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# The contribution of mitochondrial metagenomics to large-scale data mining and phylogenetic analysis of Coleoptera

Benjamin Linard<sup>1,8</sup>, Alex Crampton-Platt<sup>1,3,16</sup>, Jérôme Moriniere<sup>7</sup>, Martijn J.T.N. Timmermans<sup>1,4</sup>, Carmelo Andujar<sup>1,2,14</sup>, Paula Arribas<sup>1,2,14</sup>, Kirsten E. Miller<sup>1,2,9</sup>, Julia Lipecki<sup>1,11</sup>, Emeline Favreau<sup>1,10</sup>, Amie Hunter<sup>1</sup>, Carola Gomez-Rodriguez<sup>5</sup>, Christopher Barton<sup>1</sup>, Ruie Nie<sup>1,15</sup>, Conrad P.D.T. Gillett<sup>1,12</sup>, Thijmen Breeschoten<sup>1,13</sup>, Ladislav Bocak<sup>6</sup>, Alfried P. Vogler<sup>1,2</sup>

<sup>1</sup> Department of Life Sciences, Natural History Museum, London, SW7 5BD, United Kingdom

<sup>2</sup> Department of Life Sciences, Silwood Park Campus, Imperial College London, Ascot, SL5 7PY, United Kingdom

<sup>3</sup> Department of Genetics, Evolution and Environment, University College London, Gower Street, London, WC1E 6BT, United Kingdom

<sup>4</sup> Department of Natural Sciences, Hendon Campus, Middlesex University, London, NW4 4BT, United Kingdom

<sup>5</sup> Departamento de Zoología, Facultad de Biología, Universidad de Santiago de Compostela, c/ Lope Gómez de Marzoa s/n, 15782 Santiago de Compostela, Spain

<sup>6</sup> Department of Zoology, Faculty of Science, Palacky University, 17. listopadu 50, 771 46 Olomouc, Czech Republic

<sup>7</sup> Bavarian State Collection of Zoology (SNSB – ZSM), Münchhausenstrasse 21, 81247 München, Germany

## Current affiliation (present address):

<sup>8</sup> LIRMM, Univ Montpellier, CNRS, Montpellier, France

<sup>9</sup> Department of Ecology, Swedish University of Agricultural Sciences, Uppsala, Sweden

<sup>10</sup> School of Biological and Chemical Sciences, Queen Mary University of London, London, UK

<sup>11</sup> Chemistry Department, University of Warwick, Coventry, UK

<sup>12</sup> School of Forest Resources and Conservation, University of Florida, Gainesville, FL 32611, USA

<sup>13</sup> Biosystematics Group, Wageningen University & Research, Droevendaalsesteeg 1, 6708 PB Wageningen, The Netherlands

<sup>14</sup> Island Ecology and Evolution Research Group, IPNA-CSIC, 38206 La Laguna, Tenerife, Canary Islands, Spain

<sup>15</sup> Key Laboratory of Zoological Systematics and Evolution, Institute of Zoology, Chinese Academy of Sciences, Beijing, 100101, China

## Abstract

A phylogenetic tree at the species level is still far off for highly diverse insect orders, including the Coleoptera, but the taxonomic breadth of public sequence databases is growing. In addition, new types of data may contribute to increasing taxon coverage, such as metagenomic shotgun sequencing for assembly of mitogenomes from bulk specimen samples. The current study explores the application of these techniques for large-scale efforts to build the tree of Coleoptera. We used shotgun data from 17 different ecological and taxonomic datasets (5 unpublished) to assemble a total of 1942 mitogenome contigs of >3000 bp. These sequences were combined into a single dataset together with all mitochondrial data available at GenBank, in addition to nuclear markers widely used in molecular phylogenetics. The resulting matrix of nearly 16000 species with two or more loci produced trees (RAxML) showing overall congruence with the Linnaean taxonomy at hierarchical levels from suborders to genera. We tested the role of full-length mitogenomes in stabilizing the tree from GenBank data, as mitogenomes might link terminals with non-overlapping gene representation. However, the mitogenome data were only partly useful in this respect, presumably because of the purely automated approach to assembly and gene delimitation, but improvements in future may be possible by using multiple assemblers and manual curation. In conclusion, the combination of data mining and metagenomic sequencing of bulk samples provided the largest phylogenetic tree of Coleoptera to date, which represents a summary of existing phylogenetic knowledge and a defensible tree of great utility, in particular for studies at the intra-familial level, despite some shortcomings for resolving basal nodes.

## Keywords

Coleoptera, mass-trapped samples, mitochondrial metagenomics, metagenome skimming, biodiversity discovery.

# Introduction

Current studies aiming at the construction of an ever more complete Tree-of-Life can draw on rapidly growing public taxonomic DNA databases (Chesters, 2017; Hinchliff et al., 2015; Hunt and Vogler, 2008; McMahon and Sanderson, 2006; Peters et al., 2011; Price and Bhattacharya, 2017; Zhou et al., 2016). Hitherto most taxonomic DNA data of higher eukaryotes have been obtained by sequencing from individual specimens, based on studies dedicated to particular target species. In insects, this approach requires focused collecting efforts and careful taxonomic identification, and may not achieve the broader goal of a fully sampled Tree. However, a rapid increase in taxon coverage is possible by direct sequencing of pooled multi-species DNA extracts obtained from mass-trapped arthropod specimens. Metagenomic sequencing of arthropods readily yields mitochondrial genome sequences that are assembled preferentially from the mixture of shotgun reads due to their high copy number ('metagenome skimming'; Linard et al., 2016; Malé et al., 2014), allowing for species detection and phylogenetic placement of specimens in the samples. When focused on organelles, this approach is referred to as mitochondrial metagenomics or mito-metagenomics (MMG) (Crampton-Platt et al., 2016) and, if widely applied to samples from various habitats and biogeographic regions, may add large numbers of species to the assembly of the Tree-of-Life. The procedure is equally applicable to specimens that have not been formally described or characterized taxonomically, and thus even species that are new to science may be included in the tree, which can rapidly increase the taxonomic coverage especially in poorly known, species-rich and small-bodied groups of invertebrates.

In addition to greater species representation, mitochondrial genomes as those obtained through MMG are powerful markers to determine the phylogenetic position of the newly added taxa. Phylogenetic trees from MMG studies therefore may be more robustly supported than those resulting from conventional PCR-based analyses which usually only contain one or a few loci sequenced with 'universal' primers (Gómez-Rodríguez et al., 2015; Nie et al., 2017). In addition, existing studies have used different mitochondrial genes. Only the 658 bp barcode region of the *cox1* gene is now a widely agreed standard (Meusnier et al., 2008), while the representation of other genes in DNA databases varies greatly among taxa. Uneven gene coverage will result in data matrices with a high proportion of missing data and low phylogenetic support (Wiens, 1998). These matrices may be unable to define relationships among taxa represented by non-overlapping gene fragments (or provide poor support in case of partial overlap). However, the phylogenetic position of such taxa may still be approximated by establishing their relationships to a closely related mitogenome sequence, which determines their placement relative to each other indirectly through the

mitochondrial loci shared with the full-length mitogenome. Thus, the fast production of mitogenomes from MMG could act as scaffolds for otherwise unmatched clades and complete the overall species representation and tree topology. Equally, these mitogenome sequences may represent species with already existing partial entries, which can be recognized for example by high sequence similarity to an existing *cox1* barcode. In these cases, the addition of MMG sequences can fill the missing data for that species and increase the phylogenetic signal of the matrix.

The present study attempts to integrate the growing amount of sequence data held at NCBI (GenBank) with newly generated mitogenome data from shotgun sequencing of specimen pools, to increase taxon coverage of the joint phylogenetic tree. We apply this approach to the arguably most diverse group of animals, the Coleoptera (beetles), whose total species richness is estimated to be in the millions (Basset et al., 2012), although currently the most comprehensive published DNA-based trees contain no more than 8000 species (Bocak et al., 2014). The Coleoptera has already been the focus of various MMG studies, e.g. to analyze basal relationship within the order and within several family-level taxa (e.g. Scarabaeidae, Chrysomelidae, and Curculionoidea) (Gillett et al., 2014; Gómez-Rodríguez et al., 2015; Nie et al., 2017), or to investigate species diversity in rainforests (Crampton-Platt et al., 2015), the soil (Andújar et al., 2015; Cicconardi et al., 2017), pollinators communities (Tang et al., 2015), and temperate terrestrial and aquatic habitats (Linard et al., 2016). This growing number of available mitogenomes provides a unique opportunity to draw together diverse samples for cross-phylogeny mitogenomic studies, and to link them to taxonomic data in GenBank.

To explore the contribution of the metagenomic approach for Tree-of-Life studies, we compiled public sequence data for the Coleoptera, and tested the effects of adding MMG data to the phylogenetic analysis. We assembled mitogenomes from several sets of shotgun sequence data from recent ecological and taxonomic studies, including those from poorly characterised tropical beetle assemblages obtained by mass trapping. A simple automated bioinformatics approach was used to integrate with data mined from the NCBI database. The analysis focuses on the contribution that MMG data make to the Tree and searched for their potential role as an anchor for linking non-overlapping mitochondrial gene sequences from public databases. The resulting tree of some 16,000 species constitutes the most complete compilation of phylogenetic data for the Coleoptera and represents a scaffold for forthcoming MMG and other data sources, which will iteratively enrich the tree of beetles.

## Material and Methods

### GenBank sequence extractions

Following the general scheme of the bioinformatics pipeline (Figure 1), selected loci were extracted from GenBank (Benson et al., 2013) using a set of steps previously developed by (Bocak et al., 2014). Briefly, a set of “bait” sequences of some 200 species covering the major lineages of Coleoptera was built for each target locus, whereby taxa were selected for completeness of available data and maximum clade coverage. Next, the Coleoptera fraction of the non-redundant (*nr*) database was retrieved to recover all potential homologous GenBank entries, by selecting all entries attached to the Coleoptera taxonomic identifier (taxid=7041). These sequences were converted to build a Blast searchable database, using the blastdb software. The above bait sequences were used as queries in Blastn (Camacho et al., 2009) searches (Evalue=1e-5, word size =12 and align\_length>=60% of the expected locus length) against this database. The matching sequence regions were trimmed and extracted, building separate sets of sequences for each targeted locus. When several sequences were available for the same species (as identified in the NCBI taxonomy), only the longest fragment was kept. If several sequences of equal length were available, only the first-hit sequence was kept without consideration of subspecies or specimen information.

In total, three commonly used nuclear genes and 13 mitochondrial loci genes were retrieved (October 2015). The nuclear loci included a partial coding region of Elongation Factor 1-alpha (*ef1a*; ~600 bp), the 18S rRNA, split in two segments denoted 18Sa (~650 bp) and 18Sb (~1100 bp) and the 28S rRNA expansion segment (D2-D3 region, ~800 bp). All mitochondrial genes were included and the full length of each gene was used, except for *rrnL* (16S rRNA), for which two fragments were retrieved. These were denoted 16Sa and 16Sb, located between the V2-V3 (~300 bp) and V3-V4 regions (~220 bp) of the RNA gene. Additionally, the *cox1* gene was split into 2 segments (*cox1a*, *cox1b*) to accommodate the *cox1*-5' 658 bp barcoding region and the widely represented *cox1*-3' portion bracketed by the Pat-Jerry primer pair (~700 bp). Thus, from these 16 genes we defined a total of 19 loci: *nad2*, *cox1a*, *cox1b*, *cox2*, *atp6*, *cox3*, *nad3*, *nad5*, *nad4*, *nad6*, *cob*, *nad1*, *rrnS*, *rrnLa*, *rrnLb*, *ef1a*, *18Sa*, *18Sb* and *28S*. The compiled data extracted in the above manner are referred to as ‘NCBI dataset’ (Fig. 1).

### Mitochondrial Metagenomics

Metagenomic shotgun reads were obtained from various existing studies motivated initially by separate phylogenetic, taxonomic, methodological or ecological questions (Table 1; see Suppl. File S1 for GenBank accessions). Out of these, the MT1 and MT2 datasets were partially based on long-range PCR of mitochondrial genomes or were Sanger sequenced NCBI data (273 mitogenomes of which 80

were by long-range-PCR (Timmermans et al., 2015b, 2010), whereas all other datasets were obtained by bulk shotgun sequencing of genomic DNA. Mitogenomes were extracted from these mixtures using the MMG protocol of (Crampton-Platt et al., 2016). The published datasets had been assembled and manually curated to various degrees previously, but under slightly different parameter settings for each set (different quality control, different assemblers). Here, raw data were used to re-build these contigs under uniform conditions and without any manual curation steps, to test the data quality achievable under a fully automated approach that is appropriate to large-scale application of MMG. A small proportion of these data had already been deposited at NCBI at the time of data extraction but they were removed from the NCBI mined dataset to avoid duplication. The shotgun mixtures underwent mitochondrial assembly starting from the corresponding raw Illumina libraries with the following protocol: (i) Libraries were trimmed to remove residual library adaptors with Trimmomatic v0.32 (Bolger et al., 2014) and low-quality reads were filtered with Prinseq v0.20.4 (Schmieder and Edwards, 2011). Only paired reads were retained. (ii) Mitochondrial reads were filtered with Blastn (Camacho et al., 2009) using the same reference database (i.e., all complete coleopteran mitochondria from GenBank, October 2015), to remove reads lacking similarity to mitogenomes. (iii) The filtered reads were then assembled with IDBA-UD v1.1.1 (Camacho et al., 2009; Peng et al., 2012) and only contigs of a minimum length of 3 kb were kept. (iv) Similarly to the GenBank sequence extraction, mitochondrial contigs underwent loci extraction through the custom pipeline (Bocak et al., 2014) for 15 mitochondrial loci (splitting *cox1a*, *cox1b* and *rrnLa* and *rrnLb*). The aligned matrix of contigs obtained in the above manner is referred to as 'MMG dataset' (Fig. 1). All parameters settings used in the assembly and data compilation are given in Suppl. File S1.

### **Multiple alignments and supermatrix**

Eight mitochondrial genomes from the supraorder Neuropterida, the presumed sister group of Coleoptera (+ Strepsiptera), were added as an outgroup to each locus (Suppl. File S1). All protein-coding loci from the NCBI and MMG datasets were aligned with transalign (Bininda-Emonds, 2005; Sievers et al., 2011), except for the larger *cox1a* and *cox1b* datasets (more than 40,000 sequences each), which were aligned with Clustal Omega (Sievers et al., 2011) that is more suitable to the alignment of large numbers of sequences, using the '-auto' configuration and default parameters. Each alignment was then manually curated and trimmed to start with the first and end with the last base of a codon. During this editing step, all gene boundaries extending beyond the average ORF length were removed. All rRNA fragments (*rrnS*, *rrnLa*, *rrnLb*, *18Sa*, *18Sb*, *28S*) were aligned in two steps. A first multiple alignment was built with Clustal Omega using default parameters, then

realigned with Mafft v7.123b (Katoh and Standley, 2013) using the FFT-NS-2 method, a gap extension value of 1.0 (option -gap) to favor longer indels in the conserved regions, and other parameters set to default.

All alignments were grouped under three concatenation schemes (Figure 1): (i) 'NCBI' based on the 19 concatenated loci (15 mitochondrial + 4 nuclear) of the 'NCBI dataset'; (ii) 'MMG' containing the 15 concatenated mitochondrial loci from the 'MMG dataset' (also including the Timmermans et al., 2015b) data; see above); and (iii) 'NCBI+MMG' containing 15 mitochondrial + 4 nuclear concatenated loci, merging the two original datasets (Fig. 1, center). For the latter, if NCBI and MMG loci were both available for the same species (identified by an exact match of an NCBI entry to any portion of the mitogenome), only the MMG-based sequence was kept. For the NCBI-only and NCBI+MMG datasets we built 4 separate matrices (Fig. 1) requiring either a minimum of 2 or 3 available loci for each taxon (denoted min2loci and min3loci), and either using all nucleotides or removing the 3<sup>rd</sup> codon positions and RY coding of 1<sup>st</sup> positions (denoted 1RY/3del). All mitogenomes included more than 2 loci, and thus for the MMG-only dataset we conducted searches on all available contigs. Note that genetic variants in pooled DNA extracts generally collapse into a single contig during assembly (Gómez-Rodríguez et al., 2016) and therefore separate contigs were considered equivalent to different species.

### **Tree labelling and taxonomic retention index**

Leaves on the tree were labelled extensively (see Suppl. File S1 for details) with (i) the locus code, representing which of the 19 loci are available for a particular species in the matrix, (ii) the taxonomic code, a shorthand alphanumeric code that compresses the Linnaean taxonomy associated to the species (see Suppl. File S2 for complete list), (iii) the full Linnaean binomial as given on GenBank or from other sources, at the lowest taxonomic level available, and (iv) only for terminals based on MMG contigs, a short metadata string indicating the source dataset (Table 1), a contig identifier, the keyword "MERGED" when concatenated with GenBank data, in particular for nuclear genes, followed by a keyword referring to the method used to attribute a species identification to the MMG contig.

The locus code (see Suppl. File S1) is a vector of 19 positions either marked by 'X' (locus present in the supermatrix) or '-' (locus absent). The position of each symbol was given in the canonical mitochondrial gene order: *nad2*, *cox1a*, *cox1b*, *cox2*, *atp6*, *cox3*, *nad3*, *nad5*, *nad4*, *nad6*, *cob*, *nad1*, *rrnLa*, *rrnLb*, *rrnS*, followed by the 4 nuclear loci in the order: *ef1a*, *18Sa*, *18Sb*, *28S*. For instance, a common locus string is -XX-----X-----, indicating a species supported by a complete *cox1* gene



(loci *cox1a+cox1b*, in positions 2 and 3) and a 16S RNA fragment (*rrnLa*, position 13). Similarly, the code --XXXXXXXXXXXXX---X indicates a species supported by a nearly complete mitochondrial contig (only *nad2* and *cox1a* are missing) complemented by a 28S RNA sequence extracted from NCBI.

The taxonomic code compresses the Linnaean taxonomy associated to the sequence according to the GenBank classification (Federhen, 2012) for seven hierarchical levels: suborder, infraorder, superfamily, family, subfamily, tribe, genus, species. Names at each level were abbreviated to include only the first or second letter, with a third letter added to discriminate among names with the same starting letters. After each abbreviated name the hierarchical levels were given (1 to 7 from highest to lowest taxonomic level). The alphanumeric codes were also used as pseudocharacters to calculate the taxonomic Retention Index (tRI) at each hierarchical level, as a measure of the fit of the tree to the Linnaean classification (Hunt and Vogler, 2008).

The identification labels of assembled shotgun mitogenomes were based on identifications with the *cox1* barcodes generated during the original MMG studies (Table 1). Briefly, internal barcodes were produced for specimens prior to DNA mixing for bulk shotgun sequencing and were used as 'bait sequences' to link specimen and mitogenome (see Crampton-Platt et al., 2016). When barcodes were not available, contigs were identified to species level by Blast matches (>99% identity) to (i) *cox1* records from NCBI Genbank and (ii) the BOLD database, or (iii) where no such identification via existing entries was available, contigs were labelled at family level, based on their phylogenetic position in preliminary tree searches. The taxon label includes the method of identification (annotated from barcodes or from tree topology).

### **Tree searches**

Phylogenetic trees were generated using likelihood searches under data partitioning. Mitochondrial genes were attributed to a total of 7 data partitions, one for each codon position of protein coding genes on the forward (3 partitions) and reverse (3 partitions) strands, plus one partition for the two rRNA genes. Each nuclear gene was assigned to a single additional partition (*ef1a*, *18Sa+18Sb*, *28S*), for a total of 10 partitions. Using both the CIPRES web server (Miller et al., 2010) and in-house servers, tree searches were performed with RAxML-HPC2 v8.2.6 (Stamatakis, 2014) under the GTRCAT model of nucleotide substitution, which approximates a GTR+ $\Gamma$  model at reduced computational cost, and the likelihoods of the final tree topologies were re-evaluated under GTR+ $\Gamma$ . For the different tree searches (NCBI-only, NCBI+MMG, MMG-only) based on a minimum of three loci (min3loci, see Suppl. File S1), 20 independent runs with different starting seeds were performed, and the tree with the best likelihood score was selected. For searches on the larger datasets with a minimum of 2 loci (min2loci), we used the min3loci tree as starting tree (RAxML option --t). This

starting tree option did not constrain the tree search, but started the taxon addition from a given topology of the smaller dataset. In addition, tree searches were performed under RY coding of 1<sup>st</sup> and removal of 3<sup>rd</sup> codon positions (1-RY/3-del), to reduce long-branch attraction due to compositional and rate heterogeneity. We did not obtain measures of node support (e.g. bootstrap values) due to the computing limitations imposed by the size of the studied matrices.

## Results

### NCBI and MMG extractions

The NCBI extraction revealed a preponderance of *cox1* sequences representing more than 46,000 species for each segment (*cox1a*, *cox1b*). The next highest numbers were for the *rnl* segments (*16Sa* and *16Sb*) with over 13,000 species, and the *cox2*, *cytb* and 18S rRNA genes, available for around 5,000 species each. These loci represented a great diversity at all taxonomic levels (Figure 2A, left). Other mitochondrial and nuclear loci were underrepresented, restricted to a few clades, and on average corresponded to sequence fragments shorter than the full-length coleopteran gene, which was particularly striking for the widely used *cox3*, *nad5* and *cytb* genes (Figure 2A, bottom-right histogram). Changes in the stringency of the Blast searches using e-values of  $e=-12$  to  $e=+1$  showed little differences in the number of sequences obtained, except under the least stringent conditions (Suppl. Table S1).

The mitogenome assembly conducted independently on each of the 17 shotgun datasets produced between 6 and 236 contigs, for a total of 1942 mitochondrial contigs, of which 561 contigs were obtained from previously unpublished datasets (Table 1). The contigs included complete (as indicated by their >15kb length) and partial mitochondrial genomes. For most shotgun datasets, a complete set of protein coding and rRNA genes was obtained in one half to two thirds of contigs, but with the notable exception of one dataset (Table 1). The distribution of recovered mitochondrial loci (Figure 2B, upper-right histogram) and their representation at all hierarchical levels were largely uniform (Figure 2B, left). The MMG-derived gene extractions were mostly composed of the expected full length sequences, in contrast to the partial genes in the NCBI dataset (Figure 2B, lower-right histogram). After assigning taxonomic names (see Materials and Methods), MMG contigs were complemented with NCBI data for the same species, adding the corresponding nuclear loci (and mitochondrial loci missing in incomplete contigs). In the min2loci NCBI+MMG matrix a total of 666 terminals were a combination of both sources, i.e. for ~1/3 of all MMG mitogenomes (see Suppl. File S1 for a list of all combined terminals). In many cases only the *cox1* sequences were available at

NCBI, and were consequently discarded in favor of the longer MMG contig (see Materials and Methods).

### **Taxonomic composition**

The NCBI extraction recovered 165 out of 189 currently recognized beetle families, including 257 subfamilies, 5441 genera and 30,700 species (Table 2). After concatenation, 13,666 species were omitted from the tree searches on the final dataset because they did not have sequences for a minimum of 2 or 3 of the target loci and were mainly represented by *cox1* and *rrnL* fragments (data not shown). The minimum locus requirement mainly removed species at lower hierarchical levels, e.g. retaining only 39.0% and 52.1% of the total species available at NCBI for the min3loci and min2loci datasets, respectively, while retaining 95.8% and 97.6% of family level taxa (corresponding to 7 and 4 unrepresented families). The MMG set contained 120 families and 139 subfamilies, which is a minimum estimate, as many sequences remained unidentified. Both datasets overlapped in the coverage of higher taxa present but the proportion of taxa in the MMG set also represented in the NCBI extraction decreased towards the tip (species) level from 54.5% at the family level to a mere 3.4% at the species level (Table 2). At the same time, the MMG data contributed an increasing number of unique taxa for each hierarchical level. After redundancy correction for the species represented by both datasets, the total species representation in the min3loci and min2loci datasets was 11944 and 15983 terminals, respectively, including 1942 MMG contigs (Table 2).

### **Phylogenetic analyses**

Tree searches were conducted on five datasets; the MMG contigs, the NCBI-only database requiring a minimum of either 3 or 2 loci, and the combined MMG and NCBI database with minimum of 3 or 2 loci (the min3loci and min2loci databases). Except for MMG-only, these datasets included >10,000 terminals with a large proportion of missing data in many sites. We first assessed the effect of different starting trees on the likelihood of the trees obtained with the RAxML software, launching 20 tree searches under different starting seeds on the min3loci dataset with all nucleotides partitioned into 10 partitions (Material and Methods). Each search took 5 to 9 days of calculation using 12 or 16 CPU cores on the Cipres web server and in-house server launches, respectively. The best tree had a likelihood score of -11,449,869.61, with other trees worse by between -263.00 and -1046.15 log likelihood units (final likelihoods were calculated under GTR+ $\Gamma$  on each topology for direct comparisons). The resulting tree topologies were overall similar although they differed in various places, including the basal relationships of the polyphagan superfamilies (see Suppl. File S1 for an example).

Tree topologies were assessed with the tRI, a measure of fit to the Linnaean taxonomy, at four hierarchical levels (genus, subfamily, family, superfamily) (Table 3). The NCBI min3loci (10,063 taxa) and MMG+NCBI min3loci (pruned, 10,063 taxa) datasets showed the highest values at all four levels (Table 3, bold values), in particular for superfamilies, whose distributions were almost entirely consistent with the tree (tRI=0.996 and 0.997). The 1-RY/3-del coding (Table 3: trees T1, T3, T5, T7) produced the exact same or very similar tRI values at high taxonomic levels, but these dropped slightly at the subfamily and particularly genus level. The tRI values for MMG were much lower at all hierarchical levels, ranging between 0.650 and 0.693, except for superfamilies (tRI=0.963) (Table 3: T8, T9). These values were directly correlated to the completeness of taxonomical annotation of the different studies from which these datasets were obtained. For example, several ecological MMG datasets (Panama, French Guyana, Soil) had been fully identified at superfamily level but not necessarily at lower taxonomic levels. When NCBI and MMG data were analyzed together, whether using the min3loci or min2loci datasets, the values were slightly reduced compared to the tRIs from the NCBI data alone (Table 3: T4 and T5). However, after pruning of the MMG data from the tree, the original values were largely regained or even slightly increased (Table 3: T4 MMG-pruned and T5 MMG-pruned), indicating a similar phenomenon of signal dilution.

The largest MMG+NCBI tree (T4) was inspected for the details of the topology, as the most complete summary of coleopteran relationships obtainable from the current NCBI database (Fig. 3; Suppl. File S4). We made extensive comments on the tree topology in the ‘small’ suborders Myxophaga, Archostemata and Adephaga with 25, 9 and 3,406 terminals, respectively, in the light of existing taxonomic knowledge and previous studies, including those that generated these data (Suppl. File S1). The subclades of the tree in some cases were almost entirely from entries of a single phylogenetic study (e.g. in Gyrinoidea), whereas other subclades combined the results from multiple studies and thus extended the taxon sampling in this tree beyond any existing work (e.g. in Cicindelidae). We found a general agreement with the expected relationships, while inconsistencies mostly affected individual terminals or small subgroups that were apparently misplaced (see Suppl. File S1 for detailed discussion). Likewise, the expected major clades and basal relationships of Polyphaga, including almost the entire set of infraorders and superfamilies (Mckenna et al., 2015; Timmermans et al., 2015b; Zhang et al., 2018), were recovered (Fig. 3; Suppl. File S4). Basal relationships within Polyphaga showed the basal split of Scirtoidea from the ‘core Polyphaga’ (Hunt et al., 2007; Zhang et al., 2018), and the branching of the series (infraorder) Elateriformia (Byrrhoidea, Elateroidea), followed by the Staphyliniformia plus Scarabaeiformia (Staphyloidea + Hydrophiloidea + Scarabaeoidea), and the Bostrichiformia as sister to the large series Cucujiformia, which are arranged in a plausible topology (((Tenebrionoidea (Cleroidea (Cucujoidea

(Chrysomeloidea, Curculionoidea). However, closer inspection of the tree (Fig. S4) also revealed individual species or smaller sublineages to be removed from the main clades representing a higher taxon, which was reflected in the tRI of <1.0. This is particularly evident in the two small suborders which were not monophyletic with respect to each other, presumably due to attraction of taxa with overlapping gene coverage, while the difficult basal relationships of the four suborders also were not in agreement with transcriptome data (Misof et al., 2014). Comparing the topologies from the min2loci NCBI-only and NCBI+MMG datasets (under 1-RY/3-del) many of the major lineages were monophyletic in both trees, but two groups (Bostrichiforma and Staphylinoidea) were recovered only with the MMG data included.

## Discussion

### MMG approaches and the Coleoptera Tree-of-Life

Phylogenetically informed studies of species diversity rely increasingly on genomic approaches (Maddison, 2016). While species-level trees already exist for major vertebrate phyla, and ambitious plans for full-genome sequencing of all species have been widely articulated (Zhang et al., 2014), the species-level phylogenetic analysis of a group of insects containing potentially millions of species has not been seriously considered. The MMG technology has the potential to provide rapid species recognition and phylogenetic placement of numerous species at the same time, thus setting the context for studies of evolutionary biology and ecology of the most diverse groups of animals (Crampton-Platt et al. 2016). With >1,900 contigs (representing nearly this number of different species, including 1000 fully identified species in 630 genera) the current database greatly exceeds the ~250 beetle mitogenomes previously available. In addition, this type of data will rapidly expand in the near future, not least because of the possibility of hybrid enrichment of mitochondrial genomes (Liu et al., 2016; Zhang et al., 2014) and improved sequencing methods that ensure efficient assembly (Mostovoy et al., 2016).

The inclusion of numerous mitogenome sequences into a highly incomplete matrix might improve the tree topologies and increase nodal support by reducing the overall proportion of missing data. They might also act as a scaffold to non-overlapping mitochondrial fragments from the NCBI entries. However, the improvements of tree topologies after inclusion of the MMG mitogenomes were negligible according to the test applied here. The comparison is based on the tRI values, i.e. a measure that integrates taxonomic information in relation to the Linnaean classification over the

entire tree. The Linnaean taxonomy seems to be an excellent fit to the tree obtained from the NCBI data, in particular at the highest levels (suborder and superfamily), indicating that the tRI is a good measure of tree quality. Yet, the MMG data did not perform well by this criterion. The interpretation of this result should consider that the mitogenome data were obtained in the course of studies of various lineages and ecosystems unrelated to the aims of the current work. Three of the largest datasets (Soil, Panama and FG) represent specimens identified based on close matches to DNA barcodes and GenBank entries, or based on in-house sequences from specimens identified with various degrees of confidence. Many of these identifications are incompletely defined, e. g. only at the superfamily level, which would reduce the per-character tRI due to lack of data, as consistency with the tree may not be recognizable. High levels of 'missing data' in the calculation of the tRI can reduce the measure of consistency with the tree (Lanfear et al., 2014; Maddison, 1993). In addition, some names may be incorrect, creating conflict with the taxonomy. Therefore the low tRI from the MMG data alone (Table 3) is not a meaningful representation of the phylogenetic power of these mitogenomes. More relevant is the fact that the NCBI+MMG combined tree shows high tRI, and after pruning the MMG data from this combined tree (to avoid the annotation effect described above) the pruned NCBI+MMG tree even shows a slightly higher tRI, i.e. the MMG data improved the tree topology obtained from the NCBI data.

The MMG data might be further strengthened with more uniform taxon selection, which differed greatly across various parts of the tree. For example, among 442 species of Cicindelidae (tiger beetles) only one species is represented by a mitogenome, whereas 1,649 species of Chrysomelidae (leaf beetles) include nearly 300 mitogenomes. If applied more widely, MMG can could easily contribute more uniform coverage and might stabilize the tree, as hypothesized. Second, the MMG data were obtained with fully automated procedures for mitogenome assembly and matrix construction, as the approach is designed for high-throughput analysis of biodiversity samples. Several steps of data curation including the use of multiple assemblers and super-assembly of the products generally result in longer contigs and help to recognize chimeras and other spurious portions mostly near the ends of a contig (Gomez-Rodriguez et al., 2015). These incorrect terminal portions may also be responsible for the split of partial contigs that would otherwise be fused, which are evident in the tree as closely related contigs with marginally overlapping locus strings (Suppl. File S1). In addition, the quality of the MMG data is further affected by the gene extractions performed using Blast (in analogy to the extractions from NCBI), as opposed to template-based annotations, e.g. with the MITOS algorithm (Bernt et al., 2013). This limits the precision of gene delimitation for detecting the start and stop codons and the resulting nucleotide alignment. In conclusion, the current MMG data neither help nor disturb the tree, but it is likely that after thorough taxonomic

identification and improved sequence editing we will see a positive impact on the tree generated from the incongruous NCBI data, ameliorating the effect of highly uneven gene coverage.

### **Current state of the Coleoptera tree**

Data mining of the NCBI database provided a much greater number of taxa than the MMG datasets. However, among the >40,000 species represented at the time of data extraction (October 2015), a large proportion were represented only by a single short fragment, while just under 16,000 and 12,000 terminals, respectively, were represented by a minimum of two or three markers. Tree searches were challenging given the large number of taxa and high proportion of missing data. Yet, it was possible to apply the RAxML software (Bernt et al., 2013; Stamatakis, 2014), which is more reliable than methods designed for even larger trees, such as FastTree (Price et al., 2010), even if the algorithm is not very robust to compositional biases and high rate variation that are prevalent in mitogenome data (Pons et al., 2010; Sheffield et al., 2009; Timmermans et al., 2015b). The RAxML software permits data partitioning which improves the likelihood scores for trees from mitogenomes, whereby a split into six separate partitions for the protein coding genes (the three codon positions for forward and reverse strands) is known to provide nearly the same benefit as the separation of each gene and codon position (Lanfear et al., 2014; Timmermans et al., 2015b). Individual searches took approximately one week with our moderate local computing equipment or the CIPRES server. We observed that searches for the min3loci datasets were much faster than the min2loci, indicating that even adding a quarter more taxa and increasing the proportion of missing data put much greater demand on the searches. A search that also included species represented by only a single locus, mostly corresponding to the barcode *cox1* gene, added some 15,000 taxa to the matrix (for a total of >30,000 taxa), which was beyond the power of existing likelihood algorithms (Izquierdo-Carrasco et al., 2011), and our attempts to perform RAxML analyses on this dataset failed. Our largest tree using the min2loci dataset was obtained by using the tree from the min3loci dataset as starting tree. Thus, the greater information content (fewer missing data) of the min3loci data could be incorporated into the larger dataset without applying topological or backbone constraints based on the smaller set. This distinguishes our approach from similar efforts for species-level phylogenetics in other groups of insects, e.g. in Trichoptera, based on the barcode marker alone, which constrained several taxa at family and genus level to be monophyletic due to the limited power of these short sequences (Zhou et al., 2016). Finally, we combined the mitogenomes with the most widely used nuclear genes, in particular the 18S rRNA gene known to resolve basal relationships in the Coleoptera (Bocak et al., 2014). The end result is a generally defensible tree of an unprecedented magnitude, which now constitutes the first global assessment of relationships in all major lineages of Coleoptera (Suppl. File S3).

When evaluating the tree topology, it is tempting to focus on the basal relationships of the major subgroups, but the sequencing and sampling strategies used here are probably not the most appropriate for resolving this aspect. We consider the greatest value of the current tree of 16,000 species as a resource for the study of sublineages, e.g. within families or subfamilies. Given the high tRI, the trees are generally congruent with the existing taxonomy, which is remarkable given the rapid alignment and tree searches at the scale of many thousand taxa. This finding also implies that particularly at the highest taxonomic levels there are almost no errors in the database itself, i.e. the great majority of GenBank entries is accurate, at least at the level of families and above. We corrected a few known or suspected errors prior to the final tree searches (Suppl. File S1). The tree integrates data from independent studies that were focused on internal relationships within families or subfamilies. The relationships within these groups (discussed in detail for the families of Adephaga in the Suppl. File S1) were generally in agreement with the original studies, but the finer relationships inevitably differ because these studies may have used additional loci and more complex models.

Inconsistencies with the existing analyses were also due to non-overlapping gene sequences, in particular where either the nuclear rRNA or mitochondrial markers were available without any shared loci in these terminals or close relatives. For example, in the five representatives of the myxophagan genus *Sphaerius* (CM1S4Sp7) complete mitogenomes were available for two of the terminals, while two others were sequenced only for 18S rRNA and another one for *cox1a* and *ef1a*. Although some entries may correspond to close relatives, either gene marker placed the sequences in very different clades (the 18S-only terminals were even placed outside of Myxophaga, producing the only case that renders any of the suborders as non-monophyletic) (Suppl. File S1). To some extent the effect of non-overlapping genes can also be observed for the two subclades of Trachypachidae (the North American genus *Trachypachus* and the South American *Systolosoma*), which were placed in distant positions at the base of Carabini and Broscini, respectively. *Systolosoma* had only been sequenced for 18S rRNA and none of the mitochondrial markers, thus being attracted to other species sequenced exclusively for this gene, such as Broscini. In contrast, in *Trachypachus* the 18S rRNA was complemented by a complete mitogenome (Suppl. File S1), which allows placement relative to other mitochondrial sequences.

Another source of inconsistency is the naming of taxa. The myxophagan *Sphaerius* again illustrates a case where inconsistent naming at the species level creates extra terminals. None of the five terminals were identified to species in NCBI but instead were labeled with different alphanumeric identifiers. These specimens may correspond to the same species or even to the same specimen (e.g. submitted by the same research group as part of different datasets), and because our bioinformatics pipeline treats these as separate species entries, inflating the total number of terminals, and also



placing these terminals in distant positions due to the affinities of the various gene markers.

Further problems resulting from labelling of GenBank entries are due to the casual application of taxonomic ranks and the resulting discrepancies with the Linnaean taxonomy on which the tRI is based. This was particularly evident at the genus and subgenus ranks that were not applied consistently in the NCBI classification (and the original literature on which this scheme is based). For example, the Cicindelidae, and specifically the subtribe Cicindelina, has been subdivided into subgroups by Rivalier (1953) that have been interpreted to imply a hierarchical scheme of relationships, but this is inconsistently followed by modern taxonomists. Whereas some studies have recognized two main genera named *Cicindela* and *Cylindera*, besides several other 'genera', the extent and internal subgeneric subdivision of these two lineages remain largely unstudied. Inevitably the mixed application of certain names at both subgeneric and generic levels in the classification inflates the tRI measure.

Finally, the heavy reliance on mitogenomes caused problems of tree inference, due to well understood problems with rate and compositional heterogeneity affecting this marker. For example, mitochondrial genomes generally recover distorted basal relationships in Adephaga, with the highly divergent aquatic families Noteridae + Meruidae separated from all others at the basal node, which renders the remaining aquatic families (Hydradephaga) paraphyletic. This well-known phenomenon (Timmermans et al., 2015a) also is reflected in the current analysis. Only additional taxon sampling or expanded sequencing of the nuclear genome will resolve these problematic basal nodes conclusively.

## **Conclusions**

This is the largest compilation of phylogenetic information for the Coleoptera to date. Various portions of the tree are now open to further investigation and data curation, to remove remaining errors in naming, classification, identification and sequencing. We noted in particular the errors from spelling of names and from different classificatory level to which names were attributed, which led to splitting of taxa into multiple entries in this database. Careful curation of the sequence database and the associated taxonomy database therefore is required, through requests for corrections at the NCBI database and the removal of erroneous sequence data or misassigned species. The tree enables us to identify the taxa which are placed in conflict with their identification. While some terminals may be misidentified or mislabeled, an unexpected position in certain cases can point to alternative phylogenetic relationships. The tree also offers a powerful framework for phylogenetic placement of mitochondrial reads or contigs from additional insect metagenomes or any type of environmental

sequencing, facilitating biodiversity discovery.

Yet, we still have a long way to go to achieve a stable species-level tree of the Coleoptera. We show here how MMG may be a new avenue for rapidly increasing the species representation and also adding tree support. Vice versa, linking these MMG data to the existing phylogenetic database also contributes to the characterization of samples from poorly known ecosystems, such as tropical rainforests. As these data are added to the growing database, the phylogenetic placement of ecological mixtures and the generation of a more secure tree topology go hand-in-hand. Due to the unconstrained searches and inclusion of very large numbers of taxa, our approach opens the possibility for discovery of new lineages, without prior notions of taxon choice and relationships. This includes the ability to reveal new deep lineages that have hitherto been overlooked by classical taxonomy (Andujar et al., 2016; Bocak et al., 2016). This kind of sequencing effort of samples from diverse ecological and biogeographical provenances will iteratively enrich the reference tree, for an increasingly complete picture of the Tree-of-Life. Considering that the Coleoptera is the largest metazoan order on Earth, building such a reference would be a major milestone and can lead the way for similar studies across the Tree-of-Life.

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### **Authors contribution**

BL, APV conceived the study; ACP, JM, MJTNT, CA, PA, KEM, JL, EM, AH, CGR, CB, RN, CPDTG, TB, LB collected the specimen and/or obtained the molecular data; BL, ACP and APV analysed the data; BL, APV wrote the manuscript, and all the authors revised the manuscript.

### **TABLES**

**Table 1: Shotgun datasets used in this study and their origin.**

**Table 2: Taxonomic content of the NCBI, MMG and NCBI+MMG coleopteran supermatrices.** “NCBI Proportion” describes the proportion of the NCBI coleopteran taxonomy covered by each dataset. \* Numbers are low estimates as many contigs belongs to currently unidentified coleopteran species. <sup>1</sup> Mitochondrial contigs belonging to clades which were not barcoded in BOLD or defined in the NCBI taxonomy in October 2015 (date of the NCBI data extraction).

**Table 3: Taxonomic retention index of the NCBI, MMG and NCBI+MMG coleopteran trees.** The taxonomic retention index (tRI) was calculated for four taxonomic level: genus, subfamily, family and superfamily. The 2 trees with best tRI scores are highlighted in bold. Asterisks mark MMG+NCBI trees resulting to less terminals than the summed of NCBI and MMG terminals, because of merged terminals (same species).

## FIGURES

**Figure 1: Sequence datasets built for this study and decision tree for generating the supermatrices.**

Sets of loci were extracted from the GenBank and MMG contigs to respectively build the NCBI dataset (left, blue stippled lines) and the MMG dataset (right, green dashed lines). Both were merged in the MMG-NCBI dataset (center, purple solid lines). The loci support filters and sequence recoding applied to these datasets are reported and resulted in 10 different sequence matrices whose names are given at the bottom of the figure.

**Figure 2: Composition of the extracted sequence data.** Loci statistics are reported for (A.) the NCBI extraction (split in 15 mitochondrial and 4 nuclear loci) and (B.) the MMG datasets (15 mitochondrial loci). Left radars illustrate the taxonomic evenness of the extraction, with one unit corresponding to one clade of the following taxonomic levels: species (orange dashes), genera (blue dots), subfamilies (purple triangles), families (green squares) and superfamilies (red crosses). On the right side, dotted histograms report the total number of entries retrieved for each locus (including multiple entries belonging to the same species) on a log scale, while dashed histograms reports the corresponding average sequence length.

**Figure 3: A graphical representation of the NCBI+MMG tree.** This is a condensed version of the full tree of 15983 terminals requiring a minimum of two loci under 1RY/3del coding. The taxon labels were created with the Dendroscope tree viewer that displays sparse labels upon condensing of the tree. The complete unfolded tree is presented in Suppl. File S4. The naming scheme for terminals is according to the locus and name codes described in Material and Methods and Suppl. File S1. Ar1 Archostemata (red); A1, Adephaga (green); P1, Polyphaga (blue); C3, Caraboidea; D3, Dytiscoidea;

Sci3, Scirtoidea; E3, Elateroidea; B3, Byrrhoidea; S3, Staphylinoidea; H3, Hydrophiloidea; Sc3, Scarabaeoidea; Bo, Bostrichoidea; T3, Tenebrionoidea; C3, Cleroidea; Cu3, Cucujoidea; Ch3, Chrysomeloidea; Cur3, Curculionoidea. See Suppl. File S2 for detailed classification key.

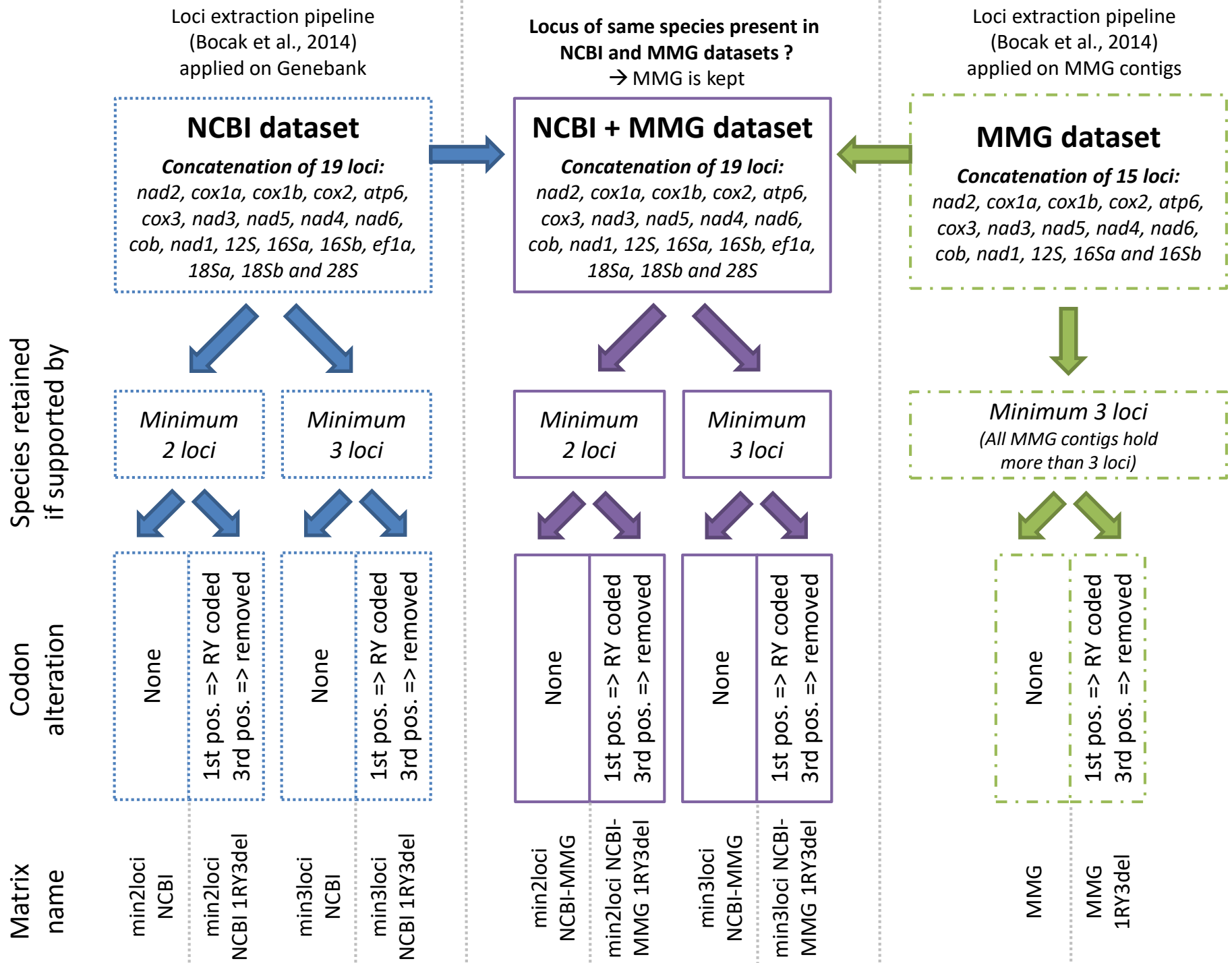
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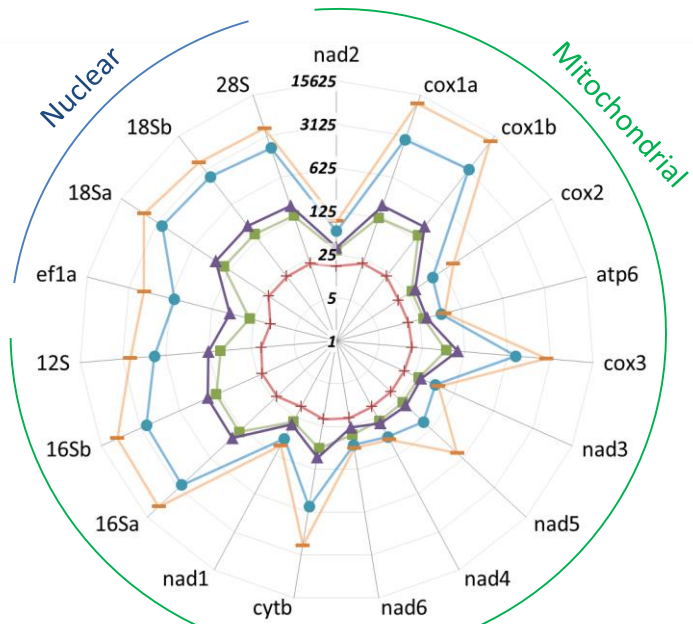
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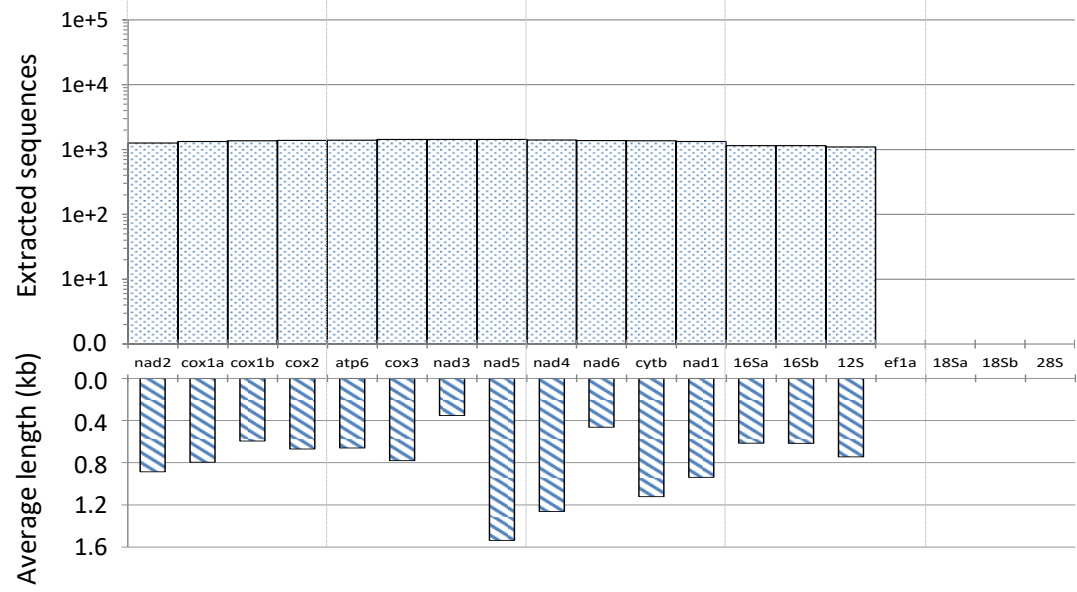
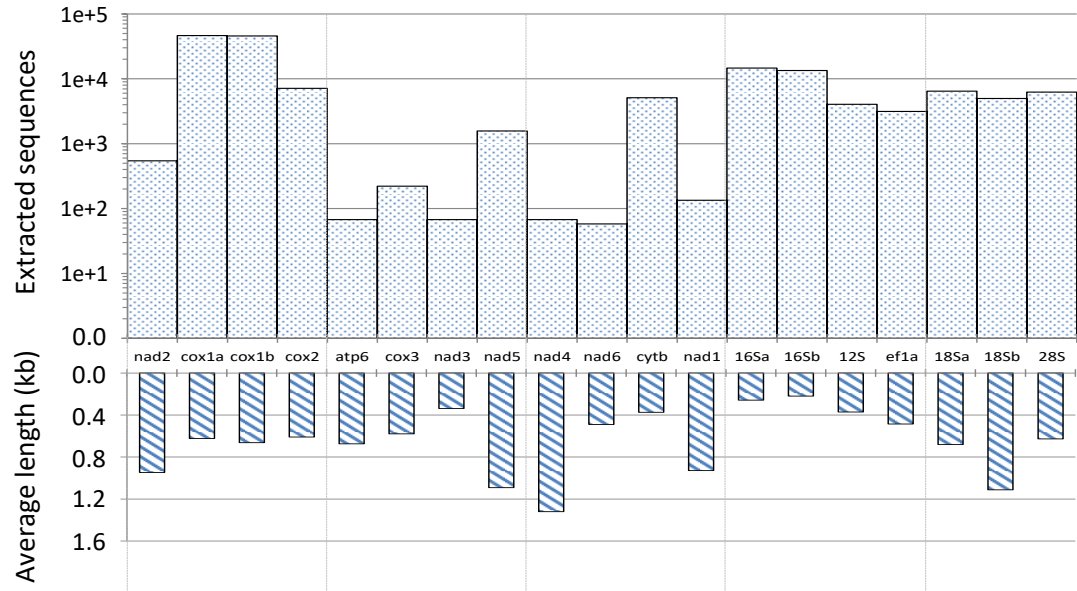
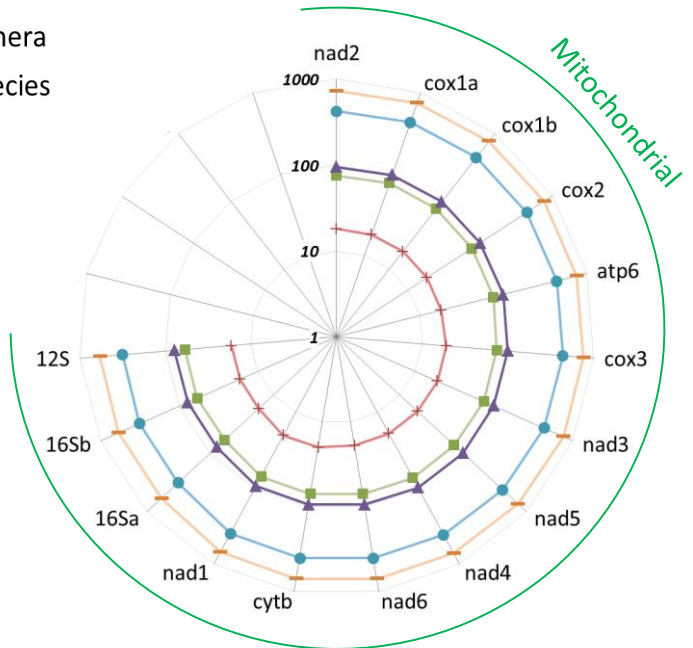


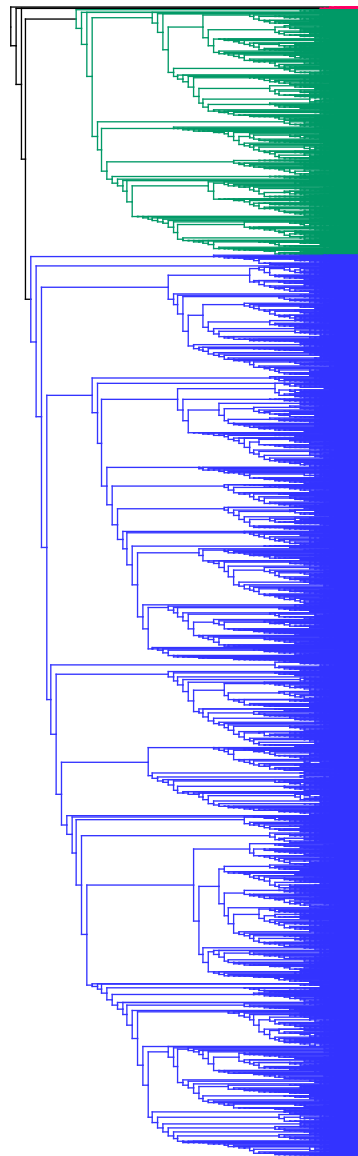
### A. NCBI dataset



- +— superfamilies
- families
- ▲— subfamilies
- genera
- species

### B. MMG dataset





-----X---XX- Car1M4Mi7deb *Micromalthus debilis* NCBI  
--XX-----CA1D3D4C5C6Rh7bou *Rhantus bouvieri* NCBI  
--X-----X-XX-----CA1D3D4Co5C6Pa7MB267 *Papuadytes MB267* NCBI  
--X-----X-XX-----CA1D3D4Co5C6Co7029TA593 *Copelatus 029TA593* NCBI  
--X-----XX-----CA1D3D4H5H6St7lep *Stictonectes lepidus* NCBI  
--X-----XX-----CA1D3D4H5H6Or7sno *Oreodytes snoqualmie* NCBI  
-XXX-----X-X-----CA1G3G4An7sed *Andogyrus sedilloti* NCBI  
--X-----X-XX-----CA1C3C4C5C6Cy7ovi *Cylindera ovipennis* NCBI  
XXXXXXXXXXXXXXXXX-----CA1C3C4Ca6Cal7BYUC0241 *Calosoma BYUC0241* NCBI  
--XX-----X---XX-----CA1C3C4T5B6Be7lun *Bembidion lunulatum* NCBI  
--X-----XX-----CA1C3C4T5T6Du7les *Duvalius lespeii* NCBI  
--XX-----CA1C3C4H5P6Ac7fer *Acanthoferonia ferox* NCBI  
--X-----X-----CA1C3C4P15P6BL7ery *Blackburnia erythropus* NCBI  
XXXXXXXXXXXXX-----CP1Sci3 *Scirtoidea* sp2 FG.idba.75 MMG ANNOT FROI  
-----XXXXX-----CP1By3 *Byrrhoidea* sp2 B480tru.idba.155 MMG ANNO  
--X-----XX---XXX-----CP1E3E4A5Ad7RK0064 *AdeLocera RK0064* NCBI  
-----XXXXXXXX-----CP1E3C4C5Rh7 *Rhagonycha* sp Soil.idba.140 MMG ANI  
--X-----XX---XXX-----CP1E3P4RK0368 *Phengodidae* RK0368 NCBI  
--X-----XXX-----CP1E3Ly4Met7000010 *Metriorrhynchus 000010* NCBI  
--X-----XX---XX-----CP1S3S4Ps5Rh7JP2014 *Rhytus JP2014* NCBI  
--X-----XX-X-X-----CP1S3S4M5Mi7AI521 *Micropeplus AI521* NCBI  
-----XX---X-----CP1S3S4Sta5S6Ag7car *Agelosus carinatus* NCBI  
-XXX-----CP1S3S4A5A6Al7spad *Aleochara spadicea* NCBI  
-XXX-----XX-----CP1S3S4A5T6Pa7den *Paradilacra densissima* NCBI  
--X-----XX-----CP1S3H4Li7mont *Limnebius montanus* NCBI  
--X-----XX-----CP1S3H4Hy7ana *Hydraena anatolica* NCBI  
--XX-----XX-----CP1H3H4S5Ph7car *Phaenonotum caribense* NCBI  
-XXX-----XX-----CP1Sc3Ge4Ge7spi *Geotrupes spiniger* NCBI  
XXXXXXXXXXXXXXXXX-----CP1Sc3S4S5Eu6Eu7foe *Eurysternus foedus* CS.idba.!  
--X-----X-----CP1Sc3S4S5Ma7CLS2009 *Macroderes CLS2009* NCBI  
-XXX-----CP1Sc3S4M5Pr7mod *Prodontria modesta* NCBI  
--X-----XX-----CP1Sc3S4D5En7pan *Enema pan* NCBI  
-XX-----CP1Sc3S4M5Phy7bip *Phyllophaga bipartita* NCBI  
--X-----X---XXX-----CP1Bo3B4B5Bo7cap *Bostrichus capucinus* NCBI  
-----XX-----CP1T3M4Mi7hol *Mimethes holgaticus* NCBI  
--X-----X-----CP1T3Z4C5Ta7par *Tarphius parallelus* NCBI  
--X-----X-X-X-----CP1T3NLG2012\_6 *Tenebrionoidea NLG2012* NCBI  
-XX-----X-X-X-----CP1C3T4P5Re7NLG2013 *Rentonellum NLG2013* NCBI  
-XX-----X-X-X-----CP1C3C4Ze7cra *Zenithicola crassus* NCBI  
--X-----X-XXX-----CP1Cu3Lat4Ak7atr *Akalyptoischion atrichos* NCBI  
--XX-----CP1Cu3C4O5O6Or7ccoc060 *Ortalia ccoc060* NCBI  
XXXXXXXX-----CP1Cu3 *Cucujoidea* spB0LD AAU7028 Panama.idba.18:  
-XX-----XX-----CP1Ch3Ce4L5L6Al7tab *Alosterna tabacicolor* NCBI  
-XX-----XX-X-----CP1Ch3C4P17rus *Plateumaris rustica* NCBI  
-XX-----XX-X-----CP1Ch3C4B5B6Br7var *Bruchidius varius* NCBI  
--X-----XX-----CP1Ch3C4C5C6Cy7eum *Cyrtonus eumolpus* NCBI  
XXXXXXXX-----CP1Ch3C4G5A6Chal7aur *Chalcoides aurea* BIUK.idba  
--X-----X---XX-----CP1Ch3C4G5G6Lo7scu *Lochmaea scu tellata* NCBI  
--X-----X-----CP1Ch3C4E5S5a7fau *Samuelsonia fauveli* NCBI  
-----XX-----CP1Cur3Ca4Ca7top *Caenominurus topali* NCBI  
--X-----X-X-----CP1Cur3C4P6P17pah *Platypus pahangensis* NCBI  
--X-----X-----CP1Cur3C4E5L6La7ang *Laparocerus angustus* NCBI  
-XX-----CP1Cur3Bra4E5Sm7jun *Smicronyx jungermanniae* NCB:  
--X-----XX-----CP1Cur3C4Cr5On7lui *Onyxaltes luigionii* NCBI  
--X-X-----X-XXX-----CP1Cur3C4C5M6Rh7nef *Rhinusa nef* NCBI  
--X-----X-----CP1Cur3C4SPN003 *Curculionidae* SPN003 NCBI  
--X-----X-----CP1Cur3C4S5Li7bic *Liparthrum bicaudatum* NCBI  
--X-----X-X-X-----CP1Cur3C4S5Cn7sol *Cnestus solidus* NCBI

<b>Dataset Identifier</b>	<b>Tree identifier</b>	<b>Publication</b>	<b>Initial study purpose</b>	<b>Sequencing approach</b>	<b>mitochondrial contigs</b>	<b>complete mitochondria (all coding genes)</b>
<b>B480</b>	B480	Crampton-Platt et al., 2015	Biodiversity	MMG	155	85
<b>BIUK</b>	BIUK	Crampton-Platt, PhD UCL 2015	Biodiversity	MMG	87	44
<b>MT1</b>	JX*	Timmermans et al., 2010	Phylogeny	Long-range PCR	28	0
<b>MT2</b>	JX*	Timmermans et al., 2016	Phylogeny	Long-range PCR / MMG	245	24
<b>Curc</b>	Curc	Gillett et al., 2014	Phylogeny	MMG	110	74
<b>Germany Barcode-of-Life</b>	amie	Present study	Phylogeny	MMG	189	2
<b>Chryso</b>	chryso	Gómez-Rodríguez, et al., 2015	Ecology	MMG	173	130
<b>Staphylinidae</b>	staph	Present study	Phylogeny	MMG	90	61
<b>Soil</b>	soil	Andújar et al., 2015	Ecology	MMG	171	71
<b>Ethanol</b>	1VWB/2VGB	Linard et al., 2016	Methodology	MMG	45	29
<b>M2015</b>	m2015	Present study	Phylogeny	MMG	33	21
<b>Scarabaeidae</b>	scarab	Breeschoten et al., 2016	Phylogeny	MMG	86	17
<b>ChrysoT</b>	chrysot	Rui et al., submitted	Phylogeny	MMG	72	49
<b>French Guyana</b>	FG	Present study	Biodiversity	MMG	153	71
<b>Panama</b>	panama	Present study	Biodiversity	MMG	236	100
<b>Scolytinae</b>	scoly	Milller et al., 2015	Methodology	MMG	63	53
<b>Cocci</b>	cocci	Paula et al., 2014	Ecology	MMG	6	6

	NCBI dataset	MMG datasets			min2loci NCBI+MMG tree	
		Count	NCBI Proportion (%)	Novel taxa (not in NCBI)	count	NCBI Proportion (%)
<i>suborders</i>	4	4	100.0	0	4	100.0
<i>superfamilies</i>	21	20	95.2	0	21	100.0
<i>families</i>	165	>126*	>73.7*	>1 <sup>*1</sup>	161	97.6
<i>subfamilies</i>	257	>140*	>54.5*	>4 <sup>*1</sup>	240	93.4
<i>genera</i>	5441	>632*	>11.6*	>36 <sup>*1</sup>	3999	73.5
<i>species</i>	30700	>1053*	>3.4*	>59 <sup>*1</sup>	16002	52.1

Tree name	NCBI trees				NCBI+MMG trees								MMG trees	
	min3loci		min2loci		min3loci				min2loci				T8	T9
	T0	T1	T2	T3	T4	T4, MMG pruned	T5	T5, MMG pruned	T6	T6, MMG pruned	T7	T7, MMG pruned		
<b>Codon recoding</b>	none	1RY3del	none	1RY3d	none	none	1RY3d	1RY3d	none	none	1RY3d	1RY3d	none	1RY3d
<b>terminals</b>	10063	10062	14612	14612	11944	10063	11942	10062	15983	14028*	15983	14028*	1876	1876
<b>tRI genus</b>	<b>0.868</b>	0.854	0.819	0.785	0.820	<b>0.867</b>	0.803	<b>0.851</b>	0.782	0.824	0.754	0.798	0.693	0.693
<b>tRI subfamily</b>	<b>0.946</b>	0.941	0.930	0.922	0.857	<b>0.950</b>	0.855	<b>0.947</b>	0.860	0.933	0.856	0.929	0.656	0.653
<b>tRI family</b>	<b>0.986</b>	0.985	0.977	0.977	0.896	<b>0.987</b>	0.896	<b>0.986</b>	0.910	0.982	0.910	0.980	0.650	0.663
<b>tRI superfamily</b>	<b>0.995</b>	0.995	0.991	0.991	0.942	<b>0.996</b>	0.942	<b>0.997</b>	0.953	0.995	0.953	0.995	0.953	0.963

# The contribution of mitochondrial metagenomics to large-scale data mining and phylogenetic analysis of Coleoptera

Benjamin Linard, Alex Crampton-Platt, Jérôme Moriniere, Martijn J.T.N. Timmermans, Carmelo Andujar, Paula Arribas, Kirsten E. Miller, Julia Lipecki, Emeline Favreau, Amie Hunter, Carola Gomez-Rodriguez, Christopher Barton, Ruie Nie, Conrad P.D.T. Gillett, Thijmen Breeschoten, Ladislav Bocak, Alfried P. Vogler

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## Neuropterida outgroups

A set of 8 complete Neuropterida mitochondrial genomes, from 8 different families were used as outgroups.

