Monaghan et al., 2009; Pons et al., 2006) produced with COI data. This procedure exploits the differences in the rate of lineage branching at the level of species and populations, recognizable as a sudden increase of apparent diversification rate when ultrametric node height (distance to tips) is plotted against the log number of nodes in a lineage-through-time plot (Nee et al., 1992).

Poisson tree processes (PTP) modelling was used as implemented on the PTP web server (http://species.h-its.org/ptp/) (Zhang et al., 2013). This method is similar to GMYC modelling but uses directly the number of substitutions (instead of the time) to identify branching rate transition points and therefore avoids the potentially error-prone process of making the tree ultrametric (Zhang et al., 2013).

The results of the different molecular species delimitation methods (networks, distance-, GMYC-, and PTP-clusters) are species-like units and often identical with species discerned by taxonomists. In this study they are summed up in the term molecular operational taxonomic units (MOTUs). The molecular species delimitation methods are described more detailed in Chapter 6.

Haplotype diversity

Additionally, for the analyses in Chapters 4 and 6 haplotype diversity was inferred as a further independent measure for molecular diversity (Papadopoulou et al., 2011).

Data sets

Due to capacity restrictions not all collected specimens could be analysed, so a selection had to be made. Generally, only one (in some cases two or three) specimen of each preliminary morphospecies per sample was processed, i.e. assigned to a morphospecies and sequenced. For the different analyses, different data sets of the totality of processed specimens have been used. For some analyses also the duplicate specimens were included, for others only those specimens for that a DNA barcode could be obtained were used (Tab. 2.3):

Data set 1 (data set of total analysed specimens): Consists of all specimens that have been processed (sorted into morphospecies and sequenced; 1775 specimens). It comprises data set 2 and several additional specimens of specific interest that were processed as well. All specimens have been assigned to a morphospecies and those with a barcode (*data set 1b*; 1475 specimens) to a haplotype network, too. Data set 1 was used for counting the total number of found morphospecies (Chapter 3) and for comparison of the sampling methods (Chapter 7). Data set 1b was used for the comparison of morphological and molecular species delimitation approaches (Chapter 5).

Data set 2 (complete data set): Comprises specimens of 199 standardized plot samples (consisting of 199 sweep net, 199 beating, and 199 standardized hand-collection subsamples; 186 of the subsamples contained no chrysomelid specimen) and additional 65 non-standardized samples (hand-collection, light-, Malaise-, flight interception-, and pitfall-traps). All these samples have been analysed completely: From each sample, usually one (sometimes up to three) specimen per morphospecies has been processed. The data set 2 comprises all those processed individuals (1583 specimens). For some analyses, also the not processed specimens from these samples (duplicate specimens per morphospecies per sample) have been included (*data set 2a*; 2227 specimens), for others only those specimens with a barcode (*data set 2b*; 1334 specimens). Data sets 2, 2a, and 2b were used for general diversity analyses (Chapter 3), data set 2a also for sampling method analyses (Chapter 7).

Data set 3 (plot data set): The data set is a subset of the complete data set. It is based only on the 199 standardized plot samples (consisting of 199 sweep net, 199 beating, and 199 standardized hand-collection subsamples). One (in exceptions up to three) specimen of each morphospecies of each subsample was processed (1200 specimens). It was used for comparison of subfamily composition between the different elevations (Chapter 3). For sampling method analyses (Chapter 7) also the not processed duplicate specimens per morphospecies per sample were included (*data set 3a*; 1578 specimens). The biodiversity analyses along the gradient in Chapter 4 were based on a data set with only those specimens for that a barcode could be obtained (*data set 3b*; 995 specimens).

Data set 4 (preliminary data set): The data set was used for the comparison of

the different molecular species delimitation methods (Chapter 6). It contains 674 specimens that were sampled in November and December 2010 and from May 2011 until 11.08.2011. It is a preliminary data set containing all those specimens that were available at mid of August 2011 for that a barcode could be obtained until June 2012. Several specimens from that sampling time period have been chosen only later to be analysed and for some specimens a barcode could be obtained afterwards. They are not included in this data set. The data set includes four sequences that have been later on excluded from further analyses as they were in retrospect considered to be doubtful or probably contaminated.
Tab. D.1 in the Appendix lists for each specimen the data sets it was used for.

Table 2.3: **Overview of the different data sets.**

Name		Content	# Specimens
Data set 1	data set of total analysed specimens	all processed specimens (data set 2 + several additional specimens of specific interest)	1775
Data set 1b		all specimens of data set 1 with a barcode	1475
Data set 2	complete data set	specimens from 199 plot samples and 65 additional samples	1583
Data set 2a		all specimens of data set 2 plus duplicate specimens	2227
Data set 2b		all specimens of data set 2 with a barcode	1334
Data set 3	plot data set	specimens from 199 plot samples	1200
Data set 3a		all specimens of data set 3 plus duplicate specimens	1578
Data set 3b		specimens of data set 3 with a barcode	995
Data set 4	preliminary data set	all specimens that were available at mid of August 2011 for that a barcode could be obtained until June 2012	674

Chapter 3

General patterns of leaf beetle diversity

3.1 Introduction

Despite an increasing effort in discovering Earth's biodiversity (Dirzo and Raven, 2003; Novotny and Miller, 2014) it is not yet ultimately known how many species of organisms there are. Estimates range from 3.6 to 100 million species, most probable the species number is an order-of-magnitude of ten million (Chapman, 2009; May, 2010; Mora et al., 2011; Wilson, 2003). Although it is clear that only a small fragment of species has been formally identified and named, there is still uncertainty about the exact numbers (1.4–2.2 million) (Chapman, 2009; Grove and Stork, 2000; Mora et al., 2011; Wilson, 2003).

The largest fraction of all species is made up by the tremendous but largely unexplored fauna of arthropods, predominantly insects, with ~1.1 million named distinct species (Chapman, 2009). The majority of them live in the most species-rich tropical ecosystems, especially the rainforests, where they contribute a large part of diversity in numbers of species as well as individuals (Corlett and Primack, 2011; Novotny et al., 2006). Therefore, in biodiversity research and global species richness estimates tropical arthropods, and especially tropical beetles, play a key role (Grove and Stork, 2000; Hamilton et al., 2010; May, 2010). Beetles are both functionally diverse and the most species-rich animal order, making up about one-quarter of all species on Earth (Hunt et al., 2007; Ødegaard, 2000). Since Erwin's (1982) spectacular estimation based on the number of beetle species associated with an individual tropical rainforest tree species, numerous studies led to widely varying estimates of global insect species numbers (Pimm et al., 1995; Stork, 1988, 1993). Those between four and six million arthropod species seem the most probable (Basset et al., 2012; Hamilton et al., 2010, 2013; Novotny et al., 2002b). Global and regional insect diversity estimates have often been plant-based estimates, i.e. the number of plant species is multiplied by the number of insect species that are effectively specialized to them (Erwin, 1982; Novotny and Miller, 2014). Therefore, especially herbivorous beetles, including Chrysomelidae, and their degree of host-specificity have played a fundamental role in species number estimates (Erwin, 1982; Ødegaard, 2000). Herbivorous insects are an extremely species-rich feeding guild and play essential functional roles in ecosystems (Coley and Barone (1996); Janzen (1970, 1987); Mattson and Addy (1975); Price (2002); see also Chapter 1.3).

Whereas research has focused mainly on lowland rainforests, tropical mountain forests have received comparatively little attention (Beck et al., 2008a). And yet they are very exceptional habitats with an extraordinary flora and fauna that is extremely diverse, even more diverse than the tropical lowland rainforests (Beck and Kottke, 2008). The study area in the tropical Andes of southern Ecuador belongs to a biodiversity hotspot. Studies on e.g. geometrid moths, birds, vascular epiphytes, bryophytes, or orchids, revealed high species numbers for the respective groups (Brehm et al., 2008b). For beetles as for most other insect taxa there is still a gap and explicitly studies on Chrysomelidae are missing (Brehm et al., 2008b). For more information about biodiversity research in the study area see Chapters 1.4 and 2.1.

Data that can be adduced for comparison are scarce: The state of knowledge of leaf beetle diversity in Ecuador and in the Neotropics in general is poor (more detailed information about research on Neotropical Chrysomelidae is given in Chapter 1.4). Inventories or biodiversity studies on Neotropical leaf beetles are quite rare and often focus on single taxa (e.g. Flowers and Hanson (2003); Furth et al. (2003); Linzmeier and Ribeiro-Costa (2008, 2012, 2013); Staines (2011)). Especially their diversity in montane ecosystems has scarcely been studied (Furth, 2013; Sánchez-Reyes et al., 2014).

This study is a first attempt to assess the leaf beetle diversity of the herbaceous and shrubby understorey vegetation in the mountain forest of the Reserva Biológica San Francisco (RBSF) and Podocarpus National Park in southern Ecuador. Although it does provide neither a complete inventory nor a taxonomic checklist, it can serve as basis for future research on chrysomelid diversity.

3.2 Methods

All leaf beetles were sampled between November 2010 and June 2012 in parts of Podocarpus NP and RBSF, Ecuador (detailed information about the study area is given in Chapter 2.1). They were mainly collected by sweep netting, beating, and hand-collection of the lower vegetation. Additionally, light- and Malaise-traps have been used (detailed information about sampling methods and design is given in Chapters 2.2 and 7).

Due to capacity restrictions, not all collected specimens could be analysed but a selection had to be made: Usually the specimens of one sample were sorted into preliminary morphospecies and of each morphospecies per sample only one specimen (in some cases up to three) was selected for sequencing and final morphospecies assignment. However, for some analyses also the not selected specimens (*duplicate specimens*) were included (data set 2a). This procedure is described more detailed in Chapters 2.3 and 2.5. Laboratory analyses are described in Chapter 2.4, for information on morphospecies sorting please refer to Chapters 2.5 and 5.

For different analyses different subsets of specimens have been used; these are described detailed in Chapter 2.5 and summarized in Appendix Tab. D.1. The total number of morphospecies was counted for all processed specimens (data sets 1, 1b). For all obtained barcode sequences (1475 specimens, data set 1b), a statistical parsimony analysis as implemented in TCS v.1.21 (95% connection limit) was used to group sequences into separate haplotype networks (more detailed information about statistical parsimony analysis is given in Chapters 2.5 and 6). For the further biodiversity analyses the data sets 2, 2a, and 2b were used. For comparisons between the elevational levels the plot data set (data sets 3, 3b) was used. Individuals of this data set with a barcode were grouped into PTP-clusters (Poisson tree processes (PTP) modelling is explained in Chapters 2.5 and 6). Elevational levels were also compared on the basis of haplotypes. The term MOTU (molecular operational taxonomic unit) in this chapter refers to the haplotype networks and PTP-clusters.

Species accumulation curves were calculated with R version 2.15.1 using the package VEGAN 2.0-10 (function *specaccum*). They show the increase in number of found species with growing number of sampled individuals or analysed samples. They can be used to visualize the completeness of the sampling. Species richness estimates were carried out with R and the VEGAN package using the function *specpool*. The function estimates the extrapolated species richness in a species pool. It is based on incidences in sample sites, and gives a single estimate for a collection of sample sites. In a collection of sample plots, many species will remain undetected. The function *specpool* uses some popular ways of estimating the number of the unseen species and adding them to the observed species richness: The variants of extrapolated richness in *specpool* are chao, first and second order jackknife, and bootstrap (Oksanen et al., 2013). These are widely used non-parametric estimators that consider information on the rare species in an assemblage to estimate the minimum number of species in the assemblage (Gotelli and Colwell, 2011). The methods have found to perform well in several comparative studies on species richness estimation (e.g. Colwell and Coddington (1994); Walther and Moore (2005); Walther and Morand (1998)). As different estimators are sensitive to the properties of the assemblage and sampling design, a set of different estimators was used to allow a range of estimates (Samways et al., 2010).

Morphospecies incidence (number of samples in which the morphospecies was found) and abundance (number of individuals per morphospecies collected) were divided into five categories: 1) uniques (morphospecies found in only one sample) respectively singletons (morphospecies of which only one individual occurred in the data set), 2) duplicates (single morphospecies found in two samples) respectively doubletons (single morphospecies of which two individuals were found in all samples), 3) rare morphospecies (found in 3–10 samples, respectively represented by 3–10 individuals), 4) common morphospecies (11–20 samples/individuals), and 5) very common morphospecies (>20 samples/individuals).

Data plottings were created in R 3.3.1 (using the packages VEGAN, RESHAPE2, GDATA, and MUMIN) or with Microsoft Office Excel 2003. For Figure 3.6, a NJ-Tree (Saitou and Nei, 1987) based on a MUSCLE alignment (Edgar, 2004) was constructed for representatives of each network of the plot data set 3b (370 sequences). For a better illustration branch lengths were made ultrametric with PATHd8 software (Britton et al., 2007) using relative ages of nodes and setting the root to an arbitrary age of 1. The Neighbor-Net of Cassidinae plus Hispinae (Fig. 3.10) was constructed with SplitsTree v.4.12.3 (Huson and Bryant, 2006) using uncorrected p-distances.

3.3 Results

General Results

Within the complete project, 1174 samples have been taken resulting in a total of 4286 collected Chrysomelidae. Due to capacity restraints not all specimens could be analysed. A total of 1775 specimens (belonging to 515 morphospecies) have been processed (barcoded, mounted, and assorted to morphospecies) (data set 1). They comprise the specimens from the 662 samples that have been analysed completely and additional individuals of specific interest. For 1475 of these individuals (448 morphospecies, 493 MOTUs), barcoding has been successful (data set 1b). Selection of the specimens and the different data sets are explained in Chapters 2.3 and 2.5.

Found and estimated species richness

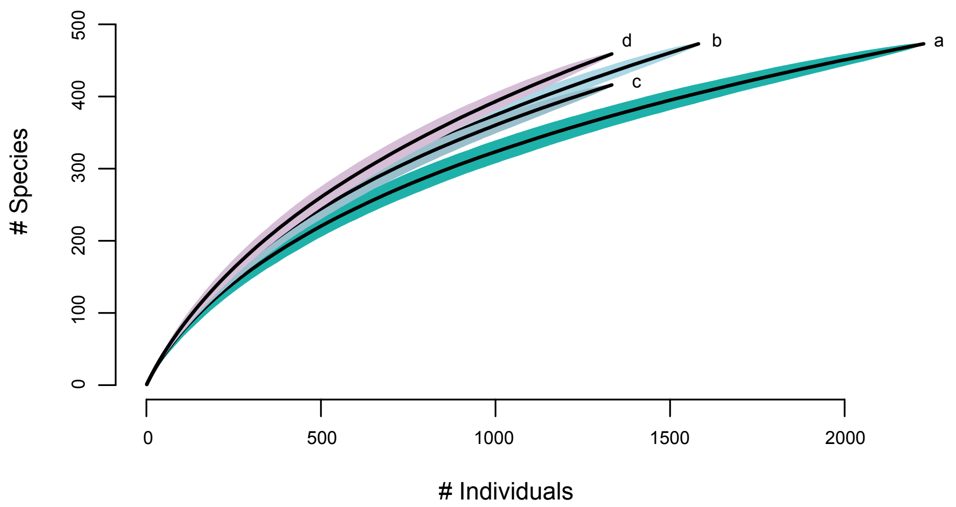


Figure 3.1: **Species accumulation curves (mean ±95% confidence interval) showing increase in number of found species with increasing number of sampled individuals.** Shown are curves for all processed specimens plus duplicate specimens (a; data set 2a), all processed specimens (b; data set 2), and all specimens with barcode (data set 2b; c: morphospecies curve, d: MOTU (haplotype network) curve).

For the following biodiversity analyses a data set was used consisting of all individuals from the 662 samples that have been analysed completely (data set 2a). It contained a total of 2227 specimens of which 1583 belonging to 473 morphospecies were processed (1–3 per preliminary morphospecies per sample) (data set 2). Barcoding has been successful for 1334 specimens (84.3%) belonging to 416 morphospecies and 459 MOTUs (data set 2b). Species accumulation curves did not reach saturation indicating that additional sampling would yield more species (Fig. 3.1). When the duplicate specimens where included (data set 2a; 2227 specimens), the curve levelled out but still did not reach saturation (Fig. 3.1a). It is to note that the inclusion of the duplicate specimens did not increase species number because duplicate specimens were assigned to the same morphospecies as the processed voucher specimen (see Chapters 2.3 and 2.5).

The expected total number of morphospecies estimated with the chao2 estimator was highest when calculated for all 1583 analysed specimens (915.53). When not processed duplicate specimens per morphospecies per sample were included it was slightly lower (905.07). When based on the specimens for which a barcode was obtained it was 705 morphospecies, compared to an estimated MOTU number of 804.72. Species numbers found and estimated by different estimators are given in Table 3.1.

Table 3.1: **Species numbers found and estimated by different estimators for data sets 2, 2a, and 2b.** Data set 2a: all processed individuals plus duplicate specimens, data set 2: processed individuals, data set 2b: individuals with barcode.

	Specimens	Found Species	Estimated Morphospecies Numbers				
		Morphospecies	chao	jack1	jack2	boot	n Samples
Data set 2a	2227	473	905.07±80.34	709.5±24.48	880.92	572.18±12.98	477
Data set 2	1583	473	915.53±82.42	710.5±24.58	883.91	572.42±12.96	477
Data set 2b	1334	416	705±55.56	619.55±20.75	751.13	503.46±11.35	454
		MOTUs	Estimated MOTU Numbers				
Data set 2b	1334	459	804.72±61.26	699.47±23.31	855.96	561.44±12.4	454

Incidence and abundance of morphospecies

The studied leaf beetle community shows an uneven distribution of incidence and abundance with very few common morphospecies while the vast majority is rare. Half of all found morphospecies (237) were collected in only one sample (uniques), and 14% in two samples (duplicates) (Fig. 3.2). Almost one third were rare (found in three to ten samples). The proportion of common and very common species was very low (three, respectively two percent). A similar pattern is visible for the abundance of morphospecies, where ten percent of the morphospecies accounted for 52% of the individuals: The number of singletons (213) is slightly lower than the number of uniques making up 45% of all morphospecies. Proportion of doubletons and common morphospecies remains almost equal, whereas common and very common morphospecies was slightly higher with one morphospecies (Alticinae sp. 118)

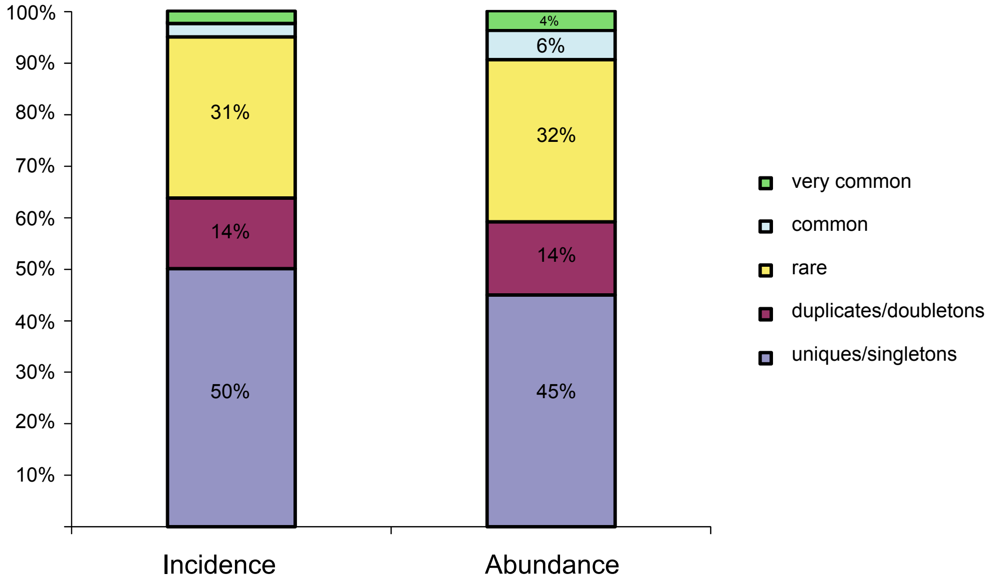


Figure 3.2: **Proportion of uniques/singletons, duplicates/doubletons, rare, common, and very common morphospecies.** Incidence: number of samples in which the morphospecies was found, abundance: number of individuals per morphospecies collected.

showing an extremely distant number of 136 found individuals.

Figure 3.3A is another illustration of the incidence of morphospecies showing that the vast majority was collected in very few samples. A similar pattern is visualized for the abundance of morphospecies (Fig. 3.3B): Most morphospecies were represented by very few individuals.

When the increase in singletons is plotted against the number of individuals, the curve shows a steep incline without any sign of approaching saturation (Fig. 3.4). Therefore, adding further specimens will increase the number of singletons.

Figure 3.5 shows the incidence and abundance of the most frequent, respectively most abundant morphospecies. Of the 19 most abundant morphospecies, 17 were also among the 19 most frequently found ones. Of the most frequently found morphospecies, 14 belonged to Alticinae, four to Eumolpinae, and one to Galerucinae. Of the most abundant morphospecies, 13 belonged to Alticinae, (the same) four to Eumolpinae, and two to Galerucinae. Of the 237 uniques, 213 are singletons. Those uniques that are no singletons are represented by two (in 19 cases), three (in three cases), or four (in two cases) individuals. All morphospecies with five or more specimens were found in at least two samples.

The similar results for incidence and abundance arose from the fact that morphospecies were usually represented by one or few individuals in one sample (one individual: 78%, two individuals: 13%, 3–10 individuals: 8%, >11 individuals: <1%). So, usually a high incidence accounts for the high abundance of morphospecies.

Fig. 3.6 illustrates the incidence of species on the different sampling sites for data set 3b.

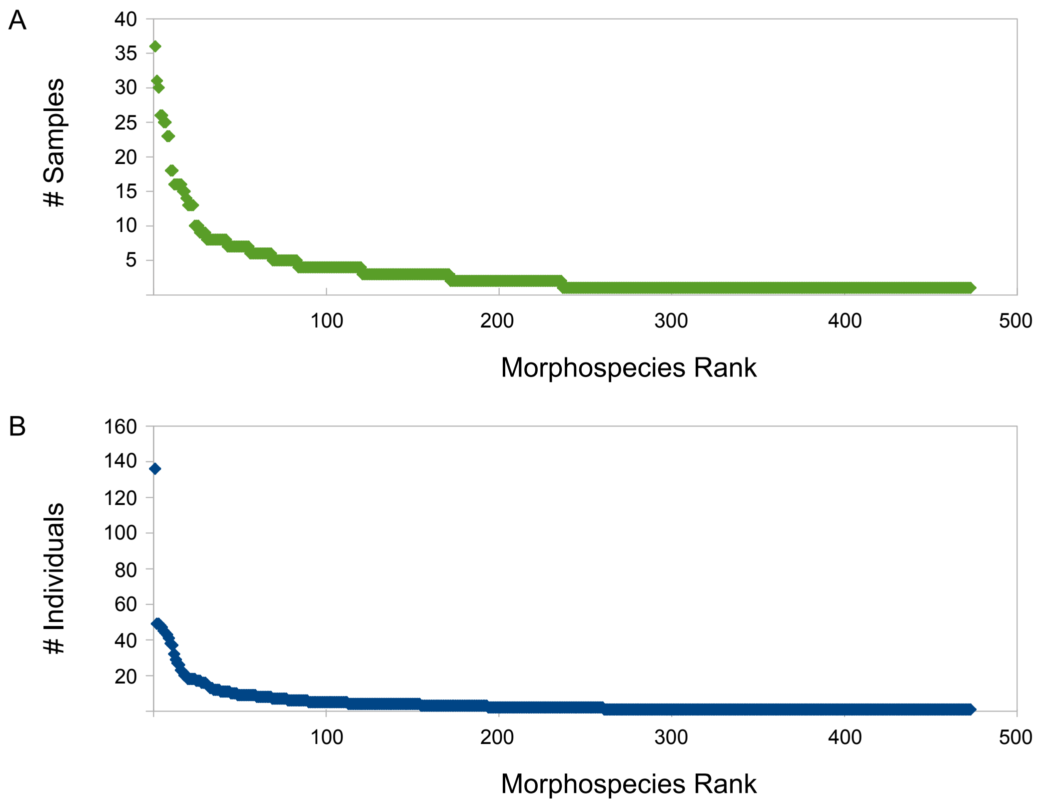


Figure 3.3: **Incidence (A) and abundance (B) of morphospecies.**

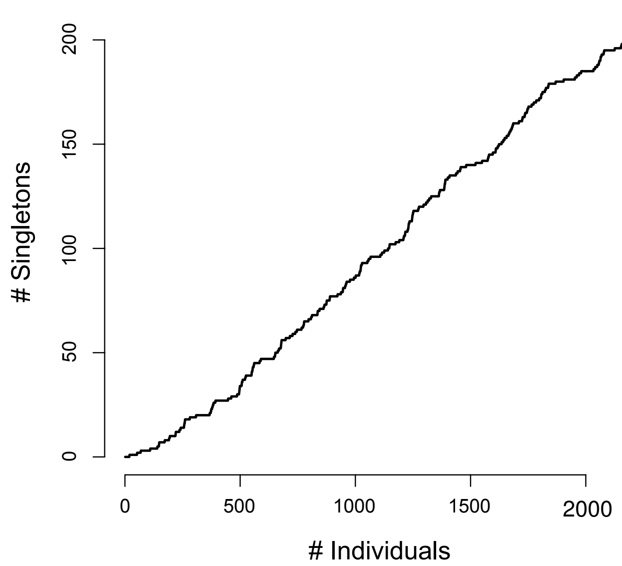


Figure 3.4: **Singleton curve.** The curve shows the increase in singletons with increasing number of individuals.

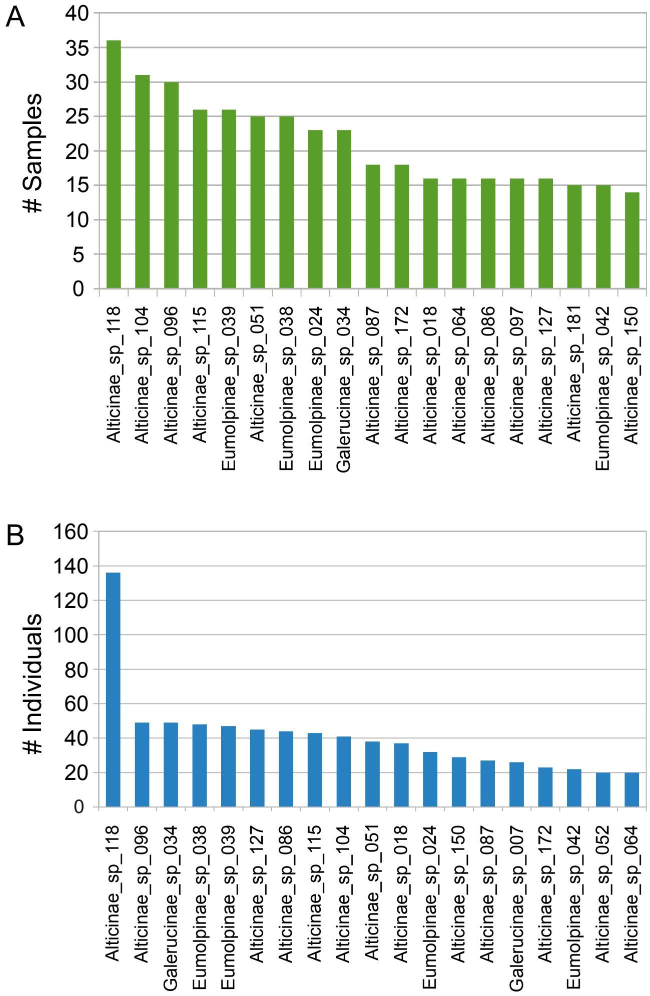


Figure 3.5: **Incidence (A) and abundance (B) for the most frequent, respectively abundant morphospecies.**

The majority of morphospecies was found at only one elevation (91%) and no morphospecies was found at all three elevations (Fig. 3.7). This stenoecy is even more pronounced for MOTUs (PTP-clusters; 96%) and haplotypes (99%). Only three haplotypes were found in Bombuscaro and also ECSF. If morphospecies, MOTUs, and haplotypes that occur only once in the data set are removed, the proportion of species/haplotypes restricted to one elevation slightly decreases, however still remains the majority (82%, 91%, 98%). Of the species/haplotypes that occur on two elevations, the majority was found in Bombuscaro and ECSF (83% of morphospecies, 93% of MOTUs, and 100% of haplotypes), the others in ECSF and Cajanuma. Only one morphospecies (Alticinae sp. 095), but no MOTUs or haplotypes occur in Bombuscaro and Cajanuma. Probably the two specimens have been erroneously assigned to the same morphospecies. Cajanuma has the highest proportion of species/haplotypes that were found only there: 90% of morphospecies, 98%

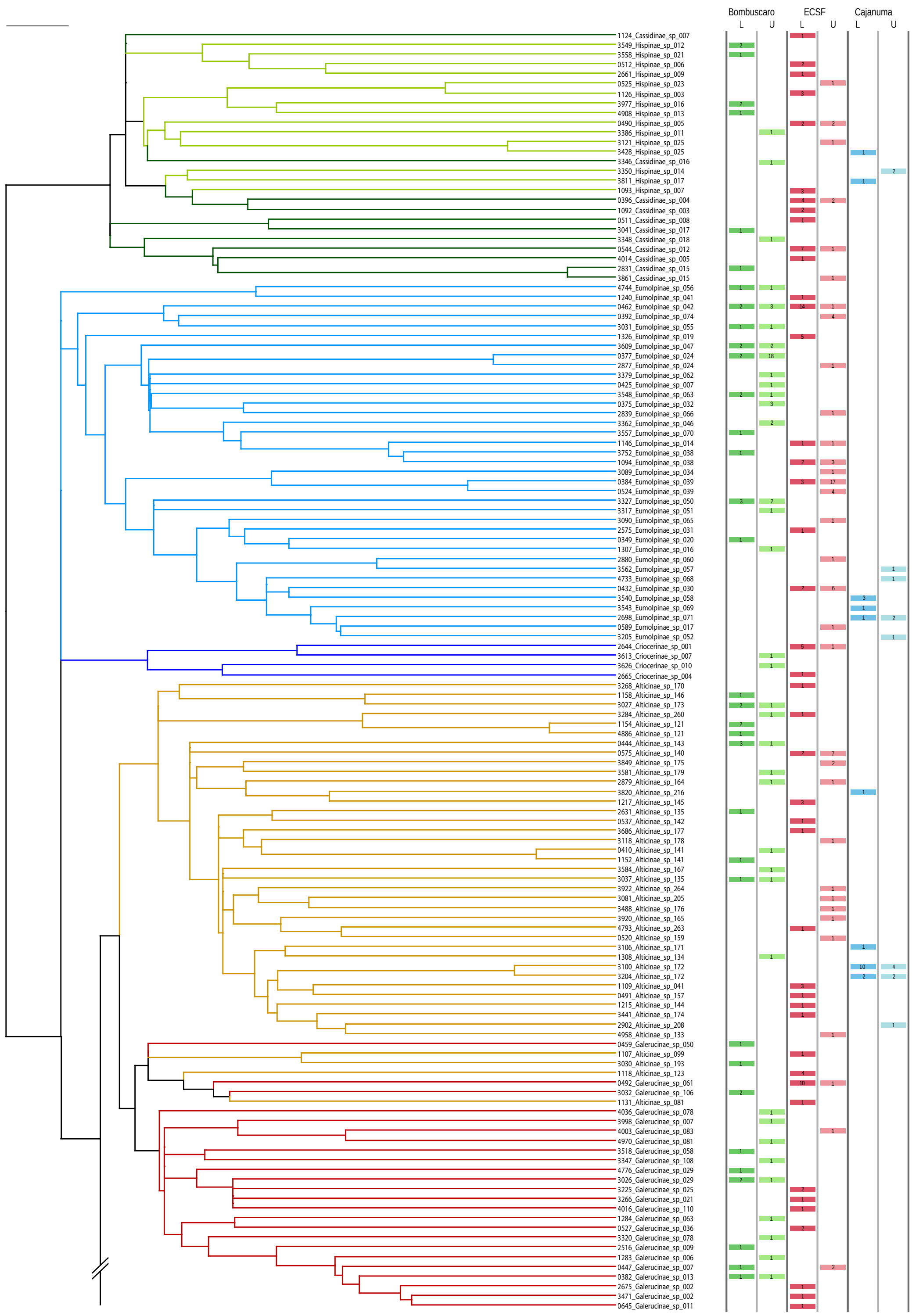
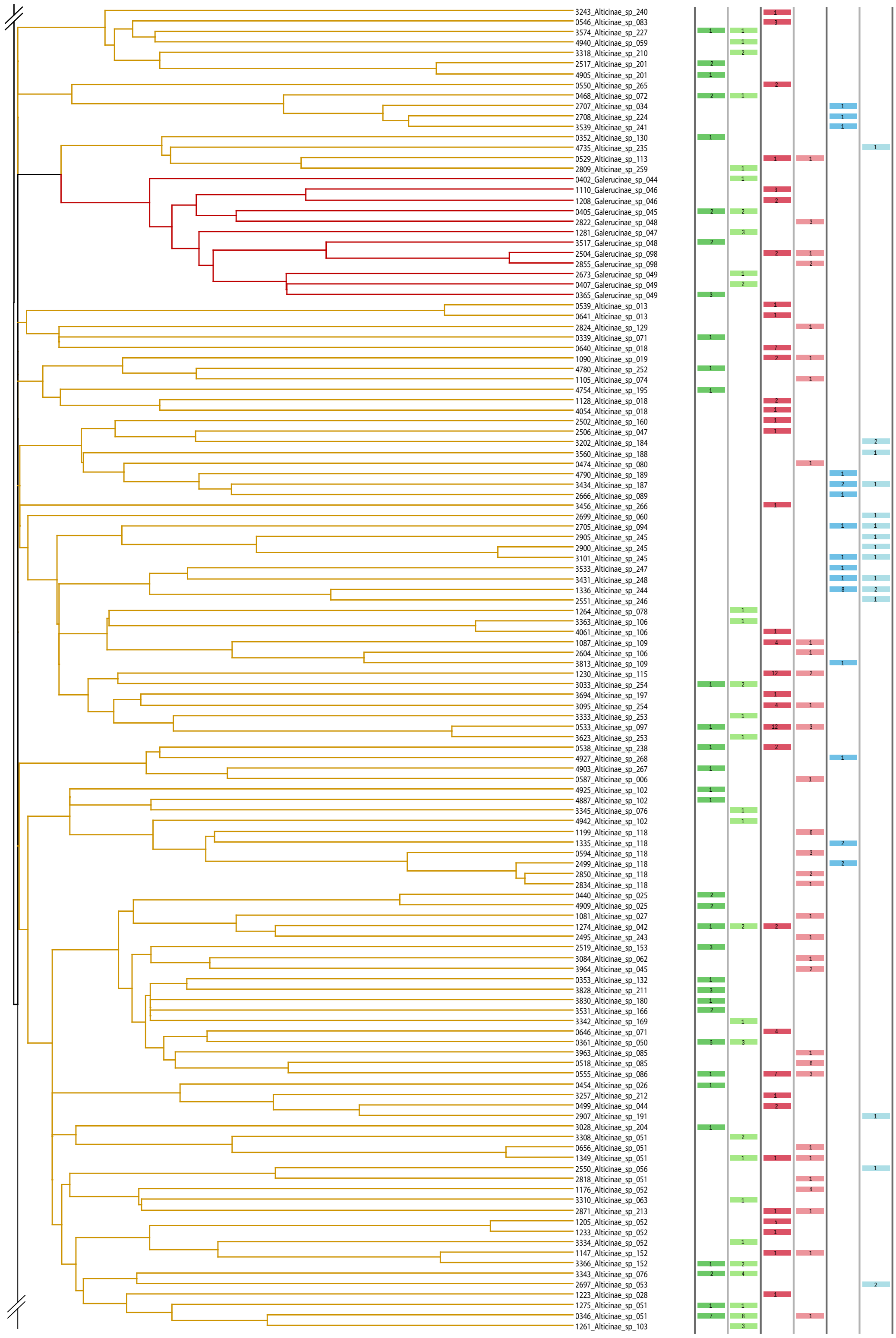


Figure 3.6: **NJ-tree of one representative of each MOTU (haplotype network) with incidence of MOTUs.** Of each MOTU one specimen was chosen; its voucher-number and its morphospecies name is given as this is rather informative than the MOTU name. Coloured boxes indicate elevational area (Bombuscaro, 1000 m; ECSF, 2000 m; Cajanuma, 3000 m) and habitat (L= 'lower plot', valley; U= 'upper plot', ridge) where the MOTU was found, numbers therein indicate in how many samples (sweep netting, beating, hand-collection) the respective MOTU was found. Based on plot data set 3b.


3243_Alticinae_sp_240
0546_Alticinae_sp_083
3574_Alticinae_sp_227
4940_Alticinae_sp_059
3318_Alticinae_sp_210
2517_Alticinae_sp_201
4905_Alticinae_sp_201
0550_Alticinae_sp_265
0468_Alticinae_sp_072
2707_Alticinae_sp_034
2708_Alticinae_sp_224
3539_Alticinae_sp_241
0352_Alticinae_sp_130
4735_Alticinae_sp_235
0529_Alticinae_sp_113
2809_Alticinae_sp_259
0402_Galerucinae_sp_044
1110_Galerucinae_sp_046
1208_Galerucinae_sp_046
0405_Galerucinae_sp_045
2822_Galerucinae_sp_048
1281_Galerucinae_sp_047
3517_Galerucinae_sp_048
2504_Galerucinae_sp_098
2855_Galerucinae_sp_098
2673_Galerucinae_sp_049
0407_Galerucinae_sp_049
0365_Galerucinae_sp_049
0539_Alticinae_sp_013
0641_Alticinae_sp_013
2824_Alticinae_sp_129
0339_Alticinae_sp_071
0640_Alticinae_sp_018
1090_Alticinae_sp_019
4780_Alticinae_sp_252
1105_Alticinae_sp_074
4754_Alticinae_sp_195
1128_Alticinae_sp_018
4054_Alticinae_sp_018
2502_Alticinae_sp_160
2506_Alticinae_sp_047
3202_Alticinae_sp_184
3560_Alticinae_sp_188
0474_Alticinae_sp_080
4790_Alticinae_sp_189
3434_Alticinae_sp_187
2666_Alticinae_sp_089
3456_Alticinae_sp_266
2699_Alticinae_sp_060
2705_Alticinae_sp_094
2905_Alticinae_sp_245
2900_Alticinae_sp_245
3101_Alticinae_sp_245
3533_Alticinae_sp_247
3431_Alticinae_sp_248
1336_Alticinae_sp_244
2551_Alticinae_sp_246
1264_Alticinae_sp_078
3363_Alticinae_sp_106
4061_Alticinae_sp_106
1087_Alticinae_sp_109
2604_Alticinae_sp_106
3813_Alticinae_sp_109
1230_Alticinae_sp_115
3033_Alticinae_sp_254
3694_Alticinae_sp_197
3095_Alticinae_sp_254
3333_Alticinae_sp_253
0533_Alticinae_sp_097
3623_Alticinae_sp_253
0538_Alticinae_sp_238
4927_Alticinae_sp_268
4903_Alticinae_sp_267
0587_Alticinae_sp_006
4925_Alticinae_sp_102
4887_Alticinae_sp_102
3345_Alticinae_sp_076
4942_Alticinae_sp_102
1199_Alticinae_sp_118
1335_Alticinae_sp_118
0594_Alticinae_sp_118
2499_Alticinae_sp_118
2850_Alticinae_sp_118
2834_Alticinae_sp_118
0440_Alticinae_sp_025
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1233_Alticinae_sp_052
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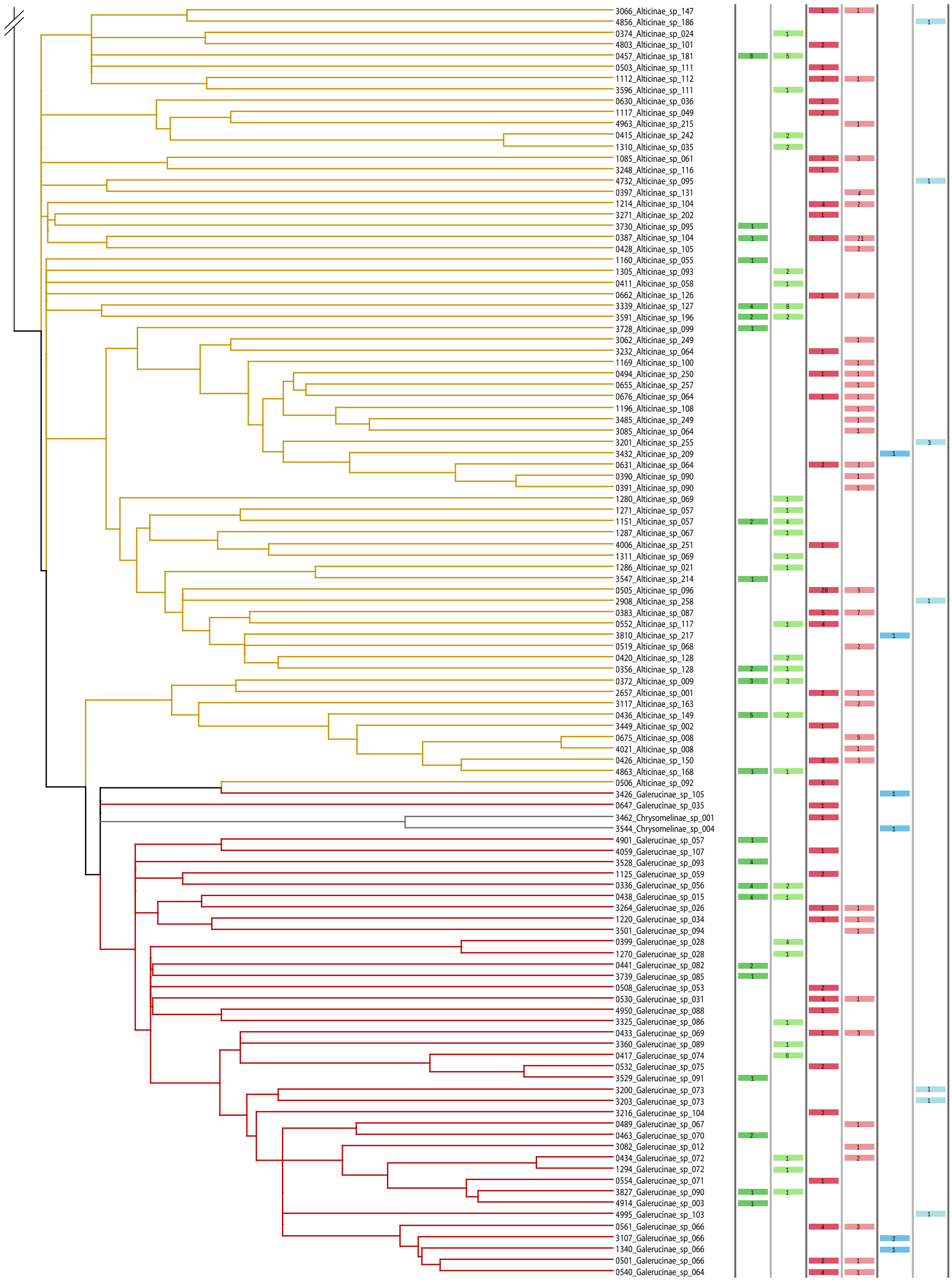
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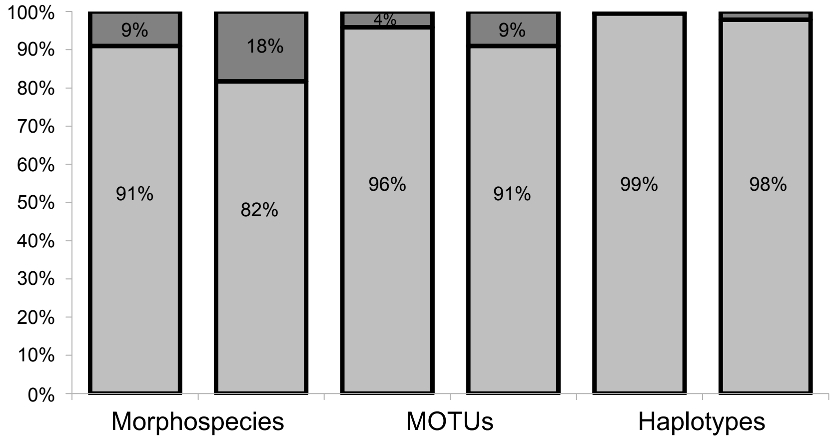


Figure 3.7: **Proportion of morphospecies, MOTUs (PTP-clusters) and haplotypes found at one (light grey), respectively two (dark grey) elevations.** Shown for data set 3b. Left column: complete data set 3b, right column: without morphospecies, MOTUs, and haplotypes that occur only once in the data set.

of MOTUs and all haplotypes found at Cajanuma were found exclusively there. For ECSF (83%, 91%, 99%) and Bombuscaro (82%, 91%, 99%) the percentage was very similar.

Species richness and abundance of subgroups

The 2227 specimens of the complete data set for biodiversity analyses (data set 2a) belonged to nine subfamilies (Galerucinae s.str., Alticinae, Cassidinae s.str. and Hispinae are regarded as separate subfamilies, see Chapter 1.3): Alticinae, Galerucinae, Eumolpinae, Cassidinae, Hispinae, Criocerinae, Chrysomelinae, Lamprosomatinae, and Cryptocephalinae. The numbers of found individuals and morphospecies are given in Table 3.2.

Table 3.2: **Numbers of found specimens and morphospecies for subfamilies.**

	Morphospecies	Individuals
Alticinae	251	1326
Galerucinae	99	433
Eumolpinae	68	340
Cassidinae	19	65
Hispinae	22	38
Criocerinae	8	19
Chrysomelinae	3	3
Lamprosomatinae	2	2
Cryptocephalinae	1	1
total	473	2227

Alticinae showed the highest species richness and abundance, accounting for more than half of all found morphospecies (53%) as well as individuals (60%; Fig. 3.8). The second species- and individual-rich subgroup was Galerucinae (21% of morphospecies, 19% of individuals). Eumolpinae represented 14% of all found morphospecies and 15% of all found individuals, Cassidinae accounted for four percent, respectively three percent, and Hispinae for five percent, respectively two percent. Criocerinae, Chrysomelinae, Lamprosomatinae, and Cryptocephalinae together accounted for three percent, respectively one percent.

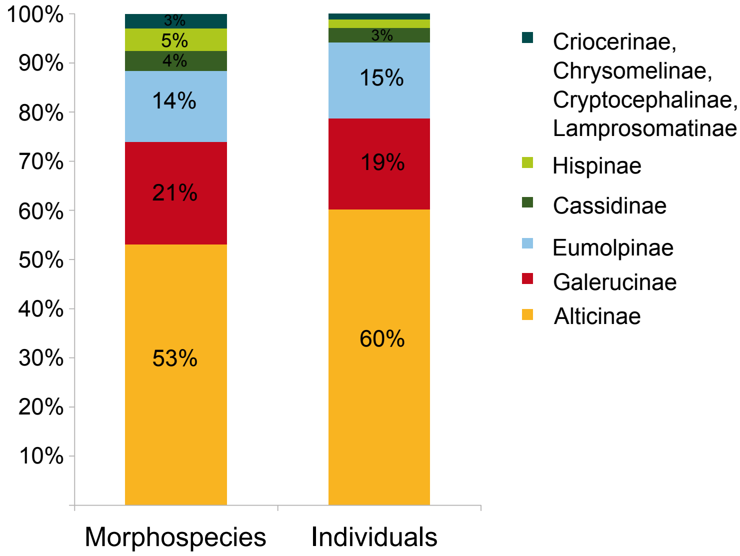


Figure 3.8: **Composition of Chrysomelidae subfamilies.** The proportion of the different subfamilies is shown in terms of morphospecies and number of individuals.

When the proportion of the different subfamilies in the total number of morphospecies is regarded for each altitude separately (for the plot data set 3), the rank order remains the same (Fig. 3.9). However, there are small differences among the elevations: Whereas the proportion of Alticinae plus Galerucinae remains similar (77% at Bombuscaro and ECSF, 74% at Cajanuma), there is a shift towards Alticinae with increasing elevation (51% at Bombuscaro, 59% at ECSF, 68% at Cajanuma). At Bombuscaro and ECSF, there are almost equal portions of Hispinae and Cassidinae; in contrast, at Cajanuma Cassidinae are not found at all.

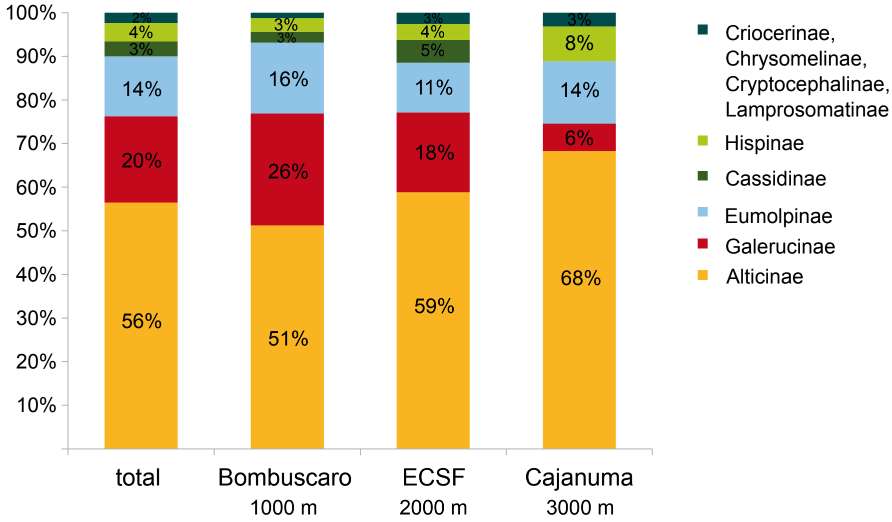


Figure 3.9: **Proportion of subfamilies in number of morphospecies for the different elevations.**

It is to note that for the most part barcoding grouped the morphospecies correctly into subfamilies (see Fig. 3.6). Cassidinae + Hispinae, Eumolpinae, and Criocerinae formed clusters each. Also Alticinae + Galerucinae formed a cluster but with Chrysomelinae placed within. With single exceptions, within Galerucinae s.l., Galerucinae s.str. and Alticinae formed several well distinguished clusters. Also within the subfamily-clusters, COI-sequences form clearly distinguishable clusters (as an example see Fig. 3.10).

3.4 Discussion

Species richness

So far, there exist no published records of leaf beetle species for the studied area. The Chrysomelidae found under tree bark in RBSF by J. Schmidl (2007–2008) were sorted into ~50 morphospecies, but not identified taxonomically. The only Chrysomelidae checklist for Ecuador (and whole Central and South America) by Blackwelder (1947) is outdated. Since then, numerous species have been newly described from Ecuador (Borowiec, 1998, 2000a,b; Flowers, 2009a,b; Sekerka and Windsor, 2012; Staines and Zamorano, 2012; Świętojańska and Borowiec, 2000), but only for Cassidinae a more recent checklist has been published (Borowiec, 1998).

Blackwelder lists ~450 chrysomelid species explicitly for Ecuador, a number even below the number of morphospecies found in this rather small-scale study. In this study, 515 morphospecies have been found, and one has to keep in mind that due to capacity restraints not all of the collected specimens have been assigned to morphospecies. The not processed specimens are likely to entail more not yet identified morphospecies. These numbers illustrate the striking discrepancy between the de-

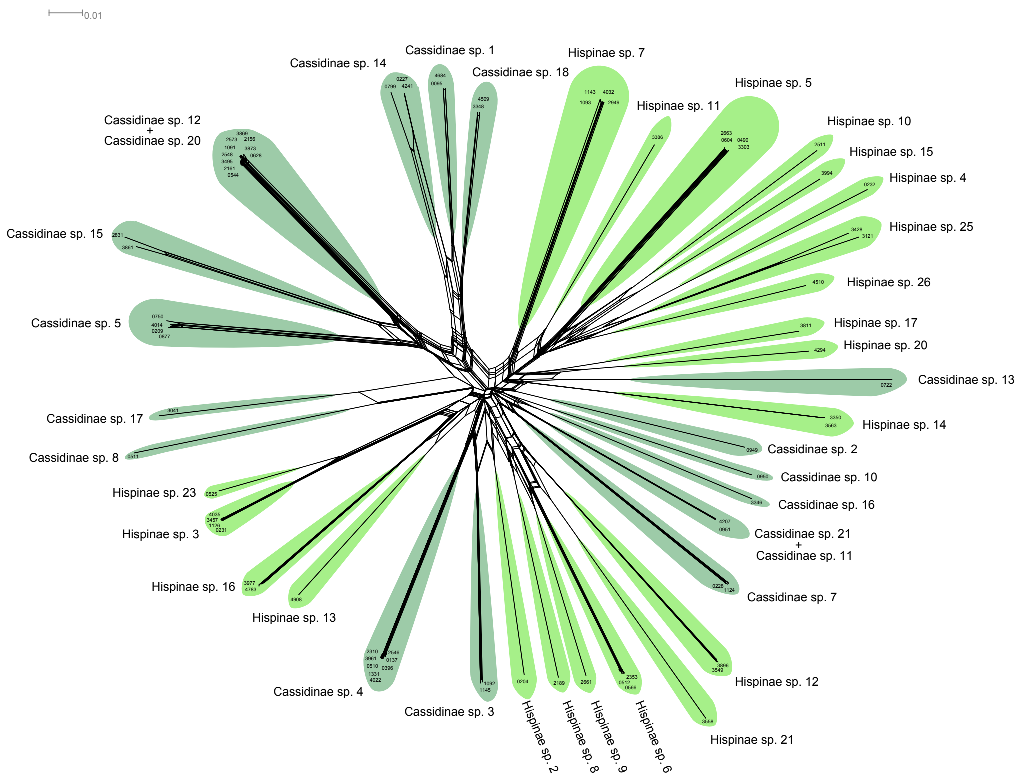


Figure 3.10: **Neighbor-Net of Cassidinae plus Hispinae.** Visualization of clustering within Cassidinae + Hispinae showing that information content of the data is useful to discriminate species but not for phylogenies.

scribed and the true Ecuadorian leaf beetle diversity. That Ecuador still provides much unknown diversity to be discovered is also reflected by its collections: The Invertebrate Section of the Museum of Zoology at the Pontifical Catholic University of Ecuador in Quito comprises with almost two million specimens Ecuador's largest collection of native taxa. It harbours over 24,000 Chrysomelidae, most of them still awaiting identification: Only ~11% of all specimens are determined to species, ~14% to genus, but ~75% have no identification at all (Clifford Keil, pers. comm.). There are only nine chrysomelid type specimens deposited in the collection, all of them belonging to Cassidinae (Donoso et al., 2009). In most other Neotropical countries the situation is similar (see Chapter 1.4).

The present study focused on the analysis of leaf beetle biodiversity and its changes along an altitudinal gradient. It was not attempted to create a complete inventory. The species accumulation curves indicate that additional sampling would further increase the number of found morphospecies. Estimated morphospecies numbers even range up to more than 900 (chao). It is to note that analyses of assemblages with low evenness (few dominating and many rare species) tend to underestimate species richness (Magurran, 2004). The number of found MOTUs for those individuals with a DNA barcode was even higher than the respective number of morphospecies.

As this is one of the first known studies of site-specific data on leaf beetle richness and diversity for Ecuador there are no published data with which the present results can be compared. Studies of other Neotropical regions are difficult to compare due to differences in geograhical scale, sampling effort, and methods. Some of them focus on certain subfamilies or study different habitats (e.g. Furth et al. (2003); Sánchez-Reyes et al. (2014)). If a careful comparison is still attempted, and considering that sampling in this study is far from being complete, species numbers seem comparable to or rather higher than in other Neotropical regions (Charles and Bassett, 2005; Flowers and Hanson, 2003; Furth et al., 2003; Linzmeier and Ribeiro-Costa, 2009, 2011, 2012; Ødegaard, 2006; Sánchez-Reyes et al., 2014).

It is to note that in this study mainly a selected habitat was investigated, the herbaceous and shrubby understorey vegetation. The canopy that is considered to be the most diverse habitat in tropical rainforests and harbouring an especially high leaf beetle diversity (Basset et al., 2001; Charles and Bassett, 2005; Farrell and Erwin, 1988) was completely neglected. Also the inclusion of particular habitats as the tree bark that was studied by Schmidl (2007–2008, pers. comm.) could further increase species number. Studies that include the rainforest canopy or are part of large-scale studies and inventories are likely to yield comparatively higher species numbers (e.g. Farrell and Erwin (1988) who found >650 species in a Peruvian rainforest canopy). Large-scale research programmes (e.g. IBISCA (http://www.ibisca.net/): Basset et al. (2012, 2007); Basset and Leponce (2005), ALAS (http://viceroy.eeb.uconn.edu/ALAS/): e.g. Furth et al. (2003); Staines (2011)) are capable of more intense sampling due to a much longer available time period and more manpower compared to the present study (Basset et al., 2007; Staines, 2011). They often include a comprehensive set of sampling methods (Basset et al., 2007; Longino and Colwell, 1997). For certain taxa they can aim at complete inventories, e.g. the hispine species at La Selva, Costa Rica, resulting in a quite impressive number of 139 species (Staines, 2011).

In the studied area a high leaf beetle diversity had been expected. The region is part of the Tropical Andes, a biodiversity hotspot, and especially known for its outstanding rich plant diversity (see Chapter 2.1). Particularly the diversity of herbivorous insects is closely tied to plant diversity and can be expected to be especially rich in regions with diverse vegetation. The diversity of the moth family Geometridae has been intensely studied in the study area (Bodner et al., 2010; Brehm and Fiedler, 2003, 2004, 2005; Brehm et al., 2003a, 2013, 2003b; Hilt et al., 2007; Strutzenberger et al., 2011) and found to be much higher than anywhere else in the world documented (Brehm et al., 2005). Although the leaf beetle diversity seems comparatively high in the region, a more complete sampling should be attempted to allow more thorough propositions about the true species numbers for the area.

Abundance and incidence of morphospecies

Abundance and incidence of the studied leaf beetle assemblage showed a pattern with a few common species and an overabundance of rare species that is characteristic for many taxa of tropical rainforests and was also found for Neotropical leaf beetles (Furth et al., 2003; Linzmeier and Ribeiro-Costa, 2012; Sánchez-Reyes et al., 2014). A low evenness delays the saturation of the species accumulation curve (Magurran, 2004). Whereas 'rare species' are often defined as those species at the lower end of the distribution of species abundance (the cut-off often placed at the first quartile; Magurran (2004)), the term is also used synonymously with singletons (species represented by a single individual in the data set) (Novotny and Basset, 2000). The latter often prevent the species accumulation curves from attaining an asymptote even in much larger-scaled studies than the present one (Novotny and Basset, 2000). Usually, additional sampling turns some singletons into doubletons, but new singletons appear (Lim et al., 2012). In the present study, half of all morphospecies were sampled only once (uniques), most of them were represented by only one individual in the whole data set (singletons; 45% of all morphospecies). This proportion is comparable to many other studies of rainforest arthropods, where the proportion of singletons is on average 32% (Coddington et al., 2009) and often up to half and more (Allison et al., 1993; Erwin, 1997; Janzen and Schoener, 1968).

A high proportion of singletons often results from undersampling even in very large and ambitious tropical arthropod surveys (Coddington et al. (2009) and references therein). Although there are many genuinely rare species in the tropics, most are not as rare as they seem: Sampling flaws can make species appear rare when they were sampled in marginal times or places (insufficient seasonal or spatial replication; Novotny and Basset (2000)) or with inadequate methods (Longino et al., 2002). Rare species in a sample might also be common elsewhere, e.g. in adjacent regions or well-known from collections or literature (Longino et al., 2002). In host plant based surveys of herbivorous insects, many rare species are transient species or 'tourists' that do not use the studied plant as host plant but rather as a site for resting, sun-basking or sexual display (Moran and Southwood, 1982; Novotny and Basset, 2000; Ødegaard, 2004). However, feeding and rearing trials showed that many rare species are indeed associated with the studied hosts (Novotny and Basset, 2000). They might be generalists feeding occasionally on the host examined but with relatively high overall population levels when all potential host plant species are considered or specialists feeding on the host examined but preferring, and being more abundant on other hosts (Novotny and Basset, 2000). Probably few are specialists with genuinely low population levels (Novotny and Basset, 2000).

The circumstance that the assemblage in this study is clearly undersampled (as the species accumulation curves show) is the most likely explanation for the high percentage of singletons, rather than any more biological explanation (Coddington et al., 2009). With additional sampling effort, the percentage of singletons might decrease, but is expected to remain quite high. Biological reasons for singletons in this study cannot be evaluated as insect-plant-relationship is not addressed. Furthermore, species are not described and therefore there is no information about their distribution outside of the study area.

The finding that most morphospecies, MOTUs, and haplotypes were found exclusively at one elevational level, whereas none was found at all three elevations, indicates ecological specialization and the presence of different leaf beetle communities at the different sites. Also the differences in the composition of subfamilies at different levels confirm this. It is not surprising that the three elevations harbour a different leaf beetle fauna: Although the three sites are as close as ~20 km, there are 1000 m elevation difference and the areas exhibit remarkable differences in climate and vegetation. The turnover of tropical insect communities along elevational gradients is generally rapid (Brühl et al., 1999; Ghalambor et al., 2006; Janzen, 1967) and there are often large differences in insect communities in considerably smaller ranges than 1000 m (e.g. Olson (1994); Smith et al. (2014)). For a detailed analysis of the change of communities with increasing altitude see Chapter 4.

Methodological considerations

DNA barcode data generally revealed similar results as morphospecies data. However, there are certain advantages and disadvantages of each method that should be considered: When morphospecies and MOTU richness was compared, for those specimens for that a barcode was obtained (data set 2b), found and estimated MOTU numbers were higher than morphospecies numbers. The morphospecies sorting probably overlooks differences between species ('cryptic diversity') and is likely to underestimate true species richness. However, there are specimens where sequences could not be obtained at all or could not be used as they were contaminated, too short, or of insufficient quality. In contrast, morphospecies can be determined for every specimen (as long it is not severely damaged). Those specimens for that no barcode could be obtained can be assigned to a morphospecies and do not have to be excluded from the data set. If they are included, found and estimated morphospecies richness is higher than MOTU richness.

Aside from those specimens where barcode generation failed, often not all sampled specimens can be barcoded: Temporal or financial restrictions usually require a selection (this might not apply in metabarcoding studies). In the present study, usually only one specimen (sometimes up to three specimens) of each morphospecies per sample was sequenced leading to a number of 644 specimens (duplicate specimens) for which no barcodes were produced. Therefore, in this case, morphospecies can provide abundance data in contrast to barcode data. Although this is actually additional data that the barcode data cannot provide, there are no severe differences between inclusion or exclusion of the duplicate specimens, i.e. incidence and abundance data was very similar. For example, of the 19 most abundant morphospecies, 17 were also among the 19 most incident ones. Furthermore, 90% of the uniques are also singletons. This supports the decision to select one morphospecies per sample for sequencing, at least when, like in this study, usually only few individuals of a morphospecies occur in one sample.

Species richness and abundance of subgroups

It is to note that for a better understanding Hispinae and Cassidinae are treated as separate subgroups although they both belong to the subfamily Cassidinae (s.l.). The same applies to Alticinae and Galerucinae: The traditional view of two distinct subgroups is retained although their status as subfamilies of equal rank and also their respective monophyly is in question. For information about the classification and relations of Cassidinae and Hispinae as well as Alticinae and Galerucinae see Chapter 1.3.

In the present study Galerucinae s.l. make up the largest fraction of found leaf beetles in terms of morphospecies as well as individuals. This is in accordance with subfamiliy composition worldwide (Chaboo, 2007; Reid and Beatson, 2013) and other studies on Chrysomelidae in different regions (Kalaichelvan et al., 2005; Linzmeier and Ribeiro-Costa, 2012; Sánchez-Reyes et al., 2014; Wagner, 1999). Especially Alticinae, the largest leaf beetle subfamily (Furth et al., 2003), are often extremely abundant and species-rich (Farrell and Erwin, 1988; Flowers and Hanson, 2003; Freund, 2005; Linzmeier and Ribeiro-Costa, 2012; Wagner, 2003). In this study they accounted for more than half of all individuals and morphospecies at each elevational level. The Neotropical region harbours the most diverse Alticinae fauna in terms of genera and species (Scherer, 1988). Almost half of the known alticine genera occur in the Neotropics (Furth, 2005). More than 200 genera are known from South America, compared to ~40 Nearctic genera and ~65 genera in Africa (Furth, 2005; Scherer, 1988). All of the South American alticine genera are endemic, except *Chaetocnema*, *Epitrix*, *Longitarsus*, and *Terpnochlorus* (Scherer, 1988).

After Alticinae and Galerucinae s.str., the next most abundant and species-rich subfamily in this study was Eumolpinae. This was reported likewise in other studies on Neotropical leaf beetles (Farrell and Erwin, 1988; Linzmeier and Ribeiro-Costa, 2012), however not in the study of Sánchez-Reyes et al. (2014) on leaf beetle assemblages in forest and thorny scrub vegetation, who found Cassidinae more abundant and species-rich. Cassidinae and Hispinae are a dominant element of the Neotropical region, distinguishing it from any other area of the world (Kimoto, 1988). Worldwide, Cassidinae s.l. is the second largest subfamily of Chrysomelidae with 324 genera and ~6000 species (Chaboo, 2007). There is little overlap between Old World and New World cassidine fauna (Chaboo, 2007). Despite the high Cassidinae and Hispinae diversity in the Neotropics, they make up only a small portion in this study, as in studies using canopy fogging in lowland forest or Malaise trapping (Farrell and Erwin, 1988; Flowers and Hanson, 2003). This is probably due to the used methods as different sampling methods are more efficient for certain subfamilies. The composition of subfamilies depends on the sampling methods and a focus on other sampling methods could alter the composition of subfamilies. For example, Cassidinae are reluctant flyers that are mainly collected by hand-collection, whereas light trapping seems to be suited especially for Galerucinae (see Chapter 7).

The comparison of subfamily composition between the different elevations showed an increasing proportion of Alticinae at the expense of Galerucinae. A dominance of Alticinae with increasing elevation was also observed by Flowers and Hanson (2003) along an elevational gradient in Costa Rica. Alticinae and Galerucinae in tropical mountains can survive up to elevations where the vegetation ends (Jolivet and

Hawkeswood, 1995). Notably Alticinae are known to occur at very high altitudes in the Andes as well as on the Venezuelan Tepuys (Jolivet and Hawkeswood, 1995). The fact that most fern-feeding leaf beetles are found among Alticinae could be related to the scarcity of other suitable food plants at high altitudes (Jolivet and Hawkeswood, 1995).

Phylogenetic considerations

It is well-known that COI has only limited information content at deeper phylogenetic levels (Moritz and Cicero, 2004) and it is not the purpose of this study to infer a phylogeny of leaf beetles. However, it is to note that for the most part DNA barcoding grouped the morphospecies correctly into subfamilies.

Eumolpinae and Criocerinae form monophyletic clusters. Both are taxonomically quite well defined subfamilies considered to be monophyletic (Duckett et al. (2004); Gómez-Zurita et al. (2005); Jolivet and Verma (2008); Matsumura et al. (2014); Reid (1995); Schmitt (1985a,b); but see Gómez-Zurita et al. (2007, 2008) who recovered Eumolpinae as paraphyletic). Also Cassidinae plus Hispinae form a monophyletic cluster that is consistent with current taxonomy. Both taxa are placed by many authors into one subfamily, the Cassidinae (Borowiec (1995); Chaboo (2007); Staines (2002); = Hispinae sensu Reid (1995)). Morphologically and biologically there seems to be no valid reason for retaining Hispinae and Cassidinae as separate subfamilies and there exist intermediate genera (e.g. in the tribes Cephaloleiini, Imatidiini) (Borowiec, 1995; Staines, 2002). At least three morphospecies in this study seem to belong to these taxa: Cassidinae spp. 8 and 17 probably belong to the genus *Imatidium* FABRICIUS (presumably the species *I. buckleyi* SPAETH, respectively *I. thoracicum* FABRICIUS, both known from Ecuador). Morphospecies Hispinae sp. 10 could belong to the genus *Demotispa* BALY. *Imatidium* and *Demotispa* belong to the tribe Imatidiini that has been synonymized with Cephaloleiini that have been traditionally classed with hispines (Borowiec, 1995; Staines, 2002). The genus *Imatidium* has been placed in hispines as well as in cassidines at one time or another (Staines, 2002). For further information about classification and relationships of Cassidinae and Hispinae see Chapter 1.3.

Also Alticinae plus Galerucinae form a monophyletic cluster, however with Chrysomelinae placed as a monophyletic cluster within. With single exceptions, within Galerucinae s.l., the Galerucinae s.str. and Alticinae appear in several well separated clusters. Whereas the monophyly of the group Galerucinae plus Alticinae is generally acknowledged, often subsuming the alticines (flea-beetles) in Galerucinae s.l. (Lingafelter and Konstantinov, 1999; Reid, 1995; Riley et al., 2002), relationships between the groups are controversial (see Chapter 1.3). Chrysomelinae seem to be closely related to Galerucinae s.l. (Duckett et al., 2004; Gómez-Zurita et al., 2008; Reid, 1995). Duckett et al. (2004) recovered Chrysomelinae as the sister group to the Galerucinae s.str. A recent study based on RNA data found a 'chrysomeline' clade with Galerucinae (with alticines) and paraphyletic Chrysomelinae (Gómez-Zurita et al., 2008).

In the NJ-tree in Figure 5.1 (Chapter 5) that includes one specimen of Cryptocephalinae and Lamprosomatinae each, both cluster together. This agrees with the placement of both groups in the 'Camptosomata' (Erber, 1988).

For relationships between the subfamilies see the leaf beetle phylogenies of e.g. Duckett et al. (2004); Farrell (1998); Farrell and Sequeira (2004); Reid (1995), and Gómez-Zurita et al. (2008). The relationships between cassidines and hispines, respectively galerucines and alticines are discussed in detail in Borowiec (1995); Staines (2002), and Chaboo (2007), respectively Duckett et al. (2004); Ge et al. (2012); Lingafelter and Konstantinov (1999) and references therein.

3.5 Conclusions

This study is the first attempt to investigate the leaf beetle fauna of the herbaceous and shrubby understorey vegetation of Podocarpus NP and RBSF in southern Ecuador. Considering that mainly one type of vegetation was sampled and that sampling is far from being complete, the more than 500 found morphospecies are rather a glimpse on the true diversity of the area. Further sampling as well as inclusion of the canopy fauna is likely to raise species numbers immensely. Given the poor taxonomic recording of leaf beetles in Ecuador, many of the found species are probably not yet recorded for Ecuador or might even be not yet described.

Although incomplete, the analysed selection of beetles provides a good insight into the characteristics of the leaf beetle assemblage: The chrysomelid fauna is species-rich and composed of few common and an overabundance of rare species, as it is typical for tropical arthropod assemblages. However, the number of rare species is likely to be overestimated due to undersampling. Communities differ between the three elevational levels, an issue that is investigated in detail in the following chapter (Chapter 4). The composition of leaf beetle subfamilies seems to be representative of a Neotropical leaf beetle fauna.

DNA barcode data led to higher species richness estimates and similar patterns in the comparison between elevational levels. The barcodes grouped morphospecies correctly into subfamilies.

Chapter 4

Habitat specialization and its influence on elevational diversity patterns inferred by DNA barcode data

4.1 Introduction

One pivotal pattern of biodiversity is the variation of species richness along elevational gradients (Körner, 2000; McCain and Grytnes, 2010). In montane regions across the world the diversity of most plant and animal taxa can be described by one of three different patterns: a decreasing pattern, a low-elevation plateau pattern, or a mid-elevation peak pattern (McCain, 2009; Nogués-Bravo et al., 2008; Rahbek, 2005). Elevational diversity patterns were shown to systematically vary among taxa or geographic regions (McCain and Grytnes, 2010) but are usually assumed to be constant for one taxon on a single mountain. However, tropical mountains exhibit a complex topography shaping spatially heterogeneous habitats within elevational belts (Homeier et al., 2010; Takyu et al., 2002; Werner and Homeier, 2015). While spatial heterogeneity has been identified as a significant determinant of diversity (Stein et al., 2014), the influence of small-scale topography on patterns of diversity remains little understood.

Mountains are ideally described by a simple conical shape (Körner, 2000). However, the terrain formed by geological and hydrological processes over time is more complex and exhibits 'small-scale' geomorphological elements like mountain ridges or valleys (Beck et al., 2008b; Oesker et al., 2008). These habitats may strongly differ in abiotic conditions. For example, soils at ridge crests have higher rates of nutrient losses due to down slope fluxes, lower nutrient contents and lower rates of decomposition which significantly influence structural characteristics of the vegetation, e.g. species richness, forest canopy height and the production of wood and foliage (Takyu et al., 2002; Werner and Homeier, 2015). The variable abiotic and biotic conditions in different habitats may influence species richness of consumer taxa and may lead to habitat-specific differences in the elevational distribution of species. Moreover, community turnover between habitats may be heterogeneous along elevational gradients and lead to systematic changes in diversity patterns when scaling up from the local scale (including one habitat) to the regional multi-habitat scale.

Theory and empirical data support the hypothesis that higher temperatures, higher primary productivity, and more land area at lower elevations may foster habitat specialization and consequently species turnover between habitats. First, species turnover increases with productivity due to a higher importance of stochastic relative to deterministic assembly processes in highly productive environments (Chase and Leibold, 2002; Chase, 2010). Second, the benign warm climate at lower elevations has a positive effect on evolutionary rates (Allen et al., 2006; Rohde, 1992) and increases the importance of biotic interactions driving niche segregation and the evolution of specialization (Dobzhansky, 1950; Mittelbach et al., 2007; Pellissier et al., 2012; Schemske, 2002). Third, everything else being the same, higher amounts of land and the often higher productivity at lower elevations translate into a higher total amount of specific resources (e.g. total leaf biomass of a particular plant species) in lowland elevations than in highland elevations, which increases the probability of specialists' populations to persist. In contrast, populations in higher elevations may have to be generalists to persist over longer intervals of time (Srivastava and Lawton, 1998).

In this study, species diversity and turnover rates of leaf beetle communities are compared between montane ridge crest and valley forest habitats of southern Ecuador and it is inferred how differential turnover rates affect patterns of elevational species richness when scaling up from the local study site to the regional elevational belt scale. Leaf beetles (Coleoptera: Chrysomelidae) are major tropical herbivores and constitute one of the most speciose families in the whole tree of life (Basset and Samuelson (1996); Farrell and Erwin (1988); Wagner (2000); more detailed information on leaf beetles is given in Chapter 1.3). Their considerable specialization on host plants and large contribution to total biodiversity explains their key importance for estimating the total species richness on Earth. However, the extreme diversity, the little developed taxonomy of tropical beetle species and a suspected large proportion of cryptic diversity make the family particularly challenging for ecological studies (Costa, 2000; Flowers and Hanson, 2003; Furth et al., 2003; Gómez-Zurita et al., 2008; Jolivet et al., 1988) advocating the use of molecular approaches for species delimitation (Craft et al., 2010; Hebert et al., 2003b; Pfenninger et al., 2007; Smith et al., 2009, 2005; Tänzler et al., 2012). Molecular methods also allow inference of levels of intraspecific genetic diversity contributing to the understanding of trends in elevational species richness.

DNA barcoding was used to study the elevational diversity of leaf beetles in Podocarpus National Park and RBSF in southern Ecuador. The study region is considered to be one of the most diverse regions of the world (Brehm et al., 2005). Its steep slopes harbour two forest types at different topographic positions which differ in abiotic conditions and species composition of plant communities: ridge habitats at the upper slopes and valley habitats at the lower slopes (Homeier et al., 2010). For more detailed information on study area and sampling sites please refer to Chapters 2.1 and 2.2.

The following four predictions were tested:

1. Patterns of elevational diversity differ between ridge and valley forests.

2. Higher levels of productivity, area, and temperature provide increasing opportunities for habitat specialization and stochastic processes of community assembly (Chase, 2010). Therefore higher levels of species turnover between habitats at lower elevation than at higher elevations can be expected.

3. Elevational patterns of species richness are depending on the spatial scale of analysis (Nogués-Bravo et al., 2008) and may particularly depend on the variation in the rates of species turnover in space (Chase and Leibold, 2002). Due to higher species turnover between habitats at lower elevations stronger increases in species richness at lower than at higher elevation are expected with the spatial scale of the analysis increasing.

4. A decrease in productivity and increasing climatic harshness at high elevations may lead to higher levels of population bottlenecks or extinctions with subsequent recolonization of habitats by lineages from lower elevation (Ehinger et al., 2002; Gilles et al., 2007; Shama et al., 2011). Genetic diversity, here measured as haplotype diversity per species, can be therefore expected to decrease with increasing elevation.

4.2 Methods

Beetles were sampled on sampling sites within the Podocarpus NP and the adjacent RBSF, Ecuador. The study area is described in detail in Chapter 2.1. Sampling was conducted between May 2011 and April 2012 following a standardized design at the three different elevational levels Bombuscaro ('1000 m', premontane rainforest), ECSF ('2000 m', lower montane rainforest), and Cajanuma ('3000 m', upper montane rainforest or cloud forest) (classification of vegetation: Homeier et al. (2008)).

At each elevational level, 12 sites were sampled. Sampling sites were 20 $\times$ 20 m plots situated within homogeneous mature forest representative for the elevation in question and without visible recent natural or human disturbance (Homeier et al., 2010). At each elevational level, the 12 sites were located in two different types of habitats, six sites in valleys and six on ridges. Habitat types harbour different forest types and differ in several environmental parameters: Compared to sites on ridges, the sites in valleys are vegetated with a forest which differs in species composition, has a smaller canopy openness, consists of higher trees, has a higher biomass, and harbours a higher diversity of tree species. Furthermore, valley habitats are more nutrient-rich, have a minor organic layer thickness, a higher productivity, and a lower C:N ratio (Homeier et al. (2010); Werner and Homeier (2015); Homeier pers. comm.). With increasing elevation, the aboveground biomass of trees decreased as well as height of trees. The tree growth at higher elevation seems to be limited by decreasing temperatures but also by shortage in nutrients and/or adverse soil chemical and physical conditions (Homeier et al., 2010).

Leaf beetle assemblages were sampled with a combination of three different collection methods: (1) Sweep netting, (2) beating of shrubs and smaller trees using a beating tray, and (3) hand-collection from the vegetation. All vegetation within reach was sampled (up to ca. 2.5 m). Each sampling-site was sampled following a standardized procedure: Sweep netting alongside two edges of the plot for 30 min; beating alongside the other two edges of the plot for 30 min; hand-collection within the plot for 30 min.

Beetles were killed and collected in 70% ethanol but transferred into 96% ethanol the following day. For each subsample (a subsample is either 30 min sweep netting, 30 min beating, or 30 min hand-collection) Chrysomelidae were sorted into preliminary morphospecies and one specimen of each morphospecies of each subsample was used for following morphological classification and molecular analyses.

Processing of the specimens and procedure of DNA barcoding of COI is described in Chapters 2.3 and 2.4. Sequences were submitted to GenBank (accession numbers KR424781–KR425417; see also Appendix Tab. C.1). All plot-samples resulted in a total of 995 leaf beetle specimens for which a barcode could be obtained (data set 3b, plot data set; Chapter 2.5, Appendix Tab. D.1).

Specimens were sorted into morphospecies (for information about morphospecies sorting see Chapters 2.5 and 5) and assigned to MOTUs using the different molecular species identification methods that are described in Chapter 6. As there were only few discrepancies between the methods (the methods were more or less conservative) only the results of Poisson tree processes (PTP) modelling were used for biodiversity analyses.

Analyses of biodiversity patterns

For analyses of biodiversity patterns, a standardized data set was used which was based on four replicate samplings on each study site. All statistical analyses and data plottings were conducted in R 3.0.2 using the add-on packages RESHAPE2, VEGAN and SCIPLOT.

Species richness patterns on the local scale: Studies on insect diversity in the tropics always suffer from undersampling and correlation of sampling intensity with species richness causing strong biases in observed data (Brose et al. 2003). Therefore, asymptotic species richness of leaf beetles per study site was estimated using the non-parametric individual-based chao1 estimator provided in the VEGAN package and the estimated species richness was used for all main analyses (Chao et al., 2005; Gotelli and Colwell, 2011; Oksanen et al., 2013). The effect of elevation on species richness per site was analysed with ordinary linear models with estimated species richness per plot as the response (continuous) and elevational level (factorial) as the explanatory variable. In case of significant differences between elevational levels in the general model, post-hoc pairwise t-tests with pooled standard deviations were conducted to test for differences between pairs of elevational levels. In addition to the above mentioned analysis in which it was not differentiated between valley and ridge crest habitats, trends in species richness with elevation were analysed for the two forest habitats separately using the same procedures as described for the total data set.

Species richness patterns on the regional scale: To calculate patterns of species richness with elevation at the regional scale the data of all study plots per elevational level were pooled and the asymptotic cumulative species richness (± SE) was estimated using the non-parametric chao1 estimator (Chao et al., 2005; Gotelli and Colwell, 2011). Regional species richness was estimated for plots of ridge and valley forests separately and for all plots per elevational level combined. To compare patterns of species richness for a standardized (rarefied) number of sampled individuals per elevational level individual-based species accumulation curves were calculated for each elevational level. Species accumulation curves were calculated using the method 'random' which adds up individuals in a random order with 1000 iterations and calculates the mean ±95% confidence interval.

Trends in species turnover across elevations and habitats were visualized using non-metric multidimensional scaling (NMDS) and statistically analysed using permutational multivariate analysis of variance (MANOVA) provided in the VEGAN package. For measuring the dissimilarity in species composition between the communities of different plots the chao dissimilarity index was used (Chao et al., 2005). The chao dissimilarity index is recommended for samples that differ in the intensity and completeness of sampling and which is particularly suited for data which are known or suspected to contain high numbers of rare or undetected species, and therefore seems appropriate for highly speciose leaf beetle communities in which typically a large number of singletons appear and many species remain undetected. The function *adonis* in the R package VEGAN (Oksanen et al., 2013) was used to partition the variation in overall beta-diversity among the effects of elevation, habitat and the elevation-habitat interaction and the significances were tested with permutation tests with 10,000 permutations. In case the beta-diversity between habitats was heterogeneous along the elevational gradient the interaction term was expected to be significant. With a partial Mantel test it was tested if the patterns of beta-diversity could be explained by differences in distance and elevation between the plots of different altitudinal levels.

To test for differences in relative genetic diversity an index of haplotype diversity was calculated for each elevational level. Haplotype diversity was defined as the probability that two individuals of one MOTU show different haplotypes. Probabilities were calculated based on a data set of all individuals collected per elevational level. Only species were considered for which more than two individuals per elevation were collected. The effect of elevation on haplotype diversity was analysed with ordinary linear models.

4.3 Results

Local and regional patterns in species richness

A total of 271 morphospecies and 453 haplotypes were detected which were differentiated by Poisson tree processes (PTP) modelling into 294 MOTUs. The estimated species richness (i.e. MOTU richness; for better readability hereafter simply 'species richness' is used) per site (local level) significantly varied among the three elevations ($F_{2,33} = 11.79$, $p = 0.0001$) and was highest at 2000 m a.s.l. and significantly lower at 1000 and 3000 m a.s.l. (post-hoc pairwise t-test with pooled SD: 1000–2000 m: $p < 0.05$, 1000–3000 m: $p < 0.01$, 2000–3000 m: $p < 0.0001$; Fig. 4.1A). When patterns were analysed for the two forest habitats separately, a mid-elevation peak pattern was evident in forests on ridges but not in valleys where species richness peaked at the lowest elevation but did not significantly differ from species richness at 2000 m a.s.l. (paired t-test: $p = 0.8$). However, for both habitats the lowest species richness was found at 3000 m a.s.l.

When species richness patterns were analysed at a regional level (i.e. by estimating the cumulative MOTU richness of all plots per elevational level), species richness did not differ between 1000 and 2000 m a.s.l. (Fig. 4.1B). When corrected for differences in the number of sampled individuals, species richness was even slightly higher at 1000 m a.s.l. than at 2000 m a.s.l. (Fig. 4.1C). When cumulative species richness was analysed for each habitat separately, the mid-elevation peak of diversity which was detected in ridge forests at the local scale was strongly reduced at the regional level. Regional level diversity in valley forests did not differ between 1000 and 2000 m a.s.l. Regional species richness was in all cases lowest at 3000 m a.s.l.

β-diversity between habitats and elevational levels

NMDS and permutational MANOVA analyses revealed a clear differentiation in the composition of leaf beetle communities among the three elevations (Fig. 4.2A, Tab. 4.1). The differences between 2000 and 3000 m a.s.l. were more pronounced than between 1000 and 2000 m a.s.l. Communities at 1000 and 3000 m a.s.l. differed most strongly in the composition of MOTUs. A significant interaction between habitat and elevation was found (Tab. 4.1): While communities of ridge and valley habitats strongly differed at 1000 m a.s.l., differences were less strong but still significant at 2000 m a.s.l. and non-significant at 3000 m a.s.l., suggesting a reduced habitat differentiation of species communities in higher elevations. Even though no significant difference was found in the leaf beetle composition of ridge and valley forests at 3000 m a.s.l., the turnover of MOTU between plots was generally very high and similar among the plots of one habitat as among the plots of two different habitats (Fig. 4.2B).

The higher beta-diversity between habitats in lower elevations could not be explained by differences in distance and elevation between the sites at different elevational levels (Mantel test, $p > 0.05$).

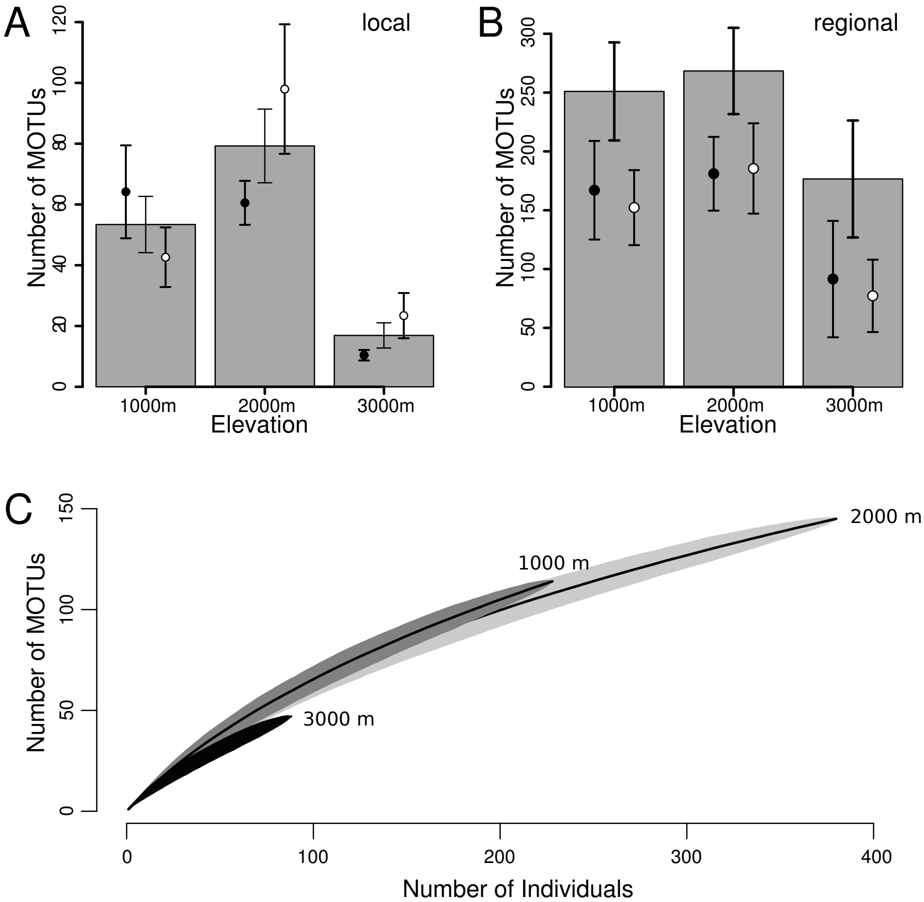


Figure 4.1: **Mean (± SE) number of estimated MOTUs per study plot (A), total number of estimated MOTUs per elevational level (B) and the cumulative number of MOTUs with increases in the number of sampled individuals (C).** A: Barplots and the error bars show the mean number of estimated species richness ± standard error found on plots of both habitats; the black and white dots with error bars show the values for plots in valley and ridge forests, respectively. The hump-shaped pattern is most pronounced for the plots on ridges (pairwise t-test: 1000–2000 m: $p < 0.02$, 2000–3000 m: $p < 0.01$, 1000–3000 m: $p = 0.4$). B: Barplots and the corresponding error bars show the total number of estimated species ± standard error for each elevational level; the black and white dots with error bars show the values for plots in valley and ridge forests, respectively. C: Species accumulation curves (mean ±95% confidence interval) show the increase in species richness with increasing number of sampled individuals.

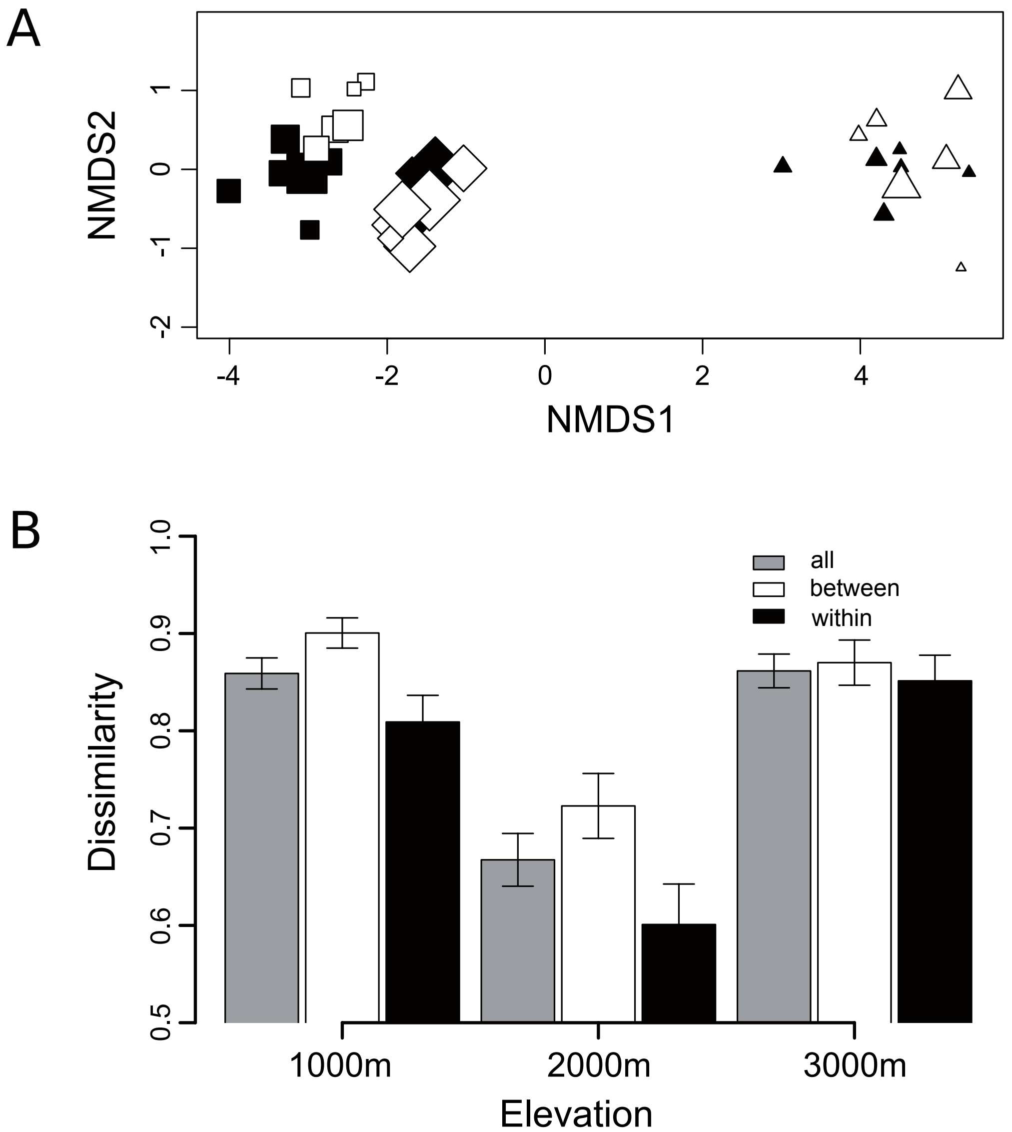


Figure 4.2: **NMDS ordination of MOTU data (A) and mean (± SE) community dissimilarity among plots within elevational levels (B).** A: Different symbols indicate different elevational levels (square = 1000 m, diamond = 2000 m, triangle = 3000 m) and habitats (black = forests in valleys, white = forests on ridges). Size of symbols is proportional to the number of estimated MOTUs per plot. B: Bars show mean estimates of community dissimilarity ± SE among the plots on one elevational level: all = dissimilarity among all plots; between = dissimilarity among plots of different habitats; within = dissmilarity among plots of the same habitat.