<b>Loci and Taxonomic code</b>	<b>Species</b>	<b>GenBank identifier</b>
XXXXXXXXXXXXXXXXXXXX---_NO4Th7lan	Thyridosmylus langii	NC_021415
XXXXXXXXXXXXXXXXXXXX---_NMa4Di7bis	Ditaxis biseriata	NC_013257
XXXXXXXXXXXXXXXXXXXX---_NCh4Chr7nip	Chrysoperla nipponensis	NC_015093
XXXXXXXXXXXXXXXXXXXX---_NPo4Po7pun	Polystoechotes punctatus	NC_011278
XXXXXXXXXXXXXXXXXXXX---_NR4Ra7xiz	Rapisma xizangense	NC_023362
XXXXXXXXXXXXXXXXXXXX---_NNy4Ny7myr	Nymphes myrmeleonoides	NC_024825
XXXXXXXXXXXXXXXXXXXX---_NMy4My7imm	Myrmeleon immanis	NC_024826
XXXXXXXXXXXXXXXXXXXX---_NA4As7app	Ascaloptynx appendiculatus	NC_011277

## GenBank accessions related to MMG contigs

Dataset Identifier	GenBank codes (# per subset)	Publication
<b>B480</b>	Submitted to NCBI	Crampton-Platt et al., 2015
<b>BIUK</b>	Submitted to NCBI	Crampton-Platt, PhD UCL 2015
<b>MT1</b>	HM486073 HQ232800-HQ232827 (27)	Timmermans et al., 2010
<b>MT2</b>	JX220988-JX221000 (13) JX313663-JX313692 (29) JX412724-JX412859 (127) JN039360 JN163945-JN163970 (25) JQ034414 JQ034416 JQ034419	Timmermans et al., 2016
<b>Curc</b>	Submitted to NCBI	Gillett et al., 2014
<b>Germany Barcode-of-Life</b>	KX087231 - KX087368 (139)	Present study
<b>Chryso</b>	KX943331-KX943509 (179)	Gómez-Rodríguez, et al., 2015
<b>Staphylinidae</b>	KT780620-KT780701 (82)	Present study
<b>Soil</b>	Submitted to NCBI	Andújar et al., 2015
<b>Ethanol</b>	KT876876-KT876915 (42)	Linard et al., 2016
<b>M2015</b>	KX035130-KX035162 (33)	Present study
<b>Scarabaeidae</b>	KU39447-KU739446 (80)	Breeschoten et al., 2016
<b>ChrysoT</b>	KX943331-KX943509 (179)	Rui et al., submitted
<b>French Guyana</b>	KT696173-KT696273 (101)	Present study
<b>Panama</b>	MG193322-MG193541 (220)	Present study
<b>Scolytinae</b>	KX035130-KX035226 (64)	Miller et al., unpublished
<b>Cocci</b>	KJ778881-KJ77883 (3) KJ778886 KJ778888-KJ778889 (2)	Paula et al., 2014



## Illumina reads QC and mitochondrial loci selection:

1. Trimmomatic was used to discard eventual Illumina adapter left in the metagenomes:  

```
java -jar trimmomatic-0.33.jar PE -threads 4 -phred33 -trimlog MyLibraryTrimlog  
MyLibrary_R1.fq MyLibrary_R2.fq MyLibrary_R1.paired.fq MyLibrary_R1.unpaired.fq  
MyLibrary_R2.paired.fq MyLibrary_R2.unpaired.fq  
ILLUMINACLIP:MyLibrary_Truseq_trimseqs.fa:2:30:10
```
2. Prinseq was used to trim reads of low quality with:  

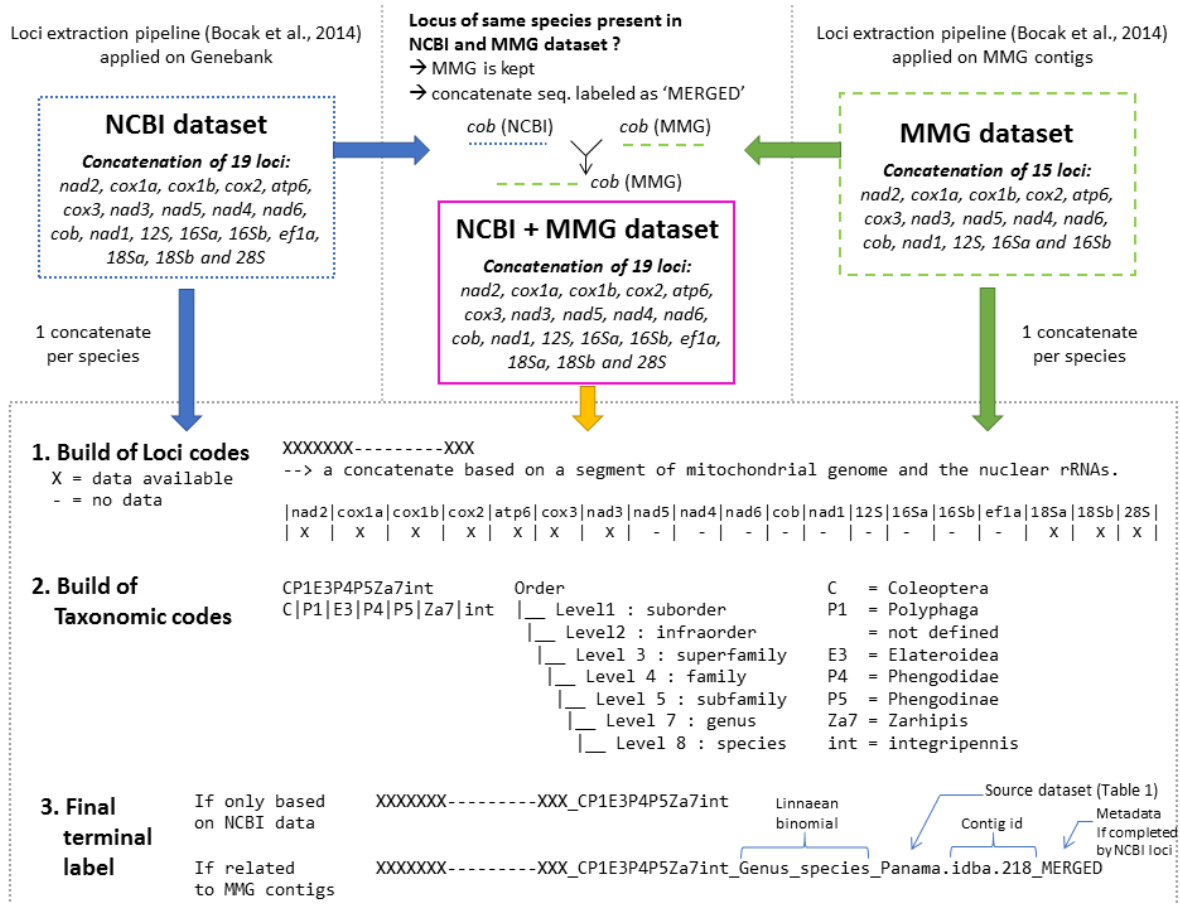
```
perl prinseq-lite.pl -verbose -fastq MyLibrary.fq -log -out_format 3 -out_good  
MyLibrary.QC -min_len 150 -min_qual_mean 25 -ns_max_n 0 -trim_qual_right 20
```
3. Mitochondrial reads were filtered with the help of blastn. First the quality controlled metagenomes were blasted to a custom database of a hundred of Coleopteran mitochondrial genomes with this command:  

```
blastn -db MitogenomeReferences.fa -query MyLibrary.paired.fq -out  
MyLibrary.paired.blastn -task blastn -evalue 1e-5 -max_target_seqs 1 -outfmt 6 -dust no
```
4. All reads matching this database at a Evalue inferior to  $1e-3$  and with at least 70% of identity were filtered out with a custom script to form a putative mitochondrial reads subset.
5. Following these quality control and filtering, the read subset was submitted to IDBA assembly with:  

```
idba_ub --mink 80 --maxk 250or300 --min_contig 1000 --similar 0.98
```
6. All contigs <5kb were discarded (short contigs cannot be identified because they don't hold the cox1 or cytb regions)
7. All remaining contigs were submitted to the pipeline of Bocak et al., 2014.

# Labelling of the tree tips

The tips labels contain 3 groups (see figure below), the locus code, the taxonomic code, the Linnaean binomial and metadata related to the mitochondrial contig if the tip is partially or fully based on loci extracted from the MMG dataset.



- **Locus code:** The ordered X/- symbols help the reader to determine which locus supports a particular tip. Typically, a X on the first 15 positions means a full mitochondria, while the 4 last positions represent the nuclear loci used in the analysis. The example in the figure below describe a species supported by a first half of mitochondrial genome ( loci nad2 to nad3) and 3 nuclear loci.
- **Taxonomic code:** This code is similar to the one used in Bocak et al, 2014. Eight taxonomic orders are associated to combinations of 1 to 3 letters and a number. The numbers represent 8 taxonomical levels: 1=suborder, 2=infraorder, 3=superfamily, 4=family, 5=subfamily, 7=genus, 8=species. A tip may or may not be associated to each of these levels: see the example below where the infraorder of Zarhipis integripennis is undefined (level 3 absent). A tip may also be associated to only high taxonomic ranks if the sequence was extracted from poorly identified specimens. Example: a taxonomic code limited to “CP1E3” correspond to an Elateroidea sp. (specimen identified at superfamily level).
- **Linnaean binomial:** The genus and species in plain letter in most cases. When the sequence correspond to a specimen identified at higher taxonomic levels, this higher level is used

instead. Example: Elateroidea sp.

- Finally, if the tip is related to MMG sequences, the study and the contig from which were built at least 1 locus are reported as **supplementary keywords**. These metadata are labelled using the following set of keywords :
  - o **NCBI**: indicates that the tip is fully based on NCBI loci.
  - o **MMG**: indicates that the tip is fully based on a MMG contig.
  - o **MERGED**: indicates that at least one locus supporting the tip was from available both from the NCBI and MMG datasets. In such case the MMG locus was kept (ensuring coherence of the full mitochondrial contig).
  - o **ANNOT\_FROM\_BARCODE**: is related to MMG contigs for which study-related, NCBI or BOLD barcodes allowed DNA-based identification of the genus or species (match >99.8%, sequenced assigned to species, match >99% identity, sequenced assigned to genus level).
  - o **ANNOT\_FROM\_TREE**; is related to MMG contigs for which no matching barcodes or other reference sequences could be discovered. In such case, the superfamily to which was placed the sequence (through tree reconstruction) was used as a high-level taxonomic identification.

## Taxonomic codes: detailed key file

All taxonomic codes and their detailed description can be found in Suppl. File S2 (excel table).

# Terminals based on both NCBI and MMG loci (“MERGED” keyword)

(Ordered taxonomically via the column “NCBI original taxonomic code)

(Use Suppl. File S2 to get taxonomic code details)

NCBI original loci code	NCBI original taxonomic code	MMG original loci code	MMG original taxonomic code	MERGED loci code	MERGED label
-XX-----	CA1C3C4B6Br7cre	XXXXXXXXXXXXXX	CA1C3C4B6Br7cre_Brachinus_crepitans_JX412826	XXXXXXXXXXXXXX	CA1C3C4B6Br7cre_Brachinus_crepitans_JX412826_MERGED
--X-----X-XX--XX-	CA1C3C4C5C6Hab7cap	XXXXXXXXXXXXXX	CA1C3C4C5C6Hab7cap_Habrodera_capensis_JX412824	XXXXXXXXXXXXXX-XX-	CA1C3C4C5C6Hab7cap_Habrodera_capensis_JX412824_MERGED
-XX---X--X-XXX-XXX	CA1C3C4Ca6Ca7nem	-XXXXXXXXXXXXXX	CA1C3C4Ca6Ca7nem_Carabus_nemoralis_BIUK.idba.47	-XXXXXXXXXXXXXX-XXX	CA1C3C4Ca6Ca7nem_Carabus_nemoralis_BIUK.idba.47_MERGED
-XX---X--X-XXX-X-X	CA1C3C4Ca6Ca7prob	XXXXX-----	CA1C3C4Ca6Ca7prob_Carabus_problematicus_BIUK.idba.82	XXXXX--X--X-XXX-X-X	CA1C3C4Ca6Ca7prob_Carabus_problematicus_BIUK.idba.82_MERGED
-X-----X-XXX-XXX	CA1C3C4Cy6Cy7car	XXXXXXXXXXXXXX	CA1C3C4Cy6Cy7car_Cychrus_caraboides_BIUK.idba.13	XXXXXXXXXXXXXX-XXX	CA1C3C4Cy6Cy7car_Cychrus_caraboides_BIUK.idba.13_MERGED
-X-----XX-	CA1C3C4E5E6B17mul	XXXXXXXXXX	CA1C3C4E5E6B17mul_Blethisa_multipunctata_ameie.idba.101	XXXXXXXXXX-----XX-	CA1C3C4E5E6B17mul_Blethisa_multipunctata_ameie.idba.101_MERGED
-XX-----X--XX-	CA1C3C4E5E6E17cup	XXXXXXXXXXXXXX	CA1C3C4E5E6E17cup_Elaphrus_cupreus_ameie.idba.30	XXXXXXXXXXXXXX--XX-	CA1C3C4E5E6E17cup_Elaphrus_cupreus_ameie.idba.30_MERGED
-XXX--X-----	CA1C3C4H5H6An7poe	XXXXXX-----	CA1C3C4H5H6An7poe_Anisodactylus_poeciloides_ameie.idba.172	XXXXXX-X-----	CA1C3C4H5H6An7poe_Anisodactylus_poeciloides_ameie.idba.172_MERGED
-XX-----	CA1C3C4H5H6Br7ruf	XXXXXXXXXX	CA1C3C4H5H6Br7ruf_Bradycellus_ruficollis_ameie.idba.124	XXXXXXXXXX-----	CA1C3C4H5H6Br7ruf_Bradycellus_ruficollis_ameie.idba.124_MERGED
-XX-----	CA1C3C4H5H6Cry7ten	XX-----	CA1C3C4H5H6Cry7ten_Cryptophonus_tenebrosus_ameie.idba.193	XX-----	CA1C3C4H5H6Cry7ten_Cryptophonus_tenebrosus_ameie.idba.193_MERGED
-XX-----	CA1C3C4H5H6Op7ard	-XXXXXXXXXXXX	CA1C3C4H5H6Op7ard_Ophonus_ardosiacus_Soil.idba.8a	-XXXXXXXXXXXX-----	CA1C3C4H5H6Op7ard_Ophonus_ardosiacus_Soil.idba.8a_MERGED
-X-----	CA1C3C4H5Le6Le7chl	XXXXXXXXXXXXXX	CA1C3C4H5Le6Le7chl_Lebia_chlorocephala_ameie.idba.39	XXXXXXXXXXXXXX-----	CA1C3C4H5Le6Le7chl_Lebia_chlorocephala_ameie.idba.39_MERGED
-XX-----X-	CA1C3C4H5Le6Mic7min	XXXXXXXXXXXXXX	CA1C3C4H5Le6Mic7min_Microlestes_minutulus_ameie.idba.19	XXXXXXXXXXXXXX-----X-	CA1C3C4H5Le6Mic7min_Microlestes_minutulus_ameie.idba.19_MERGED
-XX-----	CA1C3C4H5Le6Sy7fov	XXXXXXXXXX	CA1C3C4H5Le6Sy7fov_Syntomus_foveatus_Soil.idba.104	XXXXXXXXXX-----	CA1C3C4H5Le6Sy7fov_Syntomus_foveatus_Soil.idba.104_MERGED
-XXX--X-----XX-XX-	CA1C3C4H5P6Ab7par	XXXXXXXXXXXXXX	CA1C3C4H5P6Ab7par_Abax_parallelepipedus_2VGB.idba.3	XXXXXXXXXXXXXX-XX-	CA1C3C4H5P6Ab7par_Abax_parallelepipedus_2VGB.idba.3_MERGED
-X-----XX-	CA1C3C4H5P6Ab7para	-XXXXXX-----	CA1C3C4H5P6Ab7para_Abax_parallelus_ameie.idba.169	-XXXXXX--X-----	CA1C3C4H5P6Ab7para_Abax_parallelus_ameie.idba.169_MERGED
-XX-----	CA1C3C4H5P6Pt7mad	-XXXXXXXXXXXX	CA1C3C4H5P6Pt7mad_Pterostichus_madidus_BIUK.idba.54	-XXXXXXXXXXXX-----	CA1C3C4H5P6Pt7mad_Pterostichus_madidus_BIUK.idba.54_MERGED
-XX-----XX-	CA1C3C4H5P6Pt7nig	XXXXXXXXXXXXXX	CA1C3C4H5P6Pt7nig_Pterostichus_niger_2VGB.idba.5	XXXXXXXXXXXXXX-XX-	CA1C3C4H5P6Pt7nig_Pterostichus_niger_2VGB.idba.5_MERGED
-XXX-----XX-	CA1C3C4H5P6St7pum	XXXXXXXXXXXXXX	CA1C3C4H5P6St7pum_Stomis_pumicatus_2VGB.idba.4	XXXXXXXXXXXXXX-XX-	CA1C3C4H5P6St7pum_Stomis_pumicatus_2VGB.idba.4_MERGED
-XX-----	CA1C3C4H5Z6Am7com	XXXXXXXXXXXXXX	CA1C3C4H5Z6Am7com_Amara_communis_677553_idba_contig.5	XXXXXXXXXXXXXX-----	CA1C3C4H5Z6Am7com_Amara_communis_677553_idba_contig.5_MERGED
-XX-----X--XX-	CA1C3C4L5L6Lo7pil	XXXXXXXXXXXXXX	CA1C3C4L5L6Lo7pil_Loricera_pilicornis_BIUK.idba.49	XXXXXXXXXXXXX-X--XX-	CA1C3C4L5L6Lo7pil_Loricera_pilicornis_BIUK.idba.49_MERGED
-XX-----XX-XX-	CA1C3C4Ne6Ne7bre	XXXXXXXXXXXXXX	CA1C3C4Ne6Ne7bre_Nebria_brevicollis_2VGB.idba.0	XXXXXXXXXXXXXX-XX-	CA1C3C4Ne6Ne7bre_Nebria_brevicollis_2VGB.idba.0_MERGED
-XXX-----XXX-	CA1C3C4P15P6Ag7mue	-XXXXXXXXXXXX	CA1C3C4P15P6Ag7mue_Agonum_muelleri_JX412835	-XXXXXXXXXXXX--XXX-	CA1C3C4P15P6Ag7mue_Agonum_muelleri_JX412835_MERGED
-XX-----	CA1C3C4P15P6Ox7obs	XXXXXXXXXXXXXX	CA1C3C4P15P6Ox7obs_Oxypselaphus_obscurus_BIUK.idba.26	XXXXXXXXXXXXXX-----	CA1C3C4P15P6Ox7obs_Oxypselaphus_obscurus_BIUK.idba.26_MERGED
-XXX-----X--	CA1C3C4P15S6Ca7me1	XXXXX-----XXXX	CA1C3C4P15S6Ca7me1_Calathus_melanocephalus_2VGB.idba.15	XXXXX-----XXXX-	CA1C3C4P15S6Ca7me1_Calathus_melanocephalus_2VGB.idba.15_MERGED
-XXXX-----XX-	CA1C3C4Pr5P6Pr7cra	XXXXXXXXXXXXXX	CA1C3C4Pr5P6Pr7cra_Promecognathus_crassus_JX313665	XXXXXXXXXXXXXX-XX-	CA1C3C4Pr5P6Pr7cra_Promecognathus_crassus_JX313665_MERGED
-X-----XX-	CA1C3C4T5B6Be7lae	XXXXXXXXXXXXXX	CA1C3C4T5B6Be7lae_Bembidion_laetum_Soil.idba.40	XXXXXXXXXXXXXX-XX-	CA1C3C4T5B6Be7lae_Bembidion_laetum_Soil.idba.40_MERGED
-X-----XX-	CA1C3C4T5B6Be7var	XXXXXXXXXXXXXX	CA1C3C4T5B6Be7var_Bembidion_varium_ameie.idba.56	XXXXXXXXXXXXXX--XX-	CA1C3C4T5B6Be7var_Bembidion_varium_ameie.idba.56_MERGED
-X-----XX-	CA1C3C4T5B6Ta7nan	XXXXXXXXXXXXXX	CA1C3C4T5B6Ta7nan_Tachyta_nana_832958_idba_contig.6	XXXXXXXXXXXXXX-XX-	CA1C3C4T5B6Ta7nan_Tachyta_nana_832958_idba_contig.6_MERGED
-X-----	CA1C3C4T5Po6Po7iri	XXXXXXXXXXXXXX	CA1C3C4T5Po6Po7iri_Pogonus_iridipennis_ameie.idba.48	XXXXXXXXXXXXXX-----	CA1C3C4T5Po6Po7iri_Pogonus_iridipennis_ameie.idba.48_MERGED
-XXX-----XX-X-	CA1C3C4T5Tr7obt	XXXXXXXXXXXXXX	CA1C3C4T5Tr7obt_Trechus_obtusus_Soil.idba.42	XXXXXXXXXXXXXX-X-	CA1C3C4T5Tr7obt_Trechus_obtusus_Soil.idba.42_MERGED
XXXXXXXXXX-XXX-XX-	CA1C3T4Tr7hol	XXXXXXXXXXXXXX	CA1C3T4Tr7hol_Trachypachus_holmbergi_NC_011329	XXXXXXXXXXXXXX-XX-	CA1C3T4Tr7hol_Trachypachus_holmbergi_NC_011329_MERGED
-X-----X-XXX-XX-	CA1D3A4Am7ins	XX-----	CA1D3A4Am7ins_Amphizoia_insolens_799022_idba_contig.85	XX-----X-XXX-XX-	CA1D3A4Am7ins_Amphizoia_insolens_799022_idba_contig.85_MERGED
XXXXXXXXXXXXXX-XX-	CA1D3As4As7nio	XXXXXXXXXXXXXX	CA1D3As4As7nio_Aspidytes_niobe_NC_012139	XXXXXXXXXXXXXX-XX-	CA1D3As4As7nio_Aspidytes_niobe_NC_012139_MERGED
-XX-----XX-	CA1D3D4A5A6Ag7uli	XXXXXXXXXXXXXX	CA1D3D4A5A6Ag7uli_Agabus_uliginosus_ameie.idba.68	XXXXXXXXXXXXXX-----	CA1D3D4A5A6Ag7uli_Agabus_uliginosus_ameie.idba.68_MERGED
-XXX-----X-XXXX-	CA1D3D4C5C6Co7fus	XXXXXXXXXXXXXX-X----	CA1D3D4C5C6Co7fus_Colymbetes_fuscus_1VWB.idba.16	XXXXXXXXXXXXXX-----	CA1D3D4C5C6Co7fus_Colymbetes_fuscus_1VWB.idba.16_MERGED
--X-----X-----XX-	CA1D3D4Co5C6L17hae	XXXXXXXXXXXXXX	CA1D3D4Co5C6L17hae_Liopterus_haemorrhoidalis_1VWB.idba.11	XXXXXXXXXXXXXX-XX-	CA1D3D4Co5C6L17hae_Liopterus_haemorrhoidalis_1VWB.idba.11_MERGED
-XXX-----X--XX-	CA1D3D4D5Ac6Ac7sul	XXXXXXXXXXXXXX	CA1D3D4D5Ac6Ac7sul_Acilius_sulcatus_1VWB.idba.3	XXXXXXXXXXXXXX-XX-	CA1D3D4D5Ac6Ac7sul_Acilius_sulcatus_1VWB.idba.3_MERGED
-XX-----XX-XX-	CA1D3D4D5C6Cy7lat	XXXXXXXXXX	CA1D3D4D5C6Cy7lat_Cybister_lateralimarginalis_ameie.idba.131	XXXXXXXXXX--XX-XX-	CA1D3D4D5C6Cy7lat_Cybister_lateralimarginalis_ameie.idba.131_MERGED
-X-----XX----	CA1D3D4H5H6Hy7dis	XXXXXXXXXX	CA1D3D4H5H6Hy7dis_Hydropsorus_discretus_1VWB.idba.14	XXXXXXXXXX--XX----	CA1D3D4H5H6Hy7dis_Hydropsorus_discretus_1VWB.idba.14_MERGED
-XX-----X--XX-	CA1D3D4H5H6Hy7ery	-----XXXXXXXXXX	CA1D3D4H5H6Hy7ery_Hydropsorus_erythrocephalus_1VWB.idba.20	-XX-----XXXXXXXXXX-	CA1D3D4H5H6Hy7ery_Hydropsorus_erythrocephalus_1VWB.idba.20_MERGED
-XX-----XX----	CA1D3D4H5H6Hy7gyl	XXXXXXXXXXXXXX	CA1D3D4H5H6Hy7gyl_Hydropsorus_gyllenhalii_1VWB.idba.4	XXXXXXXXXXXXXX-----	CA1D3D4H5H6Hy7gyl_Hydropsorus_gyllenhalii_1VWB.idba.4_MERGED
-XXX-----XX-X-	CA1D3D4H5H6Hy7obs	XXXXXXXXXXXXXX	CA1D3D4H5H6Hy7obs_Hydropsorus_obscurus_1VWB.idba.1	XXXXXXXXXXXXXX-X-	CA1D3D4H5H6Hy7obs_Hydropsorus_obscurus_1VWB.idba.1_MERGED

-XX-----XX-XX-	CA1D3D4H5H6Hy7pa1	-----XXXXXX-XXXX	CA1D3D4H5H6Hy7pa1_Hydroporus_palustris_JX313670	-XX-XXXXXXXXXX-XX-	CA1D3D4H5H6Hy7pa1_Hydroporus_palustris_JX313670_MERGED
-XX-----XX-XX-	CA1D3D4H5H6Hy7pla	XXXXXXXXXXXXXXXXXXXX	CA1D3D4H5H6Hy7pla_Hydroporus_planus_1VWB.idba.2	XXXXXXXXXXXXXXXXXXXX	CA1D3D4H5H6Hy7pla_Hydroporus_planus_1VWB.idba.2_MERGED
-XX-----X--XX-	CA1D3D4H5Hyg6Hy7con	XXXXXXXXXXXXXXXXXXXX	CA1D3D4H5Hyg6Hy7con_Hygrotytus_confluens_1VWB.idba.7	XXXXXXXXXXXXXXXXXXXX-XX-	CA1D3D4H5Hyg6Hy7con_Hygrotytus_confluens_1VWB.idba.7_MERGED
-XX-----XX-XX-	CA1D3D4H5Hyg6Hy7ina	XXXXXXXXXXXXXXXXXXXX	CA1D3D4H5Hyg6Hy7ina_Hygrotytus_inaequalis_1VWB.idba.10	XXXXXXXXXXXXXXXXXXXX-XX-	CA1D3D4H5Hyg6Hy7ina_Hygrotytus_inaequalis_1VWB.idba.10_MERGED
--X-----XX----	CA1D3D4H5Hyg6Hy7nig	XXXXXXXXXXXXXXXXXXXX	CA1D3D4H5Hyg6Hy7nig_Hygrotytus_nigrolineatus_ameie.idba.11	XXXXXXXXXXXXXXXXXXXX	CA1D3D4H5Hyg6Hy7nig_Hygrotytus_nigrolineatus_ameie.idba.11_MERGED
-XX-----X-XX-XX-	CA1D3D4L5L6La7poe	XXXXXXXXXXXXXXXXXXXX	CA1D3D4L5L6La7poe_Laccophilus_poecilus_ameie.idba.8	XXXXXXXXXXXXXXXXXXXX-XX-	CA1D3D4L5L6La7poe_Laccophilus_poecilus_ameie.idba.8_MERGED
-XXX-----X-X-X-XX-	CA1D3H4Hy7her	XXXXXXXXXXXXXXXXXXXX	CA1D3H4Hy7her_Hygrobia_hermanni_1VWB.idba.13	XXXXXXXXXXXXXXXXXXXX-XX-	CA1D3H4Hy7her_Hygrobia_hermanni_1VWB.idba.13_MERGED
-X-----X-XXX-XX-	CA1D3M4Me7phy	--XXXXXXXXXXXX-XXXX	CA1D3M4Me7phy_Meru_phyllisae_JX313691	-XXXXXXXXXXXXXXXXXX-XX-	CA1D3M4Me7phy_Meru_phyllisae_JX313691_MERGED
-XXX-----X-XXX-XX-	CA1D3N4Not7cla	XXXXXXXXXXXXXXXXXXXX	CA1D3N4Not7cla_Noterus_clavicornis_1VWB.idba.5	XXXXXXXXXXXXXXXXXXXX-XX-	CA1D3N4Not7cla_Noterus_clavicornis_1VWB.idba.5_MERGED
XXXXXXXXXXXXX-X-X-XX-	CA1G3G4Ma7obl	XXXXXXXXXXXXXXXXXXXX	CA1G3G4Ma7obl_Macrogyrus_oblongus_NC_013249	XXXXXXXXXXXXXXXXXXXX	CA1G3G4Ma7obl_Macrogyrus_oblongus_NC_013249_MERGED
-X-----X-----XX-	CA1H3H4Ha7f1a	XXXXXXXXXXXX-XXXX	CA1H3H4Ha7f1a_Haliplus_flavicollis_JX313677	XXXXXXXXXXXXXXXXXXXX	CA1H3H4Ha7f1a_Haliplus_flavicollis_JX313677_MERGED
-XX-----XX-XX-XX-	CA1H3H4Ha7imm	-XXXXXXXXXX-XXXX	CA1H3H4Ha7imm_Haliplus_immaculatus_1VWB.idba.22	-XXXXXXXXXX-XXXX	CA1H3H4Ha7imm_Haliplus_immaculatus_1VWB.idba.22_MERGED
-XX-----X-X-X-XX-	CA1H3H4Ha7lin	XXXXXXXXXXXXXXXXXXXX	CA1H3H4Ha7lin_Haliplus_lineatocollis_1VWB.idba.6	XXXXXXXXXXXXXXXXXXXX-XX-	CA1H3H4Ha7lin_Haliplus_lineatocollis_1VWB.idba.6_MERGED
-X-----X-----XX-	CA1H3H4Ha7sib	XXXXXXXXXXXX-XXXX	CA1H3H4Ha7sib_Haliplus_sibiricus_ameie.idba.110	XXXXXXXXXXXX-XXXX	CA1H3H4Ha7sib_Haliplus_sibiricus_ameie.idba.110_MERGED
--X-----X-----XX-	CA1H3H4Pe7qua	--XXXXXXXXXX-XXXX	CA1H3H4Pe7qua_Peltodytes_quadratius_JX313685	-XXXXXXXXXXXX-XXXX	CA1H3H4Pe7qua_Peltodytes_quadratius_JX313685_MERGED
-X-----XX-XX-	CAr1C4Pr7ser	--XXXXXXXXXX-XXXX	CAr1C4Pr7ser_Priacma_serrata_JX412806	-XXXXXXXXXXXX-XX-	CAr1C4Pr7ser_Priacma_serrata_JX412806_MERGED
XXXXXXXXXXXXX-X-XX-	CAr1O4Te7bru	XXXXXXXXXXXXXXXXXXXX	CAr1O4Te7bru_Tetraphalerus_bruchi_NC_011328	XXXXXXXXXXXXXXXXXXXX	CAr1O4Te7bru_Tetraphalerus_bruchi_NC_011328_MERGED
XXXXXXXXXXXXX-XX-	CM1H4Hy7gra	XXXXXXXXXXXXXXXXXXXX	CM1H4Hy7gra_Hydroscapha_granulum_NC_012144	XXXXXXXXXXXXXXXXXXXX	CM1H4Hy7gra_Hydroscapha_granulum_NC_012144_MERGED
-X-----X-----XX-	CM1T4In7mad	XXXXXXXXXXXXXXXXXXXX	CM1T4In7mad_Incoltorrida_madagassica_670733_idba_contig_2	XXXXXXXXXXXXXXXXXXXX	CM1T4In7mad_Incoltorrida_madagassica_670733_idba_contig_2_MERGED
-X-----X-----XX-	CP1B3B4A5Ag7big	--XXXXXXXXXX-XXXX	CP1B3B4A5Ag7big_Agrilus_biguttatus_JX412786	-XXXXXXXXXX-XXXX	CP1B3B4A5Ag7big_Agrilus_biguttatus_JX412786_MERGED
-X-----X-XX-	CP1B3B4A5Tr7tro	XXXXXXXXXXXX-XXXX	CP1B3B4A5Tr7tro_Trachys_trogodytiformis_ameie.idba.40	XXXXXXXXXXXX-X-XX-	CP1B3B4A5Tr7tro_Trachys_trogodytiformis_ameie.idba.40_MERGED
XXXX-XXXXXXXX-X-XX-	CP1B3B4C5Ch7ful	XXXXXXXXXXXXXXXXXXXX	CP1B3B4C5Ch7ful_Chrysochroa_fulgidissima_NC_012765	XXXXXXXXXXXXXXXXXXXX	CP1B3B4C5Ch7ful_Chrysochroa_fulgidissima_NC_012765_MERGED
-X-----X-----XX-	CP1B3B4Ch5Pe7lug	--XXXXXXXXXX-XXXX	CP1B3B4Ch5Pe7lug_Perotis_lugubris_JX412762	-XXXXXXXXXXXX-XXXX	CP1B3B4Ch5Pe7lug_Perotis_lugubris_JX412762_MERGED
-X-----X-----XX-	CP1Bo3A4Ga7lae	XXXXXXXXXXXX-XXXX	CP1Bo3A4Ga7lae_Gastrallus_laevigatus_ameie.idba.78	XXXXXXXXXXXX-XXXX	CP1Bo3A4Ga7lae_Gastrallus_laevigatus_ameie.idba.78_MERGED
-X-----X-----XX-	CP1Bo3A4La7red	XXXXXXXXXXXXXXXXXXXX	CP1Bo3A4La7red_Lasioderma_redtenbacheri_ameie.idba.91	XXXXXXXXXXXXXXXXXXXX	CP1Bo3A4La7red_Lasioderma_redtenbacheri_ameie.idba.91_MERGED
XXXXXXXXXXXXX-X-X-XX-	CP1Bo3B4B5Ap7for	XXXXXXXXXXXXXXXXXXXX	CP1Bo3B4B5Ap7for_Apatides_fortis_NC_013582	XXXXXXXXXXXXXXXXXXXX	CP1Bo3B4B5Ap7for_Apatides_fortis_NC_013582_MERGED
-X-----X-----XX-	CP1Bo3B4D5D17min	XXXXXXXXXXXX-XXXX	CP1Bo3B4D5D17min_Dinoderus_minutus_ameie.idba.76	XXXXXXXXXXXX-XXXX	CP1Bo3B4D5D17min_Dinoderus_minutus_ameie.idba.76_MERGED
-XX-----X-----XX-	CP1Bo3D4An7ver	XXXXXXXXXXXX-XXXX	CP1Bo3D4An7ver_Anthrenus_verbasci_ameie.idba.111	XXXXXXXXXX-X-XX-	CP1Bo3D4An7ver_Anthrenus_verbasci_ameie.idba.111_MERGED
-XX-----XX-XXX	CP1Bo3D4De7per	--XXXXXXXXXX-XXXX	CP1Bo3D4De7per_Dermestes_peruvianus_JX313683	-XXXXXXXXXXXX-XXX	CP1Bo3D4De7per_Dermestes_peruvianus_JX313683_MERGED
-X-----X-----XX-	CP1Bo3D4Tr7hir	--XXXXXXXXXX-XXXX	CP1Bo3D4Tr7hir_Trinodes_hirtus_JX313664	-XXXXXXXXXXXX-XX-	CP1Bo3D4Tr7hir_Trinodes_hirtus_JX313664_MERGED
-X-----X-----XX-	CP1Bo3N4No7fas	XXXXXXXXXXXXXXXXXXXX	CP1Bo3N4No7fas_Nosodendron_fasciculare_ameie.idba.85	XXXXXXXXXXXXXXXXXXXX	CP1Bo3N4No7fas_Nosodendron_fasciculare_ameie.idba.85_MERGED
-X-----X-----XX-	CP1Bo3P4Nip7hol	XXXXXX-XXXX	CP1Bo3P4Nip7hol_Niptus_hololeucus_ameie.idba.138	XXXXXX-XXXX	CP1Bo3P4Nip7hol_Niptus_hololeucus_ameie.idba.138_MERGED
-X-----X-----XX-	CP1Bo3P4Pt7ruf	--XXXXXXXXXX-XXXX	CP1Bo3P4Pt7ruf_Ptinus_rufipes_HQ232819	-XXXXXXXXXXXX-XXXX	CP1Bo3P4Pt7ruf_Ptinus_rufipes_HQ232819_MERGED
-X-----X-----XX-	CP1By3D4Dr7ern	XXXXXXXXXXXXXXXXXXXX	CP1By3D4Dr7ern_Dryops_ernesti_833433_idba_contig_9	XXXXXXXXXXXXXXXXXXXX	CP1By3D4Dr7ern_Dryops_ernesti_833433_idba_contig_9_MERGED
-XX-----XX-XXX	CP1By3D4Dr7lur	XXXXXXXXXXXXXXXXXXXX	CP1By3D4Dr7lur_Dryops_luridus_1VWB.idba.12	XXXXXXXXXXXXXXXXXXXX	CP1By3D4Dr7lur_Dryops_luridus_1VWB.idba.12_MERGED
-X-----XX-XXX	CP1By3E4E5Li7per	--XXXXXXXXXX-XXXX	CP1By3E4E5Li7per_Limnius_perrisi_JX412747	-XXXXXXXXXXXX-XXX	CP1By3E4E5Li7per_Limnius_perrisi_JX412747_MERGED
-X-----XX-X-XX-	CP1By3H4He7fen	--XXXXXXXXXX-XXXX	CP1By3H4He7fen_Heterocerus_fenestratus_HQ232811	-XXXXXXXXXXXX-X-XX-	CP1By3H4He7fen_Heterocerus_fenestratus_HQ232811_MERGED
-X-----X-----XX-	CP1By3H4He7par	XXXXXXXXXXXXXXXXXXXX	CP1By3H4He7par_Heterocerus_parallelus_ameie.idba.47	XXXXXXXXXXXXXXXXXXXX	CP1By3H4He7par_Heterocerus_parallelus_ameie.idba.47_MERGED
-XX-----XX-XXX	CP1C3C4Tr7leu	XXXXXX-XXXX	CP1C3C4Tr7leu_Trichodes_leucopsidens_ameie.idba.184	XXXXXX-XXXX-XX-XXX	CP1C3C4Tr7leu_Trichodes_leucopsidens_ameie.idba.184_MERGED
XXXXXXXXXXXXX-XX-	CP1C3M4C5Ch7sca	XXXXXXXXXXXXXXXXXXXX	CP1C3M4C5Ch7sca_Chaetosoma_scaritides_NC_011324	XXXXXXXXXXXXXXXXXXXX	CP1C3M4C5Ch7sca_Chaetosoma_scaritides_NC_011324_MERGED
-X-----X-XXX	CP1C3P4Ph7edw	XXXXXXXXXXXXXXXXXXXX	CP1C3P4Ph7edw_Phloiophilus_edwardsi_JX412815	XXXXXXXXXXXXXXXXXXXX-XX-	CP1C3P4Ph7edw_Phloiophilus_edwardsi_JX412815_MERGED
-X-----XX-XXX	CP1C3T4T5Tem7vir	XXXXXXXXXXXXXXXXXXXX	CP1C3T4T5Tem7vir_Temnoscheila_virescens_JX412752	XXXXXXXXXXXXXXXXXXXX-XXX	CP1C3T4T5Tem7vir_Temnoscheila_virescens_JX412752_MERGED
-X-----XXX-XX-	CP1Ch3C4C5C6Ch7ame	-----XXXXXXXXXX-XXXX	CP1Ch3C4C5C6Ch7ame_Chrysolina_americanica_Chryso.idba.155	-X-XX-XXXXXXXXXX-XX-	CP1Ch3C4C5C6Ch7ame_Chrysolina_americanica_Chryso.idba.155_MERGED
-XX-----XXX-X-	CP1Ch3C4C5C6Ch7ban	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7ban_Chrysolina_bankii_Chryso.idba.17	XXXXXXXXXXXXXXXXXXXX-XX-	CP1Ch3C4C5C6Ch7ban_Chrysolina_bankii_Chryso.idba.17_MERGED
-XX-----XXX-XX-	CP1Ch3C4C5C6Ch7hae	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7hae_Chrysolina_haemoptera_Chryso.idba.38	XXXXXXXXXXXXXXXXXXXX-XX-	CP1Ch3C4C5C6Ch7hae_Chrysolina_haemoptera_Chryso.idba.38_MERGED
-XX-----XXX-XX-	CP1Ch3C4C5C6Ch7her	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7her_Chrysolina_herbaea_Chryso.idba.10	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7her_Chrysolina_herbaea_Chryso.idba.10_MERGED
-XX-----XXX-XX-	CP1Ch3C4C5C6Ch7hyp	-XXXXXXXXXXXX-XXXX	CP1Ch3C4C5C6Ch7hyp_Chrysolina_hyperici_Chryso.idba.134	-XXXXXXXXXXXX-XXXX	CP1Ch3C4C5C6Ch7hyp_Chrysolina_hyperici_Chryso.idba.134_MERGED
-X-----XXX-XX-	CP1Ch3C4C5C6Ch7lep	XXXXXX-XXXX	CP1Ch3C4C5C6Ch7lep_Chrysolina_lepida_Chryso.idba.151	XXXXXX-XXXX-XX-XX-	CP1Ch3C4C5C6Ch7lep_Chrysolina_lepida_Chryso.idba.151_MERGED
-XX-----XXX-XX-	CP1Ch3C4C5C6Ch7pol	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7pol_Chrysolina_polita_Chryso.idba.123	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7pol_Chrysolina_polita_Chryso.idba.123_MERGED
-X-----X-XX-XX-	CP1Ch3C4C5C6Ch7ruf	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7ruf_Chrysolina_rufoaenea_Chryso.idba.131	XXXXXXXXXXXX-XX-	CP1Ch3C4C5C6Ch7ruf_Chrysolina_rufoaenea_Chryso.idba.131_MERGED
-X-----XX-XX-	CP1Ch3C4C5C6Ch7ver	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7ver_Chrysolina_vernalis_Chryso.idba.25	XXXXXXXXXXXXXXXXXXXX-XX-	CP1Ch3C4C5C6Ch7ver_Chrysolina_vernalis_Chryso.idba.25_MERGED
-XXX-----X-XXX-XX-	CP1Ch3C4C5C6Ch7pop	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7pop_Chrysomela_populi_ameie.idba.70	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Ch7pop_Chrysomela_populi_ameie.idba.70_MERGED
-X-----X-XX-XX-	CP1Ch3C4C5C6Col7bar	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Col7bar_Colaspidea_barbarum_Chryso.idba.24	XXXXXXXXXXXXXXXXXXXX-XX-	CP1Ch3C4C5C6Col7bar_Colaspidea_barbarum_Chryso.idba.24_MERGED
-X-----X-XX-XX-	CP1Ch3C4C5C6Go7aeg	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Go7aeg_Gonioctena_aegrotata_Chryso.idba.29	XXXXXXXXXXXXXXXXXXXX-XX-	CP1Ch3C4C5C6Go7aeg_Gonioctena_aegrotata_Chryso.idba.29_MERGED
-X-----X-XX-XX-	CP1Ch3C4C5C6Go7lep	XXXXXXXXXXXXXXXXXXXX	CP1Ch3C4C5C6Go7lep_Gonioctena_lepraeuri_Chryso.idba.15	XXXXXXXXXXXXXXXXXXXX-XX-	CP1Ch3C4C5C6Go7lep_Gonioctena_lepraeuri_Chryso.idba.15_MERGED

-XX-----XX-XX	CP1Ch3C4C5C6Go7o1i	XXXXXXXXXXXXX----	CP1Ch3C4C5C6Go7o1i_Gonioctena_olivacea_Chryso.idba.3	XXXXXXXXXXXXX-XX	CP1Ch3C4C5C6Go7o1i_Gonioctena_olivacea_Chryso.idba.3_MERGED
--X-----XX-	CP1Ch3C4C5C6Hy7fai	XXXXXXXXXXXXX----	CP1Ch3C4C5C6Hy7fai_Hydrothassa_fairmairei_Chryso.idba.12	XXXXXXXXXXXXX-XX	CP1Ch3C4C5C6Hy7fai_Hydrothassa_fairmairei_Chryso.idba.12_MERGED
--X-----X--XX	CP1Ch3C4C5C6Hy7gla	XXXXXXXXXXXXX----	CP1Ch3C4C5C6Hy7gla_Hydrothassa_glabra_Chryso.idba.9	XXXXXXXXXXXXX-XX	CP1Ch3C4C5C6Hy7gla_Hydrothassa_glabra_Chryso.idba.9_MERGED
-XX-----XXXXXX	CP1Ch3C4C5C6Li7aen	XXXXXXXXXXXXX----	CP1Ch3C4C5C6Li7aen_Plagiosterna_aenea_Chryso.idba.2	XXXXXXXXXXXXX-XX	CP1Ch3C4C5C6Li7aen_Plagiosterna_aenea_Chryso.idba.2_MERGED
-XX-----XX-XXX	CP1Ch3C4C5C6Ph7arm	--XXXXXXXXXXXX--	CP1Ch3C4C5C6Ph7arm_Phaedon_armoraciae_JX220992	-XXXXXXXXXXXX-XX	CP1Ch3C4C5C6Ph7arm_Phaedon_armoraciae_JX220992_MERGED
-X-----X--XX	CP1Ch3C4C5C6Ph7tum	XXXXXXXXXXXXX----	CP1Ch3C4C5C6Ph7tum_Phaedon_tumidulus_Chryso.idba.4	XXXXXXXXXXXXX-XX	CP1Ch3C4C5C6Ph7tum_Phaedon_tumidulus_Chryso.idba.4_MERGED
-XX-----XXXX	CP1Ch3C4C5C6Phr7vit	XXXXXXXXXXXXX----	CP1Ch3C4C5C6Phr7vit_Phratora_vitellinae_Chryso.idba.79	XXXXXXXXXXXXX-XX	CP1Ch3C4C5C6Phr7vit_Phratora_vitellinae_Chryso.idba.79_MERGED
-XX-----X--XX	CP1Ch3C4C5C6Phr7vul	XXXXXXXXXXXXX----	CP1Ch3C4C5C6Phr7vul_Phratora_vulgatissima_amie.idba.119	XXXXXXXXXXXX-XX-XX	CP1Ch3C4C5C6Phr7vul_Phratora_vulgatissima_amie.idba.119_MERGED
-----XX----	CP1Ch3C4C5E6En7ado	XXXXXXXXXXXXX----	CP1Ch3C4C5E6En7ado_Entomoscelis_adonidis_Chryso.idba.57	XXXXXXXXXXXXX-XX	CP1Ch3C4C5E6En7ado_Entomoscelis_adonidis_Chryso.idba.57_MERGED
XXX-----XX----	CP1Ch3C4C5T6Ti7goe	-XXXXXXXXXXXX--	CP1Ch3C4C5T6Ti7goe_Timarcha_goettingensis_JX412789	-XXXXXXXXXXXX-XX	CP1Ch3C4C5T6Ti7goe_Timarcha_goettingensis_JX412789_MERGED
-X-----XX-XXX	CP1Ch3C4Ca5Ar7lab	--XXXXXXXXXXXX--	CP1Ch3C4Ca5Ar7lab_Arescus_labiatus_JX220988	-XXXXXXXXXXXX-XXX	CP1Ch3C4Ca5Ar7lab_Arescus_labiatus_JX220988_MERGED
-XX-----X--XX	CP1Ch3C4Ca5Ca7den	XXXXXXXXXXXXX----	CP1Ch3C4Ca5Ca7den_Cassida_denticollis_Chryso.idba.59	XXXXXXXXXXXXX-XX	CP1Ch3C4Ca5Ca7den_Cassida_denticollis_Chryso.idba.59_MERGED
-XX-----XX-XXX	CP1Ch3C4Ca5Ca7rub	XXXXXXXXXXXXX----	CP1Ch3C4Ca5Ca7rub_Cassida_rubiginosa_Chryso.idba.121	XXXXXXXXXXXXX-XX	CP1Ch3C4Ca5Ca7rub_Cassida_rubiginosa_Chryso.idba.121_MERGED
-XX-----X--XX	CP1Ch3C4Ca5Ca7vib	--XXXXXXXXXXXX--	CP1Ch3C4Ca5Ca7vib_Cassida_vibex_Chryso.idba.154	-XXXXXXXXXXXX-XX	CP1Ch3C4Ca5Ca7vib_Cassida_vibex_Chryso.idba.154_MERGED
-XX-----X--XX	CP1Ch3C4Ca5Ca7vir	XXXXXXXXXXXXX----	CP1Ch3C4Ca5Ca7vir_Cassida_viridis_Chryso.idba.6	XXXXXXXXXXXXX-XX	CP1Ch3C4Ca5Ca7vir_Cassida_viridis_Chryso.idba.6_MERGED
--X-----XX-XXX	CP1Ch3C4Ca5Im7cap	--XXXXXXXXXXXX--	CP1Ch3C4Ca5Im7cap_Imatidium_capense_JX220993	-XXXXXXXXXXXX-XX	CP1Ch3C4Ca5Im7cap_Imatidium_capense_JX220993_MERGED
-X-----X--XX	CP1Ch3C4C15Ch7obe	XXXXXXXXXXXXX----	CP1Ch3C4C15Ch7obe_Chilotomina_obethuri_Chryso.idba.32	XXXXXXXXXXXXX-XX	CP1Ch3C4C15Ch7obe_Chilotomina_obethuri_Chryso.idba.32_MERGED
-X-----X--XX	CP1Ch3C4C15La7gal	XXXXXXXXXXXXX----	CP1Ch3C4C15La7gal_Lachnaia_gallaeca_Chryso.idba.66	XXXXXXXXXXXXX-XX	CP1Ch3C4C15La7gal_Lachnaia_gallaeca_Chryso.idba.66_MERGED
-X-----X--XX	CP1Ch3C4C15La7hir	XXXXXXXXXXXXX----	CP1Ch3C4C15La7hir_Lachnaia_hirta_Chryso.idba.55	XXXXXXXXXXXXX-XX	CP1Ch3C4C15La7hir_Lachnaia_hirta_Chryso.idba.55_MERGED
-X-----X--XX	CP1Ch3C4C15La7pub	XXXXXXXXXXXXX----	CP1Ch3C4C15La7pub_Lachnaia_pubescens_Chryso.idba.36	XXXXXXXXXXXXX-XX	CP1Ch3C4C15La7pub_Lachnaia_pubescens_Chryso.idba.36_MERGED
--X-----XX-XXX	CP1Ch3C4C15La7tri	XXXXXXXXXXXXX----	CP1Ch3C4C15La7tri_Lachnaia_tristigma_Chryso.idba.68	XXXXXXXXXXXXX-XXX	CP1Ch3C4C15La7tri_Lachnaia_tristigma_Chryso.idba.68_MERGED
-----X--XX	CP1Ch3C4C15Lab7ghi	XXXXXXXXXXXXX----	CP1Ch3C4C15Lab7ghi_Labidostomis_ghiliani_Chryso.idba.91	XXXXXXXXXXXXX-XX	CP1Ch3C4C15Lab7ghi_Labidostomis_ghiliani_Chryso.idba.91_MERGED
-X-----X--XX	CP1Ch3C4C15Lab7luc	XXXXXXXXXXXXX----	CP1Ch3C4C15Lab7luc_Labidostomis_lucida_Chryso.idba.90	XXXXXXXXXXXXX-XX	CP1Ch3C4C15Lab7luc_Labidostomis_lucida_Chryso.idba.90_MERGED
-----XX-XXX	CP1Ch3C4C15Lab7lus	XXXXXXXXXXXXX----	CP1Ch3C4C15Lab7lus_Labidostomis_lusitanica_Chryso.idba.65	XXXXXXXXXXXXX-XXX	CP1Ch3C4C15Lab7lus_Labidostomis_lusitanica_Chryso.idba.65_MERGED
-----X--XX	CP1Ch3C4C15Lab7tax	XXXXXXXXXXXXX----	CP1Ch3C4C15Lab7tax_Labidostomis_taxicornis_Chryso.idba.92	XXXXXXXXXXXXX-XX	CP1Ch3C4C15Lab7tax_Labidostomis_taxicornis_Chryso.idba.92_MERGED
-X-----XX-XXX	CP1Ch3C4C15Sm7con	XXXXXXXXXXXXX----	CP1Ch3C4C15Sm7con_Smaragdina_concolor_Chryso.idba.37	XXXXXXXXXXXXX-XXX	CP1Ch3C4C15Sm7con_Smaragdina_concolor_Chryso.idba.37_MERGED
-X-----XX-XXX	CP1Ch3C4C15Sm7rey	XXXXXXXXXXXXX----	CP1Ch3C4C15Sm7rey_Smaragdina_reyi_Chryso.idba.52	XXXXXXXXXXXXX-XXX	CP1Ch3C4C15Sm7rey_Smaragdina_reyi_Chryso.idba.52_MERGED
-X-----X--XX	CP1Ch3C4C15Sm7ruf	XXXXXXXXXXXXX----	CP1Ch3C4C15Sm7ruf_Smaragdina_rufimana_Chryso.idba.20	XXXXXXXXXXXXX-XX	CP1Ch3C4C15Sm7ruf_Smaragdina_rufimana_Chryso.idba.20_MERGED
XXXXXXXXXXXXX-X	CP1Ch3C4Cr5Cr7duo	XXXXXXXXXXXXX----	CP1Ch3C4Cr5Cr7duo_Crioceris_duodecimpunctata_NC_003372	XXXXXXXXXXXXX-X	CP1Ch3C4Cr5Cr7duo_Crioceris_duodecimpunctata_NC_003372_MERGED
-X-----X--XX	CP1Ch3C4Cr5Ou7gal	XXXXXXXXXXXXX----	CP1Ch3C4Cr5Ou7gal_Oulema_gallaeciana_Chryso.idba.130	XXXXXXXXXXXXX-XX	CP1Ch3C4Cr5Ou7gal_Oulema_gallaeciana_Chryso.idba.130_MERGED
-XX-----X--XXX	CP1Ch3C4Cr5Ou7mel	XXXXXXXXXXXXX----	CP1Ch3C4Cr5Ou7mel_Oulema_melanopus_Chryso.idba.13	XXXXXXXXXXXXX-XXX	CP1Ch3C4Cr5Ou7mel_Oulema_melanopus_Chryso.idba.13_MERGED
-XX-----X----	CP1Ch3C4Cry5Cr7and	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7and_Cryptocephalus_androgyne_Chryso.idba.100	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7and_Cryptocephalus_androgyne_Chryso.idba.100_MERGED
-XX-----X----	CP1Ch3C4Cry5Cr7aur	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7aur_Cryptocephalus_aureolus_Chryso.idba.54	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7aur_Cryptocephalus_aureolus_Chryso.idba.54_MERGED
-XX-----X-XXX	CP1Ch3C4Cry5Cr7bip	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7bip_Cryptocephalus_bipunctatus_Chryso.idba.99	XXXXXXXXXXXXX-XXX	CP1Ch3C4Cry5Cr7bip_Cryptocephalus_bipunctatus_Chryso.idba.99_MERGED
-X-----X-X-XX	CP1Ch3C4Cry5Cr7can	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7can_Cryptocephalus_cantabricus_Chryso.idba.87	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7can_Cryptocephalus_cantabricus_Chryso.idba.87_MERGED
-X-----X----	CP1Ch3C4Cry5Cr7cel	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7cel_Cryptocephalus_celtibericus_Chryso.idba.56	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7cel_Cryptocephalus_celtibericus_Chryso.idba.56_MERGED
-X-----X-X-XX	CP1Ch3C4Cry5Cr7cyn	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7cyn_Cryptocephalus_cynarae_Chryso.idba.63	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7cyn_Cryptocephalus_cynarae_Chryso.idba.63_MERGED
-X-----X--XX	CP1Ch3C4Cry5Cr7liv	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7liv_Cryptocephalus_lividimanus_Chryso.idba.85	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7liv_Cryptocephalus_lividimanus_Chryso.idba.85_MERGED
-XX-----XXXX	CP1Ch3C4Cry5Cr7mor	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7mor_Cryptocephalus_moraei_Chryso.idba.107	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7mor_Cryptocephalus_moraei_Chryso.idba.107_MERGED
-X-----X--XX	CP1Ch3C4Cry5Cr7mys	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7mys_Cryptocephalus_mystacatus_Chryso.idba.41	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7mys_Cryptocephalus_mystacatus_Chryso.idba.41_MERGED
-X-----X--XX	CP1Ch3C4Cry5Cr7obl	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7obl_Cryptocephalus_obliteratifer_Chryso.idba.104	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7obl_Cryptocephalus_obliteratifer_Chryso.idba.104_MERGED
-XX-----X-X-XX	CP1Ch3C4Cry5Cr7oct	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7oct_Cryptocephalus_octoguttatus_Chryso.idba.124	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7oct_Cryptocephalus_octoguttatus_Chryso.idba.124_MERGED
-X-----X-X-XX	CP1Ch3C4Cry5Cr7pom	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7pom_Cryptocephalus_pominorum_Chryso.idba.94	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7pom_Cryptocephalus_pominorum_Chryso.idba.94_MERGED
-XX-----X----	CP1Ch3C4Cry5Cr7pus	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7pus_Cryptocephalus_pusillus_Chryso.idba.53	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7pus_Cryptocephalus_pusillus_Chryso.idba.53_MERGED
-X-----X----	CP1Ch3C4Cry5Cr7qua	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7qua_Cryptocephalus_quadripunctatus_Chryso.idba.83	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7qua_Cryptocephalus_quadripunctatus_Chryso.idba.83_MERGED
-X-----X-X-XX	CP1Ch3C4Cry5Cr7ram	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7ram_Cryptocephalus_ramburii_Chryso.idba.88	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7ram_Cryptocephalus_ramburii_Chryso.idba.88_MERGED
-X-----X----	CP1Ch3C4Cry5Cr7ruf	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7ruf_Cryptocephalus_rufipes_Chryso.idba.77	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7ruf_Cryptocephalus_rufipes_Chryso.idba.77_MERGED
-X-----X-XX	CP1Ch3C4Cry5Cr7rug	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7rug_Cryptocephalus_rugicollis_Chryso.idba.95	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7rug_Cryptocephalus_rugicollis_Chryso.idba.95_MERGED
-X-----X--XX	CP1Ch3C4Cry5Cr7sau	XXXXXXXXXXXX-XX-XX	CP1Ch3C4Cry5Cr7sau_Cryptocephalus_saucius_Chryso.idba.143	XXXXXXXXXXXX-XX-XX	CP1Ch3C4Cry5Cr7sau_Cryptocephalus_saucius_Chryso.idba.143_MERGED
-X-----X----	CP1Ch3C4Cry5Cr7sch	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7sch_Cryptocephalus_schaefferi_Chryso.idba.49	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7sch_Cryptocephalus_schaefferi_Chryso.idba.49_MERGED
-X-----X-X-XX	CP1Ch3C4Cry5Cr7tib	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7tib_Cryptocephalus_tibialis_Chryso.idba.101	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7tib_Cryptocephalus_tibialis_Chryso.idba.101_MERGED
-XX-----X--XX	CP1Ch3C4Cry5Cr7vit	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Cr7vit_Cryptocephalus_vittatus_Chryso.idba.81	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Cr7vit_Cryptocephalus_vittatus_Chryso.idba.81_MERGED
-XX-----X--XX	CP1Ch3C4Cry5Pa7reg	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Pa7reg_Pachybrachis_regius_Chryso.idba.138	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Pa7reg_Pachybrachis_regius_Chryso.idba.138_MERGED
-X-----X--XX	CP1Ch3C4Cry5Pa7suf	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Pa7suf_Pachybrachis_suffriani_Chryso.idba.98	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Pa7suf_Pachybrachis_suffriani_Chryso.idba.98_MERGED
-X-----X----	CP1Ch3C4Cry5Pa7ter	XXXXXXXXXXXXX----	CP1Ch3C4Cry5Pa7ter_Pachybrachis_terminalis_Chryso.idba.96	XXXXXXXXXXXXX-XX	CP1Ch3C4Cry5Pa7ter_Pachybrachis_terminalis_Chryso.idba.96_MERGED

--X-----X--XX-	CP1Ch3C4Cry5St7ili	XXXXXXXXXXXXX----	CP1Ch3C4Cry5St7ili_Stylosomus_illicicola_Soil.idba.48	XXXXXXXXXXXXX-XX-	CP1Ch3C4Cry5St7ili_Stylosomus_illicicola_Soil.idba.48_MERGED
--X-----X--XX-	CP1Ch3C4Cry5St7rug	XXXXXXXXXXXXX----	CP1Ch3C4Cry5St7rug_Stylosomus_rugithorax_Chryso.idba.39	XXXXXXXXXXXXX-XX-	CP1Ch3C4Cry5St7rug_Stylosomus_rugithorax_Chryso.idba.39_MERGED
--X-----XX-XXX-	CP1Ch3C4Do7dis	---XXXXXXXXXX----	CP1Ch3C4Do7dis_Donacia_distincta_JX220999	---XXXXXXXXXXXX-XXX-	CP1Ch3C4Do7dis_Donacia_distincta_JX220999_MERGED
--X-----X----	CP1Ch3C4Do7ful	XXXXXXXXXXXXX----	CP1Ch3C4Do7ful_Doryidomorpha_fulva_CS.idba.19	XXXXXXXXXXXXX-XX-	CP1Ch3C4Do7ful_Doryidomorpha_fulva_CS.idba.19_MERGED
-X-----X--XXX	CP1Ch3C4E5Br7obs	XXXXXXXXXXXXX----	CP1Ch3C4E5Br7obs_Bromius_obscurus_ame.idba.82	XXXXXXXXXXXXX--XXX	CP1Ch3C4E5Br7obs_Bromius_obscurus_ame.idba.82_MERGED
--X-----X--XX-	CP1Ch3C4E5Colas7glo	XXXXXXXXXXXXX----	CP1Ch3C4E5Colas7glo_Colaspdea_globosa_Chryso.idba.110	XXXXXXXXXXXXX-XX-	CP1Ch3C4E5Colas7glo_Colaspdea_globosa_Chryso.idba.110_MERGED
--X-----XX-XXX	CP1Ch3C4E5Phy7dil	-----XXXXXXXXXX----	CP1Ch3C4E5Phy7dil_Phytorus_dilatatus_B480tru.idba.116	--X-----XXXXXX-XXX	CP1Ch3C4E5Phy7dil_Phytorus_dilatatus_B480tru.idba.116_MERGED
--X-----X--XXX	CP1Ch3C4Ex7can	---XXXXXXXXXX----	CP1Ch3C4Ex7can_Exema_canadensis_JX220990	---XXXXXXXXXXXX-XXX	CP1Ch3C4Ex7can_Exema_canadensis_JX220990_MERGED
-----XXX	CP1Ch3C4G5A6Ac7ass	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Ac7ass_Acrocrypta_assamensis_CS.idba.43	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6Ac7ass_Acrocrypta_assamensis_CS.idba.43_MERGED
XXX-----X--XX-	CP1Ch3C4G5A6Alt7amp	XXXXXXX-----	CP1Ch3C4G5A6Alt7amp_Altica_ampelophaga_Chryso.idba.149	XXXXXXXXXX--X--XX-	CP1Ch3C4G5A6Alt7amp_Altica_ampelophaga_Chryso.idba.149_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Alt7eri	XXXXXX-----	CP1Ch3C4G5A6Alt7eri_Altica_ericeti_Chryso.idba.163	XXXXXXXXXX--X--XX-	CP1Ch3C4G5A6Alt7eri_Altica_ericeti_Chryso.idba.163_MERGED
-XXX-----	CP1Ch3C4G5A6Alt7ole	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Alt7ole_Altica_oleracea_Chryso.idba.51	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Alt7ole_Altica_oleracea_Chryso.idba.51_MERGED
-XX-----X--XXX	CP1Ch3C4G5A6Ap7orb	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Ap7orb_Apteropoda_orbiculata_Chryso.idba.18	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Ap7orb_Apteropoda_orbiculata_Chryso.idba.18_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Ap7ovu	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Ap7ovu_Apteropoda_ovulum_Chryso.idba.23	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Ap7ovu_Apteropoda_ovulum_Chryso.idba.23_MERGED
-XXX-----	CP1Ch3C4G5A6Aph7col	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Aph7col_Aphthonomorpha_collaris_ChrysoT.idba.34	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6Aph7col_Aphthonomorpha_collaris_ChrysoT.idba.34_MERGED
-----X--XX-	CP1Ch3C4G5A6Aph7alb	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Aph7alb_Aphthona_albertinae_Chryso.idba.48	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Aph7alb_Aphthona_albertinae_Chryso.idba.48_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Aph7eup	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Aph7eup_Aphthona_euphorbiae_Chryso.idba.42	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Aph7eup_Aphthona_euphorbiae_Chryso.idba.42_MERGED
-XX-----X-XX--	CP1Ch3C4G5A6Aph7lut	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Aph7lut_Aphthona_lutescens_Chryso.idba.103	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Aph7lut_Aphthona_lutescens_Chryso.idba.103_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Aph7mel	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Aph7mel_Aphthona_melancholica_Chryso.idba.71	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Aph7mel_Aphthona_melancholica_Chryso.idba.71_MERGED
-X-----XX-XXX	CP1Ch3C4G5A6As17tra	XXXXXXXXXXXXX----	CP1Ch3C4G5A6As17tra_Asiorestia_transversa_ChrysoT.idba.7	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6As17tra_Asiorestia_transversa_ChrysoT.idba.7_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Ba7aer	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Ba7aer_Batophila_aerata_Chryso.idba.47	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Ba7aer_Batophila_aerata_Chryso.idba.47_MERGED
-X-----XXX	CP1Ch3C4G5A6Ch7ang	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Ch7ang_Chabria_nr_angulicollis_ChrysoT.idba.36	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6Ch7ang_Chabria_nr_angulicollis_ChrysoT.idba.36_MERGED
-----X--XX-	CP1Ch3C4G5A6Chae7ari	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Chae7ari_Chaetocnema_arida_Chryso.idba.82	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Chae7ari_Chaetocnema_arida_Chryso.idba.82_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Chae7dep	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Chae7dep_Chaetocnema_depressa_Chryso.idba.43	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Chae7dep_Chaetocnema_depressa_Chryso.idba.43_MERGED
-XX-----XX-	CP1Ch3C4G5A6Chae7hor	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Chae7hor_Chaetocnema_hortensis_Chryso.idba.125	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Chae7hor_Chaetocnema_hortensis_Chryso.idba.125_MERGED
-X-----XX-	CP1Ch3C4G5A6Chae7obe	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Chae7obe_Chaetocnema_obesa_Chryso.idba.93	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Chae7obe_Chaetocnema_obesa_Chryso.idba.93_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Chae7pag	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Chae7pag_Chaetocnema_paganettii_Chryso.idba.78	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Chae7pag_Chaetocnema_paganettii_Chryso.idba.78_MERGED
-X-----XX-	CP1Ch3C4G5A6Chae7pel	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Chae7pel_Chaetocnema_pelagica_Chryso.idba.21	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Chae7pel_Chaetocnema_pelagica_Chryso.idba.21_MERGED
-----X--XX-	CP1Ch3C4G5A6Chae7sch	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Chae7sch_Chaetocnema_scheffleri_Chryso.idba.69	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Chae7sch_Chaetocnema_scheffleri_Chryso.idba.69_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Chae7tib	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Chae7tib_Chaetocnema_tibialis_Chryso.idba.75	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Chae7tib_Chaetocnema_tibialis_Chryso.idba.75_MERGED
-X-----X--XXX	CP1Ch3C4G5A6Chal7ful	-----XXXXXXXXXX----	CP1Ch3C4G5A6Chal7ful_Chalcoides_fulvicornis_Chryso.idba.153	--X---XXXXXXXXXX-XXX	CP1Ch3C4G5A6Chal7ful_Chalcoides_fulvicornis_Chryso.idba.153_MERGED
-X-----X--XXX	CP1Ch3C4G5A6Cre7p1u	-XXXXXXXXXXXX----	CP1Ch3C4G5A6Cre7p1u_Crepidodera_pluta_ame.idba.98	-XXXXXXXXXXXX-XXX	CP1Ch3C4G5A6Cre7p1u_Crepidodera_pluta_ame.idba.98_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Dib7occ	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Dib7occ_Dibolia_occultans_Chryso.idba.132	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Dib7occ_Dibolia_occultans_Chryso.idba.132_MERGED
-X-----	CP1Ch3C4G5A6Dib7rug	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Dib7rug_Dibolia_rugulosa_ame.idba.94	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Dib7rug_Dibolia_rugulosa_ame.idba.94_MERGED
-X-----XXX	CP1Ch3C4G5A6Ep7abe	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Ep7abe_Epitrix_abeillei_CS.idba.39	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6Ep7abe_Epitrix_abeillei_CS.idba.39_MERGED
-XX-----XX-XXXX	CP1Ch3C4G5A6He7p1a	XXXXXXXXXXXXX----	CP1Ch3C4G5A6He7p1a_Hemipyxis_plagioderoides_ChrysoT.idba.5	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6He7p1a_Hemipyxis_plagioderoides_ChrysoT.idba.5_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Her7cic	XXXXXXXXXX-----	CP1Ch3C4G5A6Her7cic_Hermaeophaga_cicatrix_CS.idba.66	XXXXXXXXXX--X--XX-	CP1Ch3C4G5A6Her7cic_Hermaeophaga_cicatrix_CS.idba.66_MERGED
-----XX-XXX	CP1Ch3C4G5A6Lan7ram	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lan7ram_Lanka_ramakrishnai_ChrysoT.idba.39	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6Lan7ram_Lanka_ramakrishnai_ChrysoT.idba.39_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Lo7aen	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7aen_Longitarsus_aeneus_Chryso.idba.115	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7aen_Longitarsus_aeneus_Chryso.idba.115_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Lo7atr	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7atr_Longitarsus_atricillus_Chryso.idba.40	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7atr_Longitarsus_atricillus_Chryso.idba.40_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Lo7cer	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7cer_Longitarsus_cerinthos_Chryso.idba.50	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7cer_Longitarsus_cerinthos_Chryso.idba.50_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Lo7dor	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7dor_Longitarsus_dorsalis_Chryso.idba.108	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7dor_Longitarsus_dorsalis_Chryso.idba.108_MERGED
-XX-----XX-XXX	CP1Ch3C4G5A6Lo7exs	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7exs_Longitarsus_exsoletus_Chryso.idba.102	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6Lo7exs_Longitarsus_exsoletus_Chryso.idba.102_MERGED
-X-----	CP1Ch3C4G5A6Lo7ibe	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7ibe_Longitarsus_ibericus_Chryso.idba.67	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7ibe_Longitarsus_ibericus_Chryso.idba.67_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Lo7lur	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7lur_Longitarsus_luridus_Chryso.idba.72	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7lur_Longitarsus_luridus_Chryso.idba.72_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Lo7me1	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7me1_Longitarsus_melanocephalus_Chryso.idba.26	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7me1_Longitarsus_melanocephalus_Chryso.idba.26_MERGED
-X-----X--XXX-	CP1Ch3C4G5A6Lo7mem	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7mem_Longitarsus_membranaceus_Chryso.idba.45	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6Lo7mem_Longitarsus_membranaceus_Chryso.idba.45_MERGED
-X-----	CP1Ch3C4G5A6Lo7nig	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7nig_Longitarsus_nigrofasciatus_Chryso.idba.89	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7nig_Longitarsus_nigrofasciatus_Chryso.idba.89_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Lo7ord	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7ord_Longitarsus_ordinatus_Chryso.idba.106	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7ord_Longitarsus_ordinatus_Chryso.idba.106_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Lo7par	XXXXXXXXXX-----	CP1Ch3C4G5A6Lo7par_Longitarsus_parvulus_Chryso.idba.145	XXXXXXXXXX--X--XX-	CP1Ch3C4G5A6Lo7par_Longitarsus_parvulus_Chryso.idba.145_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Lo7pra	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7pra_Longitarsus_pratensis_Chryso.idba.127	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7pra_Longitarsus_pratensis_Chryso.idba.127_MERGED
-X-----X--XX-	CP1Ch3C4G5A6Lo7rut	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7rut_Longitarsus_rutilus_Chryso.idba.61	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7rut_Longitarsus_rutilus_Chryso.idba.61_MERGED
-XX-----X--XX-	CP1Ch3C4G5A6Lo7tab	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lo7tab_Longitarsus_tabidus_Chryso.idba.86	XXXXXXXXXXXXX-XX-	CP1Ch3C4G5A6Lo7tab_Longitarsus_tabidus_Chryso.idba.86_MERGED
-XX-----XX-XXX	CP1Ch3C4G5A6Lup7xan	XXXXXX-----	CP1Ch3C4G5A6Lup7xan_Luperomorpha_xanthodera_ame.idba.160	XXXXXX--X--XXX	CP1Ch3C4G5A6Lup7xan_Luperomorpha_xanthodera_ame.idba.160_MERGED
-X-----X--XXX	CP1Ch3C4G5A6Lyp7pub	XXXXXXXXXXXXX----	CP1Ch3C4G5A6Lyp7pub_Lypnea_pubipennis_CS.idba.34	XXXXXXXXXXXXX-XXX	CP1Ch3C4G5A6Lyp7pub_Lypnea_pubipennis_CS.idba.34_MERGED





-X-----	CP1Ch3Ce4C5Ca6Py7san	XXXXXXXXXX	CP1Ch3Ce4C5Ca6Py7san_Pyrrhodium_sanguineum_ameie.idba.43	XXXXXXXXXX	CP1Ch3Ce4C5Ca6Py7san_Pyrrhodium_sanguineum_ameie.idba.43_MERGED
XXXXXXXXXX	CP1Ch3Ce4C5Ce6Ma7rad	XXXXXXXXXX	CP1Ch3Ce4C5Ce6Ma7rad_Massicus_raddei_NC_023937	XXXXXXXXXX	CP1Ch3Ce4C5Ce6Ma7rad_Massicus_raddei_NC_023937_MERGED
-X-----	CP1Ch3Ce4L5L6Cort7hum	XXXXXXXXXX	CP1Ch3Ce4L5L6Cort7hum_Cortodera_humeralis_ameie.idba.52	XXXXXXXXXX	CP1Ch3Ce4L5L6Cort7hum_Cortodera_humeralis_ameie.idba.52_MERGED
-XX-----	CP1Ch3Ce4L5L6St7nig	XXXXXXXXXX	CP1Ch3Ce4L5L6St7nig_Stenurella_nigra_ameie.idba.31	XXXXXXXXXX	CP1Ch3Ce4L5L6St7nig_Stenurella_nigra_ameie.idba.31_MERGED
-X-----	CP1Ch3Ce4L5L6St7sep	XXXXXXXXXX	CP1Ch3Ce4L5L6St7sep_Stenurella_septempunctata_ameie.idba.16	XXXXXXXXXX	CP1Ch3Ce4L5L6St7sep_Stenurella_septempunctata_ameie.idba.16_MERGED
-X-----	CP1Ch3Ce4L5R6Br7int	XXXXXXXXXX	CP1Ch3Ce4L5R6Br7int_Brachyta_interrogationis_ameie.idba.3	XXXXXXXXXX	CP1Ch3Ce4L5R6Br7int_Brachyta_interrogationis_ameie.idba.3_MERGED
-XX-----	CP1Ch3Ce4L5R6Rh7mor	XXXXXXXXXX	CP1Ch3Ce4L5R6Rh7mor_Rhagium_mordax_JX412743	XXXXXXXXXX	CP1Ch3Ce4L5R6Rh7mor_Rhagium_mordax_JX412743_MERGED
XXXXXXXXXX	CP1Ch3Ce4La5Ag6Ps7hil	XXXXXXXXXX	CP1Ch3Ce4La5Ag6Ps7hil_Psacotha_hilaris_NC_013070	XXXXXXXXXX	CP1Ch3Ce4La5Ag6Ps7hil_Psacotha_hilaris_NC_013070_MERGED
XXXXXXXXXX	CP1Ch3Ce4La5B6Ba7lin	XXXXXXXXXX	CP1Ch3Ce4La5B6Ba7lin_Batocera_lineolata_NC_022671	XXXXXXXXXX	CP1Ch3Ce4La5B6Ba7lin_Batocera_lineolata_NC_022671_MERGED
XXXXXXXXXX	CP1Ch3Ce4La5L6An7gla	XXXXXXXXXX	CP1Ch3Ce4La5L6An7gla_Anoplophora_glabripennis_NC_008221	XXXXXXXXXX	CP1Ch3Ce4La5L6An7gla_Anoplophora_glabripennis_NC_008221_MERGED
XXXXXXXXXX	CP1Ch3Ce4La5Mo6Mo7alt	XXXXXXXXXX	CP1Ch3Ce4La5Mo6Mo7alt_Monochamus_alternatus_NC_024652	XXXXXXXXXX	CP1Ch3Ce4La5Mo6Mo7alt_Monochamus_alternatus_NC_024652_MERGED
-XX-----	CP1Ch3Ce4N5N6Ne7u1m	XXXXXXXXXX	CP1Ch3Ce4N5N6Ne7u1m_Necydalis_ulmi_JX220989	XXXXXXXXXX	CP1Ch3Ce4N5N6Ne7u1m_Necydalis_ulmi_JX220989_MERGED
-X-----	CP1Ch3040r7cer	XXXXXXXXXX	CP1Ch3040r7cer_Orsodacne_cerasi_ameie.idba.18	XXXXXXXXXX	CP1Ch3040r7cer_Orsodacne_cerasi_ameie.idba.18_MERGED
-X-----	CP1Ch3040r7lin	XXXXXXXXXX	CP1Ch3040r7lin_Orsodacne_lineola_JX220994	XXXXXXXXXX	CP1Ch3040r7lin_Orsodacne_lineola_JX220994_MERGED
-XX-----	CP1Cu3B4By7och	XXXXXXXXXX	CP1Cu3B4By7och_Byturus_ochraceus_677381_idba_contig_12	XXXXXXXXXX	CP1Cu3B4By7och_Byturus_ochraceus_677381_idba_contig_12_MERGED
-X-----	CP1Cu3Bot4An7duo	XXXXXXXXXX	CP1Cu3Bot4An7duo_Anommatus_duodecimstriatus_Soil.idba.105	XXXXXXXXXX	CP1Cu3Bot4An7duo_Anommatus_duodecimstriatus_Soil.idba.105_MERGED
XXXXXXXXXX	CP1Cu3Bot4Da7hel	XXXXXXXXXX	CP1Cu3Bot4Da7hel_Dastarcus_helophoroides_NC_024271	XXXXXXXXXX	CP1Cu3Bot4Da7hel_Dastarcus_helophoroides_NC_024271_MERGED
-XX-----	CP1Cu3Bot4Te7cyl	XXXXXXXXXX	CP1Cu3Bot4Te7cyl_Teredus_cylindricus_ameie.idba.176	XXXXXXXXXX	CP1Cu3Bot4Te7cyl_Teredus_cylindricus_ameie.idba.176_MERGED
-XX-----	CP1Cu3C4C5Ad7dec	XXXXXXXXXX	CP1Cu3C4C5Ad7dec_Adalia_decempunctata_BIUK.idba.56	XXXXXXXXXX	CP1Cu3C4C5Ad7dec_Adalia_decempunctata_BIUK.idba.56_MERGED
-XX-----	CP1Cu3C4C5An7nov	XXXXXXXXXX	CP1Cu3C4C5An7nov_Anisosticta_novemdecimpunctata_2VGB.idba.9	XXXXXXXXXX	CP1Cu3C4C5An7nov_Anisosticta_novemdecimpunctata_2VGB.idba.9_MERGED
-X-----	CP1Cu3C4C5Ana7oce	XXXXXXXXXX	CP1Cu3C4C5Ana7oce_Anatis_ocellata_833044_idba_contig_22	XXXXXXXXXX	CP1Cu3C4C5Ana7oce_Anatis_ocellata_833044_idba_contig_22_MERGED
-X-----	CP1Cu3C4C5Ca7dec	XXXXXXXXXX	CP1Cu3C4C5Ca7dec_Calvia_decemguttata_ameie.idba.50	XXXXXXXXXX	CP1Cu3C4C5Ca7dec_Calvia_decemguttata_ameie.idba.50_MERGED
XXXXXXXXXX	CP1Cu3C4C5Ch7sex	XXXXXXXXXX	CP1Cu3C4C5Ch7sex_Cheilomenes_sexmaculata_KM244706	XXXXXXXXXX	CP1Cu3C4C5Ch7sex_Cheilomenes_sexmaculata_KM244706_MERGED
-X-----	CP1Cu3C4C5Co7mag	XXXXXXXXXX	CP1Cu3C4C5Co7mag_Coccinella_magnifica_ameie.idba.0	XXXXXXXXXX	CP1Cu3C4C5Co7mag_Coccinella_magnifica_ameie.idba.0_MERGED
-XX-----	CP1Cu3C4C5Ha7qua	XXXXXXXXXX	CP1Cu3C4C5Ha7qua_Harmonia_quadripunctata_ameie.idba.4	XXXXXXXXXX	CP1Cu3C4C5Ha7qua_Harmonia_quadripunctata_ameie.idba.4_MERGED
-XX-----	CP1Cu3C4C5Hal7sed	XXXXXXXXXX	CP1Cu3C4C5Hal7sed_Halyzia_sedecimguttata_Staph.idba.68	XXXXXXXXXX	CP1Cu3C4C5Hal7sed_Halyzia_sedecimguttata_Staph.idba.68_MERGED
-X-----	CP1Cu3C4C5Hi7und	XXXXXXXXXX	CP1Cu3C4C5Hi7und_Hippodamia_undecimnotata_ameie.idba.26	XXXXXXXXXX	CP1Cu3C4C5Hi7und_Hippodamia_undecimnotata_ameie.idba.26_MERGED
XXXXXXXXXX	CP1Cu3C4C5Pr7jap	XXXXXXXXXX	CP1Cu3C4C5Pr7jap_Propylea_japonica_KM244660	XXXXXXXXXX	CP1Cu3C4C5Pr7jap_Propylea_japonica_KM244660_MERGED
-XX-----	CP1Cu3C4Co5Co7ruf	XXXXXXXXXX	CP1Cu3C4Co5Co7ruf_Coccidula_rufa_JX412767	XXXXXXXXXX	CP1Cu3C4Co5Co7ruf_Coccidula_rufa_JX412767_MERGED
XXXXXXXXXX	CP1Cu3C4E5E6He7pusi	XXXXXXXXXX	CP1Cu3C4E5E6He7pusi_Henosepilachna_pusillanima_NC_023469	XXXXXXXXXX	CP1Cu3C4E5E6He7pusi_Henosepilachna_pusillanima_NC_023469_MERGED
-XX-----	CP1Cu3C4E5E6Su7vig	XXXXXXXXXX	CP1Cu3C4E5E6Su7vig_Suboccinella_vigintiquatuor punctata_Staph.idba.64	XXXXXXXXXX	CP1Cu3C4E5E6Su7vig_Suboccinella_vigintiquatuor punctata_Staph.idba.64_MERGED
-XX-----	CP1Cu3Ce4Ce7his	XXXXX-X-XXX	CP1Cu3Ce4Ce7his_Cerylon_histeroides_HQ232821	XXXXX-X-XXX	CP1Cu3Ce4Ce7his_Cerylon_histeroides_HQ232821_MERGED
-XX-----	CP1Cu3Cr4Cr7pil	XXXXXXXXXX	CP1Cu3Cr4Cr7pil_Cryptophagus_pilosus_Soil.idba.15	XXXXXXXXXX	CP1Cu3Cr4Cr7pil_Cryptophagus_pilosus_Soil.idba.15_MERGED
-X-----	CP1Cu3Cr4M17vil	XXXXXXXXXX	CP1Cu3Cr4M17vil_Micrambe_villosus_ameie.idba.34	XXXXXXXXXX	CP1Cu3Cr4M17vil_Micrambe_villosus_ameie.idba.34_MERGED
XXXXXXXXXX	CP1Cu3Cu4Cu7cla	XXXXXXXXXX	CP1Cu3Cu4Cu7cla_Cucujus_clavipes_NC_018350	XXXXXXXXXX	CP1Cu3Cu4Cu7cla_Cucujus_clavipes_NC_018350_MERGED
-X-----	CP1Cu3Cu4Cu7hae	XXXXXXXXXX	CP1Cu3Cu4Cu7hae_Cucujus_haematodes_ameie.idba.42	XXXXXXXXXX	CP1Cu3Cu4Cu7hae_Cucujus_haematodes_ameie.idba.42_MERGED
-XX-----	CP1Cu3E4Tr7bip	XXXX-XXXX	CP1Cu3E4Tr7bip_Tritoma_bipustulata_HQ232822	XXXX-XXXX	CP1Cu3E4Tr7bip_Tritoma_bipustulata_HQ232822_MERGED
-XX-----	CP1Cu3En4End7coc	XXXXXXXXXX	CP1Cu3En4End7coc_Endomychus_coccineus_JX313667	XXXXXXXXXX	CP1Cu3En4End7coc_Endomychus_coccineus_JX313667_MERGED
-X-----	CP1Cu3K4Bra7ves	XXXXXXXXXX	CP1Cu3K4Bra7ves_Brachypterolus_vestitus_ameie.idba.107	XXXXXXXXXX	CP1Cu3K4Bra7ves_Brachypterolus_vestitus_ameie.idba.107_MERGED
-XX-----	CP1Cu3K4Ka7ped	XXXX-XXXX	CP1Cu3K4Ka7ped_Kateretes_pedicularius_ameie.idba.175	XXXX-XXXX	CP1Cu3K4Ka7ped_Kateretes_pedicularius_ameie.idba.175_MERGED
-XXX-----	CP1Cu3Lat4Ca7nod	XXXXXXXXXX	CP1Cu3Lat4Ca7nod_Cartodere_nodifer_BIUK.idba.51	XXXXXXXXXX	CP1Cu3Lat4Ca7nod_Cartodere_nodifer_BIUK.idba.51_MERGED
-XX-----	CP1Cu3Lat4Co7gib	XXXXXXXXXX	CP1Cu3Lat4Co7gib_Corticinara_gibbosa_BIUK.idba.27	XXXXXXXXXX	CP1Cu3Lat4Co7gib_Corticinara_gibbosa_BIUK.idba.27_MERGED
-XX-----	CP1Cu3Lat4Co7sim	XXXXXXXXXX	CP1Cu3Lat4Co7sim_Corticinara_similata_BIUK.idba.1a	XXXXXXXXXX	CP1Cu3Lat4Co7sim_Corticinara_similata_BIUK.idba.1a_MERGED
-X-----	CP1Cu3Lat4En7bre	XXXXXXXXXX	CP1Cu3Lat4En7bre_Enicmus_brevicornis_JX313681	XXXXXXXXXX	CP1Cu3Lat4En7bre_Enicmus_brevicornis_JX313681_MERGED
-X-----	CP1Cu3M4M5Mo7qua	XXXXXXXXXX	CP1Cu3M4M5Mo7qua_Monotoma_quadricollis_676892_idba_contig_27-86	XXXXXXXXXX	CP1Cu3M4M5Mo7qua_Monotoma_quadricollis_676892_idba_contig_27-86_MERGED
-X-----	CP1Cu3M4R5Rh7aen	XXXXXXXXXX	CP1Cu3M4R5Rh7aen_Rhizophagus_aeneus_ameie.idba.45	XXXXXXXXXX	CP1Cu3M4R5Rh7aen_Rhizophagus_aeneus_ameie.idba.45_MERGED
-XX-----	CP1Cu3M4R5Rh7dis	XXXX-XXXX	CP1Cu3M4R5Rh7dis_Rhizophagus_dispr_676912_idba_contig_113	XXXX-XXXX	CP1Cu3M4R5Rh7dis_Rhizophagus_dispr_676912_idba_contig_113_MERGED
-XX-----	CP1Cu3N4C5Ep7me1	XXXXXXXXXX	CP1Cu3N4C5Ep7me1_Epuraea_melanocephala_BIUK.idba.43	XXXXXXXXXX	CP1Cu3N4C5Ep7me1_Epuraea_melanocephala_BIUK.idba.43_MERGED
-XX-----	CP1Cu3N4Cr5G17hor	XXXXXXXXXX	CP1Cu3N4Cr5G17hor_Glischrochilus_hortensis_JX412778	XXXXXXXXXX	CP1Cu3N4Cr5G17hor_Glischrochilus_hortensis_JX412778_MERGED
-XX-----	CP1Cu3N4N5Po7adu	XXXXXXXXXX	CP1Cu3N4N5Po7adu_Pocadius_ajustus_BIUK.idba.12	XXXXXXXXXX	CP1Cu3N4N5Po7adu_Pocadius_ajustus_BIUK.idba.12_MERGED
-XX-----	CP1Cu3P4Er7syl	XXX-----XX-XXXX	CP1Cu3P4Er7syl_Ericmodes_sylvaticus_697044_idba_contig_61	XXX-----XX-XXXX	CP1Cu3P4Er7syl_Ericmodes_sylvaticus_697044_idba_contig_61_MERGED
XXXXXXXXXX	CP1Cu3Ph4Pr7obs	XXXXXXXXXX	CP1Cu3Ph4Pr7obs_Priasilpha_obscura_NC_011326	XXXXXXXXXX	CP1Cu3Ph4Pr7obs_Priasilpha_obscura_NC_011326_MERGED
-XX-----	CP1Cu3S4As7orb	XXXXXXXXXX	CP1Cu3S4As7orb_Aspidiphorus_orbiculatus_Staph.idba.13	XXXXXXXXXX	CP1Cu3S4As7orb_Aspidiphorus_orbiculatus_Staph.idba.13_MERGED
-XX-----	CP1Cu3S4Sp7dub	XXXXXXXXXX	CP1Cu3S4Sp7dub_Sphindus_dubius_JX412803	XXXXXXXXXX	CP1Cu3S4Sp7dub_Sphindus_dubius_JX412803_MERGED
-X-----	CP1Cu3S14S50r7sur	XXXXXXXXXX	CP1Cu3S14S50r7sur_Oryzaephilus_surinamensis_Soil.idba.57	XXXXXXXXXX	CP1Cu3S14S50r7sur_Oryzaephilus_surinamensis_Soil.idba.57_MERGED

-XX-----XX-XXX	CP1Cu3S14S5S17uni	-----XXXX-XXXX	CP1Cu3S14S5S17uni_Silvanus_unidentatus_JX313687	-X-XXX-XXXX-XXX	CP1Cu3S14S5S17uni_Silvanus_unidentatus_JX313687_MERGED
-XX-----X--XX-	CP1Cur3A4A5P6P17alb	-XXXXXXXXXXXX-XXXX	CP1Cur3A4A5P6P17alb_Platystomos_albinus_JN163968	-XXXXXXXXXXXX-XX-	CP1Cur3A4A5P6P17alb_Platystomos_albinus_JN163968_MERGED
-XX-----XX-	CP1Cur3AT4A5AT7nit	XXXXXXXXXXXX-XXXX	CP1Cur3AT4A5AT7nit_AtteLabus_nitens_ameie_idba.73	XXXXXXXXXXXX-XX-	CP1Cur3AT4A5AT7nit_AtteLabus_nitens_ameie_idba.73_MERGED
-X-----X-----	CP1Cur3AT4A5P7cor	-XXXXXXXXXXXX-XXXX	CP1Cur3AT4A5P7cor_Apoderus_coryli_JN163966	-XXXXXXXXXXXX-XXXX	CP1Cur3AT4A5P7cor_Apoderus_coryli_JN163966_MERGED
-X-----XX-	CP1Cur3AT4R5B7pop	--XXXXXXXXXX-XXXX	CP1Cur3AT4R5B7pop_Byctiscus_populi_NC_018760	-X-XXXXXXXX-XXXX	CP1Cur3AT4R5B7pop_Byctiscus_populi_NC_018760_MERGED
-X-----XX-	CP1Cur3AT4R5De7bet	--XXXXXXXXXX-XXXX	CP1Cur3AT4R5De7bet_Deporaus_betulae_JN163945	-XXXXXXXXXXXX-XX-	CP1Cur3AT4R5De7bet_Deporaus_betulae_JN163945_MERGED
-X-----XX-	CP1Cur3AT4R5De7tri	XXXXXXXXXXXX-XXXX	CP1Cur3AT4R5De7tri_Deporaus_tristis_ameie_idba.109	XXXXXXXXXXXX-XXXX	CP1Cur3AT4R5De7tri_Deporaus_tristis_ameie_idba.109_MERGED
-XX-----X--XX-	CP1Cur3Br4A5Be7sim	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3Br4A5Be7sim_Betulapion_simile_BIUk_idba.36	XXXXXXXXXXXXXXXX-XX-	CP1Cur3Br4A5Be7sim_Betulapion_simile_BIUk_idba.36_MERGED
-X-----X-----	CP1Cur3Br4A5Pr7int	XXXXXXXXXXXX-XXXX	CP1Cur3Br4A5Pr7int_Protapion_interjectum_Soil_idba.118	XXXXXXXXXXXX-XXXX	CP1Cur3Br4A5Pr7int_Protapion_interjectum_Soil_idba.118_MERGED
-XX-----XX-	CP1Cur3Br4A5Pr7tri	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3Br4A5Pr7tri_Protapion_trifolii_Soil_idba.58	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3Br4A5Pr7tri_Protapion_trifolii_Soil_idba.58_MERGED
-X-----XX-	CP1Cur3Br4A5Rh7lon	--XXXXXXXXXX-XXXX	CP1Cur3Br4A5Rh7lon_Rhopalation_longirostre_JN163967	-XXXXXXXXXXXX-XXXX	CP1Cur3Br4A5Rh7lon_Rhopalation_longirostre_JN163967_MERGED
-XX-----X--XX-	CP1Cur3Br4N5Na7mar	-----XXXXXXXXXX-XXXX	CP1Cur3Br4N5Na7mar_Nanophyes_marmoratus_Curc_idba.93	-XX-XXXXXXXXXX-XX-	CP1Cur3Br4N5Na7mar_Nanophyes_marmoratus_Curc_idba.93_MERGED
-----XX-	CP1Cur3Bra4B5Br7mur	--XXXXXXXXXX-XXXX	CP1Cur3Bra4B5Br7mur_Brachycerus_muricatus_JN163970	--XXXXXXXXXX-XX-	CP1Cur3Bra4B5Br7mur_Brachycerus_muricatus_JN163970_MERGED
-X-----XXX	CP1Cur3Bra4B5Ha7DDM2009	-----XXXXXXXXXX-XXXX	CP1Cur3Bra4B5Ha7DDM2009_Haplonyx_spDDM-2009_Curc_idba.98	-X-----XXXXXX-XXX	CP1Cur3Bra4B5Ha7DDM2009_Haplonyx_spDDM-2009_Curc_idba.98_MERGED
-X-----XX-	CP1Cur3Bra4E5D07tor	XXXXXXXXXXXX-XXXX	CP1Cur3Bra4E5D07tor_Dorytomus_tortrix_ameie_idba.139	XXXXXXXXXXXX-XXXX	CP1Cur3Bra4E5D07tor_Dorytomus_tortrix_ameie_idba.139_MERGED
-XX-----X--X-	CP1Cur3C4C5A6An7pom	--XXXXXXXXXX-XXXX	CP1Cur3C4C5A6An7pom_Anthonomus_pomorum_JN163951	-XXXXXXXXXXXX-XX-	CP1Cur3C4C5A6An7pom_Anthonomus_pomorum_JN163951_MERGED
-X-----X-----	CP1Cur3C4C5A6Br7ke1	XXXXXXXXXXXX-XXXX	CP1Cur3C4C5A6Br7ke1_Bradybatus_kellneri_ameie_idba.54	XXXXXXXXXXXX-XXXX	CP1Cur3C4C5A6Br7ke1_Bradybatus_kellneri_ameie_idba.54_MERGED
-XX-----X--X-	CP1Cur3C4C5C6Cu7ele	XXXXXXXXXXXX-XXXX	CP1Cur3C4C5C6Cu7ele_Curculio_elephas_ameie_idba.5	XXXXXXXXXXXX-XX-	CP1Cur3C4C5C6Cu7ele_Curculio_elephas_ameie_idba.5_MERGED
-XX-----X-X-XXX-	CP1Cur3C4C5C6Cu7gla	-----XXXXXXXXXX-XXXX	CP1Cur3C4C5C6Cu7gla_Curculio_glandium_BIUk_idba.52	-XX-XXXXXXXXXXXX-XX-	CP1Cur3C4C5C6Cu7gla_Curculio_glandium_BIUk_idba.52_MERGED
-----X-X-XX-	CP1Cur3C4C5E6An7tar	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4C5E6An7tar_Ancyrtalia_tarsalis_Curc_idba.45	XXXXXXXXXXXXXXXX-XX	CP1Cur3C4C5E6An7tar_Ancyrtalia_tarsalis_Curc_idba.45_MERGED
-X-X-----XX-	CP1Cur3C4C5M6Me7jan	--XXXXXX-XXXX	CP1Cur3C4C5M6Me7jan_Mecinus_janthinus_ameie_idba.143	-XXXXXX-XXXX	CP1Cur3C4C5M6Me7jan_Mecinus_janthinus_ameie_idba.143_MERGED
-XXX-----X-	CP1Cur3C4Ce5Ce7obs	--XXXXXXXXXX-XXXX	CP1Cur3C4Ce5Ce7obs_Ceutorhynchus_obstrictus_JN163956	-XXXXXXXXXXXX-XX-	CP1Cur3C4Ce5Ce7obs_Ceutorhynchus_obstrictus_JN163956_MERGED
-X-----XX-	CP1Cur3C4Ce5Mon7pun	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4Ce5Mon7pun_Mononychus_punctumalbum_Curc_idba.3	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4Ce5Mon7pun_Mononychus_punctumalbum_Curc_idba.3_MERGED
-XX-----X-----	CP1Cur3C4Ce5Rh7per	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4Ce5Rh7per_Rhinoncus_pericarpus_Curc_idba.24	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4Ce5Rh7per_Rhinoncus_pericarpus_Curc_idba.24_MERGED
-X-----X--X-	CP1Cur3C4C15C17ole	--XXXXXXXXXX-XXXX	CP1Cur3C4C15C17ole_Cionus_olens_JN163958	XXXXXXXXXXXX-XX-	CP1Cur3C4C15C17ole_Cionus_olens_JN163958_MERGED
-XX-----X-X-	CP1Cur3C4C15La7tur	--XXXXXXXXXX-XXXX	CP1Cur3C4C15La7tur_Larinus_turbinatus_JN163952	-XXXXXXXXXXXX-XX-	CP1Cur3C4C15La7tur_Larinus_turbinatus_JN163952_MERGED
-X-----X-----	CP1Cur3C4C5C6Co7cyc	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4C5C6Co7cyc_Coptonotus_cyclopus_Curc_idba.67	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4C5C6Co7cyc_Coptonotus_cyclopus_Curc_idba.67_MERGED
-XX-----XX-	CP1Cur3C4C5Ac7mis	-----XXXXXXXXXX-XXXX	CP1Cur3C4C5Ac7mis_Acalles_misellus_BIUk_idba.57	-XX-XXXXXXXXXXXX-XX-	CP1Cur3C4C5Ac7mis_Acalles_misellus_BIUk_idba.57_MERGED
-XX-----XX-XX-	CP1Cur3C4C5Ac7pti	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4C5Ac7pti_Acalles_ptinoides_BIUk_idba.42	XXXXXXXXXXXX-XX-	CP1Cur3C4C5Ac7pti_Acalles_ptinoides_BIUk_idba.42_MERGED
-X-----XX-	CP1Cur3C4C5Ec7and	XXXX-XXXX	CP1Cur3C4C5Ec7and_Echinodera_andalusiensis_Soil_idba.193	XXXX-XXXX-XX-	CP1Cur3C4C5Ec7and_Echinodera_andalusiensis_Soil_idba.193_MERGED
--X-----XX-	CP1Cur3C4C5Ky7aub	-XXXXXXXXXXXX-XXXX	CP1Cur3C4C5Ky7aub_Kyklioacalles_aubei_JN163957	XXXXXXXXXXXX-XXXX	CP1Cur3C4C5Ky7aub_Kyklioacalles_aubei_JN163957_MERGED
-X-----XX-	CP1Cur3C4C5Ky7rob	-----XXXXXX-XXXX	CP1Cur3C4C5Ky7rob_Kyklioacalles_roboris_BIUk_idba.79	-X-----XXXXXX-XXXX	CP1Cur3C4C5Ky7rob_Kyklioacalles_roboris_BIUk_idba.79_MERGED
-XX-----XXX-X-	CP1Cur3C4C5Ou7squ	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4C5Ou7squ_Ouroproterus_squamiventris_Curc_idba.5	XXXXXXXXXXXXXXXX-XX-	CP1Cur3C4C5Ou7squ_Ouroproterus_squamiventris_Curc_idba.5_MERGED
-X-----XX-	CP1Cur3C4C5Di7man	XXXXXXXXXXXX-XXXX	CP1Cur3C4C5Di7man_Dichotrachelus_manueli_Curc_idba.88	XXXXXXXXXXXX-XXXX	CP1Cur3C4C5Di7man_Dichotrachelus_manueli_Curc_idba.88_MERGED
-XX-----XX-	CP1Cur3C4D5Co7sor	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4D5Co7sor_Cosmopolites_sordidus_Curc_idba.8	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4D5Co7sor_Cosmopolites_sordidus_Curc_idba.8_MERGED
-XX-----XXX-	CP1Cur3C4D5Rhi7bar	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4D5Rhi7bar_Rhinostomus_barbirostris_Panama_idba.10	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4D5Rhi7bar_Rhinostomus_barbirostris_Panama_idba.10_MERGED
-X-X-----XXX-	CP1Cur3C4D5Si7gra	--XXXXXX-XXXX	CP1Cur3C4D5Si7gra_Sitophilus_granarius_JN163959	-XXXXXX-XX-XXXX	CP1Cur3C4D5Si7gra_Sitophilus_granarius_JN163959_MERGED
-XXX-----X-X-XX-	CP1Cur3C4E5B6St7mel	--XXXXXXXXXX-XXXX	CP1Cur3C4E5B6St7mel_Strophosoma_melanogrammum_JN163949	-XXXXXXXXXXXX-XX-	CP1Cur3C4E5B6St7mel_Strophosoma_melanogrammum_JN163949_MERGED
-----XX-	CP1Cur3C4E5G6Ba7obs	-XXXXXXXXXXXX-XXXX	CP1Cur3C4E5G6Ba7obs_Barynotus_obscurus_JN163950	-XXXXXXXXXXXX-XX-	CP1Cur3C4E5G6Ba7obs_Barynotus_obscurus_JN163950_MERGED
XXXXXXXXXXXX-XXXX	CP1Cur3C4E5N6Na7xan	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4E5N6Na7xan_Naupactus_xanthographus_NC_018354	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4E5N6Na7xan_Naupactus_xanthographus_NC_018354_MERGED
-X-X-----XX-	CP1Cur3C4E5Ot60T7mor	XXXXXXXXXXXX-XXXX	CP1Cur3C4E5Ot60T7mor_Otiorhynchus_morio_ameie_idba.90	XXXXXXXXXXXX-XXXX	CP1Cur3C4E5Ot60T7mor_Otiorhynchus_morio_ameie_idba.90_MERGED
-XXX-----X-----	CP1Cur3C4E5Ot60T7rug	--XXXXXXXXXX-XXXX	CP1Cur3C4E5Ot60T7rug_Otiorhynchus_rugosostriatus_JN163969	-XXXXXXXXXXXX-XXXX	CP1Cur3C4E5Ot60T7rug_Otiorhynchus_rugosostriatus_JN163969_MERGED
-XXX-----X-XXX-	CP1Cur3C4E5Ot60T7sul	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4E5Ot60T7sul_Otiorhynchus_sulcatus_Curc_idba.36	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4E5Ot60T7sul_Otiorhynchus_sulcatus_Curc_idba.36_MERGED
-X-----XX-	CP1Cur3C4E5Po6P7mar	--XXXXXXXXXX-XXXX	CP1Cur3C4E5Po6P7mar_Polydrusus_marginatus_JN039360	-XXXXXXXXXXXX-XXXX	CP1Cur3C4E5Po6P7mar_Polydrusus_marginatus_JN039360_MERGED
-XX-----X-----	CP1Cur3C4E5S6Si7dis	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4E5S6Si7dis_Sitona_discoideus_Soil_idba.86	XXXXXXXXXXXX-XX-	CP1Cur3C4E5S6Si7dis_Sitona_discoideus_Soil_idba.86_MERGED
-XX-----X--X-	CP1Cur3C4E5S6Si7lin	--XXXXXXXXXX-XXXX	CP1Cur3C4E5S6Si7lin_Sitona_lineatus_JN163948	-XXXXXXXXXXXX-XX-	CP1Cur3C4E5S6Si7lin_Sitona_lineatus_JN163948_MERGED
-X-----XX-	CP1Cur3C4E5T6T77ele	XXXXXXXXXXXX-XXXX	CP1Cur3C4E5T6T77ele_Tropiphorus_elevatus_ameie_idba.114	XXXXXXXXXXXX-XXXX	CP1Cur3C4E5T6T77ele_Tropiphorus_elevatus_ameie_idba.114_MERGED
-----XXX-	CP1Cur3C4H5Hy7bru	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4H5Hy7bru_Hypera_brunneipennis_Soil_idba.79	XXXXXXXXXXXX-XXXX	CP1Cur3C4H5Hy7bru_Hypera_brunneipennis_Soil_idba.79_MERGED
-XXX-----XXXX-	CP1Cur3C4H5Hy7pos	--XXXXXXXXXX-XXXX	CP1Cur3C4H5Hy7pos_Hypera_postica_JN163953	-XXXXXXXXXXXX-XXXX	CP1Cur3C4H5Hy7pos_Hypera_postica_JN163953_MERGED
-XX-----X-----	CP1Cur3C4M5H6Hy7abi	--XXXXXXXXXX-XXXX	CP1Cur3C4M5H6Hy7abi_Hylobius_abietis_JN163954	-XXXXXXXXXXXX-XXXX	CP1Cur3C4M5H6Hy7abi_Hylobius_abietis_JN163954_MERGED
XXXXXXXXXX-XXXX	CP1Cur3C4M5H6Hy17xia	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4M5H6Hy17xia_Hylobitelus_xiaoi_NC_022680	XXXXXXXXXXXX-XXXX	CP1Cur3C4M5H6Hy17xia_Hylobitelus_xiaoi_NC_022680_MERGED
-X-----X-----	CP1Cur3C4M5P6P17pin	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4M5P6P17pin_Pissodes_pini_Curc_idba.48	XXXXXXXXXXXX-XXXX	CP1Cur3C4M5P6P17pin_Pissodes_pini_Curc_idba.48_MERGED
-X-----X-----	CP1Cur3C4P6Dia7uni	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4P6Dia7uni_Diapus_unispneus_Curc_idba.33	XXXXXXXXXXXX-XXXX	CP1Cur3C4P6Dia7uni_Diapus_unispneus_Curc_idba.33_MERGED
-XX-----XXX-	CP1Cur3C4P6Eu7par	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4P6Eu7par_Euplatypus_parallelus_Scoly_idba.25	XXXXXXXXXXXX-XXXX	CP1Cur3C4P6Eu7par_Euplatypus_parallelus_Scoly_idba.25_MERGED
-XX-----XX-	CP1Cur3C4P6P17cyl	XXXXXXXXXXXXXXXX-XXXX	CP1Cur3C4P6P17cyl_Platypus_cylindrus_Curc_idba.22	XXXXXXXXXXXX-XX-	CP1Cur3C4P6P17cyl_Platypus_cylindrus_Curc_idba.22_MERGED

-XX-----X--XX-	CP1Cur3C4Po5Li7tes	--XXXXXXXXX-----	CP1Cur3C4Po5Li7tes_Liophloeus_tessulatus_JN163947	-XXXXXXXXXXXX--XX-	CP1Cur3C4Po5Li7tes_Liophloeus_tessulatus_JN163947_MERGED
-XX-----X-----	CP1Cur3C4Rh5Rh7que	XXXXXXXXXXXXXXXXX----	CP1Cur3C4Rh5Rh7que_Rhynchaenus_quercus_BIUK_idba.11	XXXXXXXXXXXXXXXXX----	CP1Cur3C4Rh5Rh7que_Rhynchaenus_quercus_BIUK_idba.11_MERGED
-X-----X-----	CP1Cur3C4S5An7dis	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5An7dis_Anisandrus_dispr_Scoly_idba.47	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5An7dis_Anisandrus_dispr_Scoly_idba.47_MERGED
-XX-----XX---	CP1Cur3C4S5Co7cyp	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Co7cyp_Coccotrypes_cyper_i FG_idba.60	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Co7cyp_Coccotrypes_cyper_i FG_idba.60_MERGED
-X-----X-----	CP1Cur3C4S5Co7rub	XXXXXXXXX-----	CP1Cur3C4S5Co7rub_Corthylus_rubricollis_Curc_idba.99	XXXXXXXXX-----X---	CP1Cur3C4S5Co7rub_Corthylus_rubricollis_Curc_idba.99_MERGED
-X-----X-----	CP1Cur3C4S5Cr7sal	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Cr7sal_Cryphalus_saltuarius_Curc_idba.19	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Cr7sal_Cryphalus_saltuarius_Curc_idba.19_MERGED
-X-----X-----	CP1Cur3C4S5Cry7pus	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Cry7pus_Crypturgus_pusillus_Curc_idba.42	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Cry7pus_Crypturgus_pusillus_Curc_idba.42_MERGED
-X-----X-----	CP1Cur3C4S5Cyc7bod	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Cyc7bod_Cyclorhipidion_bodoanus_Scoly_idba.52	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Cyc7bod_Cyclorhipidion_bodoanus_Scoly_idba.52_MERGED
-X-----X-----	CP1Cur3C4S5Di7ine	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Di7ine_Diamerus_inermis_Curc_idba.58	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Di7ine_Diamerus_inermis_Curc_idba.58_MERGED
-XX-----XXXX-	CP1Cur3C4S5Dry7aut	-----XXXXX----	CP1Cur3C4S5Dry7aut_Dryocoetes_autographus_Curc_idba.118	-XX-----XXXXXXX-	CP1Cur3C4S5Dry7aut_Dryocoetes_autographus_Curc_idba.118_MERGED
-X-----X-----	CP1Cur3C4S5Dry7vil	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Dry7vil_Dryocoetes_villosus_Scoly_idba.38	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Dry7vil_Dryocoetes_villosus_Scoly_idba.38_MERGED
-X-----X-----	CP1Cur3C4S5Ern7fag	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Ern7fag_Ernoporicus_fagi_amie_idba.75	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Ern7fag_Ernoporicus_fagi_amie_idba.75_MERGED
-XX-----X---	CP1Cur3C4S5Gna7mat	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Gna7mat_Gnathotrichus_materiarius_Scoly_idba.22	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Gna7mat_Gnathotrichus_materiarius_Scoly_idba.22_MERGED
-X-----X-----	CP1Cur3C4S5Hyla7ate	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hyla7ate_Hylastes_ater_Scoly_idba.54	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hyla7ate_Hylastes_ater_Scoly_idba.54_MERGED
-X-----X-----	CP1Cur3C4S5Hyla7att	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hyla7att_Hylastes_attenuatus_Scoly_idba.12	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hyla7att_Hylastes_attenuatus_Scoly_idba.12_MERGED
-X-----X-----	CP1Cur3C4S5Hyla7bru	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hyla7bru_Hylastes_brunneus_Scoly_idba.41	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hyla7bru_Hylastes_brunneus_Scoly_idba.41_MERGED
-X-----X-----	CP1Cur3C4S5Hyla7opa	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hyla7opa_Hylastes_opacus_Curc_idba.62	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hyla7opa_Hylastes_opacus_Curc_idba.62_MERGED
-X-----X-----	CP1Cur3C4S5Hyle7var	--XXXXX-----	CP1Cur3C4S5Hyle7var_Hylesinus_varius_amie_idba.170	-XXXXXX-----XXX-	CP1Cur3C4S5Hyle7var_Hylesinus_varius_amie_idba.170_MERGED
-X-----X-----	CP1Cur3C4S5Hylur7pal	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hylur7pal_Hylurgops_palliatus_Scoly_idba.48	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hylur7pal_Hylurgops_palliatus_Scoly_idba.48_MERGED
-X-----X-----	CP1Cur3C4S5Hypo7fic	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hypo7fic_Hypoborus_ficus_Curc_idba.77	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Hypo7fic_Hypoborus_ficus_Curc_idba.77_MERGED
-XX-----X-XXX-	CP1Cur3C4S5Ip7acu	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Ip7acu_Ips_acuminatus_Curc_idba.2	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Ip7acu_Ips_acuminatus_Curc_idba.2_MERGED
-X-----X-XXX-	CP1Cur3C4S5Ip7cem	--XXX--XXX-----	CP1Cur3C4S5Ip7cem_Ips_cembrae_JN163961	-XXX--XXX--XXX-	CP1Cur3C4S5Ip7cem_Ips_cembrae_JN163961_MERGED
-XX-----X-XXX-	CP1Cur3C4S5Ip7sex	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Ip7sex_Ips_sexdentatus_Scoly_idba.4	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Ip7sex_Ips_sexdentatus_Scoly_idba.4_MERGED
-XX-----X-XX-	CP1Cur3C4S5Or7lar	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Or7lar_Orthotomicus_laricis_Scoly_idba.3	XXXXXXXXXXXXXXXXX-XX-	CP1Cur3C4S5Or7lar_Orthotomicus_laricis_Scoly_idba.3_MERGED
-X-----X-XXX-	CP1Cur3C4S5P17qua	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5P17qua_Pityogenes_quadridens_Scoly_idba.23	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5P17qua_Pityogenes_quadridens_Scoly_idba.23_MERGED
-XX-----XXXX-	CP1Cur3C4S5P17tre	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5P17tre_Pityogenes_trepanatus_Scoly_idba.5	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5P17tre_Pityogenes_trepanatus_Scoly_idba.5_MERGED
-X-----X-----	CP1Cur3C4S5P17mic	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5P17mic_Pityophthorus_micrographus_Curc_idba.39	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5P17mic_Pityophthorus_micrographus_Curc_idba.39_MERGED
-X-----X-----	CP1Cur3C4S5P17pub	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5P17pub_Pityophthorus_pubescens_Scoly_idba.14	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5P17pub_Pityophthorus_pubescens_Scoly_idba.14_MERGED
-XX-----X---	CP1Cur3C4S5Po7pol	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Po7pol_Polygraphus_poligraphus_Curc_idba.16	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Po7pol_Polygraphus_poligraphus_Curc_idba.16_MERGED
-XX-----X-XX-X	CP1Cur3C4S5Pr7cav	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Pr7cav_Premnobius_cavipennis_Curc_idba.4	XXXXXXXXXXXXXXXXX-XX	CP1Cur3C4S5Pr7cav_Premnobius_cavipennis_Curc_idba.4_MERGED
-XX-----XX---	CP1Cur3C4S5Sa7dam	XXXXXXXXX-----	CP1Cur3C4S5Sa7dam_Sampsonius_dampfi_Scoly_idba.59	XXXXXXXXX-----XX-	CP1Cur3C4S5Sa7dam_Sampsonius_dampfi_Scoly_idba.59_MERGED
-X-----X-----	CP1Cur3C4S5Scol7sco	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Scol7sco_Scolytus_scolytus_Curc_idba.23	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Scol7sco_Scolytus_scolytus_Curc_idba.23_MERGED
-X-----X-----	CP1Cur3C4S5Te7dew	-XXXXXXXXX-----	CP1Cur3C4S5Te7dew_Tesserocerus_dewalquei_Curc_idba.95	-XXXXXXXXX-----XXX-	CP1Cur3C4S5Te7dew_Tesserocerus_dewalquei_Curc_idba.95_MERGED
-XX-----XXXX-	CP1Cur3C4S5To7pin	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5To7pin_Tomicus_piniperda_Scoly_idba.17	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5To7pin_Tomicus_piniperda_Scoly_idba.17_MERGED
-X-----X-----	CP1Cur3C4S5Tr7dom	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Tr7dom_Trypodendron_domesticum_Scoly_idba.7	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Tr7dom_Trypodendron_domesticum_Scoly_idba.7_MERGED
-XX-----X---	CP1Cur3C4S5Tr7sig	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Tr7sig_Trypodendron_signatum_Scoly_idba.49	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Tr7sig_Trypodendron_signatum_Scoly_idba.49_MERGED
-XX-----XXX-	CP1Cur3C4S5Xy7saxe	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xy7saxe_Xyleborinus_saxeseni_Scoly_idba.28	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xy7saxe_Xyleborinus_saxeseni_Scoly_idba.28_MERGED
-XX-----XX---	CP1Cur3C4S5Xyl7aff	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7aff_Xyleborus_affinis_Scoly_idba.33	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7aff_Xyleborus_affinis_Scoly_idba.33_MERGED
-XX-----XX---	CP1Cur3C4S5Xyl7per	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7per_Xyleborus_perforans_Scoly_idba.27	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7per_Xyleborus_perforans_Scoly_idba.27_MERGED
-X-----X-----	CP1Cur3C4S5Xyl7vol	XXXXXXXXX-----	CP1Cur3C4S5Xyl7vol_Xyleborus_volvulus_Scoly_idba.63	XXXXXXXXX-----X---	CP1Cur3C4S5Xyl7vol_Xyleborus_volvulus_Scoly_idba.63_MERGED
-X-----X-----	CP1Cur3C4S5Xyl7com	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7com_Xylosandrus_compactus_FG_idba.55	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7com_Xylosandrus_compactus_FG_idba.55_MERGED
-XX-----XX---	CP1Cur3C4S5Xyl7cra	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7cra_Xylosandrus_crassiusculus_Scoly_idba.34	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7cra_Xylosandrus_crassiusculus_Scoly_idba.34_MERGED
-XX-----X---	CP1Cur3C4S5Xyl7ger	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7ger_Xylosandrus_germanus_Scoly_idba.35	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7ger_Xylosandrus_germanus_Scoly_idba.35_MERGED
-X-----X-----	CP1Cur3C4S5Xyl7mor	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7mor_Xylosandrus_morigerus_Scoly_idba.37	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7mor_Xylosandrus_morigerus_Scoly_idba.37_MERGED
-X-----X-----	CP1Cur3C4S5Xyl7mac	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7mac_Xyloctonus_maculatus_Curc_idba.71	XXXXXXXXXXXXXXXXX----	CP1Cur3C4S5Xyl7mac_Xyloctonus_maculatus_Curc_idba.71_MERGED
-XX-----XX---	CP1Cur3C4T5T7pus	XXXXXXXXXXXXXXXXX----	CP1Cur3C4T5T7pus_Tychius_pusillus_Soil_idba.71	XXXXXXXXXXXXXXXXX----	CP1Cur3C4T5T7pus_Tychius_pusillus_Soil_idba.71_MERGED
-X-----X-XXX-	CP1Cur3N4D07aus	-XXXXXXXXX-----	CP1Cur3N4D07aus_Doydirhynchus_austriacus_JN163964	-XXXXXXXXX-----XXX-	CP1Cur3N4D07aus_Doydirhynchus_austriacus_JN163964_MERGED
-XX-----XX-XX-XXX	CP1D3D4Da7cer	-XXXXXXXXX-----	CP1D3D4Da7cer_Dascillus_cervinus_J0034414	-XXXXXXXXX-----XXX-	CP1D3D4Da7cer_Dascillus_cervinus_J0034414_MERGED
-XX-----XXXX-	CP1E3C4C5Ca7pel	-XXXXXXXXX-----	CP1E3C4C5Ca7pel_Cantharis_pellucida_HQ232817	-XXXXXXXXX-----XXXX-	CP1E3C4C5Ca7pel_Cantharis_pellucida_HQ232817_MERGED
-X-----X-----	CP1E3C4C5Ca7tri	-XXXXXXXXX-----	CP1E3C4C5Ca7tri_Cantharis_tristis_amie_idba.95	-XXXXXXXXX-----XXXX-	CP1E3C4C5Ca7tri_Cantharis_tristis_amie_idba.95_MERGED
XXXXXXXXXX-XXXXXX	CP1E3C4Ch5Ch7opa	XXXXXXXXXXXXXXXXX----	CP1E3C4Ch5Ch7opa_Chauliognathus_opacus_NC_013576	XXXXXXXXXXXXXXXXX----	CP1E3C4Ch5Ch7opa_Chauliognathus_opacus_NC_013576_MERGED
-X-----X-----	CP1E3C4M5Ma7bal	XXXXXXXXXXXXXXXXX----	CP1E3C4M5Ma7bal_Malthinus_balteatus_Soil_idba.38	XXXXXXXXXXXXXXXXX----	CP1E3C4M5Ma7bal_Malthinus_balteatus_Soil_idba.38_MERGED
-XX-----XX---	CP1E3C4M5Ma7mar	XXXXXXX-----	CP1E3C4M5Ma7mar_Malthodes_marginatus_BIUK_idba.61	XXXXXXX-----XXXX-	CP1E3C4M5Ma7mar_Malthodes_marginatus_BIUK_idba.61_MERGED
-XX-----XX-XXX	CP1E3D4Dr7fla	XXXXXXXXXXXXXXXXX----	CP1E3D4Dr7fla_Drilus_flavescens_HQ232815	XXXXXXXXXXXXXXXXX-XXX	CP1E3D4Dr7fla_Drilus_flavescens_HQ232815_MERGED
XXXX-XXXXX-X-X---	CP1E3E4A5Py7div	XXXXXXXXXXXXXXXXX----	CP1E3E4A5Py7div_Pyrophorus_divergens_NC_009964	XXXXXXXXXXXXXXXXX----	CP1E3E4A5Py7div_Pyrophorus_divergens_NC_009964_MERGED