Table 4.1: **Results of permutational MANOVA analysis testing on the effects of elevation and habitat on the species composition of leaf beetle communities.** At 1000 m and 2000 m communities in ridge and valley habitats significantly differed in their composition, which was, however, not the case at 3000 m (1000 m: F = 2.27, p = 0.006; 2000 m: F = 3.19, p = 0.031; 3000 m: F = 1.25, p = 0.211).

	F	**df**	**r^2**	**p**
Elevation	7.43	2	0.29	0.001
Habitat	2.05	1	0.04	0.006
Elevation × Habitat	2.07	2	0.08	0.002
Residuals		30	0.59	

Genetic diversity

Haplotype diversity (defined as the probability that two individuals of one MOTU show different haplotypes) did not significantly differ among elevational levels (ANOVA, $F_{2,33} = 0.57$, p = 0.57; Fig. 4.3).

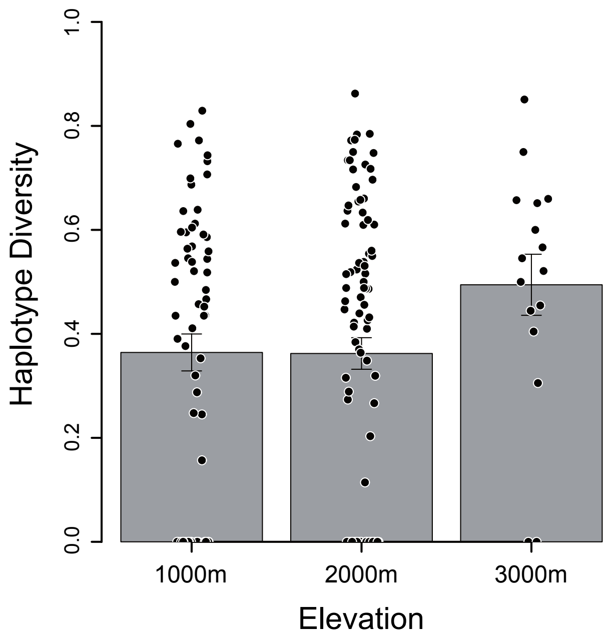


Figure 4.3: **Estimates of relative genetic diversity in different elevation levels, i.e. the haplotype diversity for MOTUs for which more than one individual was sampled per elevational level.**

4.4 Discussion

The complex topography of mountains produces habitats with strongly differing environmental conditions across and within elevational levels. The patterns of elevational diversity in the studied leaf beetles differed between ridge and valley forests. Moreover, a higher turnover of communities between and within forest habitats at lower elevations shifted mid-elevational diversity patterns towards lower plateau patterns when scaling up from the local study site level (α-diversity) to the regional elevational belt level (γ-diversity).

Differences in patterns of elevational α-diversity between ridge crest and valley habitats

While being largely ignored in elevational gradient studies, the results show the importance of small scale topography (here: topography within elevational belts) for patterns of elevational diversity. Sites on ridges strongly vary in several environmental parameters from sites in valleys: They have less nutrient-rich soils, a thicker humus layer, a lower productivity, and a higher C:N ratio of foliage. The forests on ridges have a different plant species composition from those in valleys, a lower and more open canopy layer, lower biomass and lower diversity of tree species (Homeier et al., 2010; Werner and Homeier, 2015). Differences in soil nutrient availability influence leaf quality and concentrations of phenolics (Werner and Homeier, 2015) which likely affect herbivore diversity. While there is insufficient data to directly relate leaf beetle diversity to the variation in characteristics of the vegetation, this study underscores the value of considering the small scale topography in studies of elevational diversity. Differences in the kind of sampled habitats among studies may explain some of the variation in patterns of elevational diversity found for single taxa in meta-analyses (McCain and Grytnes, 2010). Moreover, as some environmental variables vary more strongly between the habitats of one elevational level than others (primary productivity and plant species richness strongly differ between ridge and valley habitats while average temperature or O_2 concentration remain similar), incorporating the spatial habitat heterogeneity within elevational belts in the design of macroecological studies may allow more clear tests of the hypotheses commonly used to explain diversity gradients.

Habitat-differentiation of communities and the influence on patterns of elevational γ-diversity

Mid-elevational peaks of diversity as found for the pooled data in the present study are frequently reported in the ecological literature (Nogués-Bravo et al., 2008; Rahbek, 2005), in particular also for beetles on tropical mountains (Escobar et al., 2005; Furth, 2009; Sánchez-Reyes et al., 2014). In most montane regions, these patterns are in conflict with major climate-based hypotheses to explain large scale diversity gradients, e.g. the temperature hypothesis, the productivity hypothesis, or the area hypothesis (Brown et al., 2004; Currie et al., 2004; Mittelbach et al., 2007; Rosenzweig, 1995). Like in most other montane areas, in the study region temperature, primary productivity, and area decrease with elevation (Homeier et al., 2010; Körner, 2000; Moser et al., 2007; Wolf et al., 2011) suggesting monotonous positive correlations of elevation and species richness. Also plant species richness, a variable often positively correlated to herbivorous insect diversity is declining with elevation in the study area (Homeier et al., 2010, 2008) and cannot explain the mid-elevation peak pattern of species richness found at local scales.

By using leaf beetle diversity from two different forest habitats at multiple sites the study shows that mid-elevational peak patterns may disappear when increasing the spatial scale of diversity from local alpha-diversity to regional gamma-diversity. Study sites in the middle of the elevational gradient exhibited highest levels of species richness at local scales but showed lowest rates of species turnover between sites. It is widely recognized that spatial scale is a crucial factor influencing species richness patterns along environmental gradients (Gaston, 2000; McCoy, 1990; Nogués-Bravo et al., 2008; Rahbek, 2005). Local assemblage structure is inseparable from the regional context (Gaston, 2000), and it has been shown that, similar to the present study, the same data can show different diversity patterns on a local than on a regional level (Black and Prince, 1983; Chase and Leibold, 2002).

As beta-diversity often increases with increasing productivity, rates of species turnover were expected to decrease with elevation (Bai et al., 2007; Bonn et al., 2004; Chase and Leibold, 2002; Evans et al., 2008; Harrison et al., 2006). However, this prediction could only be confirmed for the two lower elevational levels while species turnover at 3000 m a.s.l. was nearly as high as at 1000 m a.s.l. Interestingly, at 1000 m a.s.l., the high turnover is related to a clear differentiation of leaf beetle communities between forests on ridge crests and in valleys. This habitat differentiation is most pronounced at 1000 m a.s.l., less strong but still significant at 2000 m a.s.l. (where turnover is generally lower), whereas absent at 3000 m a.s.l. The larger and more productive lower elevations seem to offer more opportunities for specialization (More Specialization Hypothesis; Srivastava and Lawton (1998)) and possibly allow habitat differentiation of herbivore communities into valley and ridge forest habitats.

However, in general turnover rates were very high between elevations with only a small overlap in leaf beetle community composition between 1000 and 2000 m a.s.l. and no species overlap at all with 3000 m a.s.l.: Although the linear distance between each of the three areas is only ~20 km, there are striking differences in climate and vegetation (pers. observ.). The turnover of tropical insect communities along elevational gradients is generally rapid (Brühl et al., 1999; Ghalambor et al., 2006; Janzen, 1967) and there are often large differences in insect communities in considerably smaller ranges than 1000 m (e.g. Olson (1994); Smith et al. (2014)).

It should be emphasized that spatial issues are not considered to be of sole importance for explaining mid-elevational peak patterns. In some mountain regions, land area and/or productivity exhibit hump-shaped distributions along the elevational gradient and reflect patterns in species diversity (Brown, 2001; McCain and Grytnes, 2010; Sanders, 2002). Whereas the mid-domain effect has been rejected as a general explanation of mid-elevational peak pattern it may, nevertheless, explain patterns of diversity in some taxa, particularly in those with large elevational ranges (Mid-domain effect; Brehm et al. (2007); Colwell and Lees (2000); Colwell et al. (2004)). Nevertheless, the high proportion of mid-elevational peak patterns in the ecological literature and the fact that they are often incongruent to major biogeographic hypotheses for explaining diversity gradients calls for further general explanations and issues of spatial scale could be an important factor to consider in future analyses. In this respect, the mismatch between a high proportion of hump-shaped diversity patterns reported from elevational gradient studies and a near lack of those patterns along latitudinal gradients may be due to systematic differences in the spatial scale of analyses. While most studies along elevational gradients are conducted at local scales and measure alpha-diversity, a high percentage of latitudinal gradient studies measure regional richness in large quadrats (often >100 km^2), i.e. in areas which incorporate multiple habitats. If species turnover among habitats varies along environmental gradients (or the diversity of habitats) this may cause systematic differences in diversity patterns of studies conducted at local versus regional scales.

Haplotype-diversity

In contrast to the expectations, the haplotype-diversity of species did not differ significantly between elevational levels. Species populations at higher elevations were expected to be less genetically diverse because limited resources and a harsher climate with extreme climatic events may lead to smaller and temporally less stable populations (Ehinger et al., 2002; Frankham, 1996; Gilles et al., 2007; Shama et al., 2011; Srivastava and Lawton, 1998). Population bottlenecks or local extinction with subsequent immigration from other mountain areas were expected to cause a lower diversity of haplotypes within populations (Glenn et al., 1999; Hoelzel et al., 2002; Nei et al., 1975; Weber et al., 2004). In contrast, the warm and favourable climatic conditions at low elevations were assumed to lead to larger and more stable populations holding higher levels of genetic diversity over time. In addition, higher metabolic rates and related nucleotide substitutions in warmer climates may foster higher levels of genetic diversity (Allen et al., 2006; Rohde, 1992). Indeed, elevational gradients in genetic diversity have been reported e.g. for species of shrews (Ehinger et al., 2002) and salamanders (Giordano et al., 2007).

An explanation for the lack of any systematic differences in haplotype diversity among elevational levels could be the high connectivity between the Andean mountains regions. The large and connected high elevation habitats may facilitate the sustenance of large and stable populations with high levels of genetic diversity.

It is also possible that high altitude communities contain generalist rather than specialist species that are less susceptible to adverse environmental influences and have a lower risk of extinction as they can adapt to the harsh conditions at higher elevations (Packer et al., 2005). For example, it has been shown that alpine Chrysomelidae species show a more broadly oligophagous or polyphagous feeding behaviour (Lopatin, 1996). An indication for this could be the slightly higher haplotype-diversity of species at 3000 m a.s.l. that may indicate the prevalence of generalist species. It has been shown that specialist species have a reduced genetic variation (due to a smaller effective population size) (Kelley et al., 2000; Packer et al., 2005; Zayed et al., 2005). This agrees with the notion that usually low productivity communities are dominated by generalists as some plant resources are too scarce to support viable specialist populations (Srivastava and Lawton, 1998). The finding that habitat specialization in this study is most pronounced at 1000 m a.s.l. and absent at 3000 m a.s.l. is in line with the idea of a higher prevalence of generalist species at higher elevations, too.

Methodological considerations
All results have been revealed in a similar way by morphospecies- and MOTU-based analyses. The total number of found species is ~8% higher for MOTUs compared to morphospecies. This may be explained by species indiscernible by the morphospecies approach (cryptic diversity). Possibly, integration of DNA barcoding into biodiversity studies can prevent an underestimation of diversity (Hebert et al., 2004; Witt et al., 2006). Due to a high number of uniques in the data set, cryptic diversity has a rather small influence on species number as morphospecies found only once cannot be split by the molecular approach. This is enhanced by the study design, analysing only one specimen per morphospecies per sample. However, communities with many species but a low abundance of each individual species and many rare species are typical for tropical insects. It has been shown that in such data sets and on a geographically restricted level, different methods of morphological and molecular species delimitation can lead to very similar results (Chapter 6).

DNA barcoding is often integrated in biodiversity studies not only to consider cryptic diversity but also to provide additional information at the infra-specific level (García-Lopez et al., 2013; Monaghan et al., 2009; Papadopoulou et al., 2011). It is especially useful for a rapid analysis of unknown tropical insect faunas where taxonomic identification is still missing and where it usually reveals diversity patterns in a similar way as morphological approaches (Smith et al., 2005; Tänzler et al., 2012).

4.5 Conclusions

First, the study highlights the complexity of insect communities in tropical montane regions that are so far severely understudied. It confirms the findings by Werner and Homeier (2015) who showed the relevance of topographic positions because contrasting biotic and abiotic conditions found along short topographical gradients are an important source of beta-diversity in tropical mountains and should therefore be considered in the sampling design. Furthermore, the study affirms the importance of spatial scale for the analysis of diversity patterns along elevational gradients.

Second, the study shows the suitability of DNA barcoding to examine even complex ecological questions. It is a practical example demonstrating the useful implementation of routine DNA barcoding for analysis of biodiversity patterns and their ecological implications. It is a further example showing that barcoding goes beyond the mere function of species discovery and identification. Patterns of community composition and turnover can be analysed and interpreted even without taxonomic information.

Finally, the study suggests that despite a strong loss of diversity of local communities at the species level, genetic diversity within species may remain relatively stable along the elevational gradient. It would be interesting to use the DNA barcode data for further phylogenetic measures of the leaf beetle community structure along the elevational gradient, such as phylogenetic diversity (PD) or nearest taxon index (NTI) (Brehm et al., 2013; Smith et al., 2014).

Chapter 5

Comparison of morphological and molecular species delimitation approaches

5.1 Introduction

In studies on biodiversity of tropical arthropods that are hyperdiverse and extremely abundant (although most individual species taken by themselves are not abundant) often many thousand individuals may accrue (see summary in Coddington et al. (2009)). The sheer mass of individuals and the high species richness usually prevents thorough taxonomic analyses as this is very time consuming. Especially in the light of the fast rates of habitat conversion and destruction threatening particularly ecosystems with the highest biodiversity (e.g. tropical rainforests; Corlett and Primack (2011); Laurance and Peres (2006); Primack (2014)), less time intensive methods of assessing this diversity are urgently required.

Difficult access to taxonomic expertise also impedes taxonomic identification: In large taxa, a single taxonomist is specialized only on certain subgroups and usually is not able to identify all species of a set of samples. For example, in Neotropical Chrysomelidae, the taxonomic expertise for the whole family is covered by the sum of experts for certain subfamilies (e.g. Borowiec (1998); Chaboo (2007); Chaboo and Borowiec (2003); Flowers (2004a,b,c); Flowers and Chaboo (2009); Furth and Savini (1996); Furth (2007); Staines (2002); Windsor et al. (1995)). Additionally, identification literature and keys for many taxa are incomplete, old, or not existing at all. In Neotropical Chrysomelidae, identification keys are scarce and exist only for certain subgroups or regions and are often not at species-level (Borowiec and Świętojańska, 2014; Furth, 1992; Staines, 2002, 2013, 2009). There is also a lack of easily accessible and reliably identified reference collections (Furth et al., 2003).

Due to such adverse circumstances, for most studies on tropical arthropod diversity, working units as surrogate for species serve well while taxonomic identification and description of new species has to be postponed. Traditionally, morphospecies are used as working units, but these have been recently complemented by molecular working units.

Morphospecies in the broad sense are species discerned with morphology-based taxonomic techniques but not necessarily named (Basset et al., 2008, 2004; Oliver and Beattie, 1996). The distinction of morphospecies may be performed on different levels of preciseness, for example, dissection of genitalia might be included. However, usually the term morphospecies refers to species-like groups of specimens sorted more superficially on the basis of external morphology and without the use of identification keys (Krell, 2004; Oliver and Beattie, 1996; Pik et al., 1999). In this study the term 'morphospecies' is used in this sense.

The morphospecies approach is sometimes used synonymously with parataxonomy. The term parataxonomy was originally coined by Janzen (Janzen, 1991, 2004; Janzen et al., 1993). It described a concept of training local people to support inventorying and monitoring tropical biodiversity and so improve the flow of primary information on tropical biodiversity (Basset et al., 2004). Beside preliminary sorting into morphospecies, the expertise of the trained parataxonomists comprises collecting and preparing specimens and databasing the associated information (Basset et al., 2004). Parataxonomy is widely used in terrestrial arthropod research (Basset et al., 2008; Longino and Colwell, 1997; Novotny et al., 2002a). However, the term parataxonomist may also be applied to local collectors, students, professional zoologists and botanists focusing on ecological studies, or taxonomists operating outside of their range of expertise (Basset et al., 2004).

The morphospecies approach is widely used and is a standard method in studies on tropical arthropod biodiversity (Basset et al., 2004; Springate and Basset, 2004; Wagner, 2000). It is not only applied to study tropical rainforest arthropods but also other taxa that are extremely abundant, speciose, and/or morphologically hard to identify (e.g. terrestrial nematods: Bernard and Schmitt (2005); Lawton et al. (1998), or benthic macroinvertebrates: Costa and Melo (2008); Duncan and Brusven (1985)). However, some authors criticize a low accuracy and the problem of lacking comparability and replicability (Krell, 2004).

Indeed, the superficial morphospecies sorting relying only on external characters (as used in this study) has its shortcomings. Morphospecies sorting may be confounded by cryptic diversity, sexual dimorphism, polymorphism, or juvenile forms. This may result into splittings of morphospecies into two or more species and lumping of morphospecies into a species. Furthermore, for certain organisms, even morphospecies sorting might be difficult. These may include premature stages, very small organisms (meio- and micro-fauna, zooplankton) and species only distinguishable by subtle or geographically variable morphological characters (Blaxter et al., 2004; Bucklin et al., 2007; Decaëns et al., 2013; Plaisance et al., 2009; Vences et al., 2005).

In such cases, species-like working units based on molecular characters are a useful tool. The DNA barcode marker cytochrome *c* oxidase I (COI) has been established as a species-specific identification marker (Hebert et al., 2003a). According to differences in the sequences, specimens can be classified into molecular operational taxonomic units (MOTUs; Floyd et al. (2002)). There exist a variety of methods to derive species limits from DNA sequence data, several methods are described in Chapter 6.

The barcode/MOTU approach is comparable between studies and sites (Floyd et al., 2002) whereas morphospecies at this point can be flawed (Krell, 2004). However, both methods should be followed by a thorough taxonomic analysis with description and naming to allow connection of the species-specific facts with existing literature.

Neotropical Chrysomelidae are a very diverse and species-rich taxon. Due to the lack of data and/or difficult access to taxonomic information, an approach with rapid identification of (morphological and molecular) working units is standing to reason. As leaf beetles are extremely diverse, very abundant, feature many small species and species where cryptic diversity, colour-polymorphism or sexual dimorphism occurs, it is advisable to complement the widely used morphospecies approach with a DNA barcode approach.

5.2 Methods

Chrysomelidae were sampled between November 2010 and June 2012 in parts of Podocarpus National Park and RBSF, Ecuador (detailed information about the study area is given in Chapter 2.1). Beetles were mainly collected by sweep netting, beating, and hand-collection of the lower vegetation. Additionally, light-, Malaise-, flight interception-, and pitfall traps have been used (detailed information about sampling methods and design is given in Chapters 2.2 and 7). Laboratory analyses and handling of the specimens are described in Chapters 2.3 and 2.4.

The dry mounted specimens were sorted into morphospecies. Classification into morphospecies was revised and verified by Dr. Thomas Wagner who is an experienced taxonomist for Chrysomelidae with afrotropical Galerucinae being his area of expertise (see e.g. Wagner (2004, 2007a,b); Wagner and Kurtscheid (2005)). Only ectoskeletal characters were considered, without the use of dissected parts and without identification literature. Characters for morphospecies delimitation are shape of head, pronotum, and total body, surface structures, and hairs or spines. Body size or colours may be used carefully considering that they may vary e.g. due to recent ecdysis (more information about the morphospecies concept is given in the introduction of this chapter). Morphospecies received a subfamily name and a number. Hispinae and Cassidinae are treated as separate subfamilies, likewise Alticinae and Galerucinae.

For all specimens for which a barcode sequence could be obtained (1475 specimens, data set 1b), a statistical parsimony analysis as implemented in TCS v.1.21 (95% connection limit) was used to group sequences into separate haplotype networks (more detailed information about statistical parsimony analysis is given in Chapters 2.5 and 6). The haplotype networks are termed MOTUs hereafter. All 1475 specimens that were assigned to a morphospecies and a MOTU were included in the analysis of congruence between both methods.

A Neighbor-Joining-Tree (NJ-Tree; Saitou and Nei (1987)) based on a MUSCLE alignment (Edgar, 2004) of all 1475 sequences was constructed in Geneious version 7.1.5 (Biomatters Ltd.; http://www.geneious.com/). Figures 5.2–5.5, 5.9, 5.10, 5.13, 5.14, and 5.15 showing splittings and lumpings in certain groups are excerpts from the NJ-Tree of all 1475 specimens. Figure 5.1 shows a NJ-Tree of representatives of all MOTUs (493 sequences).

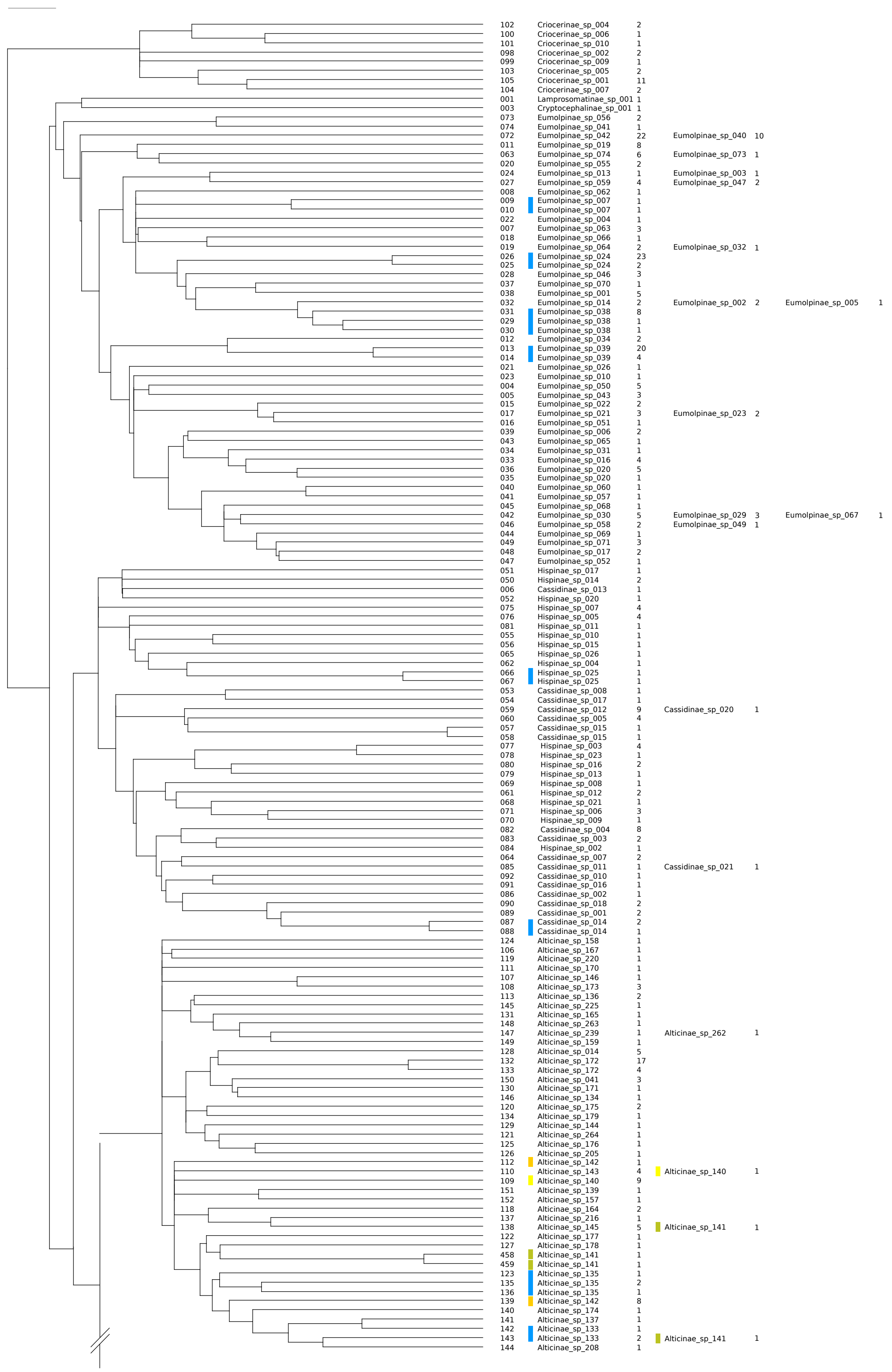
5.3 Results

The barcode approach with species delimitation using haplotype networks estimated ten percent higher species numbers compared to the morphospecies approach (448 morphospecies, 493 MOTUs). This discrepancy arose due to splittings of morphospecies into two or more MOTUs or lumpings of two or more morphospecies (respectively parts of them) into one MOTU. The occurrence of more splittings than lumpings resulted in a higher number of MOTUs than morphospecies. The similar numbers of morphospecies and MOTUs arose partly due to the fact that splittings and lumpings compensated one another. However, the number of perfect matches was comparatively low: 63% of all morphospecies corresponded exactly with one MOTU, i.e. contained specimens of only one MOTU and at the same time all of them. Five percent of all morphospecies were both split and some specimens were placed into other morphospecies at the same time. An overview of all splittings and lumpings is given in Figure 5.1.

In most cases, individuals of two (76% of all lumpings) or three (16%) morphospecies were united into one MOTU, in four percent four, respectively five morphospecies were fused. Similarly, most splittings divided a morphospecies into two (69%) or three (21%) MOTUs. In eight percent of all cases, a morphospecies was split into four MOTUs and only once a morphospecies was split into five (1%) or six MOTUs (1%).

There were slight differences between the five most abundant subfamilies. Whereas in Alticinae and Galerucinae MOTUs estimated species number 14% higher compared to morphospecies, in Hispinae it was only five percent and in Cassidinae splittings and lumpings compensated resulting in an equal number of MOTUs and morphospecies. In Eumolpinae there were more lumpings than splittings resulting in a lower estimation of species number by MOTUs by nine percent. Morphospecies that were split and lumped at the same time occurred only in Alticinae (19 cases) and Galerucinae (three cases). The proportion of perfect morphospecies (matching exactly with one MOTU) was highest in Hispinae (95% of all morphospecies). It was considerably lower in Cassidinae (67%), Galerucinae (65%), Alticinae (59%), and Eumolpinae (54%).

Despite a comparatively low 'accuracy' relative to morphospecies, Eumolpinae seemed to be one of the less challenging subfamilies beside Cassidinae and Hispinae. Only two or three complete morphospecies were lumped into one MOTU or morphospecies were split into two or three MOTUs. No morphospecies was split and lumped at the same time. The most challenging subfamilies were Galerucinae and especially Alticinae. The difficulties most probably arose due to the large number of specimens and species. Furthermore, the Alticinae in the data set contained many very small species (<5 mm) and many species looking similar (e.g. Alticinae spp. 097, 197, 198, 199, 253, and 254) exacerbating morphospecies sorting.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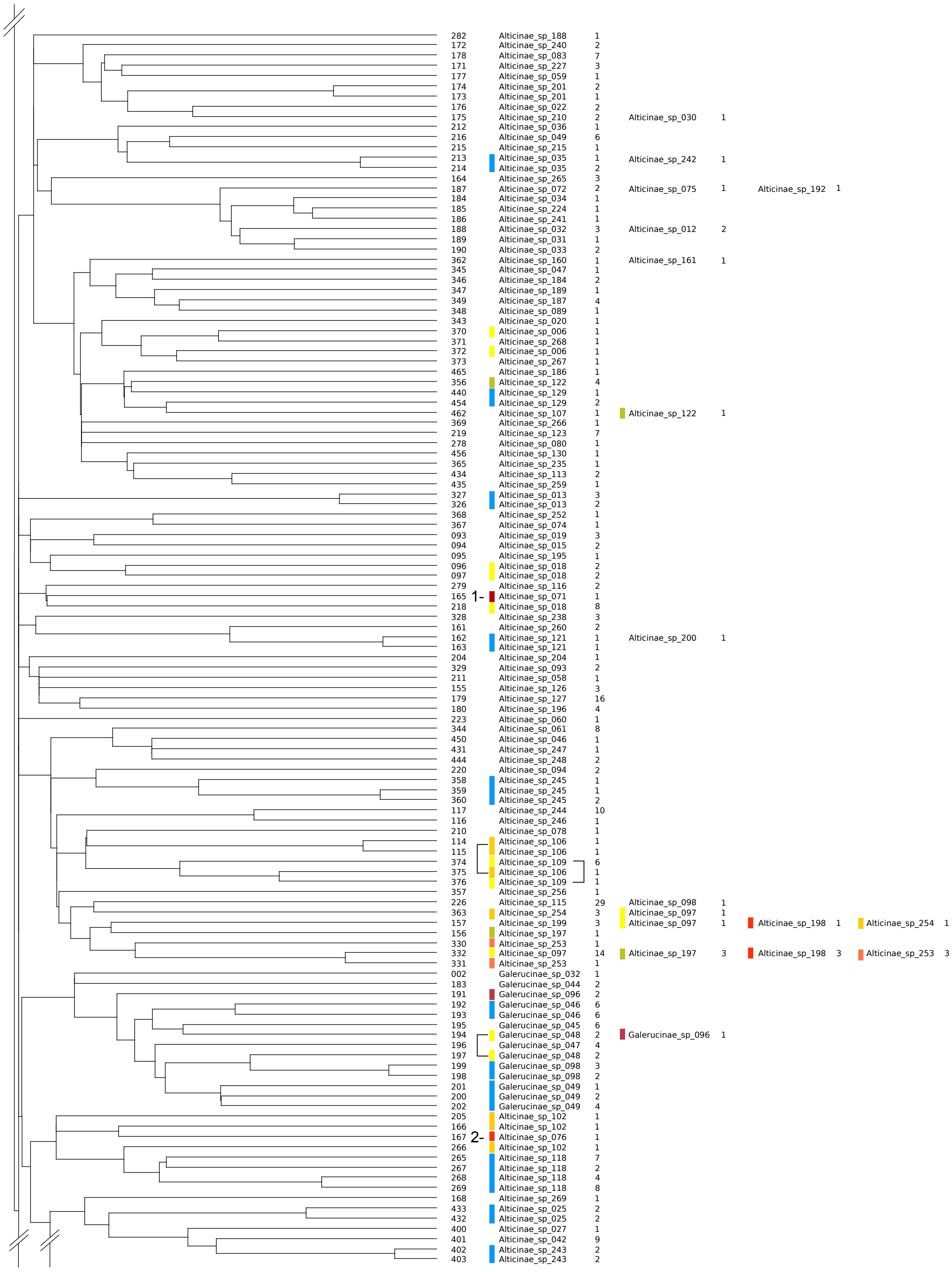
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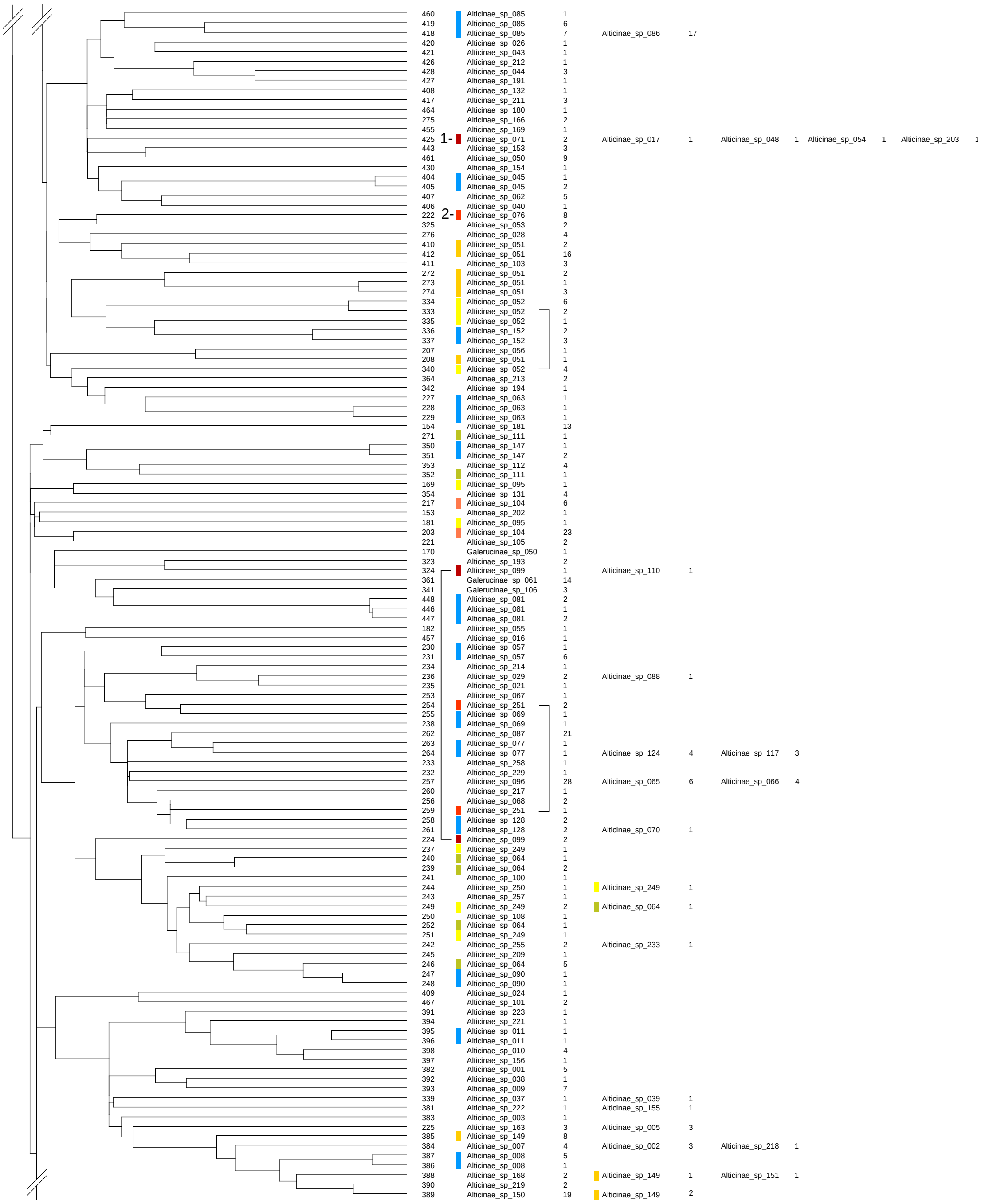
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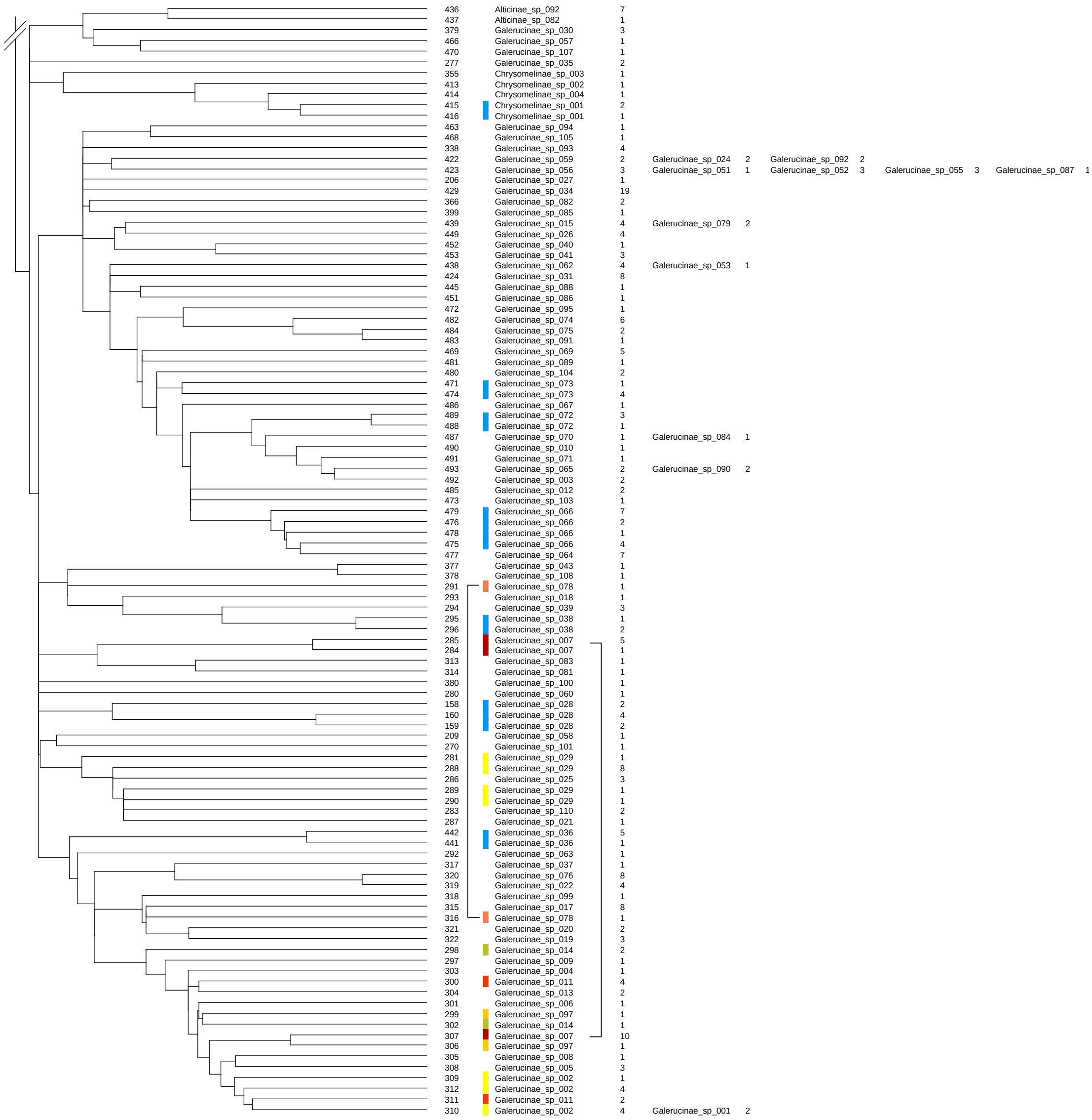


Figure 5.1: **Overview of splittings and lumpings.** NJ-Tree with ultrametric branch lengths of all MOTUs. Each MOTU is represented by one sequence. Branch labels indicate name/number of the MOTU. Morphospecies names behind the MOTU name represent the one or more morphospecies the specimens of the MOTU belong to and the numbers how many specimens of the respective morphospecies there are. Coloured bars indicate splitting of a morphospecies into several MOTUs; morphospecies split into MOTUs next to each other are indicated by blue bars.

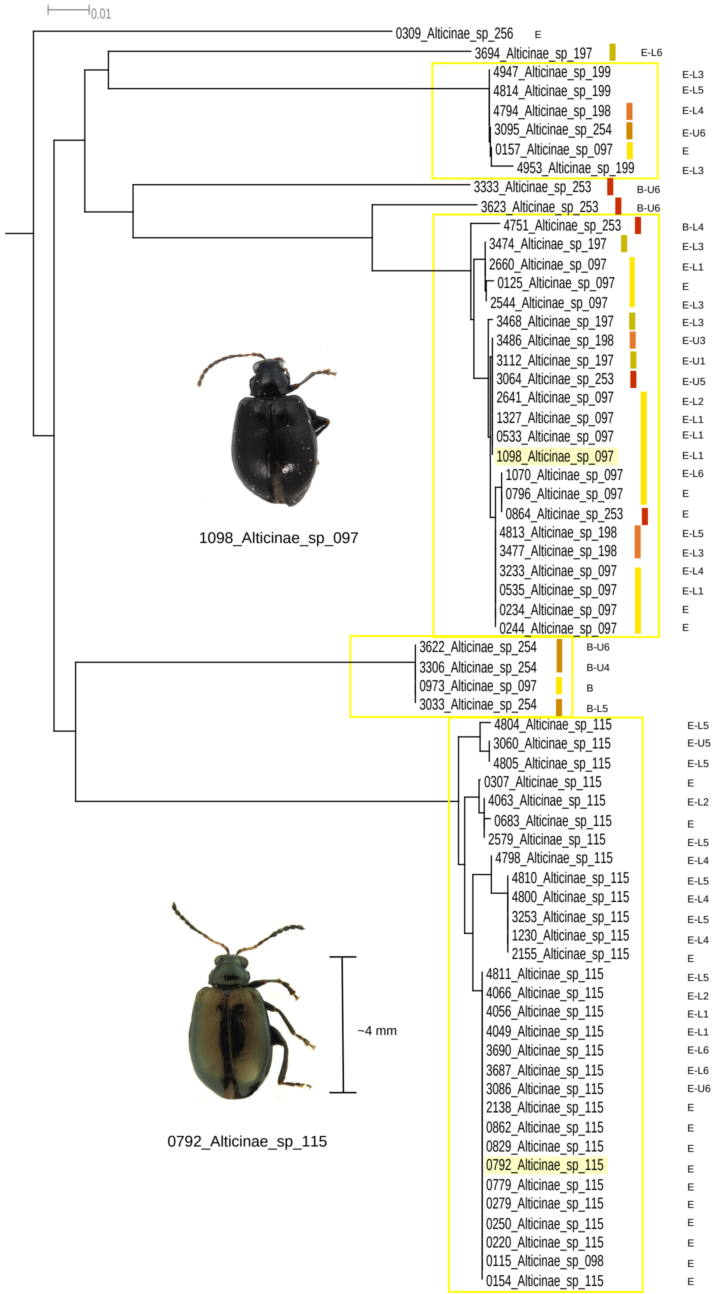


Figure 5.2: **Splittings and lumpings within a group of several small alticine morphospecies.** Coloured bars behind morphospecies names indicate splitting of the morphospecies into more than one MOTU; morphospecies that are lumped into one MOTU are bordered by a coloured box. Abbreviations behind the individuals indicate the sampling area (B = Bombuscaro, E = ECSF), respectively the plot where the specimen was collected. Information on collection plots is given in Tab. B.1 (Appendix).

The case of Alticinae spp. 097, 197, 198, 199, 253, and 254 is an example where morphospecies were both split and lumped as well (Fig. 5.2). Each of them (except Alticinae sp. 199) was split into two or three MOTUs and also lumped (two, respectively four morphospecies lumped into one MOTU). The morphospecies were completely resorted into six MOTUs. The six morphospecies consisted of very small (<5 mm), black specimens all looking very much alike, making morphospecies sorting very confounding. Another example for morphospecies that were split and lumped (Alticinae sp. 149) is given below ('Precarious taxa').

Two hundred and six morphospecies occurred only once in the data set (uniques). One hundred sixty-five of them were perfect morphospecies, 41 were lumped. Certainly, uniques cannot be split into two or more MOTUs. Therefore, for experimental reasons, uniques have been removed from the data set and again splittings and lumpings were counted. Estimation of species number by MOTUs increased to 33% higher than morphospecies. The number of splittings remained equal, but the number of lumpings decreased in this data set. Not only the agreement between MOTU and morphospecies number decreased, also the proportion of perfect morphospecies decreased (52%).

Perfect morphospecies were mostly uniques (59%). However, 39% occurred with two to ten individuals and two percent with even more than ten specimens. Whereas in the second most frequent perfect morphospecies (Galerucinae sp. 034, 19 individuals) all individuals looked very similar, the individuals of the most frequent one (Alticinae sp. 087, 21 individuals) varied in colour and size.

Splittings of morphospecies

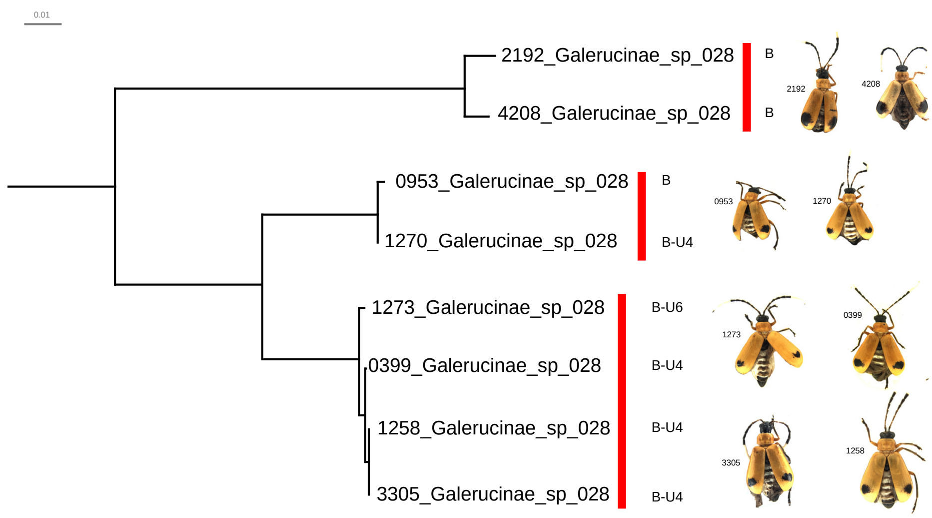


Figure 5.3: **Splitting of the morphospecies Galerucinae sp. 028 into three MOTUs.** Abbreviations behind the individuals indicate the sampling area (B = Bombuscaro), respectively the plot where the specimen was collected.

An example for splitting of morphospecies by the molecular approach is Galerucinae sp. 028 that was split into three MOTUs (Fig. 5.3). Galerucinae sp. 029 was even split into four MOTUs (Fig. 5.4). All specimens of Galerucinae sp. 029 show a conspicuous bicoloured pattern (black and yellow) that is shared by Galerucinae spp. 021, 025, and 110 (it is as well found in Alticinae sp. 163, see Fig. 5.13). The four morphospecies formed a monophyletic cluster in the molecular analyses.

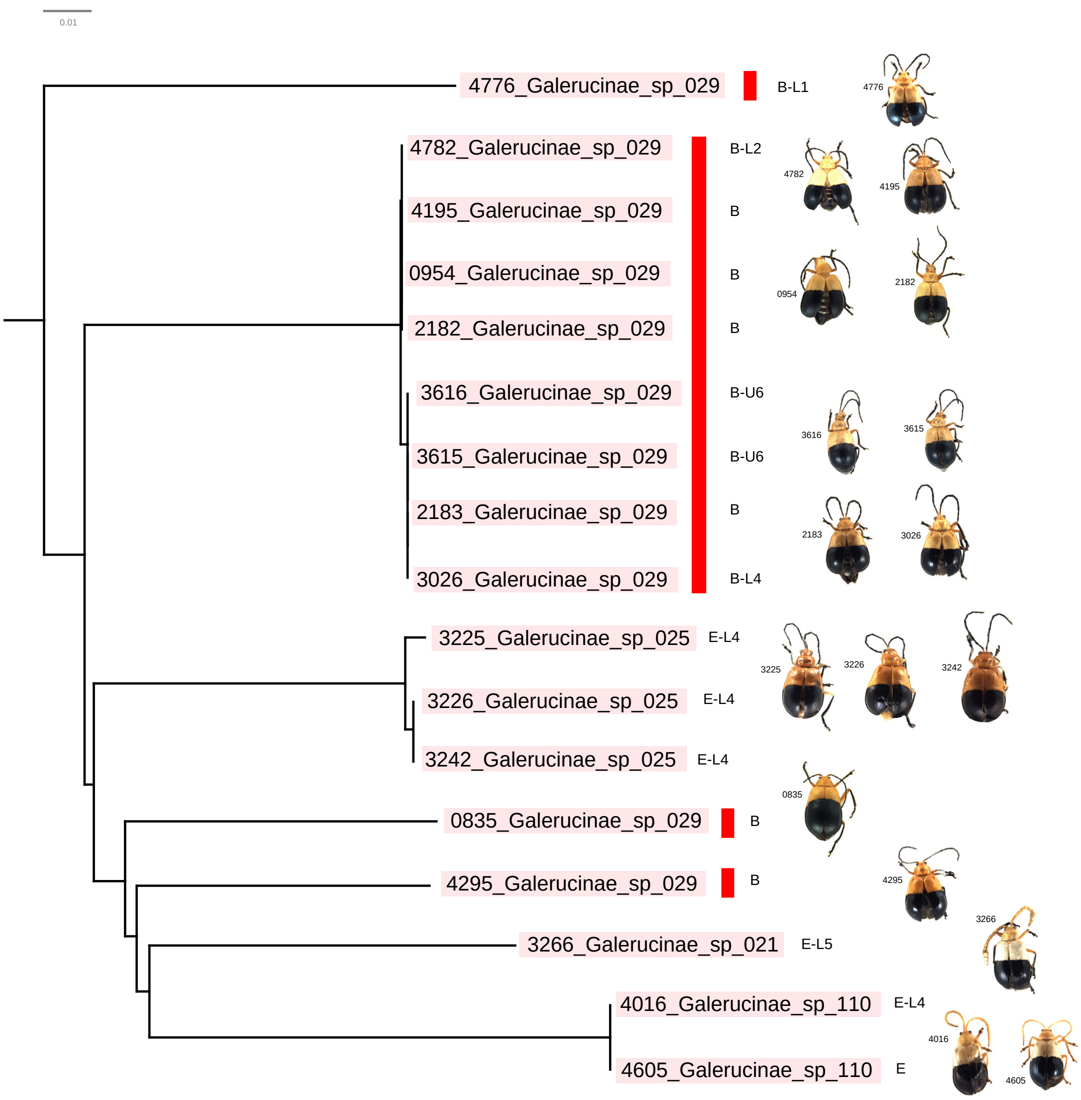


Figure 5.4: **Splitting of the morphospecies Galerucinae sp. 029 into four MOTUs.** Abbreviations behind the individuals indicate the sampling area (B = Bombuscaro, E = ECSF), respectively the plot where the specimen was collected.

Alticinae spp. 051, 052, and 152 formed a monophyletic cluster with another orange (Alticinae sp. 056), a fawn (Alticinae sp. 213), and three black (Alticinae spp. 063, 103, 194) morphospecies (Fig. 5.5). They were split into six, four, respectively two MOTUs, however other morphospecies were not lumped into these groups.

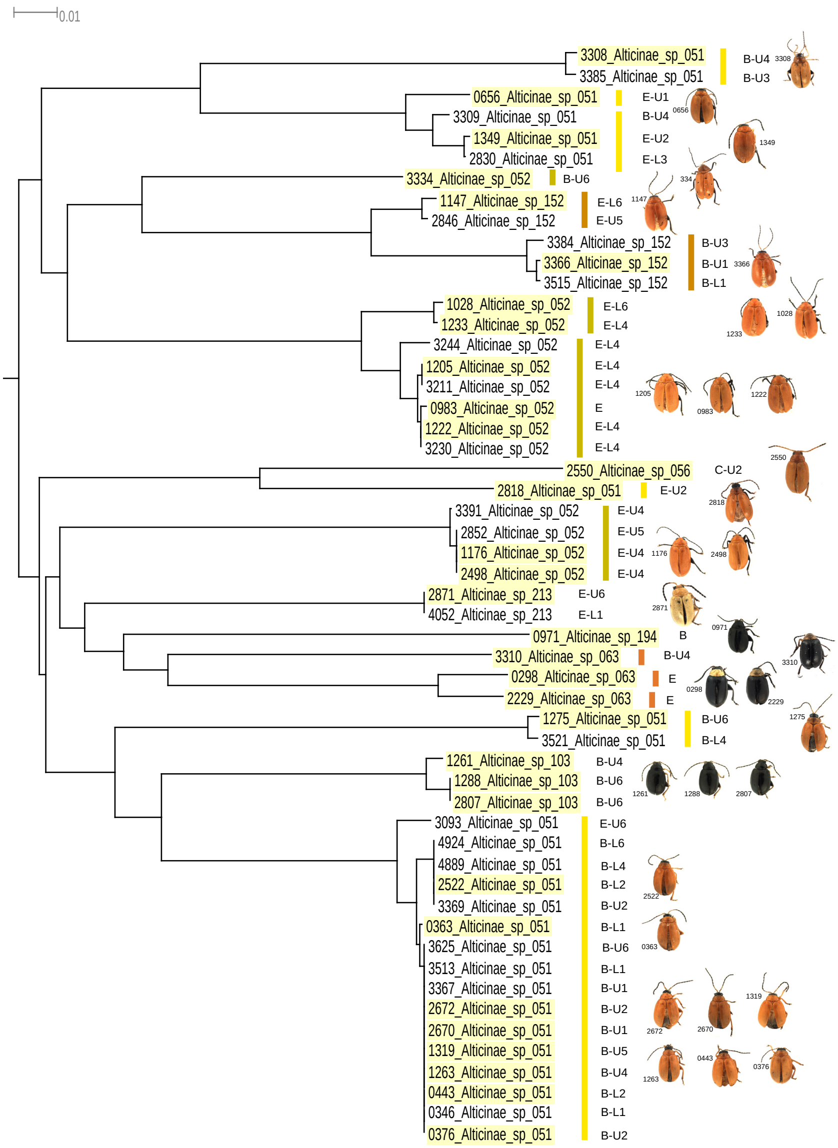


Figure 5.5: **Splittings within a group of several orange alticine morphospecies.** Coloured bars behind morphospecies names indicate splitting of the morphospecies into more than one MOTU. Abbreviations behind the individuals indicate the sampling area (B = Bombuscaro, E = ECSF, C = Cajanuma), respectively the plot where the specimen was collected.

Lumpings of morphospecies

Alticinae spp. 017, 048, 054, 071, and 203 that all have different colours belong to the same MOTU (Fig. 5.6). Likewise, Eumolpinae spp. 002, 005, and 014 are lumped by the molecular approach (Fig. 5.7).

Figure 5.6: **Five alticine species with different colours that belong to the same MOTU.** From left to right: Alticinae spp. 017, 048, 054, 071, and 203.

Figure 5.7: **Three eumolpine species with different colours that belong to the same MOTU.** From left to right: Eumolpinae spp. 014, 002, 002, and 005.

Galerucinae spp. 051, 052, 055, 056, and 087 show four different colourations but belong to the same MOTU. Also Galerucinae spp. 015 and 079 with two different patterns belong to one MOTU (Fig. 5.8A, B). Galerucinae spp. 065 and 090 that have different colour patterns belong to the same MOTU but within the MOTU the specimens with the respective pattern clustered (Fig. 5.9). Galerucinae sp. 065 (two individuals) occurs at 2000 m, and Galerucinae sp. 090 (two individuals) at 1000 m. Also the specimens of Galerucinae spp. 092, 024, and 059 belong to the same MOTU but form two distinct clusters (Galerucinae sp. 092 distinct from Galerucinae spp. 024 and 059) (Fig. 5.10). On the other hand, specimens with different colours or patterns may even share the same haplotype e.g. Galerucinae spp. 070 and 084 (Fig. 5.11).

Figure 5.8: **Galerucine morphospecies with different colourations that belong to the same MOTU.** A: Galerucinae spp. 052, 055, 056, and 087 (from left to right). B: Galerucinae sp. 015 (left), Galerucinae sp. 079 (right).

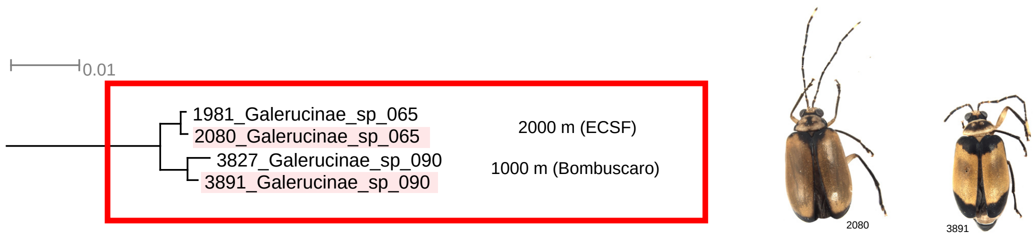


Figure 5.9: **Two galerucine morphospecies with two different patterns that were found at different elevational levels cluster in the same MOTU.**

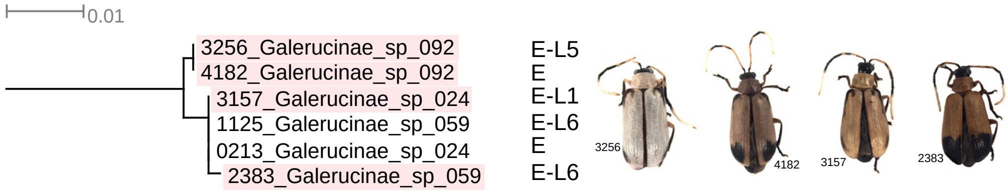


Figure 5.10: **Specimens of three galerucine morphospecies form two distinct clusters within one MOTU.**

Figure 5.11: **Two galerucine specimens show different colouration despite of sharing the same haplotype.** Specimen 0463_Galerucinae_sp_070 (left), specimen 3038_Galerucinae_sp_084 (right).

Precarious taxa
Several cases of discrepancy between morphospecies and MOTUs were found in a certain group of large Alticinae (~5–11 mm) characterized by a pronotum with a broad margin (Fig. 5.13). Many of them show striking patterns with a partly broad variance between individuals. The group contains morphospecies that were split and lumped at the same time (Alticinae sp. 149) and several cases of colour dimorphism (Alticinae spp. 002, 007, and 218; Alticinae spp. 005 and 163; Alticinae spp. 222 and 155; Alticinae spp. 037 and 039). Noteworthy are the patterns of Alticinae spp. 163, 155, and 222: They are very similar to those of certain galerucine species (Galerucinae sp. 029, respectively Galerucinae spp. 005 and 011; see Figs. 5.4 and 5.14). Alticinae sp. 155 and Galerucinae sp. 005 share an eye-spot pattern. It is to note that an eye-like pattern is also found in some cassidines: Cassidinae spp. 009, 010, and 011 have an eye-like appearance in their general habitus (Fig. 5.12).

Figure 5.12: **Three cassidine species with an eye-like appearance in their habitus.** From left to right: Cassidinae spp. 009, 010, and 011.

A challenging group concerning morphospecies sorting was a group of Galerucinae most probably belonging to the genus *Diabrotica*. They have a similar body-shape and a variety of striking colours and patterns confounding morphospecies sorting (Fig. 5.14). Many splittings occurred in a group of slender Galerucinae that are all dark blue or green and have an orange to yellow pronotum and head (only Galerucinae sp. 032 has a black pronotum and head) (Fig. 5.15). Several of them have also orange legs and antennae.

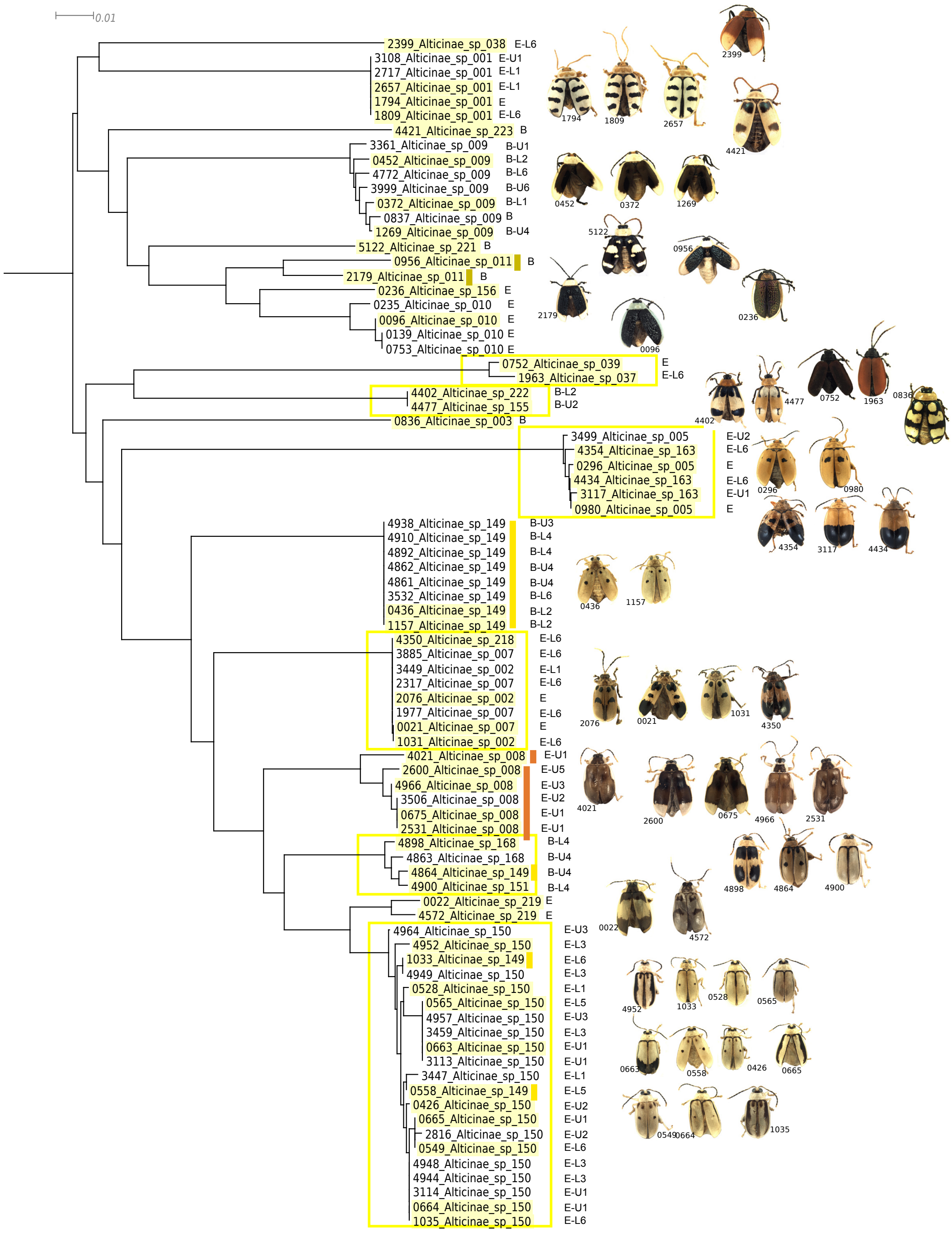


Figure 5.13: **Splittings and lumpings within a group of several large alticine morphospecies.** Coloured bars behind morphospecies names indicate splitting of the morphospecies into more than one MOTU; morphospecies that are lumped into one MOTU are bordered by a coloured box. Abbreviations behind the individuals indicate the sampling area (B = Bombuscaro, E = ECSF, C = Cajanuma), respectively the plot where the specimen was collected.

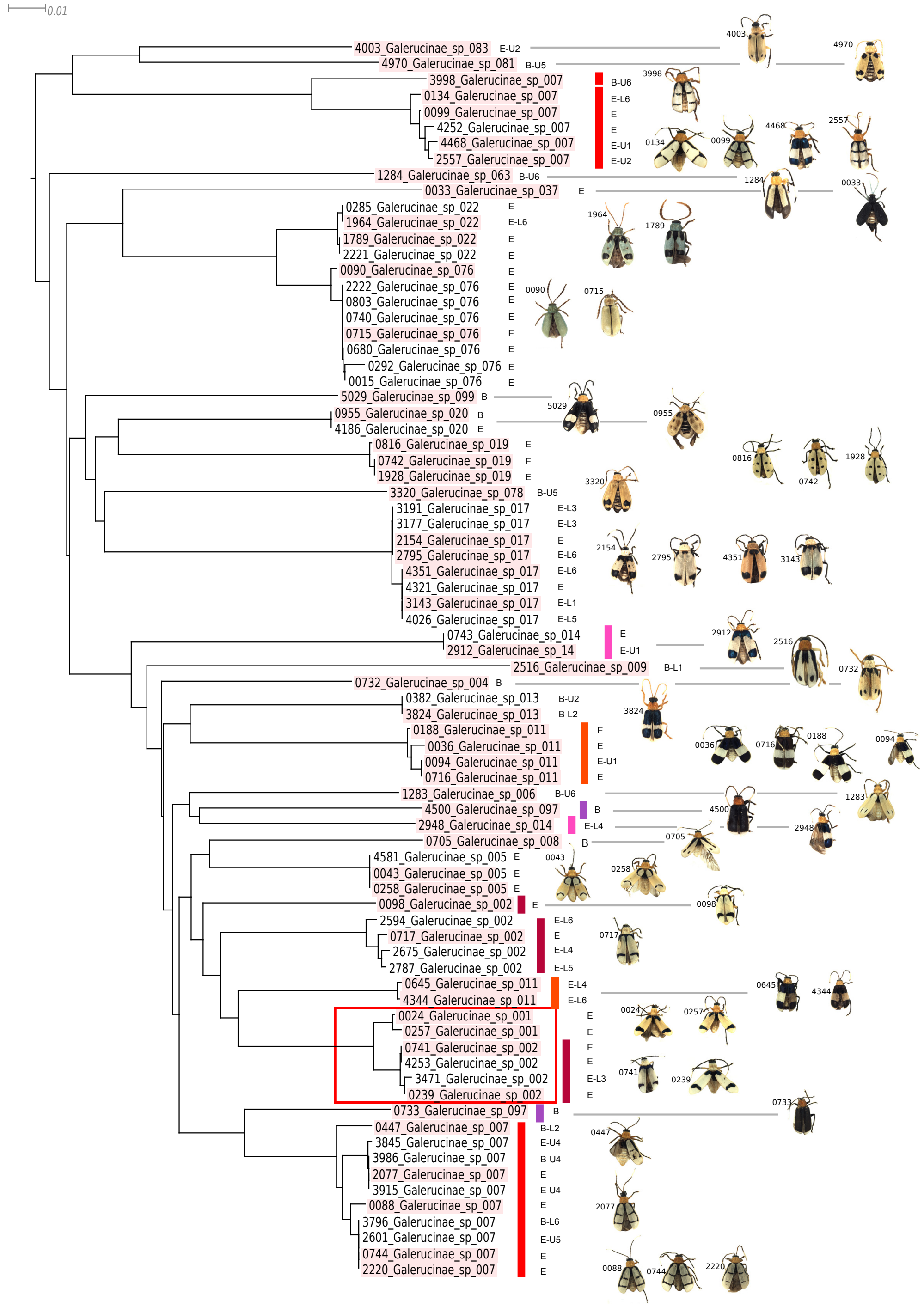


Figure 5.14: **Splittings and lumpings within a group of galerucine morphospecies, presumptively diabroticites.** Coloured bars behind morphospecies names indicate splitting of the morphospecies into more than one MOTU; morphospecies that are lumped into one MOTU are bordered by a coloured box. Abbreviations behind the individuals indicate the sampling area (B = Bombuscaro, E = ECSF, C = Cajanuma), respectively the plot where the specimen was collected.

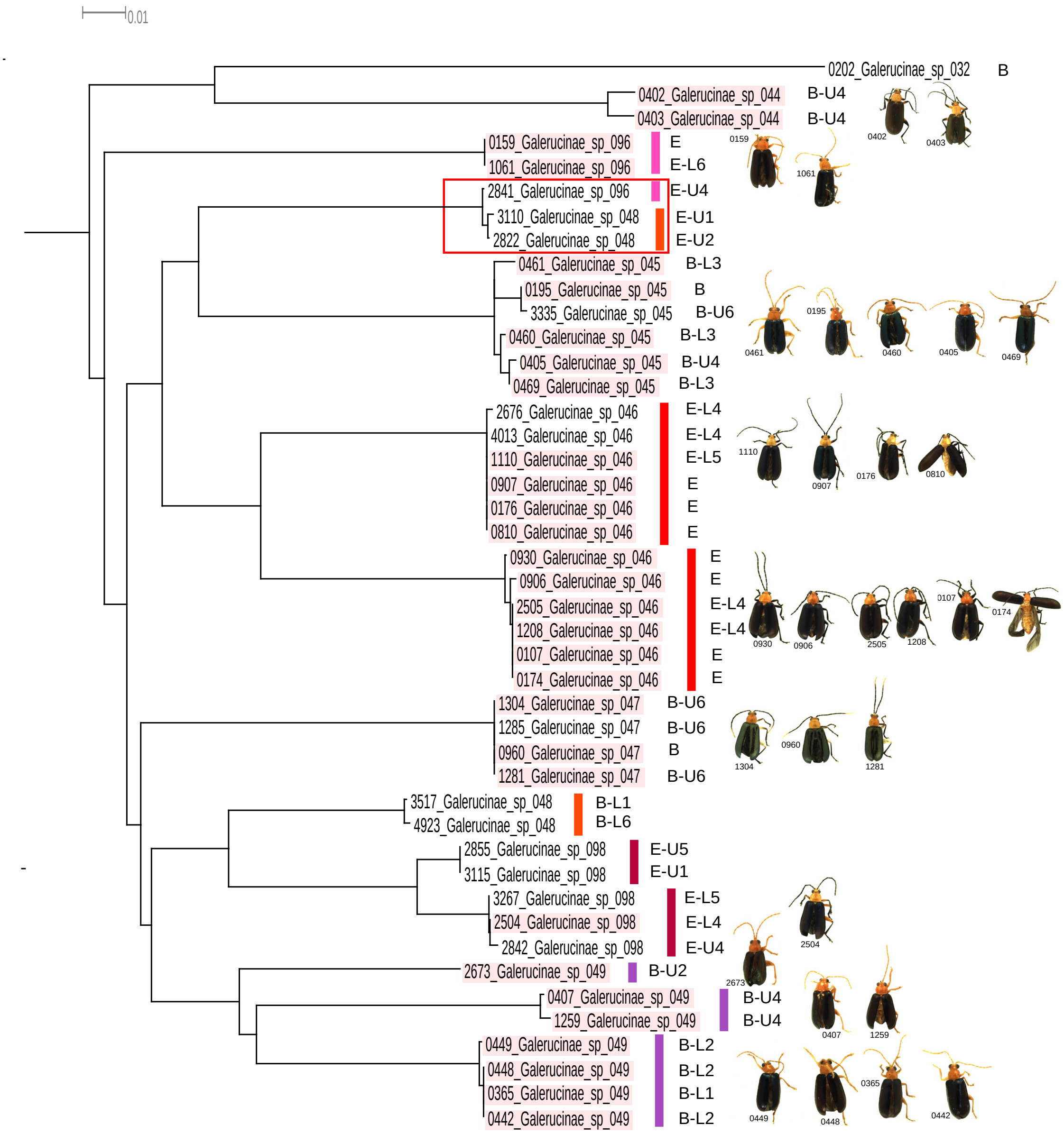


Figure 5.15: **Splittings and lumpings within a group of several galerucine morphospecies that are dark blue or green and have an orange to yellow pronotum and head.** Coloured bars behind morphospecies names indicate splitting of the morphospecies into more than one MOTU; morphospecies that are lumped into one MOTU are bordered by a coloured box. Abbreviations behind the individuals indicate the sampling area (B = Bombuscaro, E = ECSF, C = Cajanuma), respectively the plot where the specimen was collected.

5.4 Discussion

Splittings of morphospecies

The splitting of morphospecies into two or more MOTUs may arise due to several reasons: cryptic diversity, too liberal morphospecies sorting / a too restrictive molecular approach, mistakes in morphospecies sorting, and mistakes during sequencing or sequence analyses.

Cryptic diversity: Cryptic species are two or more distinct species that have been classified as a single species because they are at least superficially morphologically indistinguishable (Bickford et al., 2007; Pfenninger and Schwenk, 2007). In some taxa, cryptic species can be discriminated by differences in mating pheromones or behaviour, e.g. mating calls (Haruyama et al., 2008), however, the increasing availability of DNA sequence data has become a valuable tool for detecting cryptic diversity fuelling research on this phenomenon (Bickford et al., 2007; Hebert et al., 2004). Nowadays, a high proportion of newly described species is being discovered in cryptic complexes (Ceballos and Ehrlich, 2009). Cryptic diversity is widely distributed in most types of organisms and habitats (Bickford et al., 2007) and is also found in Chrysomelidae (Laroche et al., 1996; McKenna and Farrell, 2005; Takano et al., 2011). The unexpected high genetic diversity within species has implications for estimates of biodiversity and potentially for future conservation decisions (Bickford et al., 2007; Witt et al., 2006). In herbivorous insects, cryptic diversity may concern host plants (Blair et al., 2005).

Galerucinae sp. 028 that was split into three MOTUs (Fig. 5.3) might be an example for cryptic diversity, likewise Galerucinae sp. 029 that was split into four MOTUs forming a monophyletic cluster (Fig. 5.4). Cryptic diversity is also found within the orange Alticinae (spp. 051, 052, and 152) that are split into six, four, respectively two MOTUs (Fig. 5.5). Their lack of conspicuous external features seems to hamper the distinction of species.

In most cases of splittings, the resulting MOTUs were next to each other in the NJ-Tree or at least very close, sometimes containing also other morphospecies. In Eumolpinae, Cassidinae, Hispinae, and Chrysomelinae all split morphospecies were split into MOTUs next to each. They are probably sister species. So, usually it seemed to be closely related species that have not been separated by the morphospecies sorting (e.g. Eumolpinae sp. 007, Galerucinae sp. 038, Hispinae sp. 025).

Eumolpinae sp. 024 was split into two MOTUs, one of which (23 individuals) occurred only at Bombuscaro, the other one (two individuals) at ECSF. It is an example for very similar species or cryptic species that occur at different altitudinal levels. They are possibly two recently ecologically diverged species that do not yet have differentiated morphologically.

The term cryptic diversity / cryptic species as used in this study acknowledges that there might be morphological differences but they were not recognized during the applied superficial morphospecies separation. A further taxonomic analysis and dissection of genitalia would possibly resolve those cases.

Too liberal morphospecies sorting / a too restrictive molecular approach: Characters of different but related species might be taken as intraspecific variation. Sequence data can help to discover the real significance of slight morphological variation. On the other hand, the molecular species delimitation methods could be too restrictive and overestimate sequence differences, e.g. the genetic distance in COI could be within the range of intraspecific variance. With the applied approach it cannot be told whether the morphospecies or the MOTUs represent true species. The use of another marker could give more information.

Mistakes in morphospecies sorting: In this case, specimens have been erroneously grouped into the same morphospecies because differences have not been noticed.

Mistakes during sequencing or sequence analyses: Contaminations of DNA-samples cannot be excluded and due to the high number of analysed specimens, the risk of erroneous assignment or denotation of sequences, specimens, and names is given, too. However, all cases with hints at such errors (e.g. conspicuously different individuals sharing the same haplotype) have been rigorously excluded prior to analyses.

Lumpings of morphospecies

There are several reasons for lumpings of morphospecies into one MOTU: sexual dimorphism, intraspecific morphological variability / polymorphism, too strict morphospecies sorting / insufficient resolution of the molecular approach, mistakes in morphospecies sorting, mistakes during sequencing or sequence analyses. Sexual dimorphism and intraspecific morphological variability / polymorphism may cause erroneous sorting of conspecific individuals into different morphospecies. The molecular method will unite those morphospecies into one MOTU.

Sexual dimorphism: Morphological differences between males and females occur in many animal species (Emlen and Nijhout, 2000; Lande, 1980; Poissant et al., 2010; Shine, 1989). Especially a difference in body size (sexual size dimorphism) is a widespread phenomenon (Fairbairn, 2005; Stillwell et al., 2010).

Beetles contain a large number and a great diversity of sexually dimorphic species (Kawano, 2006) ranging from inconspicuous dimorphism to highly developed male traits such as the horns of rhinoceros beetles (Scarabaeidae: Dynastini), the enlarged mandibles of Lucanidae (e.g. *Cyclommatus elaphus* Gestro) or some Cerambycidae (e.g. *Macrodontia cervicornis* L.), or elongated legs of e.g. long-arm beetles (Scarabaeidae: Euchirinae) (Emlen and Nijhout, 2000; Kawano, 2006).

In Chrysomelidae, there are several forms of sexual dimorphism: Mandibular sexual dimorphism is frequent in leaf beetles (Reid and Beatson, 2013), as well as tarsal specialization (Hammack and French, 2007; Voigt et al., 2008) or modified antennae (Mohamedsaid, 2004). Modified male antennal segments that occur especially in Galerucinae are larger in size and differ from the usual shape of unmodified antennae (Maulik, 1932; Mohamedsaid, 2004). Galerucinae sp. 022 could be an ex-

Figure 5.16: **Different shape of antennae in two individuals of Galerucinae sp. 022.**

ample for sexual dimorphic antennae (Fig. 5.16). Generally, in Galerucinae strongly expressed sexual dimorphism is common with abundant secondary sexual modifications of head, thorax, abdomen and appendages (Mohamedsaid and Furth, 2011; Reid and Beatson, 2013). In contrast, in some subfamilies (e.g. Criocerinae) there is little external sexual dimorphism (Reid and Beatson, 2013).

Certain male modifications in Cassidinae s.l. are associated with behaviour: *Acromis sparsa* Boheman males use elongated corners of the elytra to flip over rivals (Windsor, 1987) and in several hispoid genera a head elongation is used for dislodging rival males (Beaman (1980), cited in Chaboo (2007); Reid and Beatson (2013)).

The sexual dimorphism in Chrysomelidae is often subtle, not affecting the characters considered for morphospecies separation (e.g. mandibles: Reid and Beatson (2013); tarsi: Hammack and French (2007)). Therefore it is less likely to affect morphospecies sorting in this study.

Polymorphism: Phenotypic plasticity (the ability of a single genotype to produce more than one alternative form of morphology, physiological state, and/or behaviour in response to environmental conditions; West-Eberhard (1989)) and emerging from this polymorphism (existence of morphologically distinct alternatives in a population; West-Eberhard (1989)) are quite common in insects and also Chrysomelidae (Verma and Kalaichelvan, 2004; Whitman and Agrawal, 2009).

Often, polymorphism concerns colouring and patterns. As in many other insect groups, intraspecific variation in elytral colour pattern is considerable in Chrysomelidae (Verdyck et al., 1996) and although most species of leaf beetles are not polymorphic for body colour and elytral markings, some of them show different morphs (Petitpierre, 1988).

Whereas the frequency of the two colour forms in *Chrysolina aurichalcea* Mannerheim correlates with altitude in mountainous areas (Fujiyama, 1979; Fujiyama and Arimoto, 1988), the colour pattern polymorphism in *Chelymorpha cribraria* Fabricius (Cassidinae) with eight different phenotypes is explained by mimicry (Vasconcellos-Neto, 1988). The case of Galerucinae spp. 065 and 090 that have different colour patterns and form two distinct clusters occurring at different elevational levels (Fig. 5.9) does indicate ecological speciation.

Another case where specimens belonging to the same MOTU where assigned into different morphospecies due to colour-polymorphism concerns Alticinae spp. 017, 048, 054, 071, and 203. Due to the different colours of the specimens, the morphological similarity that indicates belonging to the same morphospecies has been overlooked (Fig. 5.6). In a large data set with hundreds of species it is likely to overlook similarities. Barcoding may reveal those similarities that then can be confirmed by a direct comparison of specimens or morphospecies to preclude errors or contaminations. Another example where specimens due to colour-polymorphism are sorted into erroneous morphospecies that are lumped by the molecular approach are Eumolpinae spp. 002, 005, and 014 (Fig. 5.7). Other examples of colour-polymorphism confounding morphospecies sorting are Galerucinae spp. 051, 052, 055, 056, and 087 that show three different colourations but belong to the same MOTU and Galerucinae spp. 015 and 079 with two different patterns (Fig. 5.8A, B).

From published literature other known prominent cases of colour polymorphisms in Chrysomelidae are e.g. *Chrysomela lapponica* L. (Gross et al., 2004; Zvereva et al., 2002), *Plateumaris sericea* L. (Kurachi et al., 2002), *Phyllotreta cruciferae* Goeze (Verdyck et al., 1996), and *Chrysophtharta agricola* Chapuis (Nahrung and Allen, 2005) (Nie et al., 2012). Also the Colorado potato beetle *Leptinotarsa decemlineata* Say shows polymorphism (Verma and Kalaichelvan, 2004).

It is noteworthy that beside colour polymorphism, also the phenomenon of *colour change* has been observed in Chrysomelidae: Maybe unique among insects, adult cassidines of certain species are able to reversibly change their structural, metallic colours within minutes (Barrows, 1979; Manson, 1929). This behaviour was observed during mating or was caused by disturbance in *Charidotella* (=*Metriona*) *bicolor* Fabricius (Barrows, 1979). There is also colour changing in phases during the life cycle, e.g. in *Physonotha helianthi* Randall (Cassidinae) (Kirk, 1971). Although most frequently occurring in Cassidinae, there is also colour change in individual species of Chrysomelinae and Alticinae (Buzzi, 1988).

Polymorphism is not only restricted to colouring and patterns. For example there is also wing polymorphism in Chrysomelidae (Furth, 1980) or polymorphism regarding the ability to use an atypical host plant (de Jong and Nielsen, 1999).

Too narrow morphospecies sorting / a too liberal molecular approach: Specimens have been assigned to different morphospecies based on differences that only represent intraspecific variation. It can also be the case that COI does not provide sufficient resolution.

In a few cases, when two or more morphospecies were lumped into one MOTU, the specimens of each morphospecies formed separated clusters within the MOTU. Here, a more restrictive molecular analysis (e.g. using a very low distance threshold) would have recovered the morphospecies. However, usually lumped morphospecies did not form distinct clusters when placed in one MOTU. Erroneous sorting into different morphospecies occurred due to colour-polymorphism, overlooking of morphological similarities, or misinterpretation of intraspecific variability. When morphospecies showed a distinct colour-dimorphism or different patterns, this was usually not reflected in the genetic distances. Specimens with different colours or patterns may even share the same haplotype (e.g. Galerucinae spp. 070 and 084; Fig. 5.11). On the other hand, in some cases, morphospecies with different colouring or pattern were lumped into one MOTU but within the MOTU the specimens with the respective pattern clustered, e.g. Galerucinae spp. 065 and 090 (see Fig. 5.9) or Galerucinae spp. 092, 024, and 059 (Galerucinae sp. 092 distinct from Galerucinae spp. 024 and 059; Fig. 5.10).

Mistakes in morphospecies sorting: Due to the large amount of species and specimens there is the probability of an erroneous assignment of a specimen into a new morphospecies instead of assigning it to an already existing one. In this case the molecular approach of course lumps those (erroneous) morphospecies into one MOTU.

Precarious taxa

In the group of large Alticinae with the pronotum with a broad margin (Fig. 5.13), the discrepancies are mainly caused by the striking patterns with a partly broad variance between individuals and several cases of colour dimorphism.

A challenging group concerning morphospecies sorting was a group of Galerucinae most probably belonging to the genus *Diabrotica*. Diabroticites are New World Chrysomelidae that include several significant agricultural pests (Hammack and French, 2007). The diabroticites in the data set had a similar body-shape and a variety of striking colours and patterns confounding morphospecies sorting (Fig. 5.14). Certain patterns are found in different morphospecies and MOTUs, at the same time individuals of one morphospecies or MOTU can show more than one of those patterns.

The manyfold splittings within the blue or green galerucines with orange to yellow pronotum and head (Fig. 5.15) can be explained by the similarity of body shape and colouring that complicated morphospecies sorting. Within this group morphospecies sorting maybe was too liberal with features indicating belonging to different species being interpreted as intraspecific variation.

Some patterns of alticine species (spp. 163, 155 and 222) are very similar to those of certain galerucines (Galerucinae sp. 029 respectively Galerucinae spp. 005 and 011; see Figs. 5.4 and 5.14). There have been cases observed where galerucine and criocerine species share the same colouring. This could be explained by mimicry where species imitate toxic or unpalatable species (Balsbaugh, 1988). Eye-spot patterns that are found in Alticinae sp. 155 and Galerucinae sp. 005 are widely distributed among insects and other animals as well (Balsbaugh, 1988). There are several examples of Chrysomelidae with eye-like markings which could be involved in eye-spot mimicry (Balsbaugh, 1988). Several Neotropical cassidine species have an eye-like appearance in their general habitus as it is found in Cassidinae spp. 9, 10, and 11 (Fig. 5.12; Balsbaugh (1988); Sekerka and Windsor (2012)).

5.5 Conclusions

Although biodiversity can be assessed at different levels of classification, the significance of the species as a biological unit is widely recognized and for ecological studies based on invertebrate data species richness and species turnover are important measures (Gaston, 2000; Oliver and Beattie, 1996). Therefore, it is reasonable that the morphospecies as well as the MOTUs are at species-level. In this regard, the morphospecies- as well as the barcode approach are facing the same challenge: to decide where to draw a line between species using character differences. Using sequence data, it must be decided if e.g. differences in genetic distances (Meier et al., 2006) or in branching rates (Pons et al., 2006) are used to delimit species and which values allow assigning of specimens to different species. Different molecular species delimitation methods (Distance-based clustering: Barrett and Hebert (2005); Blaxter et al. (2005); Statistical parsimony analysis: Templeton (2001); Templeton et al. (1992); Generalized mixed Yule-coalescent (GMYC) modelling: Monaghan et al. (2009); Pons et al. (2006); Poisson tree processes (PTP) modelling: Zhang et al. (2013)) are described in Chapter 6 where also their performance and influence on species richness estimates is evaluated. In analogy, the taxonomist or parataxonomist uses morphological characters. As in molecular species delimitation, it must be decided how small or large the differences in those characters must be to assign specimens to the same or to different species.

Exacerbating the morphospecies approach is that external morphological differences are not always categorical (e.g. number of spines) but gradual (e.g. width of pronotum). Furthermore, an experienced taxonomist or parataxonomists has an eye or intuition e.g. for the significance of certain shapes of body or body parts. The problem is that his decisions are not always open to scrutiny and replicable by third persons in the same way (Krell, 2004). In addition, different persons might interpret differences differently: They may be less or more strict, i.e., based on visible differences they may separate or fuse two morphospecies (so-called 'splitters' or 'lumpers'). In contrast, all molecular species delimitation methods, disregarding their particular advantages and disadvantages, have the merit that they are third-party-verifiable and comparable among sites, and they can be applied irrespective of a person's taxonomic knowledge.

Another advantage of DNA barcoding is that it may reveal cryptic diversity that otherwise remains undiscovered. It also performs well in cases were morphospecies sorting is confounded by pronounced intraspecific variation in colour, shape, or size. Additionally, when a huge amount of specimens and species is handled, the probability increases that a specimen is assigned erroneously to a new morphospecies and it is overlooked that this morphospecies already exists. Especially in species that are small and/or lack conspicuous external characters barcoding is a useful tool to complement morphospecies sorting. Its inclusion, especially in large, specimen- and species-rich data sets is advisable, if possible, as it can facilitate morphospecies sorting and can result into a more accurate species delimitation. The collection and storing of barcode data in taxonomic databases together with information as comprehensive as possible (e.g. photos, sound records) will facilitate future identification. The general accessibility of information is supposed to be an advantage of DNA barcoding (Hebert and Gregory, 2005; Savolainen et al., 2005).

DNA barcode data can be used to infer biodiversity patterns in a similar way as morphospecies data (see Chapter 4) and thus provides a variety of information even without the species being exactly identified and described. Mass-sequencing methods completely rely on sequence data alone and provide a considerable saving of time (Ji et al., 2013; Yu et al., 2012). However, in most cases a combined voucher-based morphospecies and barcode workflow is desirable and necessary. Morphological and molecular approaches should be seen as a feedback loop with both analyses profiting from each other (Page et al., 2005). When an unknown fauna with many probably undescribed species is studied, barcode data might give valuable information about its diversity, but at least in the longer term it is necessary that the species are taxonomically identified and described. This is important as for conservation decisions it is necessary to not only compile species-lists and inventories but also to understand the species' ecology. Although the species' ecology can be studied without valid names, the taxonomic identification, species description, and naming allow the connection with existing knowledge and therefore comments on endemism or threat levels to specific species, for instance (Samways et al., 2010; Schlick-Steiner et al., 2010).

In addition, the voucher-based workflow provides the possibility to check for contaminations or errors in sequencing or naming. It should also be kept in mind that there is the possibility that COI might not be able to discriminate between certain species. It is only one of several possible markers, with advantages and shortcomings (see Chapter 2.4). Sometimes it may be advisable to include other markers than COI into analyses.

It is noteworthy that an advantage of the morphospecies sorting in comparison with barcoding is its possible application for each specimen of the data set (provided that the specimen is not damaged). In contrast, there are cases where for some individuals no barcode can be obtained. It may also be, that when specimens are sequenced individually via Sanger sequencing, usually due to financial restrictions a selection must be chosen and not all specimens can be barcoded. Therefore, in a certain way, the morphospecies approach may also provide additional information not given by the barcode approach, an aspect that also supports the combination of morphospecies sorting and barcoding.

A large amount of singletons/uniques in the data set is disadvantageous for morphospecies as well as molecular approaches: Morphospecies assignment is easier with long series of specimens (Charles and Bassett, 2005) and most techniques for molecular species delimitation consider rarity insufficiently (Lim et al., 2012).

Chapter 6

Comparison of rapid species delimitation methods and their influence on species richness estimates

6.1 Introduction

Species richness is an important measure in biodiversity research and conservation biology. At a global level, as well as at a local level where diversity of communities is assessed and compared, often the first intuitional question is 'How many species are there?'. Besides, knowledge of species numbers is important for providing a reference point to estimate biodiversity loss (Mora et al., 2011). There is still debate about the total number of species living on Earth. While estimates range from 3.6 to 100 million species, most probable is a number between 5 and 15 million (Chapman, 2009; May, 2000, 2010; Mora et al., 2011; Wilson, 2003). Only a small percentage of them has been formally identified and named (Chapman, 2009; Grove and Stork, 2000; Mora et al., 2011; Wilson, 2003).