-XX-----XX-XXX	CP1E3E4C5D1c7cin	-XXXXXXXXXX-----	CP1E3E4C5D1c7cin_Dicronychus_cinereus_amie.idba.96	-XXXXXXXXXXXX-XXX	CP1E3E4C5D1c7cin_Dicronychus_cinereus_amie.idba.96_MERGED
-X-----XX-XXX	CP1E3E4D5Ca7bip	XXXXXXXXXXXXXXXX-----	CP1E3E4D5Ca7bip_Calambus_bipustulatus_BIUK.idba.31	XXXXXXXXXXXXXXXX-----	CP1E3E4D5Ca7bip_Calambus_bipustulatus_BIUK.idba.31_MERGED
-X-----XX-XXX	CP1E3E4D5Hyp7inu	XXXXXXXXXXXXXXXX-----	CP1E3E4D5Hyp7inu_Hypoganus_inunctus_amie.idba.58	XXXXXXXXXXXXXXXX-----	CP1E3E4D5Hyp7inu_Hypoganus_inunctus_amie.idba.58_MERGED
-XX-----XX-XXX	CP1E3E4D5PH7que	XXXXXXXXXX-----	CP1E3E4D5PH7que_Pheletes_quercus_amie.idba.137	XXXXXXXXXX-----XX-XXX	CP1E3E4D5PH7que_Pheletes_quercus_amie.idba.137_MERGED
-X-----XX-XXX	CP1E3E4De5An7cas	XXXXXXXXXXXXXXXX-----	CP1E3E4De5An7cas_Anostirus_castaneus_amie.idba.28	XXXXXXXXXXXXXXXX-----	CP1E3E4De5An7cas_Anostirus_castaneus_amie.idba.28_MERGED
-XX-----XX-XXX	CP1E3E4De5At7hae	XXXXXXXXXXXXXXXX-----	CP1E3E4De5At7hae_Athous_haemorrhoidalis_2VGB.idba.8	XXXXXXXXXXXXXXXX-----XXX	CP1E3E4De5At7hae_Athous_haemorrhoidalis_2VGB.idba.8_MERGED
-XX-----XX-XXX	CP1E3E4De5Lim7min	XXXXXXXXXXXXXXXX-----	CP1E3E4De5Lim7min_Limonius_minutus_amie.idba.27	XXXXXXXXXXXXXXXX-----	CP1E3E4De5Lim7min_Limonius_minutus_amie.idba.27_MERGED
-X-----XX-XXX	CP1E3E4E5Ad7rac	XXXXXXXXXXXXXXXX-----	CP1E3E4E5Ad7rac_Adrastus_rachifer_amie.idba.32	XXXXXXXXXXXXXXXX-----	CP1E3E4E5Ad7rac_Adrastus_rachifer_amie.idba.32_MERGED
-XX-----XX-XXX	CP1E3E4E5Ag7obs	XXXXXXXXXXXXXXXX-----	CP1E3E4E5Ag7obs_Agriotes_obscurus_2VGB.idba.10	XXXXXXXXXXXXXXXX-----XXX	CP1E3E4E5Ag7obs_Agriotes_obscurus_2VGB.idba.10_MERGED
-XX-----XX-XXX	CP1E3E4E5Ag7ust	-XXXXXXXXXXXX-----	CP1E3E4E5Ag7ust_Agriotes_ustulatus_JX412737	-XXXXXXXXXXXX-----XXX	CP1E3E4E5Ag7ust_Agriotes_ustulatus_JX412737_MERGED
-X-----XX-XXX	CP1E3E4E5Da7mar	XXXXXXXXXXXXXXXX-----	CP1E3E4E5Da7mar_Dalopius_marginatus_BIUK.idba.34	XXXXXXXXXXXXXXXX-----	CP1E3E4E5Da7mar_Dalopius_marginatus_BIUK.idba.34_MERGED
-X-----XX-XXX	CP1E3E4E5Id7pic	XXXXXXXXXXXXXXXX-----	CP1E3E4E5Id7pic_Idolus_picipennis_amie.idba.67	XXXXXXXXXXXXXXXX-----	CP1E3E4E5Id7pic_Idolus_picipennis_amie.idba.67_MERGED
-XX-----XX-XXX	CP1E3E4M5Me7vil	XXXXXXXXXXXXXXXX-----	CP1E3E4M5Me7vil_Melanotus_villosus_2VGB.idba.11	XXXXXXXXXXXXXXXX-----XXX	CP1E3E4M5Me7vil_Melanotus_villosus_2VGB.idba.11_MERGED
-X-----XX-XXX	CP1E3E4N5Ne7sab	XXXXXX-----	CP1E3E4N5Ne7sab_Negastrius_sabulicola_amie.idba.161	XXXXXX-----	CP1E3E4N5Ne7sab_Negastrius_sabulicola_amie.idba.161_MERGED
-XX-----XX-XXX	CP1E3E4U4Me7bup	XXXXXXXXXXXXXXXX-----	CP1E3E4U4Me7bup_Melasis_buprestoides_amie.idba.87	XXXXXXXXXXXXXXXX-----XXX	CP1E3E4U4Me7bup_Melasis_buprestoides_amie.idba.87_MERGED
-XX-----X--XX-	CP1E3L4L5La7noc	XXXXXXXXXXXXXXXX-----	CP1E3L4L5La7noc_Lampyrus_noctiluca_amie.idba.10	XXXXXXXXXXXXXXXX-----XX-	CP1E3L4L5La7noc_Lampyrus_noctiluca_amie.idba.10_MERGED
XXXXXXXXXXXX-XXX-XXX	CP1E3L4L5Py7ruf	XXXXXXXXXXXXXXXX-----	CP1E3L4L5Py7ruf_Pyrocoelia_rufa_NC_003970	XXXXXXXXXXXXXXXX-----	CP1E3L4L5Py7ruf_Pyrocoelia_rufa_NC_003970_MERGED
XXXXXXXXXXXX-XXX-XXX	CP1E3L4Lu5Aq7lei	XXXXXXXXXXXXXXXX-----	CP1E3L4Lu5Aq7lei_Aquatica_lei_NC_025276	XXXXXXXXXXXXXXXX-----	CP1E3L4Lu5Aq7lei_Aquatica_lei_NC_025276_MERGED
XXXXXXXXXXXX-XXX-XXX	CP1E3L4Lu5Lu7cru	XXXXXXXXXXXXXXXX-----	CP1E3L4Lu5Lu7cru_Luciola_cruciata_NC_022472	XXXXXXXXXXXXXXXX-----	CP1E3L4Lu5Lu7cru_Luciola_cruciata_NC_022472_MERGED
-XX-----X--XXX	CP1E3Ly4Be7tay	XXXXXXXXXXXXXXXX-----	CP1E3Ly4Be7tay_Benibotarus_taygetanus_amie.idba.23	XXXXXXXXXXXXXXXX-----XXX	CP1E3Ly4Be7tay_Benibotarus_taygetanus_amie.idba.23_MERGED
-XX-----X--XXX	CP1E3Ly4Dic7aur	XXXXXXXXXXXXXXXX-----	CP1E3Ly4Dic7aur_Dictyoptera_aurora_JX412733	XXXXXXXXXXXXXXXX-----XXX	CP1E3Ly4Dic7aur_Dictyoptera_aurora_JX412733_MERGED
-X-----X--XXX	CP1E3Ly4Li7gra	-----XXXXXXXX-----	CP1E3Ly4Li7gra_Libnetis_granicollis_JX412813	-X-----XXXXXXXX-----	CP1E3Ly4Li7gra_Libnetis_granicollis_JX412813_MERGED
-XX-----X--XXX	CP1E3Ly4Pl7cos	XXXXXXXX-----	CP1E3Ly4Pl7cos_Platycis_cosnardi_amie.idba.135	XXXXXXXX-----X--XXX	CP1E3Ly4Pl7cos_Platycis_cosnardi_amie.idba.135_MERGED
-XX-----X--XXX	CP1E3040m7fon	-XXXXXXXXXXXX-----	CP1E3040m7fon_Omalisus_fontisbellaquei_JX412744	-XXXXXXXXXXXX-----XXX	CP1E3040m7fon_Omalisus_fontisbellaquei_JX412744_MERGED
-X-----X--XXX	CP1E30m4Dr7str	-XXXXXXXXXXXX-----	CP1E30m4Dr7str_Drilonius_striatulus_JX412822	-XXXXXXXXXXXX-----XXX	CP1E30m4Dr7str_Drilonius_striatulus_JX412822_MERGED
XXXXXXXX-XXXXXX-XXX	CP1E3P4R5Rh7luf	XXXXXXXXXXXXXXXX-----	CP1E3P4R5Rh7luf_Rhagophthalmus_lufengensis_NC_010969	XXXXXXXXXXXXXXXX-----	CP1E3P4R5Rh7luf_Rhagophthalmus_lufengensis_NC_010969_MERGED
XXXXXXXXXXXX-XXX-XXX	CP1E3P4R5Rh7ohb	XXXXXXXXXXXXXXXX-----	CP1E3P4R5Rh7ohb_Rhagophthalmus_ohbai_NC_010964	XXXXXXXXXXXXXXXX-----XXX	CP1E3P4R5Rh7ohb_Rhagophthalmus_ohbai_NC_010964_MERGED
-XX-----X--XXX	CP1E3T4Tr7der	XXXXXXXXXXXXXXXX-----	CP1E3T4Tr7der_Trixaqus_dermestoides_BIUK.idba.35	XXXXXXXXXXXXXXXX-----XXX	CP1E3T4Tr7der_Trixaqus_dermestoides_BIUK.idba.35_MERGED
-X-----X--XXX	CP1H3H4H5Be7aff	XXXXXXXXXXXXXXXX-----	CP1H3H4H5Be7aff_Berosus_affinis_1VWB.idba.9	XXXXXXXXXXXXXXXX-----	CP1H3H4H5Be7aff_Berosus_affinis_1VWB.idba.9_MERGED
-XXX-----X-X-XXX	CP1H3H4H5Cy7mar	XXXXXXXXXXXXXXXX-----	CP1H3H4H5Cy7mar_Cymbiodyta_marginella_amie.idba.89	XXXXXXXXXXXXXXXX-----XXX	CP1H3H4H5Cy7mar_Cymbiodyta_marginella_amie.idba.89_MERGED
-XX-----X--XXX	CP1H3H4S5Ce7uni	XXXXXXXXXXXXXXXX-----	CP1H3H4S5Ce7uni_Cercyon_unipunctatus_amie.idba.9	XXXXXXXXXXXXXXXX-----	CP1H3H4S5Ce7uni_Cercyon_unipunctatus_amie.idba.9_MERGED
-XXX-----X--XX-	CP1H3H4S5Cr7min	XXXXXXXXXXXXXXXX-----	CP1H3H4S5Cr7min_Cryptopleurum_minutum_Staph.idba.52	XXXXXXXXXXXXXXXX-----XX-	CP1H3H4S5Cr7min_Cryptopleurum_minutum_Staph.idba.52_MERGED
-X-----X--XXX	CP1H3H4S5Da7abd	XXXXXXXXXXXXXXXX-----	CP1H3H4S5Da7abd_Dactylosternum_abdominale_amie.idba.74	XXXXXXXXXXXXXXXX-----	CP1H3H4S5Da7abd_Dactylosternum_abdominale_amie.idba.74_MERGED
-XX-----X-X-XXX	CP1H3H4S5Sp7bip	XXXXXXXXXXXXXXXX-----	CP1H3H4S5Sp7bip_Sphaeridium_bipustulatum_Staph.idba.49	XXXXXXXXXXXXXXXX-----XXX	CP1H3H4S5Sp7bip_Sphaeridium_bipustulatum_Staph.idba.49_MERGED
-XX-----XXX-XX-	CP1H3Hy4Hy7car	XXXXXXXXXXXXXXXX-----	CP1H3Hy4Hy7car_Hydrochus_carinatus_729517_idba_contig_25	XXXXXXXXXXXXXXXX-----XX-	CP1H3Hy4Hy7car_Hydrochus_carinatus_729517_idba_contig_25_MERGED
-X-----XX-XXX	CP1H13H4D5P6Ki7min	XXXXXXXXXXXXXXXX-----	CP1H13H4D5P6Ki7min_Kissister_minimus_Soil.idba.27	XXXXXXXXXXXXXXXX-----XX-	CP1H13H4D5P6Ki7min_Kissister_minimus_Soil.idba.27_MERGED
-XX-----XXX-XXX	CP1H13H4D5P6Pa7f1a	-XXXXXXXXXXXX-----	CP1H13H4D5P6Pa7f1a_Paromalus_flavicornis_JX412766	-XXXXXXXXXXXX-----XXX	CP1H13H4D5P6Pa7f1a_Paromalus_flavicornis_JX412766_MERGED
-X-----XX-XXX	CP1H13H4H5H16Mar7mer	XXXXXXXXXXXXXXXX-----	CP1H13H4H5H16Mar7mer_Margarinotus_merdarius_Staph.idba.57	XXXXXXXXXXXXXXXX-----	CP1H13H4H5H16Mar7mer_Margarinotus_merdarius_Staph.idba.57_MERGED
XXXXXXXXXXXX-XXX-XXX	CP1H13H4S5Eu7sci	XXXXXXXXXXXXXXXX-----	CP1H13H4S5Eu7sci_Euspilotus_scissus_NC_018353	XXXXXXXXXXXXXXXX-----XX	CP1H13H4S5Eu7sci_Euspilotus_scissus_NC_018353_MERGED
-XX-----XXX-XXX	CP1L3L4Hy7der	-XXXXXXXXXXXX-----	CP1L3L4Hy7der_Hylecoetus_dermestoides_HQ232820	-XXXXXXXXXXXX-----XXX	CP1L3L4Hy7der_Hylecoetus_dermestoides_HQ232820_MERGED
-XX-----XX-XXX	CP1L3L4Ly7nav	XXXXXXXXXXXXXXXX-----	CP1L3L4Ly7nav_Lymexylon_navale_amie.idba.55	XXXXXXXXXXXXXXXX-----XX-	CP1L3L4Ly7nav_Lymexylon_navale_amie.idba.55_MERGED
-X-----XX-XXX	CP1S3H4Me7MEM1	XXXXXXXXXXXXXXXX-----	CP1S3H4Me7MEM1_Meropathus_MEM1_675618_idba_contig_21	XXXXXXXXXXXXXXXX-----XX-	CP1S3H4Me7MEM1_Meropathus_MEM1_675618_idba_contig_21_MERGED
-X-----XX-XXX	CP1S3L4C5Ag7lab	-XXXXXXXXXXXX-----	CP1S3L4C5Ag7lab_Agyrtodes_labralis_JX412779	-XXXXXXXXXXXX-----XX-	CP1S3L4C5Ag7lab_Agyrtodes_labralis_JX412779_MERGED
-X-----XX-XXX	CP1S3L4Ch5Ca7cor	XXXXXXXXXXXXXXXX-----	CP1S3L4Ch5Ca7cor_Catops_coracinus_BIUK.idba.2	XXXXXXXXXXXXXXXX-----XXX	CP1S3L4Ch5Ca7cor_Catops_coracinus_BIUK.idba.2_MERGED
-X-----XX-XXX	CP1S3L4Ch5Es7jea	XXXXXX-----	CP1S3L4Ch5Es7jea_Espnoliella_jeanneli_Staph.idba.86	XXXXXX-----XX-XXX	CP1S3L4Ch5Es7jea_Espnoliella_jeanneli_Staph.idba.86_MERGED
-XX-----XX-XXX	CP1S3L4Ch5Na7ve1	-XXXXXXXXXXXX-----	CP1S3L4Ch5Na7ve1_Nargus_velox_JX313674	-XXXXXXXXXXXX-----XX-	CP1S3L4Ch5Na7ve1_Nargus_velox_JX313674_MERGED
-X-----XX-XXX	CP1S3L4Ch5Pha7fra	XXXXXXXXXXXXXXXX-----	CP1S3L4Ch5Pha7fra_Phacomorphus_fratryi_Staph.idba.18	XXXXXXXXXXXXXXXX-----XXX	CP1S3L4Ch5Pha7fra_Phacomorphus_fratryi_Staph.idba.18_MERGED
-X-----XX-X-X-	CP1S3L4Ch5Pt7ten	XXXXXXXXXXXXXXXX-----	CP1S3L4Ch5Pt7ten_Ptomaphagus_tenuicornis_Soil.idba.24	XXXXXXXXXXXXXXXX-----X-X-	CP1S3L4Ch5Pt7ten_Ptomaphagus_tenuicornis_Soil.idba.24_MERGED
-XX-----X-XX-XXX	CP1S3L4Ch5Sc7wat	XXXXXXXXXXXXXXXX-----	CP1S3L4Ch5Sc7wat_Sciodrepoides_watsoni_Staph.idba.6	XXXXXXXXXXXXXXXX-----XXX	CP1S3L4Ch5Sc7wat_Sciodrepoides_watsoni_Staph.idba.6_MERGED
-X-----X-XX-X-X	CP1S3L4Ch5Tr7oro	XXXXXXXXXXXXXXXX-----	CP1S3L4Ch5Tr7oro_Trapezodirus_oroobios_Staph.idba.25	XXXXXXXXXXXXXXXX-----X-X	CP1S3L4Ch5Tr7oro_Trapezodirus_oroobios_Staph.idba.25_MERGED
-XX-----X-XX-XXX	CP1S3L4L5Ag7atr	XXXXXXXXXXXXXXXX-----	CP1S3L4L5Ag7atr_Agathidium_atrum_BIUK.idba.3	XXXXXXXXXXXXXXXX-----	CP1S3L4L5Ag7atr_Agathidium_atrum_BIUK.idba.3_MERGED
-XX-----XX-XXX	CP1S3L4L5An7hum	-XXXXXXXXXXXX-----	CP1S3L4L5An7hum_Anisotoma_humeralis_amie.idba.93	-XXXXXXXXXXXX-----XX-	CP1S3L4L5An7hum_Anisotoma_humeralis_amie.idba.93_MERGED
-X-----XX-XXX	CP1S3L4L5Le7pic	XXXXXX-----	CP1S3L4L5Le7pic_Leiodes_picea_amie.idba.151	XXXXXX-----	CP1S3L4L5Le7pic_Leiodes_picea_amie.idba.151_MERGED
-X-----XX-XXX	CP1S3L4L5Tr7mae	XXXXXXXXXXXXXXXX-----	CP1S3L4L5Tr7mae_Triarthron_maerkelii_amie.idba.15	XXXXXXXXXXXXXXXX-----	CP1S3L4L5Tr7mae_Triarthron_maerkelii_amie.idba.15_MERGED
-XX-----XX-XXX	CP1S3P4A5Ac7ins	-XXXXXXXXXXXX-----	CP1S3P4A5Ac7ins_Acrotrichis_insularis_BIUK.idba.28	-XXXXXXXXXXXX-----	CP1S3P4A5Ac7ins_Acrotrichis_insularis_BIUK.idba.28_MERGED

-XX-----XX-	CP1S3S4A5A6A17lan	XXXXXXXXXXXXX----	CP1S3S4A5A6A17lan_Aleochara_lanuginosa_BIUk.idba.29	XXXXXXXXXXXXX----	CP1S3S4A5A6A17lan_Aleochara_lanuginosa_BIUk.idba.29_MERGED
-XX-----XX-	CP1S3S4A5A6A17ver	--XXXXX-----	CP1S3S4A5A6A17ver_Aleochara_verna_Staph.idba.93	--XXXXX-----	CP1S3S4A5A6A17ver_Aleochara_verna_Staph.idba.93_MERGED
-X-----XX-	CP1S3S4A5A6A7obf	XXXX-----	CP1S3S4A5A6A7obf_Acrotona_obfuscata_Staph.idba.85	XXXX-----	CP1S3S4A5A6A7obf_Acrotona_obfuscata_Staph.idba.85_MERGED
-XX-----XX-	CP1S3S4A5A6A7cur	XXXXXXXXXXXXX----	CP1S3S4A5A6A7cur_Alloconota_currax_Staph.idba.39	XXXXXXXXXXXXX----	CP1S3S4A5A6A7cur_Alloconota_currax_Staph.idba.39_MERGED
-XX-----XX-	CP1S3S4A5A6A7ana	XX-----XXXX--	CP1S3S4A5A6A7ana_Amischa_analis_Staph.idba.70	XX-----XXXX--	CP1S3S4A5A6A7ana_Amischa_analis_Staph.idba.70_MERGED
-X-----XX-	CP1S3S4A5A6A7ami	XXXXXXXXXXXXX----	CP1S3S4A5A6A7ami_Atheta_amicula_Staph.idba.42	XXXXXXXXXXXXX----	CP1S3S4A5A6A7ami_Atheta_amicula_Staph.idba.42_MERGED
-XX-----XX-	CP1S3S4A5A6A7cas	XXXXXXXXXXXXX----	CP1S3S4A5A6A7cas_Atheta_castanoptera_BIUk.idba.6	XXXXXXXXXXXXX----	CP1S3S4A5A6A7cas_Atheta_castanoptera_BIUk.idba.6_MERGED
-XX-----XX-	CP1S3S4A5A6A7fun	XXXXXXXXXXXXX----	CP1S3S4A5A6A7fun_Atheta_fungi_Soil.idba.12	XXXXXXXXXXXXX----	CP1S3S4A5A6A7fun_Atheta_fungi_Soil.idba.12_MERGED
-X-----XX-	CP1S3S4A5A6A7fung	XXXXXXXXXXXXX----	CP1S3S4A5A6A7fung_Atheta_fungivora_Staph.idba.37	XXXXXXXXXXXXX----	CP1S3S4A5A6A7fung_Atheta_fungivora_Staph.idba.37_MERGED
-XX-----XX-	CP1S3S4A5A6A7gag	XXXXXXXXXXXXX----	CP1S3S4A5A6A7gag_Atheta_gagatina_Staph.idba.20	XXXXXXXXXXXXX----	CP1S3S4A5A6A7gag_Atheta_gagatina_Staph.idba.20_MERGED
-XX-----XX-	CP1S3S4A5A6A7hyp	XXXXXXXXXXXXX----	CP1S3S4A5A6A7hyp_Atheta_hypnorum_BIUk.idba.4	XXXXXXXXXXXXX----	CP1S3S4A5A6A7hyp_Atheta_hypnorum_BIUk.idba.4_MERGED
-XX-----XX-	CP1S3S4A5A6A7vol	-XXXXXXXXXXXXX--	CP1S3S4A5A6A7vol_Atheta_volans_Staph.idba.63	-XXXXXXXXXXXXX--	CP1S3S4A5A6A7vol_Atheta_volans_Staph.idba.63_MERGED
-XX-----XX-	CP1S3S4A5A6Ca7obs	XXXXXXXXXXXXX----	CP1S3S4A5A6Ca7obs_Callicerus_obscurus_Staph.idba.39	XXXXXXXXXXXXX----	CP1S3S4A5A6Ca7obs_Callicerus_obscurus_Staph.idba.39_MERGED
-XX-----XX-	CP1S3S4A5A6Ge7cir	XXXXXXXXXXXXX----	CP1S3S4A5A6Ge7cir_Geostiba_circellaris_BIUk.idba.25	XXXXXXXXXXXXX----	CP1S3S4A5A6Ge7cir_Geostiba_circellaris_BIUk.idba.25_MERGED
-XX-----XX-XX-	CP1S3S4A5A6Li7mic	XXXXXXXXXXXXX----	CP1S3S4A5A6Li7mic_Lioglutula_longiuscula_BIUk.idba.24	XXXXXXXXXXXXX----	CP1S3S4A5A6Li7mic_Lioglutula_longiuscula_BIUk.idba.24_MERGED
-XX-----XX-	CP1S3S4A5A6Mo7fun	-----XXXXX---	CP1S3S4A5A6Mo7fun_Mocyta_fungi_BIUk.idba.80	-----XXXXX---	CP1S3S4A5A6Mo7fun_Mocyta_fungi_BIUk.idba.80_MERGED
-XX-----XX-	CP1S3S4A5B6Eu7opt	XXXXXXXXXXXXX----	CP1S3S4A5B6Eu7opt_Euryusa_optabilis_Staph.idba.22	XXXXXXXXXXXXX----	CP1S3S4A5B6Eu7opt_Euryusa_optabilis_Staph.idba.22_MERGED
-XX-----XX-	CP1S3S4A5Lo6Lo7pub	XXXXXXXXXXXXX----	CP1S3S4A5Lo6Lo7pub_Lomechusa_publicollis_Soil.idba.4	XXXXXXXXXXXXX----	CP1S3S4A5Lo6Lo7pub_Lomechusa_publicollis_Soil.idba.4_MERGED
-XX-----XX-	CP1S3S4A5O6Cr7sut	-XXXXXXXXXXXXX--	CP1S3S4A5O6Cr7sut_Crataraea_suturalis_Staph.idba.50	-XXXXXXXXXXXXX--	CP1S3S4A5O6Cr7sut_Crataraea_suturalis_Staph.idba.50_MERGED
-XX-----XX-	CP1S3S4A5O6De7cor	XXXXXXXXXXXXX----	CP1S3S4A5O6De7cor_Dexiogyia_corticina_Staph.idba.34	XXXXXXXXXXXXX----	CP1S3S4A5O6De7cor_Dexiogyia_corticina_Staph.idba.34_MERGED
-XX-----XX-	CP1S3S4A5O6Ox7acu	XXXXXXXXXXXXX----	CP1S3S4A5O6Ox7acu_Oxypoda_acuminata_BIUk.idba.20	XXXXXXXXXXXXX----	CP1S3S4A5O6Ox7acu_Oxypoda_acuminata_BIUk.idba.20_MERGED
-X-----XX-	CP1S3S4A5O6Ox7bre	XXXXXXXXXXXXX----	CP1S3S4A5O6Ox7bre_Oxypoda_brevicornis_BIUk.idba.22	XXXXXXXXXXXXX----	CP1S3S4A5O6Ox7bre_Oxypoda_brevicornis_BIUk.idba.22_MERGED
-XX-----XX-	CP1S3S4A5O6Ox7lon	XXXXXXXXXXXXX----	CP1S3S4A5O6Ox7lon_Oxypoda_longipes_Staph.idba.36	XXXXXXXXXXXXX----	CP1S3S4A5O6Ox7lon_Oxypoda_longipes_Staph.idba.36_MERGED
-XX-----XX-	CP1S3S4A5O6Ox7opa	X-XXXXXXX-XXXX-	CP1S3S4A5O6Ox7opa_Oxypoda_opaca_JX412751	XXXXXXXXXX-XXXX-	CP1S3S4A5O6Ox7opa_Oxypoda_opaca_JX412751_MERGED
-XX-----XX-	CP1S3S4A5O6Par7lon	--XXXXXXXXX----	CP1S3S4A5O6Par7lon_Parocycusa_longitarsis_JX313678	--XXXXXXXXX----	CP1S3S4A5O6Par7lon_Parocycusa_longitarsis_JX313678_MERGED
-XX-----XX-	CP1S3S4A5O6Ph7tes	--XXXXXXX-----	CP1S3S4A5O6Ph7tes_Phloeopora_testacea_Staph.idba.81	--XXXXXXX-----	CP1S3S4A5O6Ph7tes_Phloeopora_testacea_Staph.idba.81_MERGED
-XX-----XX-	CP1S3S4A5T6Da7fal	XXXXXXXXXXXXX----	CP1S3S4A5T6Da7fal_Dacrila_fallax_Staph.idba.43	XXXXXXXXXXXXX----	CP1S3S4A5T6Da7fal_Dacrila_fallax_Staph.idba.43_MERGED
-XX-----XX-XX-	CP1S3S4A5T6Th7atr	XXXXXXXXXXXXX----	CP1S3S4A5T6Th7atr_Thinonoma_atra_Staph.idba.40	XXXXXXXXXXXXX----	CP1S3S4A5T6Th7atr_Thinonoma_atra_Staph.idba.40_MERGED
-XX-----X--XXX	CP1S3S4Eu5Eu7ruf	XXXXXXXXXXXXX----	CP1S3S4Eu5Eu7ruf_Euaesthetus_ruficapillus_Staph.idba.45	XXXXXXXXXXXXX----	CP1S3S4Eu5Eu7ruf_Euaesthetus_ruficapillus_Staph.idba.45_MERGED
-XX-----X-XXX-XXX	CP1S3S4H5Ha7cap	XXXXXXXXXXXXX----	CP1S3S4H5Ha7cap_Habrocerus_capillaricornis_JX412795	XXXXXXXXXXXXX----	CP1S3S4H5Ha7cap_Habrocerus_capillaricornis_JX412795_MERGED
-XX-----XX-	CP1S3S4O5An7atr	XXXXXXXXX-----	CP1S3S4O5An7atr_Anthobium_atrocephalum_BIUk.idba.67	XXXXXXXXX-----	CP1S3S4O5An7atr_Anthobium_atrocephalum_BIUk.idba.67_MERGED
-X-----XX-	CP1S3S4O5An7mel	XXXXXXXXXXXXX----	CP1S3S4O5An7mel_Anthobium_melanocephalum_ameie.idba.2	XXXXXXXXXXXXX----	CP1S3S4O5An7mel_Anthobium_melanocephalum_ameie.idba.2_MERGED
-X-----XX-	CP1S3S4O5Eu7tor	XXXXXXXXXXXXX----	CP1S3S4O5Eu7tor_Euspalerum_torquatum_Staph.idba.31	XXXXXXXXXXXXX----	CP1S3S4O5Eu7tor_Euspalerum_torquatum_Staph.idba.31_MERGED
-XX-----XX-	CP1S3S4O5Ne7bru	XXXXXXXXXXXXX----	CP1S3S4O5Ne7bru_Neophonus_bruchi_Staph.idba.0	XXXXXXXXXXXXX----	CP1S3S4O5Ne7bru_Neophonus_bruchi_Staph.idba.0_MERGED
-X-----XX-	CP1S3S4O5O17pic	XXXXXXXXXXXXX----	CP1S3S4O5O17pic_Olophrum_piceum_Staph.idba.35	XXXXXXXXXXXXX----	CP1S3S4O5O17pic_Olophrum_piceum_Staph.idba.35_MERGED
-XX-----XX-	CP1S3S4O5Om7riv	--XXXXXXXXXXXXX--	CP1S3S4O5Om7riv_Omalium_rivulare_JX412759	--XXXXXXXXXXXXX--	CP1S3S4O5Om7riv_Omalium_rivulare_JX412759_MERGED
-XX-----XX-	CP1S3S4O5Om7rug	XXXXXXXXXXXXX----	CP1S3S4O5Om7rug_Omalium_rugatum_BIUk.idba.7	XXXXXXXXXXXXX----	CP1S3S4O5Om7rug_Omalium_rugatum_BIUk.idba.7_MERGED
-X-----XX-	CP1S3S4Ox5An7mut	-XXXXXXXXXXXXX--	CP1S3S4Ox5An7mut_Anotylus_mutator_BIUk.idba.48	-XXXXXXXXXXXXX--	CP1S3S4Ox5An7mut_Anotylus_mutator_BIUk.idba.48_MERGED
-XX-----XX-	CP1S3S4Ox5An7scu	-XXXXXXXXX-----	CP1S3S4Ox5An7scu_Anotylus_sculpturatus_Staph.idba.76	-XXXXXXXXX-----	CP1S3S4Ox5An7scu_Anotylus_sculpturatus_Staph.idba.76_MERGED
-X-----XX-	CP1S3S4Ox5Ca7ful	X-XXXXXXXXX-----	CP1S3S4Ox5Ca7ful_Carpelimus_fuliginosus_ameie.idba.60	XXXXXXXXXXXXX-----	CP1S3S4Ox5Ca7ful_Carpelimus_fuliginosus_ameie.idba.60_MERGED
-XX-----XX-	CP1S3S4Ox5Ox7pic	XXXXXXXXXXXXX----	CP1S3S4Ox5Ox7pic_Oxytelus_piceus_ameie.idba.86	XXXXXXXXXXXXX----	CP1S3S4Ox5Ox7pic_Oxytelus_piceus_ameie.idba.86_MERGED
-X-----XX-XXX	CP1S3S4P5As7lyo	XXXXXXXXXXXXX----	CP1S3S4P5As7lyo_Astenus_lyonessius_Staph.idba.17	XXXXXXXXXXXXX----	CP1S3S4P5As7lyo_Astenus_lyonessius_Staph.idba.17_MERGED
-X-----XX-	CP1S3S4P5Hy7deb	--XXXXXXXXX----	CP1S3S4P5Hy7deb_Hypomedon_debiliaricornis_JX313672	--XXXXXXXXX----	CP1S3S4P5Hy7deb_Hypomedon_debiliaricornis_JX313672_MERGED
-XX-----XX-	CP1S3S4P5La7bru	XXXXXXXXXXXXX----	CP1S3S4P5La7bru_Lathrobium_brunnipes_Staph.idba.10	XXXXXXXXXXXXX----	CP1S3S4P5La7bru_Lathrobium_brunnipes_Staph.idba.10_MERGED
-XX-----XX-	CP1S3S4P5La7ful	XXXXXXX-----	CP1S3S4P5La7ful_Lathrobium_fulvipenne_BIUk.idba.70	XXXXXXX-----	CP1S3S4P5La7ful_Lathrobium_fulvipenne_BIUk.idba.70_MERGED
-XX-----XX-	CP1S3S4P5Me7api	XXXXXXXXXXXXX----	CP1S3S4P5Me7api_Medon_apicalis_Staph.idba.9	XXXXXXXXXXXXX----	CP1S3S4P5Me7api_Medon_apicalis_Staph.idba.9_MERGED
-X-----XX-	CP1S3S4P5Me7pic	XXXXXXXXXXXXX----	CP1S3S4P5Me7pic_Medon_piceus_ameie.idba.112	XXXXXXXXXXXXX----	CP1S3S4P5Me7pic_Medon_piceus_ameie.idba.112_MERGED
-XX-----XX-	CP1S3S4P5Ru7gen	XXXXXXXXXXXXX----	CP1S3S4P5Ru7gen_Rugilus_geniculatus_Staph.idba.38	XXXXXXXXXXXXX----	CP1S3S4P5Ru7gen_Rugilus_geniculatus_Staph.idba.38_MERGED
-X-----XX-	CP1S3S4P5Su7mel	XXXXXXXXXXXXX----	CP1S3S4P5Su7mel_Sunius_melanocephalus_Staph.idba.61	XXXXXXXXXXXXX----	CP1S3S4P5Su7mel_Sunius_melanocephalus_Staph.idba.61_MERGED
-XX-----XX-	CP1S3S4P5Te7ter	XXXXXXXXXXXXX----	CP1S3S4P5Te7ter_Tetartopeus_terminatus_Staph.idba.27	XXXXXXXXXXXXX----	CP1S3S4P5Te7ter_Tetartopeus_terminatus_Staph.idba.27_MERGED
-XX-----XX-	CP1S3S4Ps5Bra7fos	XXXXXXXXXXXXX----	CP1S3S4Ps5Bra7fos_Brachygluta_fossulata_BIUk.idba.21	XXXXXXXXXXXXX----	CP1S3S4Ps5Bra7fos_Brachygluta_fossulata_BIUk.idba.21_MERGED
-XX-----X--	CP1S3S4Ps5Bra7hel	XXXXXXX-----	CP1S3S4Ps5Bra7hel_Brachygluta_helferi_Staph.idba.82	XXXXXXX-----	CP1S3S4Ps5Bra7hel_Brachygluta_helferi_Staph.idba.82_MERGED
-X-----XX-	CP1S3S4Ps5Ct7pic	XXXXX-----	CP1S3S4Ps5Ct7pic_Ctenisodes_piceus_Staph.idba.88	XXXXX-----	CP1S3S4Ps5Ct7pic_Ctenisodes_piceus_Staph.idba.88_MERGED
-XX-----XX-	CP1S3S4Ps5Eu7pic	-XXXXXXXXXXXX--	CP1S3S4Ps5Eu7pic_Euplectus_piceus_BIUk.idba.53	-XXXXXXXXXXXX--	CP1S3S4Ps5Eu7pic_Euplectus_piceus_BIUk.idba.53_MERGED
-XX-----XX-	CP1S3S4Ps5Ty7nig	XXXXXXXXXXXXX----	CP1S3S4Ps5Ty7nig_Tychus_niger_BIUk.idba.17	XXXXXXXXXXXXX----	CP1S3S4Ps5Ty7nig_Tychus_niger_BIUk.idba.17_MERGED

--X-----	CP1S3S4Q5Qu7nem	XXXXXXXXXXXXX	CP1S3S4Q5Qu7nem_Quedius_nemoralis_BIUK.idba.5	XXXXXXXXXXXXX	CP1S3S4Q5Qu7nem_Quedius_nemoralis_BIUK.idba.5_MERGED
--X-----XX-	CP1S3S4S5Br7lat	--XXXXXXXXX	CP1S3S4S5Br7lat_Brachynopus_latus_JX412745	--XXXXXXXXX	CP1S3S4S5Br7lat_Brachynopus_latus_JX412745_MERGED
-XX-----XX-XXX	CP1S3S4S5Sc7qua	XXXXXXXXXXXXX	CP1S3S4S5Sc7qua_Scaphidium_quadrimaculatum_Staph.idba.5	XXXXXXXXXXXXX	CP1S3S4S5Sc7qua_Scaphidium_quadrimaculatum_Staph.idba.5_MERGED
-X-----	CP1S3S4S5Sca7bol	XXXXXXXXXXXXX	CP1S3S4S5Sca7bol_Scaphisoma_boleti_Staph.idba.55	XXXXXXXXXXXXX	CP1S3S4S5Sca7bol_Scaphisoma_boleti_Staph.idba.55_MERGED
-XX-----X-----	CP1S3S4St5St7cla	XXXXXXXXXXXXX	CP1S3S4St5St7cla_Stenus_clavicornis_2VGB.idba.1	XXXXXXXXXXXXX	CP1S3S4St5St7cla_Stenus_clavicornis_2VGB.idba.1_MERGED
-XX-----X-----	CP1S3S4St5St7com	XXXXXXXXXXXXX	CP1S3S4St5St7com_Stenus_comma_Staph.idba.58	XXXXXXXXXXXXX	CP1S3S4St5St7com_Stenus_comma_Staph.idba.58_MERGED
-XX-----XX-	CP1S3S4St506At7aff	XXXXXXXXXXXXX	CP1S3S4St506At7aff_Atreucus_affinis_Staph.idba.41	XXXXXXXXXXXXX	CP1S3S4St506At7aff_Atreucus_affinis_Staph.idba.41_MERGED
-XX-----	CP1S3S4St5060t7lae	XXXXXX	CP1S3S4St5060t7lae_Othius_laeviusculus_amei.idba.150	XXXXXX	CP1S3S4St5060t7lae_Othius_laeviusculus_amei.idba.150_MERGED
-XX-----	CP1S3S4St5060t7pun	XXXXXX	CP1S3S4St5060t7pun_Othius_punctulatus_Soil.idba.158	XXXXXX	CP1S3S4St5060t7pun_Othius_punctulatus_Soil.idba.158_MERGED
-XX-----	CP1S3S4St5066a7pil	XXXXXXXXXXXXX	CP1S3S4St5066a7pil_Gabrius_piliger_Staph.idba.12	XXXXXXXXXXXXX	CP1S3S4St5066a7pil_Gabrius_piliger_Staph.idba.12_MERGED
-XX-----	CP1S3S4St5066B17sor	XXXXXXXXXXXXX	CP1S3S4St5066B17sor_Bisnius_sordidus_Staph.idba.16	XXXXXXXXXXXXX	CP1S3S4St5066B17sor_Bisnius_sordidus_Staph.idba.16_MERGED
-X-----	CP1S3S4St5066ab7the	XXXXXXXXXXXXX	CP1S3S4St5066ab7the_Gabronthus_thermarum_Staph.idba.53	XXXXXXXXXXXXX	CP1S3S4St5066ab7the_Gabronthus_thermarum_Staph.idba.53_MERGED
-XX-----XX-	CP1S3S4St5066Ne7vil	XXXXXXXXXXXXX	CP1S3S4St5066Ne7vil_Neobisnius_villosulus_Staph.idba.1	XXXXXXXXXXXXX	CP1S3S4St5066Ne7vil_Neobisnius_villosulus_Staph.idba.1_MERGED
-XX-----XX-	CP1S3S4St5060c7aet	XXXXXXXXXXXXX	CP1S3S4St5060c7aet_Ocypus_aethiops_Soil.idba.34	XXXXXXXXXXXXX	CP1S3S4St5060c7aet_Ocypus_aethiops_Soil.idba.34_MERGED
-X-----	CP1S3S4St5060c7bru	XXXXXXXXXXXXX	CP1S3S4St5060c7bru_Ocypus_brunnipes_Staph.idba.56	XXXXXXXXXXXXX	CP1S3S4St5060c7bru_Ocypus_brunnipes_Staph.idba.56_MERGED
-XX-----	CP1S3S4St5060c7ole	XXXXXXXXXXXXX	CP1S3S4St5060c7ole_Ocypus_olens_2VGB.idba.7	XXXXXXXXXXXXX	CP1S3S4St5060c7ole_Ocypus_olens_2VGB.idba.7_MERGED
-XX-----XX-	CP1S3S4St5060c7oph	XXXXXXXXXXXXX	CP1S3S4St5060c7oph_Ocypus_ophthalmicus_amei.idba.21	XXXXXXXXXXXXX	CP1S3S4St5060c7oph_Ocypus_ophthalmicus_amei.idba.21_MERGED
-XX-----XX-	CP1S3S4St5060n7tes	XXXXXXXXXXXXX	CP1S3S4St5060n7tes_Ontholestes_tessellatus_amei.idba.69	XXXXXXXXXXXXX	CP1S3S4St5060n7tes_Ontholestes_tessellatus_amei.idba.69_MERGED
-XX-----XX-	CP1S3S4St506Ph7fim	XXXXXXXXXXXXX	CP1S3S4St506Ph7fim_Philonthus_fimeticus_Staph.idba.11	XXXXXXXXXXXXX	CP1S3S4St506Ph7fim_Philonthus_fimeticus_Staph.idba.11_MERGED
-X-----	CP1S3S4St506Ta7mor	XXXXXXXXXXXXX	CP1S3S4St506Ta7mor_Tasgius_morsitans_Staph.idba.32	XXXXXXXXXXXXX	CP1S3S4St506Ta7mor_Tasgius_morsitans_Staph.idba.32_MERGED
-XX-----	CP1S3S4St506Gy7fra	XXXXXXXXXXXXX	CP1S3S4St506Gy7fra_Gyrohypnus_fracticornis_Staph.idba.29	XXXXXXXXXXXXX	CP1S3S4St506Gy7fra_Gyrohypnus_fracticornis_Staph.idba.29_MERGED
-XX-----XX-	CP1S3S4St506Nu7len	XXXXXX	CP1S3S4St506Nu7len_Nudobius_lentus_Staph.idba.72	XXXXXX	CP1S3S4St506Nu7len_Nudobius_lentus_Staph.idba.72_MERGED
-X-----	CP1S3S4T5Bo7cas	XXXXXXXXXXXXX	CP1S3S4T5Bo7cas_Bolitobius_castaneus_BIUK.idba.14	XXXXXXXXXXXXX	CP1S3S4T5Bo7cas_Bolitobius_castaneus_BIUK.idba.14_MERGED
-X-----	CP1S3S4T5Lo7exo	XXXXXXXXXXXXX	CP1S3S4T5Lo7exo_Lordithon_exoletus_amei.idba.7	XXXXXXXXXXXXX	CP1S3S4T5Lo7exo_Lordithon_exoletus_amei.idba.7_MERGED
-X-----XX-	CP1S3S4T5Se7bip	XXXXXXXXXXXXX	CP1S3S4T5Se7bip_Sepedophilus_bipunctatus_Staph.idba.23	XXXXXXXXXXXXX	CP1S3S4T5Se7bip_Sepedophilus_bipunctatus_Staph.idba.23_MERGED
-XX-----	CP1S3S4T5Ta7chr	XXXXXXXXXXXXX	CP1S3S4T5Ta7chr_Tachyporus_chrysolinellus_Soil.idba.10	XXXXXXXXXXXXX	CP1S3S4T5Ta7chr_Tachyporus_chrysolinellus_Soil.idba.10_MERGED
-X-----	CP1S3S4T5Tac7lat	XXXXXXXXXXXXX	CP1S3S4T5Tac7lat_Tachinus_laticollis_BIUK.idba.8	XXXXXXXXXXXXX	CP1S3S4T5Tac7lat_Tachinus_laticollis_BIUK.idba.8_MERGED
-XX-----	CP1S3S4T5Tac7sub	XXXXXXXXXXXXX	CP1S3S4T5Tac7sub_Tachinus_subterraneus_amei.idba.1	XXXXXXXXXXXXX	CP1S3S4T5Tac7sub_Tachinus_subterraneus_amei.idba.1_MERGED
-XX-----XX-	CP1S3Sc4Ce7gal	XXXXXX	CP1S3Sc4Ce7gal_Cephennium_gallicum_BIUK.idba.66	XXXXXX	CP1S3Sc4Ce7gal_Cephennium_gallicum_BIUK.idba.66_MERGED
XXXXXXXXXXXXX--X	CP1S3S14S5Ne7ame	XXXXXXXXXXXXX	CP1S3S14S5Ne7ame_Necrophila_americae_NC_018352	XXXXXXXXXXXXX	CP1S3S14S5Ne7ame_Necrophila_americae_NC_018352_MERGED
-X-----	CP1S3S14S5S17tyr	XXXXXXXXXXXXX	CP1S3S14S5S17tyr_Silpha_tyrolensis_amei.idba.102	XXXXXXXXXXXXX	CP1S3S14S5S17tyr_Silpha_tyrolensis_amei.idba.102_MERGED
-XX-----XX-XX-	CP1Sc3Ge4An7ste	--XXXXXXXXX	CP1Sc3Ge4An7ste_Anoplotrupes_stercorosus_JX412838	--XXXXXXXXX	CP1Sc3Ge4An7ste_Anoplotrupes_stercorosus_JX412838_MERGED
-XX-----XX-	CP1Sc3L4Lu5Do7par	XXXXXX	CP1Sc3L4Lu5Do7par_Dorcus_parallepipedus_2VGB.idba.16	XXXXXX	CP1Sc3L4Lu5Do7par_Dorcus_parallepipedus_2VGB.idba.16_MERGED
-XX-----	CP1Sc3L4Lu5Lu7cer	XXXXXXXXXXXXX	CP1Sc3L4Lu5Lu7cer_Lucanus_cervus_2VGB.idba.13	XXXXXXXXXXXXX	CP1Sc3L4Lu5Lu7cer_Lucanus_cervus_2VGB.idba.13_MERGED
XXXXXXXXXXXXX--X	CP1Sc3L4Lu5Lu7maz	XXXXXXXXXXXXX	CP1Sc3L4Lu5Lu7maz_Lucanus_mazama_NC_013578	XXXXXXXXXXXXX	CP1Sc3L4Lu5Lu7maz_Lucanus_mazama_NC_013578_MERGED
-X-----X---X	CP1Sc3L4S5Ce7chr	XXXXXXXXXXXXX	CP1Sc3L4S5Ce7chr_Ceruchus_chrysolinellus_amei.idba.108	XXXXXXXXXXXXX	CP1Sc3L4S5Ce7chr_Ceruchus_chrysolinellus_amei.idba.108_MERGED
--XX-----	CP1Sc3S4A5Ap7ele	XXXXXXXXXXXXX	CP1Sc3S4A5Ap7ele_Aphodius_elevatus_Soil.idba.32	XXXXXXXXXXXXX	CP1Sc3S4A5Ap7ele_Aphodius_elevatus_Soil.idba.32_MERGED
-XX-----	CP1Sc3S4A5Ap7foe	-----XXXXXX	CP1Sc3S4A5Ap7foe_Aphodius_foetens_amei.idba.115	-XX-XXXXXX	CP1Sc3S4A5Ap7foe_Aphodius_foetens_amei.idba.115_MERGED
-XX-----	CP1Sc3S4A5Ap7mer	XXXXXXXXXXXXX	CP1Sc3S4A5Ap7mer_Aphodius_merdarius_Soil.idba.93	XXXXXXXXXXXXX	CP1Sc3S4A5Ap7mer_Aphodius_merdarius_Soil.idba.93_MERGED
-XX-----X---XXX	CP1Sc3S4A5Ox7syl	XXXXXXXXXXXXX	CP1Sc3S4A5Ox7syl_Oxyomus_sylvestris_amei.idba.121	XXXXXXXXXXXXX	CP1Sc3S4A5Ox7syl_Oxyomus_sylvestris_amei.idba.121_MERGED
-XX-----X	CP1Sc3S4A5Ple7cae	XXXXXXXXXXXXX	CP1Sc3S4A5Ple7cae_Pleurophorus_caesus_Soil.idba.33	XXXXXXXXXXXXX	CP1Sc3S4A5Ple7cae_Pleurophorus_caesus_Soil.idba.33_MERGED
-X-----XX---X	CP1Sc3S4D5Cyp7val	XXXXXXXXXXXXX	CP1Sc3S4D5Cyp7val_Cyphonistes_vallatus_JX412731	XXXXXXXXXXXXX	CP1Sc3S4D5Cyp7val_Cyphonistes_vallatus_JX412731_MERGED
XXXXXXXXXX-X-X-X	CP1Sc3S4M5Chei7jan	XXXXXXXXXXXXX	CP1Sc3S4M5Chei7jan_Cheirotonus_jansoni_NC_023246	XXXXXXXXXXXXX	CP1Sc3S4M5Chei7jan_Cheirotonus_jansoni_NC_023246_MERGED
-XX-----	CP1Sc3S4M5Me7hip	XXXXXXXXXXXXX	CP1Sc3S4M5Me7hip_Melolontha_hippocastani_amei.idba.79	XXXXXXXXXXXXX	CP1Sc3S4M5Me7hip_Melolontha_hippocastani_amei.idba.79_MERGED
XXXXXXXXXXXXX--X	CP1Sc3S4M5Rh7mag	XXXXXXXXXXXXX	CP1Sc3S4M5Rh7mag_Rhopaea_magnicornis_NC_013252	XXXXXXXXXXXXX	CP1Sc3S4M5Rh7mag_Rhopaea_magnicornis_NC_013252_MERGED
-XX-----XX-XXX	CP1Sc3S4R5Ph7hor	--XXXXX	CP1Sc3S4R5Ph7hor_Phyllopertha_horticola_amei.idba.189	XXXXXX	CP1Sc3S4R5Ph7hor_Phyllopertha_horticola_amei.idba.189_MERGED
-XX-----X---X	CP1Sc3S4S5Bu7bis	XXXXXXXXXXXXX	CP1Sc3S4S5Bu7bis_Bubas_bison_CS.idba.2	XXXXXXXXXXXXX	CP1Sc3S4S5Bu7bis_Bubas_bison_CS.idba.2_MERGED
--XX-----X---X	CP1Sc3S4S5Bu7bub	XXXXXXXXXXXXX	CP1Sc3S4S5Bu7bub_Bubas_bubalus_CS.idba.14	XXXXXXXXXXXXX	CP1Sc3S4S5Bu7bub_Bubas_bubalus_CS.idba.14_MERGED
-X-----X	CP1Sc3S4S5C6Ca7aeq	XXXXXX	CP1Sc3S4S5C6Ca7aeq_Canthon_aequinoctialis_Panama.idba.243	XXXXXX	CP1Sc3S4S5C6Ca7aeq_Canthon_aequinoctialis_Panama.idba.243_MERGED
-X-----X---XXX	CP1Sc3S4S5Ca7bin	XXXXXXXXXXXXX	CP1Sc3S4S5Ca7bin_Caccobius_binodulus_CS.idba.46	XXXXXXXXXXXXX	CP1Sc3S4S5Ca7bin_Caccobius_binodulus_CS.idba.46_MERGED
-X-----X---X	CP1Sc3S4S5Ca7nig	XXXXXXXXXXXXX	CP1Sc3S4S5Ca7nig_Caccobius_nigriritulus_CS.idba.25	XXXXXXXXXXXXX	CP1Sc3S4S5Ca7nig_Caccobius_nigriritulus_CS.idba.25_MERGED
-X-----X---XXX	CP1Sc3S4S5Cl7con	XXXXXX	CP1Sc3S4S5Cl7con_Cleptocaccobius_convexifrons_CS.idba.80	XXXXXX	CP1Sc3S4S5Cl7con_Cleptocaccobius_convexifrons_CS.idba.80_MERGED
-X-----X---XXX	CP1Sc3S4S5Dig7dia	XXXXXXXXXXXXX	CP1Sc3S4S5Dig7dia_Onthophagus_diabolicus_Scarab.idba.18	XXXXXXXXXXXXX	CP1Sc3S4S5Dig7dia_Onthophagus_diabolicus_Scarab.idba.18_MERGED
-XXX-----X-XX---X	CP1Sc3S4S5Dig7gaz	XXXXXXXXXXXXX	CP1Sc3S4S5Dig7gaz_Digitonthophagus_gazella_Scarab.idba.8	XXXXXXXXXXXXX	CP1Sc3S4S5Dig7gaz_Digitonthophagus_gazella_Scarab.idba.8_MERGED
-X-----X---X	CP1Sc3S4S5Dr7kir	XXXXXXXXXXXXX	CP1Sc3S4S5Dr7kir_Drepanocerus_kirbyi_CS.idba.15	XXXXXXXXXXXXX	CP1Sc3S4S5Dr7kir_Drepanocerus_kirbyi_CS.idba.15_MERGED

--X-----X----	CP1Sc3S4S5Eu6Eu7car	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu6Eu7car_Cheironitis_hoplosternus_Scarab.idba.15	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu6Eu7car_Cheironitis_hoplosternus_Scarab.idba.15_MERGED
--X-----X----	CP1Sc3S4S5Eu6Eu7foe	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu6Eu7foe_Eurysternus_foedus_Scarab.idba.1	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu6Eu7foe_Eurysternus_foedus_Scarab.idba.1_MERGED
--X-----X----	CP1Sc3S4S5Eu6Eu7ham	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu6Eu7ham_Eurysternus_hamaticollis_CS.idba.53	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu6Eu7ham_Eurysternus_hamaticollis_CS.idba.53_MERGED
--X-----X----	CP1Sc3S4S5Eu6Eu7inf	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu6Eu7inf_Eurysternus_inflexus_CS.idba.17	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu6Eu7inf_Eurysternus_inflexus_CS.idba.17_MERGED
-XX-----X----	CP1Sc3S4S5Eu7ful	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu7ful_Euoniticellus_fulvus_Scarab.idba.0	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Eu7ful_Euoniticellus_fulvus_Scarab.idba.0_MERGED
-XX-----X----	CP1Sc3S4S5Eu7int	XXXXXXXXXXXXX----	CP1Sc3S4S5Eu7int_Euoniticellus_intermedius_CS.idba.5	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Eu7int_Euoniticellus_intermedius_CS.idba.5_MERGED
--X-----X----	CP1Sc3S4S5Euon7car	-XXXXXXXXXXXXX----	CP1Sc3S4S5Euon7car_Onthophagus_carbonarius_Scarab.idba.19	-XXXXXXXXXXXXX-XX	CP1Sc3S4S5Euon7car_Onthophagus_carbonarius_Scarab.idba.19_MERGED
--X-----X-XX-XXX	CP1Sc3S4S5Hel7qua	XXXX-----X-XX-XXX	CP1Sc3S4S5Hel7qua_Helictopleurus_quadripunctatus_CS.idba.79	XXXX-----X-XX-XXX	CP1Sc3S4S5Hel7qua_Helictopleurus_quadripunctatus_CS.idba.79_MERGED
--X-----X-XXX	CP1Sc3S4S5Het7cas	XXXXXXXXXXXXX----	CP1Sc3S4S5Het7cas_Heteronitis_castelnaui_CS.idba.56	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Het7cas_Heteronitis_castelnaui_CS.idba.56_MERGED
--X-----X-XXX	CP1Sc3S4S5Hy7alc	XXXXXXXXXXXXX----	CP1Sc3S4S5Hy7alc_Hyalonthophagus_alcyon_CS.idba.42	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Hy7alc_Hyalonthophagus_alcyon_CS.idba.42_MERGED
--X-----X-X-XXX	CP1Sc3S4S5Li7mil	--XXXXXXXX-----	CP1Sc3S4S5Li7mil_Liatongus_militaris_Scarab.idba.22	--XXXXXXXX-X-XXX	CP1Sc3S4S5Li7mil_Liatongus_militaris_Scarab.idba.22_MERGED
--X-----X-XXX	CP1Sc3S4S5Mi7api	XXXXXXXXXXXXX----	CP1Sc3S4S5Mi7api_Millichus_apicalis_CS.idba.13	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Mi7api_Millichus_apicalis_CS.idba.13_MERGED
--X-----X-XXX	CP1Sc3S4S5On7ale	XXXXXXXXXXXXX----	CP1Sc3S4S5On7ale_Onitis_alexis_CS.idba.60	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7ale_Onitis_alexis_CS.idba.60_MERGED
--X-----X-XXX	CP1Sc3S4S5On7caf	XXXXXXXXXXXXX----	CP1Sc3S4S5On7caf_Onitis_caffer_CS.idba.6	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7caf_Onitis_caffer_CS.idba.6_MERGED
--X-----X-XXX	CP1Sc3S4S5On7fal	XXXXXXXXXXXXX----	CP1Sc3S4S5On7fal_Onitis_falcatatus_CS.idba.22	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7fal_Onitis_falcatatus_CS.idba.22_MERGED
-XX-----X-XXX	CP1Sc3S4S5On7ful	-----XXXXXXXX----	CP1Sc3S4S5On7ful_Onitis_fulgidus_CS.idba.62	-----XXXXXXXX-XX	CP1Sc3S4S5On7ful_Onitis_fulgidus_CS.idba.62_MERGED
--X-----X-XXX	CP1Sc3S4S5On7egr	XXXXXXXXXXXXX----	CP1Sc3S4S5On7egr_Oniticeilus_egregius_CS.idba.9	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7egr_Oniticeilus_egregius_CS.idba.9_MERGED
--X-----X-XXX	CP1Sc3S4S5On7bid	-----XXXXXXXX----	CP1Sc3S4S5On7bid_Onthophagus_bidentatus_CS.idba.77	--X-----XXXXX-XX	CP1Sc3S4S5On7bid_Onthophagus_bidentatus_CS.idba.77_MERGED
-XX-----XX----	CP1Sc3S4S5On7cly	XXXXXXXXXXXXX----	CP1Sc3S4S5On7cly_Onthophagus_clypeatus_CS.idba.50	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7cly_Onthophagus_clypeatus_CS.idba.50_MERGED
-XX-----XX----	CP1Sc3S4S5On7coe	XXXXXXXXXXXXX----	CP1Sc3S4S5On7coe_Onthophagus_coenobita_CS.idba.24	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7coe_Onthophagus_coenobita_CS.idba.24_MERGED
--X-----X-XXX	CP1Sc3S4S5On7fim	XXXXXXXXXXXXX----	CP1Sc3S4S5On7fim_Onthophagus_fimetarius_Scarab.idba.6	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7fim_Onthophagus_fimetarius_Scarab.idba.6_MERGED
-X-X-----XX----	CP1Sc3S4S5On7gra	XXXXXXXXXXXXX----	CP1Sc3S4S5On7gra_Onthophagus_gracillipes_Scarab.idba.3	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7gra_Onthophagus_gracillipes_Scarab.idba.3_MERGED
-XX-----XX----	CP1Sc3S4S5On7hae	XXXXXXXXXXXXX----	CP1Sc3S4S5On7hae_Onthophagus_haematopus_CS.idba.41	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7hae_Onthophagus_haematopus_CS.idba.41_MERGED
--XX-----XX----	CP1Sc3S4S5On7lat	-XXXXXXXXXXXXX----	CP1Sc3S4S5On7lat_Onthophagus_laticollis_Scarab.idba.13	-XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7lat_Onthophagus_laticollis_Scarab.idba.13_MERGED
--X-----X-XXX	CP1Sc3S4S5On7lon	XXXXXXXXXXXXX----	CP1Sc3S4S5On7lon_Onthophagus_longimanus_CS.idba.23	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7lon_Onthophagus_longimanus_CS.idba.23_MERGED
--X-----X-XXX	CP1Sc3S4S5On7nit	-XXXXXXXXXXXXX----	CP1Sc3S4S5On7nit_Onthophagus_nitidior_CS.idba.10	-XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7nit_Onthophagus_nitidior_CS.idba.10_MERGED
--X-----X-XXX	CP1Sc3S4S5On7obs	XXXXXXXXXXXXX----	CP1Sc3S4S5On7obs_Onthophagus_obscurior_CS.idba.31	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7obs_Onthophagus_obscurior_CS.idba.31_MERGED
-XX-----X-XXX	CP1Sc3S4S5On7och	-----XXXXX----	CP1Sc3S4S5On7och_Onthophagus_ochreatus_Scarab.idba.30	-----XXXXX-XX	CP1Sc3S4S5On7och_Onthophagus_ochreatus_Scarab.idba.30_MERGED
--X-----X-XXX	CP1Sc3S4S5On7rhi	XXXXXXXXXXXXX----	CP1Sc3S4S5On7rhi_Onthophagus_rhinolophus_Scarab.idba.2	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7rhi_Onthophagus_rhinolophus_Scarab.idba.2_MERGED
--X-----X-XXX	CP1Sc3S4S5On7ror	XXXXXXXXXXXXX----	CP1Sc3S4S5On7ror_Onthophagus_rorarius_CS.idba.1	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7ror_Onthophagus_rorarius_CS.idba.1_MERGED
--X-----X-XXX	CP1Sc3S4S5On7sem	XXXXXXXXXXXXX----	CP1Sc3S4S5On7sem_Onthophagus_semiareus_CS.idba.51	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7sem_Onthophagus_semiareus_CS.idba.51_MERGED
-XX-----X-X-XX	CP1Sc3S4S5On7sim	XXXXXXXXXXXXX----	CP1Sc3S4S5On7sim_Onthophagus_similis_CS.idba.37	XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7sim_Onthophagus_similis_CS.idba.37_MERGED
-XX-----X-XXX	CP1Sc3S4S5On7vac	-XXXXXXXXXXXXX----	CP1Sc3S4S5On7vac_Onthophagus_vacca_CS.idba.55	-XXXXXXXXXXXXX-XX	CP1Sc3S4S5On7vac_Onthophagus_vacca_CS.idba.55_MERGED
--X-----X-XXX	CP1Sc3S4S5On7vul	-----XXXXXXXX----	CP1Sc3S4S5On7vul_Onthophagus_vulpes_CS.idba.70	--X-----XXXXX-XX	CP1Sc3S4S5On7vul_Onthophagus_vulpes_CS.idba.70_MERGED
--X-----X-XXX	CP1Sc3S4S5Ph7ard	XXXXXXXXXXXXX----	CP1Sc3S4S5Ph7ard_Phalops_ardea_CS.idba.8	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Ph7ard_Phalops_ardea_CS.idba.8_MERGED
--X-----X-XXX	CP1Sc3S4S5Pr7bic	XXXXXXXXXXXXX----	CP1Sc3S4S5Pr7bic_Proagoderus_bicallosus_CS.idba.3	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Pr7bic_Proagoderus_bicallosus_CS.idba.3_MERGED
--X-----X-XXX	CP1Sc3S4S5Pr7sch	XXXXXXXXXXXXX----	CP1Sc3S4S5Pr7sch_Proagoderus_schwani CS.idba.12	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Pr7sch_Proagoderus_schwani CS.idba.12_MERGED
-X-----X-XXX	CP1Sc3S4S5Ti7sar	XXXXXXXXXXXXX----	CP1Sc3S4S5Ti7sar_Tiniocellus_sarawacus_CS.idba.21	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Ti7sar_Tiniocellus_sarawacus_CS.idba.21_MERGED
--X-----X-XXX	CP1Sc3S4S5Tra7dim	XXXXXXXXXXXXX----	CP1Sc3S4S5Tra7dim_Tragiscus_dimidiatus_Scarab.idba.4	XXXXXXXXXXXXX-XX	CP1Sc3S4S5Tra7dim_Tragiscus_dimidiatus_Scarab.idba.4_MERGED
-XX-----XX----	CP1Sc3S4T5Gn7var	XXXXXXXXXXXXX----	CP1Sc3S4T5Gn7var_Gnorimus_variabilis_ameie.idba.13	XXXXXXXXXXXXX-XX	CP1Sc3S4T5Gn7var_Gnorimus_variabilis_ameie.idba.13_MERGED
-XX-----X-XXX	CP1Sc3E4Eu7hae	XXXXXXXXXXXXX----	CP1Sci3E4Eu7hae_Eucinetus_haemorrhoidolus_842710_idba_contig_14	XXXXXXXXXXXXX-XX	CP1Sci3E4Eu7hae_Eucinetus_haemorrhoidolus_842710_idba_contig_14_MERGED
-XX-----X-XXX	CP1Sci3S4E17min	XXXXXXXXXXXXX----	CP1Sci3S4E17min_Elodes_minuta_ameie.idba.24	XXXXXXXXXXXXX-XX	CP1Sci3S4E17min_Elodes_minuta_ameie.idba.24_MERGED
-X-----X-XXX	CP1Sci3S4Sc7orb	XXXXXXXXXXXXX----	CP1Sci3S4Sc7orb_Scirtes_orbicularis_ameie.idba.100	XXXXXXXXXXXXX-XX	CP1Sci3S4Sc7orb_Scirtes_orbicularis_ameie.idba.100_MERGED
-XX-----XX----	CP1T3An40m7f1o	--XXXXXXXXXXXX----	CP1T3An40m7f1o_Omonadus_floralis_HQ232825	--XXXXXXXXXXXX-XX	CP1T3An40m7f1o_Omonadus_floralis_HQ232825_MERGED
-XX-----XX----	CP1T3An4St7tob	XXXXXXXXXXXXX----	CP1T3An4St7tob_Stricticomus_tobias_ameie.idba.57	XXXXXXXXXXXXX-XX	CP1T3An4St7tob_Stricticomus_tobias_ameie.idba.57_MERGED
-XX-----X-XXX	CP1T3B4Bo7sch	XXXXX-----	CP1T3B4Bo7sch_Boros_schneideri_ameie.idba.177	XXXXX-----X-XXX	CP1T3B4Bo7sch_Boros_schneideri_ameie.idba.177_MERGED
-X-----X-XXX	CP1T3C4C5C17mic	XXXXXXXXXXXXX----	CP1T3C4C5C17mic_Cis_micans_ameie.idba.118	XXXXXXXXXXXXX-XX	CP1T3C4C5C17mic_Cis_micans_ameie.idba.118_MERGED
-XX-----XX-XXX	CP1T3C4C50r7pyg	--XXXXXX-----	CP1T3C4C50r7pyg_Orthocis_pygmaeus_ameie.idba.147	-XXXXXX--XX-XXX	CP1T3C4C50r7pyg_Orthocis_pygmaeus_ameie.idba.147_MERGED
-X-----X-XXX	CP1T3Me4Mik7gra	--XXXXXXXXXXXX----	CP1T3Me4Mik7gra_Mikadonius_gracilis_JX412823	--XXXXXXXXXXXX-XX	CP1T3Me4Mik7gra_Mikadonius_gracilis_JX412823_MERGED
-X-----X-XXX	CP1T3Me40s7bip	--XXXXXXXXXXXX----	CP1T3Me40s7bip_Osypa_bipunctata_JX313675	-X-XXXXXXXXXXXX-XX	CP1T3Me40s7bip_Osypa_bipunctata_JX313675_MERGED
XXXXXXXXXXXXX----	CP1T3Mo4Mo7atr	XXXXXXXXXXXXX----	CP1T3Mo4Mo7atr_Mordella atrata_NC_013254	XXXXXXXXXXXXX-XX	CP1T3Mo4Mo7atr_Mordella atrata_NC_013254_MERGED
-X-----X-XXX	CP1T3Mo4Morde7mil	XXXXXXXXXXXXX----	CP1T3Mo4Morde7mil_Mordellochroa_millieri_ameie.idba.36	XXXXXXXXXXXXX-XX	CP1T3Mo4Morde7mil_Mordellochroa_millieri_ameie.idba.36_MERGED
-XX-----XX----	CP1T3Mo4To7buc	XXXXXXXXXXXXX----	CP1T3Mo4To7buc_Tomoxia_bucephala_ameie.idba.63	XXXXXXXXXXXXX-XX	CP1T3Mo4To7buc_Tomoxia_bucephala_ameie.idba.63_MERGED
-XX-----XX-XXX	CP1T3My4My7qua	--XXXXXXXXXXXX----	CP1T3My4My7qua_Mycetophagus_quadripustulatus_HQ232824	-XXXXXXXXXXXX-XX	CP1T3My4My7qua_Mycetophagus_quadripustulatus_HQ232824_MERGED
-X-----X-XXX	CP1T3O4I7s7cae	XXXXXXXXXXXXX----	CP1T3O4I7s7cae_Iscnomera caerulea_JX412790	XXXXXXXXXXXXX-XX	CP1T3O4I7s7cae_Iscnomera caerulea_JX412790_MERGED

-XX-----	CP1T304Is7cya	XXXXXXXXXXXXX----	CP1T304Is7cya_Ischnomera_cyanea_BIUK.idba.38	XXXXXXXXXXXXX----	CP1T304Is7cya_Ischnomera_cyanea_BIUK.idba.38_MERGED
-XX-----XXX	CP1T3040e7vir	--XXXXXXXXXXXXX----	CP1T3040e7vir_Oedemera_virescens_HQ232826	-XXXXXXXXXXXXX----XXX	CP1T3040e7vir_Oedemera_virescens_HQ232826_MERGED
-X-----	CP1T3P4Sc7pec	XXXXXXXXXXXXX-----	CP1T3P4Sc7pec_Schizotus_pectinicornis_ameie.idba.83	XXXXXXXXXXXXX-----	CP1T3P4Sc7pec_Schizotus_pectinicornis_ameie.idba.83_MERGED
--X-----XX--XXX	CP1T3R4Pe7fen	XXXXXXXXXXXXX-----	CP1T3R4Pe7fen_Pelecotoma_fennica_842676_idba_contig_23	XXXXXXXXXXXXX-----XXX	CP1T3R4Pe7fen_Pelecotoma_fennica_842676_idba_contig_23_MERGED
-X-----	CP1T3Sa4Li7cur	XXXXXXXXXXXXX-----	CP1T3Sa4Li7cur_Lissodema_cursor_ameie.idba.80	XXXXXXXXXXXXX-----	CP1T3Sa4Li7cur_Lissodema_cursor_ameie.idba.80_MERGED
--X-----XX--XXX	CP1T3Sa4Rh7ruf	XXXXXXXXXXXXX-----	CP1T3Sa4Rh7ruf_Rhinosimus_ruficollis_BIUK.idba.39	XXXXXXXXXXXXX-----XXX	CP1T3Sa4Rh7ruf_Rhinosimus_ruficollis_BIUK.idba.39_MERGED
-X-----	CP1T3Sa4Sa7aen	-----XXXXX-----	CP1T3Sa4Sa7aen_Salpingus_aeneus_JX313680	-X-----XXXXX-----	CP1T3Sa4Sa7aen_Salpingus_aeneus_JX313680_MERGED
-XX-----XXX	CP1T3Sa4Vi7ruf	XXXXXXXXXXXXX-----	CP1T3Sa4Vi7ruf_Vincenzellus_ruficollis_833403_Salpingidae_Vincenzellus	XXXXXXXXXXXXX-----XXX	CP1T3Sa4Vi7ruf_Vincenzellus_ruficollis_833403_Salpingidae_Vincenzellus_MERGED
-XX-----XX--XXX	CP1T3Sc5An7mac	XXXXXXXXXXXXX-----	CP1T3Sc5An7mac_Anasps_maculata_BIUK.idba.33	XXXXXXXXXXXXX-----XXX	CP1T3Sc5An7mac_Anasps_maculata_BIUK.idba.33_MERGED
-X-----	CP1T3Sc5Cy7pha	XXXXXXXXXXXXX-----	CP1T3Sc5Cy7pha_Cyrtanasps_phalerata_ameie.idba.38	XXXXXXXXXXXXX-----	CP1T3Sc5Cy7pha_Cyrtanasps_phalerata_ameie.idba.38_MERGED
-X-----	CP1T3T4D5Sc7met	XXXXXXXXXXXXX-----	CP1T3T4D5Sc7met_Scaphidema_metallicum_ameie.idba.104	XXXXXXXXXXXXX-----	CP1T3T4D5Sc7met_Scaphidema_metallicum_ameie.idba.104_MERGED
XXXX-XXX-X-XXX----	CP1T3T4D5U17der	XXXXXXXXXXXXX-----	CP1T3T4D5U17der_Ulomoides_dermestoides_NC_025332	XXXXXXXXXXXXX-----	CP1T3T4D5U17der_Ulomoides_dermestoides_NC_025332_MERGED
-XX-----	CP1T3T4T5Na7lae	XXXXXXXXXXXXX-----	CP1T3T4T5Na7lae_Nalassus_laevioctostriatus_2VGB.idba.14	XXXXXXXXXXXXX-----	CP1T3T4T5Na7lae_Nalassus_laevioctostriatus_2VGB.idba.14_MERGED
-----X--X-X--	CP1T3T4T5Sca7unc	XXXXXXX-XXXXX----	CP1T3T4T5Sca7unc_Scaurus_uncinus_Soil.idba.92	XXXXXXX-XXXXX-X-	CP1T3T4T5Sca7unc_Scaurus_uncinus_Soil.idba.92_MERGED
XXXXXXXXX-X-XXX-XXX	CP1T3T4T5Te7mol	XXXXXXXXXXXXX-----	CP1T3T4T5Te7mol_Tenebrio_molitor_NC_024633	XXXXXXXXXXXXX-----XXX	CP1T3T4T5Te7mol_Tenebrio_molitor_NC_024633_MERGED
XXXXXXXXXXXXX-XXX----	CP1T3T4Tr7aud	XXXXXXXXXXXXX-----	CP1T3T4Tr7aud_Tribolium_audax_NC_024600	XXXXXXXXXXXXX-----	CP1T3T4Tr7aud_Tribolium_audax_NC_024600_MERGED
-XX-----XX--XXX	CP1T3Te4T5Te7fun	XXXXXXXXXXXXX-----	CP1T3Te4T5Te7fun_Tetratoma_fungorum_ameie.idba.12	XXXXXXXXXXXXX-----XXX	CP1T3Te4T5Te7fun_Tetratoma_fungorum_ameie.idba.12_MERGED
--X-----XX--XXX	CP1T3Z4Z5U6Us7lac	XXXXXXXXXXXXX-----	CP1T3Z4Z5U6Us7lac_Usechus_lacerta_679350_idba_contig_8	XXXXXXXXXXXXX-----XXX	CP1T3Z4Z5U6Us7lac_Usechus_lacerta_679350_idba_contig_8_MERGED



## Manual correction of erroneous sequences

This list summarizes the manual corrections done for the tree of Figure 3 (and the complete tree below). These correspond to NCBI terminals whose taxonomic identification (their NCBI taxonomic id) appears erroneous in light of their phylogenetic placement.

### \*\*\*NCBI terminals with probable erroneous taxonomic identifications\*\*\*

- CP1Cur3C4M5M6Li7cor
- CP1Cu3Lat4Ak7sle
- CP1S3S4Ps5Ba7del
- CP1Hi3H4S5Gn7com
- CP1Cu3N4Am7C27
- CP1Bo3D4Tro7MC2010
- CP1Cur3C4Ma5Ma7cer
- CP1Ch3Ce4D5Cy7asa
- CP1Cur3C4M5Ph6Cr7pun
- CP1S3Si4S5De7qua
- CP1Cu3N4Cy5Cy7MJM2013

### \*\*\* minor errors detected in Genbank \*\*\*\*

- CP1S3S4Ox5Ox7\_Oxytelus\_sp\_JX412796 (should use *Anotylus rugatilis*)
- CP1S3S4O5Ne7TJH2005 is same species as  
CP1S3S4O5Ne7bru\_Neophonus\_bruchi\_Staph.idba.0\_MERGED

## NCBI extraction and Blast threshold

The following table reports the number of mitochondrial loci extracted from the NCBI at different blast Evalue thresholds. A value of 1E-5 was retained and is the baseline used for the differences reported below:

Locus	#sequence at 1E-5	Variation at different Blast thresholds					
		1E-12	1E-09	1E-05 (baseline)	1E-03	1E+00	1E+01
<i>12S</i>	4105	-5	-1	0	0	+5	+19
<i>16Sa</i>	14723	-4	0	0	0	+33	+49
<i>16Sb</i>	13487	-13	0	0	0	+54	+96
<i>ATP6</i>	292	-1	0	0	0	+7	+51
<i>cox3</i>	448	0	0	0	0	0	+4
<i>cox2</i>	7363	-1	0	0	0	+44	+148
<i>cox1seg1</i>	46546	-8	0	0	0	+7	+11
<i>cox1seg2</i>	46009	-1	0	0	0	+1	+64
<i>cytb</i>	5370	-6	0	0	0	+0	+1
<i>ef1a</i>	3153	-9	-3	0	+3	+3	+3
<i>nad1</i>	360	0	0	0	0	+6	+63
<i>nad2</i>	612	-2	-2	0	0	+28	+87
<i>nad3</i>	287	-1	0	0	0	+6	+30
<i>nad4</i>	290	0	0	0	0	+15	+35
<i>nad5</i>	1800	0	0	0	0	+9	+105
<i>nad6</i>	191	-29	-19	0	+14	+30	+76

We ran the blast extraction at different Blast evalue thresholds and observed the variation in the number of sequences extracted. When changing the blast Evalue threshold between 1e-12 and 1e-3, there is almost no change in the number of extracted sequences. This indicates that the criteria used in the pipeline are efficient in extracting all loci from the Genbank Coleopteran data (evalue<1e-5, word size =12, align\_length>=60% of the expected locus length). The only notable exception is the locus nad6, for which the number of extracted sequences is more dependant to the used threshold. After observing in detail, the new sequences extracted at higher Evalue thresholds, we observed that the corresponding Blast alignments were very short (dozens of bases) and were mainly disturbed by the second half of this gene, which contains a large portion of AT-rich segments. AT-rich segments are typically producing lower Evalues, because they are abundant in reference databases and the probability to have detected homology by chance and not because of a real signal (the meaning of the EValue), is higher. This mean that in the future, the Evalue value threshold should be raised for this Locus, or that better bait sequences should be used. Finally, for several loci, dozens of new sequences are extracted when very weak (and generally not recommended) thresholds of 0.1 or 1 are chosen. This is particularly true for cox2 and some nad genes. These numbers should however be taken with caution. In fact, several of the new sequences are erroneous hits due to the sequence patterns shared by the different mitochondrial genes (similar regions between the different nad gene).

## Likelihood of the 20 tree searches based on the NCBI+MMG min3loci 1RY\_3Del matrix

We launched 20 searches based on the NCBI+MMG min3loci 1RY\_3Del matrix, the best tree (see below, seed = 12000) was used as starting tree for the search based on the NCBI+MMG min2loci 1RY\_3Del matrix (topology unconstrained). RAxML command:

```
raxmlHPC-PTHREADS -T 12 -n result_min3loci_smv5.1_seed12000 -s infile.txt -q partitions.txt -p 12000 -k -c 25 -m GTRCAT
```

RAxML seed (-p)	Gamma-based Likelihood	GAMMA-based Score of best tree	time (hours)	diff to best.
1000	-11450706.323166	-11450306.278547	118.416336	-436.6692709997
2000	-11451121.951837	-11450571.131743	99.527583	-701.5224670004
3000	-11450905.917378	-11450424.776289	117.397756	-555.1670129988
4000	-11450695.323051	-11450132.612988	113.556559	-263.0037120003
5000	-11450574.745977	-11450226.311419	131.865519	-356.7021430004
6000	-11451095.862001	-11450515.188733	150.632361	-645.5794569999
7000	-11450840.566406	-11450141.221002	112.649898	-271.611725999
8000	-11451099.812055	-11450562.367976	103.53299	-692.7587000001
9000	-11451038.838944	-11450574.763927	107.389821	-705.1546509992
10000	-11450999.71374	-11450638.532262	119.203391	-768.9229859989
11000	-11450803.022373	-11450319.245878	100.511854	-449.6366019994
12000	-11450428.470626	-11449869.609276	124.213404	<b>(best)</b>
13000	-11450558.60822	-11450214.256986	106.185383	-344.6477099992
14000	-11450694.326608	-11450315.357446	114.860602	-445.7481699996
15000	-11450675.505885	-11450182.739883	153.660767	-313.1306069996
16000	-11450922.880813	-11450268.350853	110.463154	-398.7415769994
17000	-11450701.234511	-11450250.937053	111.724028	-381.3277770001
18000	-11450850.682595	-11450266.0749	101.416929	-396.465623999
19000	-11451405.119621	-11450915.764047	120.598017	-1046.1547710002
20000	-11451133.805351	-11450629.176252	121.664275	-759.5669759996

# Annotation of NCBI+MMG min2loci 1RY\_3Del tree

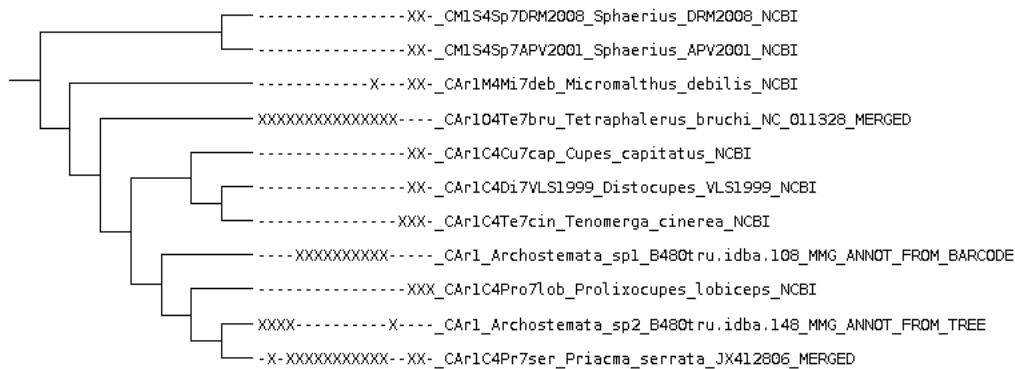
Total number in this tree based on a minimum of two loci is 15983.  
Use Suppl. File S2 to access taxonomic code details.

## 1. Suborder monophyly and basal relationships.

Molecular studies have generally recovered the four suborders as monophyletic, but their relationships are not supported. Recent consensus is (Out (Pol (Arc (Myx + Ade)))) based on transcriptomes (Misof et al., 2014), PhyloBayes analysis of mitogenomes (Timmermans et al., 2016), and multiple nuclear markers (Mckenna et al., 2015). Observed relationships in minimum-2 tree is (Out (Myx (Arc (Ade + Pol))))). Other trees from min3 and NCBI-only data show (Out (Myx (Arc (Pol+Ade))))).

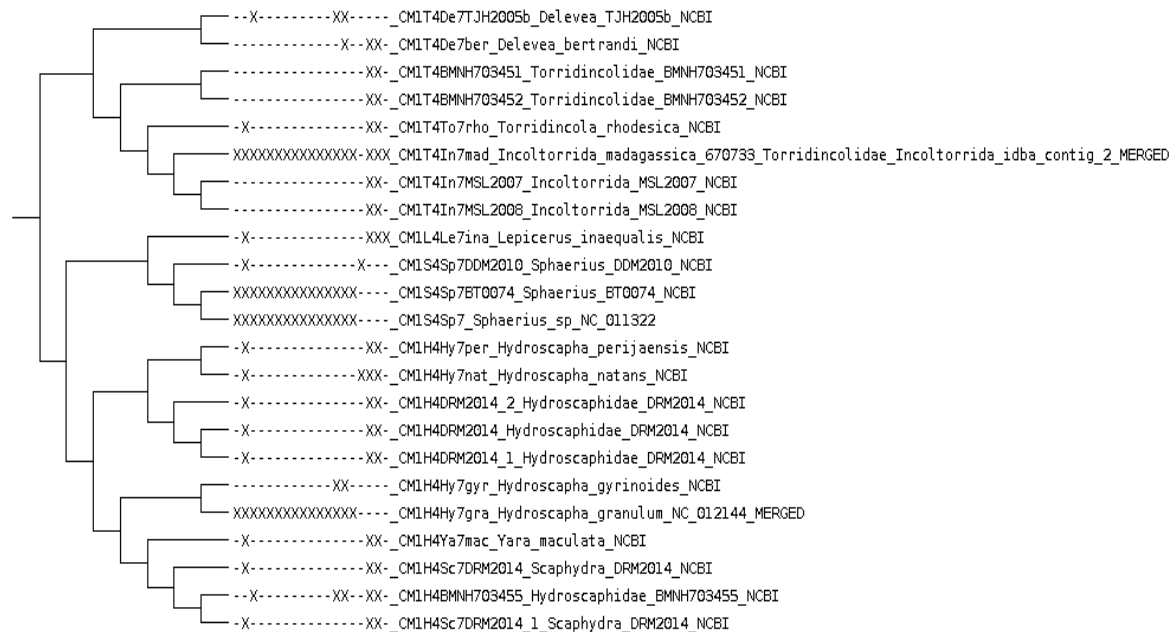
## 2. Archostemata (total number of terminals: 9; codes starting with code CAr1).

All monophyletic except for two 18S sequences of Myx sister to Ar. Three families are represented: (Micromalthidae, (Cupedidae + Ommatidae)). Two contigs from a Bornean metagenome probably correspond to a single specimen.



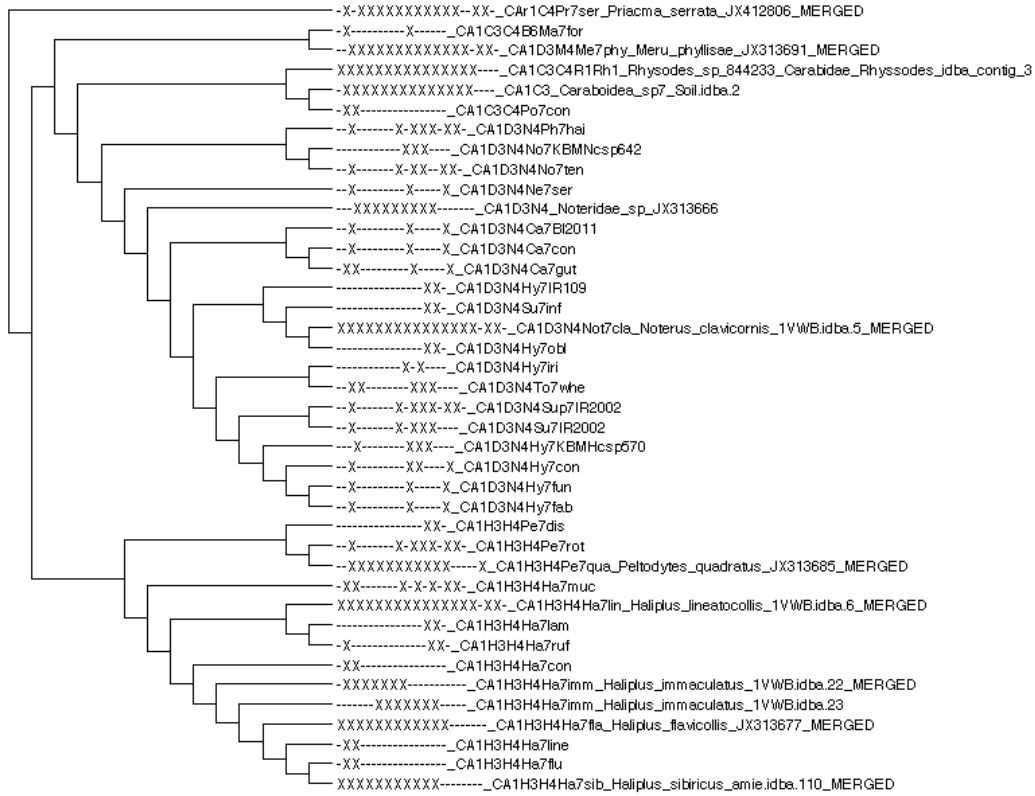
## 3. Myxophaga (25 terminals, ; codes starting with CM1).

The suborders are monophyletic except for two cox1+18S sequences of Sphaeriusidae that are sister to Archostemata. Four families are represented, with relationships (Torridincolidae ((Lepiceridae, Sphaeriusidae) Hydroscaphidae)).



4. **Adephaga (3403 terminals, codes starting with CA1).**

Basal relationships have been separated into reciprocally monophyletic aquatic Hydradephaga and terrestrial Geadephaga (Maddison et al., 2009; Shull et al., 2001) which is confirmed by recent full mitogenome studies (Lopez et al., submitted). Here we find a paraphyletic Hydradephaga, with a comb-like arrangement of ((Noteridae + Meruidae) (Haliplidae + Dytiscoidea) ((Gyrinidae (Cicindelidae + Carabidae/Trachypachidae))))). The topology with basal split of (Noteridae + Meruidae) from all others matches Timmermans et al. 2016. Hydradephaga are paraphyletic also in (Bocak et al., 2014), but with Gyrinidae at the basal split. (Mckenna et al., 2015) constrain the monophyly of Geadephaga and Hydradephaga.



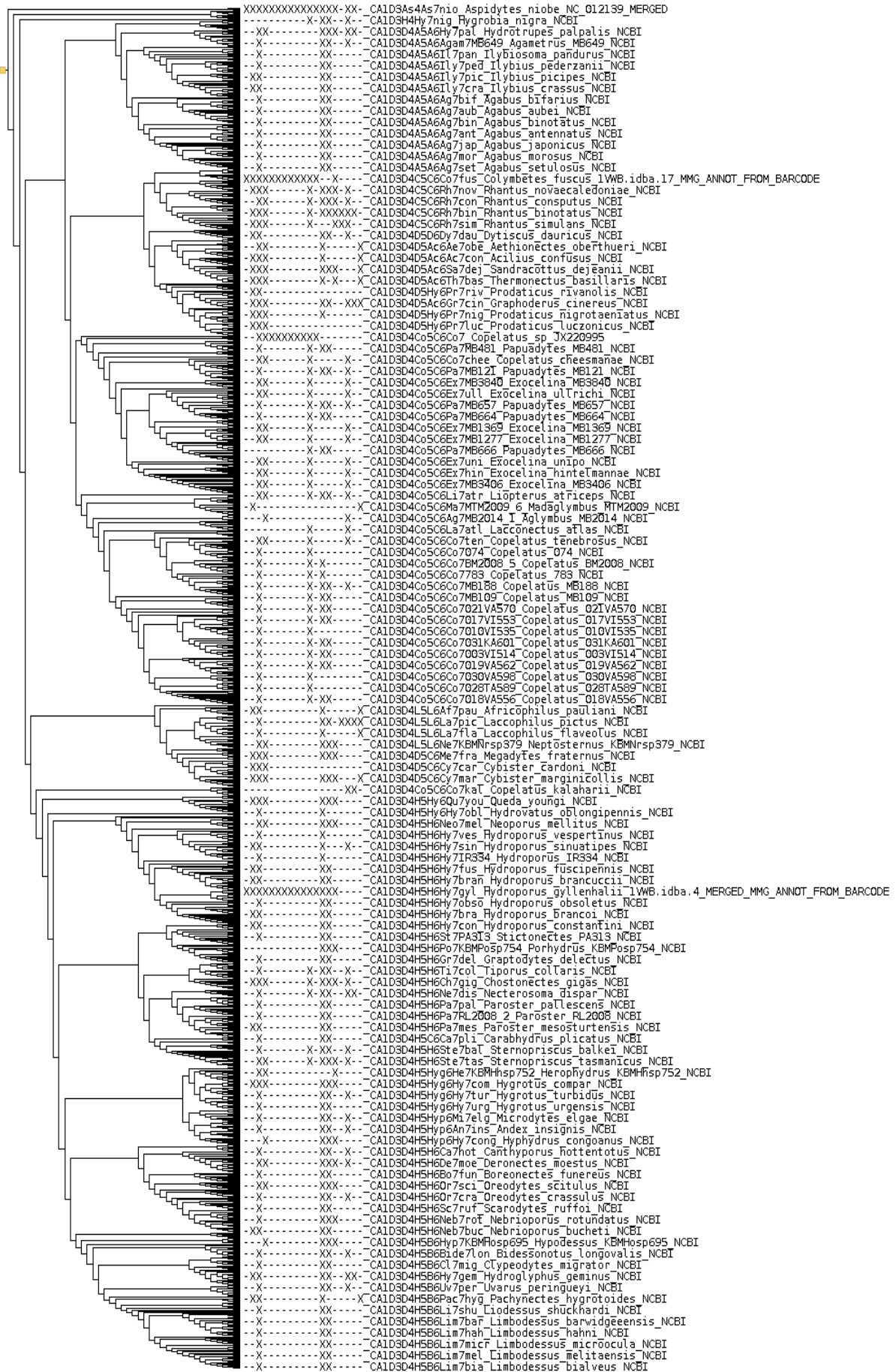
5. **Dytiscoidea (1518 terminals, codes starting with CA1D3).**The superfamily contains six families.

- a. **Basal relationships of Dytiscoidea.** The tree shows ((Aspyditidae + Amphizoidae) (Hygrobiidae (Dytiscidae))), which is in agreement with (Balke et al., 2008). Noteridae + Meruidae is placed distantly at the base of Adephaga tree (see above). All families are monophyletic, except for a few representatives of Laccophilinae are included with Hygrobiidae.
- b. **Dytiscidae (1488 terminals, codes starting with CA1D3D4).**

The most complete molecular tree available is (Ribera, 2008), which found several subfamilies non-monophyletic. The current tree is more in agreement with the subfamily classification than the summary tree of which are recovered as monophyletic here.

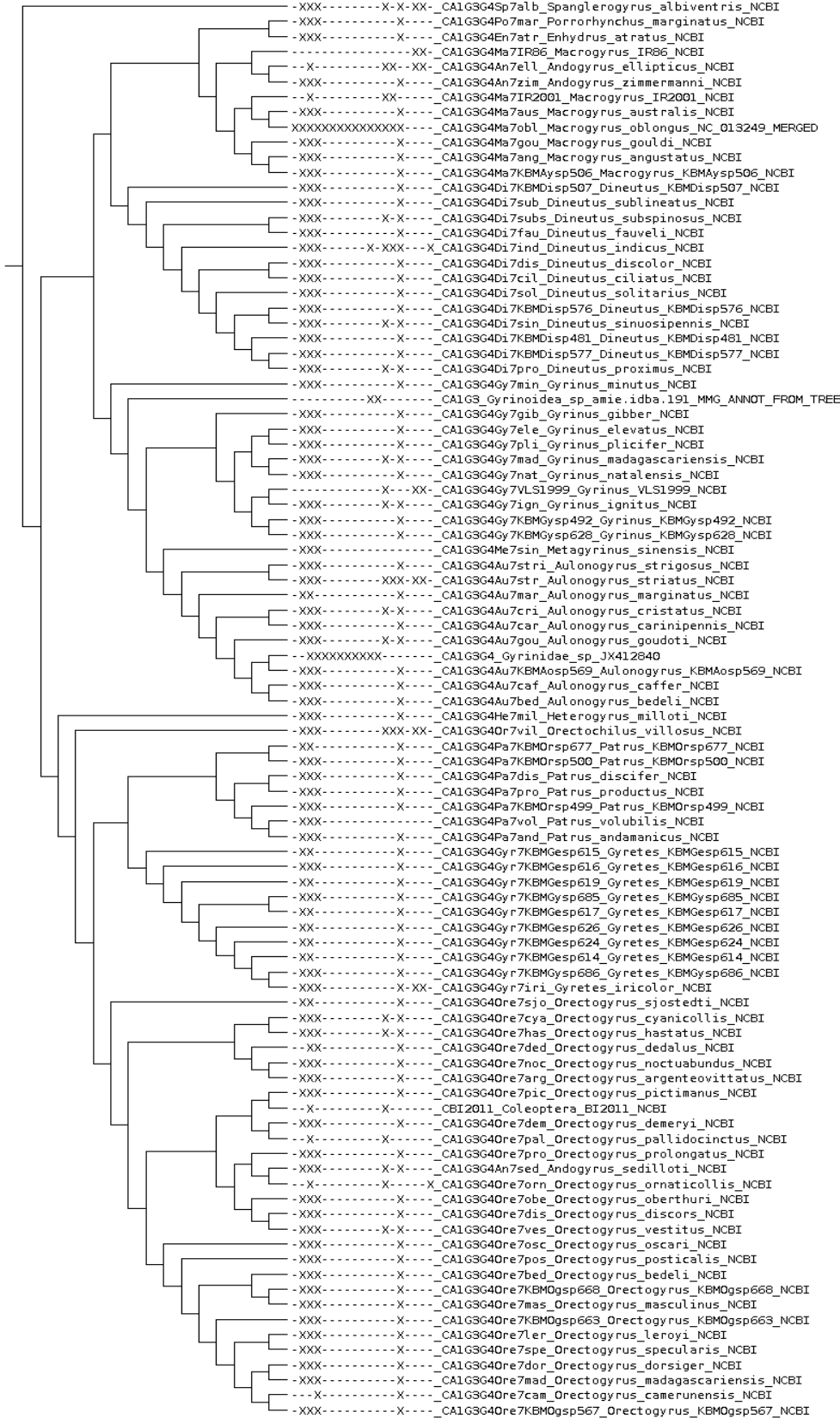
  - i. Dytiscinae is monophyletic, except for the distantly related Cybristrini. Ribera, 2008 recovered tribes Acilini and Hydatcini/Hyderodini in a clade different from Dytiscini, which is not observed here.
  - ii. Agabinae is monophyletic: Hydrotrupes is sister to Platynectes and relatives, which combined are sister to Agabini; these groups were not a monophylum in Ribera, 2008. The two large genera Ilybius/Ilybiosoma and Agabus are reciprocally monophyletic except for species of Platambus which are scattered throughout the Agabini.
  - iii. Laccophilinae is monophyletic and includes Agabetini, which was recovered distant to Laccophilini in Ribera, 2008.
  - iv. Copelatinae: Agaporomorphus is deeply embedded in this subfamily, near Madaglymbus (not recovered as closely related to other Copelatinae in Ribera, 2008. Liopterus is sister to the large Aglymbus/Copelatus clade, which is reciprocally monophyletic to the Exocelina/Papuadytes clade (Balke et al., 2004).
  - v. Relationships within Dytiscidae show four main lineages:
    1. Basal split is Aubehydrini (Dytiscinae) as sister to all others. In Ribera, 2008 Aubehydrini is recovered near the base together with Hydrodytinae /Matinae (here found nearer Hydroporinae, clade 4.)
    2. ((Coptotominae + Lancetinae) Agabinae)
    3. ((Colymbetinae + Dytiscinae)) Copelatinae) (NB: Copelatinae are not fully monophyletic because of four species represented by 18S only are placed distantly).
    4. ((Matinae (Laccophilinae Cybistrini)) ((Hydrodytinae) Hydroporinae))).

**Important note: The following tree is a compressed version of the 1488 Dytiscidae terminals. Details are part of the complete tree included in Suppl File S4 and S5 (which spans over many pages). The corresponding tree can be reached by searching for the Label prefix “CA1D3D4”.**



6. **Gyrinoidea (Gyrinidae) (93 terminals, codes starting with CA1G3).**

A recent study of (Miller and Bergsten, 2012) produced a tree very similar to that found here. The basal split is Spanglerogyrus versus all others, as expected; two main clades include ((Macrogyrus + Dineutus) Gyrinus) and (Heterochilus (Orectochilus ((Patrus + Gyretes) Orectogyrus))). Miller and Bergsten recover (Macrogyrus + Dineutus) as sister to the latter clade, but with low support.





7. **Carabaeoidea (=Geadephaga) (1774 terminals, codes starting with CA1C3).**

A major attempt for resolving basal relationships was by (Maddison et al., 1999) using 18S, and basal relationships in the large subfamily Harpalinae (Ober, 2002) based on 28S and wingless. The NCBI taxonomy recognises four families, Carabidae, Cicindelidae, Trachypachidae and Rhysodidae. We find Cicindelidae and Carabidae + Trachypachidae split into two sister lineages. (The single representative of Rhysodidae groups with Cicindelidae).

a. **Cicindelidae (442 terminals, codes starting with CA1C3C4C5).**

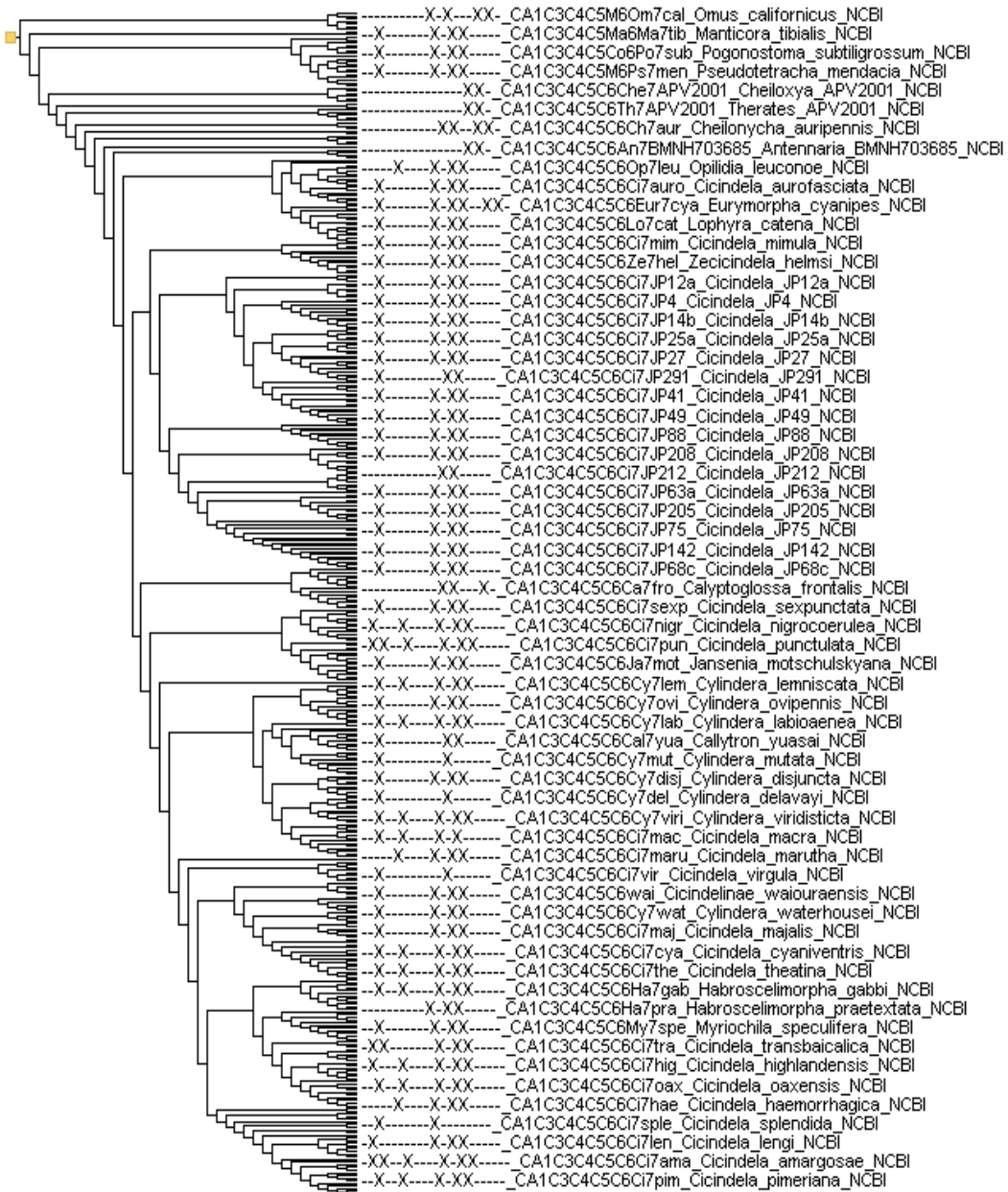
Basal relationships have been assessed by (Vogler and Pearson, 1996) using 16S and 18S rRNA. Treated as subfamily of Carabidae in the GenBank taxonomy but is sister to all other caraboids in the current tree (except for three members of tribe Rhysodini represented by 18S sequences and thus deserves family status (also see (López-López and Vogler, n.d.) et al., in press). Cicindelidae is monophyletic, with three main groups recognised in NCBI.

i. Megacephalini: split into two clades, including a diverse set of species of several species poor Southern Hemisphere genera (subtribe Omina), and the cosmopolitan genus Megacephala s.l. (subtribe Megacephalina). The latter is sister to Collyridini, a group of mainly arboreal species. Some inconsistencies in tree due to double entry for misspelling of Platychile and Platychila

ii. Cicindelini: recovered as monophyletic, includes several genera frequently assigned to subtribe Prothymina. Basal split is genus (Pseud)oxycheila, and comb-like arrangement of other genera, in agreement with Vogler and Pearson 1996.

1. Cicindelina: this group is recovered as the terminal portion of Cicindelidae, and recovers broadly the subclades of North American groups (Vogler et al., 2005) and worldwide clades based on a smaller subsample, including clades I, II, and III of (Pons et al., 2004), and Asian lineages (Sota et al., 2011). Genus and subgenus assignments in Cicindelina have been applied inconsistently, which complicates the use of measures of monophyly.

**Important note: The following tree is a compressed version of the 442 Cicindelidae terminals. Details are part of the complete tree included in Suppl File S4 and S5 (which spans over many pages). The corresponding tree can be reached by searching for the Label prefix “CA1C3C4C5”.**



b. **Carabidae (1332 terminals, codes starting with CA1C3C4).**

Data are contributed by Maddison et al.'s (1999) study using 18S, and basal relationships in the large subfamily Harpalinae (Ober and Heider, 2010) based on 28S and wingless. This is complemented by several studies on large genera, e.g. on *Carabus* (Deuve et al., 2012), *Bembidion* (Maddison, 2012), Trechitae and various genera of Harpalinae.

- i. **Carabidae.** They are a monophyletic (with the inclusion of Trachypachidae) and are sister to all other Carabidae. This branch includes several clades in a comb-shaped arrangement, including Trachypachidae + Nebriini, Elaphrini, the southern-hemisphere *Pamborus* + *Ceroglossus*, *Cychnus*, and *Calosoma* as sister to *Carabus*. These five major genus-level lineages are monophyletic except for two genera of Trachypachidae, *Trachypachis* (represented by full mitogenome) and *Systolosoma* (represented by 18S only) are widely separated.

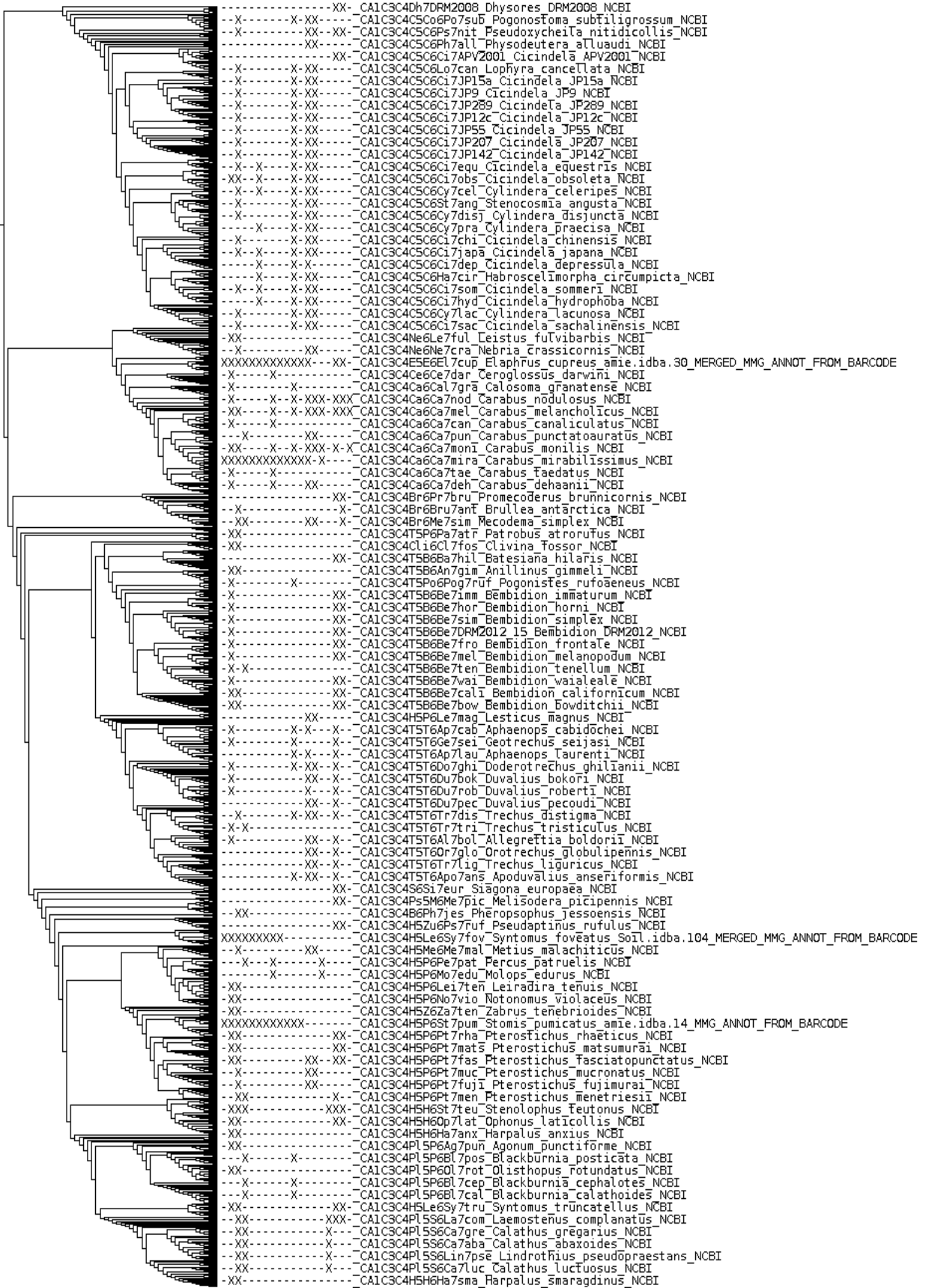
1. *Carabus*: the species groups of (Deuve et al., 2012) are mostly recovered but with slightly different relationships to each other. For example, Neocarabi are part of a wider clade including *Ohomopterus* and Archicarabus. This clade is embedded in a set of species groups of Multistriati, which are rendered paraphyletic with regard to the extended Neocarabi. Note that *Ohomopterus* from a different dataset (Sota et al., 2001) is embedded in Multistriati sister to *C. granulatus/hortensis*. The sister group of the large Multistriati + Neocarabi clade is (*Ctenocarabus* + *Tachypus*). Basal splits in *Carabus* largely correspond to the structure in Deuve et al. 2012.

2. Remaining Carabidae: Broscini sister to all others, followed by several small groups including (Promecognathinae, (Omophroninae + Psydrini)), Migadopini and Loricerini. Most of these groups have been sequenced for 18S only. The terminal split includes two very large clades, separating Trechitae and Harpalinae, each clade includes several smaller group of uncertain placement. Harpalinae is a terminal group that is embedded in various major lineages, including Scaritini, Clvini, Psydrini, Brachinini and others.

- ii. **Trechitae (469 terminals).** Consisting of two major groups, with >200 available species of *Bembidion* internal relationships and relationships with smaller genera were arranged very similarly to the study of (Maddison and Ober, 2011). Patrobini are part of Trechitae (sister to *Trechus*), as found by (Maddison and Ober, 2011).

- iii. **Harpalinae.** The NCBI taxonomy splits this group into multiple subfamilies, including Harpalinae, Licininae and Platyninae. Basal relationships in this very large group have been treated by (Ober and Heider, 2010) based on 28S and wingless, thus only one locus of those used here. Taxa present are derived from several large genus level studies (each ~100 species), for Blackburnia, Pterostichus, and Calathus. Harpalinae are monophyletic. The resolution in this part of the tree shows various incongruences with the tribal taxonomy. Basal splits are Zuphiini splitting before the Lebiini/Cyclosominini, which are sister to two large terminal clades corresponding mainly to (Zabrini + Pterostichini) and (Harpalini + Platinini). The sister relationships of Harpalinae are not clear.