It is widely accepted that the most species-rich ecosystems are in the tropics, especially the tropical rainforests (Connell, 1978; Corlett and Primack, 2011; Dirzo and Raven, 2003; Novotny et al., 2006; Wilson, 1988; Wright, 2002), and furthermore, that arthropods with ~1.1 million named distinct species make up the largest fraction of all species on Earth (Chapman, 2009). Therefore, efforts to estimate the total number of species are often based on tropical arthropods, especially tropical beetles (Grove and Stork, 2000; Hamilton et al., 2010; May, 2010). Beetles are extremely rich both in functionality and species numbers, making up about one-quarter of all species on Earth (Hunt et al., 2007; Ødegaard, 2000). Since Erwin's (1982) spectacular estimation based on the number of beetle species associated with an individual tropical rainforest tree species, numerous studies led to widely varying estimates of global insect species numbers (Pimm et al., 1995; Stork, 1988, 1993). Those between four and six million arthropod species seem the most probable ones (Basset et al., 2012; Hamilton et al., 2010, 2013; Novotny et al., 2002b). Global and regional insect diversity estimates have been often plant-based, i.e. the number of plant species is multiplied by the number of insect species effectively specialized to them (Novotny and Miller, 2014). Especially herbivorous beetles, including

Chrysomelidae, and their degree of host-specificity have played a fundamental role in species number estimates (Erwin, 1982; Ødegaard, 2000).

At a local level where diversity of assemblages is assessed and compared, the number of species is an intuitive and natural index of community structure (Gotelli and Colwell, 2011). However, despite the familiarity with species richness, analysis of this variable is complex (Gotelli and Colwell, 2011). Species are important biological units and the 'currency' of conservation biology (Agapow et al., 2004). There are several species concepts and debates on how a species should be defined (for overviews see e.g. Mayden (1997); Wägele (2005)). Different species concepts may lead to different species numbers and have potential impact on decisions of conservation management (Agapow et al., 2004). However, it is not aim of this study to delve into this subject and to determine 'real' species. The focus is rather on the practical application of working units that are recognizable and resemble species but do not necessarily correspond exactly to species. Traditionally, morphospecies have been used as such units in studies where detailed taxonomic identification is prevented, e.g. in studies of tropical arthropod diversity (Basset et al., 2008; Longino and Colwell, 1997; Novotny et al., 2002a). Recently, such studies have also profited from DNA barcoding (Janzen et al., 2005, 2009). When an unknown diversity is studied, the interpretation of the sequences is crucial, i.e. how the sequences can be linked to species. There exist several methods for species delimitation, e.g. the use of genetic distances between sequences and a defined threshold to form molecular operational taxonomic units (MOTUs) or clusters, a method which is highly discussed due to the arbitrary choice of a threshold (Blaxter et al., 2005; Hebert et al., 2003a; Meier et al., 2006); statistical parsimony analysis grouping sequences into haplotype networks that are supposed to correspond to species (Hart and Sunday, 2007; Templeton, 2001); the Generalized mixed Yule-coalescent (GMYC)- and the PTP (Poisson tree processes) modelling, a deduction of species boundaries inferred from the data itself by identifying a shift in branching rates between coalescent and speciation (Monaghan et al., 2009; Pons et al., 2006; Zhang et al., 2013). The choice of delimitation method can have a smaller or larger effect on estimates of local and regional species richness.

In this study, a set of different sequence-based species delimitation methods is used to investigate the unexplored leaf beetle fauna in the study area. Resulting predictions of species diversity are compared to estimates from morphospecies sorting. It is evaluated how these different treatments might affect estimates of species richness.

So far, there is no information at all about leaf beetle diversity in the study area or in other regions of Ecuador. In general, leaf beetle diversity is severely understudied in most Neotropical countries (Costa, 2000). More information about leaf beetle research in Ecuador is given in Chapters 1.4 and 3. In contrast to the scarce taxonomic information available for this group, a high actual species richness of Chrysomelidae may be expected: The study area is part of a megadiverse biodiversity hotspot (Brummitt and Lughadha, 2003; Myers et al., 2000), where climates and habitat types change rapidly along elevational gradients resulting in a high turnover of communities (Brehm and Fiedler, 2003; Brehm et al., 2003a).

This study should be understood as a first glance on the Chrysomelidae fauna in the studied area and an estimation of species richness and differences between elevations. The focus is on the comparison of the different species delimitation methods. General diversity patterns and especially their change along the elevation gradient is analysed in detail in Chapters 3 and 4.

6.2 Methods

Study area and specimen sampling

Analysed leaf beetles represent a set of beetles sampled in November and December 2010 and between May and August 2011 (data set 4, see Chapter 2.5). Beetles were collected in the Reserva Biológica San Francisco (RBSF) and parts of Podocarpus National Park. Chapter 2.1 gives detailed information about the study area. Sampling was conducted at all three elevational zones (Bombuscaro: 1000 m a.s.l., ECSF: 2000 m a.s.l., Cajanuma: 3000 m a.s.l.); however, Cajanuma was sampled only marginally due to logistical reasons.

Chrysomelidae were collected by standardized sampling with sweep netting, beating, and hand-collection from the vegetation. To complete the overview of species diversity for DNA based species delimitation, standardized sampling was complemented with additional hand-collection and Malaise- as well as light-trapping collections (detailed information about sampling methods and design is given in Chapters 2.2 and 7).

One specimen (in some cases up to three specimens) of each preliminary morphospecies per sample was used for morphological sorting and molecular analysis. More detailed information about laboratory analyses and handling of the specimens is given in Chapters 2.3 and 2.4.

Specimens were sorted into morphospecies on the basis of external morphology but without genital dissection or the use of identification literature. Morphospecies were subsequently provided with the subfamily name and numbered (detailed information about morphospecies sorting is provided in Chapters 2.5 and 5).

Sequences were assembled and edited with Geneious version 5.4.4 (Biomatters Ltd.; http://www.geneious.com/) being subsequently aligned using the implemented MUSCLE algorithm (Edgar 2004). The default settings were retained except for the maximum number of iterations (maxiters) that were set to 500. A Maximum Likelihood (ML) Tree was generated in RAxML version 7.3.2 (Stamatakis, 2006) using a GTR+I+Γ model and 5000 bootstrap replicates. Three species of weevils (Coleoptera: Curculionidae; sequences were obtained from GenBank and BOLD) were chosen as outgroup taxa to root the tree (*Anthonomus eugenii* Cano, *Dichromacalles dromedarius* Boheman, and *Acalles camelus* Fabricius; Appendix Tab. C.1). They were not included in the further analyses. Branch lengths were made ultrametric with PATHd8 (Britton et al., 2007) using relative ages of nodes and setting the root to an arbitrary age of 1.

Sequence-based species delimitation

Four different sequence-based methods of species delimitation were used and results were compared with results obtained from morphospecies sorting:

Statistical parsimony analysis (Templeton, 2001; Templeton et al., 1992) as implemented in TCS v.1.21 (Clement et al., 2000) (95% connection limit) was used to group sequences into separate haplotype networks. These networks consist of closely related haplotypes connected by mutational paths free from homoplasy with a probability of 95% (Posada and Crandall, 2001; Templeton, 2001). TCS-networks have been shown in various studies to correspond reliably to species across a broad range of taxa (e.g. Ahrens et al. (2007); Astrin et al. (2012); Cardoso and Vogler (2005); Hart and Sunday (2007); Pons et al. (2006); Templeton (2001)). All entities that were given out by TCS were called haplotype networks, even though they may contain only one haplotype or haplotypes that are connected linearly and not necessarily by loops.

Distance-based clustering is, despite wide criticism (Cognato, 2006; Meier et al., 2006), widely used as it is fast and easy to apply (Barrett and Hebert, 2005; Blaxter et al., 2005). SpeciesIdentifier v.1.7.7-dev3 (Meier et al., 2006) from the TaxonDNA package (http://taxondna.sourceforge.net/) was used to generate clusters of sequences based on pairwise uncorrected distances at user-defined thresholds (function 'Cluster'). All individuals that are connected directly to each other by distances below this threshold are grouped into a cluster (Meier et al., 2006). Clusters may also contain individuals that are connected to each other indirectly, i.e. some distances may exceed the threshold (e.g. A–B: 2.9%, A–C: 2.9%; B–C: 4.8%) (Meier et al., 2006). Different threshold values of 3%, 5%, and 7.5% were tested. As optimal thresholds could not be unambiguously estimated with the underlying data set (Fig. 6.1), only the results of the 3%-threshold are presented. The 3%-threshold has been initially suggested in early barcoding studies by Hebert et al. (2003a) and is often used as standard in insect barcoding (e.g. Hendrich et al. (2010); Smith et al. (2005); Strutzenberger et al. (2011); Tänzler et al. (2012)). It was successfully used to discriminate beetle species of well-known faunas (Astrin et al., 2012; Raupach et al., 2010) and analyses of Papadopoulou et al. (2013) using a combination of mtDNA loci confirmed this value.

Generalized mixed Yule-coalescent (GMYC) modelling (Monaghan et al., 2009; Pons et al., 2006) as implemented in the SPLITS package (https://www.r-forge.r-project.org /projects/splits/) for the R environment (R Development Core Team, 2009) was used to estimate species boundaries directly from the phylogenetic tree (Monaghan et al., 2009; Pons et al., 2006) produced with COI data. This procedure exploits the differences in the rate of lineage branching at the level of species and populations, recognizable as a sudden increase of apparent diversification rate when ultrametric node height (distance to tips) is plotted against the log number of nodes in a lineage-through-time plot (Nee et al., 1992). Its likelihood is compared then with that of the null hypothesis assuming no shift in branching rate (no separate species), and subsequently the threshold value (time) is estimated which is the cut-

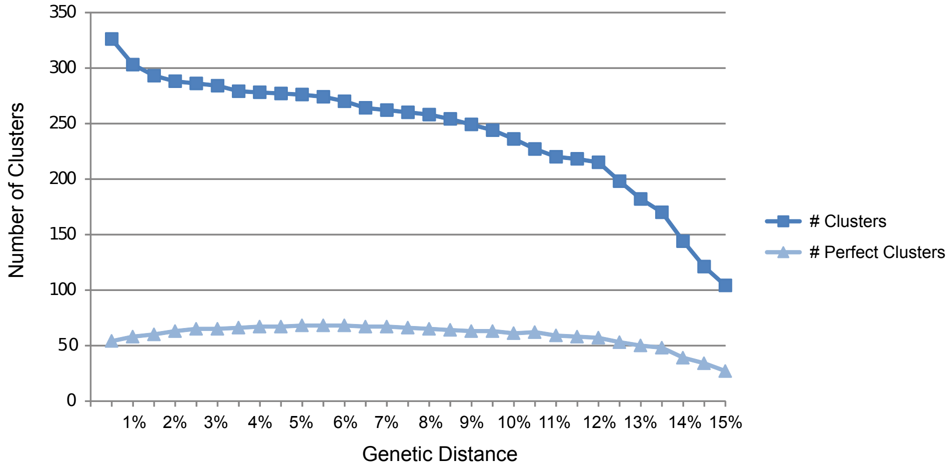


Figure 6.1: **Calibration of distance clusters with morphospecies to determine the best threshold.** Squares = number of delimited clusters, triangles = number of clusters congruent with morphospecies.

off point between speciation and coalescence (Fujisawa and Barraclough, 2013). As the single-threshold value does not differ significantly from the multiple-threshold value, the single threshold value was used for the input tree (Monaghan et al., 2009) which has been already applied successfully to selected groups of organisms (Ahrens et al., 2007; Astrin et al., 2012; Fontaneto et al., 2011; Monaghan et al., 2009; Papadopoulou et al., 2013; Pons et al., 2006).
Poisson tree processes (PTP) modelling was used as implemented on the PTP web server (http://species.h-its.org/ptp/) (Zhang et al., 2013). This method is similar to GMYC modelling but uses directly the number of substitutions instead of the time to identify branching rate transition points and therefore avoids the potentially error-prone process of making the tree ultrametric (Zhang et al., 2013).

Results of the different molecular species delimitation methods (haplotype networks, distance-, GMYC-, and PTP-clusters) are summed up in the term molecular operational taxonomic units (MOTUs). Additionally, haplotype diversity was inferred as a further independent measure for molecular diversity (Papadopoulou et al., 2011).

Species richness estimates

For species richness estimates only sweep netting, beating, and hand-collection samples were included, as light-trapping was conducted at Bombuscaro infrequently and Malaise-trapping not at all. The samples from Cajanuma were excluded because the area was significantly understudied. Because the sampled individuals result from the first field trips where the workflow just had to be developed, it was not possible to sample more frequently at Cajanuma due to logistic restrictions. The adverse weather conditions at each of the few sampling trips to Cajanuma contributed to the extremely low number of sampled specimens there.

Species accumulation curves were used to visualize the increase in total species diversity in relation to the number of analysed individuals and to check the completeness of the faunal survey. The method 'random' adds up the samples in a random order with 1000 iterations and calculates the mean ±95% confidence interval (Fig. 6.3), whereas the method 'collector' adds up samples in the order they appear in the data (Fig. 6.5). The expected total number of species was estimated using chao2 (Chao, 1987), and first- and second-order Jackknife estimator using the incidence-based estimation provided by the *specpool* function of the R package VEGAN 2.0-5 (Oksanen et al., 2012). These are widely used non-parametric estimators that use information on the rare species in an assemblage to estimate the minimum number of species in the assemblage (Gotelli and Colwell, 2011) and have found to perform well in several comparative studies on species richness estimation (Colwell and Coddington, 1994; Walther and Moore, 2005; Walther and Morand, 1998). As different estimators are sensitive to the properties of the assemblage and sampling design, a set of different estimators was used (Samways et al., 2010). Please refer also to Chapter 3.2.

As sampling effort was different between Bombuscaro and ECSF, species richness is hard to compare. To still get an assessment, the number of analysed individuals was standardized to allow comparison of mean species richness: A Jackknifing analysis was performed by randomly drawing 10,000 times 153 individuals (the number of individuals collected at Bombuscaro) from the individuals from ECSF and calculating mean and 95% confidence interval of these samples. For this procedure, the *sample* function of the R base was used within a simple loop.

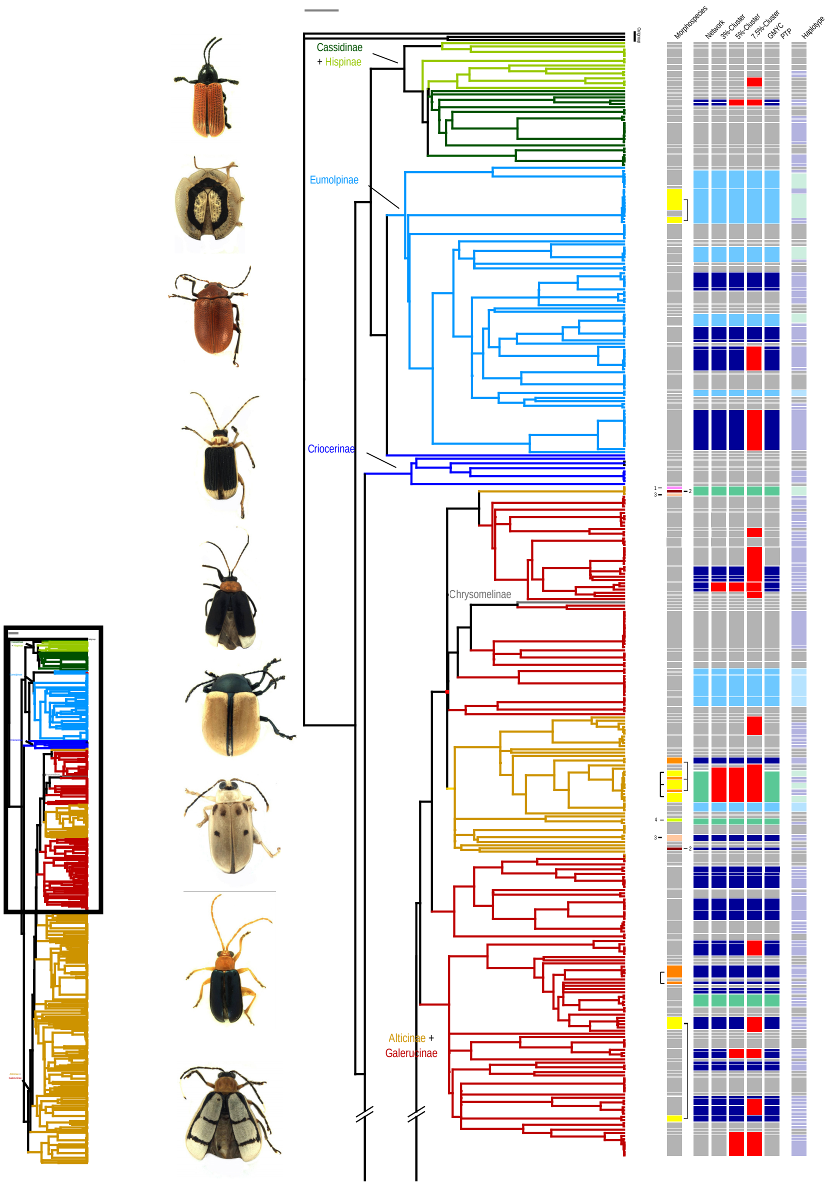
6.3 Results

General results

The 674 Chrysomelidae specimens belonged to seven different subfamilies: Galerucinae s.str. (represented by 163 specimens), Alticinae (371 specimens), Eumolpinae (90 specimens), Cassidinae s.str. (25 specimens), Hispinae (14 specimens), Criocerinae (ten specimens) and Chrysomelinae (one specimen). Specimens showed 426 different haplotypes. Galerucinae + Alticinae (= Galerucinae s.l.), Eumolpinae, as well as Cassidinae + Hispinae (= Cassidinae s.l.) formed monophyletic clusters in the COI Maximum Likelihood tree (Fig. 6.2), only Criocerinae appeared paraphyletic and the chrysomeline specimen was placed within the Galerucinae. This can be ascribed to the inaptitude of COI to resolve phylogenetic groups reliably. Galerucinae s.str. and Alticinae formed several well distinguished clusters within Galerucinae s.l.

Species delimitation

Morphospecies sorting resulted in a total number of 266 morphospecies. TCS-Network analyses led to a total number of 289 networks and distance-based cluster analyses to a number of 284 clusters. GMYC- and PTP modelling resulted in a


Outgroup
Morphospecies
Network
3%-Cluster
5%-Cluster
7.5%-Cluster
GMYC
PTP
Haplotype
Cassidinae
+ Hispinae
Eumolpinae
Criocerinae
Chrysomelinae
Alticinae +
Galerucinae

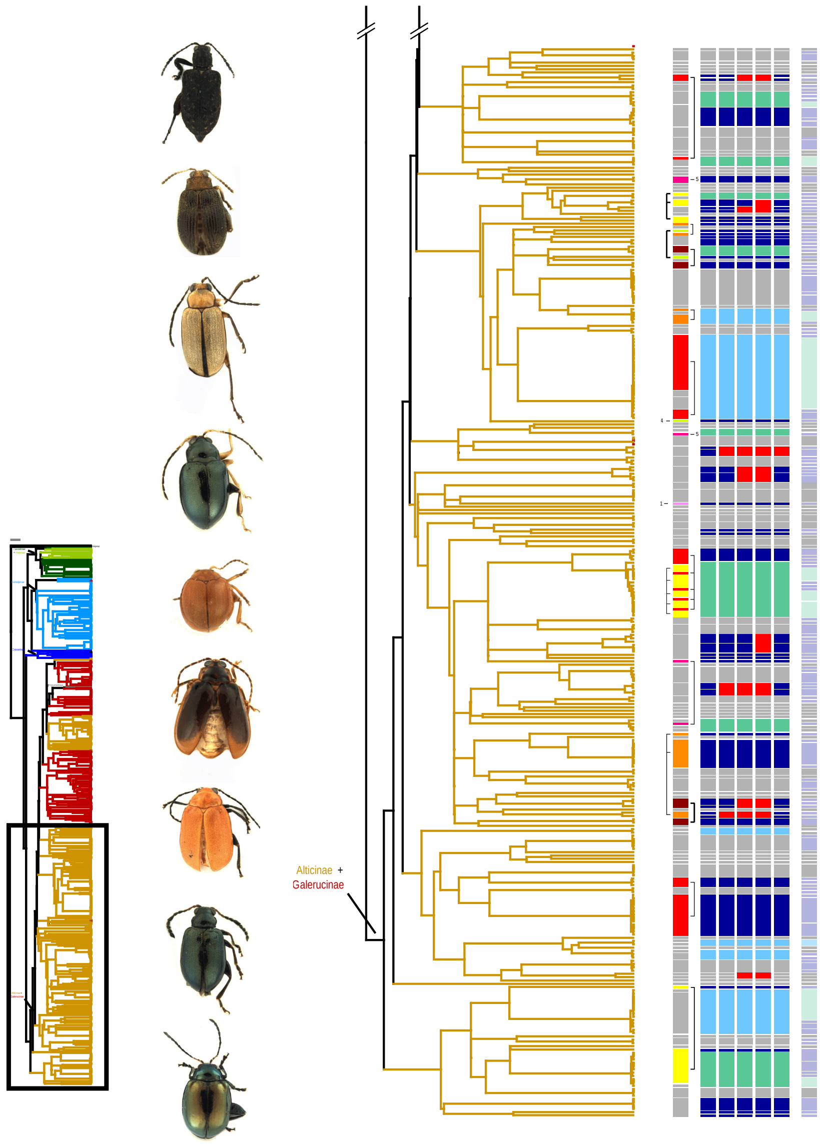


Figure 6.2: **ML-Tree providing an overview about morphospecies and MOTUs and differences between the methods.** Column 1: Split morphospecies are connected by brackets or numbers and share the same colour. Columns 2–6 + 7: MOTUs (Networks, 3%-, 5%-, 7.5%-, GMYC-/PTP-clusters) and haplotypes splitting a morphospecies are indicated by dark blue fields, those lumping morphospecies by light blue fields, those splitting and lumping morphospecies at the same time by green fields. Red fields indicate differences between the different molecular species delimitation methods.

total of 288 identical GMYC- and PTP-clusters (for results of species delimitation for each specimen see Appendix Tab. E.1).

Despite the high congruence in species numbers, it must be noted that there were several cases of conflicts between morphospecies and MOTUs (Fig. 6.2). These contradictions arise from splitting (in sequence-based analyses a morphospecies is split into two or more MOTUs, respectively parts of them) or lumping events (in sequence-based analyses two or more morphospecies, respectively parts of them, are lumped into one MOTU) (Tab. 6.1). Therefore, despite a high agreement between the number of MOTUs and the number of morphospecies (partially due to the fact that splitting and lumpings compensate one another) perfect congruence was rather low: In total there were 178 perfect matches between morphospecies and networks, 180 between morphospecies and distance-clusters, and 179 between morphospecies and GMYC-/PTP-clusters (see Tab. 6.1).

Table 6.1: **Overview of splittings and lumpings.**

	Morpho-species	Networks	Distance-clusters	GMYC-/PTP-clusters	Haplotypes
Species number	266	289	284	288	426
Singleton specimens	140	161	156	160	324
Doubleton specimens	94 (47 pairs)	104 (52 pairs)	98 (49 pairs)	102 (51 pairs)	94 (47 pairs)
Congruence with morphospecies number	–	108.65%	106.77%	108.27%	160.15%
# perfect matches morphospecies / MOTUs	–	178	180	179	154
# perfect matches that are not singletons	–	62	65	63	28
# perfect matches relative to # morphospecies	–	66.92%	67.67%	67.29%	57.9%
# Split morphospecies	–	42	39	41	88
# Lumped morphospecies	–	60	61	60	42
# Morphospecies that were both split and lumped	–	14	14	14	18

Splittings and lumpings were almost identical for networks, distance-, and GMYC-/PTP-clusters. For all approaches, the number of morphospecies being split into several MOTUs was higher than the number of cases where several morphospecies were lumped into one MOTU. The congruence between the different species delimitation methods (groups that have been identically delimited by the respective methods) was very high (see Tab. 6.2). There were only five cases of discrepancies where one or another method was more or less restrictive than the others, and there was no case where three methods disagreed, i.e. grouped specimens in three different ways (Fig. 6.2).

The morphological sorting revealed a large amount of singletons in the data set: 140 morphospecies (52.6%) were represented by only one specimen (representing 20.8% of all analysed individuals), 47 (17.7%) by only two specimens (doubletons, 14% of all analysed individuals). Of the 140 singleton morphospecies, 115 (distance-clusters), respectively 116 (networks and GMYC-/PTP-clusters) were also 'molecu-

Table 6.2: **Congruence between the different species delimitation methods.** Shown are the numbers of perfectly matching morphospecies/MOTUs, i.e. groups that have been identically delimited by the respective methods.

	Morpho-species	**Networks**	**Distance-clusters**	**GMYC-/PTP-clusters**
Morpho-species	266	178	180	179
Networks	–	289	279	287
Distance-clusters	–	–	284	280
GMYC-/PTP-clusters	–	–	–	288

lar singletons', i.e. they were the unique representatives of a MOTU, while 126 were the unique representatives of a haplotype. The remaining 25, respectively 24 singletons were lumped with other specimens into one MOTU. One hundred and sixty-one networks (55.7%), 156 distance-clusters (54.9%), and 160 GMYC-/PTP-clusters (55.6%) were represented by only one specimen; 324 haplotypes (76.1%) occurred only once (see Tab. 6.1).

Species richness

Sweep netting, beating, and hand-collection samples of Bombuscaro and ECSF resulted in 525 individuals belonging to 219 morphospecies. The species accumulation curve did not reach saturation, suggesting that additional sampling would significantly increase the number of morphospecies (Fig. 6.3). Molecular species delimitation resulted in 241 networks and GMYC-/PTP-clusters as well as 239 distance-clusters represented by 334 haplotypes. The curves of the methods were in their slope similar to the morphospecies curve, none of them showed saturation.

The expected total number of morphospecies estimated with the chao2 estimator was 413.6 ± 49.8 (first-order Jackknife: 338.2 ± 21.2; second-order Jackknife: 420.3) while the expected number of networks, GMYC- and PTP-clusters was 481.1 ± 56.9 (first-order Jackknife: 382 ± 24; second-order Jackknife: 480.9) and of distance-clusters 469 ± 54.9 (first-order Jackknife: 377 ± 23.7; second-order Jackknife: 473). Total number of haplotypes was estimated 1134.1 ± 164.1 (first-order Jackknife: 585.2 ± 35.1; second-order Jackknife: 795.5). Leaf beetle communities in the sampled areas of the Podocarpus National Park were estimated to be considerably richer by the molecular approaches than by the morphological one.

As sampling effort was different at the two elevations, the number of analysed individuals was standardized to compare species richness at the two elevational levels. At ECSF, 372 individuals were sampled belonging to 146 morphospecies, 151 networks and GMYC-/PTP-clusters, 150 distance-clusters, and 215 haplotypes. The 153 individuals from Bombuscaro were assigned to 90 morphospecies, 96 networks

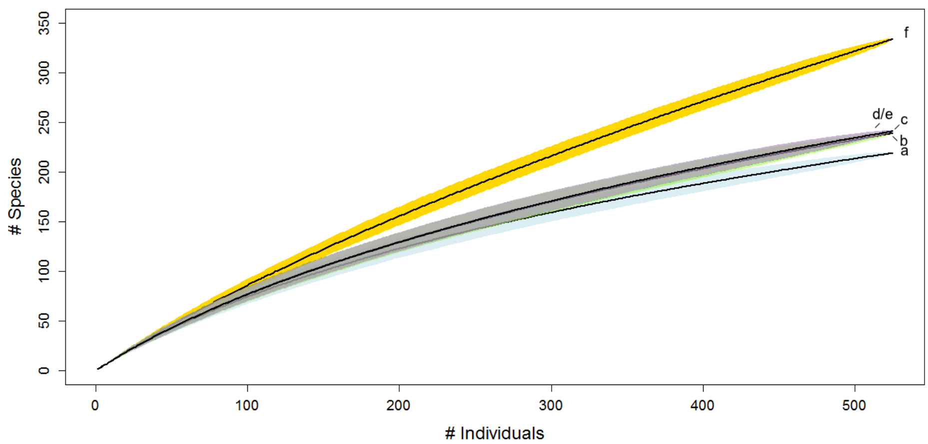


Figure 6.3: **Species accumulation curves.** Increase in the number of morphospecies (a), distance-clusters (b), networks (c), GMYC- and PTP-clusters (d/e), and haplotypes (f) with increasing number of analysed individuals. Coloured polygons indicate 95% confidence intervals.

and GMYC-/PTP-clusters, 95 distance-clusters, and 120 haplotypes. Standardizing the results of Bombuscaro and ECSF to the same number of analysed individuals (153; Jackknifing) revealed no significant difference in mean morphospecies richness between the two areas (Tab. 6.3). The same was valid for networks, distance- and GMYC-/PTP-clusters as well as for haplotype numbers.

Table 6.3: **Comparison of species- and haplotype richness between Bombuscaro and ECSF.** Results standardized with Jackknifing to the same number of analysed individuals (153 analysed individuals from Bombuscaro).

	Species richness				**Haplotype richness**
	Morphospecies	Networks	Distance-clusters	GMYC-/PTP-clusters	Haplotypes
Bombuscaro	90	96	95	96	120
ECSF	87.9	89.9	89.7	89.9	111.6

The majority of all found morphospecies occurred exclusively at a single elevational level (only 8% occurred at two elevational levels and no morphospecies was found at all three elevational levels; Fig. 6.4). This pattern was even more pronounced when using genetic clusters: Almost all MOTUs occurred at only one elevational level, only 3% at two levels. All haplotypes were restricted to one elevational level. When singletons and doubletons (morphospecies, MOTUs or haplotypes represented by one or two specimens) were removed from the data set results were similar: The percentage of species found at one single elevational level was still the vast majority (80% of all morphospecies and 91% of all distance-clusters and 92%

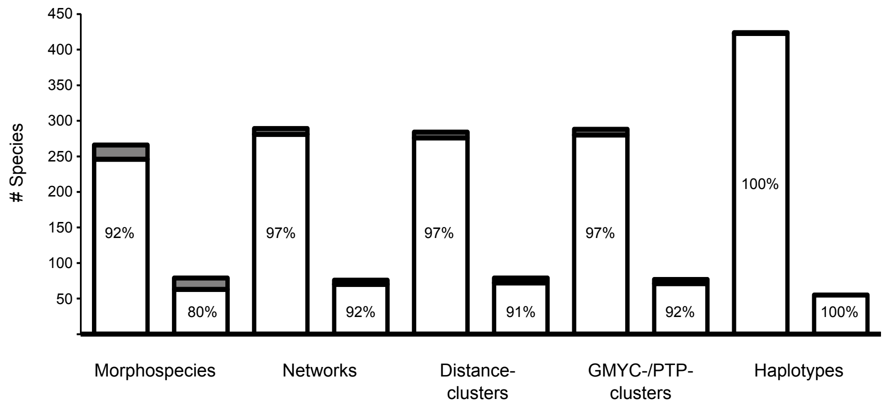


Figure 6.4: **Barplots illustrating occurrence of species at elevational levels.** Morphospecies, networks, distance- and GMYC-/PTP-clusters, and haplotypes found at one (white) or two (grey) elevational levels. Complete data set (left column) for each method and data set without singletons and doubletons (right column).

of networks and GMYC-/PTP-clusters).

The difference in species composition between the different elevations was also reflected in the species accumulation curve of specimens from Bombuscaro and ECSF (Fig. 6.5) which showed for neither of the elevations and none of the delimitation methods saturation. When species from Bombuscaro were added to the data, the slope of the curve steeply increased.

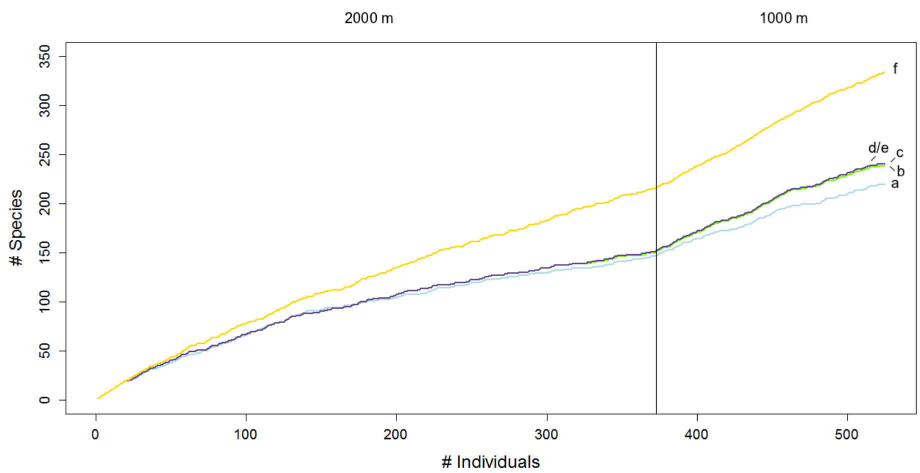


Figure 6.5: **Species accumulation curves for ECSF (2000 m a.s.l.) and Bombuscaro (1000 m a.s.l.).** Increase in the number of morphospecies (a), distance-clusters (b), networks (c), GMYC-and PTP-clusters (d/e), and haplotypes (f) with increasing number of analysed individuals.

6.4 Discussion

The study revealed a very diverse Chrysomelidae fauna with observed and estimated species numbers being higher for molecular species delimitation methods than for morphological species sorting. This indicates a significant amount of species that could not be discerned by the morphospecies approach and could contain potential cryptic diversity. Among the different DNA based species delimitation methods, there were only slight differences in observed and estimated species numbers. Species turnover in beetle communities seems to be high between the elevational levels. All findings revealed by MOTUs are similar to morphospecies data, confirming the qualification of DNA barcoding as a tool for assessing biodiversity of an unknown fauna, at least at a geographically restricted scale as in this study.

Chrysomelid diversity

A high observed and estimated species number was expected as the study area is part of a biodiversity hotspot (Brummitt and Lughadha, 2003; Myers et al., 2000). Even when singletons and doubletons were excluded, most species are restricted to one elevational level indicating a high species turnover.

As frequently found for samples from rainforest communities of insects (e.g. Novotny and Basset (2000); Wagner (2000)), the species accumulation curve did not reach saturation indicating that further sampling would increase the species number. It also lets assume that most species are rather rare, and there is indeed a large proportion of singletons (53% and 55–56% of the morphospecies and MOTUs, respectively). These 'rare species' are an important part of rainforest communities of insect herbivores, often representing from 30% up to more than half of all species in tropical arthropod samples (Coddington et al., 2009; Novotny and Basset, 2000; Wagner, 2000). They may prevent the species accumulation curve from getting saturated even in very large sample series achieved with a huge sampling effort. As the number of specimens included in this study is rather small compared to many tropical arthropod surveys (see Coddington et al. (2009)), the percentage of singletons might decrease with additional sampling effort, but is expected to remain quite high.

It could be expected that the two locations harbour a different chrysomelid fauna, even though the turnover of communities might be overestimated due to undersampling. Mountains have different habitats close to each other as the elevational gradients result in differences in climate, soil, vegetation etc. Although the two sampling areas Bombuscaro and ECSF are as close as ~20 km, there are 1000 m elevation difference and the areas exhibit remarkable differences in climate and vegetation. The turnover of tropical insect communities along elevational gradients is generally rapid (Brühl et al., 1999; Ghalambor et al., 2006; Janzen, 1967) and there are often large differences in insect communities in considerably smaller ranges (e.g. Olson (1994); Smith et al. (2014)).

However, there is no significant difference in mean species richness. A difference could have been expected, as insect species richness often declines with increasing elevation or shows a hump-shaped distribution (Olson, 1994; Rahbek, 1995, 2005). As Cajanuma was considerably undersampled in this study, it was excluded from the comparison of elevational levels. Species richness along the elevational gradient is analysed more detailed in Chapter 4.

The high species numbers found in this study illustrate how understudied Ecuador is when compared with the records listed by Blackwelder (1947): He lists ~450 species explicitly for Ecuador and in contrast 266 morphospecies were found in this preliminary survey that is far from being complete and restricted to a very small area. A comparison with species numbers found in other Neotropical countries (Charles and Bassett, 2005; Flowers and Hanson, 2003; Furth et al., 2003; Linzmeier and Ribeiro-Costa, 2009, 2011, 2012; Ødegaard, 2006; Sánchez-Reyes et al., 2014) or e.g. kept in the collection of the Museo del Instituto de Zoología Agrícola 'Francisco Fernández Yépez' (MIZA), Venezuela, also suggests a high discrepancy between recorded and actual species numbers. It should be noted that mainly one kind of habitat was sampled, the herbaceous and shrubby vegetation in a local forest including only small trees up to a height of ca. 2.5 m. Malaise- and light-trapping was performed additionally, adding on specimens with different ecology (flying and/or nocturnal species). So, besides further sampling with the same methods, the inclusion of other habitats would add more species. For example, a thorough sampling of the canopy would probably increase species numbers by far as a considerable part, perhaps the majority, of the arthropod diversity of tropical rainforests lives in the canopy (Basset et al., 2007; Didham, 2002; Didham and Fagan, 2003; Erwin, 1982) with communities distinct from understorey (Charles and Bassett, 2005). In Chapter 3 the leaf beetle species richness of the study area is compared more detailed with existing taxonomic information and with studies in other regions.

Implications of DNA barcoding on species richness estimates

The successful application of DNA based species delimitation to the studied leaf beetle fauna is not surprising, as it has been proven a reliable method for identification, detection and delimitation of species for a broad variety of taxa, including beetles, in numerous studies (e.g. Astrin et al. (2012); Kubisz et al. (2012); Papadopoulou et al. (2013); Raupach et al. (2010); Tänzler et al. (2012)). It was able to indicate distinct clusters of sequences across all subfamilies of Chrysomelidae of this study, which is an important premise if a large assemblage of unknown species is to be studied. In all analyses the species numbers inferred by molecular methods were considerably higher than morphospecies numbers. Therefore, molecular methods of species delimitation should be included in biodiversity studies, as the morphospecies approach alone may considerably underestimate species richness. These molecular data are a very effective tool for taxonomists for species delimitation and descriptions.

Statistical parsimony analysis, distance-based clustering, and GMYC- and PTP modelling were compared and validated empirically. The high congruence among these different DNA based species delimitation methods indicates a minor relevance of the choice of the particular delimitation methods, at least when sampling as in this study is geographically restricted (but see Bergsten et al. (2012)). A geographically complete sampling of a species is usually very time and labour-intensive and, therefore, beyond the scope of most ecological studies at the species community level. Often, populations or locations are isolated, either naturally or induced by the progressive fragmentation of habitats, preventing a comprehensive covering of the complete diversity. This is even more valid for tropical insects, where a complete inventory of a certain area is, even if desirable, unachievable, as tropical species in general are high in numbers, but rare and often very localized (Kricher, 1999; Novotny and Basset, 2000). While Lim et al. (2012) argue that this bias may hamper semi-automated DNA based species delimitation, however, the congruence of results of the different delimitation methods used, seems to demonstrate the opposite. Despite a high percentage of singletons and doubletons the species richness estimates remain robust.

Haplotypes as a measure for diversity
Although biodiversity is usually measured in species, the entire genetic diversity of a species, including the diversity of haplotypes, is crucial for conservation. The use of haplotype diversity seems to be an even more objective measure for biodiversity as it is completely independent from species concepts or delimitation methods including their assumptions (García-Lopez et al., 2013; Monaghan et al., 2009; Papadopoulou et al., 2011). Therefore haplotypes are in these analyses an independent estimator and a proxy for diversity in concert with DNA based species delimitation. It has been shown that mtDNA barcode accumulation curves lead to similar results as curves generated using morphology or nuclear genetic markers (Smith et al., 2009). Likewise, in the present study the haplotype accumulation curve was similar in shape to those based on morphospecies and MOTUs and differed only in scale. Therefore, 'haplotype diversity' can be a valuable tool for comparing diversity at a finer scale, which also allows the analysis of diversity of taxonomically unknown organisms, being transparent and reproducible and can be compared among sites (Smith et al., 2009). The distribution of haplotypes within species at different elevations with a strict restriction of haplotypes to a single elevation suggests a separation of populations that are occurring at different elevational zones. Thus the barcodes contain additional information compared to MOTUs or morphospecies. The barcodes are unique identifiers that allow the discovery of a specific haplotype in different samples. However, it should be expected that they will be more informative if applied in a wider geographical scale with much more extended intraspecific sampling (Papadopoulou et al., 2011).

6.5 Conclusions

This study provides a rapid biodiversity assessment of the hitherto unstudied leaf beetle fauna of the understorey vegetation of a tropical montane rainforest in Ecuador. Based on a comparatively small data set compiled in only five months of field work, it revealed a remarkable diversity of Chrysomelidae in the study area and is a good starting point for future, more detailed research on this fauna. Both morphospecies and DNA barcode data suggest a high turnover along the elevational gradient that is studied more detailed in Chapter 4.

Whereas the integration of different DNA based approaches for estimating species richness is strongly recommended (Carstens et al., 2013), the choice of the molecular species delimitation method seems at least with this data of minor relevance. All results illustrate the high potential of DNA barcoding for exploring communities of hyperdiverse taxa even before being taxonomically identified and formally described (Pons et al., 2006). It can be a useful complement to morphological approaches due to its capability of revealing cryptic diversity, and an effective tool for taxonomic species delimitation and description. Also in cases where experts are not available, applications of DNA barcoding are a suitable method. Nevertheless, an accurate taxonomic description with binary Linnaean names is highly desirable. An advantage of biodiversity assessment with DNA barcoding is that the results are verifiable and comparable among studies and sites. This is an important requirement if barcoding is used as a tool for direct biodiversity measurement. However, it should be established how far the results can be extrapolated also for other organismic groups and larger spatio-temporal scales.

Chapter 7

Comparison of sampling methods

7.1 Introduction

The current biodiversity crisis is considered as a global mass extinction event (Myers (1993) and references therein; Brook et al. (2006); Dirzo et al. (2014); Myers (2003)). Biodiversity loss proceeds at a worrisome rapid pace. Most species are not described yet and there is even no ultimate consensus on total species numbers on Earth. Therefore, exact values of extinction should be considered with caution, but rates seem to be several hundred times their pre-human levels (Pimm et al., 1995). Tens of thousands of species are likely to go extinct per year (Myers, 2003). Probably alone from tropical forests, two to five species disappear per hour (Singh, 2002).

As most biodiversity is found in the tropics, also with regard to biodiversity loss these regions can be considered hotspots (Bradshaw et al., 2009; Dirzo and Raven, 2003; Laurance, 1999). The main cause of tropical biodiversity loss is habitat destruction (Bradshaw et al., 2009; Pimm and Raven, 2000). Especially tropical forests that are extraordinarily species-rich and ecologically complex are subjected to a multitude of threats and are disappearing at alarming rates (Dirzo and Raven, 2003; Laurance, 1999; Laurance and Peres, 2006; Pimm and Raven, 2000). Tropical cloud forests face many of the same threats as other tropical forests. However, their unique ecology and their location on mountain slopes make them particularly susceptible to climate change (Bubb et al., 2004).

In view of those circumstances, there is a necessity for faster methods of biodiversity assessments. One way is to postpone the time-intensive taxonomic identification and description of species. Instead of valid species, often morphospecies are used that are identified by external morphology but without dissection or use of identification literature. They have established in tropical arthropod research to handle the huge amount of accruing specimens and species (detailed information about the morphospecies approach is given in Chapters 2.5 and 5).

In addition, DNA barcoding can help to identify and discover species and has become a valuable method for discovering cryptic diversity (e.g. Hebert et al. (2004); Johnson et al. (2008); Lara et al. (2010); Witt et al. (2006)). Generation of DNA barcode data with standard laboratory protocols has become very efficient (Hajibabaei et al., 2005; Ivanova et al., 2006; Knebelsberger and Stöger, 2012). With metabarcoding of mass samples even more sequences can be compiled with small time effort (Ji et al., 2013; Yu et al., 2012).

However, also the collection of study organisms in the field as a fundamental step of biodiversity research should be streamlined and must therefore be carefully planned. Sampling methods and sampling design must be appropriate for the studied organisms, habitats, and the aims of the study. The volume of the studied organisms (number of individuals and species) depends directly on sampling effort. Often a sampling as comprehensive as possible is desired, e.g. for inventories. However, tropical arthropod samples usually remain incomplete, even in large-scale studies. This is typically due to the large number of rare species which can cause analytical problems (Coddington et al., 2009; Novotny and Basset, 2000). For certain questions a statistically relevant number of sampling replicates is needed and the choice of sampling time or period has to be considered.

This study focused on the leaf beetles of the low and medium understorey vegetation up to a height of ca. 2.5 m, including grasses, herbs, shrubs, and small trees in a montane rainforest in Ecuador. Although the leaf beetle fauna of the respective area has not been studied yet, it was not the aim to make a complete inventory. The focus was rather on the analysis and comparison of communities at different habitats and different elevational levels as a test for the application of rapid assessment methods in tropical habitats.

7.2 Methods

Chrysomelidae were sampled in RBSF and adjacent parts of Podocarpus National Park during November and December 2010 and from May 2011 to April 2012. The study area is described in Chapter 2.1.

Mainly three standardized sampling methods have been used for collecting leaf beetles from the lower vegetation on the study plots (*plot sampling*; for details of the study plots see Chapter 2.2): sweep netting, beating, and standardized hand-collection (picking up beetles from vegetation). All kind of vegetation within reach was sampled (up to ca. 2.5 m).

Sweep netting: Sweep netting was carried out using a standard insect net with 30 cm diameter on a pole. The net was emptied into a bottle containing ethanol. Sweep netting was made alongside two edges of a plot for 30 min (edge of a plot = 20 m).

Beating: Vegetation was jarred with a stick to dislodge insects alongside two edges of the plot for 30 min. Insects falling on a horizontal beating tray made of canvas were collected individually from the tray with an aspirator or funnelled into an ethanol-filled collecting jar.

Standardized hand-collection: Insects were individually picked from vegetation either with an aspirator or directly into an ethanol-filled jar. This was carried out within the plot for 15 min by a team of two collectors (= 30 sampling minutes).

Plot sampling has been supplemented with the following methods:

Non-standardized hand-collection: Additional picking up of beetles from vegetation outside the sampling plots was carried out, e.g. on the way to or from the plots.

Malaise traps: Malaise traps are open-sided tents with a collecting head filled with ethanol in which flying or crawling arthropods are trapped (Furth et al., 2003). Bidirectional Malaise traps have been used and collecting heads were usually emptied

after three to four weeks. In some cases the interval was shorter or longer.
Light trapping: For light trapping, a light tower with two 15 W tubes (one black light, one superactinic) was used.
Occasional *flight interception traps* with ~40 x 60 cm panels were placed in trees at ~5 m height and emptied after four weeks. On trial *pitfall traps* were emptied after two days.

Being killed and collected in 70% ethanol, beetles were subsequently transferred into 96% ethanol and stored at 4 – -20 °C. A total of 662 samples has been selected to be analysed. For each of these samples, Chrysomelidae were sorted into preliminary morphospecies. One specimen of each preliminary morphospecies was dry mounted, labeled, and sorted into morphospecies (more detailed description of morphospecies sorting is given in Chapters 2.5 and 5). The remaining specimens (*duplicate specimens*) were included in the comparison of sampling methods (data set 2a). The sorting of specimens of a single sample into preliminary morphospecies is quite reliable due to the small number of individuals and species per sample. Therefore, it is likely that similar specimens were correctly classified as the same morphospecies. Furthermore, the number of affected specimens is quite low as usually (~80%) only one individual per morphospecies was found in one sample. More detailed information about selection and processing of specimens and about the different data sets is given in Chapters 2.3 and 2.5.

7.3 Results

Within the present study a total of 1174 samples (refer to Chapter 2.2 for definition of sample) were taken. They varied considerably in size and effort as different sampling methods were used. A total of 4286 Chrysomelidae was collected. As the focus of the study was the community analysis of the study sites (plots), most samples have been taken on these plots: 306 samples of each standard collection method yielded a total of 2364 leaf beetles. Of these specimens, 1091 came from the 306 sweep netting samples, 980 from the 306 beating samples, and 293 from the 306 standardized hand-collection samples. Further 947 specimens were collected with 134 non-standardized hand-collection samples, 816 specimens with 45 Malaise trap samples, and 114 specimens with 27 light trap samples. Flight interception traps (32 samples) and pitfall traps (18 samples) yielded very few specimens (43, respectively two) and are disregarded hereafter (Fig. 7.1).

For the following comparison of sampling methods the same data set as for the general biodiversity analyses in Chapter 3 was used (data set 2a; for explanation of the data sets see Chapter 2.5): It contained 2227 specimens from 662 samples. The samples were biased towards sweep netting, beating, and standardized hand-collection samples (plot samples). Number of analysed samples, collected specimens, and identified morphospecies for the different methods is given in Tab. 7.1. Fig. 7.2 illustrates the proportion of samples and specimens. For morphospecies found by the respective method the composition is similar to the composition of collected

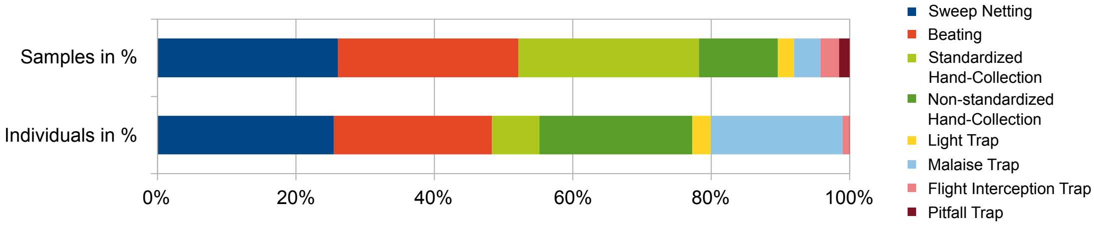


Figure 7.1: **Proportion of all within the project taken samples and yielded individuals for the different sampling methods.** Note the comparatively high number of individuals in non-standardized hand-collection and Malaise trap samples.

specimens: Sweep netting covered 54% of all 473 morphospecies, beating 45%, hand-collection (standardized and non-standardized hand-collection combined) 47%, light traps 6%, and Malaise traps 12%. Flight interception and pitfall traps covered ≤ 1%.

Table 7.1: **Comparison of the number of analysed samples, collected specimens, and identified morphospecies for the different methods.**

Method	# Samples	# Individuals	# Morphospecies
Sweep Netting	199	749	255
Beating	199	635	214
Hand-Collection (standardized & non-standardized combined)	233	597	222
Light Trap	20	54	27
Malaise Trap	6	187	58
Flight Interception Trap	3	3	3
Pitfall Trap	2	2	2
Total	662	2227	473

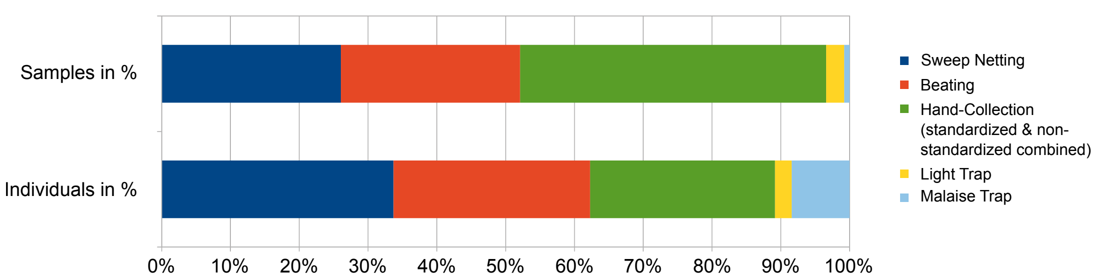


Figure 7.2: **Proportion of taken samples and corresponding proportion of number of specimens collected with the different methods for data set 2a.**

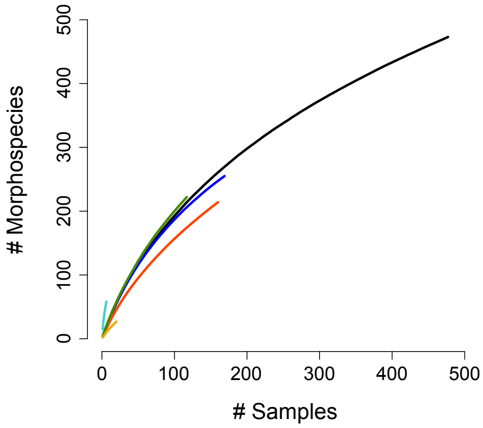


Figure 7.3: **Species accumulation curves showing the correlation between morphospecies number and number of samples (left) and sampled individuals (right) for all five sampling methods separately and for all methods combined.** Sweep netting (dark blue), beating (red), hand-collection standardized and non-standardized combined (green), light trap (yellow), and Malaise trap (light blue) samples, addition of all methods (black).

Species accumulation curves (Fig. 7.3) illustrate how the number of morphospecies grows with increasing number of samples (left), and individuals (right) for each sampling method and for all methods combined. In contrast to the sample based curve, the individual based curve shows for all sampling methods combined a higher efficiency in collecting the leaf beetle fauna of the studied area than each single method. The figures show that Malaise traps collected more morphospecies per sample than all other methods taken together whereas they were among the least efficient methods when based on number of individuals. None of the curves shows saturation.

The individual samples varied considerably in the number of sampled specimens and morphospecies (Fig. 7.4). In sweep netting, beating, hand-collection, and light trap samples, on average only few individuals and morphospecies were caught per single sample (less than five). The maximum in single standard samples was 28 specimens, in the very heterogeneous non-standardized hand-collection samples even up to 68. In contrast, the Malaise trap samples yielded a mean of 31.2 sampled individuals and 14.8 morphospecies per sample.

Regarding the sampling methods sweep netting, beating, hand-collection (standardized and non-standardized combined), light-, and Malaise trapping, more than half of all morphospecies (59%) were sampled by only one method. Twenty-three percent were sampled by two, 14% by three and only four percent by four methods. Only two morphospecies were sampled by all five methods. This is partly due to the high proportion of 'uniques': 49% of the morphospecies occurred in only one sample (were sampled only once).

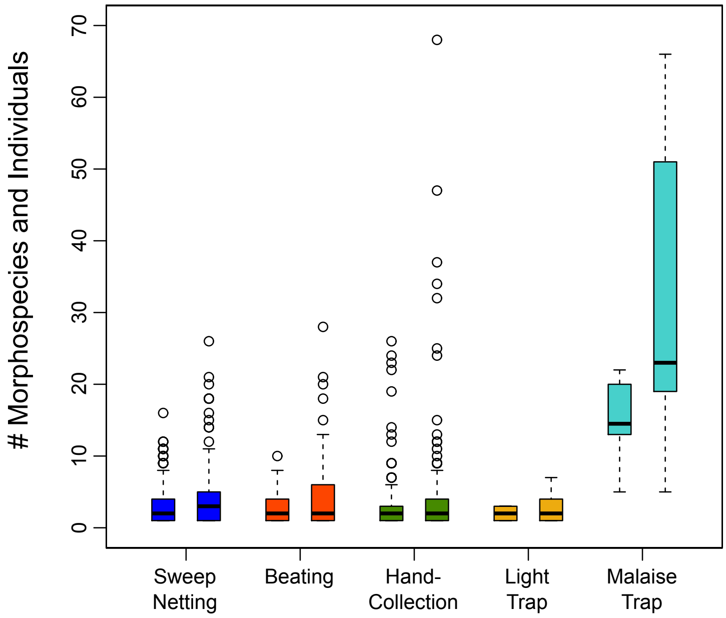


Figure 7.4: **Number of morphospecies and individuals per sample.** Found morphospecies (left column) and individuals (right column) per sample for sweep netting, beating, hand-collection, light trap, and Malaise trap samples. The boxplots show the median, the lower and upper hinge, the minimum, and the maximum.

The presence of the most frequent subfamilies accounting for 97% of all morphospecies revealed slight differences in the collection efficiency of different methods for certain subfamilies (Fig. 7.5). On average, most morphospecies belonged to Alticinae. Of the morphospecies found in Malaise trap samples, even 71% were Alticinae. In contrast, in light trap samples only 30% were Alticinae, whereas more than half of all morphospecies (52%) caught with light traps belonged to Galerucinae. Cassidinae that on average made up four percent of the morphospecies accounted for eight percent of non-standardized and standardized hand-collection samples.

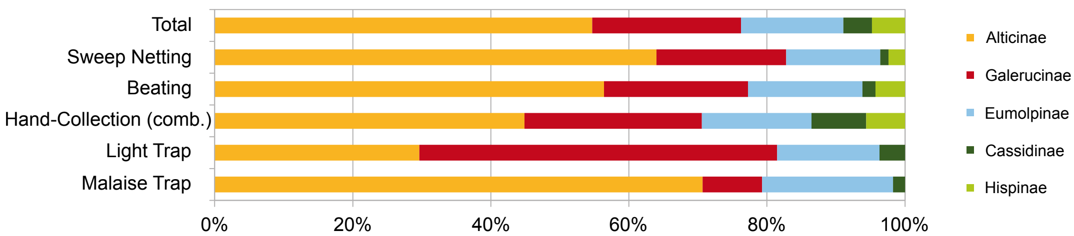


Figure 7.5: **Percentage of collected morphospecies according to subfamily for different sampling methods.**

Standardized sampling methods

A total of 199 plot sample replicates has been analysed (199 sweep net, beating, and standardized hand-collection samples) resulting in 1578 specimens and 379 morphospecies (data set 3a). Sweep netting and beating resulted in highest morphospecies numbers (255 respectively 214), whereas only 106 morphospecies were found in hand-collection samples (Fig. 7.6). However, when corrected for the number of individuals (sweep netting: 749, beating: 635, hand-collection: 194), morphospecies richness was marginally higher for hand-collection than for beating samples. The combination of the three methods did not increase the efficiency in terms of collected morphospecies compared to sweep netting alone.

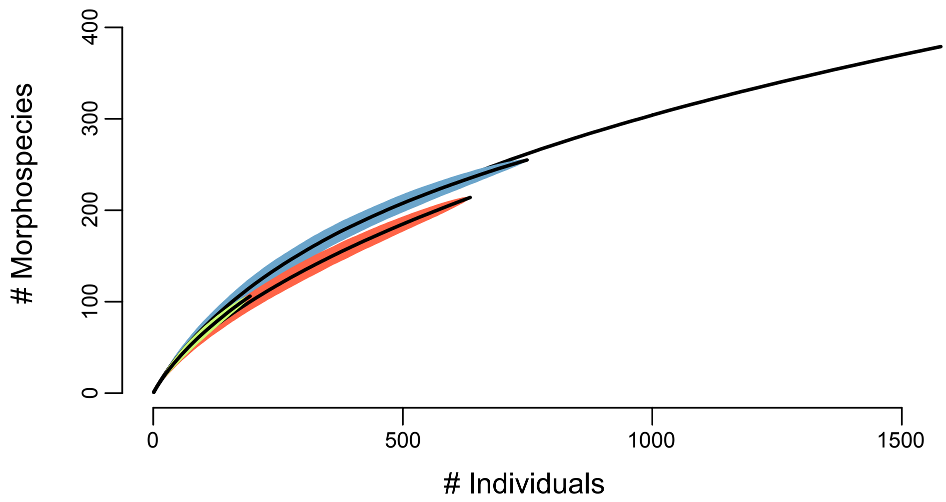


Figure 7.6: **Species accumulation curves for plot samples showing the correlation between the number of morphospecies and the number of specimens, based on 199 samples of each method: sweep netting (blue), beating (red), standardized hand-collection (green); all three methods combined (black line without confidence interval).** The trend for the standardized collection methods is the same as for all methods (see Fig. 7.3 left). Coloured polygons indicate 95% confidence intervals.

Most morphospecies of the plot data set were found by only one sampling method (61%). Twenty-seven percent were found by two methods and only 12% by all three methods. Sweep netting showed the highest percentage of morphospecies that occurred exclusively in samples of this method (45%). Thirty-nine percent of the morphospecies in beating samples and 29% of the morphospecies in standardized hand-collection samples were found only in samples of the respective sampling method. Of the morphospecies that were found by two methods, most occurred in sweep netting and beating samples (73%), 18% were shared by sweep netting and hand-collection, and ten percent by beating and hand-collection.

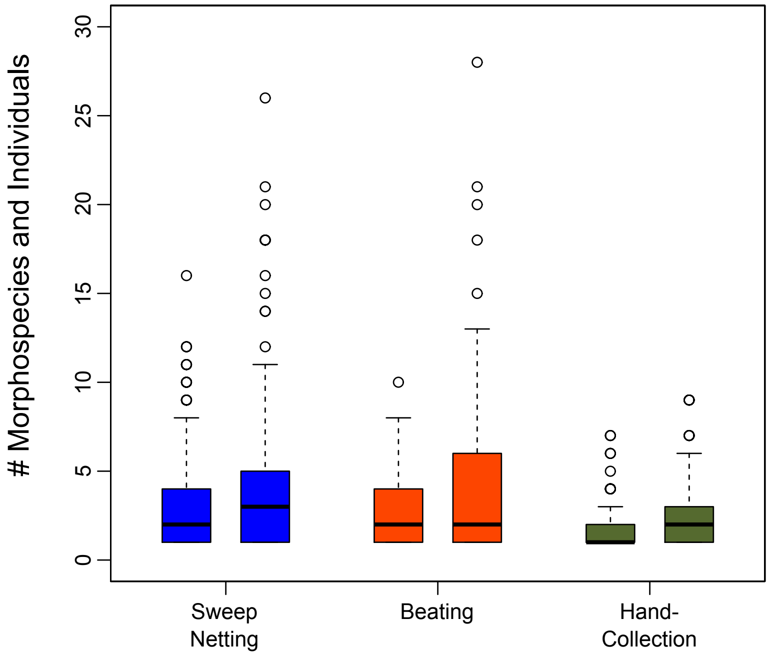


Figure 7.7: **Number of morphospecies and individuals per plot sample.** Number of morphospecies (left column) and individuals (right column) per sample for sweep netting, beating, and standardized hand-collection samples.

For the most part, a morphospecies was represented by a single individual per sample (826 times). In 137 cases, a morphospecies was represented by two specimens in a sample, in 58 cases by three or four specimens, and in 23 cases by five to eight specimens. Only occasionally more than eight specimens of the same morphospecies were found in one sample, maximally 26 specimens. Therefore, the mean number of morphospecies was similar to the mean number of individuals per sample (sweep netting: 3.3 morphospecies vs. 4.4 individuals, beating: 2.7 vs. 4.0, standardized hand-collection: 1.9 vs. 2.3). Generally, the number of individuals and morphospecies caught per sample is very low, however with a very large variance (Fig. 7.7). In sweep netting and beating samples up to 26, respectively 28 individuals could be found. In standardized hand-collection samples maximally nine specimens have been found. Also the maximum number of morphospecies per sample was considerably lower for hand-collection than for sweep netting or beating samples.

The species accumulation curve of the plot samples showed no saturation after 298.5 hours of sampling indicating that a further increase of morphospecies number is expected with further sampling (Fig. 7.8).

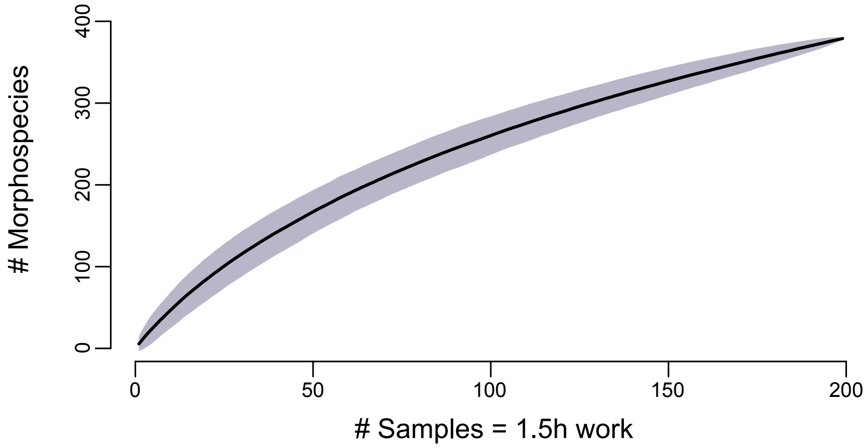


Figure 7.8: **Species accumulation curve (mean ±95% confidence interval) showing the number of morphospecies discovered with increasing number of plot samples.** One plot sample is equivalent to 1.5 hours of sampling: 30 min sweep netting, 30 min beating, and 30 min hand-collection.

7.4 Discussion

The main sampling methods (sweep netting, beating, hand-collection) are widely used for sampling of Chrysomelidae in the selected habitat, the lower vegetation of the study plots within the forest (Flowers and Chaboo, 2009; Furth, 2009; Sánchez-Reyes et al., 2014; Staines, 2011). As the comparison of communities at the study sites is an essential aspect of the project (see Chapter 4), an advantage is that the beetles are sampled more or less directly from the vegetation, so their provenance is known. In contrast, when Malaise-, light- or flight interception traps are used, the provenance of the flying insects is not known. These methods should not be used for a fine-scale sampling on sampling sites as close to each other as in this study, where they are sometimes only several meters apart, because samples will not be independent (Ozanne, 2005a). In those cases, especially light traps are not well suited because e.g. moths are attracted from a distance of up to 25 m or more (references in Brehm (2002)).

Comparing the three methods for standard sampling on the plots, sweep netting seems to be the most successful method in terms of collected specimens and species, slightly more efficient than beating (Fig. 7.6). The combination of all three methods did not result into a higher number of found species when corrected for the number of sampled individuals. In contrast, hand-collection on the plots was not very efficient, resulting in considerably lower specimen and morphospecies numbers than sweep netting and beating, in total (less than one third of the specimens and less than half of the morphospecies, Fig. 7.6) and on average (Fig. 7.7). However, when corrected for the number of sampled individuals, this method yields a comparable number of species (Fig. 7.6). The high numbers of individuals and morphospecies for the combined standardized and non-standardized hand-collection samples (Fig. 7.3,

Fig. 7.4) result from cases where extensive hand-collection was conducted under favorable weather conditions and at sites well suited for collection of Chrysomelidae. Although hand-collection on plots was less efficient, it was reasonable to be included to find additional species, as e.g. Cassidinae and Hispinae were mostly found by hand-collection.

Light trapping seems little appropriate for sampling Chrysomelidae as it was not very efficient in terms of specimens and morphospecies. This is probably because in tropical forests the majority of chrysomelids are active during daytime (Basset et al., 2001).

Malaise traps, on the contrary, show a favourable proportion between sample number and number of collected specimens and morphospecies. They seem to be an efficient method for sampling of tropical leaf beetles. They have been widely used, especially for sampling of Alticinae (Flowers and Hanson, 2003; Furth et al., 2003; Linzmeier and Ribeiro-Costa, 2008, 2009, 2012, 2013). Whereas Malaise trapping is less efficient than sweep netting, beating, and hand-collection, when based on the number of individuals, it is the most efficient method considering collected morphospecies per sampling effort (Fig. 7.3). However, compared to the other methods, Malaise trapping often generated larger numbers of a few common morphospecies, which resulted in a lower species richness per collected individuals (Fig. 7.4). The fact that Malaise traps collected the highest mean number of individuals and morphospecies per sample is not surprising because of the longer collecting time of up to ~30 days, meanwhile many insects can accrue in the collecting head of the trap.

Beside the numbers of collected specimens and species, the time effort required is a crucial factor to evaluate the effectiveness of different sampling methods. A disadvantage of the standard methods is the high workload and time requirement compared to the output: Although almost 300 hours have been spent on plot sampling, no saturation of species accumulation curves has been achieved. In addition to the pure sampling time of 298.5 hours, the time to arrive at the sampling plots can be considerable: It takes roughly one hour to arrive at the areas of Bombuscaro or Cajanuma by bus and car. The subsequent walk to the plots may require even more time. So, a team of two persons could accomplish sampling of not more than three plots per day. Although the required collection time for all of the three methods is equal, it is to note that in comparison with beating and hand-collection the processing of the sweep net samples takes a considerable amount of time: The samples contain lots of leaves and other parts of vegetation that must be carefully screened for insects, and sorting out of the specimens requires some effort.

Whereas it costs a considerable effort to carry the light trap equipment to the respective study sites, the Malaise traps are comparatively easy to handle: They can be readily placed at the sampling sites, even at remote sites, and just have to be cleared (preferentially after a few days to ensure good quality of the samples). Both light traps as well as Malaise traps could be used at a larger scale when sampling sites are further apart but are less suitable when sites are close to each other.

The methods seem differently efficient for certain subfamilies. Therefore, a mix of methods seems advisable if whole communities of leaf beetles are addressed, especially for inventories as it has been shown for ant fauna (Longino et al., 2002). However, the incomplete sampling impedes an exact comparison between the methods: The finding that most morphospecies were found by only one sampling method may be due to the high amount of morphospecies that were found only once (uniques). Therefore, differences in taxon-specific efficiency of collection methods can hardly be documented with the present data. A complete coverage of all species and a saturation of species accumulation curves was not attempted and expected because no complete inventory of the study area was intended.

The data indicate that the area is species-rich, but species usually occur with a low abundance, as it is typical for tropical rainforests. Therefore, it seems advisable to sample at several sites with a set of methods and with a statistically relevant number of sampling replicates over a certain time period. If the number of specimens that can be analysed (morphologically and molecular) is restricted, the decision to analyse only one specimen per morphospecies per sample seems reasonable: As most morphospecies were found only once per sample, the number of omitted specimens is rather low, and leaf beetle diversity of the region still can be characterized well.

Some habitats that have not been addressed explicitly in this study require special sampling methods: Schmidl et al. (2007–2008, unpublished) studied the arthropod fauna living under tree bark in parts of RBSF using an insecticide. There was no opportunity to sample canopy beetles for this project. Especially the canopy of tropical rainforests is known to harbour an extraordinarily high richness of insects in general and Chrysomelidae in particular (Basset et al., 2001; Charles and Bassett, 2005; Farrell and Erwin, 1988; Wagner, 1999, 2000, 2003). However, for Alticinae a redundancy between canopy fogging and Malaise trapping has been shown (Furth et al., 2003). Canopy fauna can be accessed directly from platforms, walkways, canopy rafts, sledges, balloons, towers, or cranes (Basset et al., 2001; Charles and Bassett, 2005; Ozanne, 2005b; Samways et al., 2010). Those structures that allow the application of different collecting methods in the canopy are very sophisticated and costly and are usually operated as part of large projects, e.g. IBISCA (www.ibisca.net; Basset et al. (2007)), or by major research institutes, e.g. the Smithsonian Tropical Research Institute in Panama (www.stri.si.edu). Other common methods involve climbing into the canopy or chemical knockdown (fogging or mist-blowing). For knockdown sampling, usually pyrethrum or related substances are used and fallen insects are captured on collecting trays, hoops, or mats (Farrell and Erwin, 1988; Ozanne, 2005b; Samways et al., 2010; Wagner, 2000).

7.5 Conclusions

Facing the rapid advance of biodiversity loss in tropical rainforests, an acceleration of biodiversity assessment is indispensable. Whereas molecular methods such as DNA barcoding, with laboratory protocols becoming more and more efficient, have been propagated to accelerate analysis and understanding of biodiversity, the sampling of specimens in the field is still the most important and basal step and can constitute a bottleneck in the workflow.

In this study, especially the standardized sampling on the plots has been proven to be quite time and work intensive, also because the considerable way to the plots must be included. However, there seems to be no alternative method of more efficiently collecting the leaf beetles from the low vegetation of the plots. Especially sweep netting is an excellent method, however, with the disadvantage that the sorting of the samples takes time. Beating yielded only slightly fewer specimens and species with sorting of the samples being less time-consuming. Because there is no great difference in efficiency between the methods, a combination of both can be recommended. Hand-collection yielded comparatively few specimens, but raises the probability for also catching Cassidinae and Hispinae and therefore should be included as well if the study focuses on a broad variety of subfamilies. To further analyse leaf beetle diversity in the studied area, further sampling with the same methods could be performed in order to approach a saturation of the species accumulation curve.

For qualitative sampling, also hand-collection at selected spots can be recommended: Especially in sunny weather at dry days or after rainfall, various leaf beetles appear quite abundant at forest edges or gaps sun-basking or feeding on leaves where they can easily be collected.

A further implementation of Malaise traps can be highly recommended, however only for qualitative sampling (e.g. inventories) or when study sites at a certain distance are used (e.g. to compare the communities between the different elevational levels Bombuscaro, ECSF, and Cajanuma). In this case they seem to be very well suited for flying leaf beetle species. They can be used to obtain a high number of specimens and species with comparatively low workload and time-effort. Sampling can be even more facilitated if the changing of collection bottles is automated. This method would also allow a fine-scale study of temporal turnover, e.g. by sampling nocturnal and diurnal species separately.

Finally, it would be interesting to include the canopy, probably the most diverse habitat, into the study. Canopy fogging provides an efficient sampling method yielding very large numbers of individuals and species per sample.

Chapter 8

General discussion and future prospects

This study is exceptional in two aspects: It is the first detailed, site-specific study about the diversity of leaf beetles (Chrysomelidae) in Ecuador, a hyperdiverse taxon that is severely understudied in the Neotropical region. Furthermore, the implementation of DNA barcoding makes it an important contribution towards the integration of DNA based methods into exploring and understanding the diversity and ecology of tropical insect assemblages.

Therefore, the lessons learned from this study cover those two aspects: On the one hand, it provides first data and insights of the hitherto unstudied leaf beetle fauna of the study area that can serve as a starting point for future research. On the other hand, it demonstrates the value of DNA barcoding for hyperdiverse arthropod assemblages, showing that even complex ecological questions can be analysed relying on DNA barcode data alone. The study provides baseline-data that can be used for future research, e.g. monitoring effects of climate change or anthropogenic disturbance on leaf beetle diversity, as well as the necessary tools.

Perspectives for future research

Although the study area has not been completely inventoried and only a certain habitat was sampled, a considerable number of morphospecies, respectively MOTUs was found. This has been expected as the study area within the Tropical Andes is known as a biodiversity hotspot for different taxa. Besides a high turnover of communities between the three elevational levels, also a microhabitat-differentiation between ridge and valley forests was observed.

The standardized plot-based sampling design allows a detailed research on leaf beetle community ecology. In future, intermediate plots situated on the slopes between ridge and valley plots could be included in the study to allow finer-grained analyses. Furthermore, the gradient should be complemented with intermediate elevational levels and also its range should be extended: Whereas the tree line is almost reached in the present study, lower elevations should be included as well. The integration of lowland forest would allow more complex comparisons between low and high altitude fauna and could help to understand general diversity patterns along elevational gradients and their underlying causes.

As this study is the first of its kind in Ecuador and locally very restricted, nothing is known about how unique the leaf beetle fauna is in comparison with other regions even close by. Elevational gradients nearby or in other parts of Ecuador should be investigated to interpret the observed patterns in a broader context. Apart from diversity changes along elevational gradients, also the response of leaf beetle communities to anthropogenic disturbance could be studied.

Another direction in which further research could lead concerns the role of leaf beetles as a model group of tropical herbivorous insects. A detailed analysis of host-specificity and species ranges along altitudinal gradients is necessary to understand general mechanisms that maintain high biodiversity in tropical mountain forests. The sampling design allows studying correlations of leaf beetle diversity with their potential host-plants on the sampling plots.

Another possibility for future research on Chrysomelidae in Podocarpus National Park and RBSF would be the continuation and intensification of the sampling towards a more complete inventory. This would allow an easier comparison with the fauna of other Neotropical regions. For an inventory also the canopy should be included that is supposed to harbour a largely different and very diverse fauna. Therefore, the comparison between understorey and canopy leaf beetle communities would be interesting as well.

In addition, once the beetles are investigated taxonomically by experts, the efforts made in this study are likely to lead to the description of a number of new species.

Integration of DNA barcoding into biodiversity assessments

Facing the rapid advance of biodiversity loss in tropical rainforests, an acceleration of biodiversity assessment is indispensable. The traditional taxonomic approach is extremely time-intensive and for most tropical arthropods not possible at all: There is a severe lack of taxonomic expertise (taxonomic impediment), and if it is available, it is quite expensive.

Usually studies on tropical arthropod diversity rely on morphospecies instead of valid taxonomic species. Although this is a more superficial morphological approach, a precise morphospecies sorting is in many taxa quite challenging still and requires taxonomic expertise, too. Therefore, especially for individual- and species rich samples even a 'mere' morphospecies approach can be time- and cost-intensive if a high level of precision is attempted. In addition, even if precisely sorted, morphospecies always contain a certain degree of subjectivity and are hardly comparable among studies.

During the last years, molecular methods such as DNA barcoding have been propagated to accelerate analysis and understanding of biodiversity, with the time-intensive taxonomic identification and description of species being postponed or even completely relinquished. In this study, it could be shown that indeed DNA barcodes can be used for analysing diversity and ecology of leaf beetle communities even without valid taxonomic species information.

The use of DNA barcoding brings along plenty advantages: Whereas even the morphospecies sorting requires a certain degree of taxonomic expertise, in contrast DNA barcode sequences can be easily generated in any molecular laboratory with standard equipment and without any taxonomic knowledge. Furthermore, the method is open to scrutiny and replicable by third persons. The barcode-based MOTUs can be re-identified and allow e.g. a comparison with leaf beetle fauna of other regions. DNA barcoding can help to delimit species by facilitating and enhancing morphospecies sorting and therefore might prevent underestimation of species richness. Moreover, the method allows interesting follow-up studies as e.g. the exploration of phylogenetic diversity along the elevational gradient.

In the present study, a voucher-based approach of Sanger-sequencing of individuals was applied. Compared to a metabarcoding approach, this is more time-intensive and probably more costly, too. Usually not all collected specimens of a large sample but only a selection can be barcoded. In contrast, recent advances in metabarcoding allow compilation of large data sets with comparatively small time effort. On the other hand, the voucher-based approach can provide abundance data and it facilitates the connection of the specimen with all information connected to the individual. Especially when working with an unknown fauna it is advisable that as much information as possible stays connected to the sampled specimens: Specimens should be archived in collections together with comprehensive sampling information, DNA sequences, and photos that can be accessed via collection databases. This facilitates further research on the samples. In the long term, it is also desirable that the collection is complemented with formal Linnean species names. Although tropical samples contain many unknown species, in those cases where it is possible the specimens should be taxonomically identified. The Linnean names allow the linkage with existing knowledge of species' biology and ecology and are relevant for conservation issues as the compilation of red lists. The beetles from this study will be sent to taxonomic specialists for the respective subtaxon to be identified as far as possible and to formally describe new species. Whereas DNA barcoding certainly should be integrated into biodiversity assessments, it should create a feedback-loop with taxonomy and not replace it.

An essential factor influencing the efficacy of biodiversity assessment, regardless of whether morphology or DNA barcoding is used, is the sampling. Whereas, indeed, laboratory protocols for DNA sequencing have become more and more efficient during the last decades, the sampling that provides the specimens can constitute a bottleneck in the workflow because it can be quite effortful, as shown in this study. Although quite an effort was made, leaf beetle diversity is so rich that it could not be assessed exhaustively with the used methods, a circumstance implicating problems with the analyses. In this study, especially the plot-based sampling design is quite time-consuming as some plots are difficult to access and several replicates temporally scattered over the whole sampling period were sampled. However, it is exactly this sampling design that allows many possibilities of community analyses on a small-grained level. Sampling methods as Malaise trapping or canopy fogging could accelerate the sampling.

Résumé

In the present study it could be shown that important knowledge about a very diverse unknown leaf beetle fauna can be derived using DNA barcodes instead of taxonomic identifications. Beside information about species richness also more complex ecological issues such as species turnover and microhabitat specialization could be addressed. DNA barcoding allows an identification of species-like units without taxonomic expertise that is required even for a reliable morphospecies sorting when dealing with species- and individual rich assemblages. However, in the long term a taxonomic identification and the description of new species should be attempted. The chosen approach allows a variety of insights and offers many possibilities for subsequent research in both, the ecological and the methodological aspect.

This study shows once more how diverse and complex the insect fauna of tropical forests is and how much there is still to discover. Especially for tropical mountain forests there are large knowledge gaps although they are probably more diverse and more vulnerable than lowland forests. Although a considerable proportion of the country is protected area, Ecuador suffers the highest annual deforestation rate in South-America (-1.9%) and the Andean mountain forests are converted rapidly. To preserve Ecuador's outstanding and precious biodiversity, protection efforts should be intensified especially turning attention to the highly endangered mountain ecosystems.