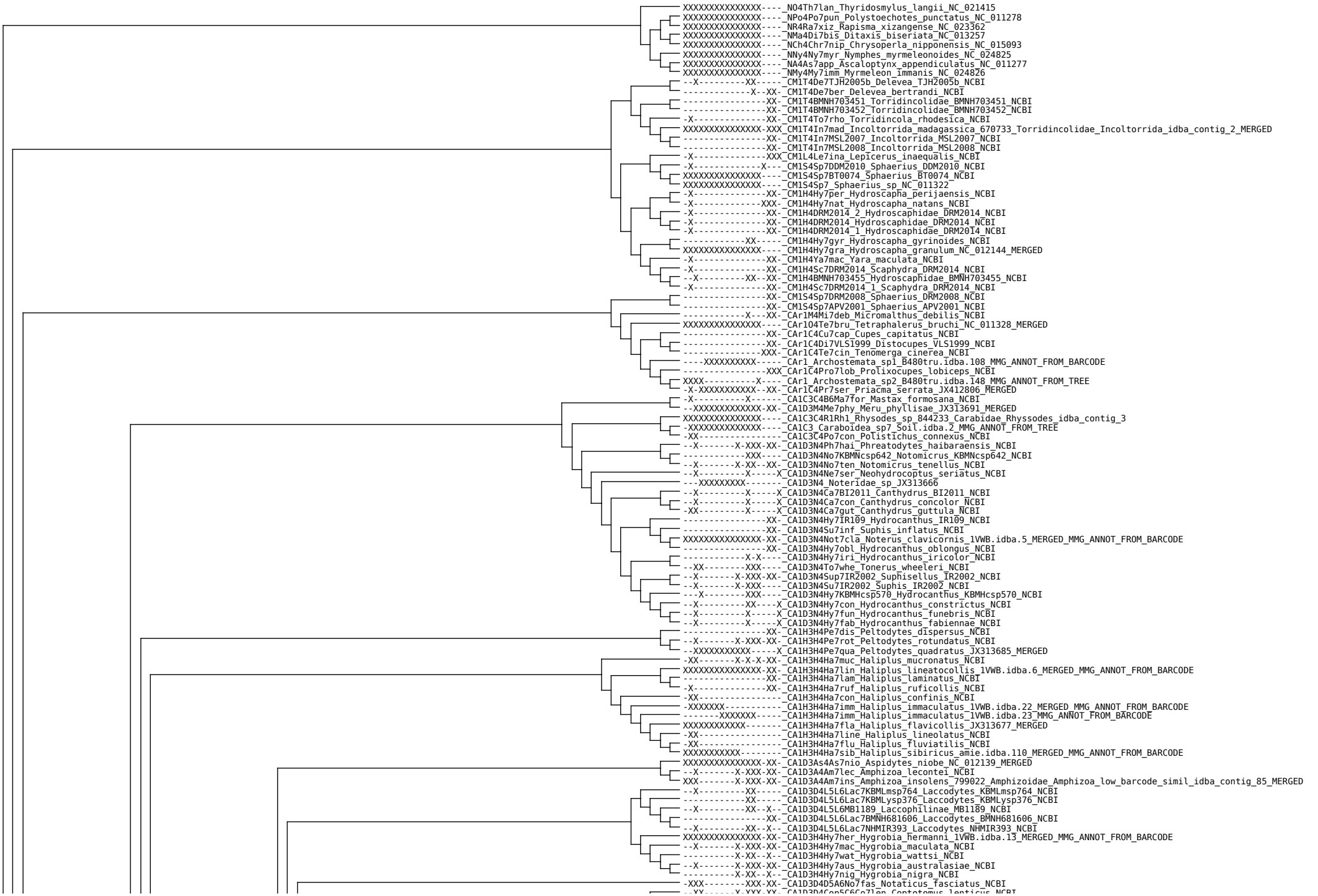
**Important note: The following tree is a compressed version of the 1332 Carabidae terminals. Details are part of the complete tree included in Suppl File S4 and S5 (which spans over many pages). The corresponding tree can be reached by searching for the Label prefix "CA1C3C4".**



## References

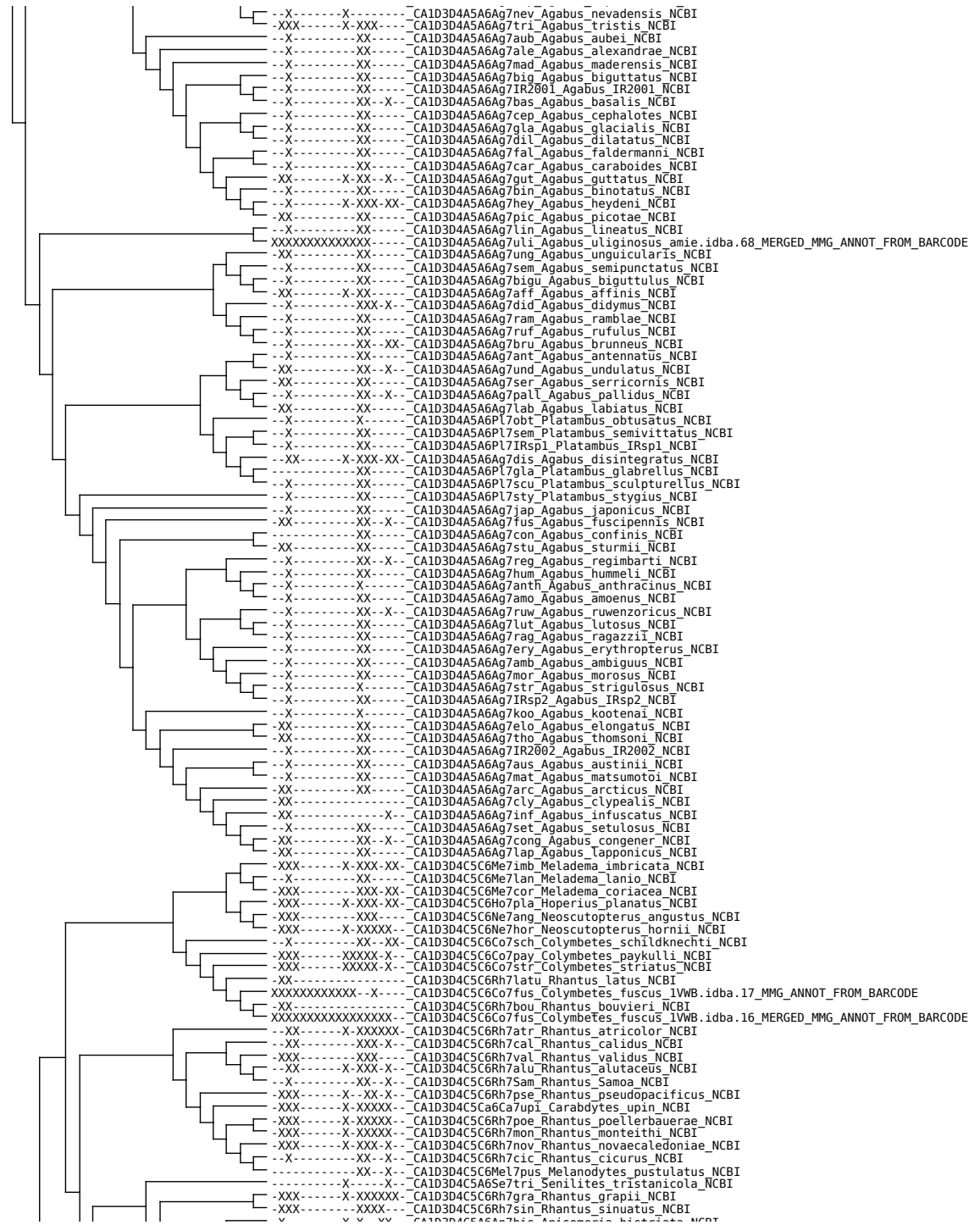
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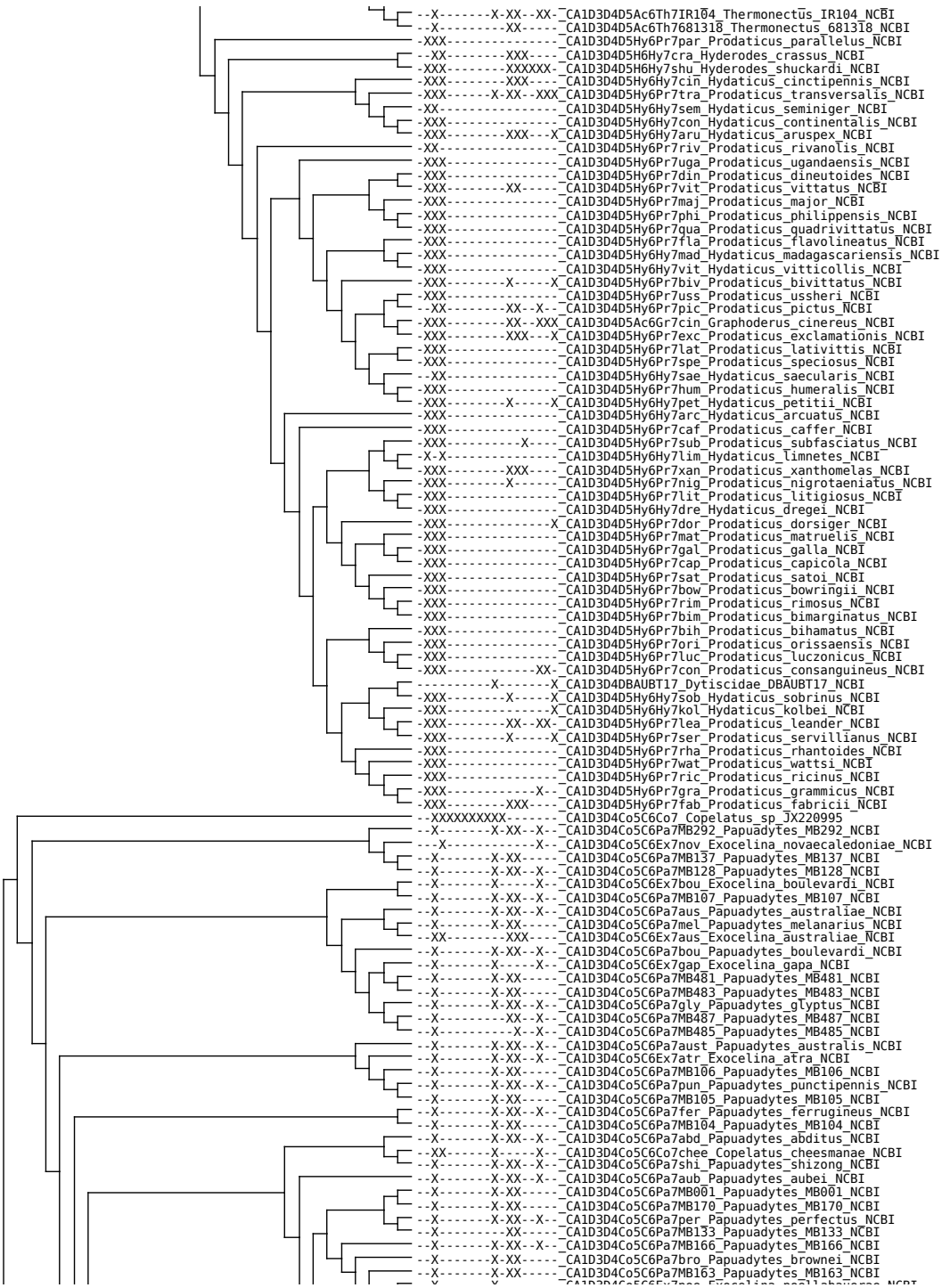


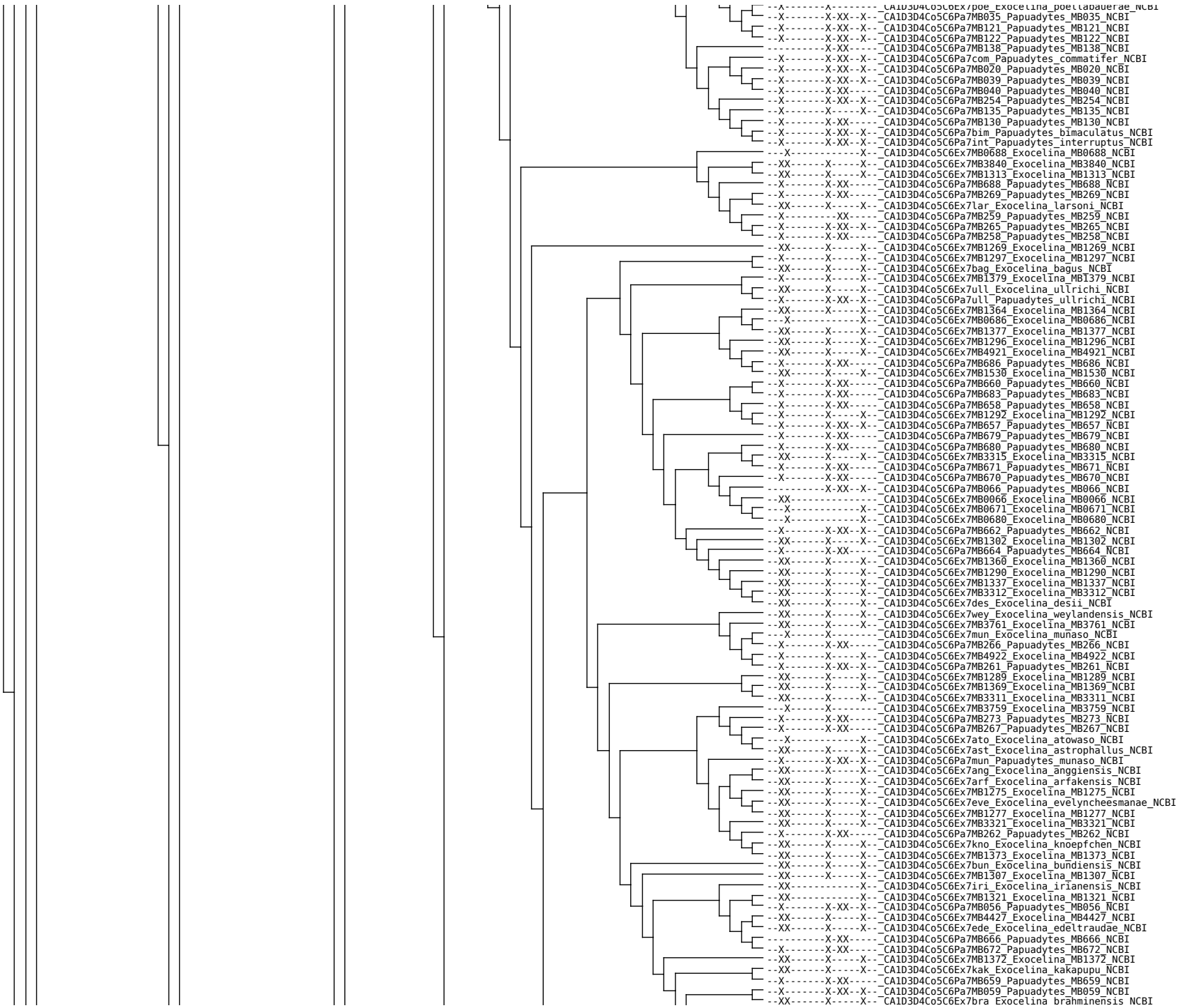






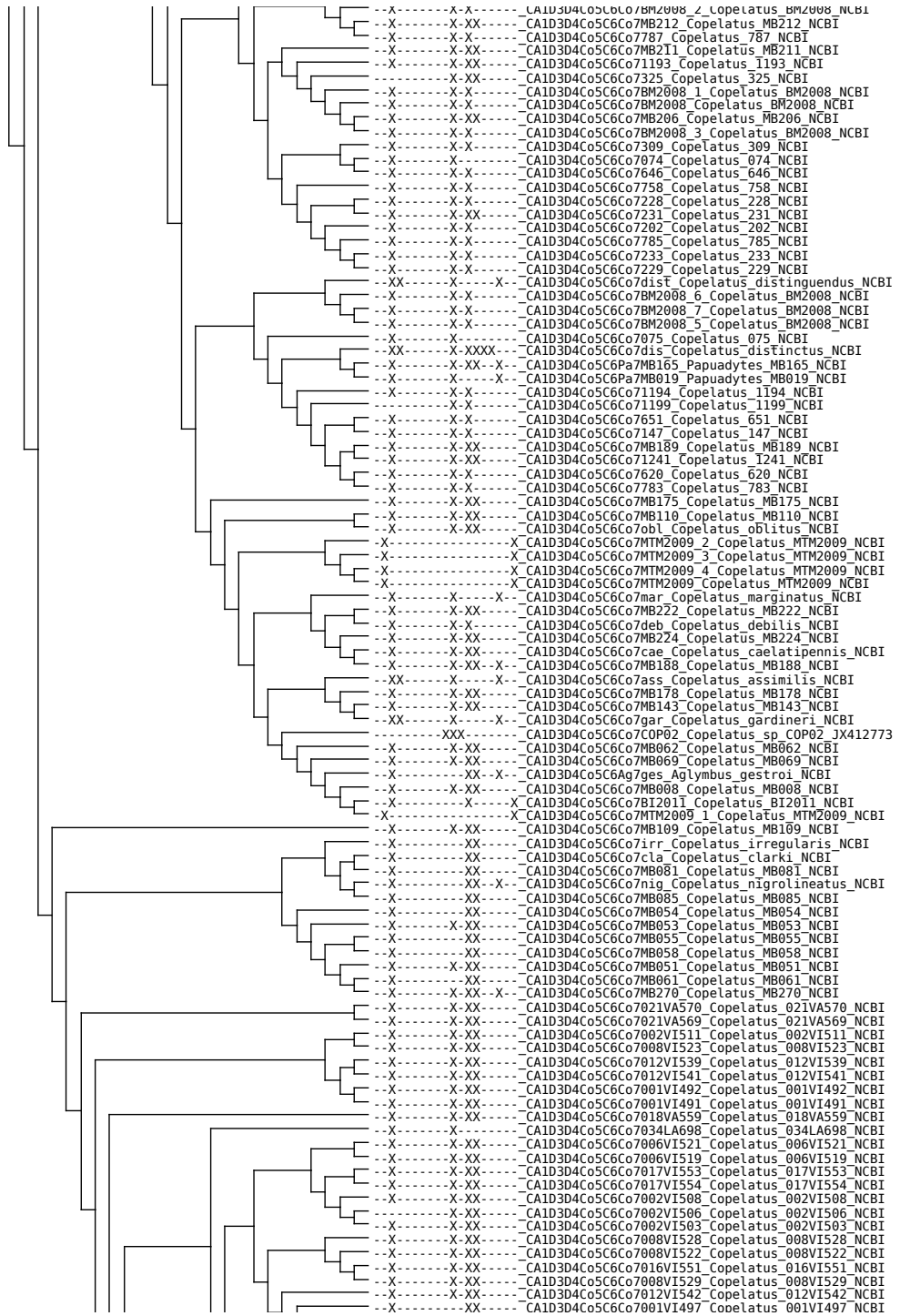
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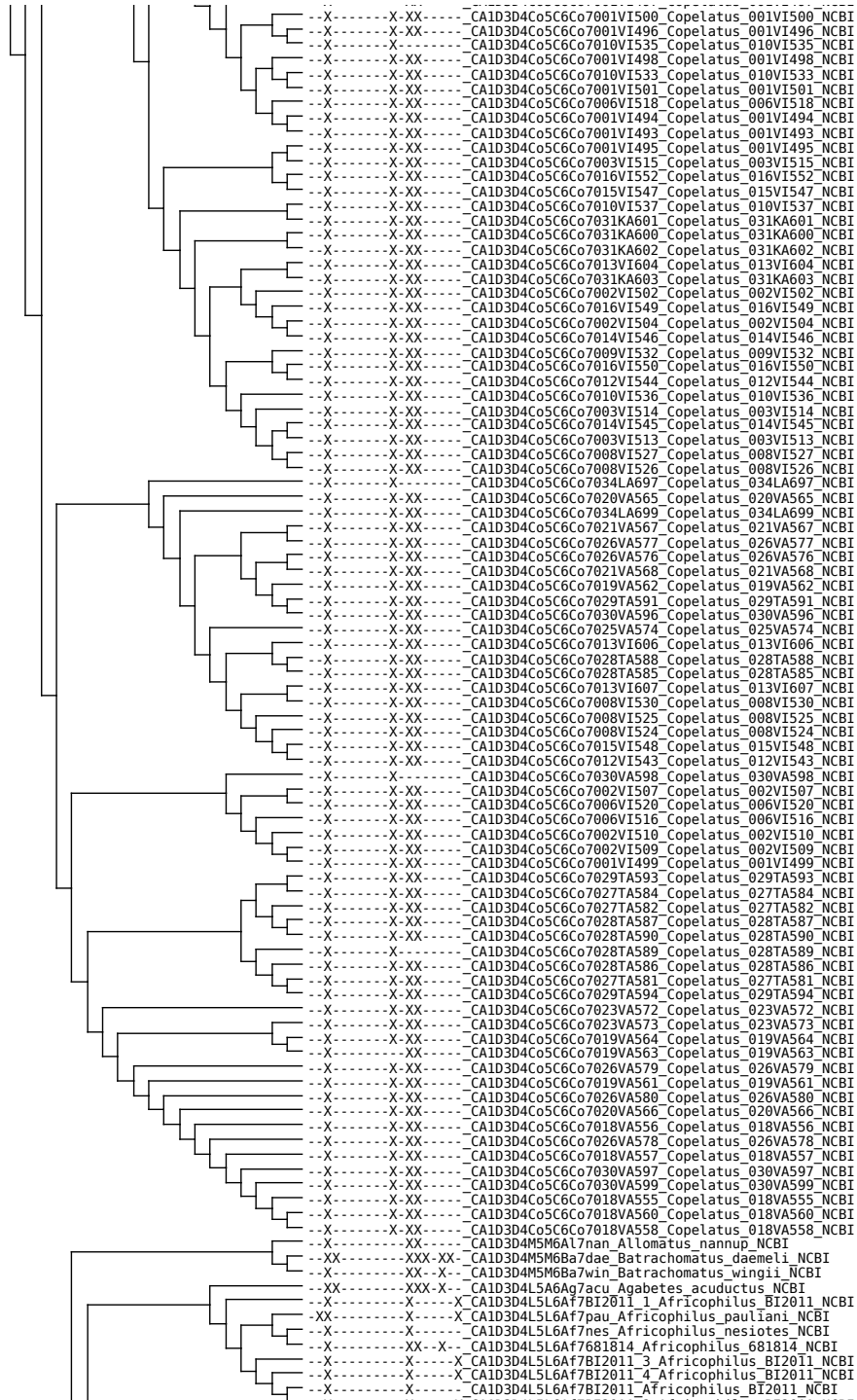


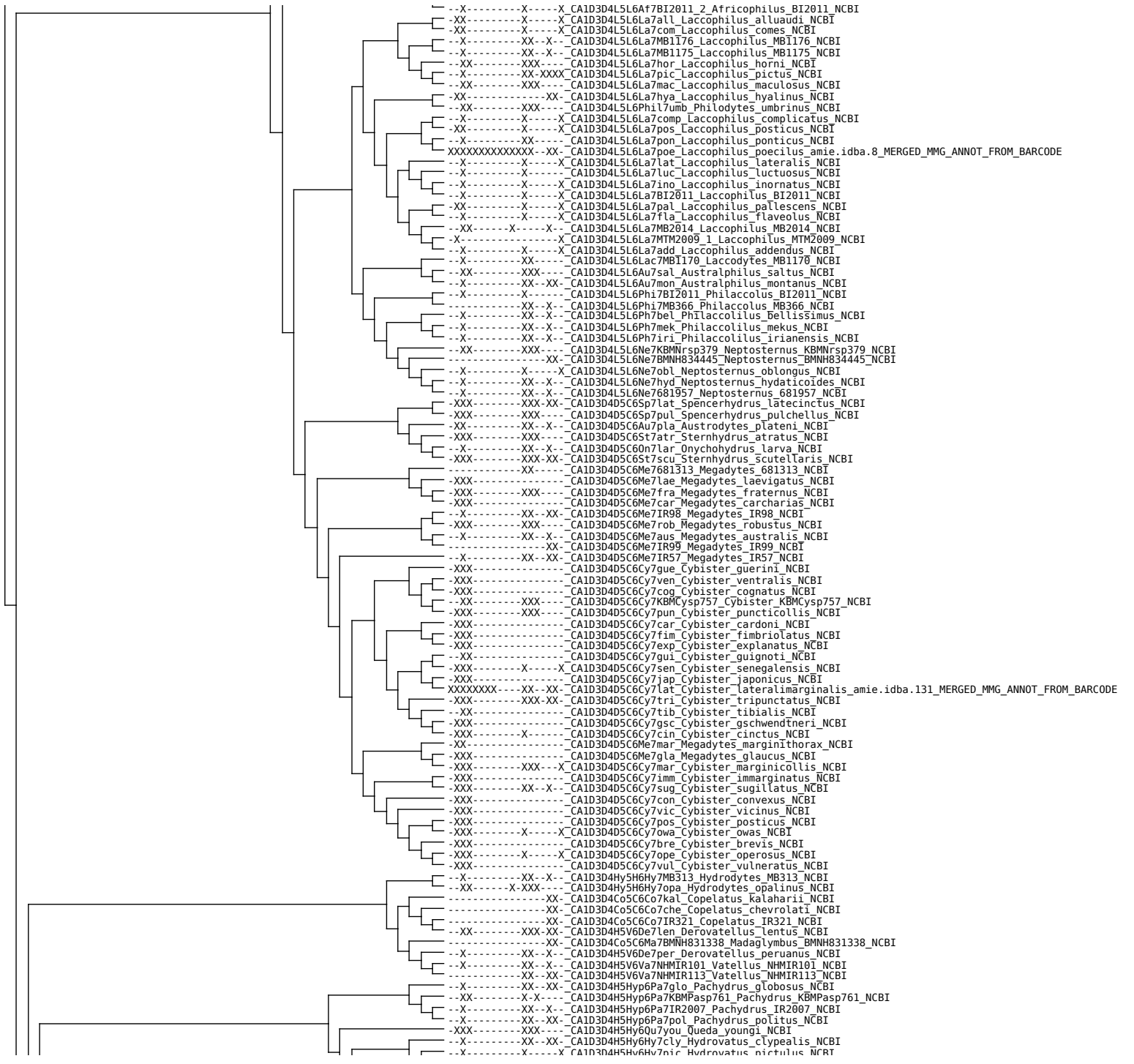


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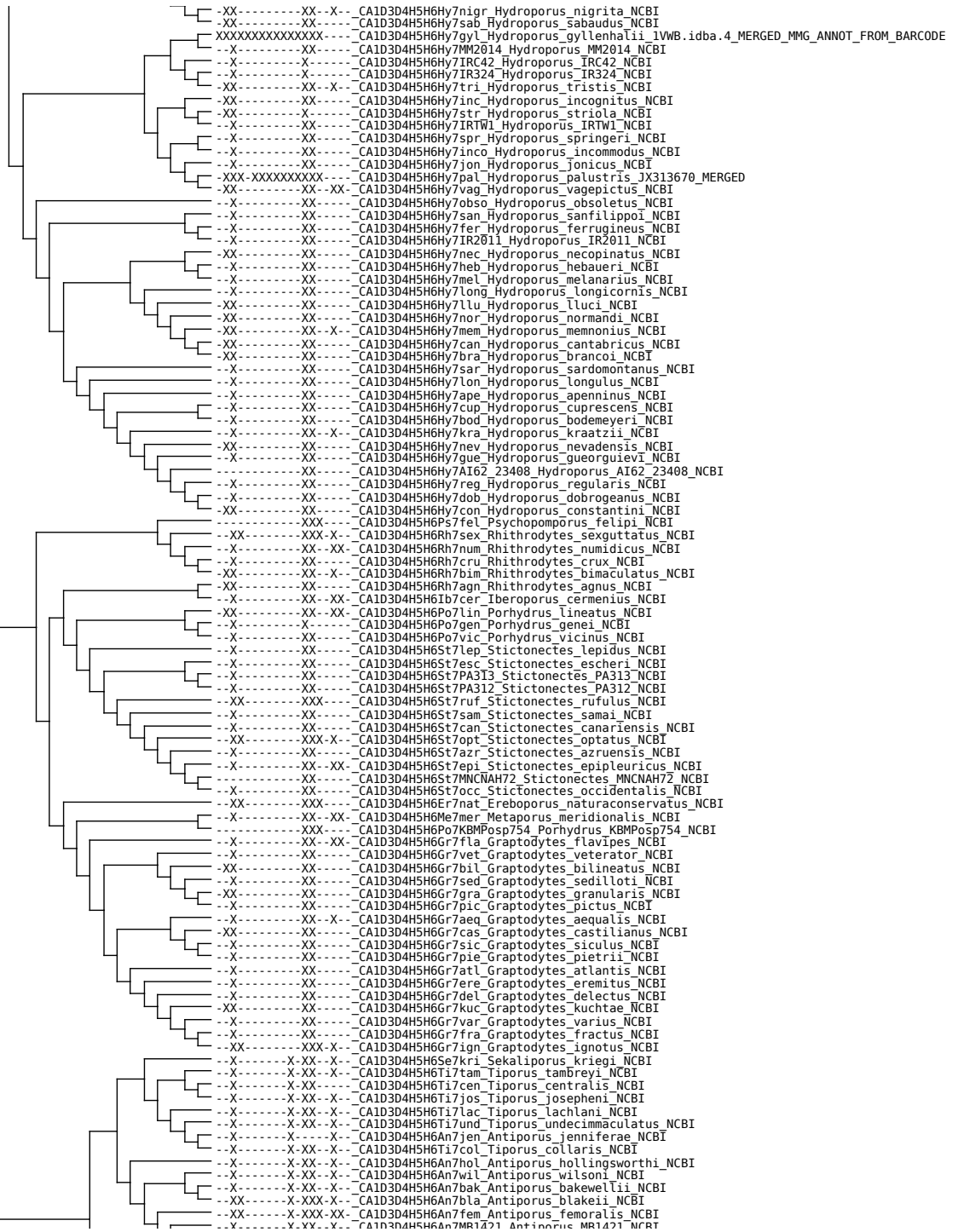




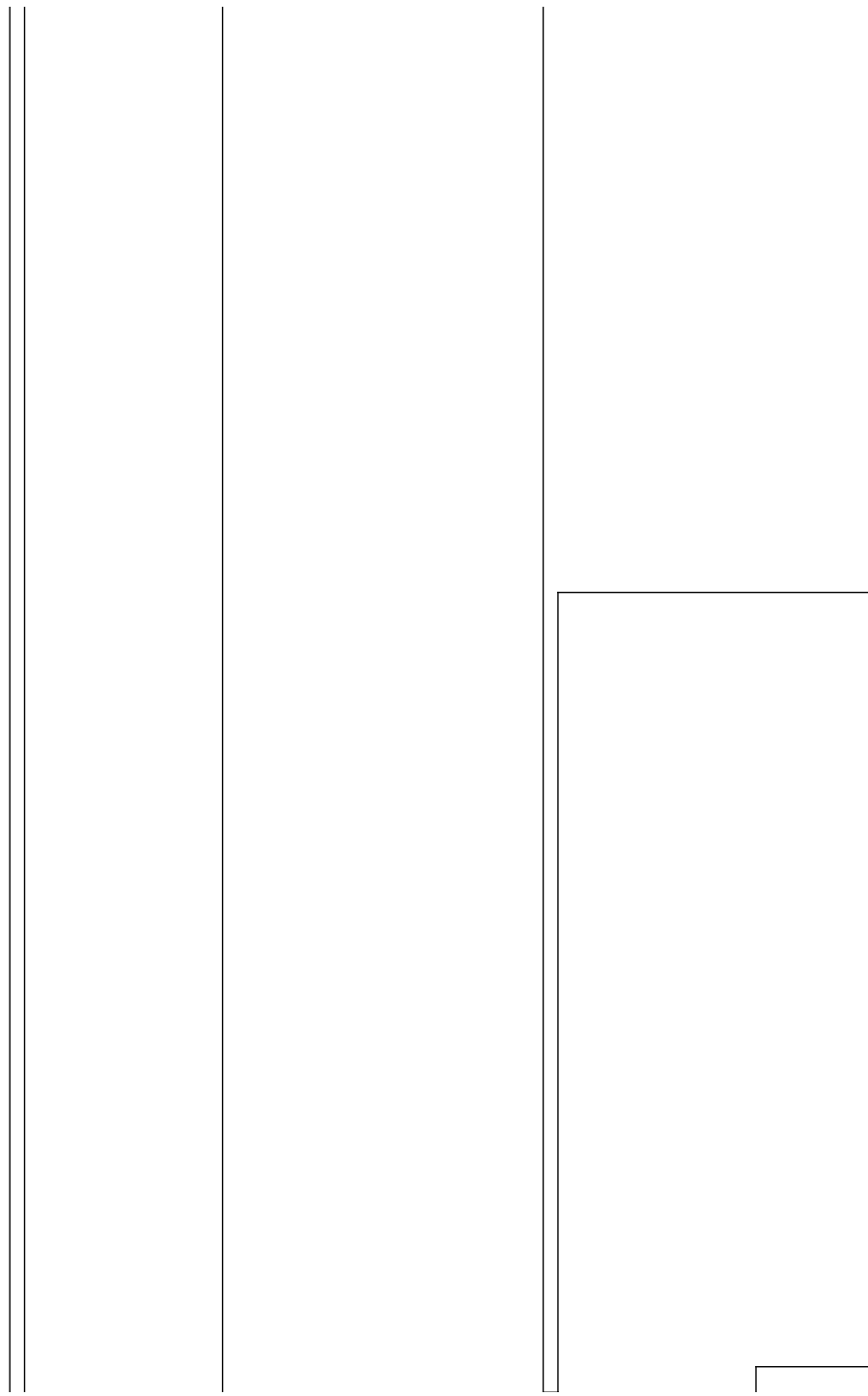
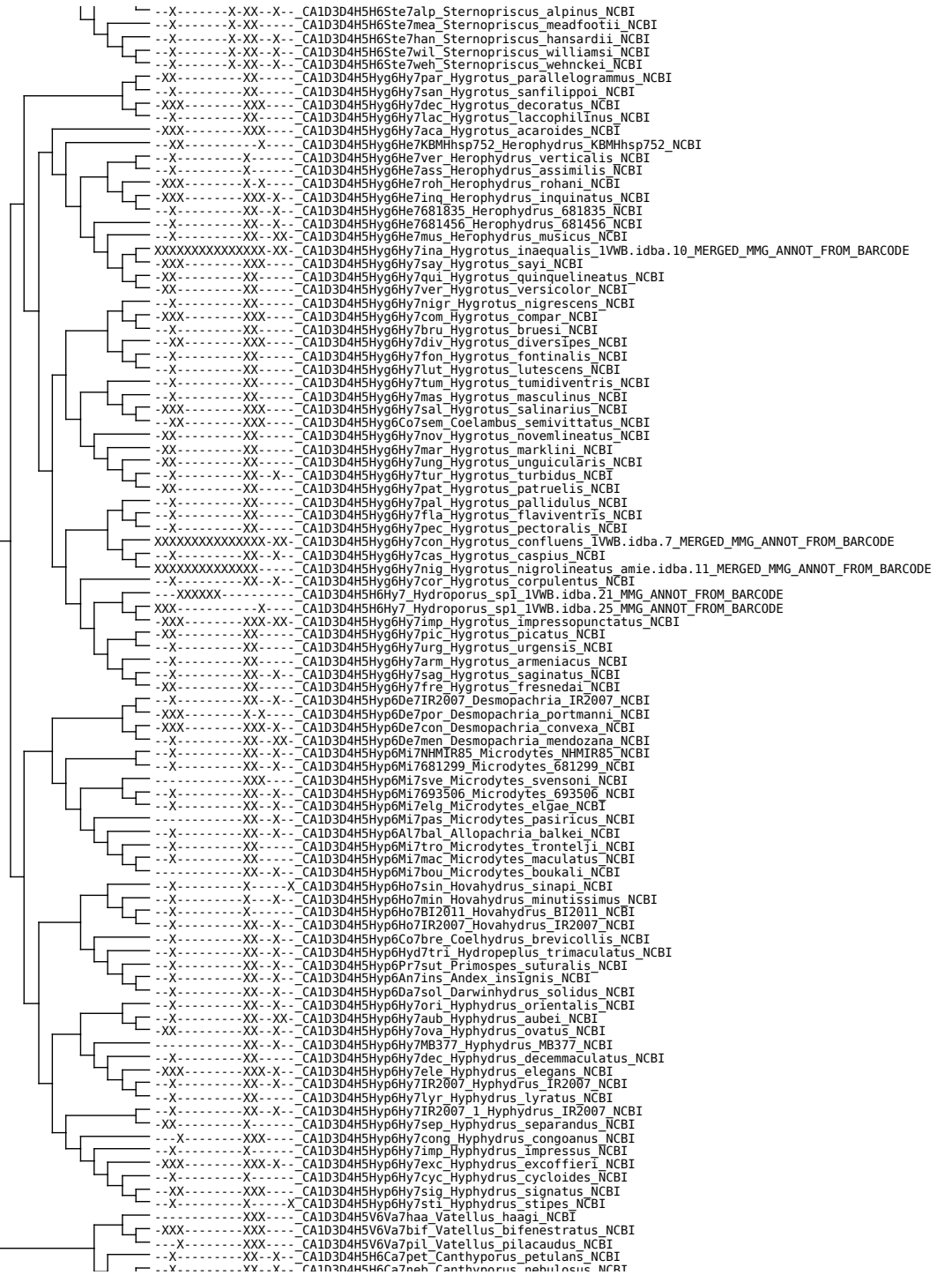




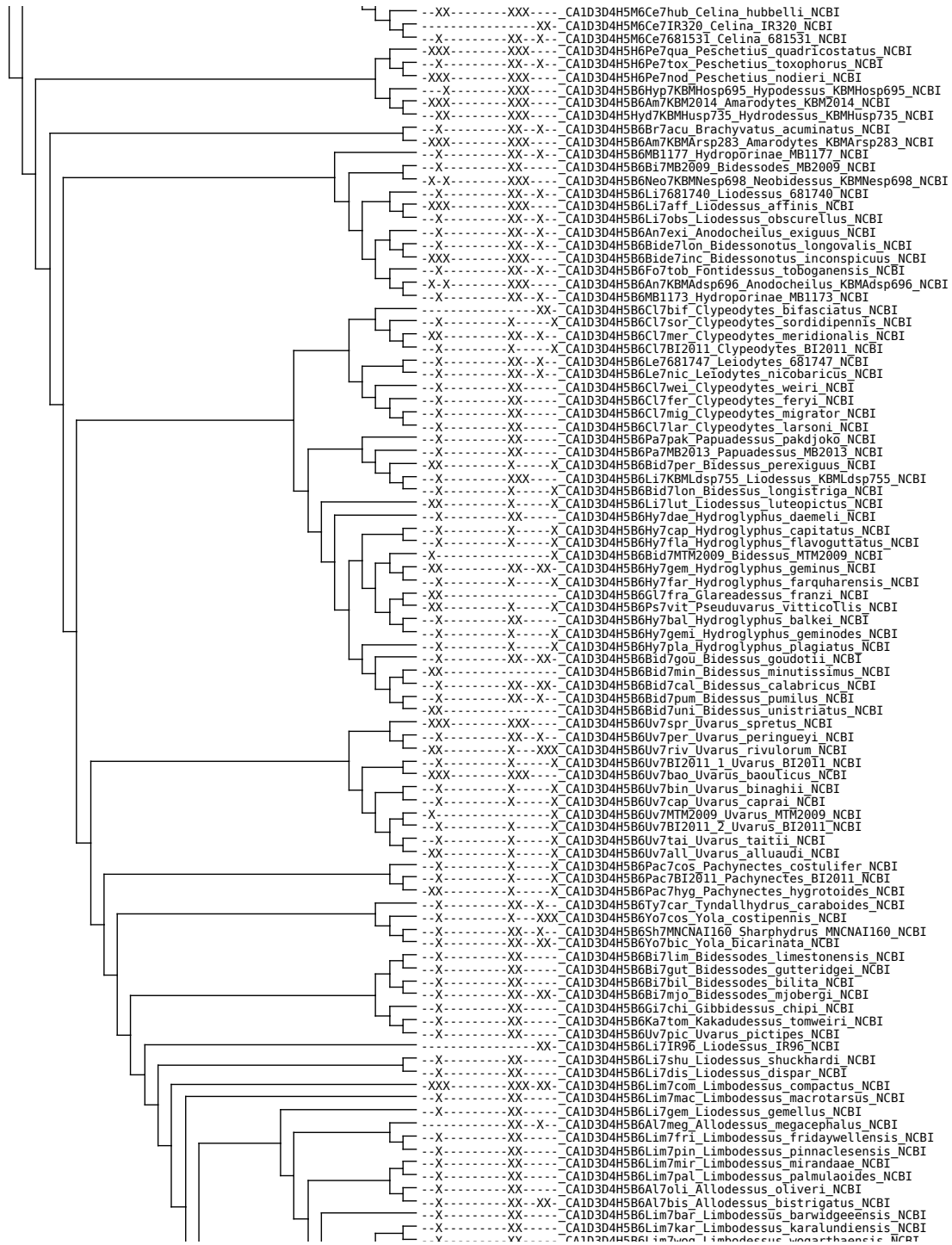
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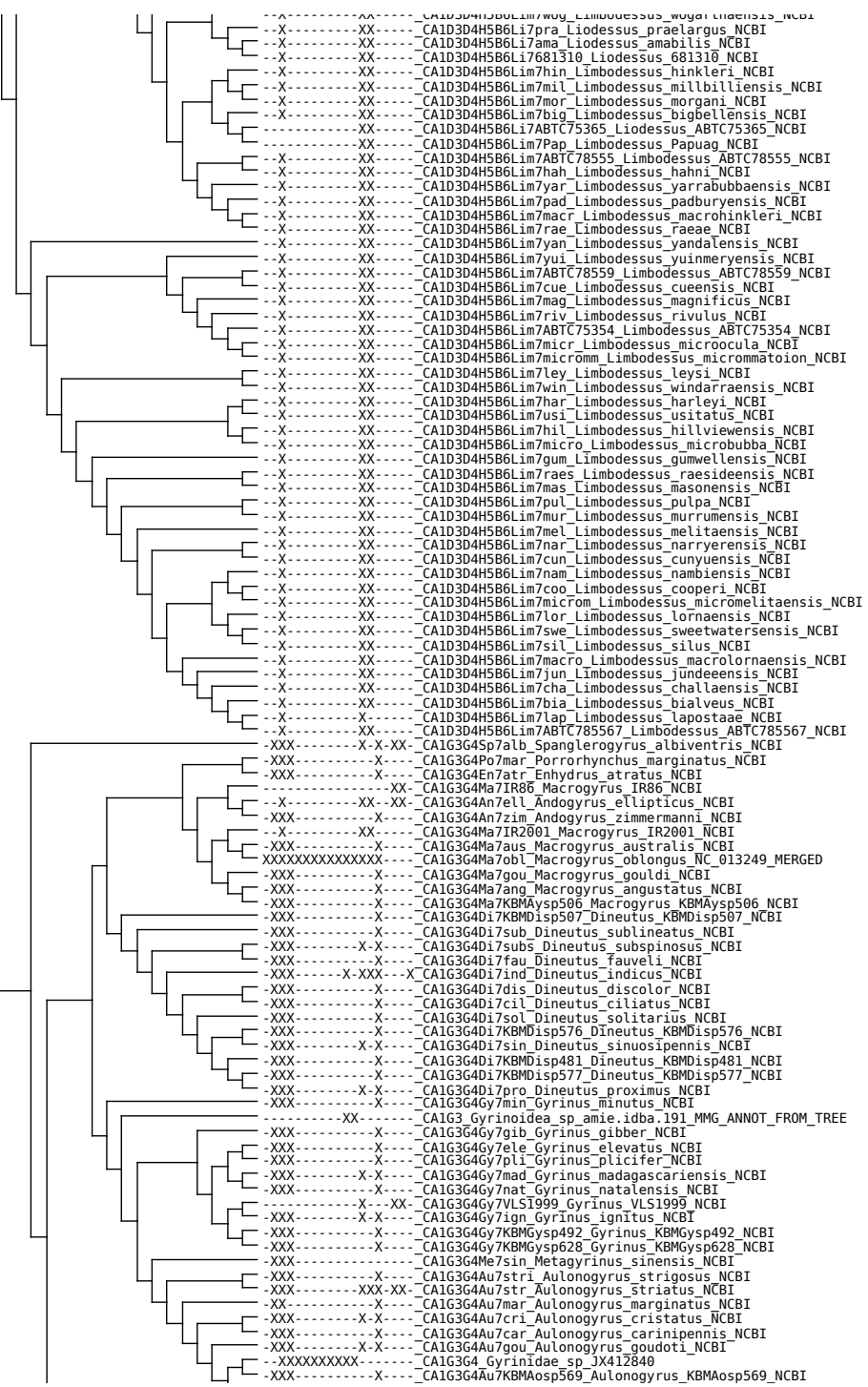


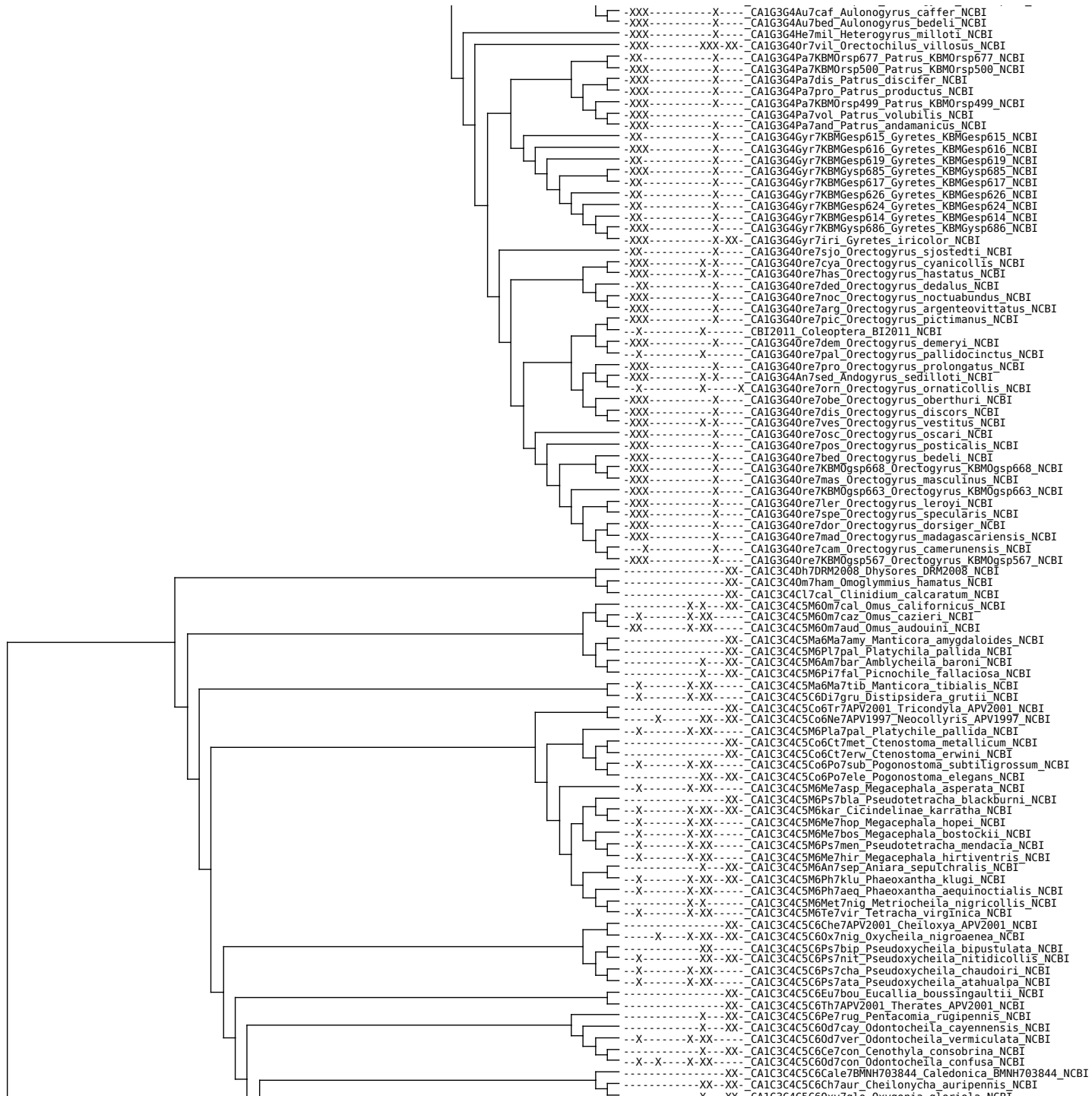
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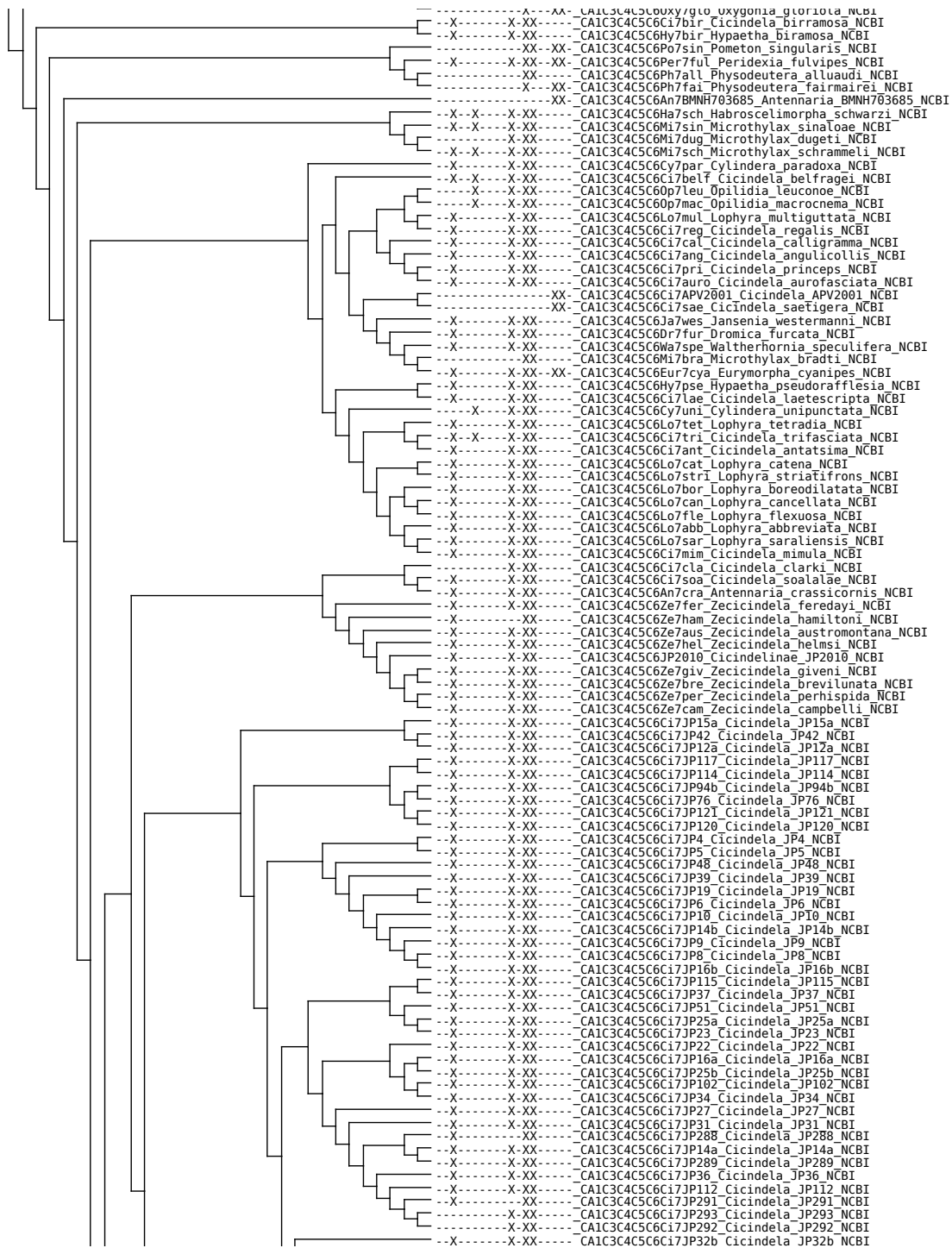
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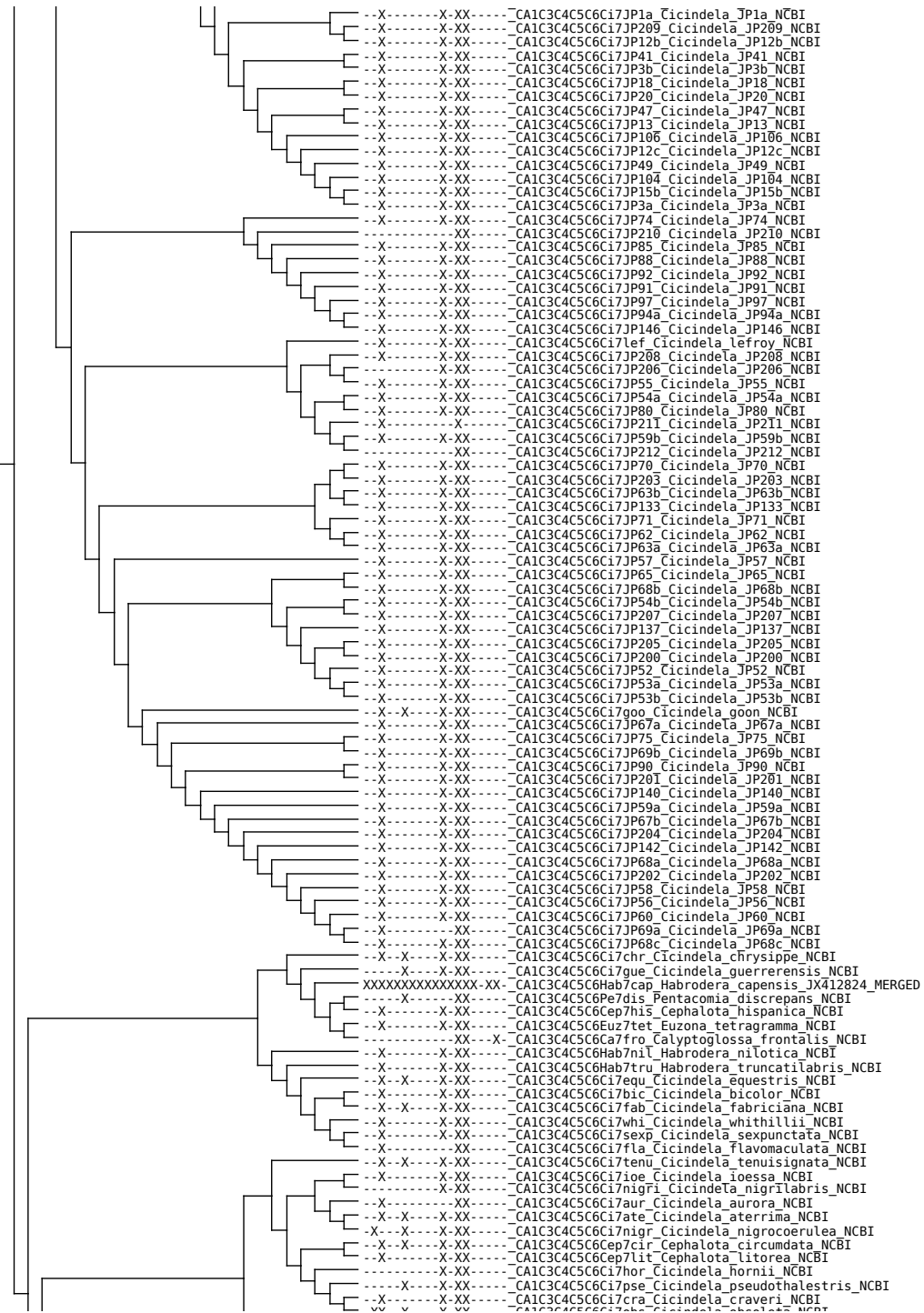








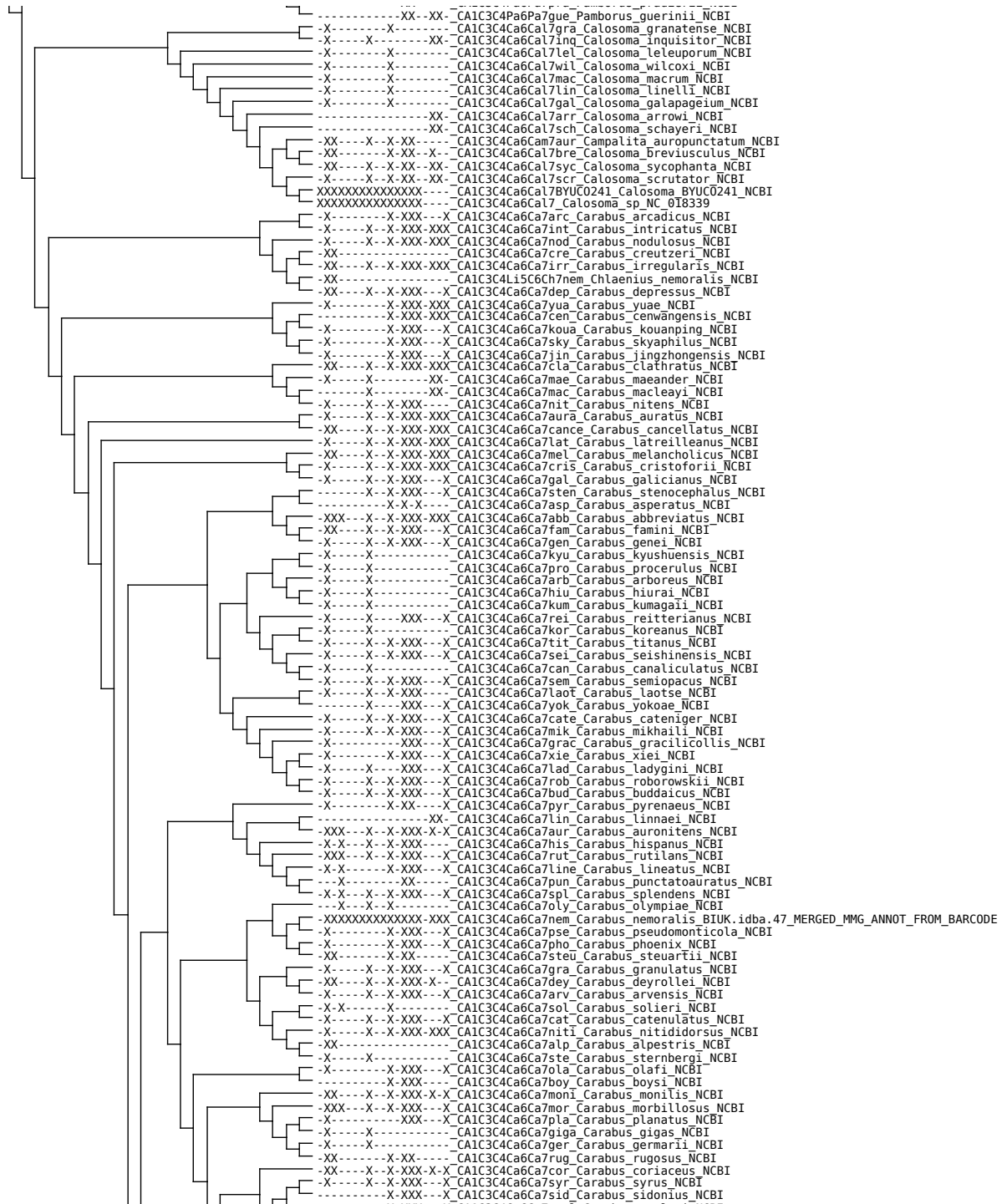






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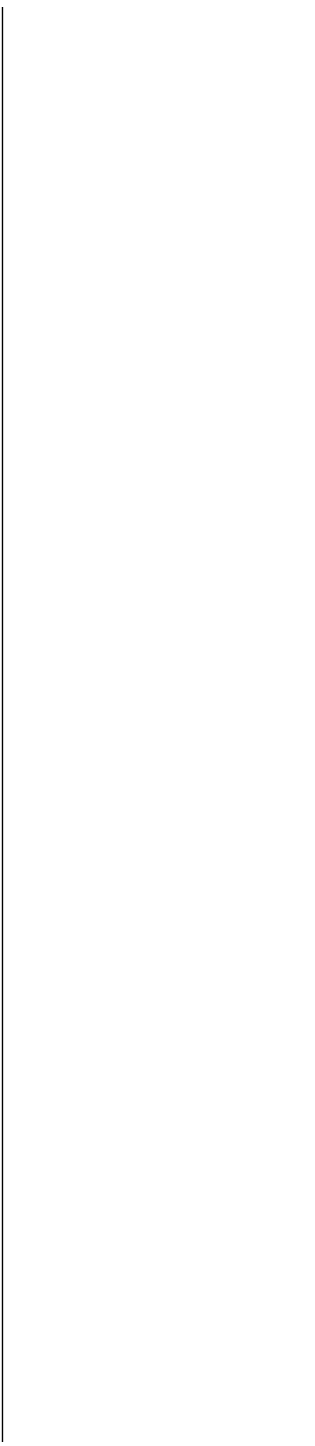
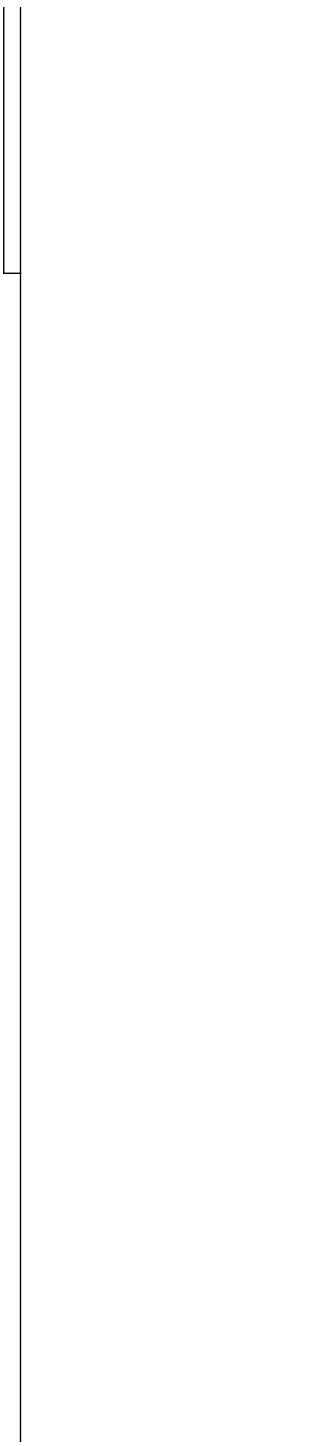
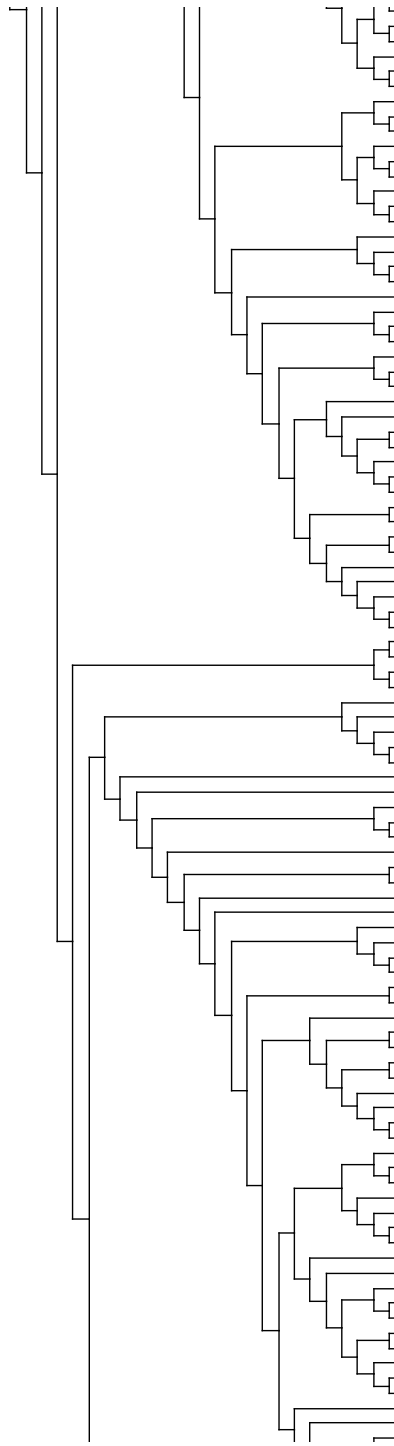


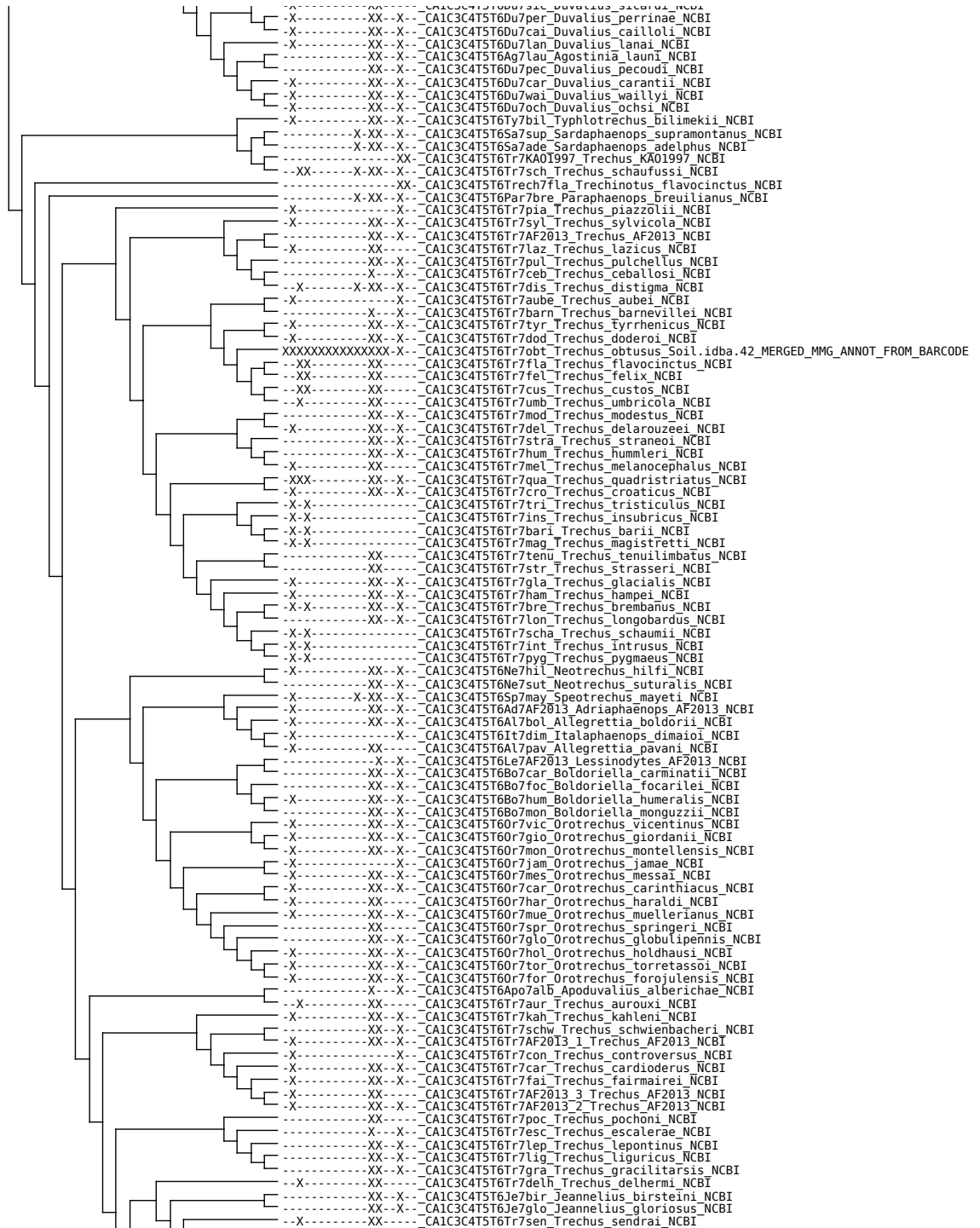


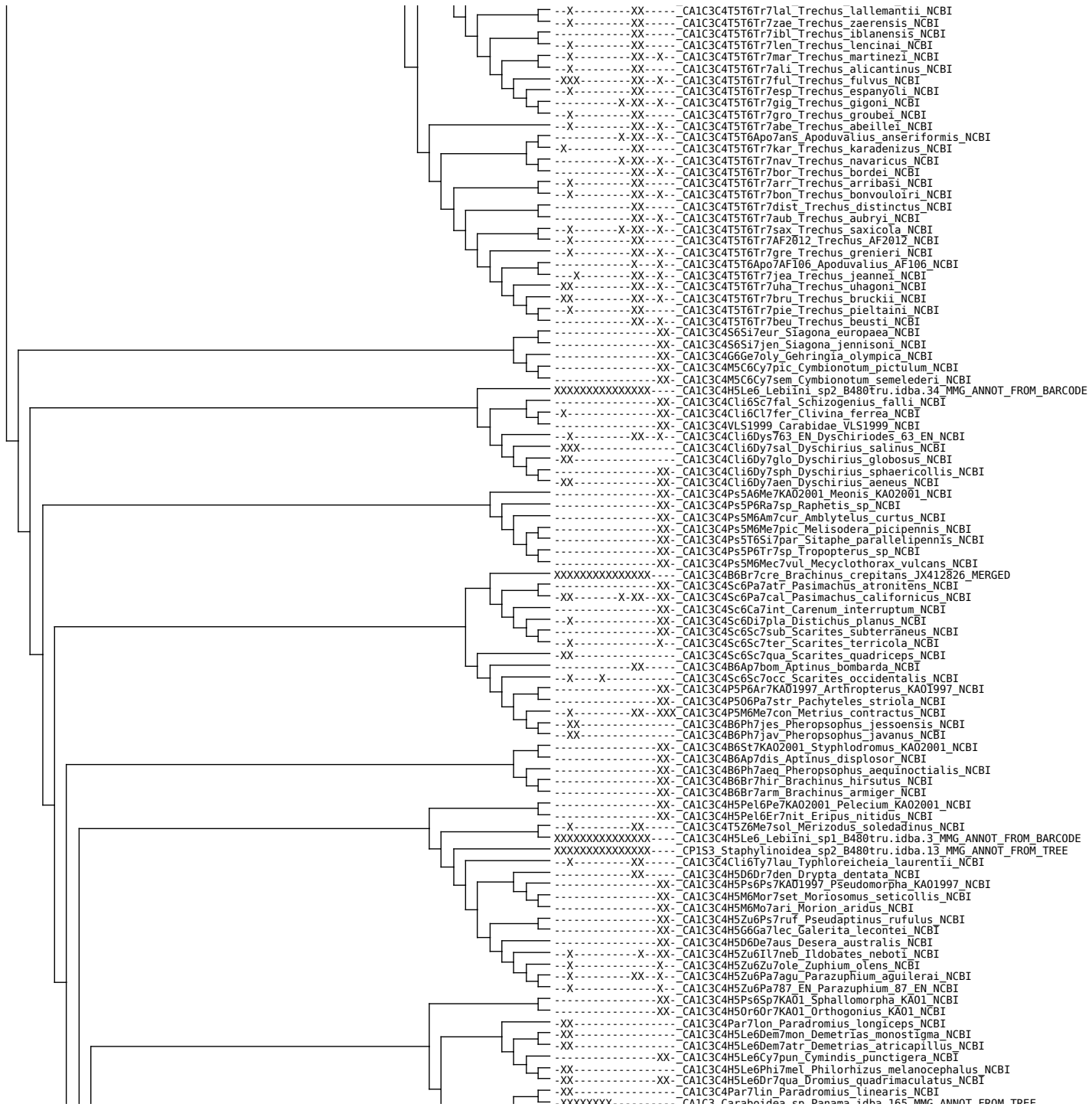
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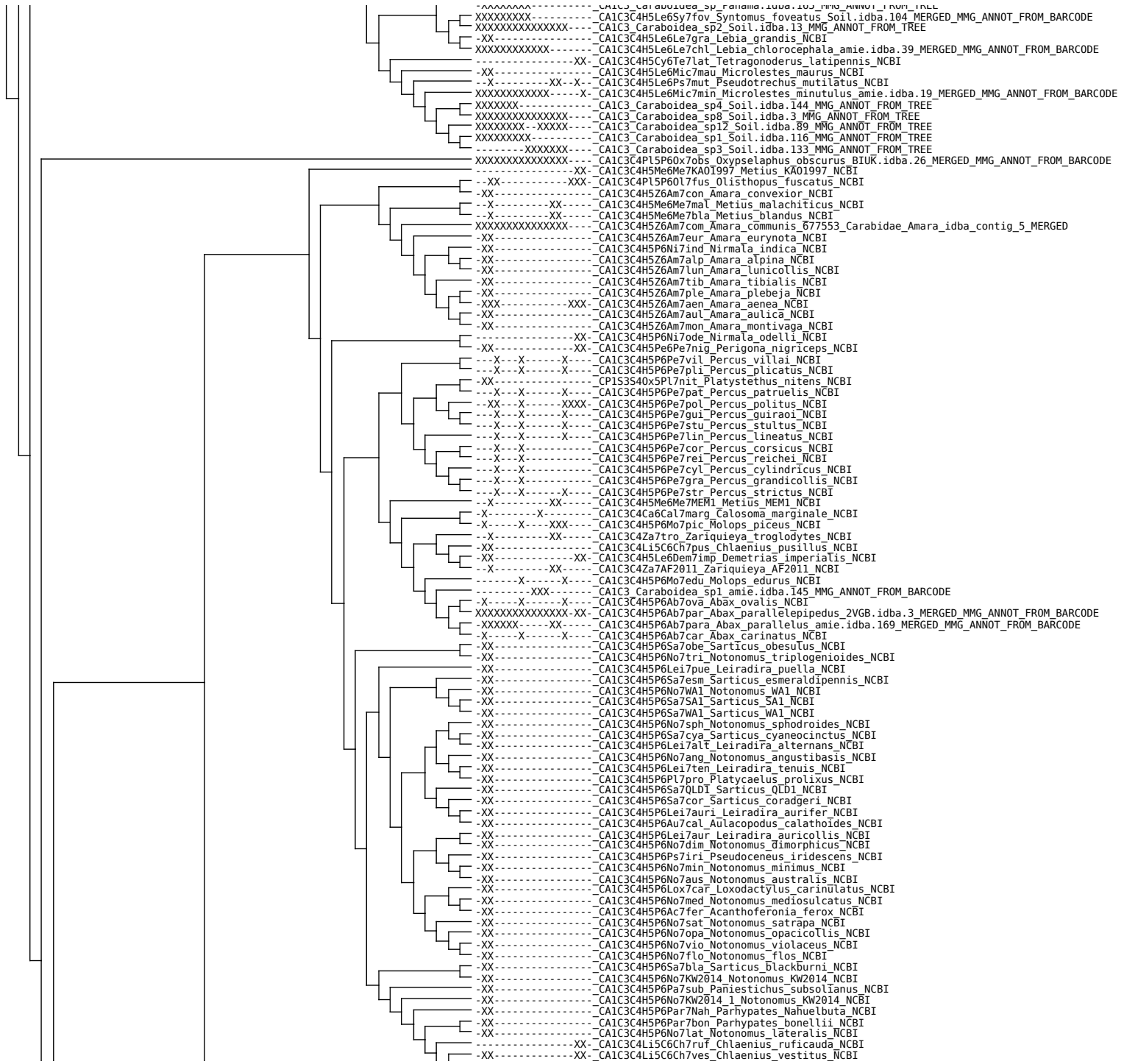
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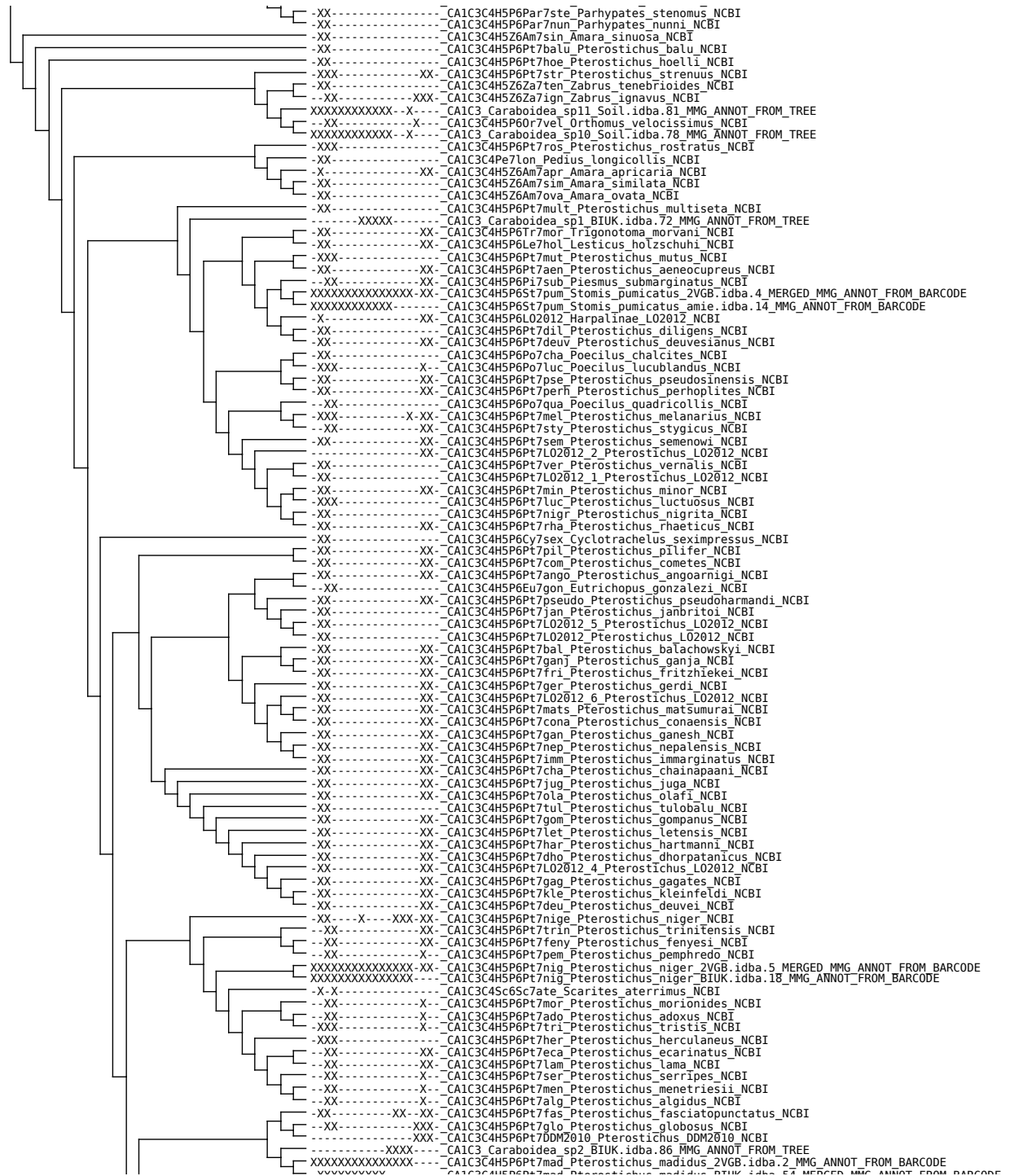


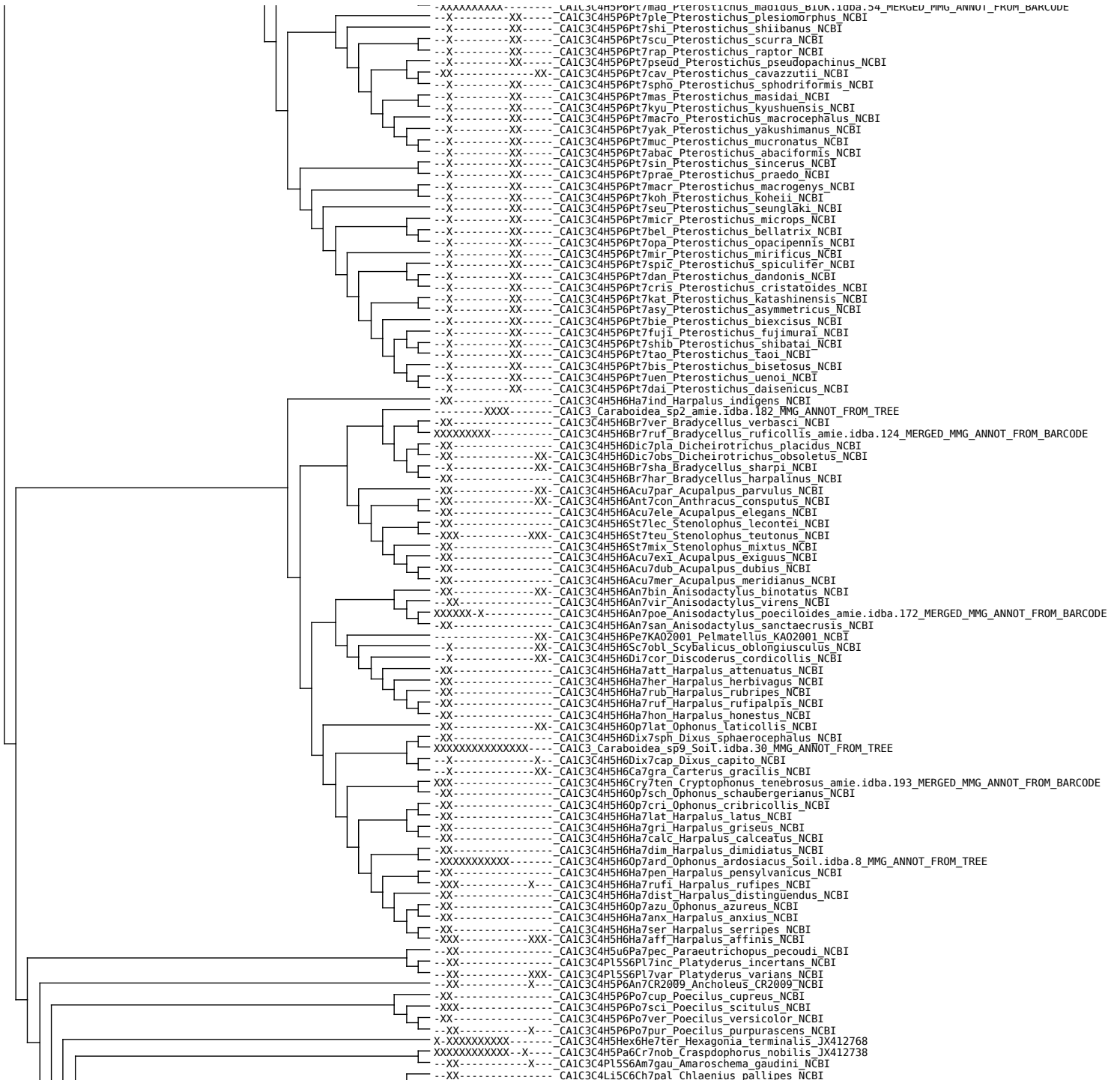




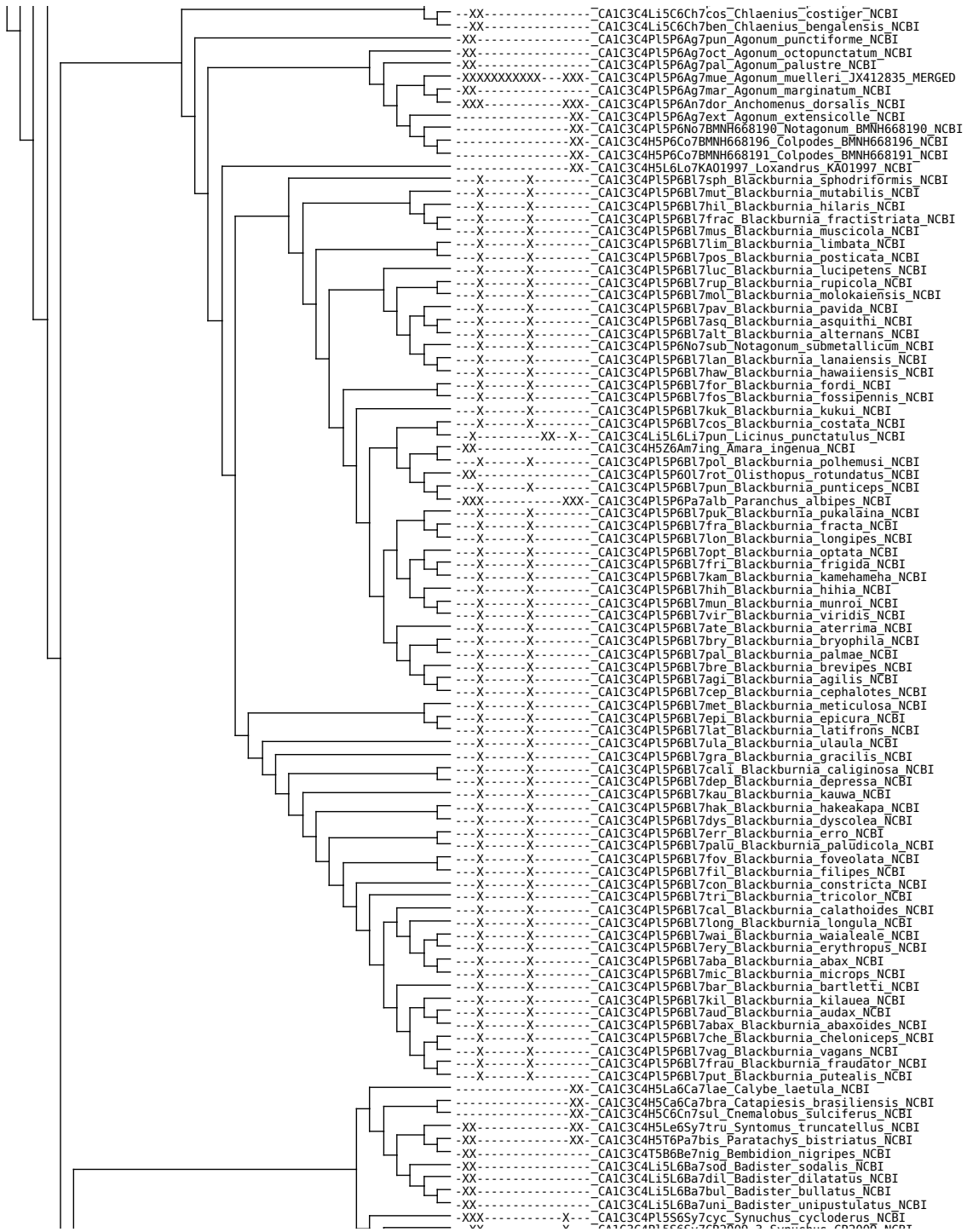
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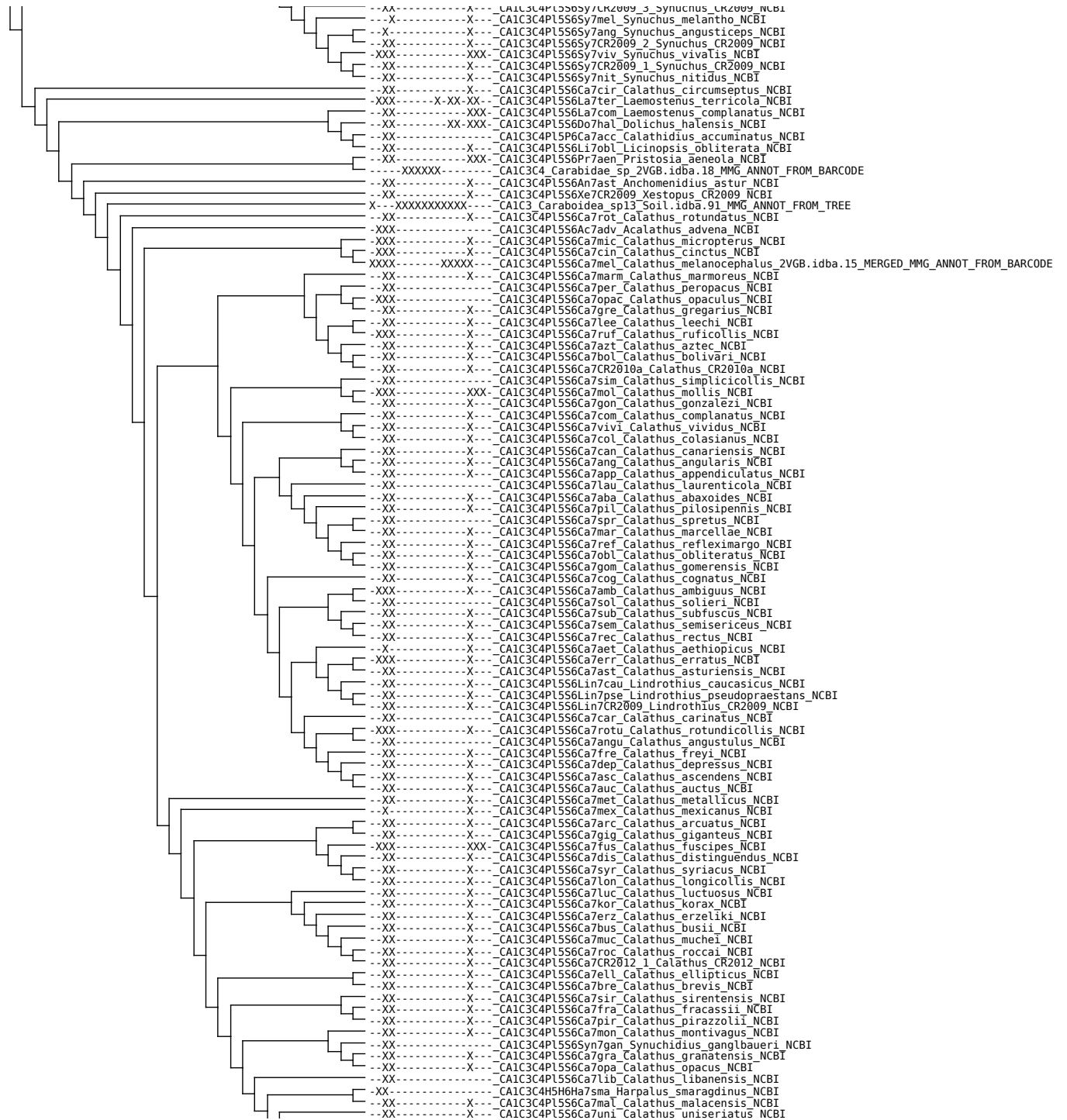




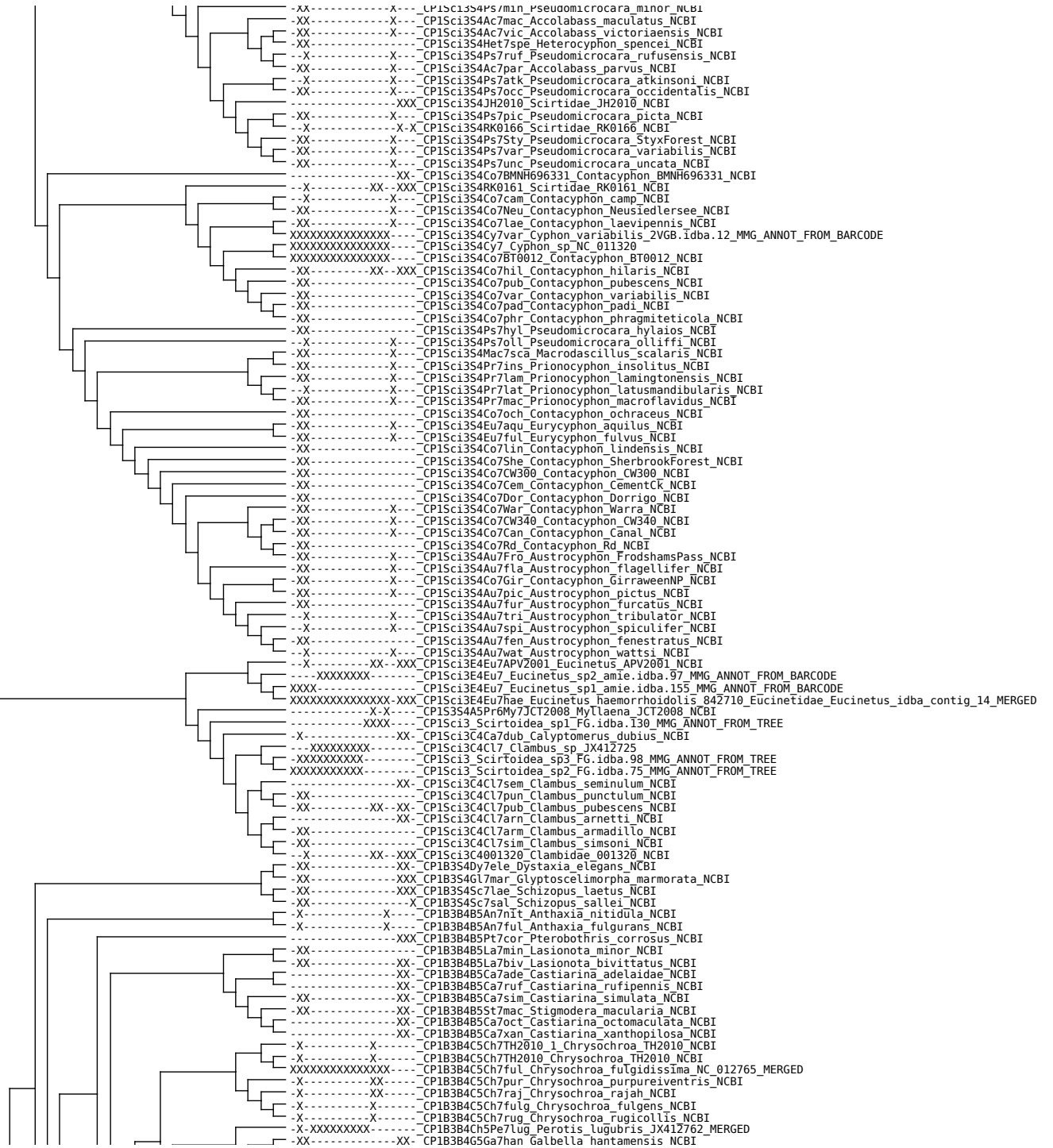




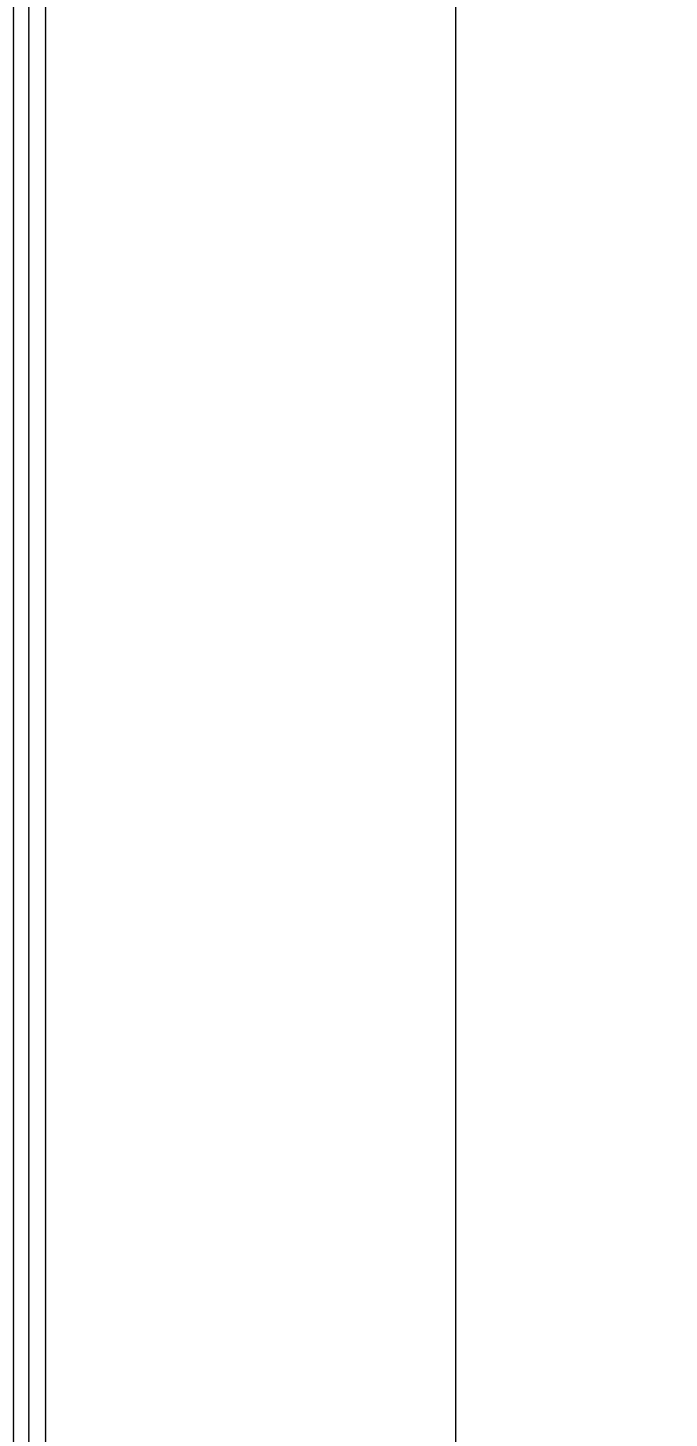
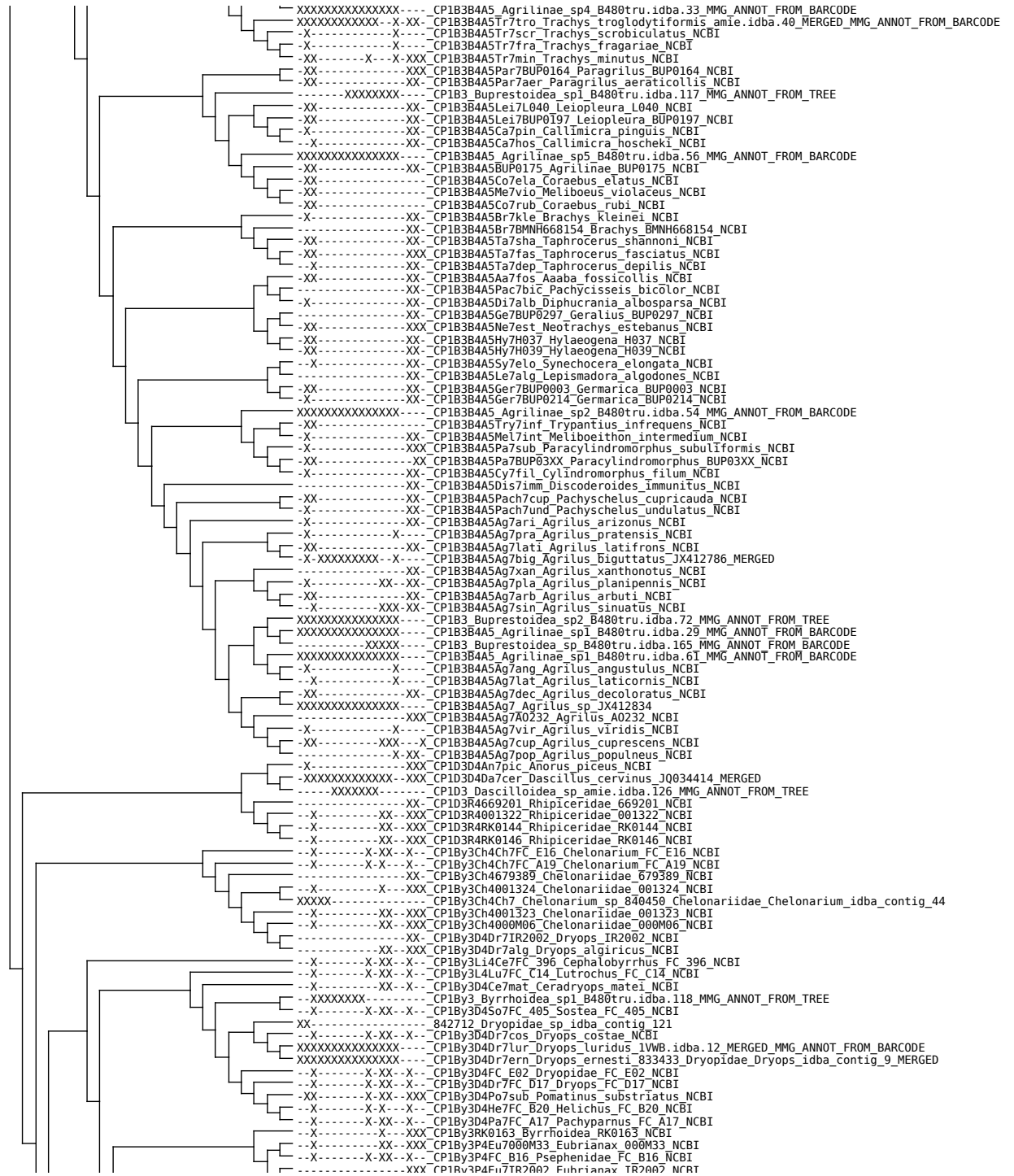




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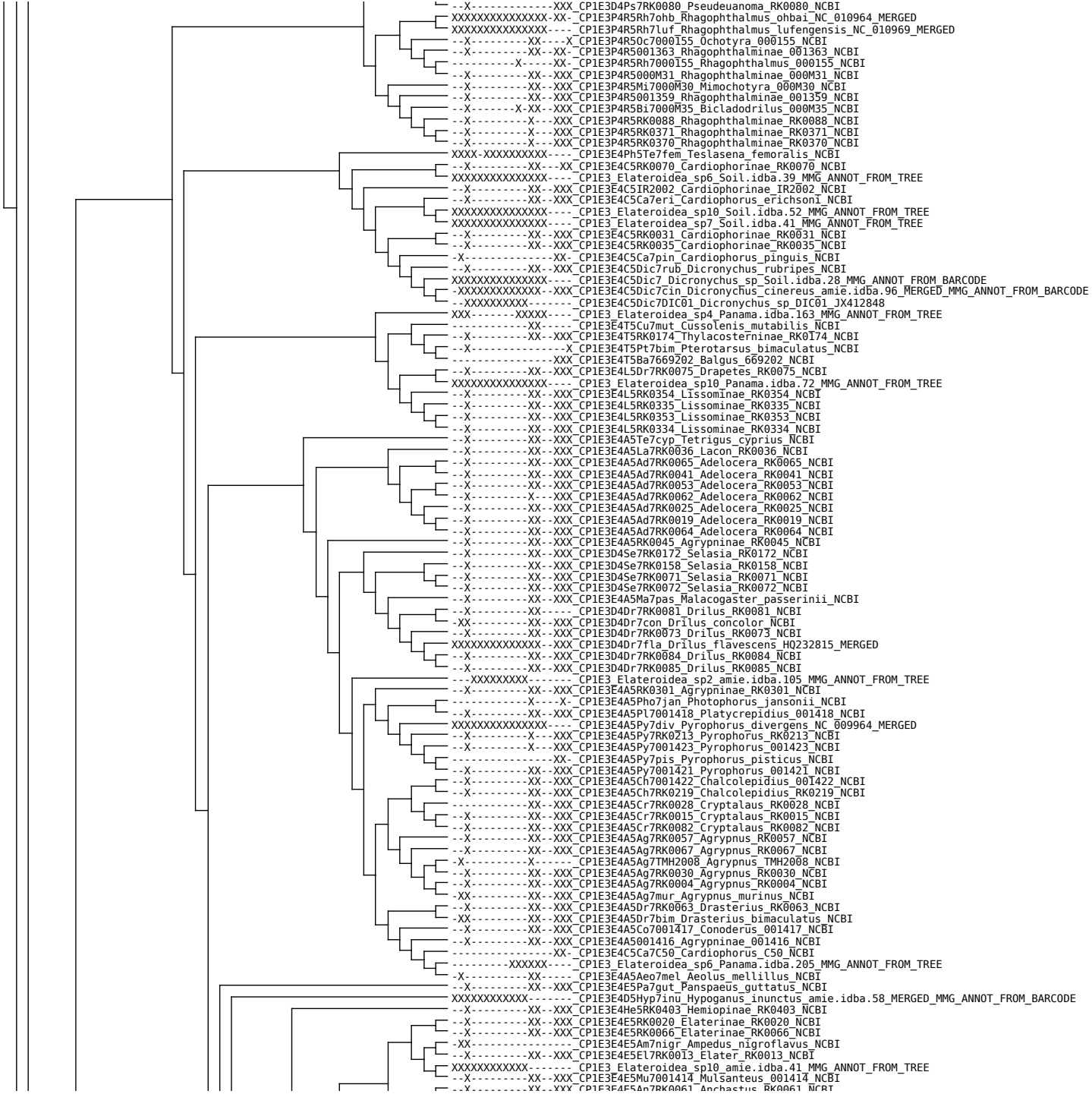


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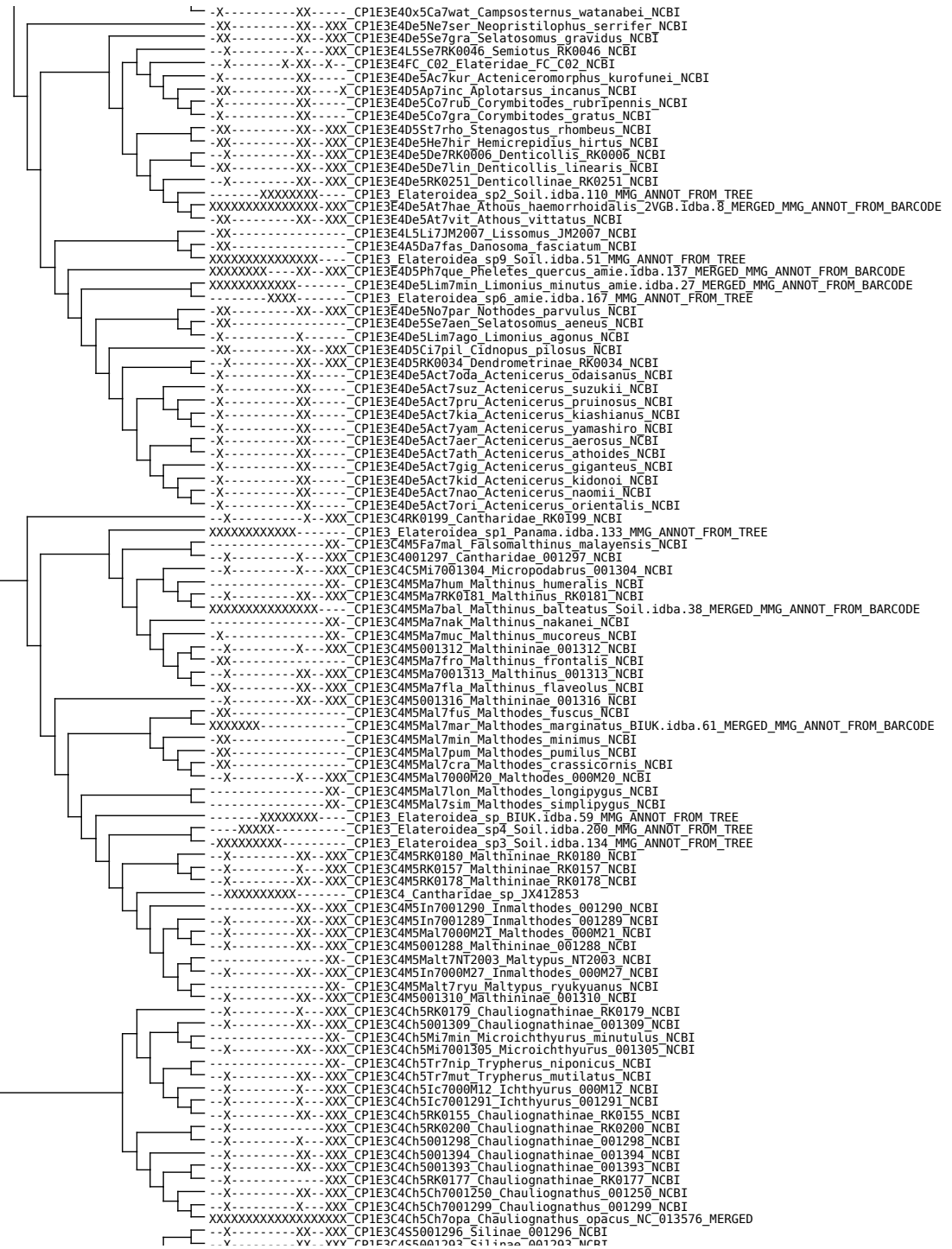




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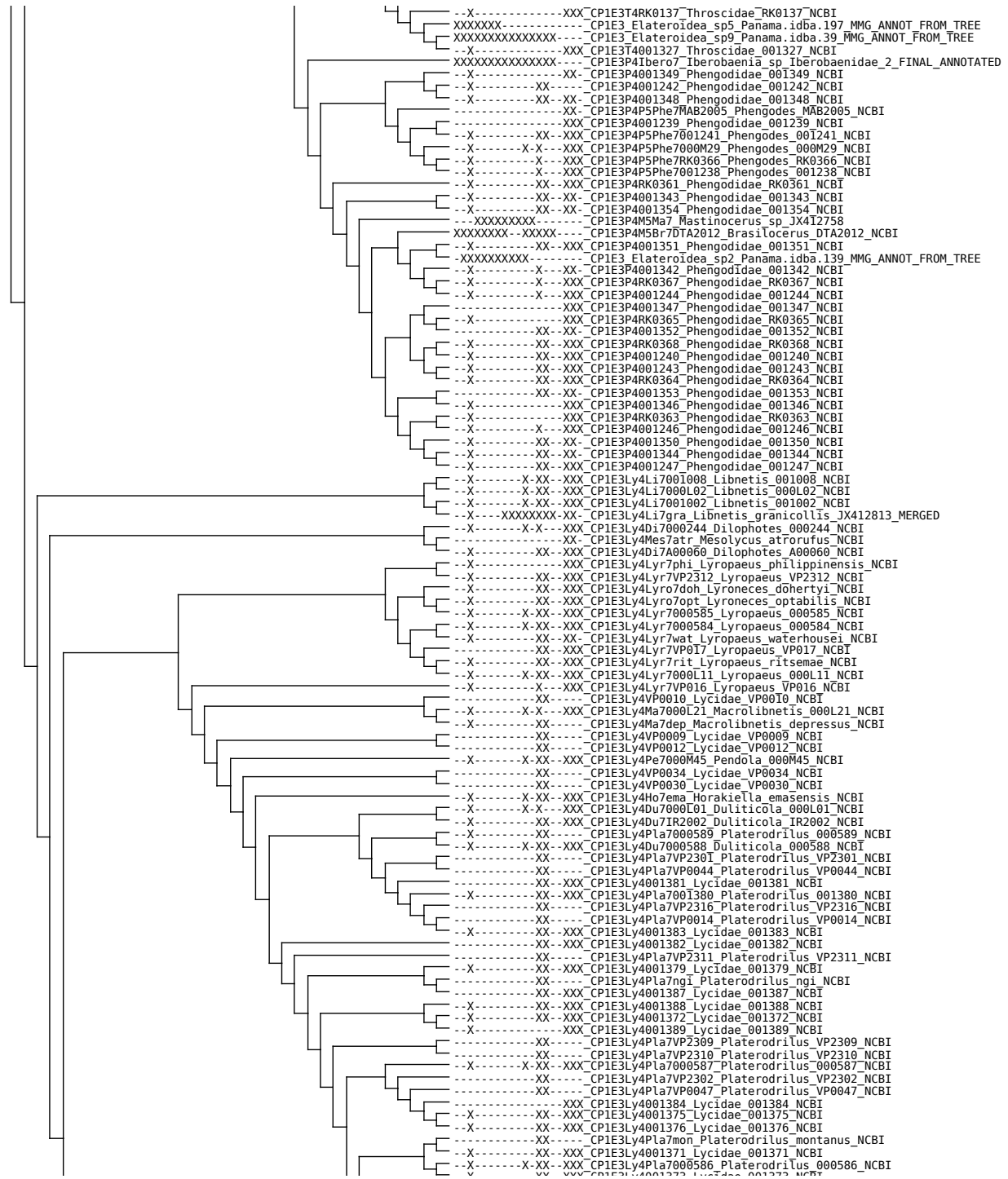
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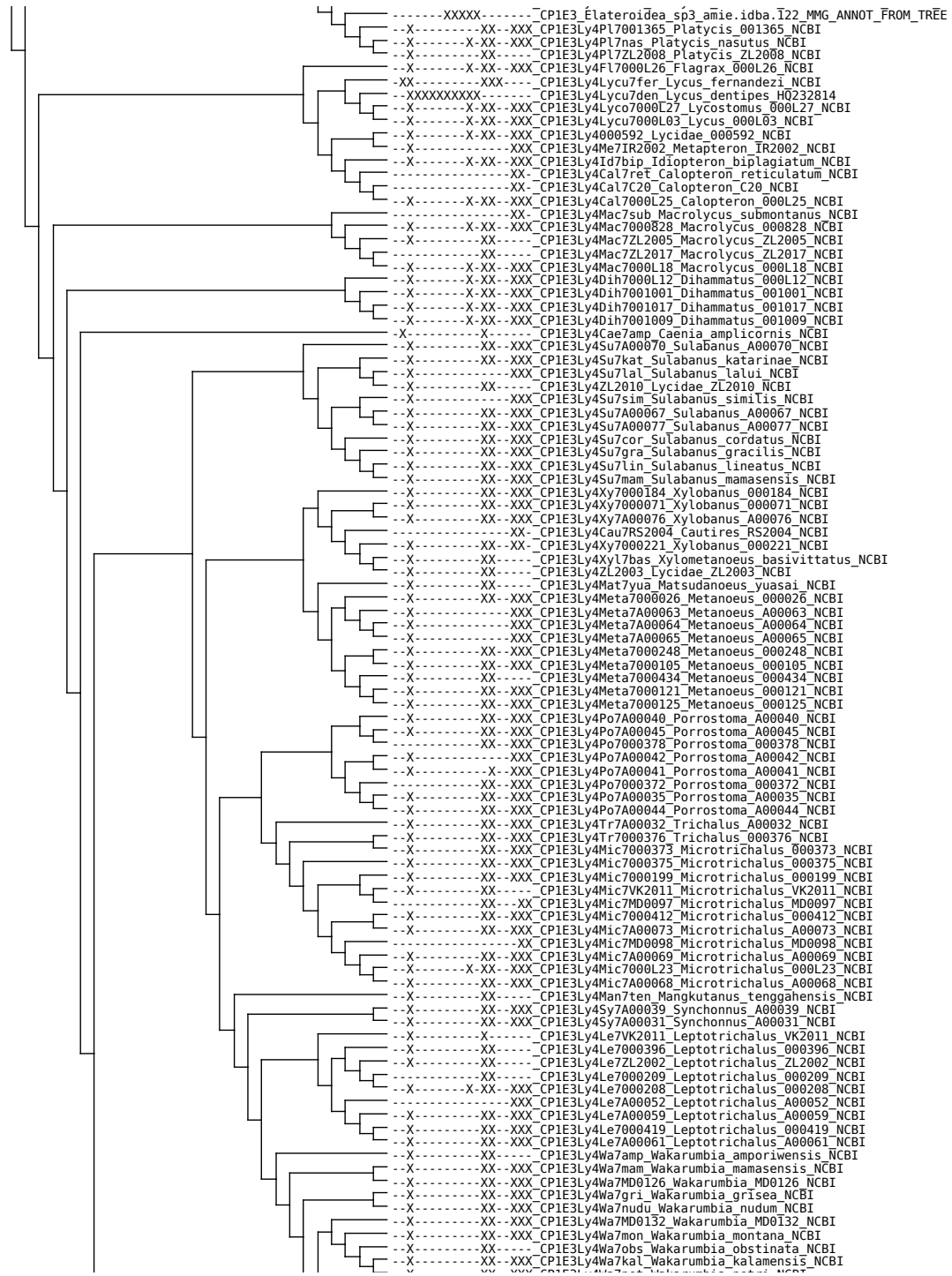




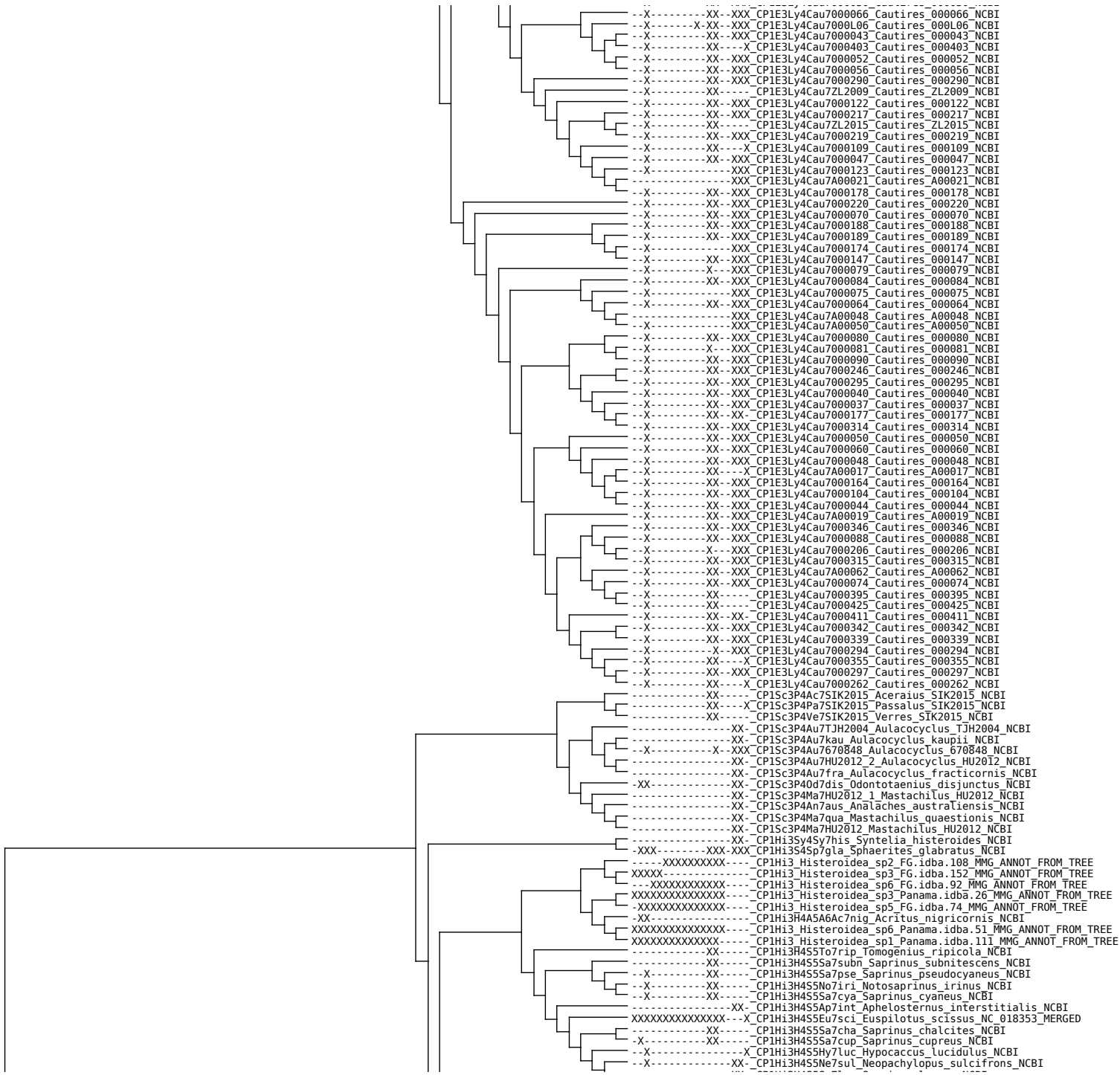


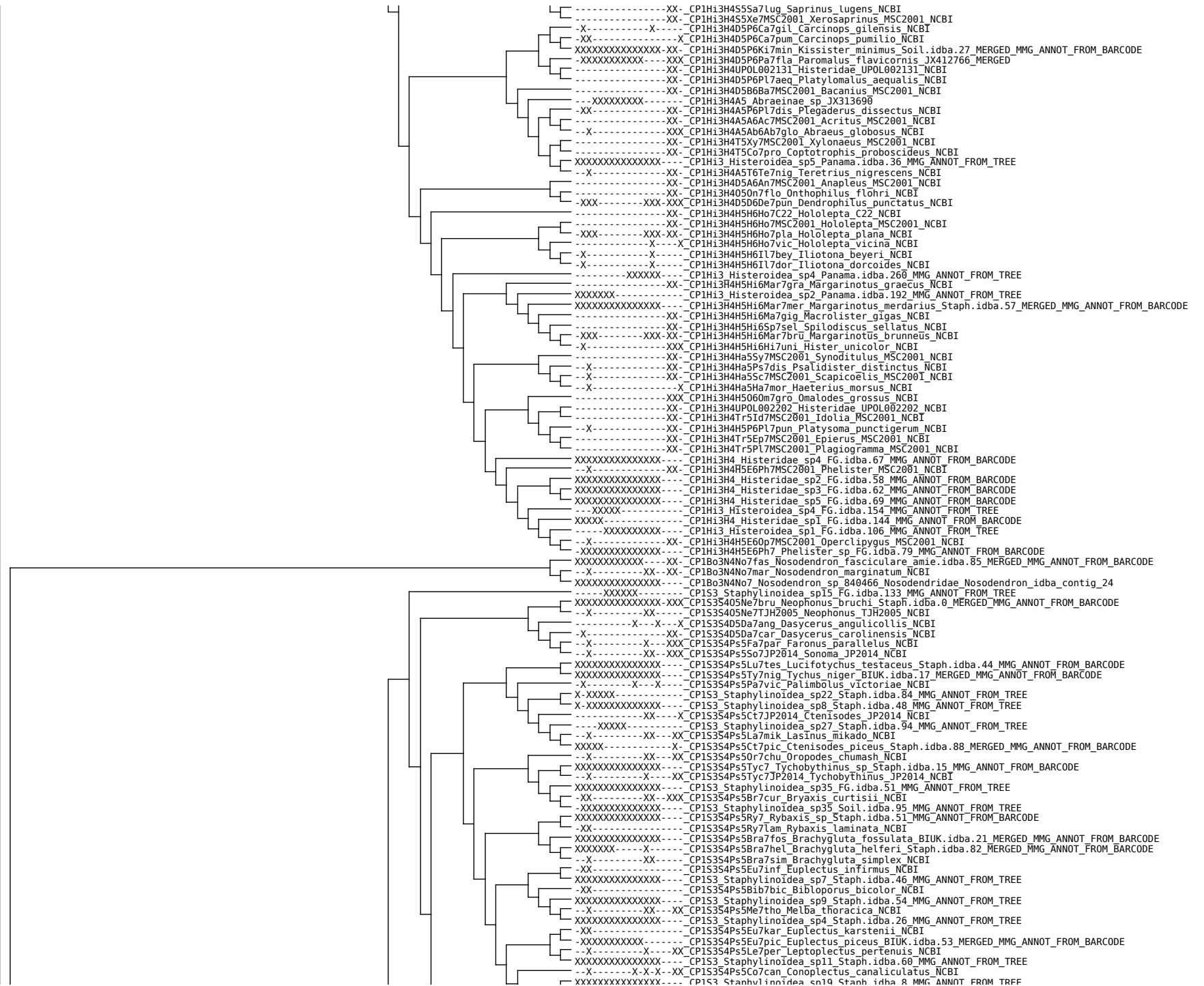






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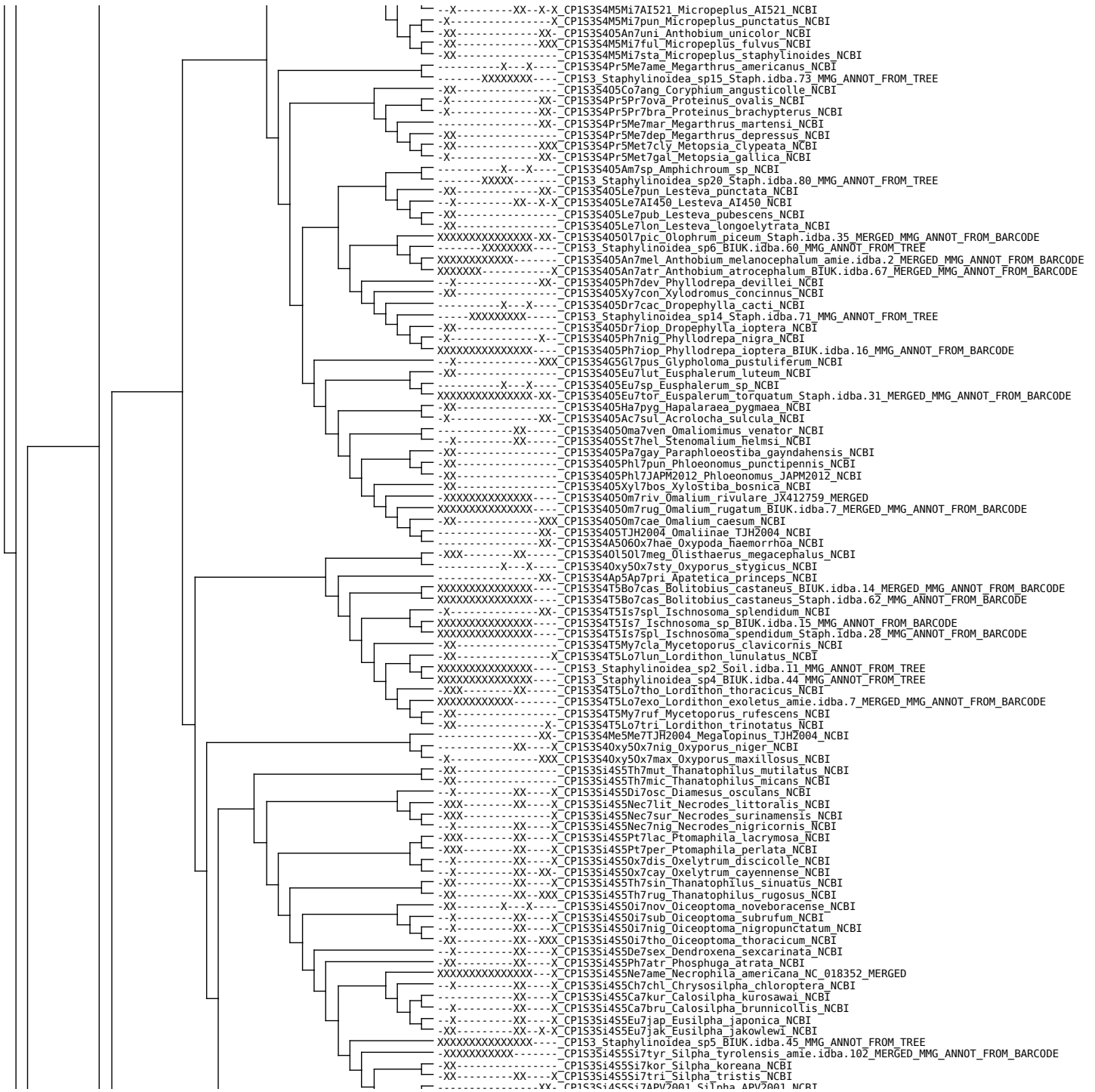