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Appendix A

List of abbreviations

Table A.1: **List of abbreviations used in this thesis.**

ANOVA	analysis of variance
a.s.l.	above sea level
B	Bombuscaro
BOLD	Barcode of Life Data Systems
bp	base pair
C	Cajanuma
CBOL	Consortium for the Barcode of Life
COI	cytochrome *c* oxidase I
E, ECSF	Estación Científica San Francisco
Fig.	Figure
GMYC	Generalized mixed Yule-coalescent
iBOL	international Barcode of Life project
MANOVA	multivariate analysis of variance
ML	Maximum Likelihood
MOTU	molecular operational taxonomic unit
mtDNA	mitochondrial DNA
NJ-Tree	Neighbor-Joining-Tree
NMDS	non-metric multidimensional scaling
PCR	Polymerase Chain Reaction
Podocarpus NP	Podocarpus National Park
PTP	Poisson tree processes
RBSF	Reserva Biológica San Francisco
rRNA	ribosomal RNA
SD	standard deviation
SE	standard error
Tab.	Table
UTPL	Universidad Técnica Particular de Loja
ZFMK	Zoologisches Forschungsmuseum Alexander Koenig

Appendix B

Additional information: Sampling site information

Table B.1: **Sampling site information.**

Site	Elevation (a.s.l.)	Latitude (S)	Longitude (W)
C-U1	2891	4° 6' 31.194"	79° 10' 44.184"
C-U2	2885	4° 6' 30.3804"	79° 10' 44.022"
C-U3	2869	4° 6' 30.7692"	79° 10' 42.9852"
C-U4	2886	4° 6' 30.5568"	79° 10' 49.6632"
C-U5	2890	4° 6' 30.618"	79° 10' 48.8208"
C-U6	2893	4° 6' 29.4804"	79° 10' 48.6948"
C-L1	2818	4° 6' 31.212"	79° 10' 37.3116"
C-L2	2805	4° 6' 31.896"	79° 10' 37.0488"
C-L3	2798	4° 6' 30.3048"	79° 10' 39.2268"
C-L4	2865	4° 6' 32.5404"	79° 10' 48.6552"
C-L5	2878	4° 6' 30.9492"	79° 10' 50.4084"
C-L6	2880	4° 6' 31.698"	79° 10' 50.3112"
B-U1	1075	4° 6' 49.8528"	78° 58' 1.0128"
B-U2	1066	4° 6' 50.8608"	78° 58' 0.7824"
B-U3	1072	4° 6' 50.2092"	78° 57' 59.94"
B-U4	1268	4° 7' 15.7008"	78° 58' 40.5588"
B-U5	1257	4° 7' 15.8592"	78° 58' 40.008"
B-U6	1266	4° 7' 16.8672"	78° 58' 39.648"
B-L1	1020	4° 6' 59.238"	78° 58' 5.2356"
B-L2	1026	4° 6' 59.5008"	78° 58' 5.916"
B-L3	1046	4° 6' 58.5648"	78° 58' 8.7384"
B-L4	1054	4° 7' 17.7888"	78° 58' 29.856"
B-L5	1056	4° 7' 18.0516"	78° 58' 31.1844"
B-L6	1044	4° 7' 19.614"	78° 58' 30.8568"
E-U1	2002	3° 58' 27.7896"	79° 4' 30.378"
E-U2	2026	3° 58' 29.8704"	79° 4' 30.2124"
E-U3	2089	3° 58' 37.9488"	79° 4' 32.1384"
E-U4	2063	3° 58' 32.1276"	79° 4' 20.0316"
E-U5	2054	3° 58' 31.0512"	79° 4' 20.4204"
E-U6	2039	3° 58' 30.108"	79° 4' 20.3916"
E-L1	2039	3° 58' 34.9536"	79° 4' 31.4328"
E-L2	1993	3° 58' 32.61"	79° 4' 32.5056"
E-L3	2030	3° 58' 34.63"	79° 4' 31.21"
E-L4	1913	3° 58' 26.13"	79° 4' 15.83"
E-L5	1954	3° 58' 27.3576"	79° 4' 12.8784"
E-L6	1933	3° 58' 28.7904"	79° 4' 12.972"
Cajanuma	Cajanuma area, unspecified		
Bombuscaro	Bombuscaro area, unspecified		
ECSF	ECSF area, unspecified		
E-Station	1826	3° 58' 17.19"	79° 4' 44.06"
E-Q2 (Quebrada 2)	1990	3° 58' 36"	79° 4' 32"
E-Q3 (Quebrada 3)	1990	3° 58' 27"	79° 4' 23"
E-Q5 (Quebrada 5)	1990	3° 58' 28"	79° 4' 13"
E-Lichtung	1900	3° 58' 24"	79° 4' 33"
El Tiro	2590	3° 59.55'	79° 07.30'

Appendix C

Additional information: Specimen list

Table C.1: **Specimen list with sampling information and GenBank accession numbers. All sampling sites are within Podocarpus National Park/Reserva Biológica San Francisco, Ecuador. Specimens 0227–0237, 0246, 0679–0737 were collected by G. Brehm, M. Adams, and L. Lehner, specimens 4572 and 4581 were collected by F. Bodner. All other specimens were sampled by B. Thormann, D. Sotomayor, J. Castillo, T. Klug, P. Schwalb, and J. Struwe. Coordinates of the sampling sites are provided in Tab. B.1. Hand-Coll.(N) = Non-standardized Hand-Collection, Hand-Coll.(S) = Standardized Hand-Collection, Flight-Intercept. = Flight Interception Trap.**

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_0001_Eumolpinae_sp_001	N1	KJ677921	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0002_Alticinae_sp_042	N1	KJ677411	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0003_Alticinae_sp_042	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0003a_Alticinae_sp_042	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0004_Eumolpinae_sp_042	N1	KJ677862	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0005_Galerucinae_sp_040	N1	KJ677774	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0006_Galerucinae_sp_040	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0006a_Galerucinae_sp_040	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0007_Galerucinae_sp_038	N1	KJ677526	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0008_Alticinae_sp_243	N1	KJ677417	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0009_Eumolpinae_sp_022	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0010_Eumolpinae_sp_022	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0011_Eumolpinae_sp_022	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0012_Eumolpinae_sp_021	N1	KJ677897	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0013_Eumolpinae_sp_021	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0014_Eumolpinae_sp_021	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0015_Galerucinae_sp_076	N1	KJ677559	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0016_Galerucinae_sp_076	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0017_Alticinae_sp_043	N1	KJ677407	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0018_Alticinae_sp_043	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0019_Alticinae_sp_043	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0020_Alticinae_sp_043	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0021_Alticinae_sp_007	N1	KJ677705	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0022_Alticinae_sp_219	N1	KJ677711	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0024_Galerucinae_sp_001	N1	KJ677550	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0025_Galerucinae_sp_001	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0026_Galerucinae_sp_001	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0027_Galerucinae_sp_001	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0028_Galerucinae_sp_001	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0029_Galerucinae_sp_001	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0030_Galerucinae_sp_001	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0031_Galerucinae_sp_001	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0032_Galerucinae_sp_001	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0033_Galerucinae_sp_037	N1	KJ677555	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0034_Eumolpinae_sp_014	N1	KJ677931	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0035_Eumolpinae_sp_006	N1	KJ677907	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0036_Galerucinae_sp_011	N1	KJ677532	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0043_Galerucinae_sp_005	N1	KJ677545	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0044_Galerucinae_sp_005	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0045_Galerucinae_sp_005	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0045a_Galerucinae_sp_005	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0046_Alticinae_sp_243	N1	KJ677415	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0047_Alticinae_sp_042	N1	KJ677412	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0048_Galerucinae_sp_039	N1	KJ677523	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0049_Galerucinae_sp_041	N1	KJ677775	ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0050_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0051_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0052_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0053_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0054_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0055_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0056_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0057_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0058_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0059_Galerucinae sp. 002	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0060_Galerucinae sp. 004	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0061_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0062_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0063_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0064_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0065_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0066_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0067_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0068_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0069_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0070_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0071_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)

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Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_0072_Galerucinae sp. 007	N1		ECSF	Station	11/12 2010	Hand-Coll.(N)
BT_0085_Eumolpinae_sp_048	N2		Bombuscaro	L1	20.11.2010	Hand-Coll.(N)
BT_0088_Galerucinae_sp_007	N4	KJ677543	ECSF	Station	20.11.2010	Light Trap
BT_0089_Eumolpinae_sp_001	N4	KJ677922	ECSF	Station	20.11.2010	Light Trap
BT_0090_Galerucinae_sp_076	N5	KJ677558	ECSF	Station	21.11.2010	Light Trap
BT_0091_Eumolpinae_sp_001	N5	KJ677923	ECSF	Station	21.11.2010	Light Trap
BT_0092_Eumolpinae_sp_001	N5		ECSF	Station	21.11.2010	Light Trap
BT_0093_Eumolpinae_sp_001	N5		ECSF	Station	21.11.2010	Light Trap
BT_0094_Galerucinae_sp_011	N6	KJ677533	ECSF	U1	22.11.2010	Hand-Coll.(N)
BT_0095_Cassidinae_sp_001	N7	KJ677873	ECSF		22.11.2010	Hand-Coll.(N)
BT_0096_Alticinae_sp_010	N7	KJ677729	ECSF		22.11.2010	Hand-Coll.(N)
BT_0097_Alticinae_sp_010	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0098_Galerucinae_sp_002	N7	KJ677547	ECSF		22.11.2010	Hand-Coll.(N)
BT_0099_Galerucinae_sp_007	N7	KJ677512	ECSF		22.11.2010	Hand-Coll.(N)
BT_0100_Galerucinae_sp_007	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0101_Galerucinae_sp_007	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0102_Alticinae_sp_044	N7	KJ677374	ECSF		22.11.2010	Hand-Coll.(N)
BT_0103_Eumolpinae_sp_038	N7	KJ677927	ECSF		22.11.2010	Hand-Coll.(N)
BT_0104_Eumolpinae_sp_038	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0105_Eumolpinae_sp_038	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0106_Eumolpinae_sp_038	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0107_Galerucinae_sp_046	N7	KJ677632	ECSF		22.11.2010	Hand-Coll.(N)
BT_0108_Galerucinae_sp_046	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0109_Alticinae_sp_251	N7	KJ677459	ECSF		22.11.2010	Hand-Coll.(N)
BT_0110_Alticinae_sp_087	N7	KJ677497	ECSF		22.11.2010	Hand-Coll.(N)
BT_0111_Alticinae_sp_087	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0112_Alticinae_sp_087	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0113_Alticinae_sp_087	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0114_Galerucinae_sp_062	N7	KJ677756	ECSF		22.11.2010	Hand-Coll.(N)
BT_0115_Alticinae_sp_098	N7	KJ677286	ECSF		22.11.2010	Hand-Coll.(N)
BT_0116_Alticinae_sp_098	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0117_Eumolpinae_sp_036	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0118_Eumolpinae_sp_019	N7	KJ677877	ECSF		22.11.2010	Hand-Coll.(N)
BT_0119_Alticinae_sp_124	N7	KJ677494	ECSF		22.11.2010	Hand-Coll.(N)
BT_0120_Alticinae_sp_064	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0121_Alticinae_sp_107	N7	KJ677776	ECSF		22.11.2010	Hand-Coll.(N)
BT_0122_Alticinae_sp_107	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0123_Alticinae_sp_129	N7	KJ677769	ECSF		22.11.2010	Hand-Coll.(N)
BT_0124_Alticinae_sp_129	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0125_Alticinae_sp_097	N7	KJ677311	ECSF		22.11.2010	Hand-Coll.(N)
BT_0126_Alticinae_sp_123	N7	KJ677618	ECSF		22.11.2010	Hand-Coll.(N)
BT_0127_Hispinae_sp_001	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0128_Eumolpinae_sp_009	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0129_Eumolpinae_sp_009	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0130_Galerucinae_sp_034	N7	KJ677691	ECSF		22.11.2010	Hand-Coll.(N)
BT_0131_Galerucinae_sp_034	N7		ECSF		22.11.2010	Hand-Coll.(N)
BT_0133_Cassidinae_sp_003	N8		ECSF	L6	24.11.2010	Hand-Coll.(N)
BT_0134_Galerucinae_sp_007	N8	KJ677513	ECSF	L6	24.11.2010	Hand-Coll.(N)
BT_0135_Eumolpinae_sp_019	N9	KJ677878	ECSF		24.11.2010	Hand-Coll.(N)
BT_0136_Eumolpinae_sp_019	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0137_Cassidinae_sp_004	N9	KJ677850	ECSF		24.11.2010	Hand-Coll.(N)
BT_0138_Cassidinae_sp_004	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0139_Alticinae_sp_010	N9	KJ677730	ECSF		24.11.2010	Hand-Coll.(N)
BT_0140_Alticinae_sp_028	N9	KJ677346	ECSF		24.11.2010	Hand-Coll.(N)
BT_0144_Eumolpinae_sp_038	N9	KJ677926	ECSF		24.11.2010	Hand-Coll.(N)
BT_0145_Galerucinae_sp_061	N9	KJ677514	ECSF		24.11.2010	Hand-Coll.(N)
BT_0146_Alticinae_sp_029	N9	KJ677442	ECSF		24.11.2010	Hand-Coll.(N)
BT_0147_Alticinae_sp_062	N9	KJ677421	ECSF		24.11.2010	Hand-Coll.(N)
BT_0148_Alticinae_sp_066	N9	KJ677468	ECSF		24.11.2010	Hand-Coll.(N)
BT_0149_Alticinae_sp_249	N9	KJ677456	ECSF		24.11.2010	Hand-Coll.(N)
BT_0150_Alticinae_sp_249	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0151_Alticinae_sp_249	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0152_Alticinae_sp_249	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0153_Alticinae_sp_109	N9	KJ677669	ECSF		24.11.2010	Hand-Coll.(N)
BT_0154_Alticinae_sp_115	N9	KJ677287	ECSF		24.11.2010	Hand-Coll.(N)
BT_0155_Alticinae_sp_193	N9	KJ677671	ECSF		24.11.2010	Hand-Coll.(N)
BT_0156_Alticinae_sp_019	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0157_Alticinae_sp_097	N9	KJ677300	ECSF		24.11.2010	Hand-Coll.(N)
BT_0158_Eumolpinae_sp_002	N9	KJ677932	ECSF		24.11.2010	Hand-Coll.(N)
BT_0159_Galerucinae_sp_096	N9	KJ677683	ECSF		24.11.2010	Hand-Coll.(N)
BT_0160_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0161_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0162_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0163_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0164_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0165_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0166_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0167_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0168_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0169_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0170_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0171_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0172_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0173_Galerucinae_sp_096	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0174_Galerucinae_sp_046	N9	KJ677633	ECSF		24.11.2010	Hand-Coll.(N)
BT_0175_Galerucinae_sp_046	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0176_Galerucinae_sp_046	N9	KJ677636	ECSF		24.11.2010	Hand-Coll.(N)
BT_0177_Galerucinae_sp_046	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0178_Galerucinae_sp_046	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0179_Galerucinae_sp_046	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0180_Galerucinae_sp_046	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0181_Galerucinae_sp_046	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0182_Galerucinae_sp_046	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0183_Galerucinae_sp_034	N9	KJ677692	ECSF		24.11.2010	Hand-Coll.(N)
BT_0184_Galerucinae_sp_034	N9		ECSF		24.11.2010	Hand-Coll.(N)
BT_0188_Galerucinae_sp_011	N10	KJ677535	ECSF	Station	24.11.2010	Light Trap
BT_0189_Alticinae_sp_161	N10	KJ677361	ECSF	Station	24.11.2010	Light Trap
BT_0190_Eumolpinae_sp_001	N10	KJ677924	ECSF	Station	24.11.2010	Light Trap
BT_0191_Eumolpinae_sp_001	N10		ECSF	Station	24.11.2010	Light Trap
BT_0195_Galerucinae_sp_045	N11		Bombuscaro		25.11.2010	Hand-Coll.(N)
BT_0196_Galerucinae_sp_010	N11	KJ677807	Bombuscaro		25.11.2010	Hand-Coll.(N)
BT_0197_Galerucinae_sp_033	N11		Bombuscaro		25.11.2010	Hand-Coll.(N)
BT_0198_Alticinae_sp_137	N14		ECSF	U1	27.11.2010	Pitfall Trap
BT_0199_Alticinae_sp_118	N16	KJ677667	ECSF		27.11.2010	Hand-Coll.(N)
BT_0201_Chrysomelinae_sp_002	N18	KJ677759	Bombuscaro	L3	29.11.2010	Hand-Coll.(N)
BT_0202_Galerucinae_sp_032	N19	KJ677273	Bombuscaro		29.11.2010	Hand-Coll.(N)
BT_0203_Galerucinae_sp_032	N19		Bombuscaro		29.11.2010	Hand-Coll.(N)
BT_0204_Hispinae_sp_002	N19	KJ677856	Bombuscaro		29.11.2010	Hand-Coll.(N)
BT_0206_Alticinae_sp_085	N24		ECSF	U1	01.12.2010	Pitfall Trap
BT_0207_Galerucinae_sp_069	N25	KJ677778	ECSF		01.12.2010	Hand-Coll.(N)

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Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_0208_Eumolpinae_sp_019	N26	KJ677879	ECSF	L2	02.12.2010	Hand-Coll.(N)
BT_0209_Cassidinae_sp_005	N27	KJ677822	ECSF		02.12.2010	Hand-Coll.(N)
BT_0210_Cassidinae_sp_006	N27		ECSF		02.12.2010	Hand-Coll.(N)
BT_0211_Alticinae_sp_087	N27	KJ677495	ECSF		02.12.2010	Hand-Coll.(N)
BT_0212_Galerucinae_sp_066	N27	KJ677794	ECSF		02.12.2010	Hand-Coll.(N)
BT_0213_Galerucinae_sp_024	N27	KJ677733	ECSF		02.12.2010	Hand-Coll.(N)
BT_0214_Alticinae_sp_028	N27	KJ677349	ECSF		02.12.2010	Hand-Coll.(N)
BT_0215_Alticinae_sp_028	N27		ECSF		02.12.2010	Hand-Coll.(N)
BT_0216_Eumolpinae_sp_038	N27		ECSF		02.12.2010	Hand-Coll.(N)
BT_0217_Eumolpinae_sp_038	N27		ECSF		02.12.2010	Hand-Coll.(N)
BT_0218_Galerucinae_sp_031	N27	KJ677751	ECSF		02.12.2010	Hand-Coll.(N)
BT_0219_Eumolpinae_sp_073	N27	KJ677831	ECSF		02.12.2010	Hand-Coll.(N)
BT_0220_Alticinae_sp_115	N27	KJ677288	ECSF		02.12.2010	Hand-Coll.(N)
BT_0221_Eumolpinae_sp_010	N27	KJ677906	ECSF		02.12.2010	Hand-Coll.(N)
BT_0223_Galerucinae_sp_034	N27	KJ677689	ECSF		02.12.2010	Hand-Coll.(N)
BT_0224_Galerucinae_sp_034	N27		ECSF		02.12.2010	Hand-Coll.(N)
BT_0227_Cassidinae_sp_014	N28	KJ677874	ECSF		02.12.2010	Hand-Coll.(N)
BT_0228_Cassidinae_sp_007	N28	KJ677837	ECSF		02.12.2010	Hand-Coll.(N)
BT_0229_Cassidinae_sp_007	N28		ECSF		02.12.2010	Hand-Coll.(N)
BT_0230_Eumolpinae_sp_022	N28		ECSF		02.12.2010	Hand-Coll.(N)
BT_0231_Hispinae_sp_003	N28	KJ677842	ECSF		02.12.2010	Hand-Coll.(N)
BT_0232_Hispinae_sp_004	N28	KJ677272	ECSF		02.12.2010	Hand-Coll.(N)
BT_0233_Alticinae_sp_061	N28	KJ677282	ECSF		02.12.2010	Hand-Coll.(N)
BT_0234_Alticinae_sp_097	N28	KJ677308	ECSF		02.12.2010	Hand-Coll.(N)
BT_0235_Alticinae_sp_010	N28	KJ677728	ECSF		02.12.2010	Hand-Coll.(N)
BT_0236_Alticinae_sp_156	N28	KJ677727	ECSF		02.12.2010	Hand-Coll.(N)
BT_0237_Alticinae_sp_156	N28		ECSF		02.12.2010	Hand-Coll.(N)
BT_0239_Galerucinae_sp_002	N29	KJ677548	ECSF		03.12.2010	Hand-Coll.(N)
BT_0240_Eumolpinae_sp_021	N29	KJ677898	ECSF		03.12.2010	Hand-Coll.(N)
BT_0241_Eumolpinae_sp_038	N29		ECSF		03.12.2010	Hand-Coll.(N)
BT_0242_Eumolpinae_sp_038	N29		ECSF		03.12.2010	Hand-Coll.(N)
BT_0243_Alticinae_sp_118	N29	KJ677666	ECSF		03.12.2010	Hand-Coll.(N)
BT_0244_Alticinae_sp_097	N29	KJ677309	ECSF		03.12.2010	Hand-Coll.(N)
BT_0245_Galerucinae_sp_034	N29	KJ677693	ECSF		03.12.2010	Hand-Coll.(N)
BT_0246_Galerucinae_sp_030	N30	KJ677701	ECSF	Q3	03.12.2010	Hand-Coll.(N)
BT_0247_Criocerinae_sp_001	N31	KJ677813	ECSF		05.12.2010	Hand-Coll.(N)
BT_0249_Criocerinae_sp_001	N31	KJ677814	ECSF		05.12.2010	Hand-Coll.(N)
BT_0250_Alticinae_sp_115	N31		ECSF		05.12.2010	Hand-Coll.(N)
BT_0251_Alticinae_sp_115	N31		ECSF		05.12.2010	Hand-Coll.(N)
BT_0252_Galerucinae_sp_034	N31	KJ677694	ECSF		05.12.2010	Hand-Coll.(N)
BT_0253_Galerucinae_sp_034	N31		ECSF		05.12.2010	Hand-Coll.(N)
BT_0254_Eumolpinae_sp_023	N31	KJ677899	ECSF		05.12.2010	Hand-Coll.(N)
BT_0255_Eumolpinae_sp_023	N31		ECSF		05.12.2010	Hand-Coll.(N)
BT_0256_Alticinae_sp_031	N32	KJ677625	ECSF	Station	03.12.2010	Light Trap
BT_0257_Galerucinae_sp_001	N32	KJ677551	ECSF	Station	03.12.2010	Light Trap
BT_0258_Galerucinae_sp_005	N32	KJ677546	ECSF	Station	03.12.2010	Light Trap
BT_0259_Alticinae_sp_096	N36	KJ677469	ECSF		08.12.2010	Hand-Coll.(N)
BT_0260_Eumolpinae_sp_038	N36		ECSF		08.12.2010	Hand-Coll.(N)
BT_0261_Eumolpinae_sp_038	N36		ECSF		08.12.2010	Hand-Coll.(N)
BT_0266_Alticinae_sp_145	N37		ECSF	Lichtung		Flight-Intercept.
BT_0267_Alticinae_sp_029	N39	KJ677443	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0268_Alticinae_sp_158	N39	KJ677582	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0269_Alticinae_sp_086	N39	KJ677396	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0270_Alticinae_sp_086	N39		ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0271_Alticinae_sp_064	N39	KJ677447	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0272_Alticinae_sp_064	N39		ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0273_Alticinae_sp_141	N39	KJ677585	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0274_Alticinae_sp_141	N39		ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0275_Alticinae_sp_141	N39		ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0276_Alticinae_sp_122	N39	KJ677777	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0277_Alticinae_sp_122	N39		ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0278_Alticinae_sp_124	N39	KJ677491	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0279_Alticinae_sp_115	N39	KJ677289	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0280_Eumolpinae_sp_022	N39		ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0281_Eumolpinae_sp_038	N39		ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0282_Eumolpinae_sp_038	N39		ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0283_Eumolpinae_sp_020	N39	KJ677941	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0284_Alticinae_sp_087	N39	KJ677496	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0285_Galerucinae_sp_022	N39	KJ677556	ECSF	Lichtung	08.12.2010	Malaise Trap
BT_0286_Alticinae_sp_012	N41		ECSF			Hand-Coll.(N)
BT_0287_Eumolpinae_sp_038	N41		ECSF			Hand-Coll.(N)
BT_0288_Eumolpinae_sp_017	N42	KJ677909	ECSF	Station	12.12.2010	Light Trap
BT_0289_Eumolpinae_sp_001	N42	KJ677925	ECSF	Station	12.12.2010	Light Trap
BT_0290_Eumolpinae_sp_001	N42		ECSF	Station	12.12.2010	Light Trap
BT_0291_Eumolpinae_sp_001	N42		ECSF	Station	12.12.2010	Light Trap
BT_0292_Galerucinae_sp_076	N42	KJ677557	ECSF	Station	12.12.2010	Light Trap
BT_0293_Galerucinae_sp_076	N42		ECSF	Station	12.12.2010	Light Trap
BT_0294_Galerucinae_sp_076	N42		ECSF	Station	12.12.2010	Light Trap
BT_0295_Galerucinae_sp_031	N43	KJ677752	ECSF		12.12.2010	Hand-Coll.(N)
BT_0296_Alticinae_sp_005	N44	KJ677652	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0297_Alticinae_sp_142	N44	KJ677593	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0298_Alticinae_sp_063	N44	KJ677342	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0299_Alticinae_sp_064	N44		ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0300_Alticinae_sp_064	N44		ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0301_Alticinae_sp_083	N44	KJ677334	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0302_Alticinae_sp_086	N44	KJ677398	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0303_Alticinae_sp_086	N44		ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0304_Alticinae_sp_086	N44		ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0305_Alticinae_sp_081	N44	KJ677765	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0306_Alticinae_sp_019	N44		ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0307_Alticinae_sp_115	N44	KJ677297	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0308_Alticinae_sp_018	N44		ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0309_Alticinae_sp_256	N44	KJ677301	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0310_Eumolpinae_sp_017	N44		ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0311_Eumolpinae_sp_042	N44	KJ677863	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0312_Eumolpinae_sp_021	N44	KJ677900	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0313_Alticinae_sp_122	N44		ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0314_Eumolpinae_sp_043	N44	KJ677809	ECSF	Lichtung	12.12.2010	Malaise Trap
BT_0318_Alticinae_sp_124	N50		ECSF	L6	14.12.2010	Malaise Trap
BT_0319_Galerucinae_sp_026	N50		ECSF	L6	14.12.2010	Malaise Trap
BT_0320_Galerucinae_sp_061	N50		ECSF	L6	14.12.2010	Malaise Trap
BT_0322_Alticinae_sp_143	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0323_Eumolpinae_sp_011	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0336_Galerucinae_sp_056	S1	KJ677740	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0337_Galerucinae_sp_056	S1	KJ677741	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0338_Galerucinae_sp_055	S1	KJ677742	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0339_Alticinae_sp_071	S1	KJ677330	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0340_Alticinae_sp_064	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0341_Alticinae_sp_073	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0342_Galerucinae_sp_051	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0343_Galerucinae_sp_052	S1	KJ677743	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0344_Galerucinae_sp_052	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0345_Alticinae_sp_051	S1		Bombuscaro	L1	20.11.2010	Sweep Netting

Continued on next page(s)

Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_0346_Alticinae_sp_051	S1	KJ677366	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0347_Alticinae_sp_051	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0348_Alticinae_sp_051	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0349_Eumolpinae_sp_020	S1	KJ677940	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0350_Eumolpinae_sp_045	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0351_Eumolpinae_sp_045	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0352_Alticinae_sp_130	S1	KJ677771	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0353_Alticinae_sp_132	S1	KJ677732	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0354_Alticinae_sp_125	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0355_Alticinae_sp_125	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0356_Alticinae_sp_128	S1	KJ677509	Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0357_Alticinae_sp_128	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0358_Alticinae_sp_128	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0359_Alticinae_sp_128	S1		Bombuscaro	L1	20.11.2010	Sweep Netting
BT_0361_Alticinae_sp_050	S2	KJ677381	Bombuscaro	L1	20.11.2010	Beating
BT_0362_Alticinae_sp_114	S2		Bombuscaro	L1	20.11.2010	Beating
BT_0363_Alticinae_sp_051	S2	KJ677373	Bombuscaro	L1	20.11.2010	Beating
BT_0364_Eumolpinae_sp_018	S2		Bombuscaro	L1	20.11.2010	Beating
BT_0365_Galerucinae_sp_049	S2	KJ677645	Bombuscaro	L1	20.11.2010	Beating
BT_0366_Galerucinae_sp_049	S2		Bombuscaro	L1	20.11.2010	Beating
BT_0367_Galerucinae_sp_049	S2		Bombuscaro	L1	20.11.2010	Beating
BT_0368_Galerucinae_sp_049	S2		Bombuscaro	L1	20.11.2010	Beating
BT_0369_Galerucinae_sp_049	S2		Bombuscaro	L1	20.11.2010	Beating
BT_0370_Galerucinae_sp_049	S2		Bombuscaro	L1	20.11.2010	Beating
BT_0371_Eumolpinae_sp_006	S3		Bombuscaro	L1	20.11.2010	Hand-Coll.(S)
BT_0372_Alticinae_sp_009	S3	KJ677723	Bombuscaro	L1	20.11.2010	Hand-Coll.(S)
BT_0373_Alticinae_sp_009	S3		Bombuscaro	L1	20.11.2010	Hand-Coll.(S)
BT_0374_Alticinae_sp_024	S4	KR424908	Bombuscaro	U2	20.11.2010	Sweep Netting
BT_0375_Eumolpinae_sp_032	S4	KJ677904	Bombuscaro	U2	20.11.2010	Sweep Netting
BT_0376_Alticinae_sp_051	S4	KJ677367	Bombuscaro	U2	20.11.2010	Sweep Netting
BT_0377_Eumolpinae_sp_024	S4	KJ677912	Bombuscaro	U2	20.11.2010	Sweep Netting
BT_0378_Eumolpinae_sp_024	S4		Bombuscaro	U2	20.11.2010	Sweep Netting
BT_0380_Eumolpinae_sp_024	S5	KJ677918	Bombuscaro	U2	20.11.2010	Beating
BT_0381_Galerucinae_sp_089	S5		Bombuscaro	U2	20.11.2010	Beating
BT_0382_Galerucinae_sp_013	S6	KJ677537	Bombuscaro	U2	20.11.2010	Hand-Coll.(S)
BT_0383_Alticinae_sp_087	S7	KJ677501	ECSF	U1	22.11.2010	Sweep Netting
BT_0384_Eumolpinae_sp_039	S7	KJ677883	ECSF	U1	22.11.2010	Sweep Netting
BT_0385_Alticinae_sp_064	S7		ECSF	U1	22.11.2010	Sweep Netting
BT_0386_Alticinae_sp_064	S7		ECSF	U1	22.11.2010	Sweep Netting
BT_0387_Alticinae_sp_104	S7	KJ677324	ECSF	U1	22.11.2010	Sweep Netting
BT_0388_Alticinae_sp_104	S7		ECSF	U1	22.11.2010	Sweep Netting
BT_0389_Alticinae_sp_105	S7		ECSF	U1	22.11.2010	Sweep Netting
BT_0390_Alticinae_sp_090	S7	KJ677453	ECSF	U1	22.11.2010	Sweep Netting
BT_0391_Alticinae_sp_090	S7	KJ677454	ECSF	U1	22.11.2010	Sweep Netting
BT_0392_Eumolpinae_sp_074	S7	KJ677832	ECSF	U1	22.11.2010	Sweep Netting
BT_0395_Eumolpinae_sp_074	S7	KJ677833	ECSF	U1	22.11.2010	Sweep Netting
BT_0396_Cassidinae_sp_004	S8	KJ677851	ECSF	U1	22.11.2010	Beating
BT_0397_Alticinae_sp_131	S8	KJ677654	ECSF	U1	22.11.2010	Beating
BT_0398_Cassidinae_sp_003	S9		ECSF	U1	22.11.2010	Hand-Coll.(S)
BT_0399_Galerucinae_sp_028	S10	KJ677437	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0400_Galerucinae_sp_028	S10		Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0401_Galerucinae_sp_054	S10		Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0402_Galerucinae_sp_044	S10	KJ677603	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0403_Galerucinae_sp_044	S10	KJ677604	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0404_Galerucinae_sp_044	S10		Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0405_Galerucinae_sp_045	S10	KJ677630	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0406_Galerucinae_sp_045	S10		Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0407_Galerucinae_sp_049	S10	KJ677642	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0408_Eumolpinae_sp_024	S10	KJ677913	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0409_Eumolpinae_sp_024	S10	KJ677914	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0410_Alticinae_sp_141	S10	KJ677772	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0411_Alticinae_sp_058	S10	KJ677350	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0412_Alticinae_sp_058	S10		Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0413_Alticinae_sp_058	S10		Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0414_Alticinae_sp_058	S10		Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0415_Alticinae_sp_242	S10	KJ677611	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0416_Alticinae_sp_242	S10		Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0417_Galerucinae_sp_074	S10	KJ677799	Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0418_Eumolpinae_sp_045	S10		Bombuscaro	U4	25.11.2010	Sweep Netting
BT_0419_Alticinae_sp_141	S11		Bombuscaro	U4	25.11.2010	Beating
BT_0420_Alticinae_sp_128	S11	KJ677506	Bombuscaro	U4	25.11.2010	Beating
BT_0421_Alticinae_sp_073	S11		Bombuscaro	U4	25.11.2010	Beating
BT_0422_Galerucinae_sp_028	S11		Bombuscaro	U4	25.11.2010	Beating
BT_0423_Eumolpinae_sp_024	S11	KJ677915	Bombuscaro	U4	25.11.2010	Beating
BT_0425_Eumolpinae_sp_007	S12	KJ677876	Bombuscaro	U4	25.11.2010	Hand-Coll.(S)
BT_0426_Alticinae_sp_150	S13	KJ677715	ECSF	U2	27.11.2010	Sweep Netting
BT_0427_Alticinae_sp_104	S13	KJ677317	ECSF	U2	27.11.2010	Sweep Netting
BT_0428_Alticinae_sp_105	S13	KJ677315	ECSF	U2	27.11.2010	Sweep Netting
BT_0429_Eumolpinae_sp_039	S13	KJ677884	ECSF	U2	27.11.2010	Sweep Netting
BT_0430_Eumolpinae_sp_039	S13		ECSF	U2	27.11.2010	Sweep Netting
BT_0431_Eumolpinae_sp_039	S13		ECSF	U2	27.11.2010	Sweep Netting
BT_0432_Eumolpinae_sp_030	S13	KJ677902	ECSF	U2	27.11.2010	Sweep Netting
BT_0433_Galerucinae_sp_069	S14	KJ677780	ECSF	U2	27.11.2010	Beating
BT_0434_Galerucinae_sp_072	S14	KJ677805	ECSF	U2	27.11.2010	Beating
BT_0436_Alticinae_sp_149	S16	KJ677708	Bombuscaro	L2	29.11.2010	Sweep Netting
BT_0437_Alticinae_sp_149	S16		Bombuscaro	L2	29.11.2010	Sweep Netting
BT_0438_Galerucinae_sp_015	S16	KJ677747	Bombuscaro	L2	29.11.2010	Sweep Netting
BT_0439_Galerucinae_sp_015	S16		Bombuscaro	L2	29.11.2010	Sweep Netting
BT_0440_Alticinae_sp_025	S16	KR424909	Bombuscaro	L2	29.11.2010	Sweep Netting
BT_0441_Galerucinae_sp_082	S16	KJ677687	Bombuscaro	L2	29.11.2010	Sweep Netting
BT_0442_Galerucinae_sp_049	S16	KJ677647	Bombuscaro	L2	29.11.2010	Sweep Netting
BT_0443_Alticinae_sp_051	S17	KJ677368	Bombuscaro	L2	29.11.2010	Beating
BT_0444_Alticinae_sp_143	S17	KJ677574	Bombuscaro	L2	29.11.2010	Beating
BT_0445_Alticinae_sp_153	S17		Bombuscaro	L2	29.11.2010	Beating
BT_0446_Alticinae_sp_153	S17		Bombuscaro	L2	29.11.2010	Beating
BT_0447_Galerucinae_sp_007	S17	KJ677541	Bombuscaro	L2	29.11.2010	Beating
BT_0448_Galerucinae_sp_049	S17	KJ677648	Bombuscaro	L2	29.11.2010	Beating
BT_0449_Galerucinae_sp_049	S17	KJ677646	Bombuscaro	L2	29.11.2010	Beating
BT_0451_Galerucinae_sp_015	S18	KJ677748	Bombuscaro	L2	29.11.2010	Hand-Coll.(S)
BT_0452_Alticinae_sp_009	S18	KJ677722	Bombuscaro	L2	29.11.2010	Hand-Coll.(S)
BT_0453_Alticinae_sp_135	S19		Bombuscaro	L3	29.11.2010	Sweep Netting
BT_0454_Alticinae_sp_026	S19	KJ677408	Bombuscaro	L3	29.11.2010	Sweep Netting
BT_0455_Alticinae_sp_026	S19		Bombuscaro	L3	29.11.2010	Sweep Netting
BT_0456_Alticinae_sp_026	S19		Bombuscaro	L3	29.11.2010	Sweep Netting
BT_0457_Alticinae_sp_181	S19	KJ677279	Bombuscaro	L3	29.11.2010	Sweep Netting
BT_0458_Alticinae_sp_181	S19		Bombuscaro	L3	29.11.2010	Sweep Netting
BT_0459_Galerucinae_sp_050	S19	KJ677432	Bombuscaro	L3	29.11.2010	Sweep Netting
BT_0460_Galerucinae_sp_045	S19	KJ677629	Bombuscaro	L3	29.11.2010	Sweep Netting
BT_0461_Galerucinae_sp_045	S19	KJ677628	Bombuscaro	L3	29.11.2010	Sweep Netting
BT_0462_Eumolpinae_sp_042	S20	KJ677858	Bombuscaro	L3	29.11.2010	Beating
BT_0463_Galerucinae_sp_070	S20	KJ677803	Bombuscaro	L3	29.11.2010	Beating
BT_0464_Eumolpinae_sp_045	S20		Bombuscaro	L3	29.11.2010	Beating
BT_0465_Alticinae_sp_050	S20	KJ677382	Bombuscaro	L3	29.11.2010	Beating
BT_0467_Eumolpinae_sp_018	S20		Bombuscaro	L3	29.11.2010	Beating
BT_0468_Alticinae_sp_072	S20	KJ677620	Bombuscaro	L3	29.11.2010	Beating

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SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_0469_Galerucinae_sp_045	S20	KJ677631	Bombuscaro	L3	29.11.2010	Beating
BT_0470_Galerucinae_sp_045	S20		Bombuscaro	L3	29.11.2010	Beating
BT_0471_Galerucinae_sp_045	S20		Bombuscaro	L3	29.11.2010	Beating
BT_0472_Galerucinae_sp_045	S20		Bombuscaro	L3	29.11.2010	Beating
BT_0473_Galerucinae_sp_069	S22	KJ677779	ECSF	U1	01.12.2010	Sweep Netting
BT_0474_Alticinae_sp_080	S22	KJ677615	ECSF	U1	01.12.2010	Sweep Netting
BT_0475_Eumolpinae_sp_039	S22	KJ677885	ECSF	U1	01.12.2010	Sweep Netting
BT_0476_Eumolpinae_sp_039	S22		ECSF	U1	01.12.2010	Sweep Netting
BT_0477_Alticinae_sp_104	S22		ECSF	U1	01.12.2010	Sweep Netting
BT_0478_Alticinae_sp_104	S22		ECSF	U1	01.12.2010	Sweep Netting
BT_0480_Hispinae_sp_005	S22		ECSF	U1	01.12.2010	Sweep Netting
BT_0489_Galerucinae_sp_067	S23	KJ677802	ECSF	U1	01.12.2010	Beating
BT_0490_Hispinae_sp_005	S23	KJ677839	ECSF	U1	01.12.2010	Beating
BT_0491_Alticinae_sp_157	S25	KJ677597	ECSF	L2	02.12.2010	Sweep Netting
BT_0492_Galerucinae_sp_061	S25	KJ677515	ECSF	L2	02.12.2010	Sweep Netting
BT_0493_Eumolpinae_sp_037	S25		ECSF	L2	02.12.2010	Sweep Netting
BT_0494_Alticinae_sp_250	S25	KJ677450	ECSF	L2	02.12.2010	Sweep Netting
BT_0495_Alticinae_sp_148	S25		ECSF	L2	02.12.2010	Sweep Netting
BT_0495a_Alticinae_sp_148	S25		ECSF	L2	02.12.2010	Sweep Netting
BT_0496_Alticinae_sp_112	S25	KJ677782	ECSF	L2	02.12.2010	Sweep Netting
BT_0497_Alticinae_sp_111	S25		ECSF	L2	02.12.2010	Sweep Netting
BT_0498_Alticinae_sp_113	S25		ECSF	L2	02.12.2010	Sweep Netting
BT_0499_Alticinae_sp_044	S26	KJ677375	ECSF	L2	02.12.2010	Beating
BT_0500_Alticinae_sp_044	S26		ECSF	L2	02.12.2010	Beating
BT_0501_Galerucinae_sp_066	S26	KJ677795	ECSF	L2	02.12.2010	Beating
BT_0502_Eumolpinae_sp_042	S26	KJ677864	ECSF	L2	02.12.2010	Beating
BT_0503_Alticinae_sp_111	S26	KJ677601	ECSF	L2	02.12.2010	Beating
BT_0504_Alticinae_sp_111	S26		ECSF	L2	02.12.2010	Beating
BT_0505_Alticinae_sp_096	S27	KJ677470	ECSF	L2	02.12.2010	Hand-Coll.(S)
BT_0506_Alticinae_sp_092	S27	KJ677737	ECSF	L2	02.12.2010	Hand-Coll.(S)
BT_0507_Alticinae_sp_092	S27		ECSF	L2	02.12.2010	Hand-Coll.(S)
BT_0508_Galerucinae_sp_053	S27	KJ677757	ECSF	L2	02.12.2010	Hand-Coll.(S)
BT_0509_Cassidinae_sp_003	S27		ECSF	L2	02.12.2010	Hand-Coll.(S)
BT_0510_Cassidinae_sp_004	S27	KJ677852	ECSF	L2	02.12.2010	Hand-Coll.(S)
BT_0511_Cassidinae_sp_008	S27	KJ677821	ECSF	L2	02.12.2010	Hand-Coll.(S)
BT_0512_Hispinae_sp_006	S27	KJ677847	ECSF	L2	02.12.2010	Hand-Coll.(S)
BT_0513_Hispinae_sp_006	S27		ECSF	L2	02.12.2010	Hand-Coll.(S)
BT_0514_Eumolpinae_sp_074	S28	KJ677834	ECSF	U3	03.12.2010	Sweep Netting
BT_0515_Eumolpinae_sp_074	S28		ECSF	U3	03.12.2010	Sweep Netting
BT_0516_Alticinae_sp_126	S28	KJ677783	ECSF	U3	03.12.2010	Sweep Netting
BT_0517_Alticinae_sp_104	S28	KJ677325	ECSF	U3	03.12.2010	Sweep Netting
BT_0518_Alticinae_sp_085	S28	KJ677388	ECSF	U3	03.12.2010	Sweep Netting
BT_0519_Alticinae_sp_068	S29	KJ677462	ECSF	U3	03.12.2010	Beating
BT_0520_Alticinae_sp_159	S29	KJ677595	ECSF	U3	03.12.2010	Beating
BT_0524_Eumolpinae_sp_039	S29	KJ677895	ECSF	U3	03.12.2010	Beating
BT_0525_Hispinae_sp_023	S29	KJ677844	ECSF	U3	03.12.2010	Beating
BT_0526_Eumolpinae_sp_039	S30	KJ677886	ECSF	U3	03.12.2010	Hand-Coll.(S)
BT_0527_Galerucinae_sp_036	S31	KJ677761	ECSF	L1	08.12.2010	Sweep Netting
BT_0528_Alticinae_sp_150	S31	KJ677714	ECSF	L1	08.12.2010	Sweep Netting
BT_0529_Alticinae_sp_113	S31	KJ677755	ECSF	L1	08.12.2010	Sweep Netting
BT_0530_Galerucinae_sp_031	S32	KJ677750	ECSF	L1	08.12.2010	Beating
BT_0531_Galerucinae_sp_062	S32	KJ677758	ECSF	L1	08.12.2010	Beating
BT_0532_Galerucinae_sp_075	S32	KJ677800	ECSF	L1	08.12.2010	Beating
BT_0533_Alticinae_sp_097	S32	KJ677302	ECSF	L1	08.12.2010	Beating
BT_0534_Alticinae_sp_111	S32		ECSF	L1	08.12.2010	Beating
BT_0535_Alticinae_sp_097	S33	KJ677310	ECSF	L1	08.12.2010	Hand-Coll.(S)
BT_0536_Cassidinae_sp_003	S33		ECSF	L1	08.12.2010	Hand-Coll.(S)
BT_0537_Alticinae_sp_142	S34	KJ677591	ECSF	L3	08.12.2010	Sweep Netting
BT_0538_Alticinae_sp_238	S34	KJ677679	ECSF	L3	08.12.2010	Sweep Netting
BT_0538a_Alticinae_sp_238	S34		ECSF	L3	08.12.2010	Sweep Netting
BT_0539_Alticinae_sp_013	S35	KJ677676	ECSF	L3	08.12.2010	Beating
BT_0540_Galerucinae_sp_064	S35	KJ677788	ECSF	L3	08.12.2010	Beating
BT_0541_Galerucinae_sp_064	S35		ECSF	L3	08.12.2010	Beating
BT_0543_Cassidinae_sp_009	S36		ECSF	L3	08.12.2010	Hand-Coll.(S)
BT_0544_Cassidinae_sp_012	S36	KJ677824	ECSF	L3	08.12.2010	Hand-Coll.(S)
BT_0546_Alticinae_sp_083	S37	KJ677335	ECSF	L6	09.12.2010	Sweep Netting
BT_0547_Alticinae_sp_096	S37	KJ677471	ECSF	L6	09.12.2010	Sweep Netting
BT_0548_Alticinae_sp_112	S37		ECSF	L6	09.12.2010	Sweep Netting
BT_0549_Alticinae_sp_150	S37	KJ677716	ECSF	L6	09.12.2010	Sweep Netting
BT_0550_Alticinae_sp_265	S37	KJ677429	ECSF	L6	09.12.2010	Sweep Netting
BT_0551_Galerucinae_sp_064	S38	KJ677789	ECSF	L6	09.12.2010	Beating
BT_0552_Alticinae_sp_117	S38	KJ677492	ECSF	L6	09.12.2010	Beating
BT_0553_Eumolpinae_sp_042	S38	KJ677865	ECSF	L6	09.12.2010	Beating
BT_0554_Galerucinae_sp_071	S38	KJ677808	ECSF	L6	09.12.2010	Beating
BT_0555_Alticinae_sp_086	S40	KJ677403	ECSF	L5	09.12.2010	Sweep Netting
BT_0556_Alticinae_sp_096	S40	KJ677472	ECSF	L5	09.12.2010	Sweep Netting
BT_0557_Alticinae_sp_181	S40	KJ677784	ECSF	L5	09.12.2010	Sweep Netting
BT_0558_Alticinae_sp_149	S41	KJ677718	ECSF	L5	09.12.2010	Beating
BT_0559_Eumolpinae_sp_042	S41	KJ677866	ECSF	L5	09.12.2010	Beating
BT_0560_Galerucinae_sp_064	S41	KJ677790	ECSF	L5	09.12.2010	Beating
BT_0561_Galerucinae_sp_066	S41	KJ677797	ECSF	L5	09.12.2010	Beating
BT_0562_Cassidinae_sp_009	S42		ECSF	L5	09.12.2010	Hand-Coll.(S)
BT_0563_Cassidinae_sp_009	S42		ECSF	L5	09.12.2010	Hand-Coll.(S)
BT_0564_Cassidinae_sp_009	S42		ECSF	L5	09.12.2010	Hand-Coll.(S)
BT_0565_Alticinae_sp_150	S42	KJ677712	ECSF	L5	09.12.2010	Hand-Coll.(S)
BT_0566_Hispinae_sp_006	S42	KJ677848	ECSF	L5	09.12.2010	Hand-Coll.(S)
BT_0567_Alticinae_sp_104	S43	KJ677326	ECSF	U5	11.12.2010	Sweep Netting
BT_0568_Alticinae_sp_118	S43		ECSF	U5	11.12.2010	Sweep Netting
BT_0569_Alticinae_sp_118	S43		ECSF	U5	11.12.2010	Sweep Netting
BT_0570_Alticinae_sp_118	S43		ECSF	U5	11.12.2010	Sweep Netting
BT_0571_Alticinae_sp_118	S43		ECSF	U5	11.12.2010	Sweep Netting
BT_0572_Alticinae_sp_118	S43		ECSF	U5	11.12.2010	Sweep Netting
BT_0573_Alticinae_sp_118	S43		ECSF	U5	11.12.2010	Sweep Netting
BT_0574_Eumolpinae_sp_039	S44	KJ677887	ECSF	U5	11.12.2010	Beating
BT_0575_Alticinae_sp_140	S45	KJ677570	ECSF	U5	11.12.2010	Hand-Coll.(S)
BT_0576_Alticinae_sp_118	S45		ECSF	U5	11.12.2010	Hand-Coll.(S)
BT_0577_Eumolpinae_sp_039	S46	KJ677888	ECSF	U4	11.12.2010	Sweep Netting
BT_0578_Eumolpinae_sp_039	S46		ECSF	U4	11.12.2010	Sweep Netting
BT_0579_Alticinae_sp_104	S46	KJ677321	ECSF	U4	11.12.2010	Sweep Netting
BT_0580_Alticinae_sp_104	S46		ECSF	U4	11.12.2010	Sweep Netting
BT_0581_Alticinae_sp_118	S46		ECSF	U4	11.12.2010	Sweep Netting
BT_0582_Alticinae_sp_118	S46		ECSF	U4	11.12.2010	Sweep Netting
BT_0583_Alticinae_sp_118	S46		ECSF	U4	11.12.2010	Sweep Netting
BT_0584_Alticinae_sp_118	S46		ECSF	U4	11.12.2010	Sweep Netting
BT_0585_Eumolpinae_sp_044	S46		ECSF	U4	11.12.2010	Sweep Netting
BT_0586_Alticinae_sp_091	S46		ECSF	U4	11.12.2010	Sweep Netting
BT_0587_Alticinae_sp_006	S47	KJ677583	ECSF	U4	11.12.2010	Beating
BT_0588_Galerucinae_sp_069	S47	KJ677781	ECSF	U4	11.12.2010	Beating
BT_0589_Eumolpinae_sp_017	S47	KJ677910	ECSF	U4	11.12.2010	Beating
BT_0590_Alticinae_sp_140	S47	KJ677571	ECSF	U4	11.12.2010	Beating
BT_0592_Eumolpinae_sp_039	S47	KJ677889	ECSF	U4	11.12.2010	Beating
BT_0593_Alticinae_sp_118	S47		ECSF	U4	11.12.2010	Beating
BT_0594_Alticinae_sp_118	S48	KJ677663	ECSF	U4	11.12.2010	Hand-Coll.(S)
BT_0595_Alticinae_sp_118	S48		ECSF	U4	11.12.2010	Hand-Coll.(S)

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Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_0596_Eumolpinae_sp_039	S49	KJ677890	ECSF	U6	14.12.2010	Sweep Netting
BT_0597_Alticinae_sp_104	S49	KJ677322	ECSF	U6	14.12.2010	Sweep Netting
BT_0598_Alticinae_sp_118	S49		ECSF	U6	14.12.2010	Sweep Netting
BT_0599_Alticinae_sp_118	S49		ECSF	U6	14.12.2010	Sweep Netting
BT_0600_Alticinae_sp_118	S49		ECSF	U6	14.12.2010	Sweep Netting
BT_0601_Alticinae_sp_118	S49		ECSF	U6	14.12.2010	Sweep Netting
BT_0602_Alticinae_sp_118	S49		ECSF	U6	14.12.2010	Sweep Netting
BT_0603_Alticinae_sp_118	S49		ECSF	U6	14.12.2010	Sweep Netting
BT_0604_Hispinae_sp_005	S49	KJ677840	ECSF	U6	14.12.2010	Sweep Netting
BT_0605_Alticinae_sp_087	S50	KJ677498	ECSF	U6	14.12.2010	Beating
BT_0606_Eumolpinae_sp_039	S50	KJ677891	ECSF	U6	14.12.2010	Beating
BT_0607_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0608_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0609_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0610_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0611_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0612_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0613_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0614_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0615_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0616_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0617_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0618_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0619_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0620_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0621_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0622_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0623_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0624_Alticinae_sp_118	S50		ECSF	U6	14.12.2010	Beating
BT_0625_Cassidinae_sp_003	S51		ECSF	U6	14.12.2010	Hand-Coll.(S)
BT_0626_Alticinae_sp_118	S51		ECSF	U6	14.12.2010	Hand-Coll.(S)
BT_0627_Alticinae_sp_118	S51		ECSF	U6	14.12.2010	Hand-Coll.(S)
BT_0628_Cassidinae_sp_012	S52	KJ677825	ECSF	L4	14.12.2010	Sweep Netting
BT_0629_Cassidinae_sp_012	S52		ECSF	L4	14.12.2010	Sweep Netting
BT_0630_Alticinae_sp_036	S52	KJ677610	ECSF	L4	14.12.2010	Sweep Netting
BT_0631_Alticinae_sp_064	S52	KJ677451	ECSF	L4	14.12.2010	Sweep Netting
BT_0632_Alticinae_sp_086	S52	KJ677392	ECSF	L4	14.12.2010	Sweep Netting
BT_0633_Alticinae_sp_085	S52	KJ677404	ECSF	L4	14.12.2010	Sweep Netting
BT_0634_Alticinae_sp_066	S52	KJ677473	ECSF	L4	14.12.2010	Sweep Netting
BT_0635_Alticinae_sp_096	S52	KJ677474	ECSF	L4	14.12.2010	Sweep Netting
BT_0636_Alticinae_sp_096	S52		ECSF	L4	14.12.2010	Sweep Netting
BT_0637_Alticinae_sp_096	S52		ECSF	L4	14.12.2010	Sweep Netting
BT_0638_Alticinae_sp_084	S52		ECSF	L4	14.12.2010	Sweep Netting
BT_0639_Alticinae_sp_096	S53		ECSF	L4	14.12.2010	Beating
BT_0640_Alticinae_sp_018	S53	KJ677425	ECSF	L4	14.12.2010	Beating
BT_0641_Alticinae_sp_013	S53	KJ677674	ECSF	L4	14.12.2010	Beating
BT_0642_Eumolpinae_sp_042	S53	KJ677859	ECSF	L4	14.12.2010	Beating
BT_0643_Eumolpinae_sp_042	S53		ECSF	L4	14.12.2010	Beating
BT_0644_Galerucinae_sp_066	S53	KJ677796	ECSF	L4	14.12.2010	Beating
BT_0645_Galerucinae_sp_011	S54	KJ677552	ECSF	L4	14.12.2010	Hand-Coll.(S)
BT_0646_Alticinae_sp_071	S54	KJ677379	ECSF	L4	14.12.2010	Hand-Coll.(S)
BT_0647_Galerucinae_sp_035	S54	KJ677660	ECSF	L4	14.12.2010	Hand-Coll.(S)
BT_0648_Alticinae_sp_140	S55	KJ677568	ECSF	U1	15.12.2010	Sweep Netting
BT_0649_Alticinae_sp_140	S55		ECSF	U1	15.12.2010	Sweep Netting
BT_0650_Eumolpinae_sp_039	S55	KJ677892	ECSF	U1	15.12.2010	Sweep Netting
BT_0651_Eumolpinae_sp_039	S55		ECSF	U1	15.12.2010	Sweep Netting
BT_0652_Alticinae_sp_104	S55	KJ677318	ECSF	U1	15.12.2010	Sweep Netting
BT_0653_Alticinae_sp_104	S55		ECSF	U1	15.12.2010	Sweep Netting
BT_0654_Alticinae_sp_104	S55		ECSF	U1	15.12.2010	Sweep Netting
BT_0655_Alticinae_sp_257	S55	KJ677449	ECSF	U1	15.12.2010	Sweep Netting
BT_0656_Alticinae_sp_051	S56	KJ677351	ECSF	U1	15.12.2010	Beating
BT_0656a_Alticinae_sp_051	S56		ECSF	U1	15.12.2010	Beating
BT_0657_Eumolpinae_sp_039	S56	KJ677893	ECSF	U1	15.12.2010	Beating
BT_0658_Eumolpinae_sp_039	S56		ECSF	U1	15.12.2010	Beating
BT_0659_Eumolpinae_sp_039	S56		ECSF	U1	15.12.2010	Beating
BT_0660_Alticinae_sp_104	S56	KJ677327	ECSF	U1	15.12.2010	Beating
BT_0661_Alticinae_sp_104	S56		ECSF	U1	15.12.2010	Beating
BT_0662_Alticinae_sp_126	S56	KJ677313	ECSF	U1	15.12.2010	Beating
BT_0663_Alticinae_sp_150	S56	KJ677713	ECSF	U1	15.12.2010	Beating
BT_0664_Alticinae_sp_150	S56	KJ677720	ECSF	U1	15.12.2010	Beating
BT_0665_Alticinae_sp_150	S56	KJ677717	ECSF	U1	15.12.2010	Beating
BT_0666_Alticinae_sp_150	S56		ECSF	U1	15.12.2010	Beating
BT_0667_Alticinae_sp_150	S56		ECSF	U1	15.12.2010	Beating
BT_0668_Alticinae_sp_150	S56		ECSF	U1	15.12.2010	Beating
BT_0669_Alticinae_sp_150	S56		ECSF	U1	15.12.2010	Beating
BT_0670_Alticinae_sp_150	S56		ECSF	U1	15.12.2010	Beating
BT_0671_Alticinae_sp_150	S56		ECSF	U1	15.12.2010	Beating
BT_0672_Alticinae_sp_150	S56		ECSF	U1	15.12.2010	Beating
BT_0673_Alticinae_sp_150	S56		ECSF	U1	15.12.2010	Beating
BT_0674_Alticinae_sp_150	S56		ECSF	U1	15.12.2010	Beating
BT_0675_Alticinae_sp_008	S56	KJ677710	ECSF	U1	15.12.2010	Beating
BT_0676_Alticinae_sp_064	S57	KJ677457	ECSF	U1	15.12.2010	Hand-Coll.(S)
BT_0677_Eumolpinae_sp_039	S57	KJ677894	ECSF	U1	15.12.2010	Hand-Coll.(S)
BT_0678_Eumolpinae_sp_044	S57		ECSF	U1	15.12.2010	Hand-Coll.(S)
BT_0679_Eumolpinae_sp_001	N60		ECSF	Station	21.03.2011	Light Trap
BT_0680_Galerucinae_sp_076	N60	KJ677560	ECSF	Station	21.03.2011	Light Trap
BT_0681_Galerucinae_sp_076	N60		ECSF	Station	21.03.2011	Light Trap
BT_0682_Galerucinae_sp_076	N60		ECSF	Station	21.03.2011	Light Trap
BT_0683_Alticinae_sp_115	N60	KJ677298	ECSF	Station	21.03.2011	Light Trap
BT_0684_Alticinae_sp_115	N60		ECSF	Station	21.03.2011	Light Trap
BT_0685_Alticinae_sp_115	N60		ECSF	Station	21.03.2011	Light Trap
BT_0686_Eumolpinae_sp_023	N61	KJ677901	ECSF		22.03.2011	Hand-Coll.(N)
BT_0687_Alticinae_sp_087	N61	KJ677499	ECSF		22.03.2011	Hand-Coll.(N)
BT_0688_Criocerinae_sp_001	N61	KJ677815	ECSF		22.03.2011	Hand-Coll.(N)
BT_0689_Criocerinae_sp_001	N61		ECSF		22.03.2011	Hand-Coll.(N)
BT_0690_Alticinae_sp_124	N61	KJ677493	ECSF		22.03.2011	Hand-Coll.(N)
BT_0691_Galerucinae_sp_031	N61	KJ677753	ECSF		22.03.2011	Hand-Coll.(N)
BT_0692_Alticinae_sp_014	N61	KJ677588	ECSF		22.03.2011	Hand-Coll.(N)
BT_0693_Alticinae_sp_014	N61		ECSF		22.03.2011	Hand-Coll.(N)
BT_0694_Alticinae_sp_014	N61		ECSF		22.03.2011	Hand-Coll.(N)
BT_0695_Alticinae_sp_014	N61		ECSF		22.03.2011	Hand-Coll.(N)
BT_0696_Alticinae_sp_014	N61		ECSF		22.03.2011	Hand-Coll.(N)
BT_0697_Alticinae_sp_014	N61		ECSF		22.03.2011	Hand-Coll.(N)
BT_0698_Alticinae_sp_013	N62	KJ677675	ECSF		22.03.2011	Light Trap
BT_0699_Alticinae_sp_083	N62	KJ677336	ECSF		22.03.2011	Light Trap
BT_0700_Alticinae_sp_083	N62		ECSF		22.03.2011	Light Trap
BT_0701_Alticinae_sp_083	N62		ECSF		22.03.2011	Light Trap
BT_0705_Galerucinae_sp_008	N63	KJ677539	Bombuscaro		23.03.2011	Light Trap
BT_0706_Eumolpinae_sp_038	N64		ECSF		24.3.2011	Light Trap
BT_0708_Alticinae_sp_135	N64		ECSF		24.3.2011	Light Trap
BT_0709_Galerucinae_sp_064	N65	KJ677791	ECSF		24.03.2011	Light Trap
BT_0710_Alticinae_sp_013	N66	KJ677678	ECSF		25.03.2011	Light Trap
BT_0711_Galerucinae_sp_073	N67	KJ677785	Cajanuma		26.03.2011	Light Trap
BT_0712_Galerucinae_sp_073	N67		Cajanuma		26.03.2011	Light Trap

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Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_0713_Galerucinae_sp_073	N68	KJ677786	Cajanuma		26.03.2011	Light Trap
BT_0714_Galerucinae_sp_042	N70		ECSF	Station	28.03.2011	Hand-Coll.(N)
BT_0715_Galerucinae_sp_076	N70	KJ677561	ECSF	Station	28.03.2011	Hand-Coll.(N)
BT_0716_Galerucinae_sp_011	N70	KJ677534	ECSF	Station	28.03.2011	Hand-Coll.(N)
BT_0717_Galerucinae_sp_002	N70	KJ677553	ECSF	Station	28.03.2011	Hand-Coll.(N)
BT_0718_Galerucinae_sp_002	N70		ECSF	Station	28.03.2011	Hand-Coll.(N)
BT_0719_Eumolpinae_sp_043	N72	KJ677810	ECSF		29.03.2011	Light Trap
BT_0720_Eumolpinae_sp_043	N72		ECSF		29.03.2011	Light Trap
BT_0721_Eumolpinae_sp_020	N72	KJ677945	ECSF		29.03.2011	Light Trap
BT_0722_Cassidinae_sp_013	N73	KJ677811	Bombuscaro		30.03.2011	Light Trap
BT_0725_Alticinae_sp_243	N75	KJ677416	ECSF		31.03.2011	Light Trap
BT_0726_Alticinae_sp_243	N75		ECSF		31.03.2011	Light Trap
BT_0727_Galerucinae_sp_073	N75	KJ677787	ECSF		31.03.2011	Light Trap
BT_0728_Galerucinae_sp_064	N75	KJ677792	ECSF		31.03.2011	Light Trap
BT_0729_Galerucinae_sp_015	N76	KJ677749	Bombuscaro		01.04.2011	Light Trap
BT_0730_Alticinae_sp_136	N76	KJ677658	Bombuscaro		01.04.2011	Light Trap
BT_0731_Alticinae_sp_004	N77		Bombuscaro		01.04.2011	Light Trap
BT_0732_Galerucinae_sp_004	N77	KJ677538	Bombuscaro		01.04.2011	Light Trap
BT_0733_Galerucinae_sp_097	N77	KJ677540	Bombuscaro		01.04.2011	Light Trap
BT_0734_Galerucinae_sp_039	N78	KJ677524	ECSF		02.04.2011	Light Trap
BT_0735_Galerucinae_sp_038	N79	KJ677527	El Tiro	El Tiro	03.04.2011	Light Trap
BT_0736_Galerucinae_sp_026	N80	KJ677768	ECSF		04.04.2011	Light Trap
BT_0737_Galerucinae_sp_026	N80		ECSF		04.04.2011	Light Trap
BT_0738_Eumolpinae_sp_004	N81	KJ677905	ECSF	Station	May 2011	Hand-Coll.(N)
BT_0739_Galerucinae_sp_018	N81	KJ677522	ECSF	Station	May 2011	Hand-Coll.(N)
BT_0740_Galerucinae_sp_076	N81	KJ677562	ECSF	Station	May 2011	Hand-Coll.(N)
BT_0741_Galerucinae_sp_002	N81	KJ677549	ECSF	Station	May 2011	Hand-Coll.(N)
BT_0742_Galerucinae_sp_019	N81	KJ677565	ECSF	Station	May 2011	Hand-Coll.(N)
BT_0743_Galerucinae_sp_014	N81	KJ677531	ECSF	Station	May 2011	Hand-Coll.(N)
BT_0744_Galerucinae_sp_007	N81	KJ677544	ECSF	Station	May 2011	Hand-Coll.(N)
BT_0745_Galerucinae_sp_007	N81		ECSF	Station	May 2011	Hand-Coll.(N)
BT_0746_Galerucinae_sp_007	N81		ECSF	Station	May 2011	Hand-Coll.(N)
BT_0747_Galerucinae_sp_038	N81	KJ677528	ECSF	Station	May 2011	Hand-Coll.(N)
BT_0748_Galerucinae_sp_038	N81		ECSF	Station	May 2011	Hand-Coll.(N)
BT_0749_Galerucinae_sp_039	N81	KJ677525	ECSF	Station	May 2011	Hand-Coll.(N)
BT_0750_Cassidinae_sp_005	N82	KJ677823	ECSF		08.05.2011	Hand-Coll.(N)
BT_0751_Galerucinae_sp_062	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0752_Alticinae_sp_039	N82	KJ677653	ECSF		08.05.2011	Hand-Coll.(N)
BT_0753_Alticinae_sp_010	N82	KJ677731	ECSF		08.05.2011	Hand-Coll.(N)
BT_0754_Eumolpinae_sp_008	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0755_Galerucinae_sp_036	N82	KJ677760	ECSF		08.05.2011	Hand-Coll.(N)
BT_0756_Eumolpinae_sp_022	N82	KJ677896	ECSF		08.05.2011	Hand-Coll.(N)
BT_0757_Eumolpinae_sp_022	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0758_Eumolpinae_sp_022	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0759_Eumolpinae_sp_038	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0760_Eumolpinae_sp_038	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0761_Eumolpinae_sp_038	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0762_Eumolpinae_sp_038	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0763_Eumolpinae_sp_038	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0764_Eumolpinae_sp_038	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0765_Eumolpinae_sp_038	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0766_Alticinae_sp_096	N82	KJ677475	ECSF		08.05.2011	Hand-Coll.(N)
BT_0767_Alticinae_sp_096	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0768_Alticinae_sp_096	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0770_Eumolpinae_sp_016	N82	KJ677937	ECSF		08.05.2011	Hand-Coll.(N)
BT_0771_Eumolpinae_sp_016	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0772_Eumolpinae_sp_016	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0773_Eumolpinae_sp_016	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0774_Eumolpinae_sp_016	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0775_Eumolpinae_sp_016	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0776_Alticinae_sp_018	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0777_Alticinae_sp_018	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0778_Alticinae_sp_018	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0779_Alticinae_sp_115	N82	KJ677290	ECSF		08.05.2011	Hand-Coll.(N)
BT_0780_Alticinae_sp_115	N82		ECSF		08.05.2011	Hand-Coll.(N)
BT_0781_Eumolpinae_sp_020	N82	KJ677942	ECSF		08.05.2011	Hand-Coll.(N)
BT_0782_Galerucinae_sp_034	N82	KJ677695	ECSF		08.05.2011	Hand-Coll.(N)
BT_0788_Alticinae_sp_006	N84	KJ677580	ECSF		10.05.2011	Hand-Coll.(N)
BT_0789_Alticinae_sp_014	N84	KJ677589	ECSF		10.05.2011	Hand-Coll.(N)
BT_0790_Alticinae_sp_014	N84		ECSF		10.05.2011	Hand-Coll.(N)
BT_0791_Eumolpinae_sp_016	N84	KJ677935	ECSF		10.05.2011	Hand-Coll.(N)
BT_0792_Alticinae_sp_115	N84	KJ677291	ECSF		10.05.2011	Hand-Coll.(N)
BT_0793_Alticinae_sp_115	N84		ECSF		10.05.2011	Hand-Coll.(N)
BT_0794_Alticinae_sp_129	N84	KJ677770	ECSF		10.05.2011	Hand-Coll.(N)
BT_0795_Alticinae_sp_096	N84	KJ677463	ECSF		10.05.2011	Hand-Coll.(N)
BT_0796_Alticinae_sp_097	N84	KJ677305	ECSF		10.05.2011	Hand-Coll.(N)
BT_0799_Cassidinae_sp_014	N86	KJ677875	ECSF		12.05.2011	Hand-Coll.(N)
BT_0800_Galerucinae_sp_030	N86	KJ677702	ECSF		12.05.2011	Hand-Coll.(N)
BT_0801_Cassidinae_sp_006	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0802_Cassidinae_sp_006	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0803_Galerucinae_sp_076	N86	KJ677563	ECSF		12.05.2011	Hand-Coll.(N)
BT_0804_Alticinae_sp_028	N86	KJ677347	ECSF		12.05.2011	Hand-Coll.(N)
BT_0805_Alticinae_sp_014	N86	KJ677590	ECSF		12.05.2011	Hand-Coll.(N)
BT_0806_Alticinae_sp_013	N86	KJ677677	ECSF		12.05.2011	Hand-Coll.(N)
BT_0807_Alticinae_sp_054	N86	KJ677378	ECSF		12.05.2011	Hand-Coll.(N)
BT_0808_Alticinae_sp_064	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0809_Alticinae_sp_012	N86	KJ677622	ECSF		12.05.2011	Hand-Coll.(N)
BT_0810_Galerucinae_sp_046	N86	KJ677637	ECSF		12.05.2011	Hand-Coll.(N)
BT_0811_Criocerinae_sp_006	N86	KJ677817	ECSF		12.05.2011	Hand-Coll.(N)
BT_0812_Criocerinae_sp_006	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0813_Criocerinae_sp_004	N86	KJ677818	ECSF		12.05.2011	Hand-Coll.(N)
BT_0814_Alticinae_sp_086	N86	KJ677405	ECSF		12.05.2011	Hand-Coll.(N)
BT_0815_Alticinae_sp_032	N86	KJ677623	ECSF		12.05.2011	Hand-Coll.(N)
BT_0816_Galerucinae_sp_019	N86	KJ677566	ECSF		12.05.2011	Hand-Coll.(N)
BT_0817_Alticinae_sp_087	N86	KJ677502	ECSF		12.05.2011	Hand-Coll.(N)
BT_0818_Galerucinae_sp_061	N86	KJ677516	ECSF		12.05.2011	Hand-Coll.(N)
BT_0819_Eumolpinae_sp_074	N86	KJ677836	ECSF		12.05.2011	Hand-Coll.(N)
BT_0820_Eumolpinae_sp_038	N86	KJ677928	ECSF		12.05.2011	Hand-Coll.(N)
BT_0821_Eumolpinae_sp_038	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0822_Galerucinae_sp_033	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0823_Galerucinae_sp_034	N86	KJ677690	ECSF		12.05.2011	Hand-Coll.(N)
BT_0824_Galerucinae_sp_034	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0825_Galerucinae_sp_034	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0826_Galerucinae_sp_034	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0827_Eumolpinae_sp_020	N86	KJ677943	ECSF		12.05.2011	Hand-Coll.(N)
BT_0828_Alticinae_sp_118	N86	KJ677664	ECSF		12.05.2011	Hand-Coll.(N)
BT_0829_Alticinae_sp_115	N86	KJ677292	ECSF		12.05.2011	Hand-Coll.(N)
BT_0830_Alticinae_sp_115	N86		ECSF		12.05.2011	Hand-Coll.(N)
BT_0831_Alticinae_sp_147	N86	KJ677439	ECSF		12.05.2011	Hand-Coll.(N)
BT_0832_Alticinae_sp_147	N86		ECSF		12.05.2011	Hand-Coll.(N)

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Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_0835_Galerucinae_sp_029	N87	KJ677519	Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0836_Alticinae_sp_003	N87	KJ677703	Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0837_Alticinae_sp_009	N87	KJ677724	Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0838_Alticinae_sp_059	N87		Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0839_Alticinae_sp_040	N87	KJ677420	Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0840_Alticinae_sp_140	N87	KJ677575	Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0841_Alticinae_sp_127	N87	KJ677277	Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0842_Alticinae_sp_127	N87		Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0843_Alticinae_sp_136	N87	KJ677659	Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0844_Alticinae_sp_138	N87		Bombuscaro		14.05.2011	Hand-Coll.(N)
BT_0847_Eumolpinae_sp_005	N89	KJ677933	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0848_Alticinae_sp_045	N89	KJ677419	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0849_Alticinae_sp_045	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0850_Alticinae_sp_049	N89	KJ677607	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0851_Alticinae_sp_065	N89	KJ677476	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0852_Alticinae_sp_133	N89	KJ677586	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0853_Alticinae_sp_133	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0854_Alticinae_sp_133	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0855_Alticinae_sp_018	N89	KJ677426	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0856_Alticinae_sp_018	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0857_Alticinae_sp_018	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0858_Alticinae_sp_018	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0859_Alticinae_sp_018	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0860_Alticinae_sp_018	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0861_Eumolpinae_sp_020	N89	KJ677944	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0862_Alticinae_sp_115	N89	KJ677293	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0863_Alticinae_sp_115	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0864_Alticinae_sp_253	N89	KJ677306	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0865_Alticinae_sp_096	N89	KJ677477	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0866_Alticinae_sp_096	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0867_Alticinae_sp_096	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0868_Alticinae_sp_122	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0869_Alticinae_sp_122	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0870_Alticinae_sp_122	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0871_Alticinae_sp_086	N89	KJ677391	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0872_Alticinae_sp_086	N89		ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0873_Alticinae_sp_085	N89	KJ677397	ECSF	Lichtung	15.05.2011	Malaise Trap
BT_0877_Cassidinae_sp_005	N90		ECSF		15.05.2011	Hand-Coll.(N)
BT_0879_Eumolpinae_sp_043	N90		ECSF		15.05.2011	Hand-Coll.(N)
BT_0880_Criocerinae_sp_001	N90		ECSF		15.05.2011	Hand-Coll.(N)
BT_0892_Galerucinae_sp_035	N90		ECSF		15.05.2011	Hand-Coll.(N)
BT_0893_Alticinae_sp_083	N90		ECSF		15.05.2011	Hand-Coll.(N)
BT_0895_Cassidinae_sp_006	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0899_Chrysomelinae_sp_001	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0900_Alticinae_sp_033	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0902_Alticinae_sp_062	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0903_Alticinae_sp_087	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0904_Alticinae_sp_046	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0905_Galerucinae_sp_060	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0906_Galerucinae_sp_046	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0907_Galerucinae_sp_046	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0908_Criocerinae_sp_005	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0909_Criocerinae_sp_001	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0924_Cryptocephalinae_sp_001	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0925_Eumolpinae_sp_029	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0926_Lamprosomatinae_sp_002	N91		ECSF		17.05.2011	Hand-Coll.(N)
BT_0930_Galerucinae_sp_046	N92		ECSF		18.05.2011	Hand-Coll.(N)
BT_0932_Alticinae_sp_015	N92		ECSF		18.05.2011	Hand-Coll.(N)
BT_0934_Alticinae_sp_116	N92		ECSF		18.05.2011	Hand-Coll.(N)
BT_0935_Alticinae_sp_082	N92		ECSF		18.05.2011	Hand-Coll.(N)
BT_0936_Eumolpinae_sp_026	N92		ECSF		18.05.2011	Hand-Coll.(N)
BT_0937_Alticinae_sp_101	N92		ECSF		18.05.2011	Hand-Coll.(N)
BT_0943_Galerucinae_sp_033	N92		ECSF		18.05.2011	Hand-Coll.(N)
BT_0949_Cassidinae_sp_002	N93	KJ677871	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0950_Cassidinae_sp_010	N93	KJ677849	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0951_Cassidinae_sp_011	N93	KJ677872	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0952_Alticinae_sp_269	N93	KJ677331	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0953_Galerucinae_sp_028	N93	KJ677434	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0954_Galerucinae_sp_029	N93	KJ677520	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0955_Galerucinae_sp_020	N93	KJ677564	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0956_Alticinae_sp_011	N93		Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0957_Galerucinae_sp_036	N93	KJ677764	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0958_Alticinae_sp_154	N93	KJ677376	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0959_Galerucinae_sp_052	N93	KJ677746	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0960_Galerucinae_sp_047	N93	KJ677639	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0961_Alticinae_sp_077	N93	KJ677489	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0962_Alticinae_sp_076	N93	KJ677343	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0963_Eumolpinae_sp_033	N93		Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0964_Alticinae_sp_030	N93	KJ677339	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0965_Criocerinae_sp_002	N93	KJ677812	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0966_Criocerinae_sp_003	N93	KJ677274	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0967_Eumolpinae_sp_046	N93	KJ677920	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0968_Alticinae_sp_099	N93	KJ677440	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0969_Alticinae_sp_099	N93		Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0970_Alticinae_sp_023	N93		Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0971_Alticinae_sp_194	N93	KJ677341	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0972_Alticinae_sp_127	N93	KJ677276	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0973_Alticinae_sp_097	N93	KJ677285	Bombuscaro		20.05.2011	Hand-Coll.(N)
BT_0979_Eumolpinae_sp_042	N94		ECSF	Lichtung	23.05.2011	Malaise Trap
BT_0980_Alticinae_sp_005	N94		ECSF	Lichtung	23.05.2011	Malaise Trap
BT_0981_Eumolpinae_sp_006	N94		ECSF	Lichtung	23.05.2011	Malaise Trap
BT_0982_Alticinae_sp_022	N94		ECSF	Lichtung	23.05.2011	Malaise Trap
BT_0983_Alticinae_sp_052	N94		ECSF	Lichtung	23.05.2011	Malaise Trap
BT_1021_Galerucinae_sp_027	N97		ECSF	L6	27.05.2011	Flight-Intercept.
BT_1025_Eumolpinae_sp_038	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1026_Eumolpinae_sp_038	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1027_Eumolpinae_sp_038	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1028_Alticinae_sp_052	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1029_Alticinae_sp_052	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1030_Alticinae_sp_240	N99	KJ677332	ECSF	L6	27.05.2011	Malaise Trap
BT_1031_Alticinae_sp_002	N99	KJ677707	ECSF	L6	27.05.2011	Malaise Trap
BT_1032_Alticinae_sp_002	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1033_Alticinae_sp_149	N99	KJ677719	ECSF	L6	27.05.2011	Malaise Trap
BT_1034_Alticinae_sp_048	N99	KJ677377	ECSF	L6	27.05.2011	Malaise Trap
BT_1035_Alticinae_sp_150	N99	KJ677721	ECSF	L6	27.05.2011	Malaise Trap
BT_1036_Alticinae_sp_062	N99	KJ677422	ECSF	L6	27.05.2011	Malaise Trap
BT_1037_Alticinae_sp_062	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1038_Alticinae_sp_065	N99	KJ677478	ECSF	L6	27.05.2011	Malaise Trap
BT_1039_Alticinae_sp_065	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1040_Alticinae_sp_065	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1041_Alticinae_sp_065	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1042_Alticinae_sp_065	N99		ECSF	L6	27.05.2011	Malaise Trap

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Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_1043_Alticinae_sp_066	N99	KJ677479	ECSF	L6	27.05.2011	Malaise Trap
BT_1044_Alticinae_sp_081	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1045_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1046_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1047_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1048_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1049_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1050_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1051_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1052_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1053_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1054_Alticinae_sp_086	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1055_Alticinae_sp_085	N99	KJ677393	ECSF	L6	27.05.2011	Malaise Trap
BT_1056_Alticinae_sp_085	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1057_Alticinae_sp_085	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1058_Alticinae_sp_085	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1059_Alticinae_sp_081	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1060_Alticinae_sp_085	N99	KJ677399	ECSF	L6	27.05.2011	Malaise Trap
BT_1061_Galerucinae_sp_096	N99	KJ677684	ECSF	L6	27.05.2011	Malaise Trap
BT_1062_Galerucinae_sp_096	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1064_Alticinae_sp_142	N99	KJ677592	ECSF	L6	27.05.2011	Malaise Trap
BT_1065_Alticinae_sp_020	N99	KJ677681	ECSF	L6	27.05.2011	Malaise Trap
BT_1066_Alticinae_sp_018	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1067_Alticinae_sp_018	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1068_Alticinae_sp_018	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1069_Alticinae_sp_123	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1070_Alticinae_sp_097	N99	KJ677307	ECSF	L6	27.05.2011	Malaise Trap
BT_1071_Alticinae_sp_096	N99	KJ677480	ECSF	L6	27.05.2011	Malaise Trap
BT_1072_Alticinae_sp_096	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1073_Alticinae_sp_096	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1074_Alticinae_sp_096	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1075_Alticinae_sp_096	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1076_Alticinae_sp_096	N99		ECSF	L6	27.05.2011	Malaise Trap
BT_1079_Alticinae_sp_104	S58	KJ677328	ECSF	U1	07.05.2011	Sweep Netting
BT_1080_Eumolpinae_sp_074	S58	KJ677835	ECSF	U1	07.05.2011	Sweep Netting
BT_1081_Alticinae_sp_027	S59	KJ677409	ECSF	U1	07.05.2011	Beating
BT_1082_Alticinae_sp_104	S59	KJ677319	ECSF	U1	07.05.2011	Beating
BT_1083_Alticinae_sp_096	S61	KJ677481	ECSF	L1	08.05.2011	Sweep Netting
BT_1084_Alticinae_sp_096	S61		ECSF	L1	08.05.2011	Sweep Netting
BT_1085_Alticinae_sp_061	S61	KJ677283	ECSF	L1	08.05.2011	Sweep Netting
BT_1086_Alticinae_sp_083	S61	KJ677337	ECSF	L1	08.05.2011	Sweep Netting
BT_1087_Alticinae_sp_109	S61	KJ677670	ECSF	L1	08.05.2011	Sweep Netting
BT_1088_Galerucinae_sp_031	S61	KJ677754	ECSF	L1	08.05.2011	Sweep Netting
BT_1089_Galerucinae_sp_031	S61		ECSF	L1	08.05.2011	Sweep Netting
BT_1090_Alticinae_sp_019	S61	KJ677423	ECSF	L1	08.05.2011	Sweep Netting
BT_1091_Cassidinae_sp_012	S62	KJ677826	ECSF	L1	08.05.2011	Beating
BT_1092_Cassidinae_sp_003	S62	KJ677854	ECSF	L1	08.05.2011	Beating
BT_1093_Hispinae_sp_007	S62	KJ677869	ECSF	L1	08.05.2011	Beating
BT_1094_Eumolpinae_sp_038	S62	KJ677929	ECSF	L1	08.05.2011	Beating
BT_1095_Alticinae_sp_096	S62	KJ677464	ECSF	L1	08.05.2011	Beating
BT_1096_Galerucinae_sp_036	S62	KJ677762	ECSF	L1	08.05.2011	Beating
BT_1098_Alticinae_sp_097	S63	KJ677303	ECSF	L1	08.05.2011	Hand-Coll.(S)
BT_1101_Alticinae_sp_104	S64	KR424910	ECSF	U2	09.05.2011	Sweep Netting
BT_1104_Alticinae_sp_140	S68	KJ677569	ECSF	U3	10.05.2011	Beating
BT_1105_Alticinae_sp_074	S68	KJ677680	ECSF	U3	10.05.2011	Beating
BT_1106_Galerucinae_sp_064	S68	KJ677793	ECSF	U3	10.05.2011	Beating
BT_1107_Alticinae_sp_099	S70	KJ677672	ECSF	L5	12.05.2011	Sweep Netting
BT_1108_Alticinae_sp_092	S70	KJ677738	ECSF	L5	12.05.2011	Sweep Netting
BT_1109_Alticinae_sp_041	S70	KJ677598	ECSF	L5	12.05.2011	Sweep Netting
BT_1110_Galerucinae_sp_046	S70	KJ677638	ECSF	L5	12.05.2011	Sweep Netting
BT_1111_Galerucinae_sp_034	S70		ECSF	L5	12.05.2011	Sweep Netting
BT_1112_Alticinae_sp_112	S70	KJ677613	ECSF	L5	12.05.2011	Sweep Netting
BT_1114_Alticinae_sp_041	S71	KJ677599	ECSF	L5	12.05.2011	Beating
BT_1116_Cassidinae_sp_006	S72		ECSF	L5	12.05.2011	Hand-Coll.(S)
BT_1117_Alticinae_sp_049	S72	KJ677609	ECSF	L5	12.05.2011	Hand-Coll.(S)
BT_1118_Alticinae_sp_123	S72	KJ677619	ECSF	L5	12.05.2011	Hand-Coll.(S)
BT_1119_Alticinae_sp_096	S72	KJ677482	ECSF	L5	12.05.2011	Hand-Coll.(S)
BT_1120_Alticinae_sp_181	S72		ECSF	L5	12.05.2011	Hand-Coll.(S)
BT_1121_Alticinae_sp_124	S72	KJ677490	ECSF	L5	12.05.2011	Hand-Coll.(S)
BT_1122_Alticinae_sp_265	S72	KJ677430	ECSF	L5	12.05.2011	Hand-Coll.(S)
BT_1124_Cassidinae_sp_007	S73	KJ677838	ECSF	L6	12.05.2011	Sweep Netting
BT_1125_Galerucinae_sp_059	S73	KJ677734	ECSF	L6	12.05.2011	Sweep Netting
BT_1126_Hispinae_sp_003	S73	KJ677843	ECSF	L6	12.05.2011	Sweep Netting
BT_1127_Alticinae_sp_066	S73	KJ677483	ECSF	L6	12.05.2011	Sweep Netting
BT_1128_Alticinae_sp_018	S73	KJ677280	ECSF	L6	12.05.2011	Sweep Netting
BT_1129_Alticinae_sp_123	S73	KJ677617	ECSF	L6	12.05.2011	Sweep Netting
BT_1130_Alticinae_sp_140	S73	KR424911	ECSF	L6	12.05.2011	Sweep Netting
BT_1131_Alticinae_sp_081	S73	KJ677767	ECSF	L6	12.05.2011	Sweep Netting
BT_1132_Alticinae_sp_086	S73	KJ677400	ECSF	L6	12.05.2011	Sweep Netting
BT_1133_Alticinae_sp_086	S73		ECSF	L6	12.05.2011	Sweep Netting
BT_1134_Alticinae_sp_086	S73		ECSF	L6	12.05.2011	Sweep Netting
BT_1135_Alticinae_sp_086	S73		ECSF	L6	12.05.2011	Sweep Netting
BT_1136_Alticinae_sp_086	S73		ECSF	L6	12.05.2011	Sweep Netting
BT_1137_Alticinae_sp_086	S73		ECSF	L6	12.05.2011	Sweep Netting
BT_1138_Alticinae_sp_086	S73	KJ677394	ECSF	L6	12.05.2011	Sweep Netting
BT_1142_Alticinae_sp_096	S74	KJ677484	ECSF	L6	12.05.2011	Beating
BT_1143_Hispinae_sp_007	S74	KJ677870	ECSF	L6	12.05.2011	Beating
BT_1145_Cassidinae_sp_003	S75	KJ677855	ECSF	L6	12.05.2011	Hand-Coll.(S)
BT_1146_Eumolpinae_sp_014	S75	KJ677934	ECSF	L6	12.05.2011	Hand-Coll.(S)
BT_1147_Alticinae_sp_152	S75	KJ677355	ECSF	L6	12.05.2011	Hand-Coll.(S)
BT_1148_Alticinae_sp_096	S75	KJ677485	ECSF	L6	12.05.2011	Hand-Coll.(S)
BT_1151_Alticinae_sp_057	S76	KJ677445	Bombuscaro	U2	14.05.2011	Sweep Netting
BT_1152_Alticinae_sp_141	S79	KJ677773	Bombuscaro	L1	14.05.2011	Sweep Netting
BT_1154_Alticinae_sp_121	S80	KR424912	Bombuscaro	L1	14.05.2011	Beating
BT_1155_Alticinae_sp_121	S80		Bombuscaro	L1	14.05.2011	Beating
BT_1157_Alticinae_sp_149	S82	KJ677709	Bombuscaro	L2	14.05.2011	Sweep Netting
BT_1158_Alticinae_sp_146	S82	KJ677567	Bombuscaro	L2	14.05.2011	Sweep Netting
BT_1159_Alticinae_sp_146	S82		Bombuscaro	L2	14.05.2011	Sweep Netting
BT_1160_Alticinae_sp_055	S82	KJ677602	Bombuscaro	L2	14.05.2011	Sweep Netting
BT_1161_Alticinae_sp_143	S82	KJ677578	Bombuscaro	L2	14.05.2011	Sweep Netting
BT_1164_Alticinae_sp_087	S85		ECSF	U4	17.05.2011	Sweep Netting
BT_1165_Alticinae_sp_061	S85	KJ677284	ECSF	U4	17.05.2011	Sweep Netting
BT_1166_Alticinae_sp_140	S85	KJ677572	ECSF	U4	17.05.2011	Sweep Netting
BT_1167_Alticinae_sp_140	S85		ECSF	U4	17.05.2011	Sweep Netting
BT_1168_Alticinae_sp_140	S85		ECSF	U4	17.05.2011	Sweep Netting
BT_1169_Alticinae_sp_100	S85	KR424913	ECSF	U4	17.05.2011	Sweep Netting
BT_1170_Alticinae_sp_105	S85	KJ677316	ECSF	U4	17.05.2011	Sweep Netting
BT_1171_Alticinae_sp_085	S85	KJ677386	ECSF	U4	17.05.2011	Sweep Netting
BT_1175_Alticinae_sp_087	S86	KJ677503	ECSF	U4	17.05.2011	Beating
BT_1176_Alticinae_sp_052	S86	KJ677353	ECSF	U4	17.05.2011	Beating
BT_1178_Alticinae_sp_087	S87	KJ677504	ECSF	U4	17.05.2011	Hand-Coll.(S)
BT_1179_Alticinae_sp_118	S88	KJ677665	ECSF	U5	17.05.2011	Sweep Netting
BT_1180_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1181_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1182_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting

Continued on next page(s)

Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_1183_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1184_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1185_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1186_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1187_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1188_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1189_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1190_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1191_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1192_Alticinae_sp_118	S88		ECSF	U5	17.05.2011	Sweep Netting
BT_1194_Alticinae_sp_087	S89	KJ677500	ECSF	U5	17.05.2011	Beating
BT_1195_Alticinae_sp_087	S89		ECSF	U5	17.05.2011	Beating
BT_1196_Alticinae_sp_108	S89	KJ677455	ECSF	U5	17.05.2011	Beating
BT_1197_Alticinae_sp_104	S89	KJ677320	ECSF	U5	17.05.2011	Beating
BT_1198_Alticinae_sp_131	S89	KJ677655	ECSF	U5	17.05.2011	Beating
BT_1199_Alticinae_sp_118	S90	KJ677661	ECSF	U5	17.05.2011	Hand-Coll.(S)
BT_1200_Alticinae_sp_118	S90		ECSF	U5	17.05.2011	Hand-Coll.(S)
BT_1201_Alticinae_sp_118	S90		ECSF	U5	17.05.2011	Hand-Coll.(S)
BT_1202_Alticinae_sp_118	S90		ECSF	U5	17.05.2011	Hand-Coll.(S)
BT_1203_Alticinae_sp_118	S90		ECSF	U5	17.05.2011	Hand-Coll.(S)
BT_1204_Alticinae_sp_111	S90		ECSF	U5	17.05.2011	Hand-Coll.(S)
BT_1205_Alticinae_sp_052	S91	KJ677357	ECSF	L4	18.05.2011	Sweep Netting
BT_1206_Alticinae_sp_052	S91		ECSF	L4	18.05.2011	Sweep Netting
BT_1207_Alticinae_sp_052	S91		ECSF	L4	18.05.2011	Sweep Netting
BT_1208_Galerucinae_sp_046	S91	KJ677634	ECSF	L4	18.05.2011	Sweep Netting
BT_1209_Galerucinae_sp_046	S91		ECSF	L4	18.05.2011	Sweep Netting
BT_1210_Alticinae_sp_064	S91	KJ677452	ECSF	L4	18.05.2011	Sweep Netting
BT_1211_Alticinae_sp_018	S91	KJ677427	ECSF	L4	18.05.2011	Sweep Netting
BT_1212_Alticinae_sp_017	S91	KJ677380	ECSF	L4	18.05.2011	Sweep Netting
BT_1213_Alticinae_sp_096	S91	KJ677486	ECSF	L4	18.05.2011	Sweep Netting
BT_1214_Alticinae_sp_104	S91	KJ677649	ECSF	L4	18.05.2011	Sweep Netting
BT_1215_Alticinae_sp_144	S91	KJ677584	ECSF	L4	18.05.2011	Sweep Netting
BT_1216_Alticinae_sp_049	S91	KJ677606	ECSF	L4	18.05.2011	Sweep Netting
BT_1217_Alticinae_sp_145	S91	KJ677579	ECSF	L4	18.05.2011	Sweep Netting
BT_1219_Alticinae_sp_086	S91	KJ677406	ECSF	L4	18.05.2011	Sweep Netting
BT_1220_Galerucinae_sp_034	S91	KJ677696	ECSF	L4	18.05.2011	Sweep Netting
BT_1221_Galerucinae_sp_034	S91		ECSF	L4	18.05.2011	Sweep Netting
BT_1222_Alticinae_sp_052	S92	KJ677358	ECSF	L4	18.05.2011	Beating
BT_1223_Alticinae_sp_028	S92	KJ677348	ECSF	L4	18.05.2011	Beating
BT_1224_Galerucinae_sp_075	S92	KJ677801	ECSF	L4	18.05.2011	Beating
BT_1225_Eumolpinae_sp_040	S92	KJ677867	ECSF	L4	18.05.2011	Beating
BT_1226_Galerucinae_sp_034	S92	KJ677697	ECSF	L4	18.05.2011	Beating
BT_1227_Galerucinae_sp_034	S92		ECSF	L4	18.05.2011	Beating
BT_1228_Alticinae_sp_096	S92	KJ677487	ECSF	L4	18.05.2011	Beating
BT_1229_Alticinae_sp_096	S92		ECSF	L4	18.05.2011	Beating
BT_1230_Alticinae_sp_115	S92	KJ677295	ECSF	L4	18.05.2011	Beating
BT_1233_Alticinae_sp_052	S93	KJ677356	ECSF	L4	18.05.2011	Hand-Coll.(S)
BT_1234_Alticinae_sp_052	S93		ECSF	L4	18.05.2011	Hand-Coll.(S)
BT_1235_Alticinae_sp_096	S93	KJ677465	ECSF	L4	18.05.2011	Hand-Coll.(S)
BT_1236_Alticinae_sp_096	S93		ECSF	L4	18.05.2011	Hand-Coll.(S)
BT_1237_Galerucinae_sp_034	S93		ECSF	L4	18.05.2011	Hand-Coll.(S)
BT_1238_Galerucinae_sp_034	S93		ECSF	L4	18.05.2011	Hand-Coll.(S)
BT_1239_Galerucinae_sp_034	S93		ECSF	L4	18.05.2011	Hand-Coll.(S)
BT_1240_Eumolpinae_sp_041	S93	KJ677857	ECSF	L4	18.05.2011	Hand-Coll.(S)
BT_1242_Lamprosomatinae_sp_003	S93		ECSF	L4	18.05.2011	Hand-Coll.(S)
BT_1244_Alticinae_sp_118	S94		ECSF	U6	18.05.2011	Sweep Netting
BT_1245_Alticinae_sp_085	S94	KJ677389	ECSF	U6	18.05.2011	Sweep Netting
BT_1248_Alticinae_sp_118	S95		ECSF	U6	18.05.2011	Beating
BT_1249_Alticinae_sp_104	S95	KJ677323	ECSF	U6	18.05.2011	Beating
BT_1250_Alticinae_sp_104	S95		ECSF	U6	18.05.2011	Beating
BT_1251_Alticinae_sp_131	S95	KJ677656	ECSF	U6	18.05.2011	Beating
BT_1252_Alticinae_sp_086	S95	KJ677401	ECSF	U6	18.05.2011	Beating
BT_1258_Galerucinae_sp_028	S97	KJ677438	Bombuscaro	U4	20.05.2011	Sweep Netting
BT_1259_Galerucinae_sp_049	S97	KJ677643	Bombuscaro	U4	20.05.2011	Sweep Netting
BT_1260_Eumolpinae_sp_024	S97	KJ677916	Bombuscaro	U4	20.05.2011	Sweep Netting
BT_1261_Alticinae_sp_103	S97	KR424914	Bombuscaro	U4	20.05.2011	Sweep Netting
BT_1262_Alticinae_sp_141	S97		Bombuscaro	U4	20.05.2011	Sweep Netting
BT_1263_Alticinae_sp_051	S97	KJ677369	Bombuscaro	U4	20.05.2011	Sweep Netting
BT_1264_Alticinae_sp_078	S97	KJ677616	Bombuscaro	U4	20.05.2011	Sweep Netting
BT_1265_Alticinae_sp_093	S97		Bombuscaro	U4	20.05.2011	Sweep Netting
BT_1266_Alticinae_sp_093	S97		Bombuscaro	U4	20.05.2011	Sweep Netting
BT_1267_Alticinae_sp_128	S98	KJ677510	Bombuscaro	U4	20.05.2011	Beating
BT_1269_Alticinae_sp_009	S99	KJ677725	Bombuscaro	U4	20.05.2011	Hand-Coll.(S)
BT_1270_Galerucinae_sp_028	S99	KJ677435	Bombuscaro	U4	20.05.2011	Hand-Coll.(S)
BT_1271_Alticinae_sp_057	S99	KJ677444	Bombuscaro	U4	20.05.2011	Hand-Coll.(S)
BT_1272_Alticinae_sp_128	S99	KJ677507	Bombuscaro	U4	20.05.2011	Hand-Coll.(S)
BT_1273_Galerucinae_sp_028	S100	KJ677436	Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1274_Alticinae_sp_042	S100	KJ677410	Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1275_Alticinae_sp_051	S100	KJ677363	Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1276_Alticinae_sp_093	S100		Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1277_Alticinae_sp_093	S100		Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1278_Alticinae_sp_143	S100	KJ677576	Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1279_Alticinae_sp_125	S100		Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1280_Alticinae_sp_069	S100	KJ677461	Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1281_Galerucinae_sp_047	S100	KJ677640	Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1282_Galerucinae_sp_052	S100	KJ677744	Bombuscaro	U6	20.05.2011	Sweep Netting
BT_1283_Galerucinae_sp_006	S101	KJ677536	Bombuscaro	U6	20.05.2011	Beating
BT_1284_Galerucinae_sp_063	S101	KJ677529	Bombuscaro	U6	20.05.2011	Beating
BT_1285_Galerucinae_sp_047	S101	KR425305	Bombuscaro	U6	20.05.2011	Beating
BT_1286_Alticinae_sp_021	S101	KJ677441	Bombuscaro	U6	20.05.2011	Beating
BT_1287_Alticinae_sp_067	S101	KJ677458	Bombuscaro	U6	20.05.2011	Beating
BT_1288_Alticinae_sp_103	S101	KJ677364	Bombuscaro	U6	20.05.2011	Beating
BT_1289_Alticinae_sp_102	S101		Bombuscaro	U6	20.05.2011	Beating
BT_1293_Alticinae_sp_050	S101	KJ677383	Bombuscaro	U6	20.05.2011	Beating
BT_1294_Galerucinae_sp_072	S101	KJ677804	Bombuscaro	U6	20.05.2011	Beating
BT_1295_Alticinae_sp_057	S101	KJ677446	Bombuscaro	U6	20.05.2011	Beating
BT_1296_Alticinae_sp_057	S101		Bombuscaro	U6	20.05.2011	Beating
BT_1297_Alticinae_sp_057	S101		Bombuscaro	U6	20.05.2011	Beating
BT_1298_Alticinae_sp_057	S101		Bombuscaro	U6	20.05.2011	Beating
BT_1299_Alticinae_sp_057	S101		Bombuscaro	U6	20.05.2011	Beating
BT_1300_Alticinae_sp_057	S101		Bombuscaro	U6	20.05.2011	Beating
BT_1301_Alticinae_sp_057	S101		Bombuscaro	U6	20.05.2011	Beating
BT_1302_Alticinae_sp_057	S101		Bombuscaro	U6	20.05.2011	Beating
BT_1303_Alticinae_sp_057	S101		Bombuscaro	U6	20.05.2011	Beating
BT_1304_Galerucinae_sp_047	S102	KJ677641	Bombuscaro	U6	20.05.2011	Hand-Coll.(S)
BT_1305_Alticinae_sp_093	S102	KJ677359	Bombuscaro	U6	20.05.2011	Hand-Coll.(S)
BT_1306_Alticinae_sp_125	S102		Bombuscaro	U6	20.05.2011	Hand-Coll.(S)
BT_1307_Eumolpinae_sp_016	S102	KJ677938	Bombuscaro	U6	20.05.2011	Hand-Coll.(S)
BT_1308_Alticinae_sp_134	S103	KJ677596	Bombuscaro	U5	20.05.2011	Sweep Netting
BT_1309_Alticinae_sp_118	S103		Bombuscaro	U5	20.05.2011	Sweep Netting
BT_1310_Alticinae_sp_035	S103	KJ677612	Bombuscaro	U5	20.05.2011	Sweep Netting
BT_1311_Alticinae_sp_069	S103	KJ677460	Bombuscaro	U5	20.05.2011	Sweep Netting
BT_1312_Alticinae_sp_093	S103	KJ677360	Bombuscaro	U5	20.05.2011	Sweep Netting
BT_1313_Alticinae_sp_093	S103		Bombuscaro	U5	20.05.2011	Sweep Netting

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Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_1314_Alticinae_sp_093	S103		Bombuscaro	U5	20.05.2011	Sweep Netting
BT_1315_Alticinae_sp_093	S103		Bombuscaro	U5	20.05.2011	Sweep Netting
BT_1318_Eumolpinae_sp_024	S104	KJ677917	Bombuscaro	U5	20.05.2011	Beating
BT_1319_Alticinae_sp_051	S104	KJ677370	Bombuscaro	U5	20.05.2011	Beating
BT_1321_Galerucinae_sp_061	S106	KJ677517	ECSF	L2	23.05.2011	Sweep Netting
BT_1322_Alticinae_sp_019	S106	KJ677424	ECSF	L2	23.05.2011	Sweep Netting
BT_1323_Alticinae_sp_104	S106	KJ677651	ECSF	L2	23.05.2011	Sweep Netting
BT_1324_Alticinae_sp_092	S106	KJ677739	ECSF	L2	23.05.2011	Sweep Netting
BT_1325_Alticinae_sp_019	S107		ECSF	L2	23.05.2011	Beating
BT_1326_Eumolpinae_sp_019	S108	KJ677880	ECSF	L2	23.05.2011	Hand-Coll.(S)
BT_1327_Alticinae_sp_097	S109	KR424915	ECSF	L1	23.05.2011	Sweep Netting
BT_1328_Alticinae_sp_106	S109		ECSF	L1	23.05.2011	Sweep Netting
BT_1329_Alticinae_sp_106	S109		ECSF	L1	23.05.2011	Sweep Netting
BT_1330_Alticinae_sp_140	S110	KR424916	ECSF	L1	23.05.2011	Beating
BT_1331_Cassidinae_sp_004	S111	KR424783	ECSF	L1	23.05.2011	Hand-Coll.(S)
BT_1332_Cassidinae_sp_004	S111		ECSF	L1	23.05.2011	Hand-Coll.(S)
BT_1334_Alticinae_sp_245	S112		Cajanuma	L6	24.05.2011	Sweep Netting
BT_1335_Alticinae_sp_118	S112	KJ677662	Cajanuma	L6	24.05.2011	Sweep Netting
BT_1336_Alticinae_sp_244	S112	KR424917	Cajanuma	L6	24.05.2011	Sweep Netting
BT_1337_Lamprosomatinae_sp_001	S112		Cajanuma	L6	24.05.2011	Sweep Netting
BT_1339_Alticinae_sp_244	S118	KR424918	Cajanuma	L4	24.05.2011	Sweep Netting
BT_1340_Galerucinae_sp_066	S119	KJ677798	Cajanuma	L4	24.05.2011	Beating
BT_1347_Alticinae_sp_092	S123		ECSF	L3	27.05.2011	Hand-Coll.(S)
BT_1349_Alticinae_sp_051	S125	KJ677352	ECSF	U2	27.05.2011	Beating
BT_1350_Alticinae_sp_131	S126	KJ677657	ECSF	U2	27.05.2011	Hand-Coll.(S)
BT_1756_Alticinae_sp_014	N101		ECSF		01.06.2011	Hand-Coll.(N)
BT_1758_Alticinae_sp_014	N101		ECSF		01.06.2011	Hand-Coll.(N)
BT_1773_Galerucinae_sp_030	N102		ECSF		03.06.2011	Hand-Coll.(N)
BT_1775_Alticinae_sp_033	N102		ECSF		03.06.2011	Hand-Coll.(N)
BT_1776_Galerucinae_sp_062	N102		ECSF		03.06.2011	Hand-Coll.(N)
BT_1784_Lamprosomatinae_sp_001	N102		ECSF		03.06.2011	Hand-Coll.(N)
BT_1785_Chrysomelinae_sp_003	N102		ECSF		03.06.2011	Hand-Coll.(N)
BT_1789_Galerucinae_sp_022	N104		ECSF		09.06.2011	Hand-Coll.(N)
BT_1794_Alticinae_sp_001	N104		ECSF		09.06.2011	Hand-Coll.(N)
BT_1795_Chrysomelinae_sp_001	N104		ECSF		09.06.2011	Hand-Coll.(N)
BT_1809_Alticinae_sp_001	N105		ECSF	L6	09.06.2011	Malaise Trap
BT_1810_Eumolpinae_sp_012	N105		ECSF	L6	09.06.2011	Malaise Trap
BT_1811_Galerucinae_sp_054	N105		ECSF	L6	09.06.2011	Malaise Trap
BT_1812_Alticinae_sp_002	N105		ECSF	L6	09.06.2011	Malaise Trap
BT_1813_Alticinae_sp_032	N105		ECSF	L6	09.06.2011	Malaise Trap
BT_1820_Alticinae_sp_142	N105		ECSF	L6	09.06.2011	Malaise Trap
BT_1821_Alticinae_sp_088	N105		ECSF	L6	09.06.2011	Malaise Trap
BT_1928_Galerucinae_sp_019	N109		ECSF		16.06.2011	Hand-Coll.(N)
BT_1932_Eumolpinae_sp_042	N110		ECSF	Q2	16.06.2011	Malaise Trap
BT_1934_Eumolpinae_sp_014	N110		ECSF	Q2	16.06.2011	Malaise Trap
BT_1935_Alticinae_sp_074	N110		ECSF	Q2	16.06.2011	Malaise Trap
BT_1936_Alticinae_sp_049	N110		ECSF	Q2	16.06.2011	Malaise Trap
BT_1954_Galerucinae_sp_041	N113		ECSF		28.06.2011	Hand-Coll.(N)
BT_1963_Alticinae_sp_037	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1964_Galerucinae_sp_022	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1970_Eumolpinae_sp_007	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1971_Eumolpinae_sp_015	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1972_Eumolpinae_sp_015	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1973_Eumolpinae_sp_015	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1974_Alticinae_sp_015	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1975_Alticinae_sp_015	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1976_Galerucinae_sp_102	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1977_Alticinae_sp_007	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1978_Eumolpinae_sp_040	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1981_Galerucinae_sp_065	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_1982_Alticinae_sp_062	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_2050_Alticinae_sp_123	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_2054_Alticinae_sp_139	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_2055_Alticinae_sp_145	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_2056_Alticinae_sp_141	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_2059_Alticinae_sp_142	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_2065_Alticinae_sp_142	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_2067_Alticinae_sp_142	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_2068_Alticinae_sp_142	N115		ECSF	L6	05.07.2011	Malaise Trap
BT_2073_Alticinae_sp_022	N116	KJ677340	ECSF	Q2	05.07.2011	Malaise Trap
BT_2074_Galerucinae_sp_034	N116	KJ677698	ECSF	Q2	05.07.2011	Malaise Trap
BT_2075_Galerucinae_sp_034	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2076_Alticinae_sp_002	N116	KJ677706	ECSF	Q2	05.07.2011	Malaise Trap
BT_2077_Galerucinae_sp_007	N116	KJ677542	ECSF	Q2	05.07.2011	Malaise Trap
BT_2078_Alticinae_sp_265	N116	KJ677431	ECSF	Q2	05.07.2011	Malaise Trap
BT_2079_Eumolpinae_sp_038	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2080_Galerucinae_sp_065	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2081_Eumolpinae_sp_042	N116	KJ677860	ECSF	Q2	05.07.2011	Malaise Trap
BT_2082_Alticinae_sp_064	N116	KJ677448	ECSF	Q2	05.07.2011	Malaise Trap
BT_2083_Alticinae_sp_064	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2084_Alticinae_sp_032	N116	KJ677624	ECSF	Q2	05.07.2011	Malaise Trap
BT_2085_Eumolpinae_sp_042	N116	KJ677861	ECSF	Q2	05.07.2011	Malaise Trap
BT_2086_Eumolpinae_sp_042	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2087_Alticinae_sp_049	N116	KJ677608	ECSF	Q2	05.07.2011	Malaise Trap
BT_2088_Alticinae_sp_049	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2089_Alticinae_sp_049	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2090_Alticinae_sp_081	N116	KJ677766	ECSF	Q2	05.07.2011	Malaise Trap
BT_2091_Alticinae_sp_081	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2092_Alticinae_sp_081	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2093_Alticinae_sp_096	N116	KJ677466	ECSF	Q2	05.07.2011	Malaise Trap
BT_2094_Alticinae_sp_096	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2095_Alticinae_sp_096	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2096_Alticinae_sp_096	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2097_Alticinae_sp_122	N116	KJ677685	ECSF	Q2	05.07.2011	Malaise Trap
BT_2098_Alticinae_sp_122	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2099_Alticinae_sp_122	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2100_Alticinae_sp_122	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2101_Alticinae_sp_086	N116	KJ677402	ECSF	Q2	05.07.2011	Malaise Trap
BT_2102_Alticinae_sp_086	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2103_Alticinae_sp_086	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2104_Alticinae_sp_086	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2105_Alticinae_sp_086	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2106_Alticinae_sp_086	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2107_Alticinae_sp_085	N116	KJ677390	ECSF	Q2	05.07.2011	Malaise Trap
BT_2108_Alticinae_sp_085	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2109_Alticinae_sp_133	N116	KJ677587	ECSF	Q2	05.07.2011	Malaise Trap
BT_2110_Alticinae_sp_133	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2111_Alticinae_sp_133	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2112_Alticinae_sp_133	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2113_Alticinae_sp_142	N116	KJ677594	ECSF	Q2	05.07.2011	Malaise Trap
BT_2114_Alticinae_sp_142	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2115_Alticinae_sp_142	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2116_Alticinae_sp_142	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2117_Alticinae_sp_142	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2118_Alticinae_sp_142	N116		ECSF	Q2	05.07.2011	Malaise Trap

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SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_2119_Eumolpinae_sp_016	N116	KJ677936	ECSF	Q2	05.07.2011	Malaise Trap
BT_2120_Eumolpinae_sp_016	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2121_Eumolpinae_sp_016	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2122_Eumolpinae_sp_016	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2123_Alticinae_sp_018	N116	KJ677281	ECSF	Q2	05.07.2011	Malaise Trap
BT_2124_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2125_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2126_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2127_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2128_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2129_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2130_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2131_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2132_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2133_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2134_Alticinae_sp_018	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2135_Alticinae_sp_122	N116	KJ677686	ECSF	Q2	05.07.2011	Malaise Trap
BT_2136_Alticinae_sp_110	N116	KJ677673	ECSF	Q2	05.07.2011	Malaise Trap
BT_2137_Alticinae_sp_110	N116		ECSF	Q2	05.07.2011	Malaise Trap
BT_2138_Alticinae_sp_115	N116	KJ677294	ECSF	Q2	05.07.2011	Malaise Trap
BT_2143_Eumolpinae_sp_042	N117		ECSF	L6	05.07.2011	Flight-Intercept.
BT_2152_Eumolpinae_sp_038	N121	KJ677930	ECSF		14.07.2011	Hand-Coll.(N)
BT_2153_Eumolpinae_sp_038	N121		ECSF		14.07.2011	Hand-Coll.(N)
BT_2154_Galerucinae_sp_017	N121	KJ677554	ECSF		14.07.2011	Hand-Coll.(N)
BT_2155_Alticinae_sp_115	N121	KJ677296	ECSF		14.07.2011	Hand-Coll.(N)
BT_2156_Cassidinae_sp_012	N121	KJ677830	ECSF		14.07.2011	Hand-Coll.(N)
BT_2157_Eumolpinae_sp_024	N121	KJ677911	ECSF		14.07.2011	Hand-Coll.(N)
BT_2158_Alticinae_sp_083	N121	KJ677338	ECSF		14.07.2011	Hand-Coll.(N)
BT_2161_Cassidinae_sp_012	N122	KJ677827	ECSF		19.07.2011	Hand-Coll.(N)
BT_2162_Cassidinae_sp_012	N122		ECSF		19.07.2011	Hand-Coll.(N)
BT_2163_Cassidinae_sp_012	N122		ECSF		19.07.2011	Hand-Coll.(N)
BT_2164_Cassidinae_sp_012	N122		ECSF		19.07.2011	Hand-Coll.(N)
BT_2165_Cassidinae_sp_012	N122		ECSF		19.07.2011	Hand-Coll.(N)
BT_2166_Cassidinae_sp_012	N122		ECSF		19.07.2011	Hand-Coll.(N)
BT_2167_Cassidinae_sp_012	N122		ECSF		19.07.2011	Hand-Coll.(N)
BT_2168_Galerucinae_sp_036	N122	KJ677763	ECSF		19.07.2011	Hand-Coll.(N)
BT_2169_Galerucinae_sp_033	N122		ECSF		19.07.2011	Hand-Coll.(N)
BT_2170_Galerucinae_sp_034	N122	KJ677699	ECSF		19.07.2011	Hand-Coll.(N)
BT_2171_Galerucinae_sp_034	N122		ECSF		19.07.2011	Hand-Coll.(N)
BT_2172_Galerucinae_sp_062	N122		ECSF		19.07.2011	Hand-Coll.(N)
BT_2173_Eumolpinae_sp_034	N122	KJ677882	ECSF		19.07.2011	Hand-Coll.(N)
BT_2176_Galerucinae_sp_043	N123	KJ677682	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2177_Galerucinae_sp_043	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2178_Galerucinae_sp_043	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2179_Alticinae_sp_011	N123	KJ677726	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2180_Alticinae_sp_075	N123	KJ677621	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2181_Alticinae_sp_251	N123	KJ677508	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2182_Galerucinae_sp_029	N123	KJ677521	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2183_Galerucinae_sp_029	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2184_Galerucinae_sp_029	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2185_Galerucinae_sp_029	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2186_Galerucinae_sp_029	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2187_Galerucinae_sp_029	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2188_Galerucinae_sp_029	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2189_Hispinae_sp_008	N123	KJ677845	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2190_Hispinae_sp_022	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2191_Criocerinae_sp_005	N123	KJ677820	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2192_Galerucinae_sp_028	N123	KJ677433	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2193_Alticinae_sp_076	N123	KJ677344	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2194_Alticinae_sp_127	N123	KJ677275	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2195_Alticinae_sp_127	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2196_Alticinae_sp_127	N123	KJ677278	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2197_Eumolpinae_sp_047	N123	KJ677919	Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2198_Eumolpinae_sp_047	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2199_Eumolpinae_sp_035	N123		Bombuscaro		21.07.2011	Hand-Coll.(N)
BT_2203_Alticinae_sp_016	N124		ECSF		26.07.2011	Hand-Coll.(N)
BT_2208_Alticinae_sp_112	N126	KJ677614	Bombuscaro		02.08.2011	Hand-Coll.(N)
BT_2218_Galerucinae_sp_012	N128		ECSF	Q2	04.08.2011	Malaise Trap
BT_2219_Eumolpinae_sp_042	N128		ECSF	Q2	04.08.2011	Malaise Trap
BT_2220_Galerucinae_sp_007	N128		ECSF	Q2	04.08.2011	Malaise Trap
BT_2221_Galerucinae_sp_022	N128		ECSF	Q2	04.08.2011	Malaise Trap
BT_2222_Galerucinae_sp_076	N128		ECSF	Q2	04.08.2011	Malaise Trap
BT_2229_Alticinae_sp_063	N128		ECSF	Q2	04.08.2011	Malaise Trap
BT_2231_Alticinae_sp_087	N128		ECSF	Q2	04.08.2011	Malaise Trap
BT_2232_Alticinae_sp_087	N128		ECSF	Q2	04.08.2011	Malaise Trap
BT_2233_Alticinae_sp_087	N128		ECSF	Q2	04.08.2011	Malaise Trap
BT_2310_Cassidinae_sp_004	N129		ECSF	U1	04.08.2011	Malaise Trap
BT_2311_Alticinae_sp_074	N129		ECSF	U1	04.08.2011	Malaise Trap
BT_2312_Alticinae_sp_042	N129	KJ677413	ECSF	U1	04.08.2011	Malaise Trap
BT_2313_Eumolpinae_sp_025	N129		ECSF	U1	04.08.2011	Malaise Trap
BT_2314_Eumolpinae_sp_030	N129			U1	04.08.2011	Malaise Trap
BT_2317_Alticinae_sp_007	N130		ECSF	L6	04.08.2011	Flight-Intercept.
BT_2353_Hispinae_sp_006	N134		ECSF		09.08.2011	Hand-Coll.(N)
BT_2383_Galerucinae_sp_059	S130		ECSF	L6	01.06.2011	Sweep Netting
BT_2399_Alticinae_sp_038	S132		ECSF	L6	01.06.2011	Hand-Coll.(S)
BT_2405_Alticinae_sp_042	S133		ECSF	L5	01.06.2011	Sweep Netting
BT_2491_Alticinae_sp_085	S139	KJ677387	ECSF	U4	03.06.2011	Sweep Netting
BT_2492_Alticinae_sp_104	S139	KJ677329	ECSF	U4	03.06.2011	Sweep Netting
BT_2495_Alticinae_sp_243	S140	KJ677418	ECSF	U4	03.06.2011	Beating
BT_2496_Alticinae_sp_140	S140	KJ677573	ECSF	U4	03.06.2011	Beating
BT_2498_Alticinae_sp_052	S141	KJ677354	ECSF	U4	03.06.2011	Hand-Coll.(S)
BT_2499_Alticinae_sp_118	S143	KJ677668	Cajanuma	L2	07.06.2011	Beating
BT_2502_Alticinae_sp_160	S151	KJ677362	ECSF	L4	14.06.2011	Sweep Netting
BT_2503_Alticinae_sp_079	S151		ECSF	L4	14.06.2011	Sweep Netting
BT_2504_Galerucinae_sp_098	S151	KJ677627	ECSF	L4	14.06.2011	Sweep Netting
BT_2505_Galerucinae_sp_046	S151	KJ677635	ECSF	L4	14.06.2011	Sweep Netting
BT_2506_Alticinae_sp_047	S152	KJ677735	ECSF	L4	14.06.2011	Beating
BT_2507_Alticinae_sp_203	S152	KR424919	ECSF	L4	14.06.2011	Beating
BT_2508_Galerucinae_sp_034	S152		ECSF	L4	14.06.2011	Beating
BT_2509_Galerucinae_sp_034	S152		ECSF	L4	14.06.2011	Beating
BT_2510_Hispinae_sp_010	S154		ECSF	L2	16.06.2011	Sweep Netting
BT_2511_Hispinae_sp_010	S154		ECSF	L2	16.06.2011	Sweep Netting
BT_2516_Galerucinae_sp_009	S158	KJ677530	Bombuscaro	L1	21.06.2011	Beating
BT_2517_Alticinae_sp_201	S159	KJ677333	Bombuscaro	L1	21.06.2011	Hand-Coll.(S)
BT_2518_Alticinae_sp_070	S159	KJ677511	Bombuscaro	L1	21.06.2011	Hand-Coll.(S)
BT_2519_Alticinae_sp_153	S160	KJ677384	Bombuscaro	L2	21.06.2011	Sweep Netting
BT_2520_Alticinae_sp_073	S160		Bombuscaro	L2	21.06.2011	Sweep Netting
BT_2521_Galerucinae_sp_082	S161	KJ677688	Bombuscaro	L2	21.06.2011	Beating
BT_2522_Alticinae_sp_051	S161	KJ677365	Bombuscaro	L2	21.06.2011	Beating
BT_2523_Alticinae_sp_153	S161	KJ677385	Bombuscaro	L2	21.06.2011	Beating
BT_2524_Alticinae_sp_153	S161		Bombuscaro	L2	21.06.2011	Beating
BT_2525_Alticinae_sp_153	S161		Bombuscaro	L2	21.06.2011	Beating
BT_2526_Alticinae_sp_153	S161		Bombuscaro	L2	21.06.2011	Beating

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SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_2528_Eumolpinae_sp_045	S162		Bombuscaro	L2	21.06.2011	Hand-Coll.(S)
BT_2529_Galerucinae_sp_055	S163	KJ677745	Bombuscaro	L3	21.06.2011	Sweep Netting
BT_2531_Alticinae_sp_008	S166	KR424920	ECSF	U1	23.06.2011	Sweep Netting
BT_2544_Alticinae_sp_097	S178	KJ677312	ECSF	L3	28.06.2011	Sweep Netting
BT_2546_Cassidinae_sp_004	S180	KJ677853	ECSF	L3	28.06.2011	Hand-Coll.(S)
BT_2547_Cassidinae_sp_004	S180		ECSF	L3	28.06.2011	Hand-Coll.(S)
BT_2548_Cassidinae_sp_012	S180	KJ677828	ECSF	L3	28.06.2011	Hand-Coll.(S)
BT_2549_Alticinae_sp_094	S184		Cajanuma	U2	30.06.2011	Sweep Netting
BT_2550_Alticinae_sp_056	S185	KJ677314	Cajanuma	U2	30.06.2011	Beating
BT_2551_Alticinae_sp_246	S185	KR424921	Cajanuma	U2	30.06.2011	Beating
BT_2552_Alticinae_sp_246	S185		Cajanuma	U2	30.06.2011	Beating
BT_2557_Galerucinae_sp_007	S187		ECSF	U2	07.07.2011	Sweep Netting
BT_2572_Alticinae_sp_018	S202	KJ677428	ECSF	L5	14.07.2011	Sweep Netting
BT_2573_Cassidinae_sp_012	S203	KJ677829	ECSF	L5	14.07.2011	Beating
BT_2574_Cassidinae_sp_012	S203		ECSF	L5	14.07.2011	Beating
BT_2575_Eumolpinae_sp_031	S203	KJ677939	ECSF	L5	14.07.2011	Beating
BT_2576_Alticinae_sp_096	S203	KJ677467	ECSF	L5	14.07.2011	Beating
BT_2578_Galerucinae_sp_034	S204	KJ677700	ECSF	L5	14.07.2011	Hand-Coll.(S)
BT_2579_Alticinae_sp_115	S204	KJ677299	ECSF	L5	14.07.2011	Hand-Coll.(S)
BT_2594_Galerucinae_sp_002	S207		ECSF	L6	14.07.2011	Hand-Coll.(S)
BT_2600_Alticinae_sp_008	S211	KR424922	ECSF	U5	19.07.2011	Sweep Netting
BT_2601_Galerucinae_sp_007	S212	KR425306	ECSF	U5	19.07.2011	Beating
BT_2602_Alticinae_sp_085	S212	KR424923	ECSF	U5	19.07.2011	Beating
BT_2603_Eumolpinae_sp_039	S212	KR424811	ECSF	U5	19.07.2011	Beating
BT_2604_Alticinae_sp_106	S212	KR424924	ECSF	U5	19.07.2011	Beating
BT_2605_Alticinae_sp_118	S212	KR424925	ECSF	U5	19.07.2011	Beating
BT_2606_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2607_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2608_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2609_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2610_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2611_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2612_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2613_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2614_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2615_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2616_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2617_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2618_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2619_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2620_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2621_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2622_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2623_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2624_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2625_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2626_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2627_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2628_Alticinae_sp_118	S212		ECSF	U5	19.07.2011	Beating
BT_2629_Eumolpinae_sp_029	S215	KJ677903	ECSF	U6	19.07.2011	Beating
BT_2631_Alticinae_sp_135	S220	KJ677581	Bombuscaro	L6	21.07.2011	Sweep Netting
BT_2632_Alticinae_sp_143	S221	KJ677577	Bombuscaro	L6	21.07.2011	Beating
BT_2634_Alticinae_sp_196	S223		Bombuscaro	L5	21.07.2011	Sweep Netting
BT_2637_Eumolpinae_sp_040	S226	KJ677868	ECSF	L2	26.07.2011	Sweep Netting
BT_2638_Galerucinae_sp_061	S226	KJ677518	ECSF	L2	26.07.2011	Sweep Netting
BT_2639_Alticinae_sp_061	S226	KR424926	ECSF	L2	26.07.2011	Sweep Netting
BT_2640_Alticinae_sp_104	S226	KJ677650	ECSF	L2	26.07.2011	Sweep Netting
BT_2641_Alticinae_sp_097	S226	KJ677304	ECSF	L2	26.07.2011	Sweep Netting
BT_2642_Eumolpinae_sp_019	S227	KJ677881	ECSF	L2	26.07.2011	Beating
BT_2643_Alticinae_sp_042	S227	KJ677414	ECSF	L2	26.07.2011	Beating
BT_2644_Criocerinae_sp_001	S227	KJ677816	ECSF	L2	26.07.2011	Beating
BT_2645_Eumolpinae_sp_038	S227		ECSF	L2	26.07.2011	Beating
BT_2646_Alticinae_sp_096	S227	KJ677488	ECSF	L2	26.07.2011	Beating
BT_2657_Alticinae_sp_001	S232	KJ677704	ECSF	L1	26.07.2011	Sweep Netting
BT_2658_Alticinae_sp_041	S232	KJ677600	ECSF	L1	26.07.2011	Sweep Netting
BT_2659_Alticinae_sp_086	S232	KJ677395	ECSF	L1	26.07.2011	Sweep Netting
BT_2660_Alticinae_sp_097	S232	KR424927	ECSF	L1	26.07.2011	Sweep Netting
BT_2661_Hispinae_sp_009	S232	KJ677846	ECSF	L1	26.07.2011	Sweep Netting
BT_2662_Alticinae_sp_087	S233	KJ677505	ECSF	L1	26.07.2011	Beating
BT_2663_Hispinae_sp_005	S233	KJ677841	ECSF	L1	26.07.2011	Beating
BT_2664_Cassidinae_sp_003	S234		ECSF	L1	26.07.2011	Hand-Coll.(S)
BT_2665_Criocerinae_sp_004	S234	KJ677819	ECSF	L1	26.07.2011	Hand-Coll.(S)
BT_2666_Alticinae_sp_089	S235	KJ677736	Cajanuma	L4	28.07.2011	Sweep Netting
BT_2668_Eumolpinae_sp_028	S236		Cajanuma	L4	28.07.2011	Beating
BT_2670_Alticinae_sp_051	S244	KJ677371	Bombuscaro	U1	02.08.2011	Sweep Netting
BT_2671_Galerucinae_sp_072	S247	KJ677806	Bombuscaro	U2	02.08.2011	Sweep Netting
BT_2672_Alticinae_sp_051	S247	KJ677372	Bombuscaro	U2	02.08.2011	Sweep Netting
BT_2673_Galerucinae_sp_049	S248	KJ677644	Bombuscaro	U2	02.08.2011	Beating
BT_2675_Galerucinae_sp_002	S253	KR425307	ECSF	L4	09.08.2011	Sweep Netting
BT_2676_Galerucinae_sp_046	S254	KR425308	ECSF	L4	09.08.2011	Beating
BT_2677_Galerucinae_sp_061	S254	KR425309	ECSF	L4	09.08.2011	Beating
BT_2678_Alticinae_sp_111	S254		ECSF	L4	09.08.2011	Beating
BT_2679_Alticinae_sp_096	S254	KR424928	ECSF	L4	09.08.2011	Beating
BT_2681_Criocerinae_sp_001	S255	KR425411	ECSF	L4	09.08.2011	Hand-Coll.(S)
BT_2684_Alticinae_sp_049	S259		ECSF	L6	09.08.2011	Sweep Netting
BT_2697_Alticinae_sp_053	S265	KJ677345	Cajanuma	U1	11.08.2011	Sweep Netting
BT_2698_Eumolpinae_sp_071	S266	KJ677908	Cajanuma	U1	11.08.2011	Beating
BT_2699_Alticinae_sp_060	S266	KR424929	Cajanuma	U1	11.08.2011	Beating
BT_2701_Alticinae_sp_056	S268		Cajanuma	L1	11.08.2011	Sweep Netting
BT_2702_Alticinae_sp_056	S268		Cajanuma	L1	11.08.2011	Sweep Netting
BT_2703_Alticinae_sp_056	S268		Cajanuma	L1	11.08.2011	Sweep Netting
BT_2704_Alticinae_sp_246	S268		Cajanuma	L1	11.08.2011	Sweep Netting
BT_2705_Alticinae_sp_094	S268	KJ677605	Cajanuma	L1	11.08.2011	Sweep Netting
BT_2706_Alticinae_sp_120	S268		Cajanuma	L1	11.08.2011	Sweep Netting
BT_2707_Alticinae_sp_034	S269	KJ677626	Cajanuma	L1	11.08.2011	Beating
BT_2708_Alticinae_sp_224	S269	KR424930	Cajanuma	L1	11.08.2011	Beating
BT_2709_Hispinae_sp_024	S269		Cajanuma	L1	11.08.2011	Beating
BT_2717_Alticinae_sp_001	S274	KR424931	ECSF	L1	16.08.2011	Sweep Netting
BT_2718_Alticinae_sp_096	S275	KR424932	ECSF	L1	16.08.2011	Beating
BT_2719_Criocerinae_sp_001	S276	KR425412	ECSF	L1	16.08.2011	Hand-Coll.(S)
BT_2723_Alticinae_sp_225	S278		ECSF	L2	16.08.2011	Beating
BT_2771_Galerucinae_sp_100	S282		ECSF	L4	18.08.2011	Hand-Coll.(S)
BT_2787_Galerucinae_sp_002	S285		ECSF	L5	18.08.2011	Hand-Coll.(S)
BT_2795_Galerucinae_sp_017	S286		ECSF	L6	18.08.2011	Sweep Netting
BT_2805_Eumolpinae_sp_006	S292		Bombuscaro	U5	23.08.2011	Sweep Netting
BT_2806_Alticinae_sp_050	S295	KR424933	Bombuscaro	U6	23.08.2011	Sweep Netting
BT_2807_Alticinae_sp_103	S295	KR424934	Bombuscaro	U6	23.08.2011	Sweep Netting
BT_2809_Alticinae_sp_259	S296	KR424935	Bombuscaro	U6	23.08.2011	Beating
BT_2810_Galerucinae_sp_072	S298	KR425310	ECSF	U1	25.08.2011	Sweep Netting
BT_2812_Alticinae_sp_104	S299	KR424936	ECSF	U1	25.08.2011	Beating
BT_2813_Alticinae_sp_104	S299		ECSF	U1	25.08.2011	Beating
BT_2814_Alticinae_sp_104	S299		ECSF	U1	25.08.2011	Beating
BT_2816_Alticinae_sp_150	S301	KR424937	ECSF	U2	25.08.2011	Sweep Netting
BT_2817_Alticinae_sp_150	S301		ECSF	U2	25.08.2011	Sweep Netting
BT_2818_Alticinae_sp_051	S301	KR424938	ECSF	U2	25.08.2011	Sweep Netting

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SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_2819_Eumolpinae_sp_030	S302	KR424812	ECSF	U2	25.08.2011	Beating
BT_2820_Eumolpinae_sp_030	S302		ECSF	U2	25.08.2011	Beating
BT_2821_Eumolpinae_sp_074	S302	KR424813	ECSF	U2	25.08.2011	Beating
BT_2822_Galerucinae_sp_048	S302	KR425311	ECSF	U2	25.08.2011	Beating
BT_2823_Alticinae_sp_068	S302	KR424939	ECSF	U2	25.08.2011	Beating
BT_2824_Alticinae_sp_129	S302	KR424940	ECSF	U2	25.08.2011	Beating
BT_2825_Alticinae_sp_126	S304	KR424941	ECSF	L3	25.08.2011	Sweep Netting
BT_2826_Alticinae_sp_104	S304	KR424942	ECSF	L3	25.08.2011	Sweep Netting
BT_2827_Eumolpinae_sp_067	S304	KR424814	ECSF	L3	25.08.2011	Sweep Netting
BT_2828_Eumolpinae_sp_029	S304		ECSF	L3	25.08.2011	Sweep Netting
BT_2829_Eumolpinae_sp_030	S305	KR424815	ECSF	L3	25.08.2011	Beating
BT_2830_Alticinae_sp_051	S305	KR424943	ECSF	L3	25.08.2011	Beating
BT_2831_Cassidinae_sp_015	S307	KR424784	Bombuscaro	L1	30.08.2011	Sweep Netting
BT_2832_Alticinae_sp_072	S311	KR424944	Bombuscaro	L2	30.08.2011	Beating
BT_2833_Alticinae_sp_104	S313	KR424945	Bombuscaro	L3	30.08.2011	Sweep Netting
BT_2834_Alticinae_sp_118	S316	KR424946	ECSF	U4	01.09.2011	Sweep Netting
BT_2835_Alticinae_sp_118	S316		ECSF	U4	01.09.2011	Sweep Netting
BT_2837_Alticinae_sp_118	S317		ECSF	U4	01.09.2011	Beating
BT_2838_Alticinae_sp_118	S317		ECSF	U4	01.09.2011	Beating
BT_2839_Eumolpinae_sp_066	S317	KR424816	ECSF	U4	01.09.2011	Beating
BT_2840_Alticinae_sp_052	S317		ECSF	U4	01.09.2011	Beating
BT_2841_Galerucinae_sp_096	S317	KR425312	ECSF	U4	01.09.2011	Beating
BT_2842_Galerucinae_sp_098	S317	KR425313	ECSF	U4	01.09.2011	Beating
BT_2843_Hispinae_sp_005	S317		ECSF	U4	01.09.2011	Beating
BT_2844_Alticinae_sp_126	S319	KR424947	ECSF	U5	01.09.2011	Sweep Netting
BT_2845_Alticinae_sp_118	S319		ECSF	U5	01.09.2011	Sweep Netting
BT_2846_Alticinae_sp_152	S319	KR424948	ECSF	U5	01.09.2011	Sweep Netting
BT_2847_Alticinae_sp_152	S319		ECSF	U5	01.09.2011	Sweep Netting
BT_2848_Alticinae_sp_118	S320		ECSF	U5	01.09.2011	Beating
BT_2849_Alticinae_sp_118	S320		ECSF	U5	01.09.2011	Beating
BT_2850_Alticinae_sp_118	S320	KR424949	ECSF	U5	01.09.2011	Beating
BT_2851_Alticinae_sp_118	S320		ECSF	U5	01.09.2011	Beating
BT_2852_Alticinae_sp_052	S320	KR424950	ECSF	U5	01.09.2011	Beating
BT_2853_Alticinae_sp_052	S320		ECSF	U5	01.09.2011	Beating
BT_2854_Eumolpinae_sp_017	S320		ECSF	U5	01.09.2011	Beating
BT_2855_Galerucinae_sp_098	S320	KR425314	ECSF	U5	01.09.2011	Beating
BT_2856_Cryptocephalinae_sp_002	S320		ECSF	U5	01.09.2011	Beating
BT_2863_Alticinae_sp_104	S321	KR424951	ECSF	U5	01.09.2011	Hand-Coll.(S)
BT_2864_Eumolpinae_sp_039	S321	KR424817	ECSF	U5	01.09.2011	Hand-Coll.(S)
BT_2865_Alticinae_sp_118	S321		ECSF	U5	01.09.2011	Hand-Coll.(S)
BT_2866_Alticinae_sp_118	S321		ECSF	U5	01.09.2011	Hand-Coll.(S)
BT_2867_Alticinae_sp_118	S321		ECSF	U5	01.09.2011	Hand-Coll.(S)
BT_2868_Alticinae_sp_118	S321		ECSF	U5	01.09.2011	Hand-Coll.(S)
BT_2869_Alticinae_sp_118	S321		ECSF	U5	01.09.2011	Hand-Coll.(S)
BT_2870_Alticinae_sp_118	S322	KR424952	ECSF	U6	01.09.2011	Sweep Netting
BT_2871_Alticinae_sp_213	S322	KR424953	ECSF	U6	01.09.2011	Sweep Netting
BT_2872_Alticinae_sp_064	S323	KR424954	ECSF	U6	01.09.2011	Beating
BT_2873_Alticinae_sp_053	S326	KR424955	Cajanuma	U1	06.09.2011	Beating
BT_2874_Alticinae_sp_094	S328		Cajanuma	U2	06.09.2011	Sweep Netting
BT_2876_Alticinae_sp_087	S334	KR424956	ECSF	U3	08.09.2011	Sweep Netting
BT_2877_Eumolpinae_sp_024	S335	KR424818	ECSF	U3	08.09.2011	Beating
BT_2878_Eumolpinae_sp_024	S335		ECSF	U3	08.09.2011	Beating
BT_2879_Alticinae_sp_164	S335	KR424957	ECSF	U3	08.09.2011	Beating
BT_2880_Eumolpinae_sp_060	S335	KR424819	ECSF	U3	08.09.2011	Beating
BT_2881_Alticinae_sp_085	S335	KR424958	ECSF	U3	08.09.2011	Beating
BT_2900_Alticinae_sp_245	S343	KR424959	Cajanuma	U4	14.09.2012	Sweep Netting
BT_2901_Alticinae_sp_244	S343	KR424960	Cajanuma	U4	14.09.2012	Sweep Netting
BT_2902_Alticinae_sp_208	S343	KR424961	Cajanuma	U4	14.09.2012	Sweep Netting
BT_2903_Eumolpinae_sp_071	S344	KR424820	Cajanuma	U4	14.09.2012	Beating
BT_2905_Alticinae_sp_245	S347	KR424962	Cajanuma	U5	14.09.2012	Beating
BT_2907_Alticinae_sp_191	S350	KR424963	Cajanuma	U6	14.09.2012	Beating
BT_2908_Alticinae_sp_258	S350	KR424964	Cajanuma	U6	14.09.2012	Beating
BT_2912_Galerucinae_sp_014	S353		ECSF	U1	19.09.2012	Beating
BT_2935_Galerucinae_sp_106	S362		Bombuscaro	U1	21.09.2012	Beating
BT_2938_Alticinae_sp_244	S364	KR424965	Cajanuma	L1	27.09.2012	Sweep Netting
BT_2939_Alticinae_sp_235	S364		Cajanuma	L1	27.09.2012	Sweep Netting
BT_2948_Galerucinae_sp_014	S373		ECSF	L4	29.09.2012	Sweep Netting
BT_2949_Hispinae_sp_007	S374		ECSF	L4	29.09.2012	Beating
BT_2954_Hispinae_sp_018	S374		ECSF	L4	29.09.2012	Beating
BT_2969_Eumolpinae_sp_013	S375		ECSF	L4	29.09.2012	Hand-Coll.(S)
BT_2999_Eumolpinae_sp_003	S379		ECSF	L6	29.09.2012	Sweep Netting
BT_3026_Galerucinae_sp_029	S382	KR425315	Bombuscaro	L4	04.10.2011	Sweep Netting
BT_3027_Alticinae_sp_173	S382	KR424966	Bombuscaro	L4	04.10.2011	Sweep Netting
BT_3028_Alticinae_sp_204	S382	KR424967	Bombuscaro	L4	04.10.2011	Sweep Netting
BT_3029_Eumolpinae_sp_017	S383		Bombuscaro	L4	04.10.2011	Beating
BT_3030_Alticinae_sp_193	S383	KR424968	Bombuscaro	L4	04.10.2011	Beating
BT_3031_Eumolpinae_sp_055	S385	KR424821	Bombuscaro	L5	04.10.2011	Sweep Netting
BT_3032_Galerucinae_sp_106	S385	KR425316	Bombuscaro	L5	04.10.2011	Sweep Netting
BT_3033_Alticinae_sp_254	S385	KR424969	Bombuscaro	L5	04.10.2011	Sweep Netting
BT_3034_Alticinae_sp_181	S385	KR424970	Bombuscaro	L5	04.10.2011	Sweep Netting
BT_3035_Galerucinae_sp_051	S386	KR425317	Bombuscaro	L5	04.10.2011	Beating
BT_3036_Alticinae_sp_042	S388	KR424971	Bombuscaro	L6	04.10.2011	Sweep Netting
BT_3037_Alticinae_sp_135	S388	KR424972	Bombuscaro	L6	04.10.2011	Sweep Netting
BT_3038_Galerucinae_sp_084	S389	KR425318	Bombuscaro	L6	04.10.2011	Beating
BT_3039_Eumolpinae_sp_040	S389	KR424822	Bombuscaro	L6	04.10.2011	Beating
BT_3040_Eumolpinae_sp_040	S389		Bombuscaro	L6	04.10.2011	Beating
BT_3041_Cassidinae_sp_017	S389	KR424785	Bombuscaro	L6	04.10.2011	Beating
BT_3060_Alticinae_sp_115	S394	KR424973	ECSF	U5	06.10.2011	Sweep Netting
BT_3061_Alticinae_sp_115	S394		ECSF	U5	06.10.2011	Sweep Netting
BT_3062_Alticinae_sp_249	S394	KR424974	ECSF	U5	06.10.2011	Sweep Netting
BT_3063_Alticinae_sp_249	S394		ECSF	U5	06.10.2011	Sweep Netting
BT_3064_Alticinae_sp_253	S394	KR424975	ECSF	U5	06.10.2011	Sweep Netting
BT_3065_Galerucinae_sp_034	S394	KR425319	ECSF	U5	06.10.2011	Sweep Netting
BT_3066_Alticinae_sp_147	S394	KR424976	ECSF	U5	06.10.2011	Sweep Netting
BT_3067_Alticinae_sp_147	S394		ECSF	U5	06.10.2011	Sweep Netting
BT_3068_Alticinae_sp_074	S394		ECSF	U5	06.10.2011	Sweep Netting
BT_3070_Eumolpinae_sp_038	S395	KR424823	ECSF	U5	06.10.2011	Beating
BT_3071_Eumolpinae_sp_038	S395		ECSF	U5	06.10.2011	Beating
BT_3072_Eumolpinae_sp_038	S395		ECSF	U5	06.10.2011	Beating
BT_3073_Eumolpinae_sp_038	S395		ECSF	U5	06.10.2011	Beating
BT_3074_Alticinae_sp_096	S395	KR424977	ECSF	U5	06.10.2011	Beating
BT_3075_Alticinae_sp_096	S395		ECSF	U5	06.10.2011	Beating
BT_3076_Criocerinae_sp_001	S395	KR425413	ECSF	U5	06.10.2011	Beating
BT_3077_Alticinae_sp_064	S395		ECSF	U5	06.10.2011	Beating
BT_3079_Alticinae_sp_104	S397	KR424978	ECSF	U6	06.10.2011	Sweep Netting
BT_3080_Alticinae_sp_112	S397	KR424979	ECSF	U6	06.10.2011	Sweep Netting
BT_3081_Alticinae_sp_205	S397	KR424980	ECSF	U6	06.10.2011	Sweep Netting
BT_3082_Galerucinae_sp_012	S397	KR425320	ECSF	U6	06.10.2011	Sweep Netting
BT_3083_Alticinae_sp_096	S397	KR424981	ECSF	U6	06.10.2011	Sweep Netting
BT_3084_Alticinae_sp_062	S397	KR424982	ECSF	U6	06.10.2011	Sweep Netting
BT_3085_Alticinae_sp_064	S397	KR424983	ECSF	U6	06.10.2011	Sweep Netting
BT_3086_Alticinae_sp_115	S397	KR424984	ECSF	U6	06.10.2011	Sweep Netting
BT_3087_Eumolpinae_sp_038	S397	KR424824	ECSF	U6	06.10.2011	Sweep Netting
BT_3088_Alticinae_sp_061	S397	KR424985	ECSF	U6	06.10.2011	Sweep Netting
BT_3089_Eumolpinae_sp_034	S397	KR424825	ECSF	U6	06.10.2011	Sweep Netting

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SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_3090_Eumolpinae_sp_065	S398	KR424826	ECSF	U6	06.10.2011	Beating
BT_3091_Eumolpinae_sp_065	S398		ECSF	U6	06.10.2011	Beating
BT_3092_Eumolpinae_sp_002	S398	KR424827	ECSF	U6	06.10.2011	Beating
BT_3093_Alticinae_sp_051	S398	KR424986	ECSF	U6	06.10.2011	Beating
BT_3094_Alticinae_sp_051	S398		ECSF	U6	06.10.2011	Beating
BT_3095_Alticinae_sp_254	S398	KR424987	ECSF	U6	06.10.2011	Beating
BT_3097_Eumolpinae_sp_038	S399	KR424828	ECSF	U6	06.10.2011	Hand-Coll.(S)
BT_3098_Eumolpinae_sp_038	S399		ECSF	U6	06.10.2011	Hand-Coll.(S)
BT_3099_Eumolpinae_sp_038	S399		ECSF	U6	06.10.2011	Hand-Coll.(S)
BT_3100_Alticinae_sp_172	S400	KR424988	Cajanuma	L4	11.10.2011	Sweep Netting
BT_3101_Alticinae_sp_245	S400	KR424989	Cajanuma	L4	11.10.2011	Sweep Netting
BT_3102_Alticinae_sp_244	S403	KR424990	Cajanuma	L5	11.10.2011	Sweep Netting
BT_3103_Alticinae_sp_121	S404		Cajanuma	L5	11.10.2011	Beating
BT_3104_Alticinae_sp_244	S404	KR424991	Cajanuma	L5	11.10.2011	Beating
BT_3105_Alticinae_sp_244	S404		Cajanuma	L5	11.10.2011	Beating
BT_3106_Alticinae_sp_171	S407	KR424992	Cajanuma	L6	11.10.2011	Beating
BT_3107_Galerucinae_sp_066	S407	KR425321	Cajanuma	L6	11.10.2011	Beating
BT_3108_Alticinae_sp_001	S409	KR424993	ECSF	U1	13.10.2011	Sweep Netting
BT_3109_Galerucinae_sp_109	S409		ECSF	U1	13.10.2011	Sweep Netting
BT_3110_Galerucinae_sp_048	S409	KR425322	ECSF	U1	13.10.2011	Sweep Netting
BT_3111_Alticinae_sp_065	S409	KR424994	ECSF	U1	13.10.2011	Sweep Netting
BT_3112_Alticinae_sp_197	S409	KR424995	ECSF	U1	13.10.2011	Sweep Netting
BT_3113_Alticinae_sp_150	S409	KR424996	ECSF	U1	13.10.2011	Sweep Netting
BT_3114_Alticinae_sp_150	S409	KR424997	ECSF	U1	13.10.2011	Sweep Netting
BT_3115_Galerucinae_sp_098	S409	KR425323	ECSF	U1	13.10.2011	Sweep Netting
BT_3116_Galerucinae_sp_098	S409		ECSF	U1	13.10.2011	Sweep Netting
BT_3117_Alticinae_sp_163	S409	KR424998	ECSF	U1	13.10.2011	Sweep Netting
BT_3118_Alticinae_sp_178	S409	KR424999	ECSF	U1	13.10.2011	Sweep Netting
BT_3120_Galerucinae_sp_098	S410		ECSF	U1	13.10.2011	Beating
BT_3121_Hispinae_sp_025	S410	KR424795	ECSF	U1	13.10.2011	Beating
BT_3122_Alticinae_sp_005	S410		ECSF	U1	13.10.2011	Beating
BT_3123_Eumolpinae_sp_065	S410		ECSF	U1	13.10.2011	Beating
BT_3124_Alticinae_sp_087	S410	KR425000	ECSF	U1	13.10.2011	Beating
BT_3125_Alticinae_sp_065	S410		ECSF	U1	13.10.2011	Beating
BT_3126_Eumolpinae_sp_039	S410	KR424829	ECSF	U1	13.10.2011	Beating
BT_3127_Eumolpinae_sp_039	S410		ECSF	U1	13.10.2011	Beating
BT_3128_Eumolpinae_sp_039	S410		ECSF	U1	13.10.2011	Beating
BT_3143_Galerucinae_sp_017	S415		ECSF	L1	18.10.2011	Sweep Netting
BT_3157_Galerucinae_sp_024	S415		ECSF	L1	18.10.2011	Sweep Netting
BT_3177_Galerucinae_sp_017	S418		ECSF	L3	18.10.2011	Sweep Netting
BT_3191_Galerucinae_sp_017	S420		ECSF	L3	18.10.2011	Hand-Coll.(S)
BT_3197_Alticinae_sp_228	S422		Cajanuma	U1	20.10.2011	Beating
BT_3198_Alticinae_sp_119	S422		Cajanuma	U1	20.10.2011	Beating
BT_3200_Galerucinae_sp_073	S424	KR425324	Cajanuma	U2	20.10.2011	Sweep Netting
BT_3201_Alticinae_sp_255	S425	KR425001	Cajanuma	U2	20.10.2011	Beating
BT_3202_Alticinae_sp_184	S425	KR425002	Cajanuma	U2	20.10.2011	Beating
BT_3203_Galerucinae_sp_073	S427	KR425325	Cajanuma	U3	20.10.2011	Sweep Netting
BT_3204_Alticinae_sp_172	S427	KR425003	Cajanuma	U3	20.10.2011	Sweep Netting
BT_3205_Eumolpinae_sp_052	S427	KR424830	Cajanuma	U3	20.10.2011	Sweep Netting
BT_3206_Alticinae_sp_245	S428	KR425004	Cajanuma	U3	20.10.2011	Beating
BT_3207_Alticinae_sp_197	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3208_Alticinae_sp_197	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3209_Alticinae_sp_123	S430	KR425005	ECSF	L4	24.10.2011	Sweep Netting
BT_3210_Galerucinae_sp_066	S430	KR425326	ECSF	L4	24.10.2011	Sweep Netting
BT_3211_Alticinae_sp_052	S430	KR425006	ECSF	L4	24.10.2011	Sweep Netting
BT_3212_Criocerinae_sp_001	S430	KR425414	ECSF	L4	24.10.2011	Sweep Netting
BT_3213_Eumolpinae_sp_040	S430	KR424831	ECSF	L4	24.10.2011	Sweep Netting
BT_3214_Eumolpinae_sp_014	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3215_Eumolpinae_sp_014	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3216_Galerucinae_sp_104	S430	KR425327	ECSF	L4	24.10.2011	Sweep Netting
BT_3217_Alticinae_sp_087	S430	KR425007	ECSF	L4	24.10.2011	Sweep Netting
BT_3218_Alticinae_sp_087	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3219_Alticinae_sp_087	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3220_Galerucinae_sp_034	S430	KR425328	ECSF	L4	24.10.2011	Sweep Netting
BT_3221_Galerucinae_sp_034	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3222_Galerucinae_sp_034	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3223_Galerucinae_sp_034	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3224_Galerucinae_sp_034	S430		ECSF	L4	24.10.2011	Sweep Netting
BT_3225_Galerucinae_sp_025	S431	KR425329	ECSF	L4	24.10.2011	Beating
BT_3226_Galerucinae_sp_025	S431	KR425330	ECSF	L4	24.10.2011	Beating
BT_3227_Galerucinae_sp_025	S431		ECSF	L4	24.10.2011	Beating
BT_3228_Galerucinae_sp_025	S431		ECSF	L4	24.10.2011	Beating
BT_3229_Galerucinae_sp_025	S431		ECSF	L4	24.10.2011	Beating
BT_3230_Alticinae_sp_052	S431	KR425008	ECSF	L4	24.10.2011	Beating
BT_3231_Alticinae_sp_052	S431		ECSF	L4	24.10.2011	Beating
BT_3232_Alticinae_sp_064	S431	KR425009	ECSF	L4	24.10.2011	Beating
BT_3233_Alticinae_sp_097	S431	KR425010	ECSF	L4	24.10.2011	Beating
BT_3234_Eumolpinae_sp_038	S431		ECSF	L4	24.10.2011	Beating
BT_3235_Alticinae_sp_018	S431	KR425011	ECSF	L4	24.10.2011	Beating
BT_3236_Galerucinae_sp_034	S431	KR425331	ECSF	L4	24.10.2011	Beating
BT_3237_Galerucinae_sp_034	S431		ECSF	L4	24.10.2011	Beating
BT_3238_Galerucinae_sp_034	S431		ECSF	L4	24.10.2011	Beating
BT_3239_Galerucinae_sp_034	S431		ECSF	L4	24.10.2011	Beating
BT_3241_Alticinae_sp_097	S432		ECSF	L4	24.10.2011	Hand-Coll.(S)
BT_3242_Galerucinae_sp_025	S432	KR425332	ECSF	L4	24.10.2011	Hand-Coll.(S)
BT_3243_Alticinae_sp_240	S432	KR425012	ECSF	L4	24.10.2011	Hand-Coll.(S)
BT_3244_Alticinae_sp_052	S432	KR425013	ECSF	L4	24.10.2011	Hand-Coll.(S)
BT_3248_Alticinae_sp_116	S432	KR425014	ECSF	L4	24.10.2011	Hand-Coll.(S)
BT_3249_Galerucinae_sp_034	S432	KR425333	ECSF	L4	24.10.2011	Hand-Coll.(S)
BT_3250_Galerucinae_sp_034	S432		ECSF	L4	24.10.2011	Hand-Coll.(S)
BT_3251_Galerucinae_sp_034	S432		ECSF	L4	24.10.2011	Hand-Coll.(S)
BT_3252_Galerucinae_sp_034	S432		ECSF	L4	24.10.2011	Hand-Coll.(S)
BT_3253_Alticinae_sp_115	S433	KR425015	ECSF	L5	24.10.2011	Sweep Netting
BT_3254_Alticinae_sp_115	S433		ECSF	L5	24.10.2011	Sweep Netting
BT_3255_Galerucinae_sp_061	S433	KR425334	ECSF	L5	24.10.2011	Sweep Netting
BT_3256_Galerucinae_sp_092	S433	KR425335	ECSF	L5	24.10.2011	Sweep Netting
BT_3257_Alticinae_sp_212	S433	KR425016	ECSF	L5	24.10.2011	Sweep Netting
BT_3258_Galerucinae_sp_066	S433	KR425336	ECSF	L5	24.10.2011	Sweep Netting
BT_3259_Galerucinae_sp_066	S433		ECSF	L5	24.10.2011	Sweep Netting
BT_3260_Alticinae_sp_109	S433	KR425017	ECSF	L5	24.10.2011	Sweep Netting
BT_3261_Alticinae_sp_029	S433		ECSF	L5	24.10.2011	Sweep Netting
BT_3262_Alticinae_sp_042	S434	KR425018	ECSF	L5	24.10.2011	Beating
BT_3263_Eumolpinae_sp_040	S434	KR424832	ECSF	L5	24.10.2011	Beating
BT_3264_Galerucinae_sp_026	S434	KR425337	ECSF	L5	24.10.2011	Beating
BT_3265_Eumolpinae_sp_042	S434	KR424833	ECSF	L5	24.10.2011	Beating
BT_3266_Galerucinae_sp_021	S434	KR425338	ECSF	L5	24.10.2011	Beating
BT_3266a_Alticinae_sp_112	S434		ECSF	L5	24.10.2011	Beating
BT_3267_Galerucinae_sp_098	S435	KR425339	ECSF	L5	24.10.2011	Hand-Coll.(S)
BT_3268_Alticinae_sp_170	S435	KR425019	ECSF	L5	24.10.2011	Hand-Coll.(S)
BT_3269_Alticinae_sp_111	S436		ECSF	L6	24.10.2011	Sweep Netting
BT_3270_Alticinae_sp_092	S436	KR425020	ECSF	L6	24.10.2011	Sweep Netting
BT_3271_Alticinae_sp_202	S436	KR425021	ECSF	L6	24.10.2011	Sweep Netting
BT_3272_Alticinae_sp_096	S436		ECSF	L6	24.10.2011	Sweep Netting
BT_3273_Galerucinae_sp_034	S436	KR425340	ECSF	L6	24.10.2011	Sweep Netting
BT_3274_Alticinae_sp_087	S437	KR425022	ECSF	L6	24.10.2011	Beating

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SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_3275_Alticinae_sp_087	S437		ECSF	L6	24.10.2011	Beating
BT_3276_Alticinae_sp_087	S437		ECSF	L6	24.10.2011	Beating
BT_3277_Eumolpinae_sp_039	S437	KR424834	ECSF	L6	24.10.2011	Beating
BT_3278_Galerucinae_sp_061	S437	KR425341	ECSF	L6	24.10.2011	Beating
BT_3279_Alticinae_sp_061	S438	KR425023	ECSF	L6	24.10.2011	Hand-Coll.(S)
BT_3280_Alticinae_sp_051	S439		Bombuscaro	U3	01.11.2011	Sweep Netting
BT_3281_Alticinae_sp_051	S439		Bombuscaro	U3	01.11.2011	Sweep Netting
BT_3282_Eumolpinae_sp_024	S439	KR424835	Bombuscaro	U3	01.11.2011	Sweep Netting
BT_3283_Eumolpinae_sp_024	S440		Bombuscaro	U3	01.11.2011	Beating
BT_3284_Alticinae_sp_260	S440	KR425024	Bombuscaro	U3	01.11.2011	Beating
BT_3299_Eumolpinae_sp_039	S449	KR424836	ECSF	L2	03.11.2011	Beating
BT_3300_Eumolpinae_sp_039	S449		ECSF	L2	03.11.2011	Beating
BT_3301_Alticinae_sp_260	S449		ECSF	L2	03.11.2011	Beating
BT_3302_Alticinae_sp_260	S449		ECSF	L2	03.11.2011	Beating
BT_3303_Hispinae_sp_005	S449	KR424796	ECSF	L2	03.11.2011	Beating
BT_3304_Alticinae_sp_260	S449	KR425025	ECSF	L2	03.11.2011	Beating
BT_3305_Galerucinae_sp_028	S451	KR425342	Bombuscaro	U4	08.11.2011	Sweep Netting
BT_3306_Alticinae_sp_254	S451	KR425026	Bombuscaro	U4	08.11.2011	Sweep Netting
BT_3307_Alticinae_sp_181	S451	KR425027	Bombuscaro	U4	08.11.2011	Sweep Netting
BT_3308_Alticinae_sp_051	S452	KR425028	Bombuscaro	U4	08.11.2011	Beating
BT_3309_Alticinae_sp_051	S452	KR425029	Bombuscaro	U4	08.11.2011	Beating
BT_3310_Alticinae_sp_063	S452	KR425030	Bombuscaro	U4	08.11.2011	Beating
BT_3311_Galerucinae_sp_015	S452	KR425343	Bombuscaro	U4	08.11.2011	Beating
BT_3312_Eumolpinae_sp_042	S452	KR424837	Bombuscaro	U4	08.11.2011	Beating
BT_3313_Eumolpinae_sp_055	S452	KR424838	Bombuscaro	U4	08.11.2011	Beating
BT_3314_Eumolpinae_sp_042	S452	KR424839	Bombuscaro	U4	08.11.2011	Beating
BT_3316_Alticinae_sp_117	S453	KR425031	Bombuscaro	U4	08.11.2011	Hand-Coll.(S)
BT_3317_Eumolpinae_sp_051	S454	KR424840	Bombuscaro	U5	08.11.2011	Sweep Netting
BT_3318_Alticinae_sp_210	S454	KR425032	Bombuscaro	U5	08.11.2011	Sweep Netting
BT_3319_Alticinae_sp_173	S454	KR425033	Bombuscaro	U5	08.11.2011	Sweep Netting
BT_3320_Galerucinae_sp_078	S454	KR425344	Bombuscaro	U5	08.11.2011	Sweep Netting
BT_3321_Alticinae_sp_035	S454	KR425034	Bombuscaro	U5	08.11.2011	Sweep Netting
BT_3322_Eumolpinae_sp_042	S455	KR424841	Bombuscaro	U5	08.11.2011	Beating
BT_3323_Eumolpinae_sp_042	S455		Bombuscaro	U5	08.11.2011	Beating
BT_3324_Eumolpinae_sp_042	S455		Bombuscaro	U5	08.11.2011	Beating
BT_3325_Galerucinae_sp_086	S455	KR425345	Bombuscaro	U5	08.11.2011	Beating
BT_3326_Eumolpinae_sp_017	S455		Bombuscaro	U5	08.11.2011	Beating
BT_3327_Eumolpinae_sp_050	S456	KR424842	Bombuscaro	U5	08.11.2011	Hand-Coll.(S)
BT_3328_Alticinae_sp_210	S457	KR425035	Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3329_Alticinae_sp_210	S457		Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3330_Alticinae_sp_210	S457		Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3331_Alticinae_sp_210	S457		Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3332_Alticinae_sp_035	S457	KR425036	Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3333_Alticinae_sp_253	S457	KR425037	Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3334_Alticinae_sp_052	S457	KR425038	Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3335_Galerucinae_sp_045	S457	KR425346	Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3336_Galerucinae_sp_045	S457		Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3337_Eumolpinae_sp_040	S457	KR424843	Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3338_Eumolpinae_sp_050	S457	KR424844	Bombuscaro	U6	08.11.2011	Sweep Netting
BT_3339_Alticinae_sp_127	S458	KR425039	Bombuscaro	U6	08.11.2011	Beating
BT_3340_Eumolpinae_sp_053	S458		Bombuscaro	U6	08.11.2011	Beating
BT_3341_Alticinae_sp_181	S458	KR425040	Bombuscaro	U6	08.11.2011	Beating
BT_3342_Alticinae_sp_169	S458	KR425041	Bombuscaro	U6	08.11.2011	Beating
BT_3343_Alticinae_sp_076	S458	KR425042	Bombuscaro	U6	08.11.2011	Beating
BT_3344_Alticinae_sp_076	S458		Bombuscaro	U6	08.11.2011	Beating
BT_3345_Alticinae_sp_076	S458	KR425043	Bombuscaro	U6	08.11.2011	Beating
BT_3346_Cassidinae_sp_016	S459	KR424786	Bombuscaro	U6	08.11.2011	Hand-Coll.(S)
BT_3347_Galerucinae_sp_108	S459	KR425347	Bombuscaro	U6	08.11.2011	Hand-Coll.(S)
BT_3348_Cassidinae_sp_018	S459	KR424787	Bombuscaro	U6	08.11.2011	Hand-Coll.(S)
BT_3349_Eumolpinae_sp_052	S461		Cajanuma	U4	10.11.2011	Beating
BT_3350_Hispinae_sp_014	S462	KR424797	Cajanuma	U4	10.11.2011	Hand-Coll.(S)
BT_3351_Alticinae_sp_255	S464	KR425044	Cajanuma	U5	10.11.2011	Beating
BT_3352_Alticinae_sp_236	S464		Cajanuma	U5	10.11.2011	Beating
BT_3353_Eumolpinae_sp_054	S464		Cajanuma	U5	10.11.2011	Beating
BT_3354_Alticinae_sp_172	S466	KR425045	Cajanuma	U6	10.11.2011	Sweep Netting
BT_3355_Eumolpinae_sp_054	S466		Cajanuma	U6	10.11.2011	Sweep Netting
BT_3356_Eumolpinae_sp_054	S466		Cajanuma	U6	10.11.2011	Sweep Netting
BT_3357_Alticinae_sp_057	S469	KR425046	Bombuscaro	U1	15.11.2011	Sweep Netting
BT_3358_Alticinae_sp_057	S469		Bombuscaro	U1	15.11.2011	Sweep Netting
BT_3359_Galerucinae_sp_074	S469	KR425348	Bombuscaro	U1	15.11.2011	Sweep Netting
BT_3360_Galerucinae_sp_089	S469	KR425349	Bombuscaro	U1	15.11.2011	Sweep Netting
BT_3361_Alticinae_sp_009	S469	KR425047	Bombuscaro	U1	15.11.2011	Sweep Netting
BT_3362_Eumolpinae_sp_046	S469	KR424845	Bombuscaro	U1	15.11.2011	Sweep Netting
BT_3363_Alticinae_sp_106	S469	KR425048	Bombuscaro	U1	15.11.2011	Sweep Netting
BT_3364_Eumolpinae_sp_024	S470	KR424846	Bombuscaro	U1	15.11.2011	Beating
BT_3365_Eumolpinae_sp_024	S470		Bombuscaro	U1	15.11.2011	Beating
BT_3366_Alticinae_sp_152	S470	KR425049	Bombuscaro	U1	15.11.2011	Beating
BT_3367_Alticinae_sp_051	S470	KR425050	Bombuscaro	U1	15.11.2011	Beating
BT_3368_Alticinae_sp_051	S470		Bombuscaro	U1	15.11.2011	Beating
BT_3369_Alticinae_sp_051	S472	KR425051	Bombuscaro	U2	15.11.2011	Sweep Netting
BT_3370_Alticinae_sp_051	S472		Bombuscaro	U2	15.11.2011	Sweep Netting
BT_3371_Alticinae_sp_051	S472		Bombuscaro	U2	15.11.2011	Sweep Netting
BT_3372_Alticinae_sp_051	S472		Bombuscaro	U2	15.11.2011	Sweep Netting
BT_3373_Eumolpinae_sp_064	S472	KR424847	Bombuscaro	U2	15.11.2011	Sweep Netting
BT_3374_Eumolpinae_sp_072	S472		Bombuscaro	U2	15.11.2011	Sweep Netting
BT_3375_Eumolpinae_sp_024	S473	KR424848	Bombuscaro	U2	15.11.2011	Beating
BT_3376_Eumolpinae_sp_024	S473		Bombuscaro	U2	15.11.2011	Beating
BT_3377_Eumolpinae_sp_024	S473		Bombuscaro	U2	15.11.2011	Beating
BT_3378_Eumolpinae_sp_024	S473		Bombuscaro	U2	15.11.2011	Beating
BT_3379_Eumolpinae_sp_062	S475	KR424849	Bombuscaro	U3	15.11.2011	Sweep Netting
BT_3380_Galerucinae_sp_074	S475	KR425350	Bombuscaro	U3	15.11.2011	Sweep Netting
BT_3381_Galerucinae_sp_074	S475		Bombuscaro	U3	15.11.2011	Sweep Netting
BT_3382_Galerucinae_sp_055	S475	KR425351	Bombuscaro	U3	15.11.2011	Sweep Netting
BT_3383_Eumolpinae_sp_024	S475	KR424850	Bombuscaro	U3	15.11.2011	Sweep Netting
BT_3384_Alticinae_sp_152	S475	KR425052	Bombuscaro	U3	15.11.2011	Sweep Netting
BT_3385_Alticinae_sp_051	S475	KR425053	Bombuscaro	U3	15.11.2011	Sweep Netting
BT_3386_Hispinae_sp_011	S476	KR424798	Bombuscaro	U3	15.11.2011	Beating
BT_3387_Eumolpinae_sp_024	S476	KR424851	Bombuscaro	U3	15.11.2011	Beating
BT_3388_Eumolpinae_sp_024	S476	KR424852	Bombuscaro	U3	15.11.2011	Beating
BT_3389_Eumolpinae_sp_064	S476	KR424853	Bombuscaro	U3	15.11.2011	Beating
BT_3390_Alticinae_sp_104	S478	KR425054	ECSF	U4	17.11.2011	Sweep Netting
BT_3391_Alticinae_sp_052	S478	KR425055	ECSF	U4	17.11.2011	Sweep Netting
BT_3392_Alticinae_sp_052	S478		ECSF	U4	17.11.2011	Sweep Netting
BT_3393_Alticinae_sp_118	S478	KR425056	ECSF	U4	17.11.2011	Sweep Netting
BT_3394_Alticinae_sp_118	S478		ECSF	U4	17.11.2011	Sweep Netting
BT_3395_Alticinae_sp_118	S478		ECSF	U4	17.11.2011	Sweep Netting
BT_3396_Alticinae_sp_118	S478		ECSF	U4	17.11.2011	Sweep Netting
BT_3398_Eumolpinae_sp_039	S479		ECSF	U4	17.11.2011	Beating
BT_3399_Eumolpinae_sp_039	S479		ECSF	U4	17.11.2011	Beating
BT_3400_Eumolpinae_sp_039	S479		ECSF	U4	17.11.2011	Beating
BT_3401_Eumolpinae_sp_039	S479		ECSF	U4	17.11.2011	Beating
BT_3402_Eumolpinae_sp_039	S479		ECSF	U4	17.11.2011	Beating
BT_3403_Eumolpinae_sp_030	S479	KR424854	ECSF	U4	17.11.2011	Beating
BT_3405_Eumolpinae_sp_039	S480	KR424855	ECSF	U4	17.11.2011	Hand-Coll.(S)
BT_3406_Eumolpinae_sp_039	S480		ECSF	U4	17.11.2011	Hand-Coll.(S)

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SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_3407_Alticinae_sp_118	S480	KR425057	ECSF	U4	17.11.2011	Hand-Coll.(S)
BT_3408_Alticinae_sp_104	S481	KR425058	ECSF	U5	17.11.2011	Sweep Netting
BT_3409_Alticinae_sp_113	S481	KR425059	ECSF	U5	17.11.2011	Sweep Netting
BT_3410_Alticinae_sp_131	S481		ECSF	U5	17.11.2011	Sweep Netting
BT_3411_Alticinae_sp_118	S481		ECSF	U5	17.11.2011	Sweep Netting
BT_3412_Eumolpinae_sp_039	S482		ECSF	U5	17.11.2011	Beating
BT_3413_Eumolpinae_sp_039	S482		ECSF	U5	17.11.2011	Beating
BT_3414_Eumolpinae_sp_039	S482		ECSF	U5	17.11.2011	Beating
BT_3415_Eumolpinae_sp_039	S482		ECSF	U5	17.11.2011	Beating
BT_3416_Alticinae_sp_118	S484		ECSF	U6	17.11.2011	Sweep Netting
BT_3417_Alticinae_sp_118	S484		ECSF	U6	17.11.2011	Sweep Netting
BT_3418_Alticinae_sp_118	S484		ECSF	U6	17.11.2011	Sweep Netting
BT_3419_Alticinae_sp_118	S484		ECSF	U6	17.11.2011	Sweep Netting
BT_3420_Alticinae_sp_118	S484		ECSF	U6	17.11.2011	Sweep Netting
BT_3421_Alticinae_sp_118	S484		ECSF	U6	17.11.2011	Sweep Netting
BT_3422_Alticinae_sp_118	S484		ECSF	U6	17.11.2011	Sweep Netting
BT_3423_Eumolpinae_sp_029	S485	KR424856	ECSF	U6	17.11.2011	Beating
BT_3424_Alticinae_sp_118	S485		ECSF	U6	17.11.2011	Beating
BT_3425_Alticinae_sp_104	S486	KR425060	ECSF	U6	17.11.2011	Hand-Coll.(S)
BT_3426_Galerucinae_sp_105	S488	KR425352	Cajanuma	L4	21.11.2011	Beating
BT_3427_Alticinae_sp_172	S490	KR425061	Cajanuma	L5	21.11.2011	Sweep Netting
BT_3428_Hispinae_sp_025	S490	KR424799	Cajanuma	L5	21.11.2011	Sweep Netting
BT_3429_Galerucinae_sp_066	S490	KR425353	Cajanuma	L5	21.11.2011	Sweep Netting
BT_3430_Alticinae_sp_172	S491	KR425062	Cajanuma	L5	21.11.2011	Beating
BT_3431_Alticinae_sp_248	S493	KR425063	Cajanuma	L6	21.11.2011	Sweep Netting
BT_3432_Alticinae_sp_209	S493	KR425064	Cajanuma	L6	21.11.2011	Sweep Netting
BT_3433_Eumolpinae_sp_071	S494	KR424857	Cajanuma	L6	21.11.2011	Beating
BT_3434_Alticinae_sp_187	S494	KR425065	Cajanuma	L6	21.11.2011	Beating
BT_3435_Eumolpinae_sp_019	S496	KR424858	ECSF	L1	23.11.2011	Sweep Netting
BT_3436_Galerucinae_sp_061	S496	KR425354	ECSF	L1	23.11.2011	Sweep Netting
BT_3437_Galerucinae_sp_061	S496		ECSF	L1	23.11.2011	Sweep Netting
BT_3438_Galerucinae_sp_031	S496	KR425355	ECSF	L1	23.11.2011	Sweep Netting
BT_3439_Alticinae_sp_018	S496		ECSF	L1	23.11.2011	Sweep Netting
BT_3440_Alticinae_sp_117	S496		ECSF	L1	23.11.2011	Sweep Netting
BT_3441_Alticinae_sp_174	S496	KR425066	ECSF	L1	23.11.2011	Sweep Netting
BT_3442_Alticinae_sp_207	S496		ECSF	L1	23.11.2011	Sweep Netting
BT_3443_Alticinae_sp_207	S496		ECSF	L1	23.11.2011	Sweep Netting
BT_3444_Alticinae_sp_064	S496		ECSF	L1	23.11.2011	Sweep Netting
BT_3445_Alticinae_sp_092	S496	KR425067	ECSF	L1	23.11.2011	Sweep Netting
BT_3446_Alticinae_sp_083	S496		ECSF	L1	23.11.2011	Sweep Netting
BT_3447_Alticinae_sp_150	S497	KR425068	ECSF	L1	23.11.2011	Beating
BT_3448_Alticinae_sp_117	S497	KR425069	ECSF	L1	23.11.2011	Beating
BT_3449_Alticinae_sp_002	S497	KR425070	ECSF	L1	23.11.2011	Beating
BT_3450_Alticinae_sp_087	S497	KR425071	ECSF	L1	23.11.2011	Beating
BT_3451_Alticinae_sp_087	S497		ECSF	L1	23.11.2011	Beating
BT_3452_Alticinae_sp_065	S497	KR425072	ECSF	L1	23.11.2011	Beating
BT_3453_Galerucinae_sp_061	S497	KR425356	ECSF	L1	23.11.2011	Beating
BT_3454_Galerucinae_sp_061	S497		ECSF	L1	23.11.2011	Beating
BT_3455_Galerucinae_sp_031	S499	KR425357	ECSF	L3	23.11.2011	Sweep Netting
BT_3456_Alticinae_sp_266	S499	KR425073	ECSF	L3	23.11.2011	Sweep Netting
BT_3457_Hispinae_sp_003	S499	KR424800	ECSF	L3	23.11.2011	Sweep Netting
BT_3458_Eumolpinae_sp_039	S499	KR424859	ECSF	L3	23.11.2011	Sweep Netting
BT_3459_Alticinae_sp_150	S499	KR425074	ECSF	L3	23.11.2011	Sweep Netting
BT_3460_Alticinae_sp_096	S499	KR425075	ECSF	L3	23.11.2011	Sweep Netting
BT_3461_Alticinae_sp_162	S499		ECSF	L3	23.11.2011	Sweep Netting
BT_3462_Chrysomelinae_sp_001	S499	KR424781	ECSF	L3	23.11.2011	Sweep Netting
BT_3463_Alticinae_sp_109	S499	KR425076	ECSF	L3	23.11.2011	Sweep Netting
BT_3464_Alticinae_sp_071	S499		ECSF	L3	23.11.2011	Sweep Netting
BT_3465_Alticinae_sp_071	S499	KR425077	ECSF	L3	23.11.2011	Sweep Netting
BT_3466_Alticinae_sp_190	S499		ECSF	L3	23.11.2011	Sweep Netting
BT_3467_Alticinae_sp_190	S499		ECSF	L3	23.11.2011	Sweep Netting
BT_3468_Alticinae_sp_197	S499	KR425078	ECSF	L3	23.11.2011	Sweep Netting
BT_3471_Galerucinae_sp_002	S500	KR425358	ECSF	L3	23.11.2011	Beating
BT_3472_Galerucinae_sp_002	S500		ECSF	L3	23.11.2011	Beating
BT_3473_Alticinae_sp_109	S500	KR425079	ECSF	L3	23.11.2011	Beating
BT_3474_Alticinae_sp_197	S500	KR425080	ECSF	L3	23.11.2011	Beating
BT_3475_Galerucinae_sp_104	S501	KR425359	ECSF	L3	23.11.2011	Hand-Coll.(S)
BT_3476_Eumolpinae_sp_065	S501		ECSF	L3	23.11.2011	Hand-Coll.(S)
BT_3477_Alticinae_sp_198	S501	KR425081	ECSF	L3	23.11.2011	Hand-Coll.(S)
BT_3478_Alticinae_sp_104	S502	KR425082	ECSF	U3	23.11.2011	Sweep Netting
BT_3479_Alticinae_sp_065	S502	KR425083	ECSF	U3	23.11.2011	Sweep Netting
BT_3480_Galerucinae_sp_061	S502	KR425360	ECSF	U3	23.11.2011	Sweep Netting
BT_3481_Alticinae_sp_064	S502	KR425084	ECSF	U3	23.11.2011	Sweep Netting
BT_3482_Galerucinae_sp_054	S502		ECSF	U3	23.11.2011	Sweep Netting
BT_3483_Alticinae_sp_123	S502		ECSF	U3	23.11.2011	Sweep Netting
BT_3484_Alticinae_sp_123	S502		ECSF	U3	23.11.2011	Sweep Netting
BT_3485_Alticinae_sp_249	S502	KR425085	ECSF	U3	23.11.2011	Sweep Netting
BT_3486_Alticinae_sp_198	S502	KR425086	ECSF	U3	23.11.2011	Sweep Netting
BT_3487_Alticinae_sp_111	S502		ECSF	U3	23.11.2011	Sweep Netting
BT_3488_Alticinae_sp_176	S503	KR425087	ECSF	U3	23.11.2011	Beating
BT_3489_Galerucinae_sp_066	S503	KR425361	ECSF	U3	23.11.2011	Beating
BT_3490_Galerucinae_sp_066	S503	KR425362	ECSF	U3	23.11.2011	Beating
BT_3491_Galerucinae_sp_066	S503		ECSF	U3	23.11.2011	Beating
BT_3492_Galerucinae_sp_066	S503		ECSF	U3	23.11.2011	Beating
BT_3493_Alticinae_sp_249	S503	KR425088	ECSF	U3	23.11.2011	Beating
BT_3494_Alticinae_sp_249	S503		ECSF	U3	23.11.2011	Beating
BT_3495_Cassidinae_sp_012	S504	KR424788	ECSF	U3	23.11.2011	Hand-Coll.(S)
BT_3496_Alticinae_sp_104	S505	KR425089	ECSF	U2	28.11.2011	Sweep Netting
BT_3497_Alticinae_sp_061	S505	KR425090	ECSF	U2	28.11.2011	Sweep Netting
BT_3498_Alticinae_sp_260	S505		ECSF	U2	28.11.2011	Sweep Netting
BT_3499_Alticinae_sp_005	S506	KR425091	ECSF	U2	28.11.2011	Beating
BT_3500_Galerucinae_sp_066	S506	KR425363	ECSF	U2	28.11.2011	Beating
BT_3501_Galerucinae_sp_094	S506	KR425364	ECSF	U2	28.11.2011	Beating
BT_3502_Eumolpinae_sp_017	S506		ECSF	U2	28.11.2011	Beating
BT_3503_Eumolpinae_sp_039	S506	KR424860	ECSF	U2	28.11.2011	Beating
BT_3504_Alticinae_sp_019	S506	KR425092	ECSF	U2	28.11.2011	Beating
BT_3505_Alticinae_sp_109	S506	KR425093	ECSF	U2	28.11.2011	Beating
BT_3506_Alticinae_sp_008	S506	KR425094	ECSF	U2	28.11.2011	Beating
BT_3507_Alticinae_sp_254	S507		ECSF	U2	28.11.2011	Hand-Coll.(S)
BT_3508_Alticinae_sp_118	S507		ECSF	U2	28.11.2011	Hand-Coll.(S)
BT_3509_Alticinae_sp_073	S508		Bombuscaro	L1	30.11.2011	Sweep Netting
BT_3510_Eumolpinae_sp_024	S508	KR424861	Bombuscaro	L1	30.11.2011	Sweep Netting
BT_3511_Galerucinae_sp_079	S508	KR425365	Bombuscaro	L1	30.11.2011	Sweep Netting
BT_3512_Galerucinae_sp_079	S508		Bombuscaro	L1	30.11.2011	Sweep Netting
BT_3513_Alticinae_sp_051	S509	KR425095	Bombuscaro	L1	30.11.2011	Beating
BT_3514_Alticinae_sp_051	S509		Bombuscaro	L1	30.11.2011	Beating
BT_3515_Alticinae_sp_152	S509	KR425096	Bombuscaro	L1	30.11.2011	Beating
BT_3516_Eumolpinae_sp_024	S509	KR424862	Bombuscaro	L1	30.11.2011	Beating
BT_3517_Galerucinae_sp_048	S509	KR425366	Bombuscaro	L1	30.11.2011	Beating
BT_3518_Galerucinae_sp_058	S510	KR425367	Bombuscaro	L1	30.11.2011	Hand-Coll.(S)
BT_3519_Alticinae_sp_201	S511		Bombuscaro	L4	06.12.2011	Sweep Netting
BT_3520_Alticinae_sp_181	S511	KR425097	Bombuscaro	L4	06.12.2011	Sweep Netting
BT_3521_Alticinae_sp_051	S512	KR425098	Bombuscaro	L4	06.12.2011	Beating
BT_3522_Alticinae_sp_181	S513	KR425099	Bombuscaro	L4	06.12.2011	Hand-Coll.(S)
BT_3528_Galerucinae_sp_093	S517	KR425368	Bombuscaro	L6	06.12.2011	Sweep Netting

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SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_3529_Galerucinae_sp_091	S517	KR425369	Bombuscaro	L6	06.12.2011	Sweep Netting
BT_3530_Alticinae_sp_153	S517	KR425100	Bombuscaro	L6	06.12.2011	Sweep Netting
BT_3531_Alticinae_sp_166	S518	KR425101	Bombuscaro	L6	06.12.2011	Beating
BT_3532_Alticinae_sp_149	S518	KR425102	Bombuscaro	L6	06.12.2011	Beating
BT_3533_Alticinae_sp_247	S520	KR425103	Cajanuma	L1	08.12.2011	Sweep Netting
BT_3534_Alticinae_sp_247	S520		Cajanuma	L1	08.12.2011	Sweep Netting
BT_3535_Alticinae_sp_172	S520	KR425104	Cajanuma	L1	08.12.2011	Sweep Netting
BT_3536_Alticinae_sp_172	S520	KR425105	Cajanuma	L1	08.12.2011	Sweep Netting
BT_3537_Alticinae_sp_172	S520	KR425106	Cajanuma	L1	08.12.2011	Sweep Netting
BT_3538_Alticinae_sp_244	S522	KR425107	Cajanuma	L1	08.12.2011	Hand-Coll.(S)
BT_3539_Alticinae_sp_241	S523	KR425108	Cajanuma	L2	08.12.2011	Sweep Netting
BT_3540_Eumolpinae_sp_058	S523	KR424863	Cajanuma	L2	08.12.2011	Sweep Netting
BT_3542_Eumolpinae_sp_049	S524	KR424864	Cajanuma	L2	08.12.2011	Beating
BT_3543_Eumolpinae_sp_069	S524	KR424865	Cajanuma	L2	08.12.2011	Beating
BT_3544_Chrysomelinae_sp_004	S526	KR424782	Cajanuma	L3	08.12.2011	Sweep Netting
BT_3545_Alticinae_sp_184	S535	KR425109	Cajanuma	U3	13.12.2011	Sweep Netting
BT_3546_Eumolpinae_sp_054	S535		Cajanuma	U3	13.12.2011	Sweep Netting
BT_3547_Alticinae_sp_214	S538	KR425110	Bombuscaro	L1	15.12.2011	Sweep Netting
BT_3548_Eumolpinae_sp_063	S539	KR424866	Bombuscaro	L1	15.12.2011	Beating
BT_3549_Hispinae_sp_012	S540	KR424801	Bombuscaro	L1	15.12.2011	Hand-Coll.(S)
BT_3550_Galerucinae_sp_093	S540	KR425370	Bombuscaro	L1	15.12.2011	Hand-Coll.(S)
BT_3551_Galerucinae_sp_093	S541	KR425371	Bombuscaro	L2	15.12.2011	Sweep Netting
BT_3552_Alticinae_sp_025	S541	KR425111	Bombuscaro	L2	15.12.2011	Sweep Netting
BT_3553_Alticinae_sp_166	S541		Bombuscaro	L2	15.12.2011	Sweep Netting
BT_3554_Alticinae_sp_073	S543		Bombuscaro	L2	15.12.2011	Hand-Coll.(S)
BT_3555_Alticinae_sp_181	S544	KR425112	Bombuscaro	L3	15.12.2011	Sweep Netting
BT_3556_Eumolpinae_sp_050	S544	KR424867	Bombuscaro	L3	15.12.2011	Sweep Netting
BT_3557_Eumolpinae_sp_070	S545	KR424868	Bombuscaro	L3	15.12.2011	Beating
BT_3558_Hispinae_sp_021	S546	KR424802	Bombuscaro	L3	15.12.2011	Hand-Coll.(S)
BT_3559_Alticinae_sp_233	S547	KR425113	Cajanuma	U4	19.12.2011	Sweep Netting
BT_3560_Alticinae_sp_188	S551	KR425114	Cajanuma	U5	19.12.2011	Beating
BT_3561_Alticinae_sp_056	S553		Cajanuma	U6	19.12.2011	Sweep Netting
BT_3562_Eumolpinae_sp_057	S554	KR424869	Cajanuma	U6	19.12.2011	Beating
BT_3563_Hispinae_sp_014	S554	KR424803	Cajanuma	U6	19.12.2011	Beating
BT_3564_Alticinae_sp_127	S556	KR425115	Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3565_Alticinae_sp_127	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3566_Alticinae_sp_127	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3567_Alticinae_sp_127	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3568_Alticinae_sp_127	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3569_Alticinae_sp_127	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3570_Alticinae_sp_127	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3571_Alticinae_sp_127	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3572_Alticinae_sp_127	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3573_Alticinae_sp_127	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3574_Alticinae_sp_227	S556	KR425116	Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3575_Alticinae_sp_227	S556	KR425117	Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3576_Alticinae_sp_196	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3577_Alticinae_sp_196	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3578_Alticinae_sp_196	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3579_Alticinae_sp_196	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3580_Alticinae_sp_196	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3581_Alticinae_sp_179	S556	KR425118	Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3582_Galerucinae_sp_106	S556		Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3583_Alticinae_sp_135	S556	KR425119	Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3584_Alticinae_sp_167	S556	KR425120	Bombuscaro	U4	21.12.2011	Sweep Netting
BT_3585_Alticinae_sp_127	S557	KR425121	Bombuscaro	U4	21.12.2011	Beating
BT_3586_Alticinae_sp_127	S557		Bombuscaro	U4	21.12.2011	Beating
BT_3587_Alticinae_sp_127	S557		Bombuscaro	U4	21.12.2011	Beating
BT_3588_Alticinae_sp_127	S557		Bombuscaro	U4	21.12.2011	Beating
BT_3589_Alticinae_sp_127	S557		Bombuscaro	U4	21.12.2011	Beating
BT_3590_Alticinae_sp_127	S557		Bombuscaro	U4	21.12.2011	Beating
BT_3591_Alticinae_sp_196	S557	KR425122	Bombuscaro	U4	21.12.2011	Beating
BT_3592_Alticinae_sp_196	S557		Bombuscaro	U4	21.12.2011	Beating
BT_3593_Alticinae_sp_076	S557	KR425123	Bombuscaro	U4	21.12.2011	Beating
BT_3594_Alticinae_sp_181	S557	KR425124	Bombuscaro	U4	21.12.2011	Beating
BT_3596_Alticinae_sp_111	S558	KR425125	Bombuscaro	U4	21.12.2011	Hand-Coll.(S)
BT_3597_Alticinae_sp_196	S558	KR425126	Bombuscaro	U4	21.12.2011	Hand-Coll.(S)
BT_3598_Alticinae_sp_196	S559		Bombuscaro	U5	21.12.2011	Sweep Netting
BT_3599_Alticinae_sp_196	S559		Bombuscaro	U5	21.12.2011	Sweep Netting
BT_3600_Alticinae_sp_253	S559		Bombuscaro	U5	21.12.2011	Sweep Netting
BT_3601_Alticinae_sp_127	S559	KR425127	Bombuscaro	U5	21.12.2011	Sweep Netting
BT_3602_Alticinae_sp_138	S559		Bombuscaro	U5	21.12.2011	Sweep Netting
BT_3603_Alticinae_sp_182	S560		Bombuscaro	U5	21.12.2011	Beating
BT_3604_Alticinae_sp_076	S560	KR425128	Bombuscaro	U5	21.12.2011	Beating
BT_3605_Alticinae_sp_076	S560		Bombuscaro	U5	21.12.2011	Beating
BT_3606_Alticinae_sp_127	S560		Bombuscaro	U5	21.12.2011	Beating
BT_3607_Alticinae_sp_138	S560		Bombuscaro	U5	21.12.2011	Beating
BT_3608_Alticinae_sp_253	S560		Bombuscaro	U5	21.12.2011	Beating
BT_3609_Eumolpinae_sp_047	S560	KR424870	Bombuscaro	U5	21.12.2011	Beating
BT_3610_Alticinae_sp_076	S561	KR425129	Bombuscaro	U5	21.12.2011	Hand-Coll.(S)
BT_3611_Alticinae_sp_181	S562	KR425130	Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3612_Eumolpinae_sp_059	S562	KR424871	Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3613_Criocerinae_sp_007	S562	KR425415	Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3614_Eumolpinae_sp_059	S562	KR424872	Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3615_Galerucinae_sp_029	S562	KR425372	Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3616_Galerucinae_sp_029	S562	KR425373	Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3617_Alticinae_sp_127	S562	KR425131	Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3618_Alticinae_sp_127	S562		Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3619_Alticinae_sp_127	S562		Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3620_Alticinae_sp_127	S562		Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3621_Alticinae_sp_127	S562		Bombuscaro	U6	21.12.2011	Sweep Netting
BT_3622_Alticinae_sp_254	S563	KR425132	Bombuscaro	U6	21.12.2011	Beating
BT_3623_Alticinae_sp_253	S563	KR425133	Bombuscaro	U6	21.12.2011	Beating
BT_3624_Alticinae_sp_127	S563	KR425134	Bombuscaro	U6	21.12.2011	Beating
BT_3625_Alticinae_sp_051	S563	KR425135	Bombuscaro	U6	21.12.2011	Beating
BT_3626_Criocerinae_sp_010	S563	KR425416	Bombuscaro	U6	21.12.2011	Beating
BT_3627_Eumolpinae_sp_039	S565		ECSF	U1	26.12.2011	Sweep Netting
BT_3628_Alticinae_sp_104	S565		ECSF	U1	26.12.2011	Sweep Netting
BT_3630_Alticinae_sp_117	S566		ECSF	U1	26.12.2011	Beating
BT_3633_Alticinae_sp_109	S566		ECSF	U1	26.12.2011	Beating
BT_3651_Galerucinae_sp_041	S572		ECSF	L4	03.01.2012	Beating
BT_3652_Alticinae_sp_086	S572		ECSF	L4	03.01.2012	Beating
BT_3653_Alticinae_sp_065	S572		ECSF	L4	03.01.2012	Beating
BT_3656_Alticinae_sp_115	S572		ECSF	L4	03.01.2012	Beating
BT_3658_Alticinae_sp_198	S573		ECSF	L4	03.01.2012	Hand-Coll.(S)
BT_3659_Alticinae_sp_237	S573		ECSF	L4	03.01.2012	Hand-Coll.(S)
BT_3660_Alticinae_sp_092	S573		ECSF	L4	03.01.2012	Hand-Coll.(S)
BT_3685_Alticinae_sp_018	S577	KR425136	ECSF	L6	03.01.2012	Sweep Netting
BT_3686_Alticinae_sp_177	S577	KR425137	ECSF	L6	03.01.2012	Sweep Netting
BT_3687_Alticinae_sp_115	S577	KR425138	ECSF	L6	03.01.2012	Sweep Netting
BT_3688_Alticinae_sp_087	S578	KR425139	ECSF	L6	03.01.2012	Beating
BT_3689_Eumolpinae_sp_040	S578	KR424873	ECSF	L6	03.01.2012	Beating
BT_3690_Alticinae_sp_115	S578	KR425140	ECSF	L6	03.01.2012	Beating
BT_3691_Alticinae_sp_147	S578	KR425141	ECSF	L6	03.01.2012	Beating
BT_3692_Alticinae_sp_147	S578		ECSF	L6	03.01.2012	Beating

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Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_3693_Alticinae_sp_123	S578	KR425142	ECSF	L6	03.01.2012	Beating
BT_3694_Alticinae_sp_197	S578	KR425143	ECSF	L6	03.01.2012	Beating
BT_3698_Galerucinae_sp_089	S586		Bombuscaro	U3	05.01.2012	Sweep Netting
BT_3699_Eumolpinae_sp_063	S586	KR424874	Bombuscaro	U3	05.01.2012	Sweep Netting
BT_3700_Eumolpinae_sp_024	S587	KR424875	Bombuscaro	U3	05.01.2012	Beating
BT_3701_Alticinae_sp_244	S590	KR425144	Cajanuma	L4	09.01.2012	Beating
BT_3702_Alticinae_sp_206	S591		Cajanuma	L4	09.01.2012	Hand-Coll.(S)
BT_3703_Alticinae_sp_206	S591		Cajanuma	L4	09.01.2012	Hand-Coll.(S)
BT_3704_Alticinae_sp_172	S597	KR425145	Cajanuma	L6	09.01.2012	Hand-Coll.(S)
BT_3705_Alticinae_sp_085	S598		Bombuscaro	L4	11.01.2012	Sweep Netting
BT_3706_Alticinae_sp_182	S598		Bombuscaro	L4	11.01.2012	Sweep Netting
BT_3707_Alticinae_sp_182	S598		Bombuscaro	L4	11.01.2012	Sweep Netting
BT_3708_Eumolpinae_sp_059	S598		Bombuscaro	L4	11.01.2012	Sweep Netting
BT_3710_Alticinae_sp_196	S598		Bombuscaro	L4	11.01.2012	Sweep Netting
BT_3711_Alticinae_sp_076	S598		Bombuscaro	L4	11.01.2012	Sweep Netting
BT_3716_Alticinae_sp_127	S599		Bombuscaro	L4	11.01.2012	Beating
BT_3719_Alticinae_sp_093	S599		Bombuscaro	L4	11.01.2012	Beating
BT_3721_Alticinae_sp_076	S599		Bombuscaro	L4	11.01.2012	Beating
BT_3723_Eumolpinae_sp_059	S599		Bombuscaro	L4	11.01.2012	Beating
BT_3724_Alticinae_sp_127	S600		Bombuscaro	L4	11.01.2012	Hand-Coll.(S)
BT_3725_Alticinae_sp_138	S600		Bombuscaro	L4	11.01.2012	Hand-Coll.(S)
BT_3726_Alticinae_sp_227	S601	KR425146	Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3727_Alticinae_sp_253	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3728_Alticinae_sp_099	S601	KR425147	Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3729_Alticinae_sp_104	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3730_Alticinae_sp_095	S601	KR425148	Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3731_Alticinae_sp_127	S601	KR425149	Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3732_Alticinae_sp_127	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3733_Alticinae_sp_127	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3734_Alticinae_sp_127	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3735_Alticinae_sp_196	S601	KR425150	Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3736_Alticinae_sp_196	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3737_Alticinae_sp_196	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3738_Alticinae_sp_196	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3739_Galerucinae_sp_085	S601	KR425374	Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3740_Eumolpinae_sp_047	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3741_Alticinae_sp_138	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3750_Alticinae_sp_076	S601	KR425151	Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3751_Alticinae_sp_076	S601		Bombuscaro	L5	11.01.2012	Sweep Netting
BT_3752_Eumolpinae_sp_038	S602	KR424876	Bombuscaro	L5	11.01.2012	Beating
BT_3753_Galerucinae_sp_093	S602	KR425375	Bombuscaro	L5	11.01.2012	Beating
BT_3754_Alticinae_sp_076	S602	KR425152	Bombuscaro	L5	11.01.2012	Beating
BT_3755_Alticinae_sp_076	S602		Bombuscaro	L5	11.01.2012	Beating
BT_3756_Alticinae_sp_127	S602	KR425153	Bombuscaro	L5	11.01.2012	Beating
BT_3757_Alticinae_sp_127	S602		Bombuscaro	L5	11.01.2012	Beating
BT_3758_Alticinae_sp_127	S602		Bombuscaro	L5	11.01.2012	Beating
BT_3759_Alticinae_sp_127	S602		Bombuscaro	L5	11.01.2012	Beating
BT_3760_Alticinae_sp_127	S602		Bombuscaro	L5	11.01.2012	Beating
BT_3761_Alticinae_sp_196	S603	KR425154	Bombuscaro	L5	11.01.2012	Hand-Coll.(S)
BT_3762_Alticinae_sp_127	S603	KR425155	Bombuscaro	L5	11.01.2012	Hand-Coll.(S)
BT_3763_Alticinae_sp_127	S603		Bombuscaro	L5	11.01.2012	Hand-Coll.(S)
BT_3765_Alticinae_sp_138	S604		Bombuscaro	L6	11.01.2012	Sweep Netting
BT_3767_Alticinae_sp_226	S604		Bombuscaro	L6	11.01.2012	Sweep Netting
BT_3768_Criocerinae_sp_008	S604		Bombuscaro	L6	11.01.2012	Sweep Netting
BT_3771_Alticinae_sp_169	S604		Bombuscaro	L6	11.01.2012	Sweep Netting
BT_3773_Alticinae_sp_127	S604		Bombuscaro	L6	11.01.2012	Sweep Netting
BT_3790_Alticinae_sp_196	S604		Bombuscaro	L6	11.01.2012	Sweep Netting
BT_3791_Alticinae_sp_232	S604		Bombuscaro	L6	11.01.2012	Sweep Netting
BT_3792_Alticinae_sp_240	S604		Bombuscaro	L6	11.01.2012	Sweep Netting
BT_3793_Alticinae_sp_204	S604		Bombuscaro	L6	11.01.2012	Sweep Netting
BT_3795_Hispinae_sp_019	S605		Bombuscaro	L6	11.01.2012	Beating
BT_3796_Galerucinae_sp_007	S605		Bombuscaro	L6	11.01.2012	Beating
BT_3807_Alticinae_sp_185	S607		Cajanuma	L1	16.01.2012	Sweep Netting
BT_3808_Alticinae_sp_230	S607		Cajanuma	L1	16.01.2012	Sweep Netting
BT_3809_Alticinae_sp_234	S607		Cajanuma	L1	16.01.2012	Sweep Netting
BT_3810_Alticinae_sp_217	S608	KR425156	Cajanuma	L1	16.01.2012	Beating
BT_3811_Hispinae_sp_017	S610	KR424804	Cajanuma	L2	16.01.2012	Sweep Netting
BT_3812_Alticinae_sp_118	S610	KR425157	Cajanuma	L2	16.01.2012	Sweep Netting
BT_3813_Alticinae_sp_109	S611	KR425158	Cajanuma	L2	16.01.2012	Beating
BT_3814_Alticinae_sp_118	S611	KR425159	Cajanuma	L2	16.01.2012	Beating
BT_3815_Alticinae_sp_118	S611	KR425160	Cajanuma	L2	16.01.2012	Beating
BT_3816_Alticinae_sp_118	S611		Cajanuma	L2	16.01.2012	Beating
BT_3817_Alticinae_sp_118	S611		Cajanuma	L2	16.01.2012	Beating
BT_3818_Alticinae_sp_118	S611		Cajanuma	L2	16.01.2012	Beating
BT_3819_Alticinae_sp_118	S611		Cajanuma	L2	16.01.2012	Beating
BT_3820_Alticinae_sp_216	S613	KR425161	Cajanuma	L3	16.01.2012	Sweep Netting
BT_3824_Galerucinae_sp_013	S619	KR425376	Bombuscaro	L2	18.01.2012	Sweep Netting
BT_3825_Alticinae_sp_050	S619	KR425162	Bombuscaro	L2	18.01.2012	Sweep Netting
BT_3826_Alticinae_sp_201	S619	KR425163	Bombuscaro	L2	18.01.2012	Sweep Netting
BT_3827_Galerucinae_sp_090	S620	KR425377	Bombuscaro	L2	18.01.2012	Beating
BT_3828_Alticinae_sp_211	S620	KR425164	Bombuscaro	L2	18.01.2012	Beating
BT_3829_Alticinae_sp_181	S620	KR425165	Bombuscaro	L2	18.01.2012	Beating
BT_3830_Alticinae_sp_180	S623	KR425166	Bombuscaro	L3	18.01.2012	Beating
BT_3832_Eumolpinae_sp_050	S624	KR424877	Bombuscaro	L3	18.01.2012	Hand-Coll.(S)
BT_3833_Alticinae_sp_231	S631		Cajanuma	U3	23.01.2012	Sweep Netting
BT_3834_Alticinae_sp_244	S631	KR425167	Cajanuma	U3	23.01.2012	Sweep Netting
BT_3845_Galerucinae_sp_007	S636		ECSF	U4	25.01.2012	Hand-Coll.(S)
BT_3846_Alticinae_sp_118	S637	KR425168	ECSF	U5	25.01.2012	Sweep Netting
BT_3847_Alticinae_sp_118	S637		ECSF	U5	25.01.2012	Sweep Netting
BT_3848_Eumolpinae_sp_039	S637	KR424878	ECSF	U5	25.01.2012	Sweep Netting
BT_3849_Alticinae_sp_175	S637	KR425169	ECSF	U5	25.01.2012	Sweep Netting
BT_3850_Alticinae_sp_140	S637	KR425170	ECSF	U5	25.01.2012	Sweep Netting
BT_3851_Alticinae_sp_118	S638	KR425171	ECSF	U5	25.01.2012	Beating
BT_3852_Alticinae_sp_118	S638	KR425172	ECSF	U5	25.01.2012	Beating
BT_3853_Eumolpinae_sp_039	S638	KR424879	ECSF	U5	25.01.2012	Beating
BT_3854_Eumolpinae_sp_039	S638		ECSF	U5	25.01.2012	Beating
BT_3855_Eumolpinae_sp_039	S638		ECSF	U5	25.01.2012	Beating
BT_3856_Alticinae_sp_118	S639	KR425173	ECSF	U5	25.01.2012	Hand-Coll.(S)
BT_3857_Alticinae_sp_118	S639		ECSF	U5	25.01.2012	Hand-Coll.(S)
BT_3858_Alticinae_sp_118	S639		ECSF	U5	25.01.2012	Hand-Coll.(S)
BT_3859_Alticinae_sp_118	S639		ECSF	U5	25.01.2012	Hand-Coll.(S)
BT_3860_Eumolpinae_sp_030	S639	KR424880	ECSF	U5	25.01.2012	Hand-Coll.(S)
BT_3861_Cassidinae_sp_015	S639	KR424789	ECSF	U5	25.01.2012	Hand-Coll.(S)
BT_3869_Cassidinae_sp_012	S646	KR424790	ECSF	L5	27.01.2012	Sweep Netting
BT_3870_Eumolpinae_sp_002	S646		ECSF	L5	27.01.2012	Sweep Netting
BT_3871_Alticinae_sp_083	S646	KR425174	ECSF	L5	27.01.2012	Sweep Netting
BT_3872_Eumolpinae_sp_040	S647	KR424881	ECSF	L5	27.01.2012	Beating
BT_3873_Cassidinae_sp_020	S648	KR424791	ECSF	L5	27.01.2012	Hand-Coll.(S)
BT_3874_Eumolpinae_sp_042	S648	KR424882	ECSF	L5	27.01.2012	Hand-Coll.(S)
BT_3885_Alticinae_sp_007	S653		ECSF	L6	27.01.2012	Beating
BT_3891_Galerucinae_sp_090	S658	KR425378	Bombuscaro	U1	29.01.2012	Sweep Netting
BT_3892_Galerucinae_sp_090	S658		Bombuscaro	U1	29.01.2012	Sweep Netting
BT_3893_Alticinae_sp_164	S658	KR425175	Bombuscaro	U1	29.01.2012	Sweep Netting
BT_3894_Alticinae_sp_200	S661	KR425176	Bombuscaro	L1	29.01.2012	Sweep Netting
BT_3895_Galerucinae_sp_079	S662	KR425379	Bombuscaro	L1	29.01.2012	Beating

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Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_3896_Hispinae_sp_012	S663	KR424805	Bombuscaro	L1	29.01.2012	Hand-Coll.(S)
BT_3915_Galerucinae_sp_007	S670	KR425380	ECSF	U4	31.01.2012	Sweep Netting
BT_3916_Galerucinae_sp_007	S670		ECSF	U4	31.01.2012	Sweep Netting
BT_3917_Alticinae_sp_065	S671	KR425177	ECSF	U4	31.01.2012	Beating
BT_3918_Alticinae_sp_096	S671	KR425178	ECSF	U4	31.01.2012	Beating
BT_3919_Alticinae_sp_096	S671		ECSF	U4	31.01.2012	Beating
BT_3920_Alticinae_sp_165	S671	KR425179	ECSF	U4	31.01.2012	Beating
BT_3921_Eumolpinae_sp_042	S671	KR424883	ECSF	U4	31.01.2012	Beating
BT_3922_Alticinae_sp_264	S671	KR425180	ECSF	U4	31.01.2012	Beating
BT_3923_Cassidinae_sp_006	S672		ECSF	U4	31.01.2012	Hand-Coll.(S)
BT_3947_Eumolpinae_sp_019	S679	KR424884	ECSF	L2	31.01.2012	Sweep Netting
BT_3948_Alticinae_sp_044	S679	KR425181	ECSF	L2	31.01.2012	Sweep Netting
BT_3949_Alticinae_sp_077	S679	KR425182	ECSF	L2	31.01.2012	Sweep Netting
BT_3950_Galerucinae_sp_061	S679	KR425381	ECSF	L2	31.01.2012	Sweep Netting
BT_3951_Alticinae_sp_238	S679	KR425183	ECSF	L2	31.01.2012	Sweep Netting
BT_3952_Alticinae_sp_092	S679	KR425184	ECSF	L2	31.01.2012	Sweep Netting
BT_3953_Alticinae_sp_112	S679	KR425185	ECSF	L2	31.01.2012	Sweep Netting
BT_3954_Alticinae_sp_112	S679		ECSF	L2	31.01.2012	Sweep Netting
BT_3955_Alticinae_sp_112	S679		ECSF	L2	31.01.2012	Sweep Netting
BT_3957_Galerucinae_sp_066	S680	KR425382	ECSF	L2	31.01.2012	Beating
BT_3958_Eumolpinae_sp_019	S681	KR424885	ECSF	L2	31.01.2012	Hand-Coll.(S)
BT_3959_Galerucinae_sp_069	S681	KR425383	ECSF	L2	31.01.2012	Hand-Coll.(S)
BT_3960_Alticinae_sp_096	S681	KR425186	ECSF	L2	31.01.2012	Hand-Coll.(S)
BT_3961_Cassidinae_sp_004	S681	KR424792	ECSF	L2	31.01.2012	Hand-Coll.(S)
BT_3962_Alticinae_sp_117	S682		ECSF	U6	31.01.2012	Sweep Netting
BT_3963_Alticinae_sp_085	S682	KR425187	ECSF	U6	31.01.2012	Sweep Netting
BT_3964_Alticinae_sp_045	S683	KR425188	ECSF	U6	31.01.2012	Beating
BT_3965_Galerucinae_sp_034	S683		ECSF	U6	31.01.2012	Beating
BT_3966_Galerucinae_sp_034	S683		ECSF	U6	31.01.2012	Beating
BT_3967_Galerucinae_sp_034	S683		ECSF	U6	31.01.2012	Beating
BT_3968_Eumolpinae_sp_061	S683		ECSF	U6	31.01.2012	Beating
BT_3969_Alticinae_sp_096	S683	KR425189	ECSF	U6	31.01.2012	Beating
BT_3970_Alticinae_sp_085	S683	KR425190	ECSF	U6	31.01.2012	Beating
BT_3971_Galerucinae_sp_026	S684	KR425384	ECSF	U6	31.01.2012	Hand-Coll.(S)
BT_3972_Alticinae_sp_231	S686		Cajanuma	L6	03.02.2012	Beating
BT_3973_Alticinae_sp_248	S694	KR425191	Cajanuma	U2	03.02.2012	Sweep Netting
BT_3974_Alticinae_sp_094	S695	KR425192	Cajanuma	U2	03.02.2012	Beating
BT_3975_Alticinae_sp_172	S697	KR425193	Cajanuma	L4	03.02.2012	Sweep Netting
BT_3976_Eumolpinae_sp_050	S700	KR424886	Bombuscaro	L4	06.02.2012	Sweep Netting
BT_3977_Hispinae_sp_016	S701	KR424806	Bombuscaro	L4	06.02.2012	Beating
BT_3986_Galerucinae_sp_007	S705		Bombuscaro	U4	06.02.2012	Hand-Coll.(S)
BT_3988_Eumolpinae_sp_059	S706	KR424887	Bombuscaro	L5	06.02.2012	Sweep Netting
BT_3989_Alticinae_sp_238	S706	KR425194	Bombuscaro	L5	06.02.2012	Sweep Netting
BT_3990_Alticinae_sp_173	S706	KR425195	Bombuscaro	L5	06.02.2012	Sweep Netting
BT_3994_Hispinae_sp_015	S713		Bombuscaro	L6	06.02.2012	Beating
BT_3995_Galerucinae_sp_074	S715	KR425385	Bombuscaro	U6	06.02.2012	Sweep Netting
BT_3996_Alticinae_sp_042	S715	KR425196	Bombuscaro	U6	06.02.2012	Sweep Netting
BT_3997_Galerucinae_sp_033	S716		Bombuscaro	U6	06.02.2012	Beating
BT_3998_Galerucinae_sp_007	S716	KR425386	Bombuscaro	U6	06.02.2012	Beating
BT_3999_Alticinae_sp_009	S717	KR425197	Bombuscaro	U6	06.02.2012	Hand-Coll.(S)
BT_4000_Alticinae_sp_175	S718	KR425198	ECSF	U2	09.02.2012	Sweep Netting
BT_4001_Alticinae_sp_175	S718		ECSF	U2	09.02.2012	Sweep Netting
BT_4002_Galerucinae_sp_066	S719	KR425387	ECSF	U2	09.02.2012	Beating
BT_4003_Galerucinae_sp_083	S720	KR425388	ECSF	U2	09.02.2012	Hand-Coll.(S)
BT_4004_Galerucinae_sp_083	S720		ECSF	U2	09.02.2012	Hand-Coll.(S)
BT_4005_Galerucinae_sp_031	S720	KR425389	ECSF	U2	09.02.2012	Hand-Coll.(S)
BT_4006_Alticinae_sp_251	S722	KR425199	ECSF	L4	09.02.2012	Beating
BT_4007_Alticinae_sp_145	S722	KR425200	ECSF	L4	09.02.2012	Beating
BT_4008_Galerucinae_sp_061	S722	KR425390	ECSF	L4	09.02.2012	Beating
BT_4009_Alticinae_sp_018	S722	KR425201	ECSF	L4	09.02.2012	Beating
BT_4010_Eumolpinae_sp_040	S722	KR424888	ECSF	L4	09.02.2012	Beating
BT_4011_Eumolpinae_sp_040	S722		ECSF	L4	09.02.2012	Beating
BT_4012_Eumolpinae_sp_040	S722		ECSF	L4	09.02.2012	Beating
BT_4013_Galerucinae_sp_046	S723	KR425391	ECSF	L4	09.02.2012	Hand-Coll.(S)
BT_4014_Cassidinae_sp_005	S723	KR424793	ECSF	L4	09.02.2012	Hand-Coll.(S)
BT_4015_Galerucinae_sp_064	S723	KR425392	ECSF	L4	09.02.2012	Hand-Coll.(S)
BT_4016_Galerucinae_sp_110	S723	KR425393	ECSF	L4	09.02.2012	Hand-Coll.(S)
BT_4017_Alticinae_sp_104	S724	KR425202	ECSF	U1	09.02.2012	Sweep Netting
BT_4018_Alticinae_sp_104	S724		ECSF	U1	09.02.2012	Sweep Netting
BT_4019_Eumolpinae_sp_039	S724	KR424889	ECSF	U1	09.02.2012	Sweep Netting
BT_4020_Eumolpinae_sp_039	S724		ECSF	U1	09.02.2012	Sweep Netting
BT_4021_Alticinae_sp_008	S725	KR425203	ECSF	U1	09.02.2012	Beating
BT_4022_Cassidinae_sp_004	S726	KR424794	ECSF	U1	09.02.2012	Hand-Coll.(S)
BT_4026_Galerucinae_sp_017	S728		ECSF	L5	09.02.2012	Beating
BT_4031_Alticinae_sp_145	S730	KR425204	ECSF	L6	09.02.2012	Sweep Netting
BT_4032_Hispinae_sp_007	S731	KR424807	ECSF	L6	09.02.2012	Beating
BT_4033_Eumolpinae_sp_037	S731		ECSF	L6	09.02.2012	Beating
BT_4035_Hispinae_sp_003	S732	KR424808	ECSF	L6	09.02.2012	Hand-Coll.(S)
BT_4036_Galerucinae_sp_078	S741	KR425394	Bombuscaro	U3	11.02.2012	Hand-Coll.(S)
BT_4047_Alticinae_sp_181	S748	KR425205	Bombuscaro	L3	11.02.2012	Sweep Netting
BT_4048_Criocerinae_sp_001	S751	KR425417	ECSF	L1	12.02.2012	Sweep Netting
BT_4049_Alticinae_sp_115	S751	KR425206	ECSF	L1	12.02.2012	Sweep Netting
BT_4050_Eumolpinae_sp_042	S752	KR424890	ECSF	L1	12.02.2012	Beating
BT_4051_Eumolpinae_sp_042	S752	KR424891	ECSF	L1	12.02.2012	Beating
BT_4052_Alticinae_sp_213	S752	KR425207	ECSF	L1	12.02.2012	Beating
BT_4053_Eumolpinae_sp_065	S752		ECSF	L1	12.02.2012	Beating
BT_4054_Alticinae_sp_018	S752	KR425208	ECSF	L1	12.02.2012	Beating
BT_4055_Alticinae_sp_018	S752		ECSF	L1	12.02.2012	Beating
BT_4056_Alticinae_sp_115	S752	KR425209	ECSF	L1	12.02.2012	Beating
BT_4057_Alticinae_sp_115	S752		ECSF	L1	12.02.2012	Beating
BT_4058_Alticinae_sp_115	S752		ECSF	L1	12.02.2012	Beating
BT_4059_Galerucinae_sp_107	S753	KR425395	ECSF	L1	12.02.2012	Hand-Coll.(S)
BT_4060_Eumolpinae_sp_038	S753		ECSF	L1	12.02.2012	Hand-Coll.(S)
BT_4061_Alticinae_sp_106	S754	KR425210	ECSF	L2	12.02.2012	Sweep Netting
BT_4062_Eumolpinae_sp_038	S755	KR424892	ECSF	L2	12.02.2012	Beating
BT_4063_Alticinae_sp_115	S755	KR425211	ECSF	L2	12.02.2012	Beating
BT_4064_Alticinae_sp_115	S755		ECSF	L2	12.02.2012	Beating
BT_4065_Alticinae_sp_018	S755	KR425212	ECSF	L2	12.02.2012	Beating
BT_4066_Alticinae_sp_115	S756	KR425213	ECSF	L2	12.02.2012	Hand-Coll.(S)
BT_4067_Alticinae_sp_115	S756		ECSF	L2	12.02.2012	Hand-Coll.(S)
BT_4182_Galerucinae_sp_092	N149		ECSF		12.09.2011	Hand-Coll.(N)
BT_4186_Galerucinae_sp_020	N151		ECSF		19.09.2011	Hand-Coll.(N)
BT_4194_Galerucinae_sp_095	N155		Bombuscaro		04.10.2011	Hand-Coll.(N)
BT_4195_Galerucinae_sp_029	N155		Bombuscaro		04.10.2011	Hand-Coll.(N)
BT_4198_Criocerinae_sp_002	N155		Bombuscaro		04.10.2011	Hand-Coll.(N)
BT_4207_Cassidinae_sp_021	N155		Bombuscaro		04.10.2011	Hand-Coll.(N)
BT_4208_Galerucinae_sp_028	N155		Bombuscaro		04.10.2011	Hand-Coll.(N)
BT_4209_Criocerinae_sp_007	N155		Bombuscaro		04.10.2011	Hand-Coll.(N)
BT_4215_Alticinae_sp_239	N157		Cajanuma		11.10.2011	Hand-Coll.(N)
BT_4216_Alticinae_sp_187	N157		Cajanuma		11.10.2011	Hand-Coll.(N)
BT_4217_Alticinae_sp_262	N157		Cajanuma		11.10.2011	Hand-Coll.(N)
BT_4241_Cassidinae_sp_014	N162		ECSF		13.10.2011	Hand-Coll.(N)
BT_4252_Galerucinae_sp_007	N163		ECSF		18.10.2011	Hand-Coll.(N)
BT_4253_Galerucinae_sp_002	N163		ECSF		18.10.2011	Hand-Coll.(N)

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SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_4294_Hispinae_sp_020	N172		Bombuscaro		08.11.2011	Hand-Coll.(N)
BT_4295_Galerucinae_sp_029	N172		Bombuscaro		08.11.2011	Hand-Coll.(N)
BT_4306_Cassidinae_sp_019	N172		Bombuscaro		08.11.2011	Hand-Coll.(N)
BT_4321_Galerucinae_sp_017	N175		ECSF		17.11.2011	Hand-Coll.(N)
BT_4344_Galerucinae_sp_011	N179		ECSF	L6	28.11.2011	Malaise Trap
BT_4350_Alticinae_sp_218	N179		ECSF	L6	28.11.2011	Malaise Trap
BT_4351_Galerucinae_sp_017	N179		ECSF	L6	28.11.2011	Malaise Trap
BT_4354_Alticinae_sp_163	N179		ECSF	L6	28.11.2011	Malaise Trap
BT_4402_Alticinae_sp_222	N184		Bombuscaro	L2	30.11.2011	Flight-Intercept.
BT_4421_Alticinae_sp_223	N193		Bombuscaro		21.12.2011	Hand-Coll.(N)
BT_4434_Alticinae_sp_163	N194		ECSF	L6	26.12.2011	Malaise Trap
BT_4468_Galerucinae_sp_007	N195		ECSF	U1	26.12.2011	Malaise Trap
BT_4477_Alticinae_sp_155	N201		Bombuscaro	U2	28.12.2011	Malaise Trap
BT_4500_Galerucinae_sp_097	N207		Bombuscaro		11.01.2012	Hand-Coll.(N)
BT_4509_Cassidinae_sp_018	N207		Bombuscaro		11.01.2012	Hand-Coll.(N)
BT_4510_Hispinae_sp_026	N208		Cajanuma		16.01.2012	Hand-Coll.(N)
BT_4511_Alticinae_sp_229	N208		Cajanuma		16.01.2012	Hand-Coll.(N)
BT_4550_Alticinae_sp_220	N216		ECSF	L6	27.01.2012	Malaise Trap
BT_4572_Alticinae_sp_219	N223		ECSF		30.01.2012	Light Trap
BT_4581_Galerucinae_sp_005	N223		ECSF		30.01.2012	Light Trap
BT_4605_Galerucinae_sp_110	N225		ECSF		31.01.2012	Hand-Coll.(N)
BT_4684_Cassidinae_sp_001	N234		ECSF		09.02.2012	Hand-Coll.(N)
BT_4687_Galerucinae_sp_036	N234		ECSF		09.02.2012	Hand-Coll.(N)
BT_4732_Alticinae_sp_095	S760	KR425214	Cajanuma	U4	16.02.2012	Sweep Netting
BT_4733_Eumolpinae_sp_068	S760	KR424893	Cajanuma	U4	16.02.2012	Sweep Netting
BT_4734_Alticinae_sp_172	S763	KR425215	Cajanuma	U5	16.02.2012	Sweep Netting
BT_4735_Alticinae_sp_235	S763	KR425216	Cajanuma	U5	16.02.2012	Sweep Netting
BT_4736_Alticinae_sp_172	S766	KR425217	Cajanuma	U6	16.02.2012	Sweep Netting
BT_4737_Alticinae_sp_172	S767	KR425218	Cajanuma	U6	16.02.2012	Beating
BT_4738_Alticinae_sp_172	S767		Cajanuma	U6	16.02.2012	Beating
BT_4739_Eumolpinae_sp_024	S769	KR424894	Bombuscaro	U4	27.02.2012	Sweep Netting
BT_4740_Eumolpinae_sp_024	S769	KR424895	Bombuscaro	U4	27.02.2012	Sweep Netting
BT_4741_Alticinae_sp_073	S772		Bombuscaro	U5	27.02.2012	Sweep Netting
BT_4742_Eumolpinae_sp_024	S772	KR424896	Bombuscaro	U5	27.02.2012	Sweep Netting
BT_4743_Alticinae_sp_181	S775	KR425219	Bombuscaro	U6	27.02.2012	Sweep Netting
BT_4744_Eumolpinae_sp_056	S781	KR424897	Bombuscaro	U2	29.02.2012	Sweep Netting
BT_4745_Galerucinae_sp_080	S781		Bombuscaro	U2	29.02.2012	Sweep Netting
BT_4746_Eumolpinae_sp_024	S781	KR424898	Bombuscaro	U2	29.02.2012	Sweep Netting
BT_4747_Galerucinae_sp_074	S781	KR425396	Bombuscaro	U2	29.02.2012	Sweep Netting
BT_4748_Eumolpinae_sp_024	S782	KR424899	Bombuscaro	U2	29.02.2012	Beating
BT_4749_Galerucinae_sp_074	S785	KR425397	Bombuscaro	U3	29.02.2012	Beating
BT_4750_Eumolpinae_sp_024	S785	KR424900	Bombuscaro	U3	29.02.2012	Beating
BT_4751_Alticinae_sp_253	S787	KR425220	Bombuscaro	L4	06.03.2012	Sweep Netting
BT_4753_Eumolpinae_sp_038	S788		Bombuscaro	L4	06.03.2012	Beating
BT_4754_Alticinae_sp_195	S788	KR425221	Bombuscaro	L4	06.03.2012	Beating
BT_4772_Alticinae_sp_009	S793	KR425222	Bombuscaro	L6	06.03.2012	Sweep Netting
BT_4773_Alticinae_sp_127	S793	KR425223	Bombuscaro	L6	06.03.2012	Sweep Netting
BT_4774_Alticinae_sp_050	S794	KR425224	Bombuscaro	L6	06.03.2012	Beating
BT_4775_Alticinae_sp_211	S795	KR425225	Bombuscaro	L6	06.03.2012	Hand-Coll.(S)
BT_4776_Galerucinae_sp_029	S798	KR425398	Bombuscaro	L1	08.03.2012	Hand-Coll.(S)
BT_4777_Alticinae_sp_183	S799		Bombuscaro	L2	08.03.2012	Sweep Netting
BT_4778_Alticinae_sp_181	S799	KR425226	Bombuscaro	L2	08.03.2012	Sweep Netting
BT_4779_Galerucinae_sp_106	S800	KR425399	Bombuscaro	L2	08.03.2012	Beating
BT_4780_Alticinae_sp_252	S800	KR425227	Bombuscaro	L2	08.03.2012	Beating
BT_4781_Alticinae_sp_141	S801		Bombuscaro	L2	08.03.2012	Hand-Coll.(S)
BT_4782_Galerucinae_sp_029	S801	KR425400	Bombuscaro	L2	08.03.2012	Hand-Coll.(S)
BT_4783_Hispinae_sp_016	S802	KR424809	Bombuscaro	L3	08.03.2012	Sweep Netting
BT_4784_Alticinae_sp_245	S805		Cajanuma	L1	13.03.2012	Sweep Netting
BT_4785_Hispinae_sp_027	S806		Cajanuma	L1	13.03.2012	Beating
BT_4786_Alticinae_sp_172	S814	KR425228	Cajanuma	L4	15.03.2012	Sweep Netting
BT_4787_Alticinae_sp_172	S814		Cajanuma	L4	15.03.2012	Sweep Netting
BT_4788_Eumolpinae_sp_058	S814	KR424901	Cajanuma	L4	15.03.2012	Sweep Netting
BT_4789_Alticinae_sp_172	S815	KR425229	Cajanuma	L4	15.03.2012	Beating
BT_4790_Alticinae_sp_189	S817	KR425230	Cajanuma	L5	15.03.2012	Sweep Netting
BT_4791_Alticinae_sp_172	S818	KR425231	Cajanuma	L5	15.03.2012	Beating
BT_4792_Alticinae_sp_187	S821	KR425232	Cajanuma	L6	15.03.2012	Beating
BT_4793_Alticinae_sp_263	S823	KR425233	ECSF	L4	20.03.2012	Sweep Netting
BT_4794_Alticinae_sp_198	S823	KR425234	ECSF	L4	20.03.2012	Sweep Netting
BT_4795_Alticinae_sp_249	S823	KR425235	ECSF	L4	20.03.2012	Sweep Netting
BT_4796_Alticinae_sp_261	S824		ECSF	L4	20.03.2012	Beating
BT_4797_Galerucinae_sp_034	S824	KR425401	ECSF	L4	20.03.2012	Beating
BT_4798_Alticinae_sp_115	S824	KR425236	ECSF	L4	20.03.2012	Beating
BT_4799_Eumolpinae_sp_038	S824		ECSF	L4	20.03.2012	Beating
BT_4800_Alticinae_sp_115	S824	KR425237	ECSF	L4	20.03.2012	Beating
BT_4801_Alticinae_sp_104	S824	KR425238	ECSF	L4	20.03.2012	Beating
BT_4802_Eumolpinae_sp_038	S826		ECSF	L5	20.03.2012	Sweep Netting
BT_4803_Alticinae_sp_101	S826	KR425239	ECSF	L5	20.03.2012	Sweep Netting
BT_4804_Alticinae_sp_115	S826	KR425240	ECSF	L5	20.03.2012	Sweep Netting
BT_4805_Alticinae_sp_115	S827	KR425241	ECSF	L5	20.03.2012	Beating
BT_4806_Alticinae_sp_115	S827		ECSF	L5	20.03.2012	Beating
BT_4807_Eumolpinae_sp_042	S827	KR424902	ECSF	L5	20.03.2012	Beating
BT_4808_Alticinae_sp_018	S827	KR425242	ECSF	L5	20.03.2012	Beating
BT_4809_Galerucinae_sp_034	S827	KR425402	ECSF	L5	20.03.2012	Beating
BT_4810_Alticinae_sp_115	S827	KR425243	ECSF	L5	20.03.2012	Beating
BT_4811_Alticinae_sp_115	S827	KR425244	ECSF	L5	20.03.2012	Beating
BT_4812_Alticinae_sp_101	S827	KR425245	ECSF	L5	20.03.2012	Beating
BT_4813_Alticinae_sp_198	S827	KR425246	ECSF	L5	20.03.2012	Beating
BT_4814_Alticinae_sp_199	S827	KR425247	ECSF	L5	20.03.2012	Beating
BT_4815_Alticinae_sp_086	S827	KR425248	ECSF	L5	20.03.2012	Beating
BT_4816_Alticinae_sp_086	S827		ECSF	L5	20.03.2012	Beating
BT_4817_Alticinae_sp_086	S827		ECSF	L5	20.03.2012	Beating
BT_4851_Eumolpinae_sp_024	S845	KR424903	Bombuscaro	U1	29.03.2012	Beating
BT_4856_Alticinae_sp_186	S853	KR425249	Cajanuma	U4	03.04.2012	Sweep Netting
BT_4857_Alticinae_sp_172	S853	KR425250	Cajanuma	U4	03.04.2012	Sweep Netting
BT_4858_Alticinae_sp_187	S854	KR425251	Cajanuma	U4	03.04.2012	Beating
BT_4859_Alticinae_sp_057	S862	KR425252	Bombuscaro	U4	05.04.2012	Sweep Netting
BT_4860_Eumolpinae_sp_046	S863	KR424904	Bombuscaro	U4	05.04.2012	Beating
BT_4861_Alticinae_sp_149	S863	KR425253	Bombuscaro	U4	05.04.2012	Beating
BT_4862_Alticinae_sp_149	S863	KR425254	Bombuscaro	U4	05.04.2012	Beating
BT_4863_Alticinae_sp_168	S863	KR425255	Bombuscaro	U4	05.04.2012	Beating
BT_4864_Alticinae_sp_149	S863	KR425256	Bombuscaro	U4	05.04.2012	Beating
BT_4867_Galerucinae_sp_003	S866		Bombuscaro	U5	05.04.2012	Beating
BT_4875_Criocerinae_sp_009	S868		Bombuscaro	U6	05.04.2012	Sweep Netting
BT_4885_Galerucinae_sp_056	S871	KR425403	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4886_Alticinae_sp_121	S871	KR425257	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4887_Alticinae_sp_102	S871	KR425258	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4888_Eumolpinae_sp_059	S871	KR424905	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4889_Alticinae_sp_051	S871	KR425259	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4890_Alticinae_sp_051	S871		Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4891_Galerucinae_sp_087	S871	KR425404	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4892_Alticinae_sp_149	S871	KR425260	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4893_Alticinae_sp_149	S871		Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4894_Alticinae_sp_149	S871		Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4895_Alticinae_sp_149	S871		Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4896_Alticinae_sp_149	S871		Bombuscaro	L4	10.04.2012	Sweep Netting

Continued on next page(s)

Table C.1 – continued from previous page(s)

SpecimenID	Sample ID	GenBank Acc. Nr.	Sampling Area	Site/ Plot	Sampling Date	Sampling Method
BT_4897_Alticinae_sp_149	S871		Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4898_Alticinae_sp_168	S871	KR425261	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4899_Alticinae_sp_168	S871		Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4900_Alticinae_sp_151	S871	KR425262	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4901_Galerucinae_sp_057	S871	KR425405	Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4902_Galerucinae_sp_057	S871		Bombuscaro	L4	10.04.2012	Sweep Netting
BT_4903_Alticinae_sp_267	S872	KR425263	Bombuscaro	L4	10.04.2012	Beating
BT_4904_Alticinae_sp_267	S872		Bombuscaro	L4	10.04.2012	Beating
BT_4905_Alticinae_sp_201	S872	KR425264	Bombuscaro	L4	10.04.2012	Beating
BT_4906_Alticinae_sp_211	S873	KR425265	Bombuscaro	L4	10.04.2012	Hand-Coll.(S)
BT_4907_Alticinae_sp_211	S873		Bombuscaro	L4	10.04.2012	Hand-Coll.(S)
BT_4908_Hispinae_sp_013	S873	KR424810	Bombuscaro	L4	10.04.2012	Hand-Coll.(S)
BT_4909_Alticinae_sp_025	S873	KR425266	Bombuscaro	L4	10.04.2012	Hand-Coll.(S)
BT_4910_Alticinae_sp_149	S873	KR425267	Bombuscaro	L4	10.04.2012	Hand-Coll.(S)
BT_4911_Alticinae_sp_057	S873	KR425268	Bombuscaro	L4	10.04.2012	Hand-Coll.(S)
BT_4912_Alticinae_sp_086	S873	KR425269	Bombuscaro	L4	10.04.2012	Hand-Coll.(S)
BT_4914_Galerucinae_sp_003	S874	KR425406	Bombuscaro	L5	10.04.2012	Sweep Netting
BT_4915_Alticinae_sp_050	S874	KR425270	Bombuscaro	L5	10.04.2012	Sweep Netting
BT_4916_Eumolpinae_sp_063	S874	KR424906	Bombuscaro	L5	10.04.2012	Sweep Netting
BT_4917_Alticinae_sp_166	S875	KR425271	Bombuscaro	L5	10.04.2012	Beating
BT_4918_Alticinae_sp_050	S875	KR425272	Bombuscaro	L5	10.04.2012	Beating
BT_4919_Eumolpinae_sp_056	S875	KR424907	Bombuscaro	L5	10.04.2012	Beating
BT_4920_Alticinae_sp_057	S875	KR425273	Bombuscaro	L5	10.04.2012	Beating
BT_4921_Alticinae_sp_057	S875		Bombuscaro	L5	10.04.2012	Beating
BT_4922_Alticinae_sp_009	S877		Bombuscaro	L6	10.04.2012	Sweep Netting
BT_4923_Galerucinae_sp_048	S877	KR425407	Bombuscaro	L6	10.04.2012	Sweep Netting
BT_4924_Alticinae_sp_051	S877	KR425274	Bombuscaro	L6	10.04.2012	Sweep Netting
BT_4925_Alticinae_sp_102	S878	KR425275	Bombuscaro	L6	10.04.2012	Beating
BT_4926_Alticinae_sp_025	S879	KR425276	Bombuscaro	L6	10.04.2012	Hand-Coll.(S)
BT_4927_Alticinae_sp_268	S880	KR425277	Cajanuma	L1	12.04.2012	Sweep Netting
BT_4928_Alticinae_sp_172	S882	KR425278	Cajanuma	L1	12.04.2012	Hand-Coll.(S)
BT_4929_Alticinae_sp_172	S884	KR425279	Cajanuma	L2	12.04.2012	Beating
BT_4930_Alticinae_sp_172	S884	KR425280	Cajanuma	L2	12.04.2012	Beating
BT_4931_Alticinae_sp_244	S888	KR425281	Cajanuma	L3	12.04.2012	Hand-Coll.(S)
BT_4937_Alticinae_sp_127	S892	KR425282	Bombuscaro	U3	17.04.2012	Sweep Netting
BT_4938_Alticinae_sp_149	S893	KR425283	Bombuscaro	U3	17.04.2012	Beating
BT_4939_Alticinae_sp_149	S893		Bombuscaro	U3	17.04.2012	Beating
BT_4940_Alticinae_sp_059	S893	KR425284	Bombuscaro	U3	17.04.2012	Beating
BT_4941_Alticinae_sp_127	S893	KR425285	Bombuscaro	U3	17.04.2012	Beating
BT_4942_Alticinae_sp_102	S893	KR425286	Bombuscaro	U3	17.04.2012	Beating
BT_4944_Alticinae_sp_150	S895	KR425287	ECSF	L3	19.04.2012	Sweep Netting
BT_4945_Eumolpinae_sp_002	S895		ECSF	L3	19.04.2012	Sweep Netting
BT_4946_Eumolpinae_sp_034	S895		ECSF	L3	19.04.2012	Sweep Netting
BT_4947_Alticinae_sp_199	S895	KR425288	ECSF	L3	19.04.2012	Sweep Netting
BT_4948_Alticinae_sp_150	S896	KR425289	ECSF	L3	19.04.2012	Beating
BT_4949_Alticinae_sp_150	S896	KR425290	ECSF	L3	19.04.2012	Beating
BT_4950_Galerucinae_sp_088	S896	KR425408	ECSF	L3	19.04.2012	Beating
BT_4951_Alticinae_sp_061	S896	KR425291	ECSF	L3	19.04.2012	Beating
BT_4952_Alticinae_sp_150	S896	KR425292	ECSF	L3	19.04.2012	Beating
BT_4953_Alticinae_sp_199	S896	KR425293	ECSF	L3	19.04.2012	Beating
BT_4954_Alticinae_sp_199	S896		ECSF	L3	19.04.2012	Beating
BT_4955_Alticinae_sp_199	S896		ECSF	L3	19.04.2012	Beating
BT_4956_Alticinae_sp_086	S896	KR425294	ECSF	L3	19.04.2012	Beating
BT_4957_Alticinae_sp_150	S898	KR425295	ECSF	U3	19.04.2012	Sweep Netting
BT_4958_Alticinae_sp_133	S898	KR425296	ECSF	U3	19.04.2012	Sweep Netting
BT_4960_Alticinae_sp_086	S898	KR425297	ECSF	U3	19.04.2012	Sweep Netting
BT_4961_Alticinae_sp_086	S898		ECSF	U3	19.04.2012	Sweep Netting
BT_4962_Alticinae_sp_086	S898		ECSF	U3	19.04.2012	Sweep Netting
BT_4963_Alticinae_sp_215	S899	KR425298	ECSF	U3	19.04.2012	Beating
BT_4964_Alticinae_sp_150	S899	KR425299	ECSF	U3	19.04.2012	Beating
BT_4965_Eumolpinae_sp_034	S899		ECSF	U3	19.04.2012	Beating
BT_4966_Alticinae_sp_008	S899	KR425300	ECSF	U3	19.04.2012	Beating
BT_4967_Eumolpinae_sp_038	S899		ECSF	U3	19.04.2012	Beating
BT_4968_Eumolpinae_sp_038	S899		ECSF	U3	19.04.2012	Beating
BT_4969_Alticinae_sp_045	S900	KR425301	ECSF	U3	19.04.2012	Hand-Coll.(S)
BT_4970_Galerucinae_sp_081	S901	KR425409	Bombuscaro	U5	24.04.2012	Sweep Netting
BT_4971_Alticinae_sp_192	S901	KR425302	Bombuscaro	U5	24.04.2012	Sweep Netting
BT_4972_Alticinae_sp_050	S902	KR425303	Bombuscaro	U5	24.04.2012	Beating
BT_4986_Galerucinae_sp_101	S908		Bombuscaro	L4	24.04.2012	Beating
BT_4994_Alticinae_sp_172	S911	KR425304	Cajanuma	L1	26.04.2012	Beating
BT_4995_Galerucinae_sp_103	S918	KR425410	Cajanuma	U3	26.04.2012	Hand-Coll.(S)
BT_5029_Galerucinae_sp_099	N242		Bombuscaro		27.02.2012	Hand-Coll.(N)
BT_5122_Alticinae_sp_221	N266		Bombuscaro		24.04.2012	Hand-Coll.(N)

Outgroup specimens:

Species	SequenceID/Accession Nr.	Source
Anthonomus eugenii	SequenceID ARBCP010-10	BOLD
Dichromacalles dromedarius	Accession number GU987917	GenBank
Acalles camelus	Accession number GU987989	GenBank

Appendix D

Additional information: Data sets

Table D.1: **Specimen list with data sets for which the specimen was used.**

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_0001_Eumolpinae_sp_001	X	X	X	X	X				X
BT_0002_Alticinae_sp_042	X	X	X	X	X				X
BT_0003_Alticinae_sp_042				X					
BT_0003a_Alticinae_sp_042				X					
BT_0004_Eumolpinae_sp_042	X	X	X	X	X				X
BT_0005_Galerucinae_sp_040	X	X	X	X	X				X
BT_0006_Galerucinae_sp_040				X					
BT_0006a_Galerucinae_sp_040				X					
BT_0007_Galerucinae_sp_038	X	X	X	X	X				X
BT_0008_Alticinae_sp_243	X	X	X	X	X				X
BT_0009_Eumolpinae_sp_022	X		X	X					
BT_0010_Eumolpinae_sp_022				X					
BT_0011_Eumolpinae_sp_022				X					
BT_0012_Eumolpinae_sp_021	X	X	X	X	X				X
BT_0013_Eumolpinae_sp_021				X					
BT_0014_Eumolpinae_sp_021				X					
BT_0015_Galerucinae_sp_076	X	X	X	X	X				X
BT_0016_Galerucinae_sp_076				X					
BT_0017_Alticinae_sp_043	X	X	X	X	X				X
BT_0018_Alticinae_sp_043				X					
BT_0019_Alticinae_sp_043				X					
BT_0020_Alticinae_sp_043				X					
BT_0021_Alticinae_sp_007	X	X	X	X	X				X
BT_0022_Alticinae_sp_219	X	X	X	X	X				X
BT_0024_Galerucinae_sp_001	X	X	X	X	X				X
BT_0025_Galerucinae_sp_001				X					
BT_0026_Galerucinae_sp_001				X					
BT_0027_Galerucinae_sp_001				X					
BT_0028_Galerucinae_sp_001				X					
BT_0029_Galerucinae_sp_001				X					
BT_0030_Galerucinae_sp_001				X					
BT_0031_Galerucinae_sp_001				X					
BT_0032_Galerucinae_sp_001				X					
BT_0033_Galerucinae_sp_037	X	X	X	X	X				X
BT_0034_Eumolpinae_sp_014	X	X	X	X	X				X
BT_0035_Eumolpinae_sp_006	X	X	X	X	X				X
BT_0036_Galerucinae_sp_011	X	X	X	X	X				X
BT_0043_Galerucinae_sp_005	X	X	X	X	X				X
BT_0044_Galerucinae_sp_005				X					
BT_0045_Galerucinae_sp_005				X					
BT_0045a_Galerucinae_sp_005				X					
BT_0046_Alticinae_sp_243	X	X	X	X	X				X
BT_0047_Alticinae_sp_042	X	X	X	X	X				X
BT_0048_Galerucinae_sp_039	X	X	X	X	X				X
BT_0049_Galerucinae_sp_041	X	X	X	X	X				X
BT_0050_Galerucinae sp. 002				X					
BT_0051_Galerucinae sp. 002				X					
BT_0052_Galerucinae sp. 002				X					
BT_0053_Galerucinae sp. 002				X					
BT_0054_Galerucinae sp. 002				X					
BT_0055_Galerucinae sp. 002				X					
BT_0056_Galerucinae sp. 002				X					
BT_0057_Galerucinae sp. 002				X					
BT_0058_Galerucinae sp. 002				X					
BT_0059_Galerucinae sp. 002				X					
BT_0060_Galerucinae sp. 004				X					
BT_0061_Galerucinae sp. 007				X					
BT_0062_Galerucinae sp. 007				X					
BT_0063_Galerucinae sp. 007				X					
BT_0064_Galerucinae sp. 007				X					
BT_0065_Galerucinae sp. 007				X					
BT_0066_Galerucinae sp. 007				X					
BT_0067_Galerucinae sp. 007				X					
BT_0068_Galerucinae sp. 007				X					
BT_0069_Galerucinae sp. 007				X					
BT_0070_Galerucinae sp. 007				X					
BT_0071_Galerucinae sp. 007				X					
BT_0072_Galerucinae sp. 007				X					
BT_0085_Eumolpinae_sp_048	X		X	X					
BT_0088_Galerucinae_sp_007	X	X	X	X	X				X
BT_0089_Eumolpinae_sp_001	X	X	X	X	X				X
BT_0090_Galerucinae_sp_076	X	X	X	X	X				X
BT_0091_Eumolpinae_sp_001	X	X	X	X	X				X
BT_0092_Eumolpinae_sp_001				X					
BT_0093_Eumolpinae_sp_001				X					
BT_0094_Galerucinae_sp_011	X	X	X	X	X				X
BT_0095_Cassidinae_sp_001	X	X	X	X	X				X
BT_0096_Alticinae_sp_010	X	X	X	X	X				X
BT_0097_Alticinae_sp_010				X					
BT_0098_Galerucinae_sp_002	X	X	X	X	X				X
BT_0099_Galerucinae_sp_007	X	X	X	X	X				X
BT_0100_Galerucinae_sp_007				X					
BT_0101_Galerucinae_sp_007				X					
BT_0102_Alticinae_sp_044	X	X	X	X	X				X
BT_0103_Eumolpinae_sp_038	X	X	X	X	X				X
BT_0104_Eumolpinae_sp_038				X					
BT_0105_Eumolpinae_sp_038				X					
BT_0106_Eumolpinae_sp_038				X					
BT_0107_Galerucinae_sp_046	X	X	X	X	X				X
BT_0108_Galerucinae_sp_046				X					
BT_0109_Alticinae_sp_251	X	X	X	X	X				X

Continued on next page(s)

Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_0110_Alticinae_sp_087	X	X	X	X	X				X
BT_0111_Alticinae_sp_087				X					
BT_0112_Alticinae_sp_087				X					
BT_0113_Alticinae_sp_087				X					
BT_0114_Galerucinae_sp_062	X	X	X	X	X				X
BT_0115_Alticinae_sp_098	X	X	X	X	X				X
BT_0116_Alticinae_sp_098				X					
BT_0117_Eumolpinae_sp_036	X		X	X					
BT_0118_Eumolpinae_sp_019	X	X	X	X	X				X
BT_0119_Alticinae_sp_124	X	X	X	X	X				X
BT_0120_Alticinae_sp_064	X		X	X					
BT_0121_Alticinae_sp_107	X	X	X	X	X				X
BT_0122_Alticinae_sp_107				X					
BT_0123_Alticinae_sp_129	X	X	X	X	X				X
BT_0124_Alticinae_sp_129				X					
BT_0125_Alticinae_sp_097	X	X	X	X	X				X
BT_0126_Alticinae_sp_123	X	X	X	X	X				X
BT_0127_Hispinae_sp_001	X		X	X					
BT_0128_Eumolpinae_sp_009	X		X	X					
BT_0129_Eumolpinae_sp_009				X					
BT_0130_Galerucinae_sp_034	X	X	X	X	X				X
BT_0131_Galerucinae_sp_034				X					
BT_0133_Cassidinae_sp_003	X		X	X					
BT_0134_Galerucinae_sp_007	X	X	X	X	X				X
BT_0135_Eumolpinae_sp_019	X	X	X	X	X				X
BT_0136_Eumolpinae_sp_019				X					
BT_0137_Cassidinae_sp_004	X	X	X	X	X				X
BT_0138_Cassidinae_sp_004				X					
BT_0139_Alticinae_sp_010	X	X	X	X	X				X
BT_0140_Alticinae_sp_028	X	X	X	X	X				X
BT_0144_Eumolpinae_sp_038	X	X	X	X	X				X
BT_0145_Galerucinae_sp_061	X	X	X	X	X				X
BT_0146_Alticinae_sp_029	X	X	X	X	X				X
BT_0147_Alticinae_sp_062	X	X	X	X	X				X
BT_0148_Alticinae_sp_066	X	X	X	X	X				X
BT_0149_Alticinae_sp_249	X	X	X	X	X				X
BT_0150_Alticinae_sp_249				X					
BT_0151_Alticinae_sp_249				X					
BT_0152_Alticinae_sp_249				X					
BT_0153_Alticinae_sp_109	X	X	X	X	X				X
BT_0154_Alticinae_sp_115	X	X	X	X	X				X
BT_0155_Alticinae_sp_193	X	X	X	X	X				X
BT_0156_Alticinae_sp_019	X		X	X					
BT_0157_Alticinae_sp_097	X	X	X	X	X				X
BT_0158_Eumolpinae_sp_002	X	X	X	X	X				X
BT_0159_Galerucinae_sp_096	X	X	X	X	X				X
BT_0160_Galerucinae_sp_096				X					
BT_0161_Galerucinae_sp_096				X					
BT_0162_Galerucinae_sp_096				X					
BT_0163_Galerucinae_sp_096				X					
BT_0164_Galerucinae_sp_096				X					
BT_0165_Galerucinae_sp_096				X					
BT_0166_Galerucinae_sp_096				X					
BT_0167_Galerucinae_sp_096				X					
BT_0168_Galerucinae_sp_096				X					
BT_0169_Galerucinae_sp_096				X					
BT_0170_Galerucinae_sp_096				X					
BT_0171_Galerucinae_sp_096				X					
BT_0172_Galerucinae_sp_096				X					
BT_0173_Galerucinae_sp_096				X					
BT_0174_Galerucinae_sp_046	X	X	X	X	X				X
BT_0175_Galerucinae_sp_046				X					
BT_0176_Galerucinae_sp_046	X	X	X	X	X				X
BT_0177_Galerucinae_sp_046				X					
BT_0178_Galerucinae_sp_046				X					
BT_0179_Galerucinae_sp_046				X					
BT_0180_Galerucinae_sp_046				X					
BT_0181_Galerucinae_sp_046				X					
BT_0182_Galerucinae_sp_046				X					
BT_0183_Galerucinae_sp_034	X	X	X	X	X				X
BT_0184_Galerucinae_sp_034				X					
BT_0188_Galerucinae_sp_011	X	X	X	X	X				X
BT_0189_Alticinae_sp_161	X	X	X	X	X				X
BT_0190_Eumolpinae_sp_001	X	X	X	X	X				X
BT_0191_Eumolpinae_sp_001				X					
BT_0195_Galerucinae_sp_045	X	X	X	X	X				
BT_0196_Galerucinae_sp_010	X	X	X	X	X				X
BT_0197_Galerucinae_sp_033	X		X	X					
BT_0198_Alticinae_sp_137	X	X	X	X	X				
BT_0199_Alticinae_sp_118	X	X	X	X	X				X
BT_0201_Chrysomelinae_sp_002	X	X	X	X	X				X
BT_0202_Galerucinae_sp_032	X	X	X	X	X				X
BT_0203_Galerucinae_sp_032				X					
BT_0204_Hispinae_sp_002	X	X	X	X	X				X
BT_0206_Alticinae_sp_085	X	X	X	X	X				
BT_0207_Galerucinae_sp_069	X	X	X	X	X				X
BT_0208_Eumolpinae_sp_019	X	X	X	X	X				X
BT_0209_Cassidinae_sp_005	X	X	X	X	X				X
BT_0210_Cassidinae_sp_006	X		X	X					
BT_0211_Alticinae_sp_087	X	X	X	X	X				X
BT_0212_Galerucinae_sp_066	X	X	X	X	X				X
BT_0213_Galerucinae_sp_024	X	X	X	X	X				X
BT_0214_Alticinae_sp_028	X	X	X	X	X				X
BT_0215_Alticinae_sp_028				X					
BT_0216_Eumolpinae_sp_038	X		X	X					
BT_0217_Eumolpinae_sp_038				X					
BT_0218_Galerucinae_sp_031	X	X	X	X	X				X
BT_0219_Eumolpinae_sp_073	X	X	X	X	X				X
BT_0220_Alticinae_sp_115	X	X	X	X	X				X
BT_0221_Eumolpinae_sp_010	X	X	X	X	X				X
BT_0223_Galerucinae_sp_034	X	X	X	X	X				X
BT_0224_Galerucinae_sp_034				X					
BT_0227_Cassidinae_sp_014	X	X	X	X	X				X
BT_0228_Cassidinae_sp_007	X	X	X	X	X				X
BT_0229_Cassidinae_sp_007				X					
BT_0230_Eumolpinae_sp_022	X	X	X	X	X				
BT_0231_Hispinae_sp_003	X	X	X	X	X				X
BT_0232_Hispinae_sp_004	X	X	X	X	X				X
BT_0233_Alticinae_sp_061	X	X	X	X	X				X
BT_0234_Alticinae_sp_097	X	X	X	X	X				X
BT_0235_Alticinae_sp_010	X	X	X	X	X				X
BT_0236_Alticinae_sp_156	X	X	X	X	X				X
BT_0237_Alticinae_sp_156				X					
BT_0239_Galerucinae_sp_002	X	X	X	X	X				X
BT_0240_Eumolpinae_sp_021	X	X	X	X	X				X
BT_0241_Eumolpinae_sp_038	X		X	X					
BT_0242_Eumolpinae_sp_038				X					

Continued on next page(s)

Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_0243_Alticinae_sp_118	X	X	X	X	X				X
BT_0244_Alticinae_sp_097	X	X	X	X	X				X
BT_0245_Galerucinae_sp_034	X	X	X	X	X				X
BT_0246_Galerucinae_sp_030	X	X	X	X	X				X
BT_0247_Criocerinae_sp_001	X	X	X	X	X				X
BT_0249_Criocerinae_sp_001	X	X	X	X	X				X
BT_0250_Alticinae_sp_115	X	X	X	X	X				
BT_0251_Alticinae_sp_115				X					
BT_0252_Galerucinae_sp_034	X	X	X	X	X				X
BT_0253_Galerucinae_sp_034				X					
BT_0254_Eumolpinae_sp_023	X	X	X	X	X				X
BT_0255_Eumolpinae_sp_023				X					
BT_0256_Alticinae_sp_031	X	X	X	X	X				X
BT_0257_Galerucinae_sp_001	X	X	X	X	X				X
BT_0258_Galerucinae_sp_005	X	X	X	X	X				X
BT_0259_Alticinae_sp_096	X	X	X	X	X				X
BT_0260_Eumolpinae_sp_038	X		X	X					
BT_0261_Eumolpinae_sp_038				X					
BT_0266_Alticinae_sp_145	X	X	X	X	X				
BT_0267_Alticinae_sp_029	X	X	X	X	X				X
BT_0268_Alticinae_sp_158	X	X	X	X	X				X
BT_0269_Alticinae_sp_086	X	X	X	X	X				X
BT_0270_Alticinae_sp_086				X					
BT_0271_Alticinae_sp_064	X	X	X	X	X				X
BT_0272_Alticinae_sp_064				X					
BT_0273_Alticinae_sp_141	X	X	X	X	X				X
BT_0274_Alticinae_sp_141				X					
BT_0275_Alticinae_sp_141				X					
BT_0276_Alticinae_sp_122	X	X	X	X	X				X
BT_0277_Alticinae_sp_122				X					
BT_0278_Alticinae_sp_124	X	X	X	X	X				X
BT_0279_Alticinae_sp_115	X	X	X	X	X				X
BT_0280_Eumolpinae_sp_022	X		X	X					
BT_0281_Eumolpinae_sp_038	X		X	X					
BT_0282_Eumolpinae_sp_038				X					
BT_0283_Eumolpinae_sp_020	X	X	X	X	X				X
BT_0284_Alticinae_sp_087	X	X	X	X	X				X
BT_0285_Galerucinae_sp_022	X	X	X	X	X				X
BT_0286_Alticinae_sp_012	X	X	X	X	X				
BT_0287_Eumolpinae_sp_038	X		X	X					
BT_0288_Eumolpinae_sp_017	X	X	X	X	X				X
BT_0289_Eumolpinae_sp_001	X	X	X	X	X				X
BT_0290_Eumolpinae_sp_001				X					
BT_0291_Eumolpinae_sp_001				X					
BT_0292_Galerucinae_sp_076	X	X	X	X	X				X
BT_0293_Galerucinae_sp_076				X					
BT_0294_Galerucinae_sp_076				X					
BT_0295_Galerucinae_sp_031	X	X	X	X	X				X
BT_0296_Alticinae_sp_005	X	X	X	X	X				X
BT_0297_Alticinae_sp_142	X	X	X	X	X				X
BT_0298_Alticinae_sp_063	X	X	X	X	X				X
BT_0299_Alticinae_sp_064	X		X	X					
BT_0300_Alticinae_sp_064				X					
BT_0301_Alticinae_sp_083	X	X	X	X	X				X
BT_0302_Alticinae_sp_086	X	X	X	X	X				X
BT_0303_Alticinae_sp_086				X					
BT_0304_Alticinae_sp_086				X					
BT_0305_Alticinae_sp_081	X	X	X	X	X				X
BT_0306_Alticinae_sp_019	X		X	X					
BT_0307_Alticinae_sp_115	X	X	X	X	X				X
BT_0308_Alticinae_sp_018	X		X	X					
BT_0309_Alticinae_sp_256	X	X	X	X	X				X
BT_0310_Eumolpinae_sp_017	X		X	X					
BT_0311_Eumolpinae_sp_042	X	X	X	X	X				X
BT_0312_Eumolpinae_sp_021	X	X	X	X	X				X
BT_0313_Alticinae_sp_122	X	X	X	X	X				
BT_0314_Eumolpinae_sp_043	X	X	X	X	X				X
BT_0318_Alticinae_sp_124	X								
BT_0319_Galerucinae_sp_026	X	X							
BT_0320_Galerucinae_sp_061	X	X							
BT_0322_Alticinae_sp_143	X		X	X		X	X		
BT_0323_Eumolpinae_sp_011	X		X	X		X	X		
BT_0336_Galerucinae_sp_056	X	X	X	X	X	X	X	X	X
BT_0337_Galerucinae_sp_056	X	X	X	X	X	X	X	X	X
BT_0338_Galerucinae_sp_055	X	X	X	X	X	X	X	X	X
BT_0339_Alticinae_sp_071	X	X	X	X	X	X	X	X	X
BT_0340_Alticinae_sp_064	X		X	X		X	X		
BT_0341_Alticinae_sp_073	X		X	X		X	X		
BT_0342_Galerucinae_sp_051	X		X	X		X	X		
BT_0343_Galerucinae_sp_052	X	X	X	X	X	X	X	X	X
BT_0344_Galerucinae_sp_052				X			X		
BT_0345_Alticinae_sp_051	X		X	X		X	X		
BT_0346_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_0347_Alticinae_sp_051				X			X		
BT_0348_Alticinae_sp_051				X			X		
BT_0349_Eumolpinae_sp_020	X	X	X	X	X	X	X	X	X
BT_0350_Eumolpinae_sp_045	X		X	X		X	X		
BT_0351_Eumolpinae_sp_045				X			X		
BT_0352_Alticinae_sp_130	X	X	X	X	X	X	X	X	X
BT_0353_Alticinae_sp_132	X	X	X	X	X	X	X	X	X
BT_0354_Alticinae_sp_125	X		X	X		X	X		
BT_0355_Alticinae_sp_125				X			X		
BT_0356_Alticinae_sp_128	X	X	X	X	X	X	X	X	X
BT_0357_Alticinae_sp_128				X			X		
BT_0358_Alticinae_sp_128				X			X		
BT_0359_Alticinae_sp_128				X			X		
BT_0361_Alticinae_sp_050	X	X	X	X	X	X	X	X	X
BT_0362_Alticinae_sp_114	X		X	X		X	X		
BT_0363_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_0364_Eumolpinae_sp_018	X		X	X		X	X		
BT_0365_Galerucinae_sp_049	X	X	X	X	X	X	X	X	X
BT_0366_Galerucinae_sp_049				X			X		
BT_0367_Galerucinae_sp_049				X			X		
BT_0368_Galerucinae_sp_049				X			X		
BT_0369_Galerucinae_sp_049				X			X		
BT_0370_Galerucinae_sp_049				X			X		
BT_0371_Eumolpinae_sp_006	X		X	X		X	X		
BT_0372_Alticinae_sp_009	X	X	X	X	X	X	X	X	X
BT_0373_Alticinae_sp_009				X			X		
BT_0374_Alticinae_sp_024	X	X	X	X	X	X	X	X	
BT_0375_Eumolpinae_sp_032	X	X	X	X	X	X	X	X	X
BT_0376_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_0377_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	X
BT_0378_Eumolpinae_sp_024				X			X		
BT_0380_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	X
BT_0381_Galerucinae_sp_089	X		X	X		X	X		
BT_0382_Galerucinae_sp_013	X	X	X	X	X	X	X	X	X

Continued on next page(s)

Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_0383_Alticinae_sp_087	X	X	X	X	X	X	X	X	X
BT_0384_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0385_Alticinae_sp_064	X		X	X		X	X		
BT_0386_Alticinae_sp_064				X			X		
BT_0387_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_0388_Alticinae_sp_104				X			X		
BT_0389_Alticinae_sp_105	X		X	X		X	X		
BT_0390_Alticinae_sp_090	X	X	X	X	X	X	X	X	X
BT_0391_Alticinae_sp_090	X	X	X	X	X	X	X	X	X
BT_0392_Eumolpinae_sp_074	X	X	X	X	X	X	X	X	X
BT_0395_Eumolpinae_sp_074	X	X	X	X	X	X	X	X	X
BT_0396_Cassidinae_sp_004	X	X	X	X	X	X	X	X	X
BT_0397_Alticinae_sp_131	X	X	X	X	X	X	X	X	X
BT_0398_Cassidinae_sp_003	X		X	X		X	X		
BT_0399_Galerucinae_sp_028	X	X	X	X	X	X	X	X	X
BT_0400_Galerucinae_sp_028				X			X		
BT_0401_Galerucinae_sp_054	X		X	X		X	X		
BT_0402_Galerucinae_sp_044	X	X	X	X	X	X	X	X	X
BT_0403_Galerucinae_sp_044	X	X	X	X	X	X	X	X	X
BT_0404_Galerucinae_sp_044				X			X		
BT_0405_Galerucinae_sp_045	X	X	X	X	X	X	X	X	X
BT_0406_Galerucinae_sp_045				X			X		
BT_0407_Galerucinae_sp_049	X	X	X	X	X	X	X	X	X
BT_0408_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	X
BT_0409_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	X
BT_0410_Alticinae_sp_141	X	X	X	X	X	X	X	X	X
BT_0411_Alticinae_sp_058	X	X	X	X	X	X	X	X	X
BT_0412_Alticinae_sp_058				X			X		
BT_0413_Alticinae_sp_058				X			X		
BT_0414_Alticinae_sp_058				X			X		
BT_0415_Alticinae_sp_242	X	X	X	X	X	X	X	X	X
BT_0416_Alticinae_sp_242				X			X		
BT_0417_Galerucinae_sp_074	X	X	X	X	X	X	X	X	X
BT_0418_Eumolpinae_sp_045	X		X	X		X	X		
BT_0419_Alticinae_sp_141	X		X	X		X	X		
BT_0420_Alticinae_sp_128	X	X	X	X	X	X	X	X	X
BT_0421_Alticinae_sp_073	X		X	X		X	X		
BT_0422_Galerucinae_sp_028	X		X	X		X	X		
BT_0423_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	X
BT_0425_Eumolpinae_sp_007	X	X	X	X	X	X	X	X	X
BT_0426_Alticinae_sp_150	X	X	X	X	X	X	X	X	X
BT_0427_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_0428_Alticinae_sp_105	X	X	X	X	X	X	X	X	X
BT_0429_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0430_Eumolpinae_sp_039				X			X		
BT_0431_Eumolpinae_sp_039				X			X		
BT_0432_Eumolpinae_sp_030	X	X	X	X	X	X	X	X	X
BT_0433_Galerucinae_sp_069	X	X	X	X	X	X	X	X	X
BT_0434_Galerucinae_sp_072	X	X	X	X	X	X	X	X	X
BT_0436_Alticinae_sp_149	X	X	X	X	X	X	X	X	X
BT_0437_Alticinae_sp_149				X			X		
BT_0438_Galerucinae_sp_015	X	X	X	X	X	X	X	X	X
BT_0439_Galerucinae_sp_015				X			X		
BT_0440_Alticinae_sp_025	X	X	X	X	X	X	X	X	
BT_0441_Galerucinae_sp_082	X	X	X	X	X	X	X	X	X
BT_0442_Galerucinae_sp_049	X	X	X	X	X	X	X	X	X
BT_0443_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_0444_Alticinae_sp_143	X	X	X	X	X	X	X	X	X
BT_0445_Alticinae_sp_153	X		X	X		X	X		
BT_0446_Alticinae_sp_153				X			X		
BT_0447_Galerucinae_sp_007	X	X	X	X	X	X	X	X	X
BT_0448_Galerucinae_sp_049	X	X	X	X	X	X	X	X	X
BT_0449_Galerucinae_sp_049	X	X	X	X	X	X	X	X	X
BT_0451_Galerucinae_sp_015	X	X	X	X	X	X	X	X	X
BT_0452_Alticinae_sp_009	X	X	X	X	X	X	X	X	X
BT_0453_Alticinae_sp_135	X		X	X		X	X		
BT_0454_Alticinae_sp_026	X	X	X	X	X	X	X	X	X
BT_0455_Alticinae_sp_026				X			X		
BT_0456_Alticinae_sp_026				X			X		
BT_0457_Alticinae_sp_181	X	X	X	X	X	X	X	X	X
BT_0458_Alticinae_sp_181				X			X		
BT_0459_Galerucinae_sp_050	X	X	X	X	X	X	X	X	X
BT_0460_Galerucinae_sp_045	X	X	X	X	X	X	X	X	X
BT_0461_Galerucinae_sp_045	X	X	X	X	X	X	X	X	X
BT_0462_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	X
BT_0463_Galerucinae_sp_070	X	X	X	X	X	X	X	X	X
BT_0464_Eumolpinae_sp_045	X		X	X		X	X		
BT_0465_Alticinae_sp_050	X	X	X	X	X	X	X	X	X
BT_0467_Eumolpinae_sp_018	X		X	X		X	X		
BT_0468_Alticinae_sp_072	X	X	X	X	X	X	X	X	X
BT_0469_Galerucinae_sp_045	X	X	X	X	X	X	X	X	X
BT_0470_Galerucinae_sp_045				X			X		
BT_0471_Galerucinae_sp_045				X			X		
BT_0472_Galerucinae_sp_045				X			X		
BT_0473_Galerucinae_sp_069	X	X	X	X	X	X	X	X	X
BT_0474_Alticinae_sp_080	X	X	X	X	X	X	X	X	X
BT_0475_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0476_Eumolpinae_sp_039				X			X		
BT_0477_Alticinae_sp_104	X		X	X		X	X		
BT_0478_Alticinae_sp_104				X			X		
BT_0480_Hispinae_sp_005	X		X	X		X	X		
BT_0489_Galerucinae_sp_067	X	X	X	X	X	X	X	X	X
BT_0490_Hispinae_sp_005	X	X	X	X	X	X	X	X	X
BT_0491_Alticinae_sp_157	X	X	X	X	X	X	X	X	X
BT_0492_Galerucinae_sp_061	X	X	X	X	X	X	X	X	X
BT_0493_Eumolpinae_sp_037	X		X	X		X	X		
BT_0494_Alticinae_sp_250	X	X	X	X	X	X	X	X	X
BT_0495_Alticinae_sp_148	X		X	X		X	X		
BT_0495a Alticinae_sp_148				X			X		
BT_0496_Alticinae_sp_112	X		X	X		X	X		X
BT_0497_Alticinae_sp_111	X		X	X		X	X		
BT_0498_Alticinae_sp_113	X		X	X		X	X		
BT_0499_Alticinae_sp_044	X	X	X	X	X	X	X	X	X
BT_0500_Alticinae_sp_044				X			X		
BT_0501_Galerucinae_sp_066	X	X	X	X	X	X	X	X	X
BT_0502_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	X
BT_0503_Alticinae_sp_111	X	X	X	X	X	X	X	X	X
BT_0504_Alticinae_sp_111				X			X		
BT_0505_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_0506_Alticinae_sp_092	X	X	X	X	X	X	X	X	X
BT_0507_Alticinae_sp_092				X			X		
BT_0508_Galerucinae_sp_053	X	X	X	X	X	X	X	X	X
BT_0509_Cassidinae_sp_003	X		X	X		X	X		
BT_0510_Cassidinae_sp_004	X	X	X	X	X	X	X	X	X
BT_0511_Cassidinae_sp_008	X	X	X	X	X	X	X	X	X
BT_0512_Hispinae_sp_006	X	X	X	X	X	X	X	X	X
BT_0513_Hispinae_sp_006				X			X		

Continued on next page(s)

Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_0514_Eumolpinae_sp_074	X	X	X	X	X	X	X	X	X
BT_0515_Eumolpinae_sp_074				X			X		
BT_0516_Alticinae_sp_126	X		X	X		X	X		X
BT_0517_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_0518_Alticinae_sp_085	X	X	X	X	X	X	X	X	X
BT_0519_Alticinae_sp_068	X	X	X	X	X	X	X	X	X
BT_0520_Alticinae_sp_159	X	X	X	X	X	X	X	X	X
BT_0524_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0525_Hispinae_sp_023	X	X	X	X	X	X	X	X	X
BT_0526_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0527_Galerucinae_sp_036	X	X	X	X	X	X	X	X	X
BT_0528_Alticinae_sp_150	X	X	X	X	X	X	X	X	X
BT_0529_Alticinae_sp_113	X	X	X	X	X	X	X	X	X
BT_0530_Galerucinae_sp_031	X	X	X	X	X	X	X	X	X
BT_0531_Galerucinae_sp_062	X	X	X	X	X	X	X	X	X
BT_0532_Galerucinae_sp_075	X	X	X	X	X	X	X	X	X
BT_0533_Alticinae_sp_097	X	X	X	X	X	X	X	X	X
BT_0534_Alticinae_sp_111	X		X	X		X	X		
BT_0535_Alticinae_sp_097	X	X	X	X	X	X	X	X	X
BT_0536_Cassidinae_sp_003	X		X	X		X	X		
BT_0537_Alticinae_sp_142	X	X	X	X	X	X	X	X	X
BT_0538_Alticinae_sp_238	X	X	X	X	X	X	X	X	X
BT_0538a_Alticinae_sp_238				X			X		
BT_0539_Alticinae_sp_013	X	X	X	X	X	X	X	X	X
BT_0540_Galerucinae_sp_064	X	X	X	X	X	X	X	X	X
BT_0541_Galerucinae_sp_064				X			X		
BT_0543_Cassidinae_sp_009	X		X	X		X	X		
BT_0544_Cassidinae_sp_012	X	X	X	X	X	X	X	X	X
BT_0546_Alticinae_sp_083	X	X	X	X	X	X	X	X	X
BT_0547_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_0548_Alticinae_sp_112	X		X	X		X	X		
BT_0549_Alticinae_sp_150	X	X	X	X	X	X	X	X	X
BT_0550_Alticinae_sp_265	X	X	X	X	X	X	X	X	X
BT_0551_Galerucinae_sp_064	X	X	X	X	X	X	X	X	X
BT_0552_Alticinae_sp_117	X	X	X	X	X	X	X	X	X
BT_0553_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	X
BT_0554_Galerucinae_sp_071	X	X	X	X	X	X	X	X	X
BT_0555_Alticinae_sp_086	X	X	X	X	X	X	X	X	X
BT_0556_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_0557_Alticinae_sp_181	X		X	X		X	X		X
BT_0558_Alticinae_sp_149	X	X	X	X	X	X	X	X	X
BT_0559_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	X
BT_0560_Galerucinae_sp_064	X	X	X	X	X	X	X	X	X
BT_0561_Galerucinae_sp_066	X	X	X	X	X	X	X	X	X
BT_0562_Cassidinae_sp_009	X		X	X		X	X		
BT_0563_Cassidinae_sp_009				X			X		
BT_0564_Cassidinae_sp_009				X			X		
BT_0565_Alticinae_sp_150	X	X	X	X	X	X	X	X	X
BT_0566_Hispinae_sp_006	X	X	X	X	X	X	X	X	X
BT_0567_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_0568_Alticinae_sp_118	X		X	X		X	X		
BT_0569_Alticinae_sp_118				X			X		
BT_0570_Alticinae_sp_118				X			X		
BT_0571_Alticinae_sp_118				X			X		
BT_0572_Alticinae_sp_118				X			X		
BT_0573_Alticinae_sp_118				X			X		
BT_0574_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0575_Alticinae_sp_140	X	X	X	X	X	X	X	X	X
BT_0576_Alticinae_sp_118	X		X	X		X	X		
BT_0577_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0578_Eumolpinae_sp_039				X			X		
BT_0579_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_0580_Alticinae_sp_104				X			X		
BT_0581_Alticinae_sp_118	X		X	X		X	X		
BT_0582_Alticinae_sp_118				X			X		
BT_0583_Alticinae_sp_118				X			X		
BT_0584_Alticinae_sp_118				X			X		
BT_0585_Eumolpinae_sp_044	X		X	X		X	X		
BT_0586_Alticinae_sp_091	X		X	X		X	X		
BT_0587_Alticinae_sp_006	X	X	X	X	X	X	X	X	X
BT_0588_Galerucinae_sp_069	X	X	X	X	X	X	X	X	X
BT_0589_Eumolpinae_sp_017	X	X	X	X	X	X	X	X	X
BT_0590_Alticinae_sp_140	X	X	X	X	X	X	X	X	X
BT_0592_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0593_Alticinae_sp_118	X		X	X		X	X		
BT_0594_Alticinae_sp_118	X	X	X	X	X	X	X	X	X
BT_0595_Alticinae_sp_118				X			X		
BT_0596_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0597_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_0598_Alticinae_sp_118	X		X	X		X	X		
BT_0599_Alticinae_sp_118				X			X		
BT_0600_Alticinae_sp_118				X			X		
BT_0601_Alticinae_sp_118				X			X		
BT_0602_Alticinae_sp_118				X			X		
BT_0603_Alticinae_sp_118				X			X		
BT_0604_Hispinae_sp_005	X	X	X	X	X	X	X	X	X
BT_0605_Alticinae_sp_087	X	X	X	X	X	X	X	X	X
BT_0606_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0607_Alticinae_sp_118	X		X	X		X	X		
BT_0608_Alticinae_sp_118				X			X		
BT_0609_Alticinae_sp_118				X			X		
BT_0610_Alticinae_sp_118				X			X		
BT_0611_Alticinae_sp_118				X			X		
BT_0612_Alticinae_sp_118				X			X		
BT_0613_Alticinae_sp_118				X			X		
BT_0614_Alticinae_sp_118				X			X		
BT_0615_Alticinae_sp_118				X			X		
BT_0616_Alticinae_sp_118				X			X		
BT_0617_Alticinae_sp_118				X			X		
BT_0618_Alticinae_sp_118				X			X		
BT_0619_Alticinae_sp_118				X			X		
BT_0620_Alticinae_sp_118				X			X		
BT_0621_Alticinae_sp_118				X			X		
BT_0622_Alticinae_sp_118				X			X		
BT_0623_Alticinae_sp_118				X			X		
BT_0624_Alticinae_sp_118	X		X	X		X	X		
BT_0625_Cassidinae_sp_003	X		X	X		X	X		
BT_0626_Alticinae_sp_118	X		X	X		X	X		
BT_0627_Alticinae_sp_118				X			X		
BT_0628_Cassidinae_sp_012	X	X	X	X	X	X	X	X	X
BT_0629_Cassidinae_sp_012				X			X		
BT_0630_Alticinae_sp_036	X	X	X	X	X	X	X	X	X
BT_0631_Alticinae_sp_064	X	X	X	X	X	X	X	X	X
BT_0632_Alticinae_sp_086	X	X	X	X	X	X	X	X	X
BT_0633_Alticinae_sp_085	X	X	X	X	X	X	X	X	X
BT_0634_Alticinae_sp_066	X	X	X	X	X	X	X	X	X
BT_0635_Alticinae_sp_096	X	X	X	X	X	X	X	X	X

Continued on next page(s)

Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_0636_Alticinae_sp_096				X			X		
BT_0637_Alticinae_sp_096				X			X		
BT_0638_Alticinae_sp_084	X		X	X		X	X		
BT_0639_Alticinae_sp_096	X		X	X		X	X		
BT_0640_Alticinae_sp_018	X	X	X	X	X	X	X	X	X
BT_0641_Alticinae_sp_013	X	X	X	X	X	X	X	X	X
BT_0642_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	X
BT_0643_Eumolpinae_sp_042				X			X		
BT_0644_Galerucinae_sp_066	X	X	X	X	X	X	X	X	X
BT_0645_Galerucinae_sp_011	X	X	X	X	X	X	X	X	X
BT_0646_Alticinae_sp_071	X	X	X	X	X	X	X	X	X
BT_0647_Galerucinae_sp_035	X	X	X	X	X	X	X	X	X
BT_0648_Alticinae_sp_140	X	X	X	X	X	X	X	X	X
BT_0649_Alticinae_sp_140				X			X		
BT_0650_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0651_Eumolpinae_sp_039				X			X		
BT_0652_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_0653_Alticinae_sp_104				X			X		
BT_0654_Alticinae_sp_104				X			X		
BT_0655_Alticinae_sp_257	X	X	X	X	X	X	X	X	X
BT_0656_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_0656a_Alticinae_sp_051				X			X		
BT_0657_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0658_Eumolpinae_sp_039				X			X		
BT_0659_Eumolpinae_sp_039				X			X		
BT_0660_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_0661_Alticinae_sp_104				X			X		
BT_0662_Alticinae_sp_126	X	X	X	X	X	X	X	X	X
BT_0663_Alticinae_sp_150	X	X	X	X	X	X	X	X	X
BT_0664_Alticinae_sp_150	X	X	X	X	X	X	X	X	X
BT_0665_Alticinae_sp_150	X	X	X	X	X	X	X	X	X
BT_0666_Alticinae_sp_150				X			X		
BT_0667_Alticinae_sp_150				X			X		
BT_0668_Alticinae_sp_150				X			X		
BT_0669_Alticinae_sp_150				X			X		
BT_0670_Alticinae_sp_150				X			X		
BT_0671_Alticinae_sp_150				X			X		
BT_0672_Alticinae_sp_150				X			X		
BT_0673_Alticinae_sp_150				X			X		
BT_0674_Alticinae_sp_150				X			X		
BT_0675_Alticinae_sp_008	X	X	X	X	X	X	X	X	X
BT_0676_Alticinae_sp_064	X	X	X	X	X	X	X	X	X
BT_0677_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	X
BT_0678_Eumolpinae_sp_044	X		X	X		X	X		
BT_0679_Eumolpinae_sp_001	X		X	X					
BT_0680_Galerucinae_sp_076	X	X	X	X	X				X
BT_0681_Galerucinae_sp_076				X					
BT_0682_Galerucinae_sp_076				X					
BT_0683_Alticinae_sp_115	X	X	X	X	X				X
BT_0684_Alticinae_sp_115				X					
BT_0685_Alticinae_sp_115				X					
BT_0686_Eumolpinae_sp_023	X	X	X	X	X				X
BT_0687_Alticinae_sp_087	X	X	X	X	X				X
BT_0688_Criocerinae_sp_001	X	X	X	X	X				X
BT_0689_Criocerinae_sp_001				X					
BT_0690_Alticinae_sp_124	X	X	X	X	X				X
BT_0691_Galerucinae_sp_031	X	X	X	X	X				X
BT_0692_Alticinae_sp_014	X	X	X	X	X				X
BT_0693_Alticinae_sp_014				X					
BT_0694_Alticinae_sp_014				X					
BT_0695_Alticinae_sp_014				X					
BT_0696_Alticinae_sp_014				X					
BT_0697_Alticinae_sp_014				X					
BT_0698_Alticinae_sp_013	X	X	X	X	X				X
BT_0699_Alticinae_sp_083	X	X	X	X	X				X
BT_0700_Alticinae_sp_083				X					
BT_0701_Alticinae_sp_083				X					
BT_0705_Galerucinae_sp_008	X	X	X	X	X				X
BT_0706_Eumolpinae_sp_038	X								
BT_0708_Alticinae_sp_135	X	X							
BT_0709_Galerucinae_sp_064	X	X	X	X	X				X
BT_0710_Alticinae_sp_013	X	X	X	X	X				X
BT_0711_Galerucinae_sp_073	X	X	X	X	X				X
BT_0712_Galerucinae_sp_073				X					
BT_0713_Galerucinae_sp_073	X	X	X	X	X				X
BT_0714_Galerucinae_sp_042	X		X	X					
BT_0715_Galerucinae_sp_076	X	X	X	X	X				X
BT_0716_Galerucinae_sp_011	X	X	X	X	X				X
BT_0717_Galerucinae_sp_002	X	X	X	X	X				X
BT_0718_Galerucinae_sp_002				X					
BT_0719_Eumolpinae_sp_043	X	X	X	X	X				X
BT_0720_Eumolpinae_sp_043				X					
BT_0721_Eumolpinae_sp_020	X	X	X	X	X				X
BT_0722_Cassidinae_sp_013	X	X	X	X	X				X
BT_0725_Alticinae_sp_243	X	X	X	X	X				X
BT_0726_Alticinae_sp_243				X					
BT_0727_Galerucinae_sp_073	X	X	X	X	X				X
BT_0728_Galerucinae_sp_064	X	X	X	X	X				X
BT_0729_Galerucinae_sp_015	X	X	X	X	X				X
BT_0730_Alticinae_sp_136	X	X	X	X	X				X
BT_0731_Alticinae_sp_004	X		X	X					
BT_0732_Galerucinae_sp_004	X	X	X	X	X				X
BT_0733_Galerucinae_sp_097	X	X	X	X	X				X
BT_0734_Galerucinae_sp_039	X	X	X	X	X				X
BT_0735_Galerucinae_sp_038	X	X	X	X	X				X
BT_0736_Galerucinae_sp_026	X	X	X	X	X				X
BT_0737_Galerucinae_sp_026				X					
BT_0738_Eumolpinae_sp_004	X	X	X	X	X				X
BT_0739_Galerucinae_sp_018	X	X	X	X	X				X
BT_0740_Galerucinae_sp_076	X	X	X	X	X				X
BT_0741_Galerucinae_sp_002	X	X	X	X	X				X
BT_0742_Galerucinae_sp_019	X	X	X	X	X				X
BT_0743_Galerucinae_sp_014	X	X	X	X	X				X
BT_0744_Galerucinae_sp_007	X	X	X	X	X				X
BT_0745_Galerucinae_sp_007				X					
BT_0746_Galerucinae_sp_007				X					
BT_0747_Galerucinae_sp_038	X	X	X	X	X				X
BT_0748_Galerucinae_sp_038				X					
BT_0749_Galerucinae_sp_039	X	X	X	X	X				X
BT_0750_Cassidinae_sp_005	X	X	X	X	X				X
BT_0751_Galerucinae_sp_062	X	X	X	X	X				
BT_0752_Alticinae_sp_039	X	X	X	X	X				X
BT_0753_Alticinae_sp_010	X	X	X	X	X				X
BT_0754_Eumolpinae_sp_008	X		X	X					
BT_0755_Galerucinae_sp_036	X	X	X	X	X				X
BT_0756_Eumolpinae_sp_022	X	X	X	X	X				X
BT_0757_Eumolpinae_sp_022				X					

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_0758_Eumolpinae_sp_022				X					
BT_0759_Eumolpinae_sp_038	X		X	X					
BT_0760_Eumolpinae_sp_038				X					
BT_0761_Eumolpinae_sp_038				X					
BT_0762_Eumolpinae_sp_038				X					
BT_0763_Eumolpinae_sp_038				X					
BT_0764_Eumolpinae_sp_038				X					
BT_0765_Eumolpinae_sp_038				X					
BT_0766_Alticinae_sp_096	X	X	X	X	X				X
BT_0767_Alticinae_sp_096				X					
BT_0768_Alticinae_sp_096				X					
BT_0770_Eumolpinae_sp_016	X	X	X	X	X				X
BT_0771_Eumolpinae_sp_016				X					
BT_0772_Eumolpinae_sp_016				X					
BT_0773_Eumolpinae_sp_016				X					
BT_0774_Eumolpinae_sp_016				X					
BT_0775_Eumolpinae_sp_016				X					
BT_0776_Alticinae_sp_018	X		X	X					
BT_0777_Alticinae_sp_018				X					
BT_0778_Alticinae_sp_018				X					
BT_0779_Alticinae_sp_115	X	X	X	X	X				X
BT_0780_Alticinae_sp_115				X					
BT_0781_Eumolpinae_sp_020	X	X	X	X	X				X
BT_0782_Galerucinae_sp_034	X	X	X	X	X				X
BT_0788_Alticinae_sp_006	X	X	X	X	X				X
BT_0789_Alticinae_sp_014	X	X	X	X	X				X
BT_0790_Alticinae_sp_014				X					
BT_0791_Eumolpinae_sp_016	X	X	X	X	X				X
BT_0792_Alticinae_sp_115	X	X	X	X	X				X
BT_0793_Alticinae_sp_115				X					
BT_0794_Alticinae_sp_129	X	X	X	X	X				X
BT_0795_Alticinae_sp_096	X	X	X	X	X				X
BT_0796_Alticinae_sp_097	X	X	X	X	X				X
BT_0799_Cassidinae_sp_014	X	X	X	X	X				X
BT_0800_Galerucinae_sp_030	X	X	X	X	X				X
BT_0801_Cassidinae_sp_006	X		X	X					
BT_0802_Cassidinae_sp_006				X					
BT_0803_Galerucinae_sp_076	X	X	X	X	X				X
BT_0804_Alticinae_sp_028	X	X	X	X	X				X
BT_0805_Alticinae_sp_014	X	X	X	X	X				X
BT_0806_Alticinae_sp_013	X	X	X	X	X				X
BT_0807_Alticinae_sp_054	X	X	X	X	X				X
BT_0808_Alticinae_sp_064	X	X	X	X	X				
BT_0809_Alticinae_sp_012	X	X	X	X	X				X
BT_0810_Galerucinae_sp_046	X	X	X	X	X				X
BT_0811_Criocerinae_sp_006	X	X	X	X	X				X
BT_0812_Criocerinae_sp_006				X					
BT_0813_Criocerinae_sp_004	X	X	X	X	X				X
BT_0814_Alticinae_sp_086	X	X	X	X	X				X
BT_0815_Alticinae_sp_032	X	X	X	X	X				X
BT_0816_Galerucinae_sp_019	X	X	X	X	X				X
BT_0817_Alticinae_sp_087	X	X	X	X	X				X
BT_0818_Galerucinae_sp_061	X	X	X	X	X				X
BT_0819_Eumolpinae_sp_074	X	X	X	X	X				X
BT_0820_Eumolpinae_sp_038	X	X	X	X	X				X
BT_0821_Eumolpinae_sp_038				X					
BT_0822_Galerucinae_sp_033	X		X	X					
BT_0823_Galerucinae_sp_034	X	X	X	X	X				X
BT_0824_Galerucinae_sp_034				X					
BT_0825_Galerucinae_sp_034				X					
BT_0826_Galerucinae_sp_034				X					
BT_0827_Eumolpinae_sp_020	X	X	X	X	X				X
BT_0828_Alticinae_sp_118	X	X	X	X	X				X
BT_0829_Alticinae_sp_115	X	X	X	X	X				X
BT_0830_Alticinae_sp_115				X					
BT_0831_Alticinae_sp_147	X	X	X	X	X				X
BT_0832_Alticinae_sp_147				X					
BT_0835_Galerucinae_sp_029	X	X	X	X	X				X
BT_0836_Alticinae_sp_003	X	X	X	X	X				X
BT_0837_Alticinae_sp_009	X	X	X	X	X				X
BT_0838_Alticinae_sp_059	X		X	X					
BT_0839_Alticinae_sp_040	X	X	X	X	X				X
BT_0840_Alticinae_sp_140	X	X	X	X	X				X
BT_0841_Alticinae_sp_127	X	X	X	X	X				X
BT_0842_Alticinae_sp_127				X					
BT_0843_Alticinae_sp_136	X	X	X	X	X				X
BT_0844_Alticinae_sp_138	X		X	X					
BT_0847_Eumolpinae_sp_005	X	X	X	X	X				X
BT_0848_Alticinae_sp_045	X	X	X	X	X				X
BT_0849_Alticinae_sp_045				X					
BT_0850_Alticinae_sp_049	X	X	X	X	X				X
BT_0851_Alticinae_sp_065	X	X	X	X	X				X
BT_0852_Alticinae_sp_133	X	X	X	X	X				X
BT_0853_Alticinae_sp_133				X					
BT_0854_Alticinae_sp_133				X					
BT_0855_Alticinae_sp_018	X	X	X	X	X				X
BT_0856_Alticinae_sp_018				X					
BT_0857_Alticinae_sp_018				X					
BT_0858_Alticinae_sp_018				X					
BT_0859_Alticinae_sp_018				X					
BT_0860_Alticinae_sp_018				X					
BT_0861_Eumolpinae_sp_020	X	X	X	X	X				X
BT_0862_Alticinae_sp_115	X	X	X	X	X				X
BT_0863_Alticinae_sp_115				X					
BT_0864_Alticinae_sp_253	X	X	X	X	X				X
BT_0865_Alticinae_sp_096	X	X	X	X	X				X
BT_0866_Alticinae_sp_096				X					
BT_0867_Alticinae_sp_096				X					
BT_0868_Alticinae_sp_122	X	X	X	X	X				
BT_0869_Alticinae_sp_122				X					
BT_0870_Alticinae_sp_122				X					
BT_0871_Alticinae_sp_086	X	X	X	X	X				X
BT_0872_Alticinae_sp_086				X					
BT_0873_Alticinae_sp_085	X	X	X	X	X				X
BT_0877_Cassidinae_sp_005	X	X							
BT_0879_Eumolpinae_sp_043	X	X							
BT_0880_Criocerinae_sp_001	X	X							
BT_0892_Galerucinae_sp_035	X	X							
BT_0893_Alticinae_sp_083	X	X							
BT_0895_Cassidinae_sp_006	X								
BT_0899_Chrysomelinae_sp_001	X	X							
BT_0900_Alticinae_sp_033	X	X							
BT_0902_Alticinae_sp_062	X	X							
BT_0903_Alticinae_sp_087	X	X							
BT_0904_Alticinae_sp_046	X	X							
BT_0905_Galerucinae_sp_060	X	X							
BT_0906_Galerucinae_sp_046	X	X							

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_0907_Galerucinae_sp_046	X	X							
BT_0908_Criocerinae_sp_005	X	X							
BT_0909_Criocerinae_sp_001	X	X							
BT_0924_Cryptocephalinae_sp_001	X	X							
BT_0925_Eumolpinae_sp_029	X	X							
BT_0926_Lamprosomatinae_sp_002	X								
BT_0930_Galerucinae_sp_046	X	X							
BT_0932_Alticinae_sp_015	X	X							
BT_0934_Alticinae_sp_116	X	X							
BT_0935_Alticinae_sp_082	X	X							
BT_0936_Eumolpinae_sp_026	X	X							
BT_0937_Alticinae_sp_101	X								
BT_0943_Galerucinae_sp_033	X								
BT_0949_Cassidinae_sp_002	X	X	X	X	X				X
BT_0950_Cassidinae_sp_010	X	X	X	X	X				X
BT_0951_Cassidinae_sp_011	X	X	X	X	X				X
BT_0952_Alticinae_sp_269	X	X	X	X	X				X
BT_0953_Galerucinae_sp_028	X	X	X	X	X				X
BT_0954_Galerucinae_sp_029	X	X	X	X	X				X
BT_0955_Galerucinae_sp_020	X	X	X	X	X				X
BT_0956_Alticinae_sp_011	X	X	X	X	X				
BT_0957_Galerucinae_sp_036	X	X	X	X	X				X
BT_0958_Alticinae_sp_154	X	X	X	X	X				X
BT_0959_Galerucinae_sp_052	X	X	X	X	X				X
BT_0960_Galerucinae_sp_047	X	X	X	X	X				X
BT_0961_Alticinae_sp_077	X	X	X	X	X				X
BT_0962_Alticinae_sp_076	X	X	X	X	X				X
BT_0963_Eumolpinae_sp_033	X		X	X					
BT_0964_Alticinae_sp_030	X	X	X	X	X				X
BT_0965_Criocerinae_sp_002	X	X	X	X	X				X
BT_0966_Criocerinae_sp_003	X		X	X					X
BT_0967_Eumolpinae_sp_046	X	X	X	X	X				X
BT_0968_Alticinae_sp_099	X	X	X	X	X				X
BT_0969_Alticinae_sp_099				X					
BT_0970_Alticinae_sp_023	X		X	X					
BT_0971_Alticinae_sp_194	X	X	X	X	X				X
BT_0972_Alticinae_sp_127	X	X	X	X	X				X
BT_0973_Alticinae_sp_097	X	X	X	X	X				X
BT_0979_Eumolpinae_sp_042	X	X							
BT_0980_Alticinae_sp_005	X	X							
BT_0981_Eumolpinae_sp_006	X	X							
BT_0982_Alticinae_sp_022	X	X							
BT_0983_Alticinae_sp_052	X	X							
BT_1021_Galerucinae_sp_027	X	X							
BT_1025_Eumolpinae_sp_038	X		X	X					
BT_1026_Eumolpinae_sp_038				X					
BT_1027_Eumolpinae_sp_038				X					
BT_1028_Alticinae_sp_052	X	X	X	X	X				
BT_1029_Alticinae_sp_052				X					
BT_1030_Alticinae_sp_240	X	X	X	X	X				X
BT_1031_Alticinae_sp_002	X	X	X	X	X				X
BT_1032_Alticinae_sp_002				X					
BT_1033_Alticinae_sp_149	X	X	X	X	X				X
BT_1034_Alticinae_sp_048	X	X	X	X	X				X
BT_1035_Alticinae_sp_150	X	X	X	X	X				X
BT_1036_Alticinae_sp_062	X	X	X	X	X				X
BT_1037_Alticinae_sp_062				X					
BT_1038_Alticinae_sp_065	X	X	X	X	X				X
BT_1039_Alticinae_sp_065				X					
BT_1040_Alticinae_sp_065				X					
BT_1041_Alticinae_sp_065				X					
BT_1042_Alticinae_sp_065				X					
BT_1043_Alticinae_sp_066	X	X	X	X	X				X
BT_1044_Alticinae_sp_081	X	X	X	X	X				
BT_1045_Alticinae_sp_086	X	X	X	X	X				
BT_1046_Alticinae_sp_086				X					
BT_1047_Alticinae_sp_086				X					
BT_1048_Alticinae_sp_086				X					
BT_1049_Alticinae_sp_086				X					
BT_1050_Alticinae_sp_086				X					
BT_1051_Alticinae_sp_086				X					
BT_1052_Alticinae_sp_086				X					
BT_1053_Alticinae_sp_086				X					
BT_1054_Alticinae_sp_086				X					
BT_1055_Alticinae_sp_085	X	X	X	X	X				X
BT_1056_Alticinae_sp_085				X					
BT_1057_Alticinae_sp_085				X					
BT_1058_Alticinae_sp_085				X					
BT_1059_Alticinae_sp_081	X	X	X	X	X				
BT_1060_Alticinae_sp_085	X	X	X	X	X				X
BT_1061_Galerucinae_sp_096	X	X	X	X	X				X
BT_1062_Galerucinae_sp_096				X					
BT_1064_Alticinae_sp_142	X	X	X	X	X				X
BT_1065_Alticinae_sp_020	X	X	X	X	X				X
BT_1066_Alticinae_sp_018	X		X	X					
BT_1067_Alticinae_sp_018				X					
BT_1068_Alticinae_sp_018	X		X	X					
BT_1069_Alticinae_sp_123	X	X	X	X	X				
BT_1070_Alticinae_sp_097	X	X	X	X	X				X
BT_1071_Alticinae_sp_096	X	X	X	X	X				X
BT_1072_Alticinae_sp_096				X					
BT_1073_Alticinae_sp_096				X					
BT_1074_Alticinae_sp_096				X					
BT_1075_Alticinae_sp_096				X					
BT_1076_Alticinae_sp_096				X					
BT_1079_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_1080_Eumolpinae_sp_074	X	X	X	X	X	X	X	X	X
BT_1081_Alticinae_sp_027	X	X	X	X	X	X	X	X	X
BT_1082_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_1083_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_1084_Alticinae_sp_096				X			X		
BT_1085_Alticinae_sp_061	X	X	X	X	X	X	X	X	X
BT_1086_Alticinae_sp_083	X	X	X	X	X	X	X	X	X
BT_1087_Alticinae_sp_109	X	X	X	X	X	X	X	X	X
BT_1088_Galerucinae_sp_031	X	X	X	X	X	X	X	X	X
BT_1089_Galerucinae_sp_031				X			X		
BT_1090_Alticinae_sp_019	X	X	X	X	X	X	X	X	X
BT_1091_Cassidinae_sp_012	X	X	X	X	X	X	X	X	X
BT_1092_Cassidinae_sp_003	X	X	X	X	X	X	X	X	X
BT_1093_Hispinae_sp_007	X	X	X	X	X	X	X	X	X
BT_1094_Eumolpinae_sp_038	X	X	X	X	X	X	X	X	X
BT_1095_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_1096_Galerucinae_sp_036	X	X	X	X	X	X	X	X	X
BT_1098_Alticinae_sp_097	X	X	X	X	X	X	X	X	X
BT_1101_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_1104_Alticinae_sp_140	X	X	X	X	X	X	X	X	X
BT_1105_Alticinae_sp_074	X	X	X	X	X	X	X	X	X

Continued on next page(s)

Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_1106_Galerucinae_sp_064	X	X	X	X	X	X	X	X	X
BT_1107_Alticinae_sp_099	X	X	X	X	X	X	X	X	X
BT_1108_Alticinae_sp_092	X	X	X	X	X	X	X	X	X
BT_1109_Alticinae_sp_041	X	X	X	X	X	X	X	X	X
BT_1110_Galerucinae_sp_046	X	X	X	X	X	X	X	X	X
BT_1111_Galerucinae_sp_034	X		X	X		X	X		
BT_1112_Alticinae_sp_112	X	X	X	X	X	X	X	X	X
BT_1114_Alticinae_sp_041	X	X	X	X	X	X	X	X	X
BT_1116_Cassidinae_sp_006	X		X	X		X	X		
BT_1117_Alticinae_sp_049	X	X	X	X	X	X	X	X	X
BT_1118_Alticinae_sp_123	X	X	X	X	X	X	X	X	X
BT_1119_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_1120_Alticinae_sp_181	X		X	X		X	X		
BT_1121_Alticinae_sp_124	X	X	X	X	X	X	X	X	X
BT_1122_Alticinae_sp_265	X	X	X	X	X	X	X	X	X
BT_1124_Cassidinae_sp_007	X	X	X	X	X	X	X	X	X
BT_1125_Galerucinae_sp_059	X	X	X	X	X	X	X	X	X
BT_1126_Hispinae_sp_003	X	X	X	X	X	X	X	X	X
BT_1127_Alticinae_sp_066	X	X	X	X	X	X	X	X	X
BT_1128_Alticinae_sp_018	X	X	X	X	X	X	X	X	X
BT_1129_Alticinae_sp_123	X	X	X	X	X	X	X	X	X
BT_1130_Alticinae_sp_140	X	X	X	X	X	X	X	X	
BT_1131_Alticinae_sp_081	X	X	X	X	X	X	X	X	X
BT_1132_Alticinae_sp_086	X	X	X	X	X	X	X	X	X
BT_1133_Alticinae_sp_086				X			X		
BT_1134_Alticinae_sp_086				X			X		
BT_1135_Alticinae_sp_086				X			X		
BT_1136_Alticinae_sp_086				X			X		
BT_1137_Alticinae_sp_086				X			X		
BT_1138_Alticinae_sp_086	X	X	X	X	X	X	X	X	X
BT_1142_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_1143_Hispinae_sp_007	X	X	X	X	X	X	X	X	X
BT_1145_Cassidinae_sp_003	X	X	X	X	X	X	X	X	X
BT_1146_Eumolpinae_sp_014	X	X	X	X	X	X	X	X	X
BT_1147_Alticinae_sp_152	X	X	X	X	X	X	X	X	X
BT_1148_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_1151_Alticinae_sp_057	X	X	X	X	X	X	X	X	X
BT_1152_Alticinae_sp_141	X	X	X	X	X	X	X	X	X
BT_1154_Alticinae_sp_121	X	X	X	X	X	X	X	X	
BT_1155_Alticinae_sp_121				X			X		
BT_1157_Alticinae_sp_149	X	X	X	X	X	X	X	X	X
BT_1158_Alticinae_sp_146	X	X	X	X	X	X	X	X	X
BT_1159_Alticinae_sp_146				X			X		
BT_1160_Alticinae_sp_055	X	X	X	X	X	X	X	X	X
BT_1161_Alticinae_sp_143	X	X	X	X	X	X	X	X	X
BT_1164_Alticinae_sp_087	X		X	X		X	X		
BT_1165_Alticinae_sp_061	X	X	X	X	X	X	X	X	X
BT_1166_Alticinae_sp_140	X	X	X	X	X	X	X	X	X
BT_1167_Alticinae_sp_140				X			X		
BT_1168_Alticinae_sp_140				X			X		
BT_1169_Alticinae_sp_100	X	X	X	X	X	X	X	X	
BT_1170_Alticinae_sp_105	X	X	X	X	X	X	X	X	X
BT_1171_Alticinae_sp_085	X	X	X	X	X	X	X	X	X
BT_1175_Alticinae_sp_087	X	X	X	X	X	X	X	X	X
BT_1176_Alticinae_sp_052	X	X	X	X	X	X	X	X	X
BT_1178_Alticinae_sp_087	X	X	X	X	X	X	X	X	X
BT_1179_Alticinae_sp_118	X	X	X	X	X	X	X	X	X
BT_1180_Alticinae_sp_118				X			X		
BT_1181_Alticinae_sp_118				X			X		
BT_1182_Alticinae_sp_118				X			X		
BT_1183_Alticinae_sp_118				X			X		
BT_1184_Alticinae_sp_118				X			X		
BT_1185_Alticinae_sp_118				X			X		
BT_1186_Alticinae_sp_118				X			X		
BT_1187_Alticinae_sp_118				X			X		
BT_1188_Alticinae_sp_118				X			X		
BT_1189_Alticinae_sp_118				X			X		
BT_1190_Alticinae_sp_118				X			X		
BT_1191_Alticinae_sp_118				X			X		
BT_1192_Alticinae_sp_118				X			X		
BT_1194_Alticinae_sp_087	X	X	X	X	X	X	X	X	X
BT_1195_Alticinae_sp_087				X			X		
BT_1196_Alticinae_sp_108	X	X	X	X	X	X	X	X	X
BT_1197_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_1198_Alticinae_sp_131	X	X	X	X	X	X	X	X	X
BT_1199_Alticinae_sp_118	X	X	X	X	X	X	X	X	X
BT_1200_Alticinae_sp_118				X			X		
BT_1201_Alticinae_sp_118				X			X		
BT_1202_Alticinae_sp_118				X			X		
BT_1203_Alticinae_sp_118				X			X		
BT_1204_Alticinae_sp_111	X		X	X		X	X		
BT_1205_Alticinae_sp_052	X	X	X	X	X	X	X	X	X
BT_1206_Alticinae_sp_052				X			X		
BT_1207_Alticinae_sp_052				X			X		
BT_1208_Galerucinae_sp_046	X	X	X	X	X	X	X	X	X
BT_1209_Galerucinae_sp_046				X			X		
BT_1210_Alticinae_sp_064	X	X	X	X	X	X	X	X	X
BT_1211_Alticinae_sp_018	X	X	X	X	X	X	X	X	X
BT_1212_Alticinae_sp_017	X	X	X	X	X	X	X	X	X
BT_1213_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_1214_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_1215_Alticinae_sp_144	X	X	X	X	X	X	X	X	X
BT_1216_Alticinae_sp_049	X	X	X	X	X	X	X	X	X
BT_1217_Alticinae_sp_145	X	X	X	X	X	X	X	X	X
BT_1219_Alticinae_sp_086	X	X	X	X	X	X	X	X	X
BT_1220_Galerucinae_sp_034	X	X	X	X	X	X	X	X	X
BT_1221_Galerucinae_sp_034				X			X		
BT_1222_Alticinae_sp_052	X	X	X	X	X	X	X	X	X
BT_1223_Alticinae_sp_028	X	X	X	X	X	X	X	X	X
BT_1224_Galerucinae_sp_075	X	X	X	X	X	X	X	X	X
BT_1225_Eumolpinae_sp_040	X	X	X	X	X	X	X	X	X
BT_1226_Galerucinae_sp_034	X	X	X	X	X	X	X	X	X
BT_1227_Galerucinae_sp_034				X			X		
BT_1228_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_1229_Alticinae_sp_096				X			X		
BT_1230_Alticinae_sp_115	X	X	X	X	X	X	X	X	X
BT_1233_Alticinae_sp_052	X	X	X	X	X	X	X	X	X
BT_1234_Alticinae_sp_052				X			X		
BT_1235_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_1236_Alticinae_sp_096				X			X		
BT_1237_Galerucinae_sp_034	X		X	X		X	X		
BT_1238_Galerucinae_sp_034				X			X		
BT_1239_Galerucinae_sp_034				X			X		
BT_1240_Eumolpinae_sp_041	X	X	X	X	X	X	X	X	X
BT_1242_Lamprosomatinae_sp_003	X		X	X		X	X		
BT_1244_Alticinae_sp_118	X		X	X		X	X		
BT_1245_Alticinae_sp_085	X	X	X	X	X	X	X	X	X

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_1248_Alticinae_sp_118	X		X	X		X	X		
BT_1249_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_1250_Alticinae_sp_104				X			X		
BT_1251_Alticinae_sp_131	X	X	X	X	X	X	X	X	X
BT_1252_Alticinae_sp_086	X	X	X	X	X	X	X	X	X
BT_1258_Galerucinae_sp_028	X	X	X	X	X	X	X	X	X
BT_1259_Galerucinae_sp_049	X	X	X	X	X	X	X	X	X
BT_1260_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	X
BT_1261_Alticinae_sp_103	X	X	X	X	X	X	X	X	
BT_1262_Alticinae_sp_141	X		X	X		X	X		
BT_1263_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_1264_Alticinae_sp_078	X	X	X	X	X	X	X	X	X
BT_1265_Alticinae_sp_093	X		X	X		X	X		
BT_1266_Alticinae_sp_093				X			X		
BT_1267_Alticinae_sp_128	X	X	X	X	X	X	X	X	X
BT_1269_Alticinae_sp_009	X	X	X	X	X	X	X	X	X
BT_1270_Galerucinae_sp_028	X	X	X	X	X	X	X	X	X
BT_1271_Alticinae_sp_057	X	X	X	X	X	X	X	X	X
BT_1272_Alticinae_sp_128	X	X	X	X	X	X	X	X	X
BT_1273_Galerucinae_sp_028	X	X	X	X	X	X	X	X	X
BT_1274_Alticinae_sp_042	X	X	X	X	X	X	X	X	X
BT_1275_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_1276_Alticinae_sp_093	X		X	X		X	X		
BT_1277_Alticinae_sp_093				X			X		
BT_1278_Alticinae_sp_143	X	X	X	X	X	X	X	X	X
BT_1279_Alticinae_sp_125	X		X	X		X	X		
BT_1280_Alticinae_sp_069	X	X	X	X	X	X	X	X	X
BT_1281_Galerucinae_sp_047	X	X	X	X	X	X	X	X	X
BT_1282_Galerucinae_sp_052	X	X	X	X	X	X	X	X	X
BT_1283_Galerucinae_sp_006	X	X	X	X	X	X	X	X	X
BT_1284_Galerucinae_sp_063	X	X	X	X	X	X	X	X	X
BT_1285_Galerucinae_sp_047	X	X	X	X	X	X	X	X	
BT_1286_Alticinae_sp_021	X	X	X	X	X	X	X	X	X
BT_1287_Alticinae_sp_067	X	X	X	X	X	X	X	X	X
BT_1288_Alticinae_sp_103	X	X	X	X	X	X	X	X	X
BT_1289_Alticinae_sp_102	X		X	X		X	X		
BT_1293_Alticinae_sp_050	X	X	X	X	X	X	X	X	X
BT_1294_Galerucinae_sp_072	X	X	X	X	X	X	X	X	X
BT_1295_Alticinae_sp_057	X	X	X	X	X	X	X	X	X
BT_1296_Alticinae_sp_057				X			X		
BT_1297_Alticinae_sp_057				X			X		
BT_1298_Alticinae_sp_057				X			X		
BT_1299_Alticinae_sp_057				X			X		
BT_1300_Alticinae_sp_057				X			X		
BT_1301_Alticinae_sp_057				X			X		
BT_1302_Alticinae_sp_057				X			X		
BT_1303_Alticinae_sp_057				X			X		
BT_1304_Galerucinae_sp_047	X	X	X	X	X	X	X	X	X
BT_1305_Alticinae_sp_093	X	X	X	X	X	X	X	X	X
BT_1306_Alticinae_sp_125	X		X	X		X	X		
BT_1307_Eumolpinae_sp_016	X	X	X	X	X	X	X	X	X
BT_1308_Alticinae_sp_134	X	X	X	X	X	X	X	X	X
BT_1309_Alticinae_sp_118	X		X	X		X	X		
BT_1310_Alticinae_sp_035	X	X	X	X	X	X	X	X	X
BT_1311_Alticinae_sp_069	X	X	X	X	X	X	X	X	X
BT_1312_Alticinae_sp_093	X	X	X	X	X	X	X	X	X
BT_1313_Alticinae_sp_093				X			X		
BT_1314_Alticinae_sp_093				X			X		
BT_1315_Alticinae_sp_093				X			X		
BT_1318_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	X
BT_1319_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_1321_Galerucinae_sp_061	X	X	X	X	X	X	X	X	X
BT_1322_Alticinae_sp_019	X	X	X	X	X	X	X	X	X
BT_1323_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_1324_Alticinae_sp_092	X	X	X	X	X	X	X	X	X
BT_1325_Alticinae_sp_019	X		X	X		X	X		
BT_1326_Eumolpinae_sp_019	X	X	X	X	X	X	X	X	X
BT_1327_Alticinae_sp_097	X	X	X	X	X	X	X	X	
BT_1328_Alticinae_sp_106	X		X	X		X	X		
BT_1329_Alticinae_sp_106				X			X		
BT_1330_Alticinae_sp_140	X	X	X	X	X	X	X	X	
BT_1331_Cassidinae_sp_004	X	X	X	X	X	X	X	X	
BT_1332_Cassidinae_sp_004				X			X		
BT_1334_Alticinae_sp_245	X		X	X		X	X		
BT_1335_Alticinae_sp_118	X	X	X	X	X	X	X	X	X
BT_1336_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_1337_Lamprosomatinae_sp_001	X		X	X		X	X		
BT_1339_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_1340_Galerucinae_sp_066	X	X	X	X	X	X	X	X	X
BT_1347_Alticinae_sp_092	X	X							
BT_1349_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_1350_Alticinae_sp_131	X	X	X	X	X	X	X	X	X
BT_1756_Alticinae_sp_014	X	X							
BT_1758_Alticinae_sp_014	X	X							
BT_1773_Galerucinae_sp_030	X	X							
BT_1775_Alticinae_sp_033	X	X							
BT_1776_Galerucinae_sp_062	X	X							
BT_1784_Lamprosomatinae_sp_001	X	X							
BT_1785_Chrysomelinae_sp_003	X	X							
BT_1789_Galerucinae_sp_022	X	X							
BT_1794_Alticinae_sp_001	X	X							
BT_1795_Chrysomelinae_sp_001	X	X							
BT_1809_Alticinae_sp_001	X	X							
BT_1810_Eumolpinae_sp_012	X								
BT_1811_Galerucinae_sp_054	X								
BT_1812_Alticinae_sp_002	X								
BT_1813_Alticinae_sp_032	X	X							
BT_1820_Alticinae_sp_142	X	X							
BT_1821_Alticinae_sp_088	X	X							
BT_1928_Galerucinae_sp_019	X	X							
BT_1932_Eumolpinae_sp_042	X	X							
BT_1934_Eumolpinae_sp_014	X								
BT_1935_Alticinae_sp_074	X								
BT_1936_Alticinae_sp_049	X	X							
BT_1954_Galerucinae_sp_041	X	X							
BT_1963_Alticinae_sp_037	X	X							
BT_1964_Galerucinae_sp_022	X	X							
BT_1970_Eumolpinae_sp_007	X	X							
BT_1971_Eumolpinae_sp_015	X								
BT_1972_Eumolpinae_sp_015	X								
BT_1973_Eumolpinae_sp_015	X								
BT_1974_Alticinae_sp_015	X	X							
BT_1975_Alticinae_sp_015	X								
BT_1976_Galerucinae_sp_102	X								
BT_1977_Alticinae_sp_007	X	X							
BT_1978_Eumolpinae_sp_040	X	X							
BT_1981_Galerucinae_sp_065	X	X							

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_1982_Alticinae_sp_062	X	X							
BT_2050_Alticinae_sp_123	X	X							
BT_2054_Alticinae_sp_139	X	X							
BT_2055_Alticinae_sp_145	X	X							
BT_2056_Alticinae_sp_141	X	X							
BT_2059_Alticinae_sp_142	X	X							
BT_2065_Alticinae_sp_142	X	X							
BT_2067_Alticinae_sp_142	X	X							
BT_2068_Alticinae_sp_142	X	X							
BT_2073_Alticinae_sp_022	X	X	X	X	X				X
BT_2074_Galerucinae_sp_034	X	X	X	X	X				X
BT_2075_Galerucinae_sp_034				X					
BT_2076_Alticinae_sp_002	X	X	X	X	X				X
BT_2077_Galerucinae_sp_007	X	X	X	X	X				X
BT_2078_Alticinae_sp_265	X	X	X	X	X				X
BT_2079_Eumolpinae_sp_038	X		X	X					
BT_2080_Galerucinae_sp_065	X	X	X	X	X				
BT_2081_Eumolpinae_sp_042	X	X	X	X	X				X
BT_2082_Alticinae_sp_064	X	X	X	X	X				X
BT_2083_Alticinae_sp_064				X					
BT_2084_Alticinae_sp_032	X	X	X	X	X				X
BT_2085_Eumolpinae_sp_042	X	X	X	X	X				X
BT_2086_Eumolpinae_sp_042				X					
BT_2087_Alticinae_sp_049	X	X	X	X	X				X
BT_2088_Alticinae_sp_049				X					
BT_2089_Alticinae_sp_049				X					
BT_2090_Alticinae_sp_081	X	X	X	X	X				X
BT_2091_Alticinae_sp_081				X					
BT_2092_Alticinae_sp_081				X					
BT_2093_Alticinae_sp_096	X	X	X	X	X				X
BT_2094_Alticinae_sp_096				X					
BT_2095_Alticinae_sp_096				X					
BT_2096_Alticinae_sp_096				X					
BT_2097_Alticinae_sp_122	X	X	X	X	X				X
BT_2098_Alticinae_sp_122				X					
BT_2099_Alticinae_sp_122				X					
BT_2100_Alticinae_sp_122				X					
BT_2101_Alticinae_sp_086	X	X	X	X	X				X
BT_2102_Alticinae_sp_086				X					
BT_2103_Alticinae_sp_086				X					
BT_2104_Alticinae_sp_086				X					
BT_2105_Alticinae_sp_086				X					
BT_2106_Alticinae_sp_086				X					
BT_2107_Alticinae_sp_085	X	X	X	X	X				X
BT_2108_Alticinae_sp_085				X					
BT_2109_Alticinae_sp_133	X	X	X	X	X				X
BT_2110_Alticinae_sp_133				X					
BT_2111_Alticinae_sp_133				X					
BT_2112_Alticinae_sp_133				X					
BT_2113_Alticinae_sp_142	X	X	X	X	X				X
BT_2114_Alticinae_sp_142				X					
BT_2115_Alticinae_sp_142				X					
BT_2116_Alticinae_sp_142				X					
BT_2117_Alticinae_sp_142				X					
BT_2118_Alticinae_sp_142				X					
BT_2119_Eumolpinae_sp_016	X	X	X	X	X				X
BT_2120_Eumolpinae_sp_016				X					
BT_2121_Eumolpinae_sp_016				X					
BT_2122_Eumolpinae_sp_016				X					
BT_2123_Alticinae_sp_018	X	X	X	X	X				X
BT_2124_Alticinae_sp_018				X					
BT_2125_Alticinae_sp_018				X					
BT_2126_Alticinae_sp_018				X					
BT_2127_Alticinae_sp_018				X					
BT_2128_Alticinae_sp_018				X					
BT_2129_Alticinae_sp_018				X					
BT_2130_Alticinae_sp_018				X					
BT_2131_Alticinae_sp_018				X					
BT_2132_Alticinae_sp_018				X					
BT_2133_Alticinae_sp_018				X					
BT_2134_Alticinae_sp_018				X					
BT_2135_Alticinae_sp_122	X	X	X	X	X				X
BT_2136_Alticinae_sp_110	X	X	X	X	X				X
BT_2137_Alticinae_sp_110				X					
BT_2138_Alticinae_sp_115	X	X	X	X	X				X
BT_2143_Eumolpinae_sp_042	X	X							
BT_2152_Eumolpinae_sp_038	X	X	X	X	X				X
BT_2153_Eumolpinae_sp_038				X					
BT_2154_Galerucinae_sp_017	X	X	X	X	X				X
BT_2155_Alticinae_sp_115	X	X	X	X	X				X
BT_2156_Cassidinae_sp_012	X	X	X	X	X				X
BT_2157_Eumolpinae_sp_024	X	X	X	X	X				X
BT_2158_Alticinae_sp_083	X	X	X	X	X				X
BT_2161_Cassidinae_sp_012	X	X	X	X	X				X
BT_2162_Cassidinae_sp_012				X					
BT_2163_Cassidinae_sp_012				X					
BT_2164_Cassidinae_sp_012				X					
BT_2165_Cassidinae_sp_012				X					
BT_2166_Cassidinae_sp_012				X					
BT_2167_Cassidinae_sp_012				X					
BT_2168_Galerucinae_sp_036	X	X	X	X	X				X
BT_2169_Galerucinae_sp_033	X		X	X					
BT_2170_Galerucinae_sp_034	X	X	X	X	X				X
BT_2171_Galerucinae_sp_034				X					
BT_2172_Galerucinae_sp_062	X		X	X					
BT_2173_Eumolpinae_sp_034	X	X	X	X	X				X
BT_2176_Galerucinae_sp_043	X	X	X	X	X				X
BT_2177_Galerucinae_sp_043				X					
BT_2178_Galerucinae_sp_043				X					
BT_2179_Alticinae_sp_011	X	X	X	X	X				X
BT_2180_Alticinae_sp_075	X	X	X	X	X				X
BT_2181_Alticinae_sp_251	X	X	X	X	X				X
BT_2182_Galerucinae_sp_029	X	X	X	X	X				X
BT_2183_Galerucinae_sp_029	X	X	X	X	X				
BT_2184_Galerucinae_sp_029				X					
BT_2185_Galerucinae_sp_029				X					
BT_2186_Galerucinae_sp_029				X					
BT_2187_Galerucinae_sp_029				X					
BT_2188_Galerucinae_sp_029				X					
BT_2189_Hispinae_sp_008	X	X	X	X	X				X
BT_2190_Hispinae_sp_022	X		X	X					
BT_2191_Criocerinae_sp_005	X	X	X	X	X				X
BT_2192_Galerucinae_sp_028	X	X	X	X	X				X
BT_2193_Alticinae_sp_076	X	X	X	X	X				X
BT_2194_Alticinae_sp_127	X	X	X	X	X				X
BT_2195_Alticinae_sp_127				X					
BT_2196_Alticinae_sp_127	X	X	X	X	X				X

Continued on next page(s)

Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_2197_Eumolpinae_sp_047	X	X	X	X	X				X
BT_2198_Eumolpinae_sp_047				X					
BT_2199_Eumolpinae_sp_035	X		X	X					
BT_2203_Alticinae_sp_016	X	X							
BT_2208_Alticinae_sp_112	X	X	X	X	X				X
BT_2218_Galerucinae_sp_012	X	X							
BT_2219_Eumolpinae_sp_042	X	X							
BT_2220_Galerucinae_sp_007	X	X							
BT_2221_Galerucinae_sp_022	X	X							
BT_2222_Galerucinae_sp_076	X	X							
BT_2229_Alticinae_sp_063	X	X							
BT_2231_Alticinae_sp_087	X	X							
BT_2232_Alticinae_sp_087	X	X							
BT_2233_Alticinae_sp_087	X	X							
BT_2310_Cassidinae_sp_004	X	X	X	X	X				
BT_2311_Alticinae_sp_074	X		X	X					
BT_2312_Alticinae_sp_042	X	X	X	X	X				X
BT_2313_Eumolpinae_sp_025	X		X	X					
BT_2314_Eumolpinae_sp_030	X		X	X					
BT_2317_Alticinae_sp_007	X	X	X	X	X				
BT_2353_Hispinae_sp_006	X	X							
BT_2383_Galerucinae_sp_059	X	X							
BT_2399_Alticinae_sp_038	X	X							
BT_2405_Alticinae_sp_042	X	X							
BT_2491_Alticinae_sp_085	X	X	X	X	X	X	X	X	X
BT_2492_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_2495_Alticinae_sp_243	X	X	X	X	X	X	X	X	X
BT_2496_Alticinae_sp_140	X	X	X	X	X	X	X	X	X
BT_2498_Alticinae_sp_052	X	X	X	X	X	X	X	X	X
BT_2499_Alticinae_sp_118	X	X	X	X	X	X	X	X	X
BT_2502_Alticinae_sp_160	X	X	X	X	X	X	X	X	X
BT_2503_Alticinae_sp_079	X		X	X		X	X		
BT_2504_Galerucinae_sp_098	X	X	X	X	X	X	X	X	X
BT_2505_Galerucinae_sp_046	X	X	X	X	X	X	X	X	X
BT_2506_Alticinae_sp_047	X	X	X	X	X	X	X	X	X
BT_2507_Alticinae_sp_203	X	X	X	X	X	X	X	X	
BT_2508_Galerucinae_sp_034	X		X	X		X	X		
BT_2509_Galerucinae_sp_034				X			X		
BT_2510_Hispinae_sp_010	X								
BT_2511_Hispinae_sp_010	X	X							
BT_2516_Galerucinae_sp_009	X	X	X	X	X	X	X	X	X
BT_2517_Alticinae_sp_201	X	X	X	X	X	X	X	X	X
BT_2518_Alticinae_sp_070	X	X	X	X	X	X	X	X	X
BT_2519_Alticinae_sp_153	X	X	X	X	X	X	X	X	X
BT_2520_Alticinae_sp_073	X		X	X		X	X		
BT_2521_Galerucinae_sp_082	X	X	X	X	X	X	X	X	X
BT_2522_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_2523_Alticinae_sp_153	X	X	X	X	X	X	X	X	X
BT_2524_Alticinae_sp_153				X			X		
BT_2525_Alticinae_sp_153				X			X		
BT_2526_Alticinae_sp_153				X			X		
BT_2528_Eumolpinae_sp_045	X		X	X		X	X		
BT_2529_Galerucinae_sp_055	X	X	X	X	X	X	X	X	X
BT_2531_Alticinae_sp_008	X	X	X	X	X	X	X	X	
BT_2544_Alticinae_sp_097	X	X	X	X	X	X	X	X	X
BT_2546_Cassidinae_sp_004	X	X	X	X	X	X	X	X	X
BT_2547_Cassidinae_sp_004				X			X		
BT_2548_Cassidinae_sp_012	X	X	X	X	X	X	X	X	X
BT_2549_Alticinae_sp_094	X		X	X		X	X		
BT_2550_Alticinae_sp_056	X	X	X	X	X	X	X	X	X
BT_2551_Alticinae_sp_246	X	X	X	X	X	X	X	X	
BT_2552_Alticinae_sp_246				X			X		
BT_2557_Galerucinae_sp_007	X	X							
BT_2572_Alticinae_sp_018	X	X	X	X	X	X	X	X	X
BT_2573_Cassidinae_sp_012	X	X	X	X	X	X	X	X	X
BT_2574_Cassidinae_sp_012				X			X		
BT_2575_Eumolpinae_sp_031	X	X	X	X	X	X	X	X	X
BT_2576_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_2578_Galerucinae_sp_034	X	X	X	X	X	X	X	X	X
BT_2579_Alticinae_sp_115	X	X	X	X	X	X	X	X	X
BT_2594_Galerucinae_sp_002	X	X							
BT_2600_Alticinae_sp_008	X	X	X	X	X	X	X	X	
BT_2601_Galerucinae_sp_007	X	X	X	X	X	X	X	X	
BT_2602_Alticinae_sp_085	X	X	X	X	X	X	X	X	
BT_2603_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_2604_Alticinae_sp_106	X	X	X	X	X	X	X	X	
BT_2605_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_2606_Alticinae_sp_118				X			X		
BT_2607_Alticinae_sp_118				X			X		
BT_2608_Alticinae_sp_118				X			X		
BT_2609_Alticinae_sp_118				X			X		
BT_2610_Alticinae_sp_118				X			X		
BT_2611_Alticinae_sp_118				X			X		
BT_2612_Alticinae_sp_118				X			X		
BT_2613_Alticinae_sp_118				X			X		
BT_2614_Alticinae_sp_118				X			X		
BT_2615_Alticinae_sp_118				X			X		
BT_2616_Alticinae_sp_118				X			X		
BT_2617_Alticinae_sp_118				X			X		
BT_2618_Alticinae_sp_118				X			X		
BT_2619_Alticinae_sp_118				X			X		
BT_2620_Alticinae_sp_118				X			X		
BT_2621_Alticinae_sp_118				X			X		
BT_2622_Alticinae_sp_118				X			X		
BT_2623_Alticinae_sp_118				X			X		
BT_2624_Alticinae_sp_118				X			X		
BT_2625_Alticinae_sp_118				X			X		
BT_2626_Alticinae_sp_118				X			X		
BT_2627_Alticinae_sp_118				X			X		
BT_2628_Alticinae_sp_118				X			X		
BT_2629_Eumolpinae_sp_029	X	X	X	X	X	X	X	X	X
BT_2631_Alticinae_sp_135	X	X	X	X	X	X	X	X	X
BT_2632_Alticinae_sp_143	X	X	X	X	X	X	X	X	X
BT_2634_Alticinae_sp_196	X		X	X		X	X		
BT_2637_Eumolpinae_sp_040	X	X	X	X	X	X	X	X	X
BT_2638_Galerucinae_sp_061	X	X	X	X	X	X	X	X	X
BT_2639_Alticinae_sp_061	X	X	X	X	X	X	X	X	
BT_2640_Alticinae_sp_104	X	X	X	X	X	X	X	X	X
BT_2641_Alticinae_sp_097	X	X	X	X	X	X	X	X	X
BT_2642_Eumolpinae_sp_019	X	X	X	X	X	X	X	X	X
BT_2643_Alticinae_sp_042	X	X	X	X	X	X	X	X	X
BT_2644_Criocerinae_sp_001	X	X	X	X	X	X	X	X	X
BT_2645_Eumolpinae_sp_038	X		X	X		X	X		
BT_2646_Alticinae_sp_096	X	X	X	X	X	X	X	X	X
BT_2657_Alticinae_sp_001	X	X	X	X	X	X	X	X	X
BT_2658_Alticinae_sp_041	X	X	X	X	X	X	X	X	X
BT_2659_Alticinae_sp_086	X	X	X	X	X	X	X	X	X

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_2660_Alticinae_sp_097	X	X	X	X	X	X	X	X	
BT_2661_Hispinae_sp_009	X	X	X	X	X	X	X	X	X
BT_2662_Alticinae_sp_087	X	X	X	X	X	X	X	X	X
BT_2663_Hispinae_sp_005	X	X	X	X	X	X	X	X	X
BT_2664_Cassidinae_sp_003	X		X	X		X	X		
BT_2665_Criocerinae_sp_004	X	X	X	X	X	X	X	X	X
BT_2666_Alticinae_sp_089	X	X	X	X	X	X	X	X	X
BT_2668_Eumolpinae_sp_028	X		X	X		X	X		
BT_2670_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_2671_Galerucinae_sp_072	X	X	X	X	X	X	X	X	X
BT_2672_Alticinae_sp_051	X	X	X	X	X	X	X	X	X
BT_2673_Galerucinae_sp_049	X	X	X	X	X	X	X	X	X
BT_2675_Galerucinae_sp_002	X	X	X	X	X	X	X	X	
BT_2676_Galerucinae_sp_046	X	X	X	X	X	X	X	X	
BT_2677_Galerucinae_sp_061	X	X	X	X	X	X	X	X	
BT_2678_Alticinae_sp_111	X		X	X		X	X		
BT_2679_Alticinae_sp_096	X	X	X	X	X	X	X	X	
BT_2681_Criocerinae_sp_001	X	X	X	X	X	X	X	X	
BT_2684_Alticinae_sp_049	X	X							
BT_2697_Alticinae_sp_053	X	X	X	X	X	X	X	X	X
BT_2698_Eumolpinae_sp_071	X	X	X	X	X	X	X	X	X
BT_2699_Alticinae_sp_060	X	X	X	X	X	X	X	X	
BT_2701_Alticinae_sp_056	X		X	X		X	X		
BT_2702_Alticinae_sp_056	X		X	X		X	X		
BT_2703_Alticinae_sp_056				X			X		
BT_2704_Alticinae_sp_246	X		X	X		X	X		
BT_2705_Alticinae_sp_094	X	X	X	X	X	X	X	X	X
BT_2706_Alticinae_sp_120	X		X	X		X	X		
BT_2707_Alticinae_sp_034	X	X	X	X	X	X	X	X	X
BT_2708_Alticinae_sp_224	X	X	X	X	X	X	X	X	
BT_2709_Hispinae_sp_024	X		X	X		X	X		
BT_2717_Alticinae_sp_001	X	X	X	X	X	X	X	X	
BT_2718_Alticinae_sp_096	X	X	X	X	X	X	X	X	
BT_2719_Criocerinae_sp_001	X	X	X	X	X	X	X	X	
BT_2723_Alticinae_sp_225	X	X							
BT_2771_Galerucinae_sp_100	X	X							
BT_2787_Galerucinae_sp_002	X	X							
BT_2795_Galerucinae_sp_017	X	X							
BT_2805_Eumolpinae_sp_006	X		X	X		X	X		
BT_2806_Alticinae_sp_050	X	X	X	X	X	X	X	X	
BT_2807_Alticinae_sp_103	X	X	X	X	X	X	X	X	
BT_2809_Alticinae_sp_259	X	X	X	X	X	X	X	X	
BT_2810_Galerucinae_sp_072	X	X	X	X	X	X	X	X	
BT_2812_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_2813_Alticinae_sp_104				X			X		
BT_2814_Alticinae_sp_104				X			X		
BT_2816_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_2817_Alticinae_sp_150				X			X		
BT_2818_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_2819_Eumolpinae_sp_030	X	X	X	X	X	X	X	X	
BT_2820_Eumolpinae_sp_030				X			X		
BT_2821_Eumolpinae_sp_074	X	X	X	X	X	X	X	X	
BT_2822_Galerucinae_sp_048	X	X	X	X	X	X	X	X	
BT_2823_Alticinae_sp_068	X	X	X	X	X	X	X	X	
BT_2824_Alticinae_sp_129	X	X	X	X	X	X	X	X	
BT_2825_Alticinae_sp_126	X	X	X	X	X	X	X	X	
BT_2826_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_2827_Eumolpinae_sp_067	X	X	X	X	X	X	X	X	
BT_2828_Eumolpinae_sp_029	X		X	X		X	X		
BT_2829_Eumolpinae_sp_030	X	X	X	X	X	X	X	X	
BT_2830_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_2831_Cassidinae_sp_015	X	X	X	X	X	X	X	X	
BT_2832_Alticinae_sp_072	X	X	X	X	X	X	X	X	
BT_2833_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_2834_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_2835_Alticinae_sp_118				X			X		
BT_2837_Alticinae_sp_118	X		X	X		X	X		
BT_2838_Alticinae_sp_118				X			X		
BT_2839_Eumolpinae_sp_066	X	X	X	X	X	X	X	X	
BT_2840_Alticinae_sp_052	X		X	X		X	X		
BT_2841_Galerucinae_sp_096	X	X	X	X	X	X	X	X	
BT_2842_Galerucinae_sp_098	X	X	X	X	X	X	X	X	
BT_2843_Hispinae_sp_005	X		X	X		X	X		
BT_2844_Alticinae_sp_126	X	X	X	X	X	X	X	X	
BT_2845_Alticinae_sp_118	X		X	X		X	X		
BT_2846_Alticinae_sp_152	X	X	X	X	X	X	X	X	
BT_2847_Alticinae_sp_152				X			X		
BT_2848_Alticinae_sp_118	X		X	X		X	X		
BT_2849_Alticinae_sp_118				X			X		
BT_2850_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_2851_Alticinae_sp_118				X			X		
BT_2852_Alticinae_sp_052	X	X	X	X	X	X	X	X	
BT_2853_Alticinae_sp_052				X			X		
BT_2854_Eumolpinae_sp_017	X		X	X		X	X		
BT_2855_Galerucinae_sp_098	X	X	X	X	X	X	X	X	
BT_2856_Cryptocephalinae_sp_002	X		X	X		X	X		
BT_2863_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_2864_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_2865_Alticinae_sp_118	X		X	X		X	X		
BT_2866_Alticinae_sp_118				X			X		
BT_2867_Alticinae_sp_118				X			X		
BT_2868_Alticinae_sp_118				X			X		
BT_2869_Alticinae_sp_118				X			X		
BT_2870_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_2871_Alticinae_sp_213	X	X	X	X	X	X	X	X	
BT_2872_Alticinae_sp_064	X	X	X	X	X	X	X	X	
BT_2873_Alticinae_sp_053	X	X	X	X	X	X	X	X	
BT_2874_Alticinae_sp_094	X		X	X		X	X		
BT_2876_Alticinae_sp_087	X	X	X	X	X	X	X	X	
BT_2877_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_2878_Eumolpinae_sp_024				X			X		
BT_2879_Alticinae_sp_164	X	X	X	X	X	X	X	X	
BT_2880_Eumolpinae_sp_060	X	X	X	X	X	X	X	X	
BT_2881_Alticinae_sp_085	X	X	X	X	X	X	X	X	
BT_2900_Alticinae_sp_245	X	X	X	X	X	X	X	X	
BT_2901_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_2902_Alticinae_sp_208	X	X	X	X	X	X	X	X	
BT_2903_Eumolpinae_sp_071	X	X	X	X	X	X	X	X	
BT_2905_Alticinae_sp_245	X	X	X	X	X	X	X	X	
BT_2907_Alticinae_sp_191	X	X	X	X	X	X	X	X	
BT_2908_Alticinae_sp_258	X	X	X	X	X	X	X	X	
BT_2912_Galerucinae_sp_014	X	X							
BT_2935_Galerucinae_sp_106	X	X							
BT_2938_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_2939_Alticinae_sp_235	X		X	X		X	X		
BT_2948_Galerucinae_sp_014	X	X							
BT_2949_Hispinae_sp_007	X	X							

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_2954_Hispinae_sp_018	X								
BT_2969_Eumolpinae_sp_013	X	X							
BT_2999_Eumolpinae_sp_003	X	X							
BT_3026_Galerucinae_sp_029	X	X	X	X	X	X	X	X	
BT_3027_Alticinae_sp_173	X	X	X	X	X	X	X	X	
BT_3028_Alticinae_sp_204	X	X	X	X	X	X	X	X	
BT_3029_Eumolpinae_sp_017	X		X	X		X	X		
BT_3030_Alticinae_sp_193	X	X	X	X	X	X	X	X	
BT_3031_Eumolpinae_sp_055	X	X	X	X	X	X	X	X	
BT_3032_Galerucinae_sp_106	X	X	X	X	X	X	X	X	
BT_3033_Alticinae_sp_254	X	X	X	X	X	X	X	X	
BT_3034_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_3035_Galerucinae_sp_051	X	X	X	X	X	X	X	X	
BT_3036_Alticinae_sp_042	X	X	X	X	X	X	X	X	
BT_3037_Alticinae_sp_135	X	X	X	X	X	X	X	X	
BT_3038_Galerucinae_sp_084	X	X	X	X	X	X	X	X	
BT_3039_Eumolpinae_sp_040	X	X	X	X	X	X	X	X	
BT_3040_Eumolpinae_sp_040				X			X		
BT_3041_Cassidinae_sp_017	X	X	X	X	X	X	X	X	
BT_3060_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_3061_Alticinae_sp_115				X			X		
BT_3062_Alticinae_sp_249	X	X	X	X	X	X	X	X	
BT_3063_Alticinae_sp_249				X			X		
BT_3064_Alticinae_sp_253	X	X	X	X	X	X	X	X	
BT_3065_Galerucinae_sp_034	X	X	X	X	X	X	X	X	
BT_3066_Alticinae_sp_147	X	X	X	X	X	X	X	X	
BT_3067_Alticinae_sp_147				X			X		
BT_3068_Alticinae_sp_074	X		X	X		X	X		
BT_3070_Eumolpinae_sp_038	X	X	X	X	X	X	X	X	
BT_3071_Eumolpinae_sp_038				X			X		
BT_3072_Eumolpinae_sp_038				X			X		
BT_3073_Eumolpinae_sp_038				X			X		
BT_3074_Alticinae_sp_096	X	X	X	X	X	X	X	X	
BT_3075_Alticinae_sp_096				X			X		
BT_3076_Criocerinae_sp_001	X	X	X	X	X	X	X	X	
BT_3077_Alticinae_sp_064	X		X	X		X	X		
BT_3079_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_3080_Alticinae_sp_112	X	X	X	X	X	X	X	X	
BT_3081_Alticinae_sp_205	X	X	X	X	X	X	X	X	
BT_3082_Galerucinae_sp_012	X	X	X	X	X	X	X	X	
BT_3083_Alticinae_sp_096	X	X	X	X	X	X	X	X	
BT_3084_Alticinae_sp_062	X	X	X	X	X	X	X	X	
BT_3085_Alticinae_sp_064	X	X	X	X	X	X	X	X	
BT_3086_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_3087_Eumolpinae_sp_038	X	X	X	X	X	X	X	X	
BT_3088_Alticinae_sp_061	X	X	X	X	X	X	X	X	
BT_3089_Eumolpinae_sp_034	X	X	X	X	X	X	X	X	
BT_3090_Eumolpinae_sp_065	X	X	X	X	X	X	X	X	
BT_3091_Eumolpinae_sp_065				X			X		
BT_3092_Eumolpinae_sp_002	X	X	X	X	X	X	X	X	
BT_3093_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_3094_Alticinae_sp_051				X			X		
BT_3095_Alticinae_sp_254	X	X	X	X	X	X	X	X	
BT_3097_Eumolpinae_sp_038	X	X	X	X	X	X	X	X	
BT_3098_Eumolpinae_sp_038				X			X		
BT_3099_Eumolpinae_sp_038				X			X		
BT_3100_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3101_Alticinae_sp_245	X	X	X	X	X	X	X	X	
BT_3102_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_3103_Alticinae_sp_121	X		X	X		X	X		
BT_3104_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_3105_Alticinae_sp_244				X			X		
BT_3106_Alticinae_sp_171	X	X	X	X	X	X	X	X	
BT_3107_Galerucinae_sp_066	X	X	X	X	X	X	X	X	
BT_3108_Alticinae_sp_001	X	X	X	X	X	X	X	X	
BT_3109_Galerucinae_sp_109	X		X	X		X	X		
BT_3110_Galerucinae_sp_048	X	X	X	X	X	X	X	X	
BT_3111_Alticinae_sp_065	X	X	X	X	X	X	X	X	
BT_3112_Alticinae_sp_197	X	X	X	X	X	X	X	X	
BT_3113_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_3114_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_3115_Galerucinae_sp_098	X	X	X	X	X	X	X	X	
BT_3116_Galerucinae_sp_098				X			X		
BT_3117_Alticinae_sp_163	X	X	X	X	X	X	X	X	
BT_3118_Alticinae_sp_178	X	X	X	X	X	X	X	X	
BT_3120_Galerucinae_sp_098	X		X	X		X	X		
BT_3121_Hispinae_sp_025	X	X	X	X	X	X	X	X	
BT_3122_Alticinae_sp_005	X		X	X		X	X		
BT_3123_Eumolpinae_sp_065	X		X	X		X	X		
BT_3124_Alticinae_sp_087	X	X	X	X	X	X	X	X	
BT_3125_Alticinae_sp_065	X		X	X		X	X		
BT_3126_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_3127_Eumolpinae_sp_039				X			X		
BT_3128_Eumolpinae_sp_039				X			X		
BT_3143_Galerucinae_sp_017	X	X							
BT_3157_Galerucinae_sp_024	X	X							
BT_3177_Galerucinae_sp_017	X	X							
BT_3191_Galerucinae_sp_017	X	X							
BT_3197_Alticinae_sp_228	X		X	X		X	X		
BT_3198_Alticinae_sp_119	X		X	X		X	X		
BT_3200_Galerucinae_sp_073	X	X	X	X	X	X	X	X	
BT_3201_Alticinae_sp_255	X	X	X	X	X	X	X	X	
BT_3202_Alticinae_sp_184	X	X	X	X	X	X	X	X	
BT_3203_Galerucinae_sp_073	X	X	X	X	X	X	X	X	
BT_3204_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3205_Eumolpinae_sp_052	X	X	X	X	X	X	X	X	
BT_3206_Alticinae_sp_245	X	X	X	X	X	X	X	X	
BT_3207_Alticinae_sp_197	X		X	X		X	X		
BT_3208_Alticinae_sp_197				X			X		
BT_3209_Alticinae_sp_123	X	X	X	X	X	X	X	X	
BT_3210_Galerucinae_sp_066	X	X	X	X	X	X	X	X	
BT_3211_Alticinae_sp_052	X	X	X	X	X	X	X	X	
BT_3212_Criocerinae_sp_001	X	X	X	X	X	X	X	X	
BT_3213_Eumolpinae_sp_040	X	X	X	X	X	X	X	X	
BT_3214_Eumolpinae_sp_014	X		X	X		X	X		
BT_3215_Eumolpinae_sp_014				X			X		
BT_3216_Galerucinae_sp_104	X	X	X	X	X	X	X	X	
BT_3217_Alticinae_sp_087	X	X	X	X	X	X	X	X	
BT_3218_Alticinae_sp_087				X			X		
BT_3219_Alticinae_sp_087				X			X		
BT_3220_Galerucinae_sp_034	X	X	X	X	X	X	X	X	
BT_3221_Galerucinae_sp_034				X			X		
BT_3222_Galerucinae_sp_034				X			X		
BT_3223_Galerucinae_sp_034				X			X		
BT_3224_Galerucinae_sp_034				X			X		
BT_3225_Galerucinae_sp_025	X	X	X	X	X	X	X	X	
BT_3226_Galerucinae_sp_025	X	X	X	X	X	X	X	X	

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_3227_Galerucinae_sp_025				X			X		
BT_3228_Galerucinae_sp_025				X			X		
BT_3229_Galerucinae_sp_025				X			X		
BT_3230_Alticinae_sp_052	X	X	X	X	X	X	X	X	
BT_3231_Alticinae_sp_052				X			X		
BT_3232_Alticinae_sp_064	X	X	X	X	X	X	X	X	
BT_3233_Alticinae_sp_097	X	X	X	X	X	X	X	X	
BT_3234_Eumolpinae_sp_038	X		X	X		X	X		
BT_3235_Alticinae_sp_018	X	X	X	X	X	X	X	X	
BT_3236_Galerucinae_sp_034	X	X	X	X	X	X	X	X	
BT_3237_Galerucinae_sp_034				X			X		
BT_3238_Galerucinae_sp_034				X			X		
BT_3239_Galerucinae_sp_034				X			X		
BT_3241_Alticinae_sp_097	X		X	X		X	X		
BT_3242_Galerucinae_sp_025	X	X	X	X	X	X	X	X	
BT_3243_Alticinae_sp_240	X	X	X	X	X	X	X	X	
BT_3244_Alticinae_sp_052	X	X	X	X	X	X	X	X	
BT_3248_Alticinae_sp_116	X	X	X	X	X	X	X	X	
BT_3249_Galerucinae_sp_034	X	X	X	X	X	X	X	X	
BT_3250_Galerucinae_sp_034				X			X		
BT_3251_Galerucinae_sp_034				X			X		
BT_3252_Galerucinae_sp_034				X			X		
BT_3253_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_3254_Alticinae_sp_115				X			X		
BT_3255_Galerucinae_sp_061	X	X	X	X	X	X	X	X	
BT_3256_Galerucinae_sp_092	X	X	X	X	X	X	X	X	
BT_3257_Alticinae_sp_212	X	X	X	X	X	X	X	X	
BT_3258_Galerucinae_sp_066	X	X	X	X	X	X	X	X	
BT_3259_Galerucinae_sp_066				X			X		
BT_3260_Alticinae_sp_109	X	X	X	X	X	X	X	X	
BT_3261_Alticinae_sp_029	X		X	X		X	X		
BT_3262_Alticinae_sp_042	X	X	X	X	X	X	X	X	
BT_3263_Eumolpinae_sp_040	X	X	X	X	X	X	X	X	
BT_3264_Galerucinae_sp_026	X	X	X	X	X	X	X	X	
BT_3265_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	
BT_3266_Galerucinae_sp_021	X	X	X	X	X	X	X	X	
BT_3266a_Alticinae_sp_112	X		X	X		X	X		
BT_3267_Galerucinae_sp_098	X	X	X	X	X	X	X	X	
BT_3268_Alticinae_sp_170	X	X	X	X	X	X	X	X	
BT_3269_Alticinae_sp_111	X		X	X		X	X		
BT_3270_Alticinae_sp_092	X	X	X	X	X	X	X	X	
BT_3271_Alticinae_sp_202	X	X	X	X	X	X	X	X	
BT_3272_Alticinae_sp_096	X		X	X		X	X		
BT_3273_Galerucinae_sp_034	X	X	X	X	X	X	X	X	
BT_3274_Alticinae_sp_087	X	X	X	X	X	X	X	X	
BT_3275_Alticinae_sp_087				X			X		
BT_3276_Alticinae_sp_087				X			X		
BT_3277_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_3278_Galerucinae_sp_061	X	X	X	X	X	X	X	X	
BT_3279_Alticinae_sp_061	X	X	X	X	X	X	X	X	
BT_3280_Alticinae_sp_051	X		X	X		X	X		
BT_3281_Alticinae_sp_051				X			X		
BT_3282_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_3283_Eumolpinae_sp_024	X		X	X		X	X		
BT_3284_Alticinae_sp_260	X	X	X	X	X	X	X	X	
BT_3299_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_3300_Eumolpinae_sp_039				X			X		
BT_3301_Alticinae_sp_260	X		X	X		X	X		
BT_3302_Alticinae_sp_260	X		X	X		X	X		
BT_3303_Hispinae_sp_005	X	X	X	X	X	X	X	X	
BT_3304_Alticinae_sp_260	X	X	X	X	X	X	X	X	
BT_3305_Galerucinae_sp_028	X	X	X	X	X	X	X	X	
BT_3306_Alticinae_sp_254	X	X	X	X	X	X	X	X	
BT_3307_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_3308_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_3309_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_3310_Alticinae_sp_063	X	X	X	X	X	X	X	X	
BT_3311_Galerucinae_sp_015	X	X	X	X	X	X	X	X	
BT_3312_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	
BT_3313_Eumolpinae_sp_055	X	X	X	X	X	X	X	X	
BT_3314_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	
BT_3316_Alticinae_sp_117	X	X	X	X	X	X	X	X	
BT_3317_Eumolpinae_sp_051	X	X	X	X	X	X	X	X	
BT_3318_Alticinae_sp_210	X	X	X	X	X	X	X	X	
BT_3319_Alticinae_sp_173	X	X	X	X	X	X	X	X	
BT_3320_Galerucinae_sp_078	X	X	X	X	X	X	X	X	
BT_3321_Alticinae_sp_035	X	X	X	X	X	X	X	X	
BT_3322_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	
BT_3323_Eumolpinae_sp_042				X			X		
BT_3324_Eumolpinae_sp_042				X			X		
BT_3325_Galerucinae_sp_086	X	X	X	X	X	X	X	X	
BT_3326_Eumolpinae_sp_017	X		X	X		X	X		
BT_3327_Eumolpinae_sp_050	X	X	X	X	X	X	X	X	
BT_3328_Alticinae_sp_210	X	X	X	X	X	X	X	X	
BT_3329_Alticinae_sp_210				X			X		
BT_3330_Alticinae_sp_210				X			X		
BT_3331_Alticinae_sp_210				X			X		
BT_3332_Alticinae_sp_035	X	X	X	X	X	X	X	X	
BT_3333_Alticinae_sp_253	X	X	X	X	X	X	X	X	
BT_3334_Alticinae_sp_052	X	X	X	X	X	X	X	X	
BT_3335_Galerucinae_sp_045	X	X	X	X	X	X	X	X	
BT_3336_Galerucinae_sp_045				X			X		
BT_3337_Eumolpinae_sp_040	X	X	X	X	X	X	X	X	
BT_3338_Eumolpinae_sp_050	X	X	X	X	X	X	X	X	
BT_3339_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_3340_Eumolpinae_sp_053	X		X	X		X	X		
BT_3341_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_3342_Alticinae_sp_169	X	X	X	X	X	X	X	X	
BT_3343_Alticinae_sp_076	X	X	X	X	X	X	X	X	
BT_3344_Alticinae_sp_076				X			X		
BT_3345_Alticinae_sp_076	X	X	X	X	X	X	X	X	
BT_3346_Cassidinae_sp_016	X	X	X	X	X	X	X	X	
BT_3347_Galerucinae_sp_108	X	X	X	X	X	X	X	X	
BT_3348_Cassidinae_sp_018	X	X	X	X	X	X	X	X	
BT_3349_Eumolpinae_sp_052	X		X	X		X	X		
BT_3350_Hispinae_sp_014	X	X	X	X	X	X	X	X	
BT_3351_Alticinae_sp_255	X	X	X	X	X	X	X	X	
BT_3352_Alticinae_sp_236	X		X	X		X	X		
BT_3353_Eumolpinae_sp_054	X		X	X		X	X		
BT_3354_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3355_Eumolpinae_sp_054	X		X	X		X	X		
BT_3356_Eumolpinae_sp_054	X		X	X		X	X		
BT_3357_Alticinae_sp_057	X	X	X	X	X	X	X	X	
BT_3358_Alticinae_sp_057				X			X		
BT_3359_Galerucinae_sp_074	X	X	X	X	X	X	X	X	
BT_3360_Galerucinae_sp_089	X	X	X	X	X	X	X	X	
BT_3361_Alticinae_sp_009	X	X	X	X	X	X	X	X	

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_3362_Eumolpinae_sp_046	X	X	X	X	X	X	X	X	
BT_3363_Alticinae_sp_106	X	X	X	X	X	X	X	X	
BT_3364_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_3365_Eumolpinae_sp_024				X			X		
BT_3366_Alticinae_sp_152	X	X	X	X	X	X	X	X	
BT_3367_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_3368_Alticinae_sp_051				X			X		
BT_3369_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_3370_Alticinae_sp_051				X			X		
BT_3371_Alticinae_sp_051				X			X		
BT_3372_Alticinae_sp_051				X			X		
BT_3373_Eumolpinae_sp_064	X	X	X	X	X	X	X	X	
BT_3374_Eumolpinae_sp_072	X		X	X		X	X		
BT_3375_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_3376_Eumolpinae_sp_024				X			X		
BT_3377_Eumolpinae_sp_024				X			X		
BT_3378_Eumolpinae_sp_024				X			X		
BT_3379_Eumolpinae_sp_062	X	X	X	X	X	X	X	X	
BT_3380_Galerucinae_sp_074	X	X	X	X	X	X	X	X	
BT_3381_Galerucinae_sp_074				X			X		
BT_3382_Galerucinae_sp_055	X	X	X	X	X	X	X	X	
BT_3383_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_3384_Alticinae_sp_152	X	X	X	X	X	X	X	X	
BT_3385_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_3386_Hispinae_sp_011	X	X	X	X	X	X	X	X	
BT_3387_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_3388_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_3389_Eumolpinae_sp_064	X	X	X	X	X	X	X	X	
BT_3390_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_3391_Alticinae_sp_052	X	X	X	X	X	X	X	X	
BT_3392_Alticinae_sp_052				X			X		
BT_3393_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_3394_Alticinae_sp_118				X			X		
BT_3395_Alticinae_sp_118				X			X		
BT_3396_Alticinae_sp_118				X			X		
BT_3398_Eumolpinae_sp_039	X		X	X		X	X		
BT_3399_Eumolpinae_sp_039				X			X		
BT_3400_Eumolpinae_sp_039				X			X		
BT_3401_Eumolpinae_sp_039				X			X		
BT_3402_Eumolpinae_sp_039				X			X		
BT_3403_Eumolpinae_sp_030	X	X	X	X	X	X	X	X	
BT_3405_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_3406_Eumolpinae_sp_039				X			X		
BT_3407_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_3408_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_3409_Alticinae_sp_113	X	X	X	X	X	X	X	X	
BT_3410_Alticinae_sp_131	X		X	X		X	X		
BT_3411_Alticinae_sp_118	X		X	X		X	X		
BT_3412_Eumolpinae_sp_039	X		X	X		X	X		
BT_3413_Eumolpinae_sp_039				X			X		
BT_3414_Eumolpinae_sp_039				X			X		
BT_3415_Eumolpinae_sp_039				X			X		
BT_3416_Alticinae_sp_118	X		X	X		X	X		
BT_3417_Alticinae_sp_118				X			X		
BT_3418_Alticinae_sp_118	X		X	X		X	X		
BT_3419_Alticinae_sp_118				X			X		
BT_3420_Alticinae_sp_118				X			X		
BT_3421_Alticinae_sp_118				X			X		
BT_3422_Alticinae_sp_118				X			X		
BT_3423_Eumolpinae_sp_029	X	X	X	X	X	X	X	X	
BT_3424_Alticinae_sp_118	X		X	X		X	X		
BT_3425_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_3426_Galerucinae_sp_105	X	X	X	X	X	X	X	X	
BT_3427_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3428_Hispinae_sp_025	X	X	X	X	X	X	X	X	
BT_3429_Galerucinae_sp_066	X	X	X	X	X	X	X	X	
BT_3430_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3431_Alticinae_sp_248	X	X	X	X	X	X	X	X	
BT_3432_Alticinae_sp_209	X	X	X	X	X	X	X	X	
BT_3433_Eumolpinae_sp_071	X	X	X	X	X	X	X	X	
BT_3434_Alticinae_sp_187	X	X	X	X	X	X	X	X	
BT_3435_Eumolpinae_sp_019	X	X	X	X	X	X	X	X	
BT_3436_Galerucinae_sp_061	X	X	X	X	X	X	X	X	
BT_3437_Galerucinae_sp_061				X			X		
BT_3438_Galerucinae_sp_031	X	X	X	X	X	X	X	X	
BT_3439_Alticinae_sp_018	X		X	X		X	X		
BT_3440_Alticinae_sp_117	X		X	X		X	X		
BT_3441_Alticinae_sp_174	X	X	X	X	X	X	X	X	
BT_3442_Alticinae_sp_207	X		X	X		X	X		
BT_3443_Alticinae_sp_207				X			X		
BT_3444_Alticinae_sp_064	X		X	X		X	X		
BT_3445_Alticinae_sp_092	X	X	X	X	X	X	X	X	
BT_3446_Alticinae_sp_083	X		X	X		X	X		
BT_3447_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_3448_Alticinae_sp_117	X	X	X	X	X	X	X	X	
BT_3449_Alticinae_sp_002	X	X	X	X	X	X	X	X	
BT_3450_Alticinae_sp_087	X	X	X	X	X	X	X	X	
BT_3451_Alticinae_sp_087				X			X		
BT_3452_Alticinae_sp_065	X	X	X	X	X	X	X	X	
BT_3453_Galerucinae_sp_061	X	X	X	X	X	X	X	X	
BT_3454_Galerucinae_sp_061				X			X		
BT_3455_Galerucinae_sp_031	X	X	X	X	X	X	X	X	
BT_3456_Alticinae_sp_266	X	X	X	X	X	X	X	X	
BT_3457_Hispinae_sp_003	X	X	X	X	X	X	X	X	
BT_3458_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_3459_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_3460_Alticinae_sp_096	X	X	X	X	X	X	X	X	
BT_3461_Alticinae_sp_162	X		X	X		X	X		
BT_3462_Chrysomelinae_sp_001	X	X	X	X	X	X	X	X	
BT_3463_Alticinae_sp_109	X	X	X	X	X	X	X	X	
BT_3464_Alticinae_sp_071	X		X	X		X	X		
BT_3465_Alticinae_sp_071	X	X	X	X	X	X	X	X	
BT_3466_Alticinae_sp_190	X		X	X		X	X		
BT_3467_Alticinae_sp_190				X			X		
BT_3468_Alticinae_sp_197	X	X	X	X	X	X	X	X	
BT_3471_Galerucinae_sp_002	X	X	X	X	X	X	X	X	
BT_3472_Galerucinae_sp_002				X			X		
BT_3473_Alticinae_sp_109	X	X	X	X	X	X	X	X	
BT_3474_Alticinae_sp_197	X	X	X	X	X	X	X	X	
BT_3475_Galerucinae_sp_104	X	X	X	X	X	X	X	X	
BT_3476_Eumolpinae_sp_065	X		X	X		X	X		
BT_3477_Alticinae_sp_198	X	X	X	X	X	X	X	X	
BT_3478_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_3479_Alticinae_sp_065	X	X	X	X	X	X	X	X	
BT_3480_Galerucinae_sp_061	X	X	X	X	X	X	X	X	
BT_3481_Alticinae_sp_064	X	X	X	X	X	X	X	X	
BT_3482_Galerucinae_sp_054	X		X	X		X	X		

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_3483_Alticinae_sp_123	X		X	X		X	X		
BT_3484_Alticinae_sp_123				X			X		
BT_3485_Alticinae_sp_249	X	X	X	X	X	X	X	X	
BT_3486_Alticinae_sp_198	X	X	X	X	X	X	X	X	
BT_3487_Alticinae_sp_111	X		X	X		X	X		
BT_3488_Alticinae_sp_176	X	X	X	X	X	X	X	X	
BT_3489_Galerucinae_sp_066	X	X	X	X	X	X	X	X	
BT_3490_Galerucinae_sp_066	X	X	X	X	X	X	X	X	
BT_3491_Galerucinae_sp_066				X			X		
BT_3492_Galerucinae_sp_066				X			X		
BT_3493_Alticinae_sp_249	X	X	X	X	X	X	X	X	
BT_3494_Alticinae_sp_249				X			X		
BT_3495_Cassidinae_sp_012	X	X	X	X	X	X	X	X	
BT_3496_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_3497_Alticinae_sp_061	X	X	X	X	X	X	X	X	
BT_3498_Alticinae_sp_260	X		X	X		X	X		
BT_3499_Alticinae_sp_005	X	X	X	X	X	X	X	X	
BT_3500_Galerucinae_sp_066	X	X	X	X	X	X	X	X	
BT_3501_Galerucinae_sp_094	X	X	X	X	X	X	X	X	
BT_3502_Eumolpinae_sp_017	X		X	X		X	X		
BT_3503_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_3504_Alticinae_sp_019	X	X	X	X	X	X	X	X	
BT_3505_Alticinae_sp_109	X	X	X	X	X	X	X	X	
BT_3506_Alticinae_sp_008	X	X	X	X	X	X	X	X	
BT_3507_Alticinae_sp_254	X		X	X		X	X		
BT_3508_Alticinae_sp_118	X		X	X		X	X		
BT_3509_Alticinae_sp_073	X		X	X		X	X		
BT_3510_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_3511_Galerucinae_sp_079	X	X	X	X	X	X	X	X	
BT_3512_Galerucinae_sp_079				X			X		
BT_3513_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_3514_Alticinae_sp_051				X			X		
BT_3515_Alticinae_sp_152	X	X	X	X	X	X	X	X	
BT_3516_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_3517_Galerucinae_sp_048	X	X	X	X	X	X	X	X	
BT_3518_Galerucinae_sp_058	X	X	X	X	X	X	X	X	
BT_3519_Alticinae_sp_201	X		X	X		X	X		
BT_3520_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_3521_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_3522_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_3528_Galerucinae_sp_093	X	X	X	X	X	X	X	X	
BT_3529_Galerucinae_sp_091	X	X	X	X	X	X	X	X	
BT_3530_Alticinae_sp_153	X	X	X	X	X	X	X	X	
BT_3531_Alticinae_sp_166	X	X	X	X	X	X	X	X	
BT_3532_Alticinae_sp_149	X	X	X	X	X	X	X	X	
BT_3533_Alticinae_sp_247	X	X	X	X	X	X	X	X	
BT_3534_Alticinae_sp_247				X			X		
BT_3535_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3536_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3537_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3538_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_3539_Alticinae_sp_241	X	X	X	X	X	X	X	X	
BT_3540_Eumolpinae_sp_058	X	X	X	X	X	X	X	X	
BT_3542_Eumolpinae_sp_049	X	X	X	X	X	X	X	X	
BT_3543_Eumolpinae_sp_069	X	X	X	X	X	X	X	X	
BT_3544_Chrysomelinae_sp_004	X	X	X	X	X	X	X	X	
BT_3545_Alticinae_sp_184	X	X	X	X	X	X	X	X	
BT_3546_Eumolpinae_sp_054	X		X	X		X	X		
BT_3547_Alticinae_sp_214	X	X	X	X	X	X	X	X	
BT_3548_Eumolpinae_sp_063	X	X	X	X	X	X	X	X	
BT_3549_Hispinae_sp_012	X	X	X	X	X	X	X	X	
BT_3550_Galerucinae_sp_093	X	X	X	X	X	X	X	X	
BT_3551_Galerucinae_sp_093	X	X	X	X	X	X	X	X	
BT_3552_Alticinae_sp_025	X	X	X	X	X	X	X	X	
BT_3553_Alticinae_sp_166	X		X	X		X	X		
BT_3554_Alticinae_sp_073	X		X	X		X	X		
BT_3555_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_3556_Eumolpinae_sp_050	X	X	X	X	X	X	X	X	
BT_3557_Eumolpinae_sp_070	X	X	X	X	X	X	X	X	
BT_3558_Hispinae_sp_021	X	X	X	X	X	X	X	X	
BT_3559_Alticinae_sp_233	X	X	X	X	X	X	X	X	
BT_3560_Alticinae_sp_188	X	X	X	X	X	X	X	X	
BT_3561_Alticinae_sp_056	X		X	X		X	X		
BT_3562_Eumolpinae_sp_057	X	X	X	X	X	X	X	X	
BT_3563_Hispinae_sp_014	X	X	X	X	X	X	X	X	
BT_3564_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_3565_Alticinae_sp_127				X			X		
BT_3566_Alticinae_sp_127				X			X		
BT_3567_Alticinae_sp_127				X			X		
BT_3568_Alticinae_sp_127				X			X		
BT_3569_Alticinae_sp_127				X			X		
BT_3570_Alticinae_sp_127				X			X		
BT_3571_Alticinae_sp_127				X			X		
BT_3572_Alticinae_sp_127				X			X		
BT_3573_Alticinae_sp_127				X			X		
BT_3574_Alticinae_sp_227	X	X	X	X	X	X	X	X	
BT_3575_Alticinae_sp_227	X	X	X	X	X	X	X	X	
BT_3576_Alticinae_sp_196	X		X	X		X	X		
BT_3577_Alticinae_sp_196				X			X		
BT_3578_Alticinae_sp_196				X			X		
BT_3579_Alticinae_sp_196				X			X		
BT_3580_Alticinae_sp_196				X			X		
BT_3581_Alticinae_sp_179	X	X	X	X	X	X	X	X	
BT_3582_Galerucinae_sp_106	X		X	X		X	X		
BT_3583_Alticinae_sp_135	X	X	X	X	X	X	X	X	
BT_3584_Alticinae_sp_167	X	X	X	X	X	X	X	X	
BT_3585_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_3586_Alticinae_sp_127				X			X		
BT_3587_Alticinae_sp_127				X			X		
BT_3588_Alticinae_sp_127				X			X		
BT_3589_Alticinae_sp_127				X			X		
BT_3590_Alticinae_sp_127				X			X		
BT_3591_Alticinae_sp_196	X	X	X	X	X	X	X	X	
BT_3592_Alticinae_sp_196				X			X		
BT_3593_Alticinae_sp_076	X	X	X	X	X	X	X	X	
BT_3594_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_3596_Alticinae_sp_111	X	X	X	X	X	X	X	X	
BT_3597_Alticinae_sp_196	X	X	X	X	X	X	X	X	
BT_3598_Alticinae_sp_196	X		X	X		X	X		
BT_3599_Alticinae_sp_196				X			X		
BT_3600_Alticinae_sp_253	X		X	X		X	X		
BT_3601_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_3602_Alticinae_sp_138	X		X	X		X	X		
BT_3603_Alticinae_sp_182	X		X	X		X	X		
BT_3604_Alticinae_sp_076	X	X	X	X	X	X	X	X	
BT_3605_Alticinae_sp_076				X			X		
BT_3606_Alticinae_sp_127	X		X	X		X	X		

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_3607_Alticinae_sp_138	X		X	X		X	X		
BT_3608_Alticinae_sp_253	X		X	X		X	X		
BT_3609_Eumolpinae_sp_047	X	X	X	X	X	X	X	X	
BT_3610_Alticinae_sp_076	X	X	X	X	X	X	X	X	
BT_3611_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_3612_Eumolpinae_sp_059	X	X	X	X	X	X	X	X	
BT_3613_Criocerinae_sp_007	X	X	X	X	X	X	X	X	
BT_3614_Eumolpinae_sp_059	X	X	X	X	X	X	X	X	
BT_3615_Galerucinae_sp_029	X	X	X	X	X	X	X	X	
BT_3616_Galerucinae_sp_029	X	X	X	X	X	X	X	X	
BT_3617_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_3618_Alticinae_sp_127				X			X		
BT_3619_Alticinae_sp_127				X			X		
BT_3620_Alticinae_sp_127				X			X		
BT_3621_Alticinae_sp_127				X			X		
BT_3622_Alticinae_sp_254	X	X	X	X	X	X	X	X	
BT_3623_Alticinae_sp_253	X	X	X	X	X	X	X	X	
BT_3624_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_3625_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_3626_Criocerinae_sp_010	X	X	X	X	X	X	X	X	
BT_3627_Eumolpinae_sp_039	X								
BT_3628_Alticinae_sp_104	X								
BT_3630_Alticinae_sp_117	X								
BT_3633_Alticinae_sp_109	X								
BT_3651_Galerucinae_sp_041	X	X							
BT_3652_Alticinae_sp_086	X								
BT_3653_Alticinae_sp_065	X								
BT_3656_Alticinae_sp_115	X								
BT_3658_Alticinae_sp_198	X								
BT_3659_Alticinae_sp_237	X								
BT_3660_Alticinae_sp_092	X								
BT_3685_Alticinae_sp_018	X	X	X	X	X	X	X	X	
BT_3686_Alticinae_sp_177	X	X	X	X	X	X	X	X	
BT_3687_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_3688_Alticinae_sp_087	X	X	X	X	X	X	X	X	
BT_3689_Eumolpinae_sp_040	X	X	X	X	X	X	X	X	
BT_3690_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_3691_Alticinae_sp_147	X	X	X	X	X	X	X	X	
BT_3692_Alticinae_sp_147				X			X		
BT_3693_Alticinae_sp_123	X	X	X	X	X	X	X	X	
BT_3694_Alticinae_sp_197	X	X	X	X	X	X	X	X	
BT_3698_Galerucinae_sp_089	X		X	X		X	X		
BT_3699_Eumolpinae_sp_063	X	X	X	X	X	X	X	X	
BT_3700_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_3701_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_3702_Alticinae_sp_206	X		X	X		X	X		
BT_3703_Alticinae_sp_206	X		X	X		X	X		
BT_3704_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3705_Alticinae_sp_085	X								
BT_3706_Alticinae_sp_182	X								
BT_3707_Alticinae_sp_182	X								
BT_3708_Eumolpinae_sp_059	X								
BT_3710_Alticinae_sp_196	X								
BT_3711_Alticinae_sp_076	X								
BT_3716_Alticinae_sp_127	X								
BT_3719_Alticinae_sp_093	X								
BT_3721_Alticinae_sp_076	X								
BT_3723_Eumolpinae_sp_059	X								
BT_3724_Alticinae_sp_127	X								
BT_3725_Alticinae_sp_138	X								
BT_3726_Alticinae_sp_227	X	X	X	X	X	X	X	X	
BT_3727_Alticinae_sp_253	X		X	X		X	X		
BT_3728_Alticinae_sp_099	X	X	X	X	X	X	X	X	
BT_3729_Alticinae_sp_104	X		X	X		X	X		
BT_3730_Alticinae_sp_095	X	X	X	X	X	X	X	X	
BT_3731_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_3732_Alticinae_sp_127				X			X		
BT_3733_Alticinae_sp_127				X			X		
BT_3734_Alticinae_sp_127				X			X		
BT_3735_Alticinae_sp_196	X	X	X	X	X	X	X	X	
BT_3736_Alticinae_sp_196				X			X		
BT_3737_Alticinae_sp_196				X			X		
BT_3738_Alticinae_sp_196				X			X		
BT_3739_Galerucinae_sp_085	X	X	X	X	X	X	X	X	
BT_3740_Eumolpinae_sp_047	X		X	X		X	X		
BT_3741_Alticinae_sp_138	X		X	X		X	X		
BT_3750_Alticinae_sp_076	X	X	X	X	X	X	X	X	
BT_3751_Alticinae_sp_076				X			X		
BT_3752_Eumolpinae_sp_038	X	X	X	X	X	X	X	X	
BT_3753_Galerucinae_sp_093	X	X	X	X	X	X	X	X	
BT_3754_Alticinae_sp_076	X	X	X	X	X	X	X	X	
BT_3755_Alticinae_sp_076				X			X		
BT_3756_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_3757_Alticinae_sp_127				X			X		
BT_3758_Alticinae_sp_127				X			X		
BT_3759_Alticinae_sp_127				X			X		
BT_3760_Alticinae_sp_127				X			X		
BT_3761_Alticinae_sp_196	X	X	X	X	X	X	X	X	
BT_3762_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_3763_Alticinae_sp_127				X			X		
BT_3765_Alticinae_sp_138	X								
BT_3767_Alticinae_sp_226	X								
BT_3768_Criocerinae_sp_008	X								
BT_3771_Alticinae_sp_169	X								
BT_3773_Alticinae_sp_127	X								
BT_3790_Alticinae_sp_196	X								
BT_3791_Alticinae_sp_232	X								
BT_3792_Alticinae_sp_240	X								
BT_3793_Alticinae_sp_204	X								
BT_3795_Hispinae_sp_019	X								
BT_3796_Galerucinae_sp_007	X	X							
BT_3807_Alticinae_sp_185	X		X	X		X	X		
BT_3808_Alticinae_sp_230	X		X	X		X	X		
BT_3809_Alticinae_sp_234	X		X	X		X	X		
BT_3810_Alticinae_sp_217	X	X	X	X	X	X	X	X	
BT_3811_Hispinae_sp_017	X	X	X	X	X	X	X	X	
BT_3812_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_3813_Alticinae_sp_109	X	X	X	X	X	X	X	X	
BT_3814_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_3815_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_3816_Alticinae_sp_118				X			X		
BT_3817_Alticinae_sp_118				X			X		
BT_3818_Alticinae_sp_118				X			X		
BT_3819_Alticinae_sp_118				X			X		
BT_3820_Alticinae_sp_216	X	X	X	X	X	X	X	X	
BT_3824_Galerucinae_sp_013	X	X	X	X	X	X	X	X	
BT_3825_Alticinae_sp_050	X	X	X	X	X	X	X	X	

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_3826_Alticinae_sp_201	X	X	X	X	X	X	X	X	
BT_3827_Galerucinae_sp_090	X	X	X	X	X	X	X	X	
BT_3828_Alticinae_sp_211	X	X	X	X	X	X	X	X	
BT_3829_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_3830_Alticinae_sp_180	X	X	X	X	X	X	X	X	
BT_3832_Eumolpinae_sp_050	X	X	X	X	X	X	X	X	
BT_3833_Alticinae_sp_231	X		X	X		X	X		
BT_3834_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_3845_Galerucinae_sp_007	X	X							
BT_3846_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_3847_Alticinae_sp_118				X			X		
BT_3848_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_3849_Alticinae_sp_175	X	X	X	X	X	X	X	X	
BT_3850_Alticinae_sp_140	X	X	X	X	X	X	X	X	
BT_3851_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_3852_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_3853_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_3854_Eumolpinae_sp_039				X			X		
BT_3855_Eumolpinae_sp_039				X			X		
BT_3856_Alticinae_sp_118	X	X	X	X	X	X	X	X	
BT_3857_Alticinae_sp_118				X			X		
BT_3858_Alticinae_sp_118				X			X		
BT_3859_Alticinae_sp_118				X			X		
BT_3860_Eumolpinae_sp_030	X	X	X	X	X	X	X	X	
BT_3861_Cassidinae_sp_015	X	X	X	X	X	X	X	X	
BT_3869_Cassidinae_sp_012	X	X	X	X	X	X	X	X	
BT_3870_Eumolpinae_sp_002	X		X	X		X	X		
BT_3871_Alticinae_sp_083	X	X	X	X	X	X	X	X	
BT_3872_Eumolpinae_sp_040	X	X	X	X	X	X	X	X	
BT_3873_Cassidinae_sp_020	X	X	X	X	X	X	X	X	
BT_3874_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	
BT_3885_Alticinae_sp_007	X	X							
BT_3891_Galerucinae_sp_090	X	X	X	X	X	X	X	X	
BT_3892_Galerucinae_sp_090				X			X		
BT_3893_Alticinae_sp_164	X	X	X	X	X	X	X	X	
BT_3894_Alticinae_sp_200	X	X	X	X	X	X	X	X	
BT_3895_Galerucinae_sp_079	X	X	X	X	X	X	X	X	
BT_3896_Hispinae_sp_012	X	X	X	X	X	X	X	X	
BT_3915_Galerucinae_sp_007	X	X	X	X	X	X	X	X	
BT_3916_Galerucinae_sp_007				X			X		
BT_3917_Alticinae_sp_065	X	X	X	X	X	X	X	X	
BT_3918_Alticinae_sp_096	X	X	X	X	X	X	X	X	
BT_3919_Alticinae_sp_096				X			X		
BT_3920_Alticinae_sp_165	X	X	X	X	X	X	X	X	
BT_3921_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	
BT_3922_Alticinae_sp_264	X	X	X	X	X	X	X	X	
BT_3923_Cassidinae_sp_006	X		X	X		X	X		
BT_3947_Eumolpinae_sp_019	X	X	X	X	X	X	X	X	
BT_3948_Alticinae_sp_044	X	X	X	X	X	X	X	X	
BT_3949_Alticinae_sp_077	X	X	X	X	X	X	X	X	
BT_3950_Galerucinae_sp_061	X	X	X	X	X	X	X	X	
BT_3951_Alticinae_sp_238	X	X	X	X	X	X	X	X	
BT_3952_Alticinae_sp_092	X	X	X	X	X	X	X	X	
BT_3953_Alticinae_sp_112	X	X	X	X	X	X	X	X	
BT_3954_Alticinae_sp_112				X			X		
BT_3955_Alticinae_sp_112				X			X		
BT_3957_Galerucinae_sp_066	X	X	X	X	X	X	X	X	
BT_3958_Eumolpinae_sp_019	X	X	X	X	X	X	X	X	
BT_3959_Galerucinae_sp_069	X	X	X	X	X	X	X	X	
BT_3960_Alticinae_sp_096	X	X	X	X	X	X	X	X	
BT_3961_Cassidinae_sp_004	X	X	X	X	X	X	X	X	
BT_3962_Alticinae_sp_117	X		X	X		X	X		
BT_3963_Alticinae_sp_085	X	X	X	X	X	X	X	X	
BT_3964_Alticinae_sp_045	X	X	X	X	X	X	X	X	
BT_3965_Galerucinae_sp_034	X		X	X		X	X		
BT_3966_Galerucinae_sp_034				X			X		
BT_3967_Galerucinae_sp_034				X			X		
BT_3968_Eumolpinae_sp_061	X		X	X		X	X		
BT_3969_Alticinae_sp_096	X	X	X	X	X	X	X	X	
BT_3970_Alticinae_sp_085	X	X	X	X	X	X	X	X	
BT_3971_Galerucinae_sp_026	X	X	X	X	X	X	X	X	
BT_3972_Alticinae_sp_231	X		X	X		X	X		
BT_3973_Alticinae_sp_248	X	X	X	X	X	X	X	X	
BT_3974_Alticinae_sp_094	X	X	X	X	X	X	X	X	
BT_3975_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_3976_Eumolpinae_sp_050	X	X	X	X	X	X	X	X	
BT_3977_Hispinae_sp_016	X	X	X	X	X	X	X	X	
BT_3986_Galerucinae_sp_007	X	X							
BT_3988_Eumolpinae_sp_059	X	X	X	X	X	X	X	X	
BT_3989_Alticinae_sp_238	X	X	X	X	X	X	X	X	
BT_3990_Alticinae_sp_173	X	X	X	X	X	X	X	X	
BT_3994_Hispinae_sp_015	X	X							
BT_3995_Galerucinae_sp_074	X	X	X	X	X	X	X	X	
BT_3996_Alticinae_sp_042	X	X	X	X	X	X	X	X	
BT_3997_Galerucinae_sp_033	X		X	X		X	X		
BT_3998_Galerucinae_sp_007	X	X	X	X	X	X	X	X	
BT_3999_Alticinae_sp_009	X	X	X	X	X	X	X	X	
BT_4000_Alticinae_sp_175	X	X	X	X	X	X	X	X	
BT_4001_Alticinae_sp_175				X			X		
BT_4002_Galerucinae_sp_066	X	X	X	X	X	X	X	X	
BT_4003_Galerucinae_sp_083	X	X	X	X	X	X	X	X	
BT_4004_Galerucinae_sp_083				X			X		
BT_4005_Galerucinae_sp_031	X	X	X	X	X	X	X	X	
BT_4006_Alticinae_sp_251	X	X	X	X	X	X	X	X	
BT_4007_Alticinae_sp_145	X	X	X	X	X	X	X	X	
BT_4008_Galerucinae_sp_061	X	X	X	X	X	X	X	X	
BT_4009_Alticinae_sp_018	X	X	X	X	X	X	X	X	
BT_4010_Eumolpinae_sp_040	X	X	X	X	X	X	X	X	
BT_4011_Eumolpinae_sp_040				X			X		
BT_4012_Eumolpinae_sp_040				X			X		
BT_4013_Galerucinae_sp_046	X	X	X	X	X	X	X	X	
BT_4014_Cassidinae_sp_005	X	X	X	X	X	X	X	X	
BT_4015_Galerucinae_sp_064	X	X	X	X	X	X	X	X	
BT_4016_Galerucinae_sp_110	X	X	X	X	X	X	X	X	
BT_4017_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_4018_Alticinae_sp_104				X			X		
BT_4019_Eumolpinae_sp_039	X	X	X	X	X	X	X	X	
BT_4020_Eumolpinae_sp_039				X			X		
BT_4021_Alticinae_sp_008	X	X	X	X	X	X	X	X	
BT_4022_Cassidinae_sp_004	X	X	X	X	X	X	X	X	
BT_4026_Galerucinae_sp_017	X	X							
BT_4031_Alticinae_sp_145	X	X	X	X	X	X	X	X	
BT_4032_Hispinae_sp_007	X	X	X	X	X	X	X	X	
BT_4033_Eumolpinae_sp_037	X		X	X		X	X		
BT_4035_Hispinae_sp_003	X	X	X	X	X	X	X	X	
BT_4036_Galerucinae_sp_078	X	X	X	X	X	X	X	X	
BT_4047_Alticinae_sp_181	X	X	X	X	X	X	X	X	

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Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_4048_Criocerinae_sp_001	X	X	X	X	X	X	X	X	
BT_4049_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4050_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	
BT_4051_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	
BT_4052_Alticinae_sp_213	X	X	X	X	X	X	X	X	
BT_4053_Eumolpinae_sp_065	X		X	X		X	X		
BT_4054_Alticinae_sp_018	X	X	X	X	X	X	X	X	
BT_4055_Alticinae_sp_018				X			X		
BT_4056_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4057_Alticinae_sp_115				X			X		
BT_4058_Alticinae_sp_115				X			X		
BT_4059_Galerucinae_sp_107	X	X	X	X	X	X	X	X	
BT_4060_Eumolpinae_sp_038	X		X	X		X	X		
BT_4061_Alticinae_sp_106	X	X	X	X	X	X	X	X	
BT_4062_Eumolpinae_sp_038	X	X	X	X	X	X	X	X	
BT_4063_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4064_Alticinae_sp_115				X			X		
BT_4065_Alticinae_sp_018	X	X	X	X	X	X	X	X	
BT_4066_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4067_Alticinae_sp_115				X			X		
BT_4182_Galerucinae_sp_092	X	X							
BT_4186_Galerucinae_sp_020	X	X							
BT_4194_Galerucinae_sp_095	X	X							
BT_4195_Galerucinae_sp_029	X	X							
BT_4198_Criocerinae_sp_002	X	X							
BT_4207_Cassidinae_sp_021	X	X							
BT_4208_Galerucinae_sp_028	X	X							
BT_4209_Criocerinae_sp_007	X	X							
BT_4215_Alticinae_sp_239	X	X	X	X	X				
BT_4216_Alticinae_sp_187	X	X	X	X	X				
BT_4217_Alticinae_sp_262	X	X	X	X	X				
BT_4241_Cassidinae_sp_014	X	X							
BT_4252_Galerucinae_sp_007	X	X							
BT_4253_Galerucinae_sp_002	X	X							
BT_4294_Hispinae_sp_020	X	X							
BT_4295_Galerucinae_sp_029	X	X							
BT_4306_Cassidinae_sp_019	X								
BT_4321_Galerucinae_sp_017	X	X							
BT_4344_Galerucinae_sp_011	X	X							
BT_4350_Alticinae_sp_218	X	X							
BT_4351_Galerucinae_sp_017	X	X							
BT_4354_Alticinae_sp_163	X	X							
BT_4402_Alticinae_sp_222	X	X	X	X	X				
BT_4421_Alticinae_sp_223	X	X							
BT_4434_Alticinae_sp_163	X	X							
BT_4468_Galerucinae_sp_007	X	X							
BT_4477_Alticinae_sp_155	X	X							
BT_4500_Galerucinae_sp_097	X	X							
BT_4509_Cassidinae_sp_018	X	X							
BT_4510_Hispinae_sp_026	X	X	X	X	X				
BT_4511_Alticinae_sp_229	X	X	X	X	X				
BT_4550_Alticinae_sp_220	X	X							
BT_4572_Alticinae_sp_219	X	X							
BT_4581_Galerucinae_sp_005	X	X							
BT_4605_Galerucinae_sp_110	X	X							
BT_4684_Cassidinae_sp_001	X	X							
BT_4687_Galerucinae_sp_036	X	X							
BT_4732_Alticinae_sp_095	X	X	X	X	X	X	X	X	
BT_4733_Eumolpinae_sp_068	X	X	X	X	X	X	X	X	
BT_4734_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4735_Alticinae_sp_235	X	X	X	X	X	X	X	X	
BT_4736_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4737_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4738_Alticinae_sp_172				X			X		
BT_4739_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_4740_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_4741_Alticinae_sp_073	X		X	X		X	X		
BT_4742_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_4743_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_4744_Eumolpinae_sp_056	X	X	X	X	X	X	X	X	
BT_4745_Galerucinae_sp_080	X		X	X		X	X		
BT_4746_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_4747_Galerucinae_sp_074	X	X	X	X	X	X	X	X	
BT_4748_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_4749_Galerucinae_sp_074	X	X	X	X	X	X	X	X	
BT_4750_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_4751_Alticinae_sp_253	X	X	X	X	X	X	X	X	
BT_4753_Eumolpinae_sp_038	X		X	X		X	X		
BT_4754_Alticinae_sp_195	X	X	X	X	X	X	X	X	
BT_4772_Alticinae_sp_009	X	X	X	X	X	X	X	X	
BT_4773_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_4774_Alticinae_sp_050	X	X	X	X	X	X	X	X	
BT_4775_Alticinae_sp_211	X	X	X	X	X	X	X	X	
BT_4776_Galerucinae_sp_029	X	X	X	X	X	X	X	X	
BT_4777_Alticinae_sp_183	X		X	X		X	X		
BT_4778_Alticinae_sp_181	X	X	X	X	X	X	X	X	
BT_4779_Galerucinae_sp_106	X	X	X	X	X	X	X	X	
BT_4780_Alticinae_sp_252	X	X	X	X	X	X	X	X	
BT_4781_Alticinae_sp_141	X		X	X		X	X		
BT_4782_Galerucinae_sp_029	X	X	X	X	X	X	X	X	
BT_4783_Hispinae_sp_016	X	X	X	X	X	X	X	X	
BT_4784_Alticinae_sp_245	X		X	X		X	X		
BT_4785_Hispinae_sp_027	X		X	X		X	X		
BT_4786_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4787_Alticinae_sp_172				X			X		
BT_4788_Eumolpinae_sp_058	X	X	X	X	X	X	X	X	
BT_4789_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4790_Alticinae_sp_189	X	X	X	X	X	X	X	X	
BT_4791_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4792_Alticinae_sp_187	X	X	X	X	X	X	X	X	
BT_4793_Alticinae_sp_263	X	X	X	X	X	X	X	X	
BT_4794_Alticinae_sp_198	X	X	X	X	X	X	X	X	
BT_4795_Alticinae_sp_249	X	X	X	X	X	X	X	X	
BT_4796_Alticinae_sp_261	X		X	X		X	X		
BT_4797_Galerucinae_sp_034	X	X	X	X	X	X	X	X	
BT_4798_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4799_Eumolpinae_sp_038	X		X	X		X	X		
BT_4800_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4801_Alticinae_sp_104	X	X	X	X	X	X	X	X	
BT_4802_Eumolpinae_sp_038	X		X	X		X	X		
BT_4803_Alticinae_sp_101	X	X	X	X	X	X	X	X	
BT_4804_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4805_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4806_Alticinae_sp_115				X			X		
BT_4807_Eumolpinae_sp_042	X	X	X	X	X	X	X	X	
BT_4808_Alticinae_sp_018	X	X	X	X	X	X	X	X	
BT_4809_Galerucinae_sp_034	X	X	X	X	X	X	X	X	

Continued on next page(s)

Table S3 – continued from previous page(s)

Specimen	1	1b	2	2a	2b	3	3a	3b	4
BT_4810_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4811_Alticinae_sp_115	X	X	X	X	X	X	X	X	
BT_4812_Alticinae_sp_101	X	X	X	X	X	X	X	X	
BT_4813_Alticinae_sp_198	X	X	X	X	X	X	X	X	
BT_4814_Alticinae_sp_199	X	X	X	X	X	X	X	X	
BT_4815_Alticinae_sp_086	X	X	X	X	X	X	X	X	
BT_4816_Alticinae_sp_086				X			X		
BT_4817_Alticinae_sp_086				X			X		
BT_4851_Eumolpinae_sp_024	X	X	X	X	X	X	X	X	
BT_4856_Alticinae_sp_186	X	X	X	X	X	X	X	X	
BT_4857_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4858_Alticinae_sp_187	X	X	X	X	X	X	X	X	
BT_4859_Alticinae_sp_057	X	X	X	X	X	X	X	X	
BT_4860_Eumolpinae_sp_046	X	X	X	X	X	X	X	X	
BT_4861_Alticinae_sp_149	X	X	X	X	X	X	X	X	
BT_4862_Alticinae_sp_149	X	X	X	X	X	X	X	X	
BT_4863_Alticinae_sp_168	X	X	X	X	X	X	X	X	
BT_4864_Alticinae_sp_149	X	X	X	X	X	X	X	X	
BT_4867_Galerucinae_sp_003	X	X							
BT_4875_Criocerinae_sp_009	X	X							
BT_4885_Galerucinae_sp_056	X	X	X	X	X	X	X	X	
BT_4886_Alticinae_sp_121	X	X	X	X	X	X	X	X	
BT_4887_Alticinae_sp_102	X	X	X	X	X	X	X	X	
BT_4888_Eumolpinae_sp_059	X	X	X	X	X	X	X	X	
BT_4889_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_4890_Alticinae_sp_051				X			X		
BT_4891_Galerucinae_sp_087	X	X	X	X	X	X	X	X	
BT_4892_Alticinae_sp_149	X	X	X	X	X	X	X	X	
BT_4893_Alticinae_sp_149				X			X		
BT_4894_Alticinae_sp_149				X			X		
BT_4895_Alticinae_sp_149				X			X		
BT_4896_Alticinae_sp_149				X			X		
BT_4897_Alticinae_sp_149				X			X		
BT_4898_Alticinae_sp_168	X	X	X	X	X	X	X	X	
BT_4899_Alticinae_sp_168				X			X		
BT_4900_Alticinae_sp_151	X	X	X	X	X	X	X	X	
BT_4901_Galerucinae_sp_057	X	X	X	X	X	X	X	X	
BT_4902_Galerucinae_sp_057				X			X		
BT_4903_Alticinae_sp_267	X	X	X	X	X	X	X	X	
BT_4904_Alticinae_sp_267				X			X		
BT_4905_Alticinae_sp_201	X	X	X	X	X	X	X	X	
BT_4906_Alticinae_sp_211	X	X	X	X	X	X	X	X	
BT_4907_Alticinae_sp_211				X			X		
BT_4908_Hispinae_sp_013	X	X	X	X	X	X	X	X	
BT_4909_Alticinae_sp_025	X	X	X	X	X	X	X	X	
BT_4910_Alticinae_sp_149	X	X	X	X	X	X	X	X	
BT_4911_Alticinae_sp_057	X	X	X	X	X	X	X	X	
BT_4912_Alticinae_sp_086	X	X	X	X	X	X	X	X	
BT_4914_Galerucinae_sp_003	X	X	X	X	X	X	X	X	
BT_4915_Alticinae_sp_050	X	X	X	X	X	X	X	X	
BT_4916_Eumolpinae_sp_063	X	X	X	X	X	X	X	X	
BT_4917_Alticinae_sp_166	X	X	X	X	X	X	X	X	
BT_4918_Alticinae_sp_050	X	X	X	X	X	X	X	X	
BT_4919_Eumolpinae_sp_056	X	X	X	X	X	X	X	X	
BT_4920_Alticinae_sp_057	X	X	X	X	X	X	X	X	
BT_4921_Alticinae_sp_057				X			X		
BT_4922_Alticinae_sp_009	X		X	X		X	X		
BT_4923_Galerucinae_sp_048	X	X	X	X	X	X	X	X	
BT_4924_Alticinae_sp_051	X	X	X	X	X	X	X	X	
BT_4925_Alticinae_sp_102	X	X	X	X	X	X	X	X	
BT_4926_Alticinae_sp_025	X	X	X	X	X	X	X	X	
BT_4927_Alticinae_sp_268	X	X	X	X	X	X	X	X	
BT_4928_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4929_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4930_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4931_Alticinae_sp_244	X	X	X	X	X	X	X	X	
BT_4937_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_4938_Alticinae_sp_149	X	X	X	X	X	X	X	X	
BT_4939_Alticinae_sp_149				X			X		
BT_4940_Alticinae_sp_059	X	X	X	X	X	X	X	X	
BT_4941_Alticinae_sp_127	X	X	X	X	X	X	X	X	
BT_4942_Alticinae_sp_102	X	X	X	X	X	X	X	X	
BT_4944_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_4945_Eumolpinae_sp_002	X		X	X		X	X		
BT_4946_Eumolpinae_sp_034	X		X	X		X	X		
BT_4947_Alticinae_sp_199	X	X	X	X	X	X	X	X	
BT_4948_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_4949_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_4950_Galerucinae_sp_088	X	X	X	X	X	X	X	X	
BT_4951_Alticinae_sp_061	X	X	X	X	X	X	X	X	
BT_4952_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_4953_Alticinae_sp_199	X	X	X	X	X	X	X	X	
BT_4954_Alticinae_sp_199				X			X		
BT_4955_Alticinae_sp_199				X			X		
BT_4956_Alticinae_sp_086	X	X	X	X	X	X	X	X	
BT_4957_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_4958_Alticinae_sp_133	X	X	X	X	X	X	X	X	
BT_4960_Alticinae_sp_086	X	X	X	X	X	X	X	X	
BT_4961_Alticinae_sp_086				X			X		
BT_4962_Alticinae_sp_086				X			X		
BT_4963_Alticinae_sp_215	X	X	X	X	X	X	X	X	
BT_4964_Alticinae_sp_150	X	X	X	X	X	X	X	X	
BT_4965_Eumolpinae_sp_034	X		X	X		X	X		
BT_4966_Alticinae_sp_008	X	X	X	X	X	X	X	X	
BT_4967_Eumolpinae_sp_038	X		X	X		X	X		
BT_4968_Eumolpinae_sp_038				X			X		
BT_4969_Alticinae_sp_045	X	X	X	X	X	X	X	X	
BT_4970_Galerucinae_sp_081	X	X	X	X	X	X	X	X	
BT_4971_Alticinae_sp_192	X	X	X	X	X	X	X	X	
BT_4972_Alticinae_sp_050	X	X	X	X	X	X	X	X	
BT_4986_Galerucinae_sp_101	X	X							
BT_4994_Alticinae_sp_172	X	X	X	X	X	X	X	X	
BT_4995_Galerucinae_sp_103	X	X	X	X	X	X	X	X	
BT_5029_Galerucinae_sp_099	X	X							
BT_5122_Alticinae_sp_221	X	X							

Appendix E

Additional information: Species delimitation results

Table E.1: **Results of species delimitation for each specimen.** Only specimens from data set 4. D.-Cluster = Distance-Cluster

Specimen	Haplotype-Network	3% D.-Cluster	5% D.-Cluster	7.5% D.-Cluster	GMYC-Cluster	PTP-Cluster	Haplo-type
BT_0001_Eumolpinae sp. 1	Network282	3Cl001	5Cl001	75Cl001	GMYC008	PTP023	H416
BT¯0002¯Alticinae sp. 42	Network52	3Cl002	5Cl002	75Cl002	GMYC219	PTP114	H085
BT¯0004¯Eumolpinae sp. 42	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H388
BT¯0005¯Galerucinae sp. 40	Network216	3Cl004	5Cl004	75Cl004	GMYC100	PTP238	H329
BT¯0007¯Galerucinae sp. 38	Network98	3Cl005	5Cl005	75Cl005	GMYC117	PTP272	H154
BT¯0008¯Alticinae sp. 243	Network54	3Cl006	5Cl006	75Cl006	GMYC220	PTP115	H088
BT¯0012¯Eumolpinae sp. 21	Network270	3Cl007	5Cl007	75Cl007	GMYC022	PTP007	H401
BT¯0015¯Galerucinae sp. 76	Network118	3Cl008	5Cl008	75Cl008	GMYC113	PTP288	H185
BT¯0017¯Alticinae sp. 43	Network49	3Cl009	5Cl009	75Cl009	GMYC227	PTP122	H081
BT¯0021¯Alticinae sp. 7	Network187	3Cl010	5Cl010	75Cl010	GMYC087	PTP204	H285
BT¯0022¯Alticinae sp. 219	Network190	3Cl115	5Cl011	75Cl011	GMYC089	PTP202	H288
BT¯0024¯Galerucinae sp. 1	Network112	3Cl011	5Cl012	75Cl012	GMYC138	PTP264	H176
BT¯0033¯Galerucinae sp. 37	Network116	3Cl012	5Cl013	75Cl013	GMYC115	PTP286	H181
BT¯0034¯Eumolpinae sp. 14	Network285	3Cl013	5Cl014	75Cl014	GMYC009	PTP016	H419
BT¯0035¯Eumolpinae sp. 006	Network275	3Cl014	5Cl015	75Cl015	GMYC017	PTP025	H407
BT¯0036¯Galerucinae sp. 11	Network103	3Cl015	5Cl016	75Cl016	GMYC143	PTP258	H160
BT¯0043¯Galerucinae sp. 5	Network110	3Cl016	5Cl017	75Cl017	GMYC137	PTP265	H172
BT¯0046¯Alticinae sp. 243	Network53	3Cl006	5Cl006	75Cl006	GMYC221	PTP116	H087
BT¯0047¯Alticinae sp. 42	Network52	3Cl002	5Cl002	75Cl002	GMYC219	PTP114	H086
BT¯0048¯Galerucinae sp. 39	Network97	3Cl017	5Cl018	75Cl018	GMYC118	PTP271	H153
BT¯0049¯Galerucinae sp. 41	Network217	3Cl018	5Cl019	75Cl019	GMYC101	PTP237	H330
BT¯0088¯Galerucinae sp. 7	Network109	3Cl019	5Cl020	75Cl020	GMYC134	PTP267	H170
BT¯0089¯Eumolpinae sp. 1	Network282	3Cl001	5Cl001	75Cl001	GMYC008	PTP023	H416
BT¯0090¯Galerucinae sp. 76	Network118	3Cl008	5Cl008	75Cl008	GMYC113	PTP288	H184
BT¯0091¯Eumolpinae sp. 1	Network282	3Cl001	5Cl001	75Cl001	GMYC008	PTP023	H416
BT¯0094¯Galerucinae sp. 11	Network103	3Cl015	5Cl016	75Cl016	GMYC143	PTP258	H161
BT¯0095¯Cassidinae sp. 1	Network261	3Cl020	5Cl021	75Cl021	GMYC280	PTP038	H392
BT¯0096¯Alticinae sp. 10	Network195	3Cl021	5Cl022	75Cl022	GMYC097	PTP195	H303
BT¯0098¯Galerucinae sp. 002	Network111	3Cl022	5Cl023	75Cl023	GMYC139	PTP263	H173
BT¯0099¯Galerucinae sp. 7	Network92	3Cl023	5Cl024	75Cl024	GMYC126	PTP284	H147
BT¯0102¯Alticinae sp. 44	Network42	3Cl024	5Cl025	75Cl025	GMYC214	PTP102	H060
BT¯0103¯Eumolpinae sp. 38	Network284	3Cl025	5Cl026	75Cl026	GMYC010	PTP017	H418
BT¯0107¯Galerucinae sp. 46	Network155	3Cl026	5Cl027	75Cl027	GMYC178	PTP249	H241
BT¯0109¯Alticinae sp. 251	Network81	3Cl027	5Cl028	75Cl028	GMYC057	PTP156	H124
BT¯0110¯Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H136
BT¯0114¯Galerucinae sp. 62	Network205	3Cl029	5Cl030	75Cl030	GMYC111	PTP239	H317
BT¯0115¯Alticinae sp. 98	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H010
BT¯0118¯Eumolpinae sp. 19	Network265	3Cl031	5Cl032	75Cl032	GMYC028	PTP004	H396
BT¯0119¯Alticinae sp. 124	Network87	3Cl032	5Cl033	75Cl033	GMYC048	PTP166	H135
BT¯0121¯Alticinae sp. 107	Network218	3Cl033	5Cl034	75Cl034	GMYC062	PTP141	H331
BT¯0123¯Alticinae sp. 129	Network212	3Cl034	5Cl035	75Cl035	GMYC065	PTP098	H325
BT¯0125¯Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H020
BT¯0126¯Alticinae sp. 123	Network148	3Cl036	5Cl037	75Cl037	GMYC070	PTP144	H228
BT¯0130¯Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT¯0134¯Galerucinae sp. 7	Network92	3Cl023	5Cl024	75Cl024	GMYC126	PTP284	H148
BT¯0135¯Eumolpinae sp. 19	Network265	3Cl031	5Cl032	75Cl032	GMYC028	PTP004	H396
BT¯0137¯Cassidinae sp. 4	Network253	3Cl038	5Cl039	75Cl039	GMYC284	PTP053	H379
BT¯0139¯Alticinae sp. 10	Network195	3Cl021	5Cl022	75Cl022	GMYC097	PTP195	H304
BT¯0140¯Alticinae sp. 28	Network29	3Cl039	5Cl040	75Cl040	GMYC209	PTP129	H041
BT¯0144¯Eumolpinae sp. 38	Network283	3Cl040	5Cl041	75Cl041	GMYC011	PTP018	H417
BT¯0145¯Galerucinae sp. 61	Network93	3Cl041	5Cl042	75Cl042	GMYC131	PTP279	H149
BT¯0146¯Alticinae sp. 29	Network68	3Cl042	5Cl043	75Cl043	GMYC049	PTP168	H107
BT¯0147¯Alticinae sp. 62	Network57	3Cl043	5Cl044	75Cl044	GMYC224	PTP117	H092
BT¯0148¯Alticinae sp. 66	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯0149¯Alticinae sp. 249	Network79	3Cl045	5Cl046	75Cl046	GMYC037	PTP147	H121
BT¯0153¯Alticinae sp. 109	Network171	3Cl046	5Cl047	75Cl047	GMYC254	PTP062	H264
BT¯0154¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H010
BT¯0155¯Alticinae sp. 193	Network172	3Cl047	5Cl048	75Cl048	GMYC243	PTP206	H266
BT¯0157¯Alticinae sp. 97	Network11	3Cl048	5Cl049	75Cl049	GMYC256	PTP064	H015
BT¯0158¯Eumolpinae sp. 2	Network285	3Cl013	5Cl014	75Cl014	GMYC009	PTP016	H419
BT¯0159¯Galerucinae sp. 096	Network180	3Cl049	5Cl050	75Cl050	GMYC174	PTP252	H277
BT¯0174¯Galerucinae sp. 46	Network155	3Cl026	5Cl027	75Cl027	GMYC178	PTP249	H241
BT¯0176¯Galerucinae sp. 46	Network156	3Cl050	5Cl051	75Cl051	GMYC179	PTP250	H242
BT¯0183¯Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT¯0188¯Galerucinae sp. 11	Network103	3Cl015	5Cl016	75Cl016	GMYC143	PTP258	H162
BT¯0189¯Alticinae sp.161	Network38	3Cl051	5Cl052	75Cl052	GMYC151	PTP071	H053
BT¯0190¯Eumolpinae sp. 1	Network282	3Cl001	5Cl001	75Cl001	GMYC008	PTP023	H416
BT¯0196¯Galerucinae sp. 10	Network232	3Cl052	5Cl053	75Cl053	GMYC076	PTP228	H353
BT¯0199¯Alticinae sp. 118	Network170	3Cl053	5Cl054	75Cl054	GMYC187	PTP108	H262
BT¯0201¯Chrysomelinae sp. 2	Network206	3Cl054	5Cl055	75Cl055	GMYC102	PTP236	H318
BT¯0202¯Galerucinae sp. 32	Network2	3Cl055	5Cl056	75Cl056	GMYC175	PTP247	H002
BT¯0204¯Hispinae sp. 2	Network255	3Cl056	5Cl057	75Cl057	GMYC273	PTP051	H382
BT¯0207¯Galerucinae sp. 69	Network219	3Cl057	5Cl058	75Cl058	GMYC086	PTP215	H333
BT¯0208¯Eumolpinae sp. 19	Network265	3Cl031	5Cl032	75Cl032	GMYC028	PTP004	H396
BT¯0209¯Cassidinae sp. 5	Network242	3Cl058	5Cl059	75Cl059	GMYC277	PTP043	H364
BT¯0211¯Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H136
BT¯0212¯Galerucinae sp. 66	Network223	3Cl059	5Cl060	75Cl060	GMYC079	PTP222	H341
BT¯0213¯Galerucinae sp. 24	Network197	3Cl060	5Cl061	75Cl061	GMYC108	PTP230	H306
BT¯0214¯Alticinae sp. 28	Network29	3Cl039	5Cl040	75Cl040	GMYC209	PTP129	H043
BT¯0218¯Galerucinae sp. 31	Network203	3Cl061	5Cl062	75Cl062	GMYC084	PTP217	H313
BT¯0219¯Eumolpinae sp. 073	Network244	3Cl062	5Cl063	75Cl063	GMYC031	PTP002	H368
BT¯0220¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H010
BT_0221_Eumolpinae sp. 10	Network274	3Cl063	5Cl064	75Cl064	GMYC021	PTP008	H406

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BT_0223_Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT_0227_Cassidinae sp. 14	Network262	3Cl064	5Cl065	75Cl065	GMYC281	PTP039	H393
BT_0228_Cassidinae sp. 7	Network245	3Cl065	5Cl066	75Cl066	GMYC276	PTP042	H370
BT_0231_Hispinae sp. 3	Network247	3Cl066	5Cl067	75Cl067	GMYC272	PTP050	H372
BT_0232_Hispinae sp. 4	Network1	3Cl067	5Cl068	75Cl068	GMYC288	PTP033	H001
BT_0233_Alticinae sp. 61	Network8	3Cl068	5Cl069	75Cl069	GMYC259	PTP066	H008
BT_0234_Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H019
BT_0235_Alticinae sp. 10	Network195	3Cl021	5Cl022	75Cl022	GMYC097	PTP195	H302
BT_0236_Alticinae sp. 156	Network194	3Cl069	5Cl070	75Cl022	GMYC098	PTP194	H301
BT_0239_Galerucinae sp. 2	Network112	3Cl011	5Cl012	75Cl012	GMYC138	PTP264	H174
BT_0240_Eumolpinae sp. 21	Network270	3Cl007	5Cl007	75Cl007	GMYC022	PTP007	H402
BT_0243_Alticinae sp. 118	Network170	3Cl053	5Cl054	75Cl054	GMYC187	PTP108	H261
BT_0244_Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H019
BT_0245_Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT_0246_Galerucinae sp. 30	Network184	3Cl070	5Cl071	75Cl070	GMYC110	PTP240	H282
BT_0247_Criocerinae sp. 1	Network237	3Cl071	5Cl072	75Cl071	GMYC264	PTP057	H358
BT_0249_Criocerinae sp. 1	Network237	3Cl071	5Cl072	75Cl071	GMYC264	PTP057	H358
BT_0252_Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT_0254_Eumolpinae sp. 23	Network270	3Cl007	5Cl007	75Cl007	GMYC022	PTP007	H402
BT_0256_Alticinae sp. 31	Network151	3Cl072	5Cl073	75Cl072	GMYC241	PTP083	H234
BT_0257_Galerucinae sp. 1	Network112	3Cl011	5Cl012	75Cl012	GMYC138	PTP264	H177
BT_0258_Galerucinae sp. 5	Network110	3Cl016	5Cl017	75Cl017	GMYC137	PTP265	H172
BT_0259_Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT_0267_Alticinae sp. 29	Network68	3Cl042	5Cl043	75Cl043	GMYC049	PTP168	H108
BT_0268_Alticinae sp. 158	Network127	3Cl073	5Cl074	75Cl073	GMYC165	PTP179	H200
BT_0269_Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H076
BT_0271_Alticinae sp. 64	Network71	3Cl075	5Cl076	75Cl075	GMYC044	PTP153	H112
BT_0273_Alticinae sp. 141	Network130	3Cl076	5Cl077	75Cl076	GMYC170	PTP192	H203
BT_0276_Alticinae sp. 122	Network218	3Cl033	5Cl034	75Cl034	GMYC062	PTP141	H332
BT_0278_Alticinae sp. 124	Network87	3Cl032	5Cl033	75Cl033	GMYC048	PTP166	H133
BT_0279_Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H010
BT_0283_Eumolpinae sp. 20	Network289	3Cl077	5Cl078	75Cl077	GMYC003	PTP010	H425
BT_0284_Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H137
BT_0285_Galerucinae sp. 22	Network117	3Cl078	5Cl008	75Cl008	GMYC114	PTP287	H182
BT_0288_Eumolpinae sp. 17	Network277	3Cl079	5Cl079	75Cl078	GMYC018	PTP027	H409
BT_0289_Eumolpinae sp. 1	Network282	3Cl001	5Cl001	75Cl001	GMYC008	PTP023	H416
BT_0292_Galerucinae sp. 76	Network118	3Cl008	5Cl008	75Cl008	GMYC113	PTP288	H183
BT_0295_Galerucinae sp. 31	Network203	3Cl061	5Cl062	75Cl062	GMYC084	PTP217	H314
BT_0296_Alticinae sp. 5	Network162	3Cl080	5Cl080	75Cl079	GMYC092	PTP205	H252
BT_0297_Alticinae sp. 142	Network132	3Cl081	5Cl081	75Cl080	GMYC167	PTP189	H205
BT_0298_Alticinae sp. 63	Network26	3Cl082	5Cl082	75Cl081	GMYC201	PTP131	H038
BT_0301_Alticinae sp. 83	Network22	3Cl083	5Cl083	75Cl082	GMYC230	PTP072	H033
BT_0302_Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H078
BT_0305_Alticinae sp. 81	Network209	3Cl084	5Cl084	75Cl083	GMYC069	PTP143	H322
BT_0307_Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H012
BT_0309_Alticinae sp. 256	Network12	3Cl085	5Cl085	75Cl084	GMYC257	PTP063	H016
BT_0311_Eumolpinae sp. 42	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H388
BT_0312_Eumolpinae sp. 21	Network270	3Cl007	5Cl007	75Cl007	GMYC022	PTP007	H402
BT_0314_Eumolpinae sp. 43	Network234	3Cl086	5Cl086	75Cl085	GMYC020	PTP009	H355
BT_0336_Galerucinae sp. 56	Network201	3Cl087	5Cl087	75Cl086	GMYC107	PTP231	H310
BT_0337_Galerucinae sp. 56	Network201	3Cl087	5Cl087	75Cl086	GMYC107	PTP231	H310
BT_0338_Galerucinae sp. 55	Network201	3Cl087	5Cl087	75Cl086	GMYC107	PTP231	H310
BT_0339_Alticinae sp. 71	Network18	3Cl088	5Cl088	75Cl087	GMYC195	PTP112	H029
BT_0343_Galerucinae sp. 52	Network201	3Cl087	5Cl087	75Cl086	GMYC107	PTP231	H310
BT_0346_Alticinae sp. 51	Network41	3Cl089	5Cl089	75Cl088	GMYC197	PTP126	H058
BT_0349_Eumolpinae sp. 20	Network288	3Cl090	5Cl090	75Cl089	GMYC004	PTP011	H424
BT_0352_Alticinae sp. 130	Network213	3Cl091	5Cl091	75Cl090	GMYC063	PTP139	H326
BT_0353_Alticinae sp. 132	Network196	3Cl092	5Cl092	75Cl091	GMYC212	PTP101	H305
BT_0356_Alticinae sp. 128	Network91	3Cl093	5Cl093	75Cl092	GMYC055	PTP160	H144
BT_0361_Alticinae sp. 50	Network45	3Cl094	5Cl094	75Cl093	GMYC211	PTP107	H066
BT_0363_Alticinae sp. 51	Network41	3Cl089	5Cl089	75Cl088	GMYC197	PTP126	H059
BT_0365_Galerucinae sp. 49	Network160	3Cl095	5Cl095	75Cl094	GMYC183	PTP246	H247
BT_0372_Alticinae sp. 9	Network192	3Cl096	5Cl096	75Cl095	GMYC099	PTP196	H297
BT_0375_Eumolpinae sp. 32	Network272	3Cl097	5Cl097	75Cl096	GMYC007	PTP014	H404
BT_0376_Alticinae sp. 51	Network41	3Cl089	5Cl089	75Cl088	GMYC197	PTP126	H058
BT_0377_Eumolpinae sp. 24	Network279	3Cl098	5Cl098	75Cl097	GMYC014	PTP021	H412
BT_0380_Eumolpinae sp. 24	Network279	3Cl098	5Cl098	75Cl097	GMYC014	PTP021	H413
BT_0382_Galerucinae sp. 13	Network105	3Cl099	5Cl099	75Cl098	GMYC144	PTP259	H164
BT_0383_Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H138
BT_0384_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0387_Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H027
BT_0390_Alticinae sp. 90	Network76	3Cl102	5Cl102	75Cl101	GMYC041	PTP149	H118
BT_0391_Alticinae sp. 90	Network77	3Cl103	5Cl102	75Cl101	GMYC040	PTP150	H119
BT_0392_Eumolpinae sp. 074	Network244	3Cl062	5Cl063	75Cl063	GMYC031	PTP002	H368
BT_0395_Eumolpinae sp. 074	Network244	3Cl062	5Cl063	75Cl063	GMYC031	PTP002	H368
BT_0396_Cassidinae sp. 4	Network253	3Cl038	5Cl039	75Cl039	GMYC284	PTP053	H379
BT_0397_Alticinae sp. 131	Network164	3Cl104	5Cl103	75Cl102	GMYC237	PTP077	H254
BT_0399_Galerucinae sp. 28	Network64	3Cl105	5Cl104	75Cl103	GMYC128	PTP283	H102
BT_0402_Galerucinae sp. 44	Network139	3Cl106	5Cl105	75Cl104	GMYC176	PTP248	H214
BT_0403_Galerucinae sp. 44	Network139	3Cl106	5Cl105	75Cl104	GMYC176	PTP248	H215
BT_0405_Galerucinae sp. 45	Network154	3Cl107	5Cl106	75Cl105	GMYC177	PTP251	H239
BT_0407_Galerucinae sp. 049	Network158	3Cl108	5Cl107	75Cl106	GMYC182	PTP244	H244
BT_0408_Eumolpinae sp. 24	Network279	3Cl098	5Cl098	75Cl097	GMYC014	PTP021	H412
BT_0409_Eumolpinae sp. 24	Network279	3Cl098	5Cl098	75Cl097	GMYC014	PTP021	H412
BT_0410_Alticinae sp. 141	Network214	3Cl109	5Cl108	75Cl107	GMYC171	PTP182	H327
BT_0411_Alticinae sp. 58	Network30	3Cl110	5Cl109	75Cl108	GMYC248	PTP094	H044
BT_0415_Alticinae sp. 242	Network143	3Cl111	5Cl110	75Cl109	GMYC033	PTP086	H221
BT_0417_Galerucinae sp. 74	Network226	3Cl112	5Cl111	75Cl110	GMYC083	PTP218	H345
BT_0420_Alticinae sp. 128	Network89	3Cl113	5Cl112	75Cl111	GMYC054	PTP163	H141
BT_0423_Eumolpinae sp. 24	Network279	3Cl098	5Cl098	75Cl097	GMYC014	PTP021	H412
BT_0425_Eumolpinae sp. 7	Network264	3Cl114	5Cl113	75Cl112	GMYC012	PTP019	H395
BT_0426_Alticinae sp. 150	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H291
BT_0427_Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H026
BT_0428_Alticinae sp. 105	Network16	3Cl116	5Cl114	75Cl113	GMYC234	PTP079	H024
BT_0429_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0432_Eumolpinae sp. 30	Network271	3Cl117	5Cl115	75Cl114	GMYC019	PTP024	H403
BT_0433_Galerucinae sp. 69	Network219	3Cl057	5Cl058	75Cl058	GMYC086	PTP215	H335
BT_0434_Galerucinae sp. 72	Network231	3Cl118	5Cl116	75Cl115	GMYC073	PTP225	H351
BT_0436_Alticinae sp. 149	Network188	3Cl119	5Cl117	75Cl116	GMYC091	PTP200	H286
BT_0438_Galerucinae sp. 15	Network202	3Cl120	5Cl118	75Cl117	GMYC105	PTP234	H311
BT_0441_Galerucinae sp. 082	Network182	3Cl121	5Cl119	75Cl118	GMYC106	PTP235	H279
BT_0442_Galerucinae sp. 049	Network160	3Cl095	5Cl095	75Cl094	GMYC183	PTP246	H247
BT_0443_Alticinae sp. 51	Network41	3Cl089	5Cl089	75Cl088	GMYC197	PTP126	H058
BT_0444_Alticinae sp. 143	Network123	3Cl122	5Cl120	75Cl119	GMYC158	PTP186	H193
BT_0447_Galerucinae sp. 7	Network109	3Cl019	5Cl020	75Cl020	GMYC134	PTP267	H168
BT_0448_Galerucinae sp. 049	Network160	3Cl095	5Cl095	75Cl094	GMYC183	PTP246	H247
BT_0449_Galerucinae sp. 049	Network160	3Cl095	5Cl095	75Cl094	GMYC183	PTP246	H248
BT_0451_Galerucinae sp. 15	Network202	3Cl120	5Cl118	75Cl117	GMYC105	PTP234	H311
BT_0452_Alticinae sp. 9	Network192	3Cl096	5Cl096	75Cl095	GMYC099	PTP196	H296
BT_0454_Alticinae sp. 26	Network50	3Cl123	5Cl121	75Cl120	GMYC213	PTP103	H082
BT_0457_Alticinae sp. 181	Network5	3Cl124	5Cl122	75Cl121	GMYC193	PTP212	H005
BT_0459_Galerucinae sp. 50	Network61	3Cl125	5Cl123	75Cl122	GMYC127	PTP280	H097
BT_0460_Galerucinae sp. 45	Network154	3Cl107	5Cl106	75Cl105	GMYC177	PTP251	H238
BT_0461_Galerucinae sp. 45	Network154	3Cl107	5Cl106	75Cl105	GMYC177	PTP251	H237
BT_0462_Eumolpinae sp. 42	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H384
BT_0463_Galerucinae sp. 70	Network229	3Cl126	5Cl124	75Cl123	GMYC081	PTP229	H349
BT_0465_Alticinae sp. 050	Network45	3Cl094	5Cl094	75Cl093	GMYC211	PTP107	H066
BT_0468_Alticinae sp. 72	Network149	3Cl127	5Cl125	75Cl124	GMYC240	PTP082	H230
BT_0469_Galerucinae sp. 45	Network154	3Cl107	5Cl106	75Cl105	GMYC177	PTP251	H240

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BT_0473_Galerucinae sp. 69	Network219	3Cl057	5Cl058	75Cl058	GMYC086	PTP215	H334
BT_0474_Alticinae sp. 80	Network146	3Cl128	5Cl126	75Cl125	GMYC156	PTP171	H225
BT_0475_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0489_Galerucinae sp. 67	Network228	3Cl129	5Cl127	75Cl126	GMYC085	PTP216	H348
BT_0490_Hispinae sp. 5	Network246	3Cl130	5Cl128	75Cl127	GMYC287	PTP034	H371
BT_0491_Alticinae sp. 157	Network135	3Cl131	5Cl129	75Cl128	GMYC169	PTP190	H209
BT_0492_Galerucinae sp. 61	Network93	3Cl041	5Cl042	75Cl042	GMYC131	PTP279	H149
BT_0494_Alticinae sp. 250	Network74	3Cl132	5Cl130	75Cl129	GMYC039	PTP146	H115
BT_0496_Alticinae sp. 112	Network220	3Cl133	5Cl131	75Cl130	GMYC071	PTP214	H336
BT_0499_Alticinae sp. 44	Network42	3Cl024	5Cl025	75Cl025	GMYC214	PTP102	H060
BT_0501_Galerucinae sp. 66	Network223	3Cl059	5Cl060	75Cl060	GMYC079	PTP222	H341
BT_0502_Eumolpinae sp. 42	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H388
BT_0503_Alticinae sp. 111	Network137	3Cl134	5Cl132	75Cl131	GMYC192	PTP213	H212
BT_0505_Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT_0506_Alticinae sp. 92	Network200	3Cl135	5Cl133	75Cl132	GMYC191	PTP208	H309
BT_0508_Galerucinae sp. 53	Network205	3Cl029	5Cl030	75Cl030	GMYC111	PTP239	H317
BT_0510_Cassidinae sp. 4	Network253	3Cl038	5Cl039	75Cl039	GMYC284	PTP053	H379
BT_0511_Cassidinae sp. 8	Network241	3Cl136	5Cl134	75Cl133	GMYC286	PTP032	H363
BT_0512_Hispinae sp. 6	Network251	3Cl137	5Cl135	75Cl134	GMYC269	PTP048	H376
BT_0514_Eumolpinae sp. 074	Network244	3Cl062	5Cl063	75Cl063	GMYC031	PTP002	H368
BT_0516_Alticinae sp. 126	Network220	3Cl133	5Cl131	75Cl130	GMYC071	PTP214	H336
BT_0517_Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H027
BT_0518_Alticinae sp. 85	Network47	3Cl138	5Cl136	75Cl135	GMYC217	PTP104	H071
BT_0519_Alticinae sp. 68	Network84	3Cl139	5Cl137	75Cl136	GMYC052	PTP162	H127
BT_0520_Alticinae sp. 159	Network133	3Cl140	5Cl138	75Cl137	GMYC164	PTP180	H207
BT_0524_Eumolpinae sp. 39	Network268	3Cl141	5Cl139	75Cl099	GMYC026	PTP029	H399
BT_0525_Hispinae sp. 023	Network248	3Cl142	5Cl140	75Cl067	GMYC271	PTP049	H373
BT_0526_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0527_Galerucinae sp. 36	Network208	3Cl143	5Cl141	75Cl138	GMYC146	PTP254	H320
BT_0528_Alticinae sp. 150	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H290
BT_0529_Alticinae sp. 113	Network204	3Cl144	5Cl142	75Cl139	GMYC064	PTP140	H316
BT_0530_Galerucinae sp. 31	Network203	3Cl061	5Cl062	75Cl062	GMYC084	PTP217	H312
BT_0531_Galerucinae sp. 62	Network205	3Cl029	5Cl030	75Cl030	GMYC111	PTP239	H317
BT_0532_Galerucinae sp. 75	Network227	3Cl145	5Cl143	75Cl110	GMYC082	PTP219	H346
BT_0533_Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H017
BT_0535_Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H019
BT_0537_Alticinae sp. 142	Network132	3Cl081	5Cl081	75Cl080	GMYC167	PTP189	H205
BT_0538_Alticinae sp. 238	Network176	3Cl146	5Cl144	75Cl140	GMYC189	PTP210	H273
BT_0539_Alticinae sp. 13	Network175	3Cl147	5Cl156	75Cl141	GMYC066	PTP090	H271
BT_0540_Galerucinae sp. 64	Network222	3Cl148	5Cl145	75Cl060	GMYC080	PTP221	H339
BT_0544_Cassidinae sp. 12	Network243	3Cl149	5Cl146	75Cl142	GMYC278	PTP044	H366
BT_0546_Alticinae sp. 83	Network22	3Cl083	5Cl083	75Cl082	GMYC230	PTP072	H034
BT_0547_Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT_0549_Alticinae sp. 150	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H292
BT_0550_Alticinae sp. 265	Network60	3Cl150	5Cl147	75Cl143	GMYC068	PTP142	H096
BT_0551_Galerucinae sp. 64	Network222	3Cl148	5Cl145	75Cl060	GMYC080	PTP221	H339
BT_0552_Alticinae sp. 117	Network87	3Cl032	5Cl033	75Cl033	GMYC048	PTP166	H133
BT_0553_Eumolpinae sp. 42	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H388
BT_0554_Galerucinae sp. 71	Network233	3Cl151	5Cl148	75Cl053	GMYC075	PTP227	H354
BT_0555_Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H078
BT_0556_Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT_0557_Alticinae sp. 181	Network220	3Cl133	5Cl131	75Cl130	GMYC071	PTP214	H336
BT_0558_Alticinae sp. 149	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H293
BT_0559_Eumolpinae sp. 42	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H388
BT_0560_Galerucinae sp. 64	Network222	3Cl148	5Cl145	75Cl060	GMYC080	PTP221	H339
BT_0561_Galerucinae sp. 66	Network224	3Cl152	5Cl149	75Cl060	GMYC077	PTP224	H343
BT_0565_Alticinae sp. 150	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H289
BT_0566_Hispinae sp. 6	Network251	3Cl137	5Cl135	75Cl134	GMYC269	PTP048	H377
BT_0567_Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H027
BT_0574_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0575_Alticinae sp. 140	Network122	3Cl153	5Cl150	75Cl144	GMYC157	PTP187	H191
BT_0577_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0579_Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H027
BT_0587_Alticinae sp. 6	Network128	3Cl154	5Cl151	75Cl145	GMYC153	PTP099	H201
BT_0588_Galerucinae sp. 69	Network219	3Cl057	5Cl058	75Cl058	GMYC086	PTP215	H335
BT_0589_Eumolpinae sp. 17	Network277	3Cl079	5Cl079	75Cl078	GMYC018	PTP027	H410
BT_0590_Alticinae sp. 140	Network122	3Cl153	5Cl150	75Cl144	GMYC157	PTP187	H191
BT_0592_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0594_Alticinae sp. 118	Network169	3Cl155	5Cl152	75Cl054	GMYC188	PTP109	H260
BT_0596_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0597_Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H027
BT_0604_Hispinae sp. 5	Network246	3Cl130	5Cl128	75Cl127	GMYC287	PTP034	H371
BT_0605_Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H136
BT_0606_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0628_Cassidinae sp. 12	Network243	3Cl149	5Cl146	75Cl142	GMYC278	PTP044	H366
BT_0630_Alticinae sp. 36	Network142	3Cl156	5Cl153	75Cl146	GMYC035	PTP088	H220
BT_0631_Alticinae sp. 64	Network75	3Cl157	5Cl154	75Cl101	GMYC042	PTP148	H116
BT_0632_Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H075
BT_0633_Alticinae sp. 85	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H078
BT_0634_Alticinae sp. 66	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT_0635_Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT_0640_Alticinae sp. 18	Network59	3Cl158	5Cl155	75Cl147	GMYC251	PTP067	H095
BT_0641_Alticinae sp. 13	Network174	3Cl159	5Cl156	75Cl141	GMYC067	PTP089	H269
BT_0642_Eumolpinae sp. 42	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H385
BT_0644_Galerucinae sp. 66	Network223	3Cl059	5Cl060	75Cl060	GMYC079	PTP222	H342
BT_0645_Galerucinae sp. 11	Network113	3Cl160	5Cl157	75Cl148	GMYC140	PTP260	H178
BT_0646_Alticinae sp. 71	Network44	3Cl161	5Cl158	75Cl149	GMYC215	PTP123	H064
BT_0647_Galerucinae sp. 35	Network166	3Cl162	5Cl159	75Cl150	GMYC109	PTP241	H257
BT_0648_Alticinae sp. 140	Network122	3Cl153	5Cl150	75Cl144	GMYC157	PTP187	H190
BT_0650_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0652_Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H026
BT_0655_Alticinae sp. 257	Network73	3Cl163	5Cl160	75Cl151	GMYC038	PTP151	H114
BT_0656_Alticinae sp. 51	Network31	3Cl164	5Cl161	75Cl152	GMYC207	PTP135	H045
BT_0657_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0660_Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H027
BT_0662_Alticinae sp. 126	Network14	3Cl165	5Cl162	75Cl153	GMYC246	PTP093	H022
BT_0663_Alticinae sp. 150	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H289
BT_0664_Alticinae sp. 150	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H295
BT_0665_Alticinae sp. 150	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H292
BT_0675_Alticinae sp. 8	Network189	3Cl166	5Cl163	75Cl011	GMYC090	PTP201	H287
BT_0676_Alticinae sp. 64	Network79	3Cl045	5Cl046	75Cl046	GMYC037	PTP147	H122
BT_0677_Eumolpinae sp. 39	Network267	3Cl100	5Cl100	75Cl099	GMYC025	PTP028	H398
BT_0680_Galerucinae sp. 76	Network118	3Cl008	5Cl008	75Cl008	GMYC113	PTP288	H185
BT_0683_Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H013
BT_0686_Eumolpinae sp. 23	Network270	3Cl007	5Cl007	75Cl007	GMYC022	PTP007	H402
BT_0687_Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H136
BT_0688_Criocerinae sp. 1	Network237	3Cl071	5Cl072	75Cl071	GMYC264	PTP057	H359
BT_0690_Alticinae sp. 124	Network87	3Cl032	5Cl033	75Cl033	GMYC048	PTP166	H134
BT_0691_Galerucinae sp. 31	Network203	3Cl061	5Cl062	75Cl062	GMYC084	PTP217	H314
BT_0692_Alticinae sp. 14	Network131	3Cl167	5Cl164	75Cl154	GMYC162	PTP188	H204
BT_0698_Alticinae sp. 13	Network174	3Cl159	5Cl156	75Cl141	GMYC067	PTP089	H270
BT_0699_Alticinae sp. 83	Network22	3Cl083	5Cl083	75Cl082	GMYC230	PTP072	H034
BT_0705_Galerucinae sp. 8	Network107	3Cl168	5Cl165	75Cl155	GMYC136	PTP266	H166
BT_0709_Galerucinae sp. 64	Network222	3Cl148	5Cl145	75Cl060	GMYC080	PTP221	H339
BT_0710_Alticinae sp. 13	Network175	3Cl147	5Cl156	75Cl141	GMYC066	PTP090	H272
BT_0711_Galerucinae sp. 73	Network221	3Cl169	5Cl166	75Cl156	GMYC072	PTP220	H337
BT_0713_Galerucinae sp. 73	Network221	3Cl169	5Cl166	75Cl156	GMYC072	PTP220	H337
BT_0715_Galerucinae sp. 76	Network118	3Cl008	5Cl008	75Cl008	GMYC113	PTP288	H185
BT_0716_Galerucinae sp. 11	Network103	3Cl015	5Cl016	75Cl016	GMYC143	PTP258	H161

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Table S4 – continued from previous page(s)

BT_0717_Galerucinae sp. 002	Network114	3Cl170	5Cl167	75Cl157	GMYC141	PTP262	H179
BT¯0719¯Eumolpinae sp. 43	Network234	3Cl086	5Cl086	75Cl085	GMYC020	PTP009	H355
BT¯0721¯Eumolpinae sp. 20	Network289	3Cl077	5Cl078	75Cl077	GMYC003	PTP010	H426
BT¯0722¯Cassidinae sp. 13	Network235	3Cl171	5Cl168	75Cl158	GMYC275	PTP041	H356
BT¯0725¯Alticinae sp. 243	Network53	3Cl006	5Cl006	75Cl006	GMYC221	PTP116	H087
BT¯0727¯Galerucinae sp. 73	Network221	3Cl169	5Cl166	75Cl156	GMYC072	PTP220	H338
BT¯0728¯Galerucinae sp. 64	Network222	3Cl148	5Cl145	75Cl060	GMYC080	PTP221	H339
BT¯0729¯Galerucinae sp. 15	Network202	3Cl120	5Cl118	75Cl117	GMYC105	PTP234	H311
BT¯0730¯Alticinae sp. 136	Network165	3Cl172	5Cl169	75Cl159	GMYC159	PTP185	H255
BT¯0732¯Galerucinae sp. 4	Network106	3Cl173	5Cl170	75Cl160	GMYC145	PTP257	H165
BT¯0733¯Galerucinae sp. 097	Network108	3Cl174	5Cl171	75Cl020	GMYC135	PTP268	H167
BT¯0734¯Galerucinae sp. 39	Network97	3Cl017	5Cl018	75Cl018	GMYC118	PTP271	H153
BT¯0735¯Galerucinae sp. 38	Network99	3Cl175	5Cl005	75Cl005	GMYC116	PTP273	H155
BT¯0736¯Galerucinae sp. 26	Network211	3Cl176	5Cl172	75Cl161	GMYC104	PTP233	H324
BT¯0738¯Eumolpinae sp. 4	Network273	3Cl177	5Cl173	75Cl162	GMYC024	PTP005	H405
BT¯0739¯Galerucinae sp. 18	Network96	3Cl178	5Cl174	75Cl163	GMYC119	PTP270	H152
BT¯0740¯Galerucinae sp. 76	Network118	3Cl008	5Cl008	75Cl008	GMYC113	PTP288	H185
BT¯0741¯Galerucinae sp. 002	Network112	3Cl011	5Cl012	75Cl012	GMYC138	PTP264	H175
BT¯0742¯Galerucinae sp. 19	Network120	3Cl179	5Cl175	75Cl164	GMYC112	PTP285	H187
BT¯0743¯Galerucinae sp. 14	Network102	3Cl180	5Cl176	75Cl165	GMYC132	PTP255	H159
BT¯0744¯Galerucinae sp. 7	Network109	3Cl019	5Cl020	75Cl020	GMYC134	PTP267	H171
BT¯0747¯Galerucinae sp. 38	Network99	3Cl175	5Cl005	75Cl005	GMYC116	PTP273	H156
BT¯0749¯Galerucinae sp. 39	Network97	3Cl017	5Cl018	75Cl018	GMYC118	PTP271	H153
BT¯0750¯Cassidinae sp. 5	Network242	3Cl058	5Cl059	75Cl059	GMYC277	PTP043	H365
BT¯0752¯Alticinae sp. 39	Network163	3Cl181	5Cl177	75Cl166	GMYC094	PTP198	H253
BT¯0753¯Alticinae sp. 10	Network195	3Cl021	5Cl022	75Cl022	GMYC097	PTP195	H304
BT¯0755¯Galerucinae sp. 36	Network207	3Cl182	5Cl178	75Cl138	GMYC147	PTP253	H319
BT¯0756¯Eumolpinae sp. 22	Network269	3Cl183	5Cl179	75Cl167	GMYC023	PTP006	H400
BT¯0766¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯0770¯Eumolpinae sp. 16	Network286	3Cl184	5Cl180	75Cl168	GMYC002	PTP012	H422
BT¯0779¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H010
BT¯0781¯Eumolpinae sp. 20	Network289	3Cl077	5Cl078	75Cl077	GMYC003	PTP010	H425
BT¯0782¯Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT¯0788¯Alticinae sp. 6	Network125	3Cl185	5Cl181	75Cl169	GMYC154	PTP100	H198
BT¯0789¯Alticinae sp.14	Network131	3Cl167	5Cl164	75Cl154	GMYC162	PTP188	H204
BT¯0791¯Eumolpinae sp. 16	Network286	3Cl184	5Cl180	75Cl168	GMYC002	PTP012	H421
BT¯0792¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H010
BT¯0794¯Alticinae sp. 129	Network212	3Cl034	5Cl035	75Cl035	GMYC065	PTP098	H325
BT¯0795¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H128
BT¯0796¯Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H018
BT¯0799¯Cassidinae sp. 14	Network263	3Cl186	5Cl065	75Cl065	GMYC282	PTP040	H394
BT¯0800¯Galerucinae sp. 30	Network184	3Cl070	5Cl071	75Cl070	GMYC110	PTP240	H282
BT¯0803¯Galerucinae sp. 76	Network118	3Cl008	5Cl008	75Cl008	GMYC113	PTP288	H185
BT¯0804¯Alticinae sp. 28	Network29	3Cl039	5Cl040	75Cl040	GMYC209	PTP129	H042
BT¯0805¯Alticinae sp. 14	Network131	3Cl167	5Cl164	75Cl154	GMYC162	PTP188	H204
BT¯0806¯Alticinae sp. 13	Network175	3Cl147	5Cl156	75Cl141	GMYC066	PTP090	H271
BT¯0807¯Alticinae sp. 54	Network44	3Cl161	5Cl158	75Cl149	GMYC215	PTP123	H063
BT¯0809¯Alticinae sp. 12	Network150	3Cl187	5Cl182	75Cl170	GMYC239	PTP084	H231
BT¯0810¯Galerucinae sp. 46	Network156	3Cl050	5Cl051	75Cl051	GMYC179	PTP250	H242
BT¯0811¯Criocerinae sp. 6	Network238	3Cl188	5Cl183	75Cl171	GMYC266	PTP058	H360
BT¯0813¯Criocerinae sp. 4	Network239	3Cl189	5Cl184	75Cl172	GMYC262	PTP055	H361
BT¯0814¯Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H078
BT¯0815¯Alticinae sp. 32	Network150	3Cl187	5Cl182	75Cl170	GMYC239	PTP084	H232
BT¯0816¯Galerucinae sp. 19	Network120	3Cl179	5Cl175	75Cl164	GMYC112	PTP285	H188
BT¯0817¯Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H139
BT¯0818¯Galerucinae sp. 61	Network93	3Cl041	5Cl042	75Cl042	GMYC131	PTP279	H149
BT¯0819¯Eumolpinae sp. 074	Network244	3Cl062	5Cl063	75Cl063	GMYC031	PTP002	H369
BT¯0820¯Eumolpinae sp. 38	Network284	3Cl025	5Cl026	75Cl026	GMYC010	PTP017	H418
BT¯0823¯Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H281
BT¯0827¯Eumolpinae sp. 20	Network289	3Cl077	5Cl078	75Cl077	GMYC003	PTP010	H425
BT¯0828¯Alticinae sp. 118	Network169	3Cl155	5Cl152	75Cl054	GMYC188	PTP109	H260
BT¯0829¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H010
BT¯0831¯Alticinae sp. 147	Network65	3Cl190	5Cl185	75Cl173	GMYC194	PTP211	H104
BT¯0835¯Galerucinae sp. 29	Network94	3Cl191	5Cl186	75Cl174	GMYC125	PTP275	H150
BT¯0836¯Alticinae sp. 3	Network185	3Cl192	5Cl187	75Cl175	GMYC095	PTP197	H283
BT¯0837¯Alticinae sp. 9	Network192	3Cl096	5Cl096	75Cl095	GMYC099	PTP196	H298
BT¯0839¯Alticinae sp. 40	Network56	3Cl193	5Cl188	75Cl176	GMYC223	PTP118	H091
BT¯0840¯Alticinae sp. 140	Network123	3Cl122	5Cl120	75Cl119	GMYC158	PTP186	H194
BT¯0841¯Alticinae sp. 127	Network4	3Cl194	5Cl189	75Cl177	GMYC247	PTP092	H004
BT¯0843¯Alticinae sp. 136	Network165	3Cl172	5Cl169	75Cl159	GMYC159	PTP185	H256
BT¯0847¯Eumolpinae sp. 5	Network285	3Cl013	5Cl014	75Cl014	GMYC009	PTP016	H419
BT¯0848¯Alticinae sp. 45	Network55	3Cl195	5Cl190	75Cl178	GMYC225	PTP119	H090
BT¯0850¯Alticinae sp. 49	Network141	3Cl196	5Cl191	75Cl179	GMYC032	PTP085	H218
BT¯0851¯Alticinae sp. 65	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯0852¯Alticinae sp. 133	Network130	3Cl076	5Cl077	75Cl076	GMYC170	PTP192	H203
BT¯0855¯Alticinae sp. 018	Network59	3Cl158	5Cl155	75Cl147	GMYC251	PTP067	H095
BT¯0861¯Eumolpinae sp. 20	Network289	3Cl077	5Cl078	75Cl077	GMYC003	PTP010	H425
BT¯0862¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H010
BT¯0864¯Alticinae sp. 253	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H018
BT¯0865¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯0871¯Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H074
BT¯0873¯Alticinae sp. 85	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H077
BT¯0949¯Cassidinae sp. 2	Network259	3Cl197	5Cl192	75Cl180	GMYC283	PTP037	H390
BT¯0950¯Cassidinae sp. 10	Network252	3Cl198	5Cl193	75Cl181	GMYC274	PTP036	H378
BT¯0951¯Cassidinae sp. 11	Network260	3Cl199	5Cl194	75Cl182	GMYC279	PTP045	H391
BT¯0952¯Alticinae sp. 269	Network19	3Cl200	5Cl195	75Cl183	GMYC228	PTP121	H030
BT¯0953¯Galerucinae sp. 28	Network63	3Cl201	5Cl196	75Cl103	GMYC129	PTP282	H099
BT¯0954¯Galerucinae sp. 29	Network95	3Cl202	5Cl197	75Cl184	GMYC124	PTP276	H151
BT¯0955¯Galerucinae sp. 20	Network119	3Cl203	5Cl198	75Cl185	GMYC122	PTP277	H186
BT¯0957¯Galerucinae sp. 36	Network208	3Cl143	5Cl141	75Cl138	GMYC146	PTP254	H321
BT¯0958¯Alticinae sp. 154	Network43	3Cl204	5Cl199	75Cl186	GMYC226	PTP120	H061
BT¯0959¯Galerucinae sp. 52	Network201	3Cl087	5Cl087	75Cl086	GMYC107	PTP231	H310
BT¯0960¯Galerucinae sp. 47	Network157	3Cl205	5Cl200	75Cl187	GMYC180	PTP242	H243
BT¯0961¯Alticinae sp. 77	Network86	3Cl206	5Cl201	75Cl188	GMYC047	PTP165	H132
BT¯0962¯Alticinae sp. 76	Network27	3Cl207	5Cl202	75Cl189	GMYC210	PTP127	H039
BT¯0964¯Alticinae sp. 30	Network23	3Cl208	5Cl203	75Cl190	GMYC232	PTP074	H035
BT¯0965¯Criocerinae sp. 2	Network236	3Cl209	5Cl204	75Cl191	GMYC265	PTP054	H357
BT¯0966¯Criocerinae sp. 3	Network3	3Cl210	5Cl205	75Cl192	GMYC030	PTP031	H003
BT¯0967¯Eumolpinae sp. 46	Network281	3Cl211	5Cl206	75Cl193	GMYC006	PTP015	H415
BT¯0968¯Alticinae sp. 99	Network66	3Cl212	5Cl207	75Cl194	GMYC046	PTP170	H105
BT¯0971¯Alticinae sp. 194	Network25	3Cl213	5Cl208	75Cl195	GMYC202	PTP130	H037
BT¯0972¯Alticinae sp. 127	Network4	3Cl194	5Cl189	75Cl177	GMYC247	PTP092	H004
BT¯0973¯Alticinae sp. 97	Network9	3Cl214	5Cl209	75Cl196	GMYC252	PTP059	H009
BT¯1030¯Alticinae sp. 240	Network20	3Cl215	5Cl210	75Cl197	GMYC229	PTP073	H031
BT¯1031¯Alticinae sp. 2	Network187	3Cl010	5Cl010	75Cl010	GMYC087	PTP204	H285
BT¯1033¯Alticinae sp. 149	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H294
BT¯1034¯Alticinae sp. 48	Network44	3Cl161	5Cl158	75Cl149	GMYC215	PTP123	H062
BT¯1035¯Alticinae sp. 150	Network191	3Cl115	5Cl011	75Cl011	GMYC088	PTP203	H295
BT¯1036¯Alticinae sp. 62	Network57	3Cl043	5Cl044	75Cl044	GMYC224	PTP117	H093
BT¯1038¯Alticinae sp. 65	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1043¯Alticinae sp. 66	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1055¯Alticinae sp. 85	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H075
BT¯1060¯Alticinae sp. 85	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H079
BT¯1061¯Galerucinae sp. 096	Network180	3Cl049	5Cl050	75Cl050	GMYC174	PTP252	H277
BT¯1064¯Alticinae sp. 142	Network132	3Cl081	5Cl081	75Cl080	GMYC167	PTP189	H206
BT¯1065¯Alticinae sp. 20	Network178	3Cl216	5Cl211	75Cl198	GMYC152	PTP070	H275
BT¯1070¯Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H018
BT¯1071¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1079¯Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H027

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BT_1080_Eumolpinae sp. 074	Network244	3Cl062	5Cl063	75Cl063	GMYC031	PTP002	H368
BT¯1081¯Alticinae sp. 27	Network51	3Cl217	5Cl212	75Cl199	GMYC222	PTP113	H083
BT¯1082¯Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H026
BT¯1083¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1085¯Alticinae sp. 61	Network8	3Cl068	5Cl069	75Cl069	GMYC259	PTP066	H008
BT¯1086¯Alticinae sp. 83	Network22	3Cl083	5Cl083	75Cl082	GMYC230	PTP072	H034
BT¯1087¯Alticinae sp. 109	Network171	3Cl046	5Cl047	75Cl047	GMYC254	PTP062	H265
BT¯1088¯Galerucinae sp. 31	Network203	3Cl061	5Cl062	75Cl062	GMYC084	PTP217	H315
BT¯1090¯Alticinae sp. 19	Network58	3Cl218	5Cl213	75Cl200	GMYC245	PTP097	H094
BT¯1091¯Cassidinae sp. 12	Network243	3Cl149	5Cl146	75Cl142	GMYC278	PTP044	H366
BT¯1092¯Cassidinae sp. 3	Network254	3Cl219	5Cl214	75Cl201	GMYC285	PTP052	H381
BT¯1093¯Hispinae sp. 7	Network258	3Cl220	5Cl215	75Cl202	GMYC267	PTP035	H389
BT¯1094¯Eumolpinae sp. 38	Network284	3Cl025	5Cl026	75Cl026	GMYC010	PTP017	H418
BT¯1095¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H128
BT¯1096¯Galerucinae sp. 36	Network208	3Cl143	5Cl141	75Cl138	GMYC146	PTP254	H320
BT¯1098¯Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H017
BT¯1104¯Alticinae sp. 140	Network122	3Cl153	5Cl150	75Cl144	GMYC157	PTP187	H190
BT¯1105¯Alticinae sp. 74	Network177	3Cl221	5Cl216	75Cl203	GMYC244	PTP096	H274
BT¯1106¯Galerucinae sp. 64	Network222	3Cl148	5Cl145	75Cl060	GMYC080	PTP221	H340
BT¯1107¯Alticinae sp. 099	Network173	3Cl222	5Cl217	75Cl204	GMYC242	PTP207	H267
BT¯1108¯Alticinae sp. 92	Network200	3Cl135	5Cl133	75Cl132	GMYC191	PTP208	H309
BT¯1109¯Alticinae sp. 41	Network136	3Cl223	5Cl218	75Cl205	GMYC161	PTP177	H210
BT¯1110¯Galerucinae sp. 46	Network156	3Cl050	5Cl051	75Cl051	GMYC179	PTP250	H242
BT¯1112¯Alticinae sp. 112	Network145	3Cl224	5Cl219	75Cl206	GMYC190	PTP209	H223
BT¯1114¯Alticinae sp. 41	Network136	3Cl223	5Cl218	75Cl205	GMYC161	PTP177	H210
BT¯1117¯Alticinae sp. 49	Network141	3Cl196	5Cl191	75Cl179	GMYC032	PTP085	H219
BT¯1118¯Alticinae sp. 123	Network148	3Cl036	5Cl037	75Cl037	GMYC070	PTP144	H229
BT¯1119¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1121¯Alticinae sp. 124	Network87	3Cl032	5Cl033	75Cl033	GMYC048	PTP166	H133
BT¯1122¯Alticinae sp. 265	Network60	3Cl150	5Cl147	75Cl143	GMYC068	PTP142	H096
BT¯1124¯Cassidinae sp. 7	Network245	3Cl065	5Cl066	75Cl066	GMYC276	PTP042	H370
BT¯1125¯Galerucinae sp. 59	Network197	3Cl060	5Cl061	75Cl061	GMYC108	PTP230	H306
BT¯1126¯Hispinae sp. 3	Network247	3Cl066	5Cl067	75Cl067	GMYC272	PTP050	H372
BT¯1127¯Alticinae sp. 66	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1128¯Alticinae sp. 18	Network6	3Cl225	5Cl220	75Cl207	GMYC260	PTP069	H006
BT¯1129¯Alticinae sp. 123	Network148	3Cl036	5Cl037	75Cl037	GMYC070	PTP144	H227
BT¯1131¯Alticinae sp. 081	Network210	3Cl084	5Cl084	75Cl083	GMYC069	PTP143	H323
BT¯1132¯Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H079
BT¯1138¯Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H075
BT¯1142¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1143¯Hispinae sp. 7	Network258	3Cl220	5Cl215	75Cl202	GMYC267	PTP035	H389
BT¯1145¯Cassidinae sp. 3	Network254	3Cl219	5Cl214	75Cl201	GMYC285	PTP052	H381
BT¯1146¯Eumolpinae sp. 14	Network285	3Cl013	5Cl014	75Cl014	GMYC009	PTP016	H420
BT¯1147¯Alticinae sp. 152	Network34	3Cl226	5Cl221	75Cl208	GMYC205	PTP134	H048
BT¯1148¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1151¯Alticinae sp. 57	Network70	3Cl227	5Cl222	75Cl209	GMYC059	PTP159	H110
BT¯1152¯Alticinae sp. 141	Network215	3Cl228	5Cl108	75Cl107	GMYC172	PTP183	H328
BT¯1157¯Alticinae sp. 149	Network188	3Cl119	5Cl117	75Cl116	GMYC091	PTP200	H286
BT¯1158¯Alticinae sp. 146	Network121	3Cl229	5Cl223	75Cl210	GMYC160	PTP184	H189
BT¯1160¯Alticinae sp. 55	Network138	3Cl230	5Cl224	75Cl211	GMYC250	PTP095	H213
BT¯1161¯Alticinae sp. 143	Network123	3Cl122	5Cl120	75Cl119	GMYC158	PTP186	H196
BT¯1165¯Alticinae sp. 61	Network8	3Cl068	5Cl069	75Cl069	GMYC259	PTP066	H008
BT¯1166¯Alticinae sp. 140	Network122	3Cl153	5Cl150	75Cl144	GMYC157	PTP187	H191
BT¯1170¯Alticinae sp. 105	Network16	3Cl116	5Cl114	75Cl113	GMYC234	PTP079	H025
BT¯1171¯Alticinae sp. 85	Network47	3Cl138	5Cl136	75Cl135	GMYC217	PTP104	H070
BT¯1175¯Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H140
BT¯1176¯Alticinae sp. 52	Network33	3Cl231	5Cl225	75Cl212	GMYC199	PTP137	H047
BT¯1178¯Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H140
BT¯1179¯Alticinae sp. 118	Network169	3Cl155	5Cl152	75Cl054	GMYC188	PTP109	H260
BT¯1194¯Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H136
BT¯1196¯Alticinae sp. 108	Network78	3Cl232	5Cl226	75Cl213	GMYC036	PTP145	H120
BT¯1197¯Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H026
BT¯1198¯Alticinae sp. 131	Network164	3Cl104	5Cl103	75Cl102	GMYC237	PTP077	H254
BT¯1199¯Alticinae sp. 118	Network167	3Cl233	5Cl227	75Cl214	GMYC186	PTP110	H258
BT¯1205¯Alticinae sp. 52	Network36	3Cl234	5Cl228	75Cl215	GMYC204	PTP132	H050
BT¯1208¯Galerucinae sp. 46	Network155	3Cl026	5Cl027	75Cl027	GMYC178	PTP249	H241
BT¯1210¯Alticinae sp. 64	Network75	3Cl157	5Cl154	75Cl101	GMYC042	PTP148	H117
BT¯1211¯Alticinae sp. 18	Network59	3Cl158	5Cl155	75Cl147	GMYC251	PTP067	H095
BT¯1212¯Alticinae sp. 17	Network44	3Cl161	5Cl158	75Cl149	GMYC215	PTP123	H065
BT¯1213¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1214¯Alticinae sp. 104	Network161	3Cl235	5Cl229	75Cl216	GMYC236	PTP078	H249
BT¯1215¯Alticinae sp. 144	Network129	3Cl236	5Cl230	75Cl217	GMYC163	PTP178	H202
BT¯1216¯Alticinae sp. 49	Network141	3Cl196	5Cl191	75Cl179	GMYC032	PTP085	H217
BT¯1217¯Alticinae sp. 145	Network124	3Cl237	5Cl231	75Cl218	GMYC168	PTP191	H197
BT¯1219¯Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H078
BT¯1220¯Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT¯1222¯Alticinae sp. 52	Network36	3Cl234	5Cl228	75Cl215	GMYC204	PTP132	H051
BT¯1223¯Alticinae sp. 28	Network29	3Cl039	5Cl040	75Cl040	GMYC209	PTP129	H042
BT¯1224¯Galerucinae sp. 75	Network227	3Cl145	5Cl143	75Cl110	GMYC082	PTP219	H347
BT¯1225¯Eumolpinae sp. 40	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H388
BT¯1226¯Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT¯1228¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯1230¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H011
BT¯1233¯Alticinae sp. 52	Network35	3Cl238	5Cl228	75Cl215	GMYC203	PTP133	H049
BT¯1235¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H129
BT¯1240¯Eumolpinae sp. 41	Network256	3Cl239	5Cl232	75Cl219	GMYC029	PTP001	H383
BT¯1245¯Alticinae sp. 85	Network47	3Cl138	5Cl136	75Cl135	GMYC217	PTP104	H072
BT¯1249¯Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H028
BT¯1251¯Alticinae sp. 131	Network164	3Cl104	5Cl103	75Cl102	GMYC237	PTP077	H254
BT¯1252¯Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H079
BT¯1258¯Galerucinae sp. 28	Network64	3Cl105	5Cl104	75Cl103	GMYC128	PTP283	H103
BT¯1259¯Galerucinae sp. 049	Network158	3Cl108	5Cl107	75Cl106	GMYC182	PTP244	H245
BT¯1260¯Eumolpinae sp. 24	Network279	3Cl098	5Cl098	75Cl097	GMYC014	PTP021	H412
BT¯1263¯Alticinae sp. 51	Network41	3Cl089	5Cl089	75Cl088	GMYC197	PTP126	H058
BT¯1264¯Alticinae sp. 78	Network147	3Cl240	5Cl233	75Cl220	GMYC255	PTP061	H226
BT¯1267¯Alticinae sp. 128	Network91	3Cl093	5Cl093	75Cl092	GMYC055	PTP160	H145
BT¯1269¯Alticinae sp. 9	Network192	3Cl096	5Cl096	75Cl095	GMYC099	PTP196	H299
BT¯1270¯Galerucinae sp. 28	Network63	3Cl201	5Cl196	75Cl103	GMYC129	PTP282	H100
BT¯1271¯Alticinae sp. 57	Network69	3Cl241	5Cl234	75Cl221	GMYC060	PTP158	H109
BT¯1272¯Alticinae sp. 128	Network89	3Cl113	5Cl112	75Cl111	GMYC054	PTP163	H142
BT¯1273¯Galerucinae sp. 28	Network64	3Cl105	5Cl104	75Cl103	GMYC128	PTP283	H101
BT¯1274¯Alticinae sp. 42	Network52	3Cl002	5Cl002	75Cl002	GMYC219	PTP114	H084
BT¯1275¯Alticinae sp. 51	Network39	3Cl242	5Cl235	75Cl222	GMYC196	PTP124	H055
BT¯1278¯Alticinae sp. 143	Network123	3Cl122	5Cl120	75Cl119	GMYC158	PTP186	H194
BT¯1280¯Alticinae sp. 69	Network83	3Cl243	5Cl236	75Cl223	GMYC045	PTP154	H126
BT¯1281¯Galerucinae sp. 47	Network157	3Cl205	5Cl200	75Cl187	GMYC180	PTP242	H243
BT¯1282¯Galerucinae sp. 52	Network201	3Cl087	5Cl087	75Cl086	GMYC107	PTP231	H310
BT¯1283¯Galerucinae sp. 6	Network104	3Cl244	5Cl237	75Cl224	GMYC133	PTP256	H163
BT¯1284¯Galerucinae sp. 63	Network100	3Cl245	5Cl238	75Cl225	GMYC121	PTP269	H157
BT¯1286¯Alticinae sp. 21	Network67	3Cl246	5Cl239	75Cl226	GMYC050	PTP167	H106
BT¯1287¯Alticinae sp. 67	Network80	3Cl247	5Cl240	75Cl227	GMYC058	PTP155	H123
BT¯1288¯Alticinae sp. 103	Network40	3Cl248	5Cl241	75Cl228	GMYC198	PTP125	H056
BT¯1293¯Alticinae sp. 50	Network45	3Cl094	5Cl094	75Cl093	GMYC211	PTP107	H067
BT¯1294¯Galerucinae sp. 72	Network230	3Cl118	5Cl116	75Cl115	GMYC074	PTP226	H350
BT¯1295¯Alticinae sp. 57	Network70	3Cl227	5Cl222	75Cl209	GMYC059	PTP159	H111
BT¯1304¯Galerucinae sp. 47	Network157	3Cl205	5Cl200	75Cl187	GMYC180	PTP242	H243
BT¯1305¯Alticinae sp. 93	Network37	3Cl249	5Cl242	75Cl229	GMYC249	PTP091	H052
BT¯1307¯Eumolpinae sp. 16	Network286	3Cl184	5Cl180	75Cl168	GMYC002	PTP012	H422
BT¯1308¯Alticinae sp. 134	Network134	3Cl250	5Cl243	75Cl230	GMYC166	PTP176	H208

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Table S4 – continued from previous page(s)

BT_1310_Alticinae sp. 35	Network144	3Cl251	5Cl110	75Cl109	GMYC034	PTP087	H222
BT¯1311¯Alticinae sp. 69	Network82	3Cl252	5Cl244	75Cl231	GMYC056	PTP157	H125
BT¯1312¯Alticinae sp. 93	Network37	3Cl249	5Cl242	75Cl229	GMYC249	PTP091	H052
BT¯1318¯Eumolpinae sp. 24	Network279	3Cl098	5Cl098	75Cl097	GMYC014	PTP021	H412
BT¯1319¯Alticinae sp. 51	Network41	3Cl089	5Cl089	75Cl088	GMYC197	PTP126	H058
BT¯1321¯Galerucinae sp. 61	Network93	3Cl041	5Cl042	75Cl042	GMYC131	PTP279	H149
BT¯1322¯Alticinae sp. 19	Network58	3Cl218	5Cl213	75Cl200	GMYC245	PTP097	H094
BT¯1323¯Alticinae sp. 104	Network161	3Cl235	5Cl229	75Cl216	GMYC236	PTP078	H251
BT¯1324¯Alticinae sp. 92	Network200	3Cl135	5Cl133	75Cl132	GMYC191	PTP208	H309
BT¯1326¯Eumolpinae sp. 19	Network265	3Cl031	5Cl032	75Cl032	GMYC028	PTP004	H396
BT¯1335¯Alticinae sp. 118	Network168	3Cl253	5Cl245	75Cl232	GMYC185	PTP111	H259
BT¯1340¯Galerucinae sp. 66	Network225	3Cl254	5Cl246	75Cl060	GMYC078	PTP223	H344
BT¯1349¯Alticinae sp. 51	Network32	3Cl164	5Cl161	75Cl152	GMYC206	PTP136	H046
BT¯1350¯Alticinae sp. 131	Network164	3Cl104	5Cl103	75Cl102	GMYC237	PTP077	H254
BT¯2073¯Alticinae sp. 22	Network24	3Cl255	5Cl247	75Cl233	GMYC231	PTP075	H036
BT¯2074¯Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT¯2076¯Alticinae sp. 2	Network187	3Cl010	5Cl010	75Cl010	GMYC087	PTP204	H285
BT¯2077¯Galerucinae sp. 7	Network109	3Cl019	5Cl020	75Cl020	GMYC134	PTP267	H169
BT¯2078¯Alticinae sp. 265	Network60	3Cl150	5Cl147	75Cl143	GMYC068	PTP142	H096
BT¯2081¯Eumolpinae sp. 42	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H386
BT¯2082¯Alticinae sp. 64	Network72	3Cl256	5Cl248	75Cl234	GMYC043	PTP152	H113
BT¯2084¯Alticinae sp. 32	Network150	3Cl187	5Cl182	75Cl170	GMYC239	PTP084	H233
BT¯2085¯Eumolpinae sp. 42	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H387
BT¯2087¯Alticinae sp. 49	Network141	3Cl196	5Cl191	75Cl179	GMYC032	PTP085	H218
BT¯2090¯Alticinae sp. 81	Network209	3Cl084	5Cl084	75Cl083	GMYC069	PTP143	H322
BT¯2093¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H130
BT¯2097¯Alticinae sp. 122	Network181	3Cl257	5Cl249	75Cl235	GMYC149	PTP174	H278
BT¯2101¯Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H080
BT¯2107¯Alticinae sp. 85	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H073
BT¯2109¯Alticinae sp. 133	Network130	3Cl076	5Cl077	75Cl076	GMYC170	PTP192	H203
BT¯2113¯Alticinae sp. 142	Network132	3Cl081	5Cl081	75Cl080	GMYC167	PTP189	H205
BT¯2119¯Eumolpinae sp. 16	Network286	3Cl184	5Cl180	75Cl168	GMYC002	PTP012	H421
BT¯2123¯Alticinae sp. 18	Network7	3Cl258	5Cl250	75Cl236	GMYC261	PTP068	H007
BT¯2135¯Alticinae sp. 122	Network181	3Cl257	5Cl249	75Cl235	GMYC149	PTP174	H278
BT¯2136¯Alticinae sp. 110	Network173	3Cl222	5Cl217	75Cl204	GMYC242	PTP207	H268
BT¯2138¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H010
BT¯2152¯Eumolpinae sp. 38	Network284	3Cl025	5Cl026	75Cl026	GMYC010	PTP017	H418
BT¯2154¯Galerucinae sp. 17	Network115	3Cl259	5Cl251	75Cl237	GMYC123	PTP278	H180
BT¯2155¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H011
BT¯2156¯Cassidinae sp. 12	Network243	3Cl149	5Cl146	75Cl142	GMYC278	PTP044	H367
BT¯2157¯Eumolpinae sp. 24	Network278	3Cl260	5Cl252	75Cl097	GMYC013	PTP020	H411
BT¯2158¯Alticinae sp. 83	Network22	3Cl083	5Cl083	75Cl082	GMYC230	PTP072	H034
BT¯2161¯Cassidinae sp. 12	Network243	3Cl149	5Cl146	75Cl142	GMYC278	PTP044	H366
BT¯2168¯Galerucinae sp. 36	Network208	3Cl143	5Cl141	75Cl138	GMYC146	PTP254	H320
BT¯2170¯Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT¯2173¯Eumolpinae sp. 34	Network266	3Cl261	5Cl253	75Cl238	GMYC027	PTP030	H397
BT¯2176¯Galerucinae sp. 43	Network179	3Cl262	5Cl254	75Cl239	GMYC120	PTP274	H276
BT¯2179¯Alticinae sp. 11	Network193	3Cl263	5Cl255	75Cl022	GMYC096	PTP193	H300
BT¯2180¯Alticinae sp. 75	Network149	3Cl127	5Cl125	75Cl124	GMYC240	PTP082	H230
BT¯2181¯Alticinae sp. 251	Network90	3Cl264	5Cl256	75Cl240	GMYC053	PTP161	H143
BT¯2182¯Galerucinae sp. 29	Network95	3Cl202	5Cl197	75Cl184	GMYC124	PTP276	H151
BT¯2189¯Hispinae sp. 8	Network249	3Cl265	5Cl257	75Cl241	GMYC268	PTP046	H374
BT¯2191¯Criocerinae sp. 5	Network240	3Cl266	5Cl258	75Cl242	GMYC263	PTP056	H362
BT¯2192¯Galerucinae sp. 28	Network62	3Cl267	5Cl259	75Cl243	GMYC130	PTP281	H098
BT¯2193¯Alticinae sp. 76	Network27	3Cl207	5Cl202	75Cl189	GMYC210	PTP127	H039
BT¯2194¯Alticinae sp. 127	Network4	3Cl194	5Cl189	75Cl177	GMYC247	PTP092	H004
BT¯2196¯Alticinae sp. 127	Network4	3Cl194	5Cl189	75Cl177	GMYC247	PTP092	H004
BT¯2197¯Eumolpinae sp. 47	Network280	3Cl268	5Cl260	75Cl244	GMYC015	PTP022	H414
BT¯2208¯Alticinae sp. 112	Network145	3Cl224	5Cl219	75Cl206	GMYC190	PTP209	H224
BT¯2312¯Alticinae sp. 42	Network52	3Cl002	5Cl002	75Cl002	GMYC219	PTP114	H086
BT¯2491¯Alticinae sp. 85	Network47	3Cl138	5Cl136	75Cl135	GMYC217	PTP104	H070
BT¯2492¯Alticinae sp. 104	Network17	3Cl101	5Cl101	75Cl100	GMYC235	PTP080	H027
BT¯2495¯Alticinae sp. 243	Network54	3Cl006	5Cl006	75Cl006	GMYC220	PTP115	H089
BT¯2496¯Alticinae sp. 140	Network122	3Cl153	5Cl150	75Cl144	GMYC157	PTP187	H192
BT¯2498¯Alticinae sp. 52	Network33	3Cl231	5Cl225	75Cl212	GMYC199	PTP137	H047
BT¯2499¯Alticinae sp. 118	Network170	3Cl053	5Cl054	75Cl054	GMYC187	PTP108	H263
BT¯2502¯Alticinae sp.160	Network38	3Cl051	5Cl052	75Cl052	GMYC151	PTP071	H054
BT¯2504¯Galerucinae sp. 098	Network153	3Cl269	5Cl261	75Cl245	GMYC181	PTP243	H236
BT¯2505¯Galerucinae sp. 46	Network155	3Cl026	5Cl027	75Cl027	GMYC178	PTP249	H241
BT¯2506¯Alticinae sp. 47	Network198	3Cl270	5Cl262	75Cl246	GMYC150	PTP175	H307
BT¯2516¯Galerucinae sp. 9	Network101	3Cl271	5Cl263	75Cl247	GMYC142	PTP261	H158
BT¯2517¯Alticinae sp. 201	Network21	3Cl272	5Cl264	75Cl248	GMYC233	PTP076	H032
BT¯2518¯Alticinae sp. 70	Network91	3Cl093	5Cl093	75Cl092	GMYC055	PTP160	H146
BT¯2519¯Alticinae sp. 153	Network46	3Cl273	5Cl265	75Cl249	GMYC218	PTP106	H068
BT¯2521¯Galerucinae sp. 082	Network182	3Cl121	5Cl119	75Cl118	GMYC106	PTP235	H279
BT¯2522¯Alticinae sp. 51	Network41	3Cl089	5Cl089	75Cl088	GMYC197	PTP126	H057
BT¯2523¯Alticinae sp. 153	Network46	3Cl273	5Cl265	75Cl249	GMYC218	PTP106	H069
BT¯2529¯Galerucinae sp. 55	Network201	3Cl087	5Cl087	75Cl086	GMYC107	PTP231	H310
BT¯2544¯Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H021
BT¯2546¯Cassidinae sp. 4	Network253	3Cl038	5Cl039	75Cl039	GMYC284	PTP053	H380
BT¯2548¯Cassidinae sp. 12	Network243	3Cl149	5Cl146	75Cl142	GMYC278	PTP044	H366
BT¯2550¯Alticinae sp. 56	Network15	3Cl274	5Cl266	75Cl250	GMYC200	PTP138	H023
BT¯2572¯Alticinae sp. 18	Network59	3Cl158	5Cl155	75Cl147	GMYC251	PTP067	H095
BT¯2573¯Cassidinae sp. 12	Network243	3Cl149	5Cl146	75Cl142	GMYC278	PTP044	H366
BT¯2575¯Eumolpinae sp. 31	Network287	3Cl275	5Cl267	75Cl251	GMYC005	PTP013	H423
BT¯2576¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯2578¯Galerucinae sp. 34	Network183	3Cl037	5Cl038	75Cl038	GMYC103	PTP232	H280
BT¯2579¯Alticinae sp. 115	Network10	3Cl030	5Cl031	75Cl031	GMYC253	PTP060	H014
BT¯2629¯Eumolpinae sp. 29	Network271	3Cl117	5Cl115	75Cl114	GMYC019	PTP024	H403
BT¯2631¯Alticinae sp. 135	Network126	3Cl276	5Cl268	75Cl252	GMYC173	PTP181	H199
BT¯2632¯Alticinae sp. 143	Network123	3Cl122	5Cl120	75Cl119	GMYC158	PTP186	H195
BT¯2637¯Eumolpinae sp. 40	Network257	3Cl003	5Cl003	75Cl003	GMYC001	PTP003	H388
BT¯2638¯Galerucinae sp. 61	Network93	3Cl041	5Cl042	75Cl042	GMYC131	PTP279	H149
BT¯2640¯Alticinae sp. 104	Network161	3Cl235	5Cl229	75Cl216	GMYC236	PTP078	H250
BT¯2641¯Alticinae sp. 97	Network13	3Cl035	5Cl036	75Cl036	GMYC258	PTP065	H017
BT¯2642¯Eumolpinae sp. 19	Network265	3Cl031	5Cl032	75Cl032	GMYC028	PTP004	H396
BT¯2643¯Alticinae sp. 42	Network52	3Cl002	5Cl002	75Cl002	GMYC219	PTP114	H086
BT¯2644¯Criocerinae sp. 1	Network237	3Cl071	5Cl072	75Cl071	GMYC264	PTP057	H359
BT¯2646¯Alticinae sp. 96	Network85	3Cl044	5Cl045	75Cl045	GMYC051	PTP169	H131
BT¯2657¯Alticinae sp. 1	Network186	3Cl277	5Cl269	75Cl253	GMYC093	PTP199	H284
BT¯2658¯Alticinae sp. 41	Network136	3Cl223	5Cl218	75Cl205	GMYC161	PTP177	H211
BT¯2659¯Alticinae sp. 86	Network48	3Cl074	5Cl075	75Cl074	GMYC216	PTP105	H075
BT¯2661¯Hispinae sp. 9	Network250	3Cl278	5Cl270	75Cl254	GMYC270	PTP047	H375
BT¯2662¯Alticinae sp. 87	Network88	3Cl028	5Cl029	75Cl029	GMYC061	PTP164	H140
BT¯2663¯Hispinae sp. 5	Network246	3Cl130	5Cl128	75Cl127	GMYC287	PTP034	H371
BT¯2665¯Criocerinae sp. 4	Network239	3Cl189	5Cl184	75Cl172	GMYC262	PTP055	H361
BT¯2666¯Alticinae sp. 89	Network199	3Cl279	5Cl271	75Cl255	GMYC155	PTP172	H308
BT¯2670¯Alticinae sp. 51	Network41	3Cl089	5Cl089	75Cl088	GMYC197	PTP126	H058
BT¯2671¯Galerucinae sp. 72	Network231	3Cl118	5Cl116	75Cl115	GMYC073	PTP225	H352
BT¯2672¯Alticinae sp. 51	Network41	3Cl089	5Cl089	75Cl088	GMYC197	PTP126	H058
BT¯2673¯Galerucinae sp. 49	Network159	3Cl280	5Cl272	75Cl256	GMYC184	PTP245	H246
BT¯2697¯Alticinae sp. 53	Network28	3Cl281	5Cl273	75Cl257	GMYC208	PTP128	H040
BT¯2698¯Eumolpinae sp. 071	Network276	3Cl282	5Cl274	75Cl258	GMYC016	PTP026	H408
BT¯2705¯Alticinae sp. 94	Network140	3Cl283	5Cl275	75Cl259	GMYC148	PTP173	H216
BT¯2707¯Alticinae sp. 34	Network152	3Cl284	5Cl276	75Cl260	GMYC238	PTP081	H235

Appendix F

Acknowledgement

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Appendix G

Erklärung

Ich versichere, dass ich diese Arbeit selbständig verfasst, keine anderen Quellen und Hilfsmittel als die angegebenen benutzt und die Stellen der Arbeit, die anderen Werken dem Wortlaut oder Sinn nach entnommen sind, kenntlich gemacht habe.

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