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-X-XX-XX-CP153S4Ps5Fu7kna\_Fustiger\_knausii\_NCBI  
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-X-XX-XX-CP153S4Ps5Ce7ret\_Cerylambus\_reticulatus\_NCBI  
-X-XX-XX-CP153S4Ps5Ad7tay\_Adranes\_taylori\_NCBI  
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-X-XX-XX-CP153S4Ps5Cl7lon\_Claviger\_longicornis\_NCBI  
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-X-XX-XX-CP153S4Ps5Ma7JP2014\_1\_Mastiger\_JP2014\_NCBI  
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-XX-CP153S4St5St7inte\_Stenus\_intermedius\_NCBI  
-XX-CP153S4St5St7mel\_Stenus\_melanarius\_NCBI  
-XX-CP153S4St5St7nit\_Stenus\_nitens\_NCBI  
-XX-CP153S4St5St7can\_Stenus\_canaliculatus\_NCBI  
-XX-CP153S4St5St7boo\_Stenus\_boops\_NCBI  
-XX-CP153S4St5St7mor\_Stenus\_morio\_NCBI  
-XX-CP153S4St5St7pub\_Stenus\_puberulus\_NCBI  
-XX-CP153S4St5St7arg\_Stenus\_argus\_NCBI  
-XX-CP153S4St5St7eur\_Stenus\_eurous\_NCBI  
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-XX-CP153S4St5St7rug\_Stenus\_rugipennis\_NCBI  
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-XX-CP153S4St5St7bim\_Stenus\_bimaculatus\_NCBI  
-XX-CP153S4St5St7hum\_Stenus\_humilis\_NCBI  
-XX-CP153S4St5St7jun\_Stenus\_juno\_NCBI  
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-XX-CP153S4St5St7ins\_Stenus\_insignatus\_NCBI  
-XX-CP153S4St5St7ten\_Stenus\_tenuipes\_NCBI  
-XX-CP153S4St5St7ali\_Stenus\_alienus\_NCBI  
-XX-CP153S4St5St7big\_Stenus\_biguttatus\_NCBI  
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-XX-CP153S4St5St7gut\_Stenus\_guttula\_NCBI  
-XX-CP153S4St5St7fos\_Stenus\_fossulatus\_NCBI  
-X-CP153S4St5St7fel\_Dianous\_fellowesi\_NCBI  
-XX-CP153S4St5St7hai\_Dianous\_hainanensis\_NCBI  
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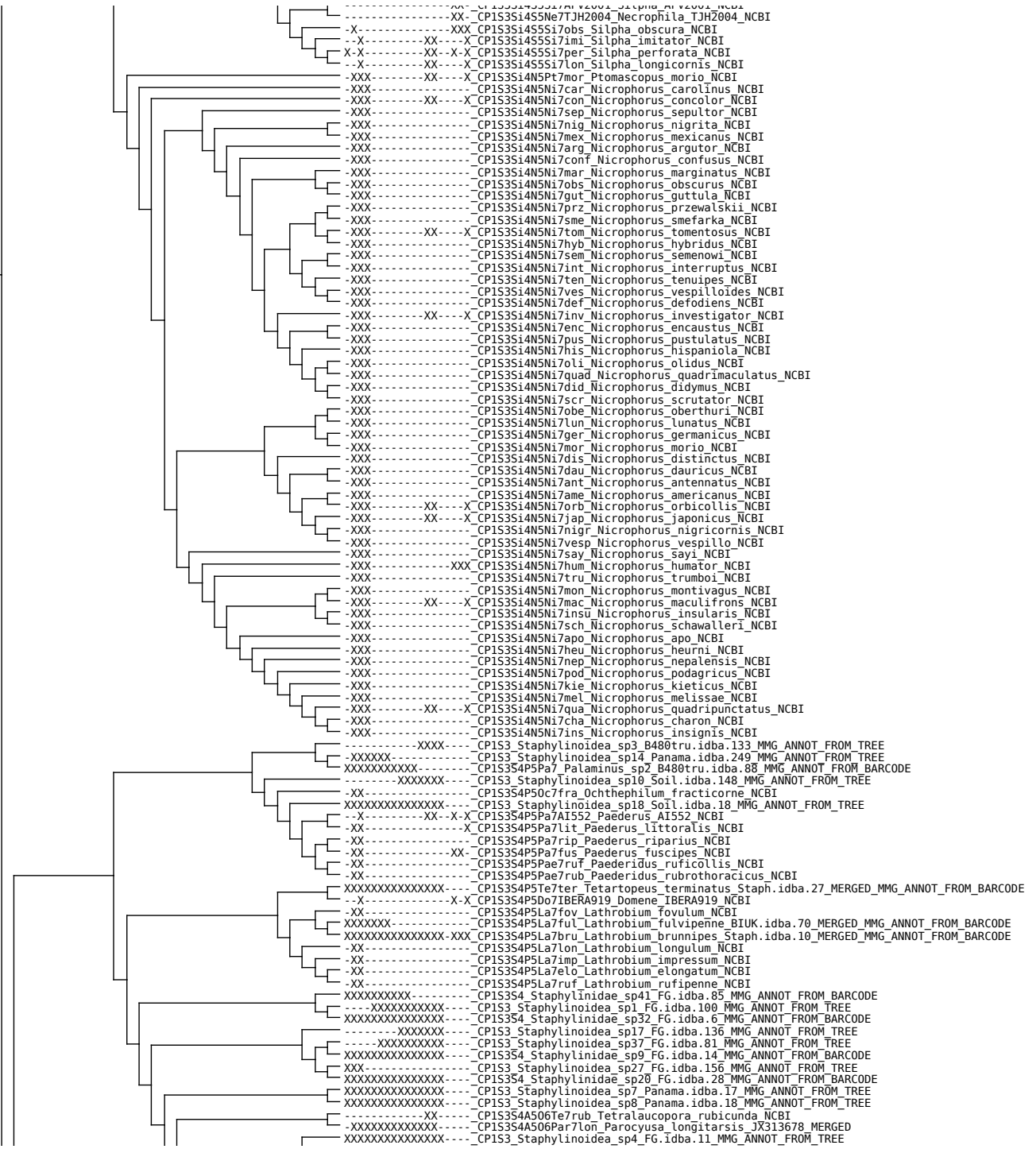






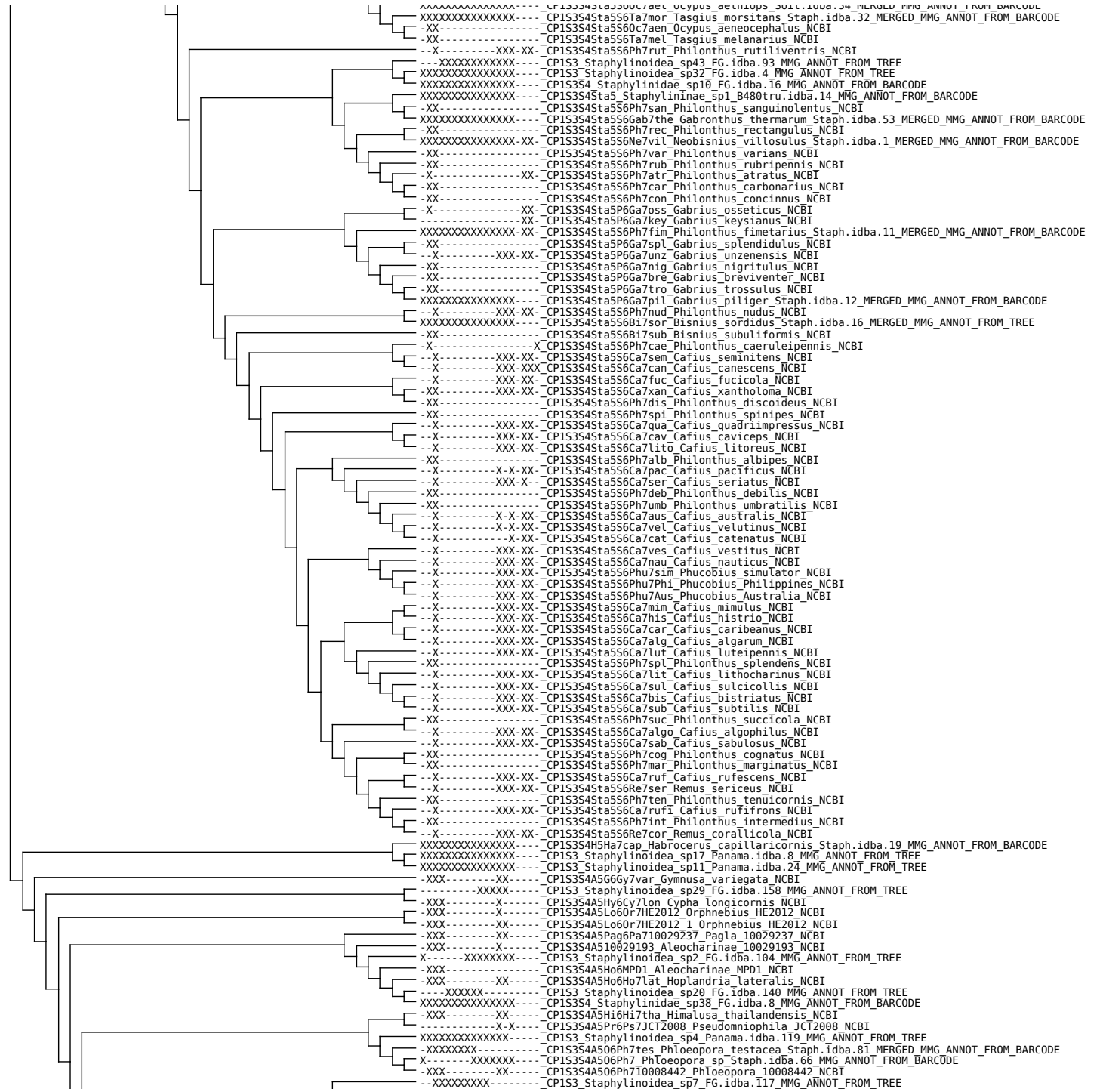


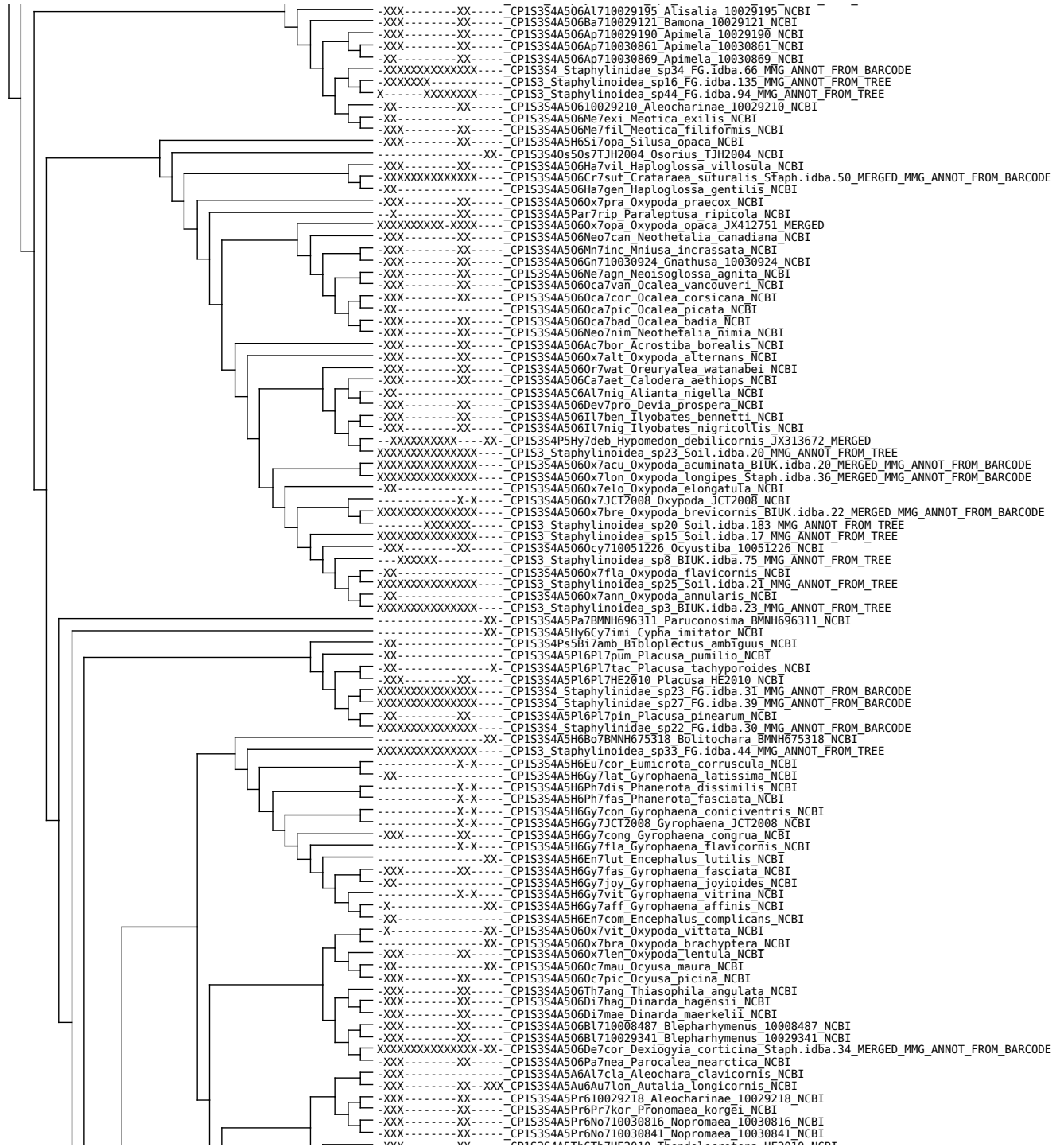
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-XX-----XX CP1535405An7uni Anthobium unicolor NCBI  
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-XX-----CP1535405Co7ang Coryphium angusticolle NCBI  
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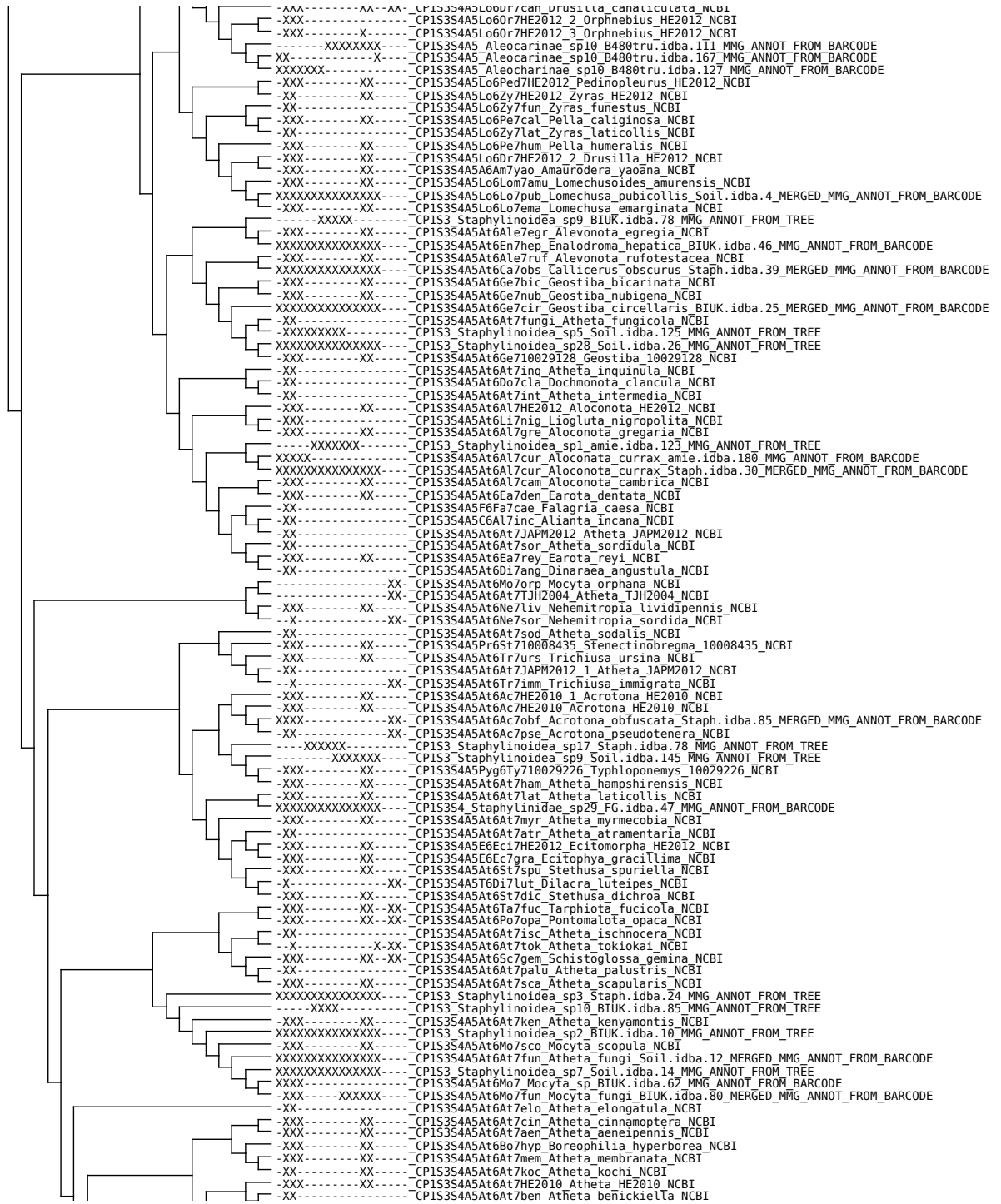




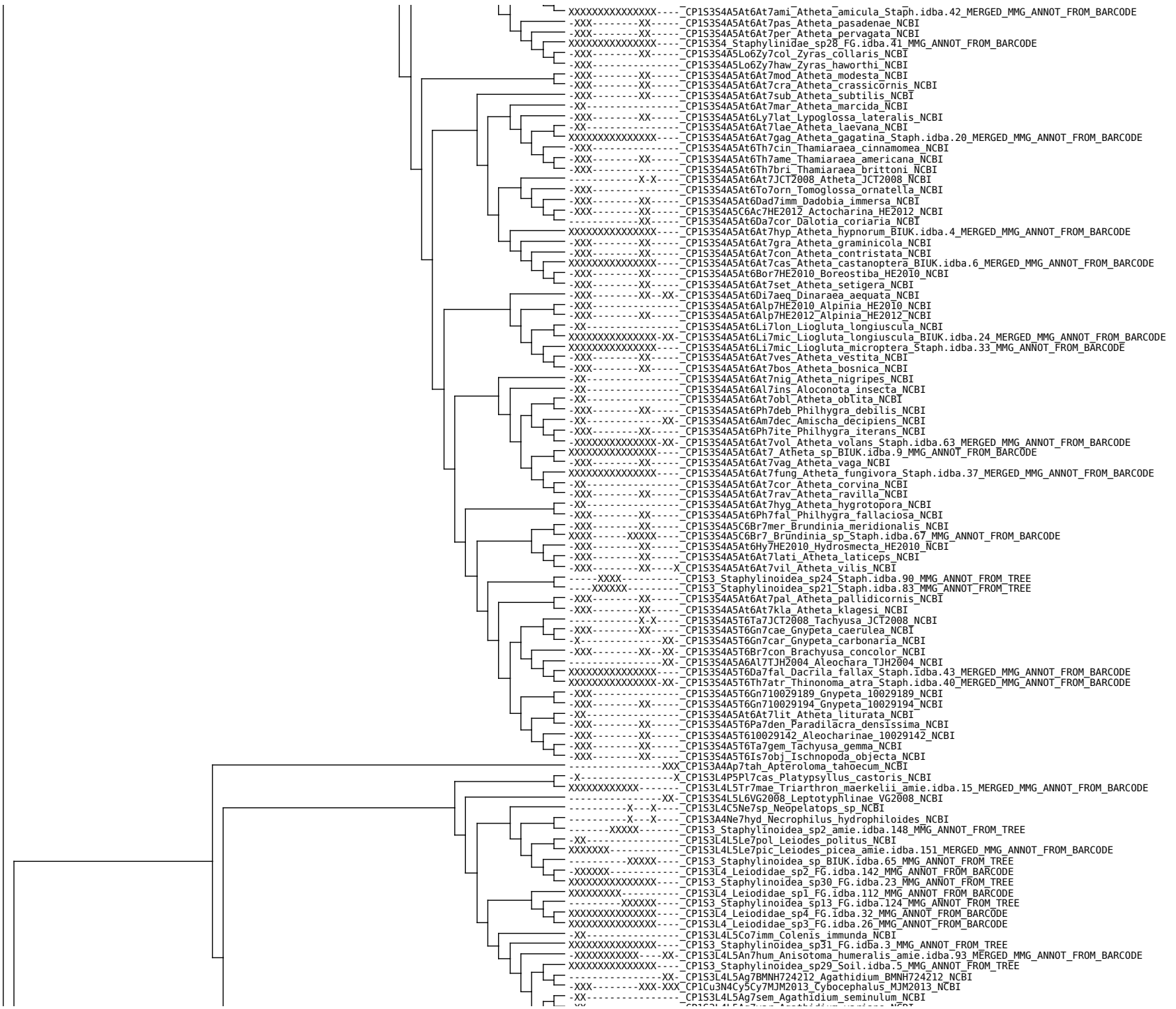


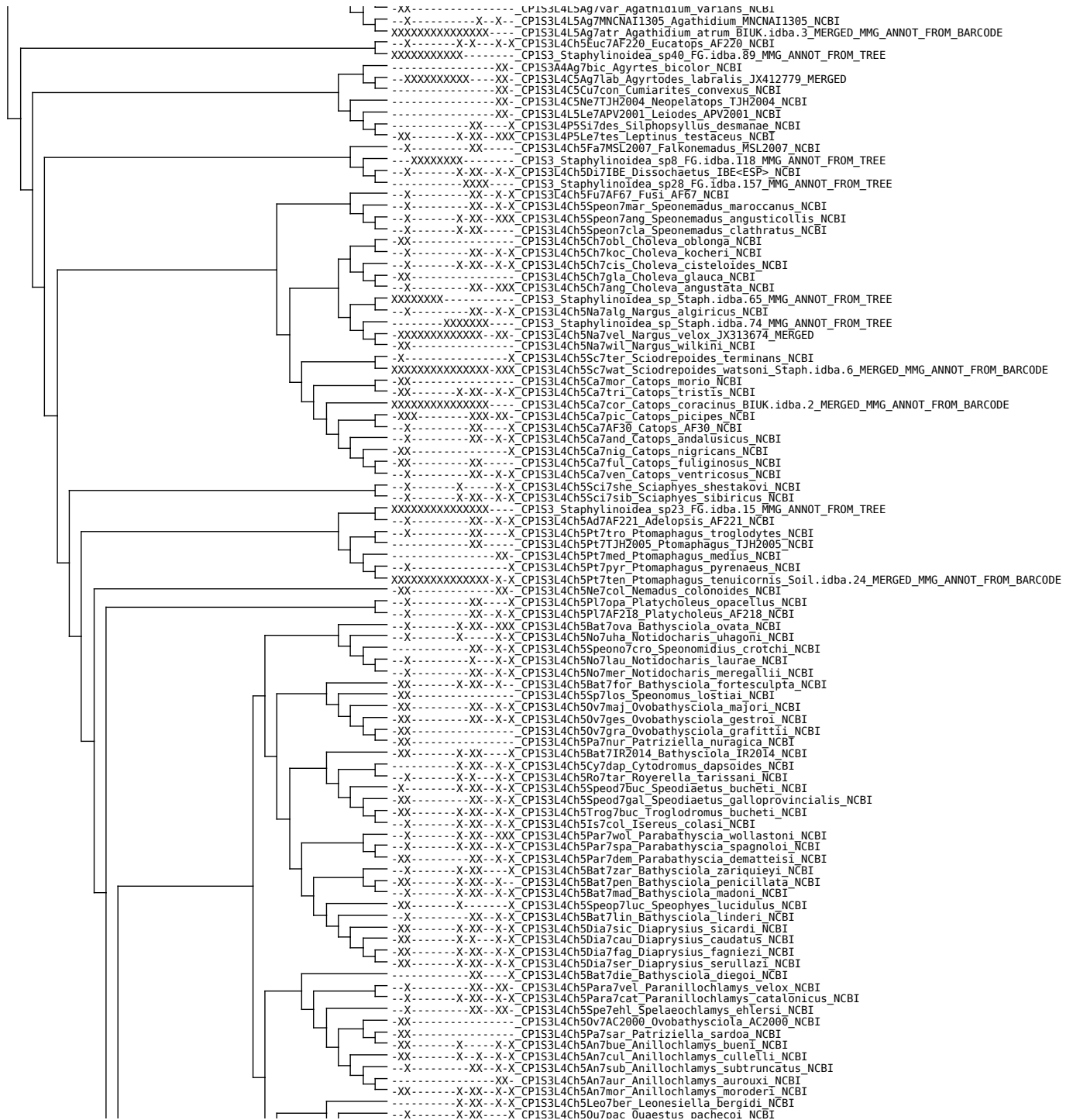
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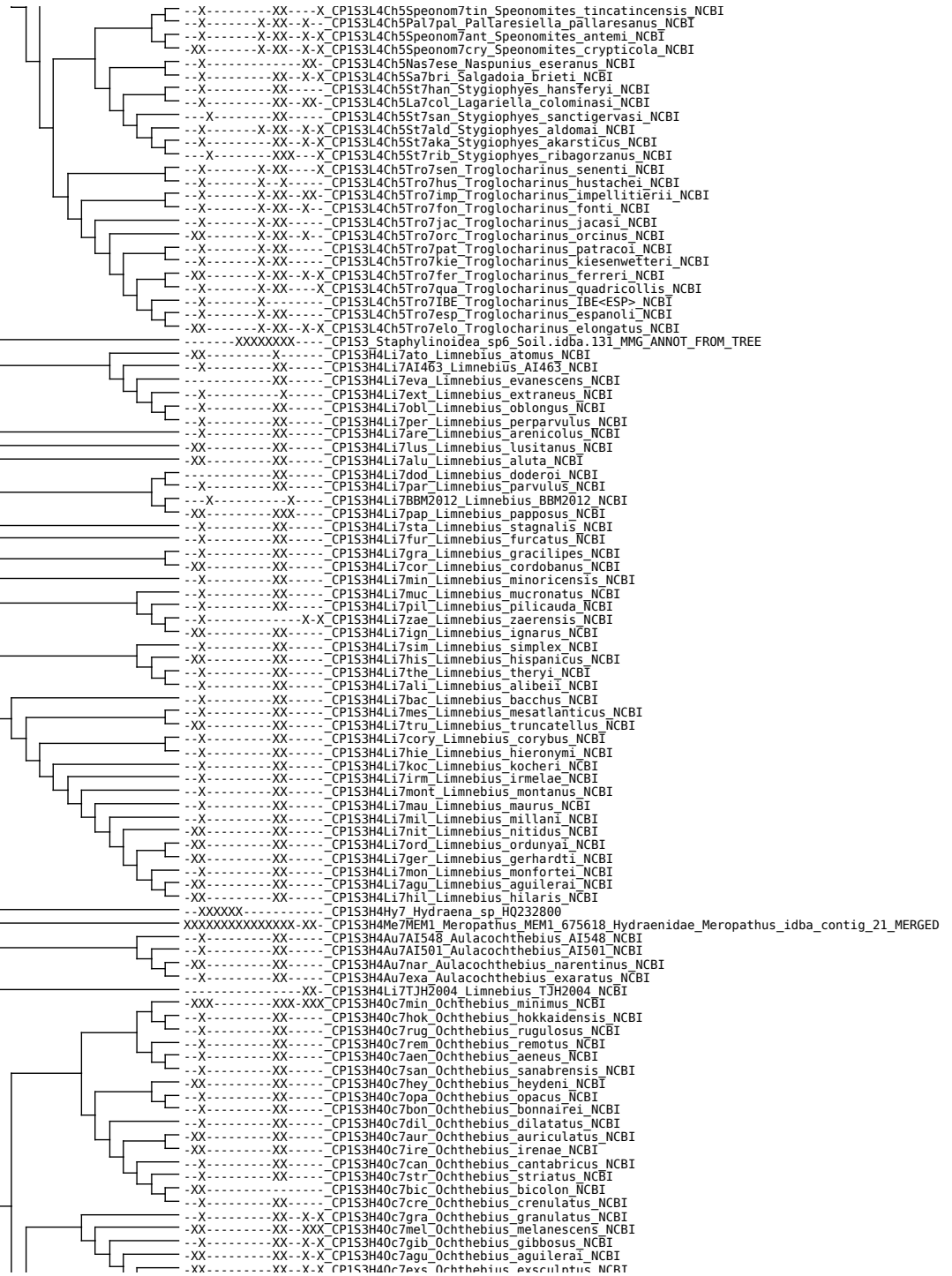




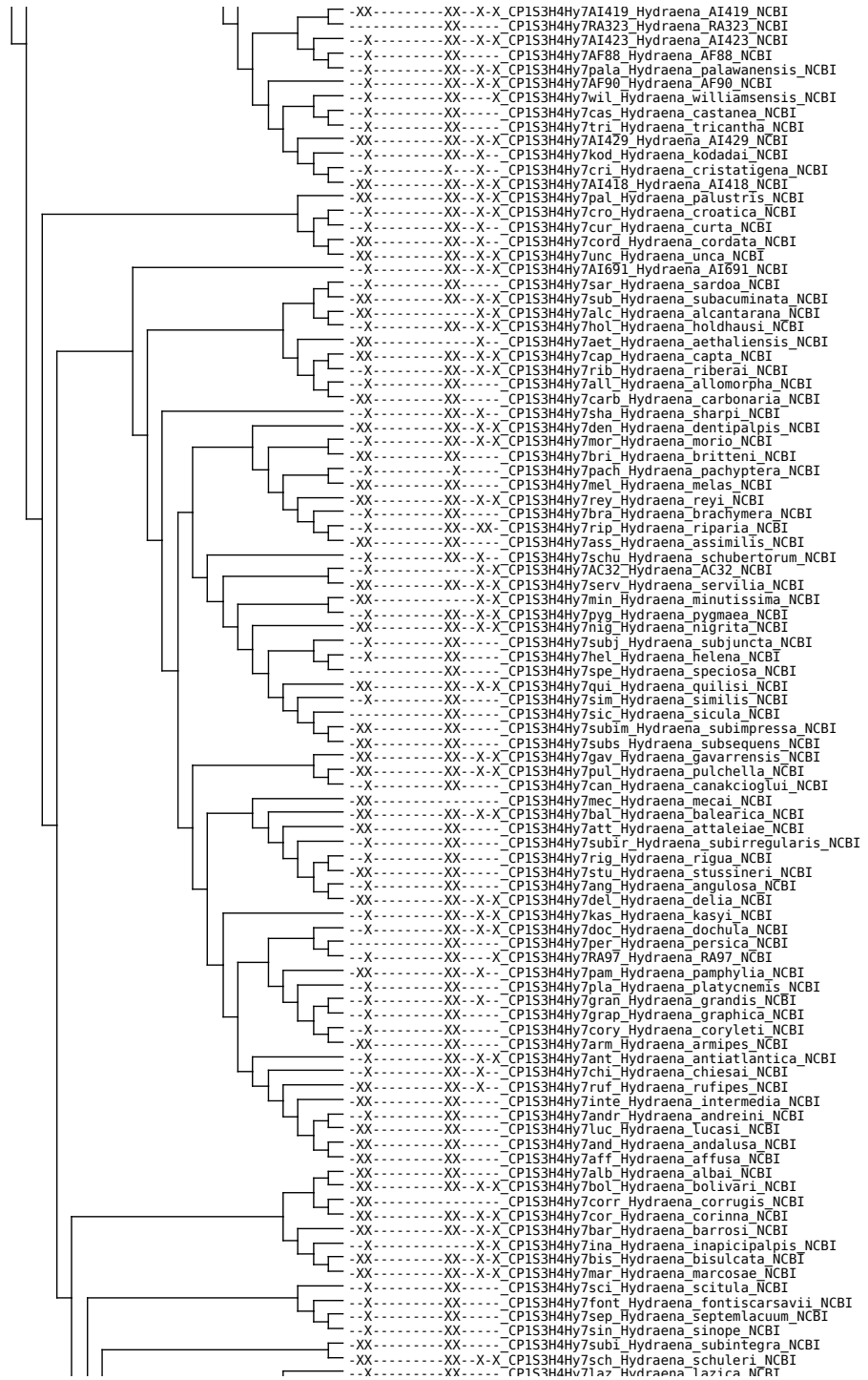


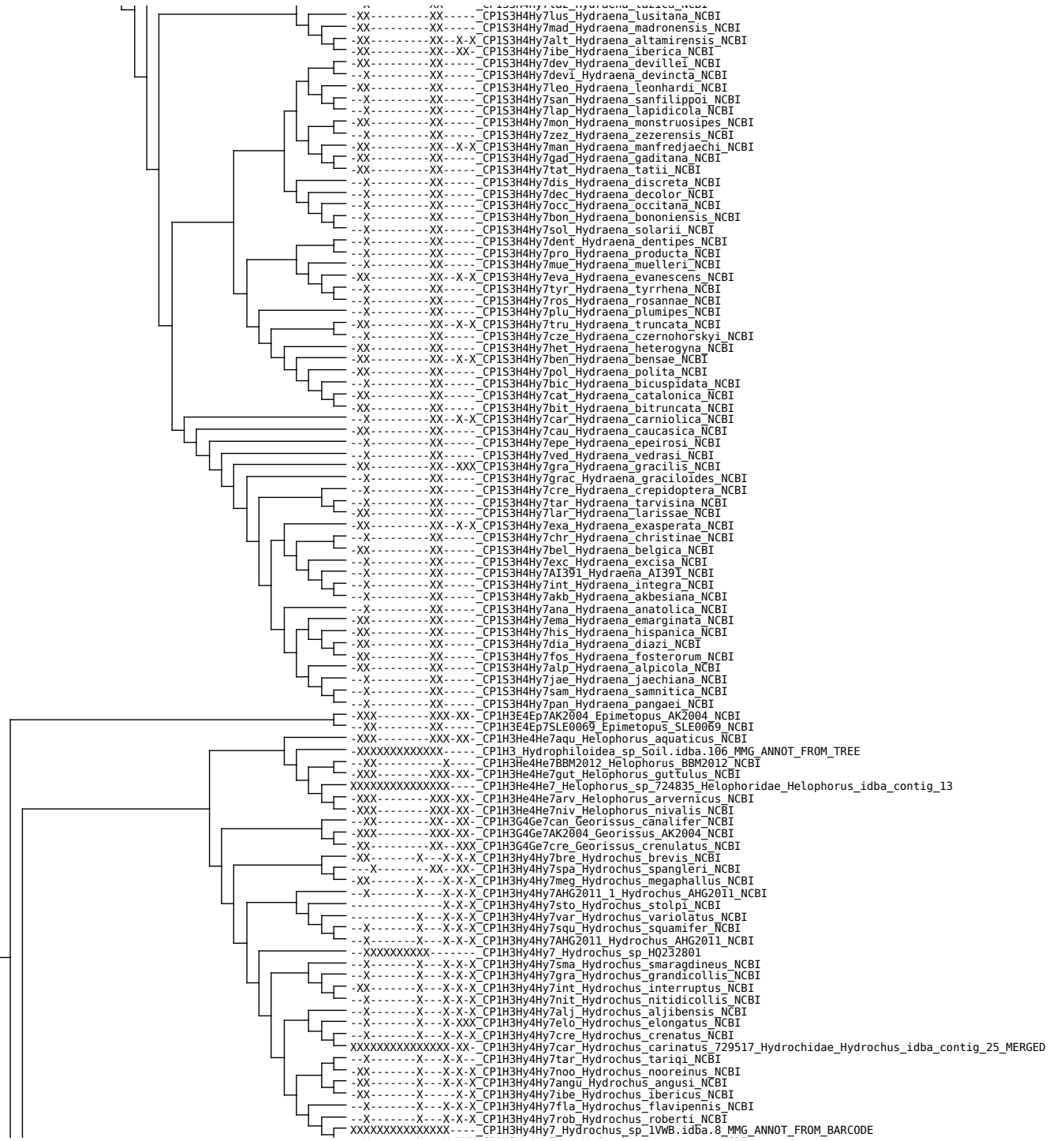


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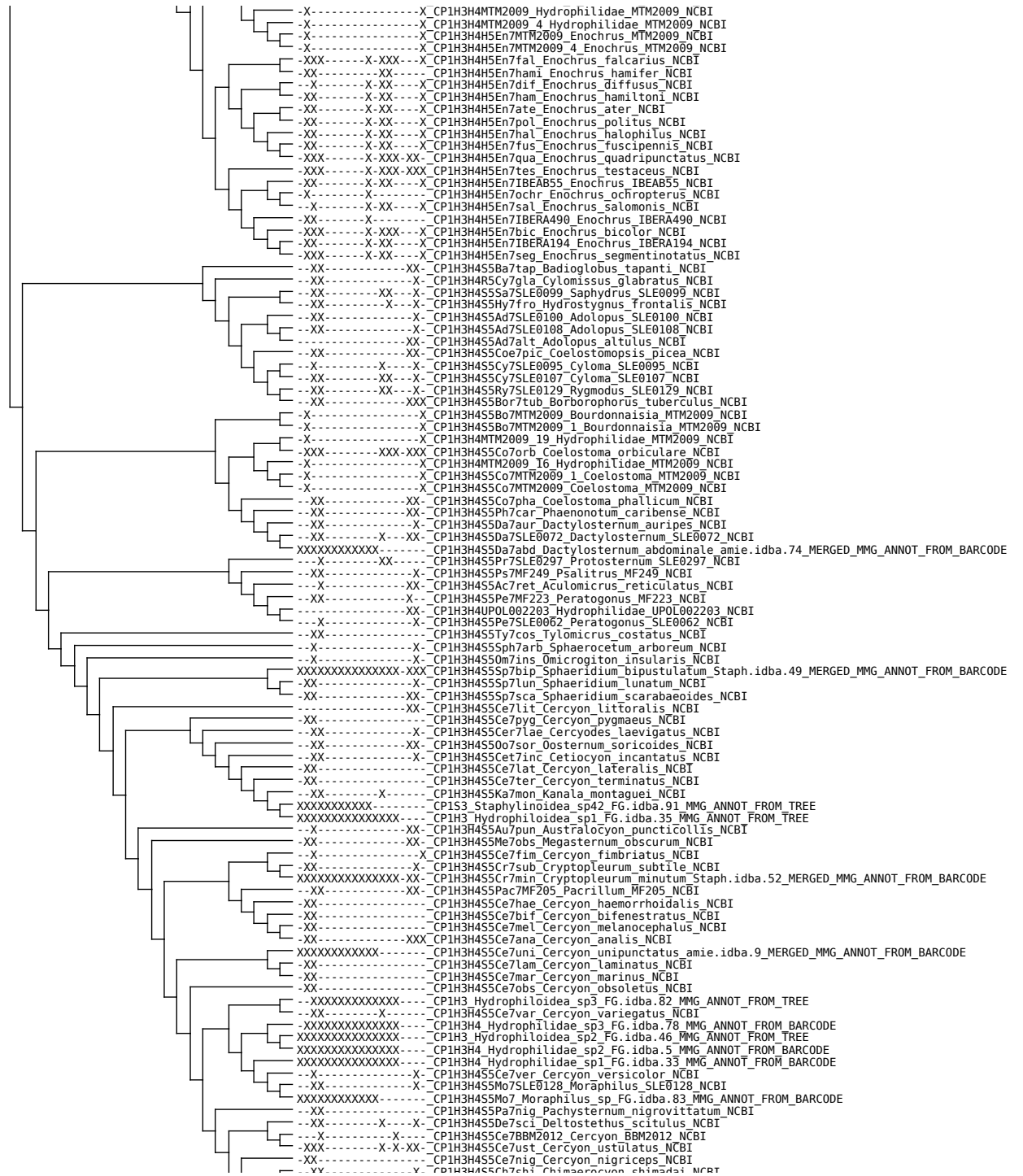




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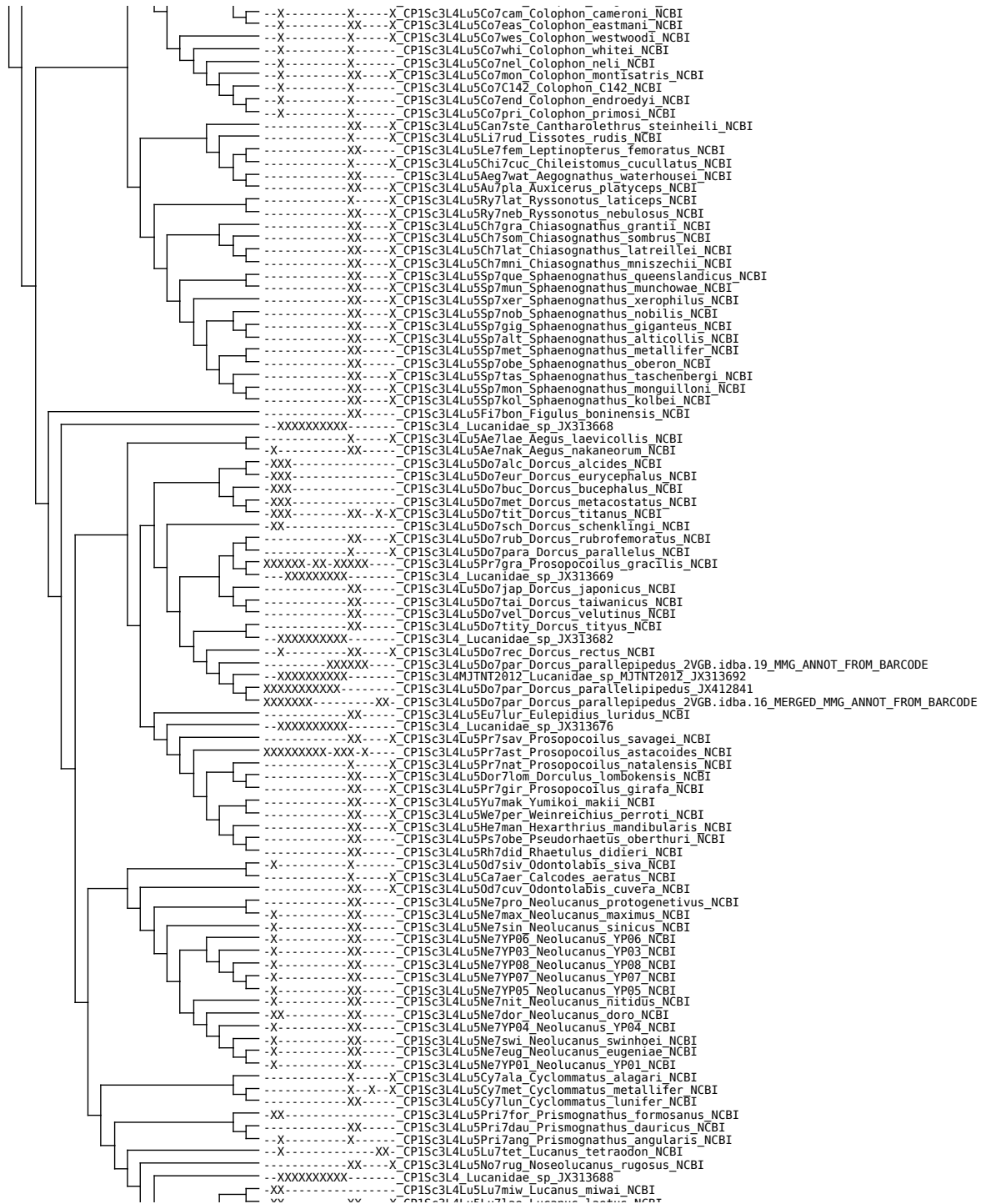


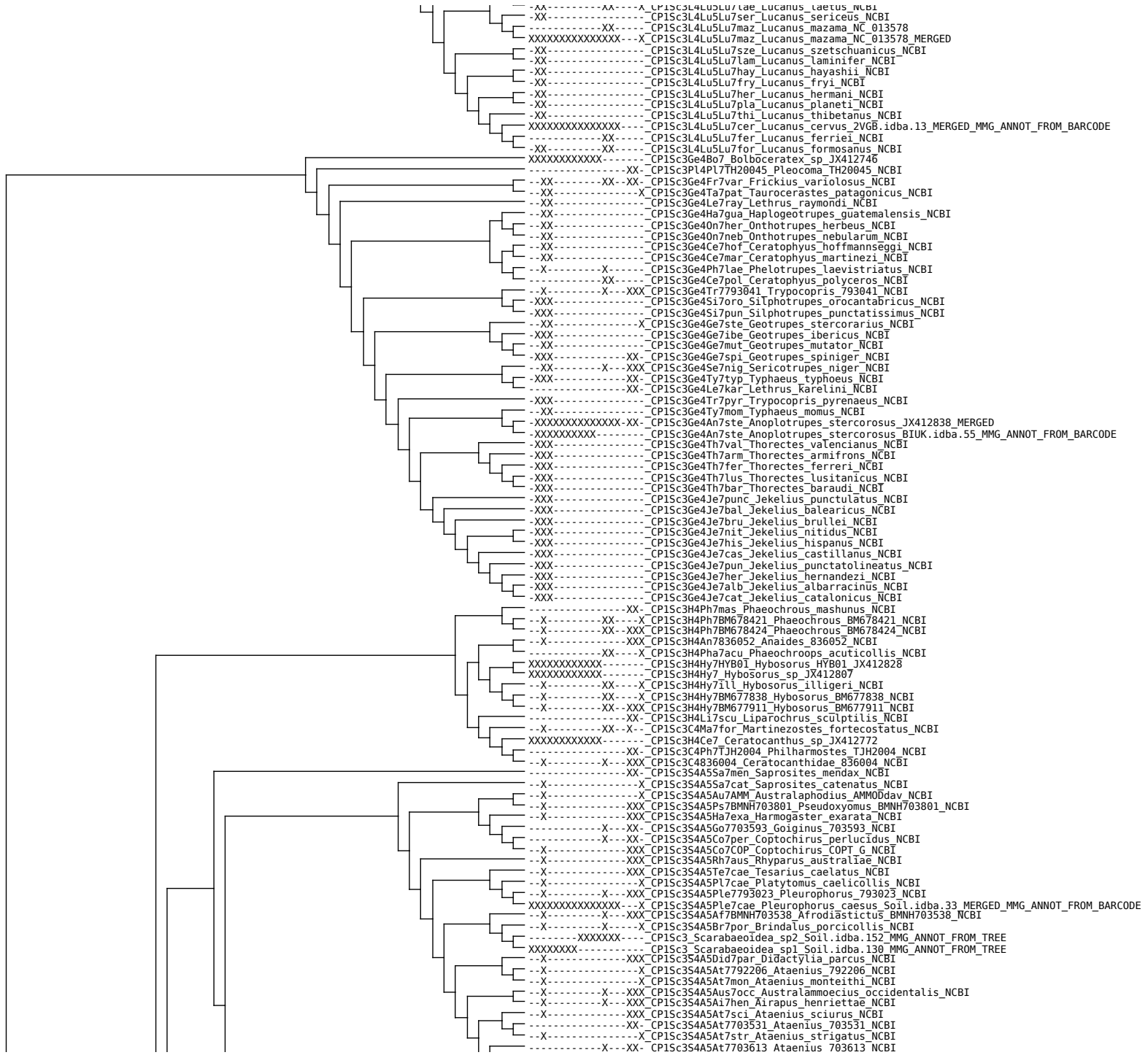
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CP1H3H4H5En7coa Enochrus coarctatus NCBI  
CP1H3H4H5En7och Enochrus ochraceus NCBI  
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CP1H3H4H5En7nig Enochrus nigrinus NCBI  
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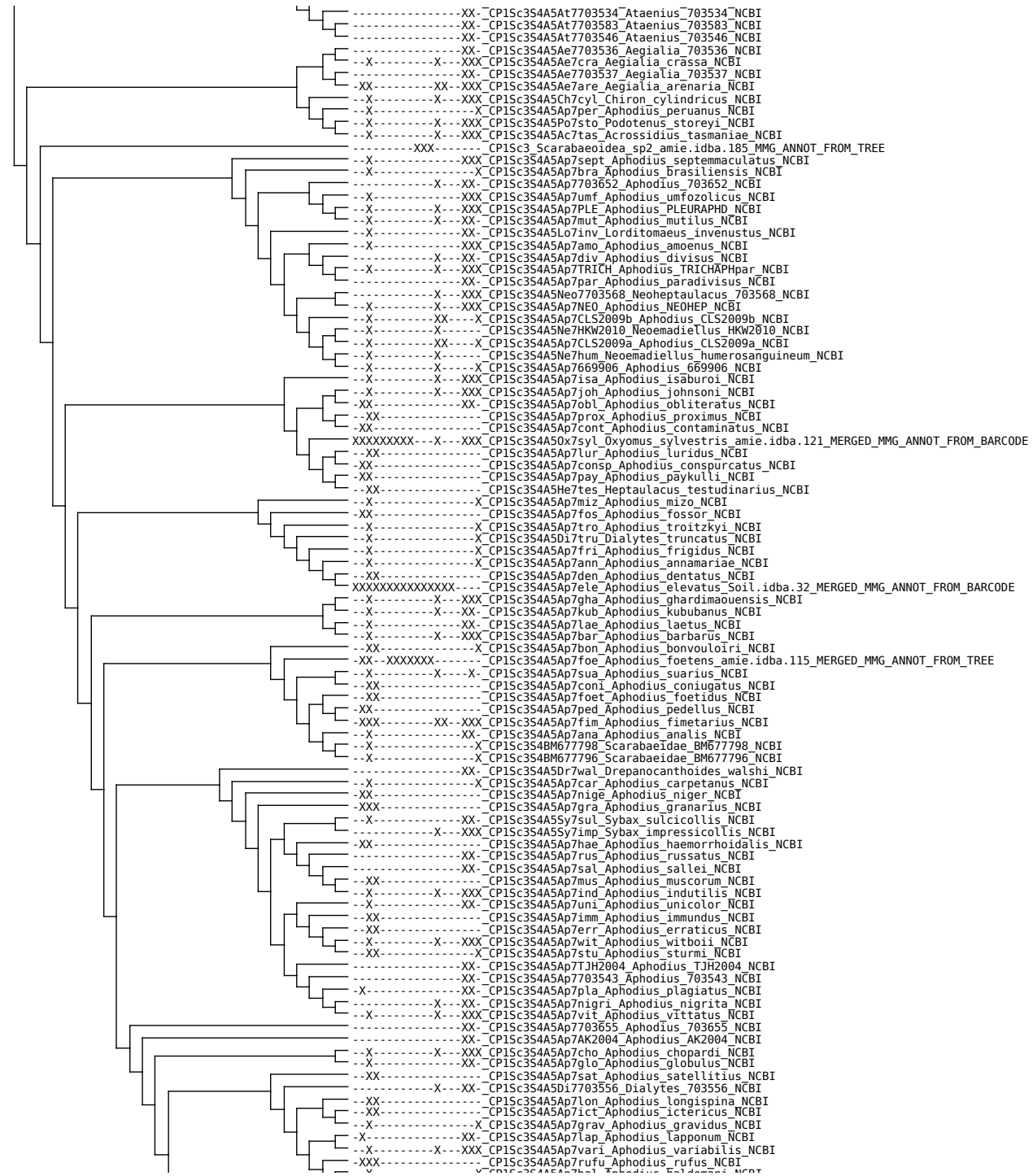


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CP1Sc354A5Ap7hyd Aphodius hydrochaeris NCBI  
CP1Sc354A5Ap7proc Aphodius proci NCBI  
CP1Sc354A5Ap7dep Aphodius depressus NCBI  
CP1Sc354A5Ap7dis Aphodius distinctus NCBI  
CP1Sc354A5Ap7obs Aphodius obscurus NCBI  
CP1Sc354A5Ap7cri Aphodius cribricollis NCBI  
CP1Sc354A5Ap7con Aphodius constans NCBI  
CP1Sc354A5Ap7lin Aphodius lineolatus NCBI  
CP1Sc354A5Ap7abd Aphodius abdominalis NCBI  
CP1Sc354A5Ap7pus Aphodius pusillus NCBI  
CP1Sc354A5Ap7coe Aphodius coenosus NCBI  
CP1Sc354A5Ap7ate Aphodius ater NCBI  
CP1Sc354A5Ap7sti Aphodius sticticus NCBI  
CP1Sc354A5Ap7bor Aphodius borealis NCBI  
CP1Sc354A5Ap7nig Aphodius nigrivittis NCBI  
CP1Sc354A5Ap7quad Aphodius quadrimaculatus NCBI  
CP1Sc354A5Ap7pro Aphodius prodromus NCBI  
CP1Sc354A5Ap7mel Aphodius melanoticus NCBI  
CP1Sc354A5Ap7sph Aphodius sphaelatus NCBI  
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CP1Sc354A5Ap7pyr Aphodius pyramiformis NCBI  
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CP1Sc354S5C60d7pus Odontoloma pusillum NCBI  
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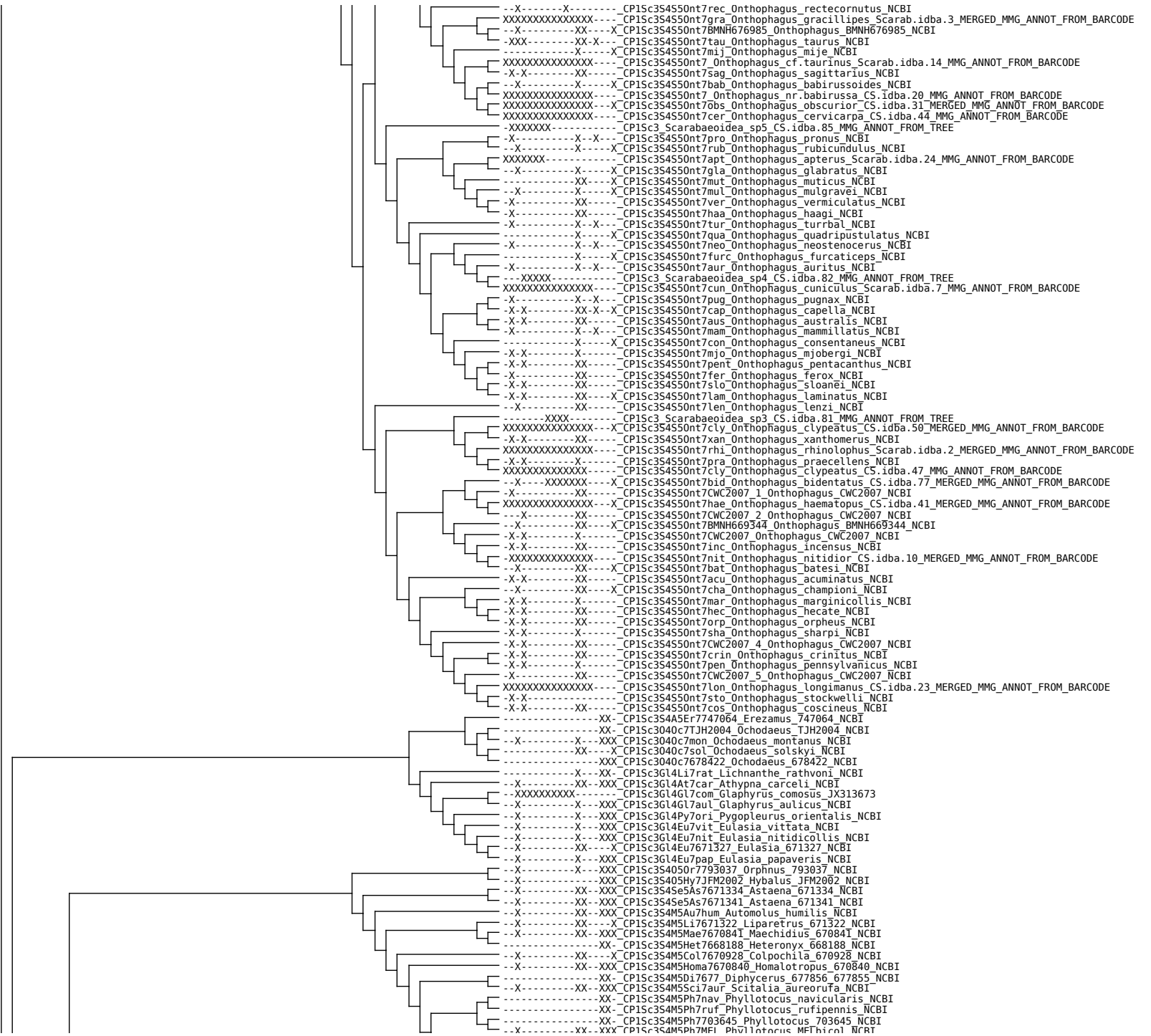


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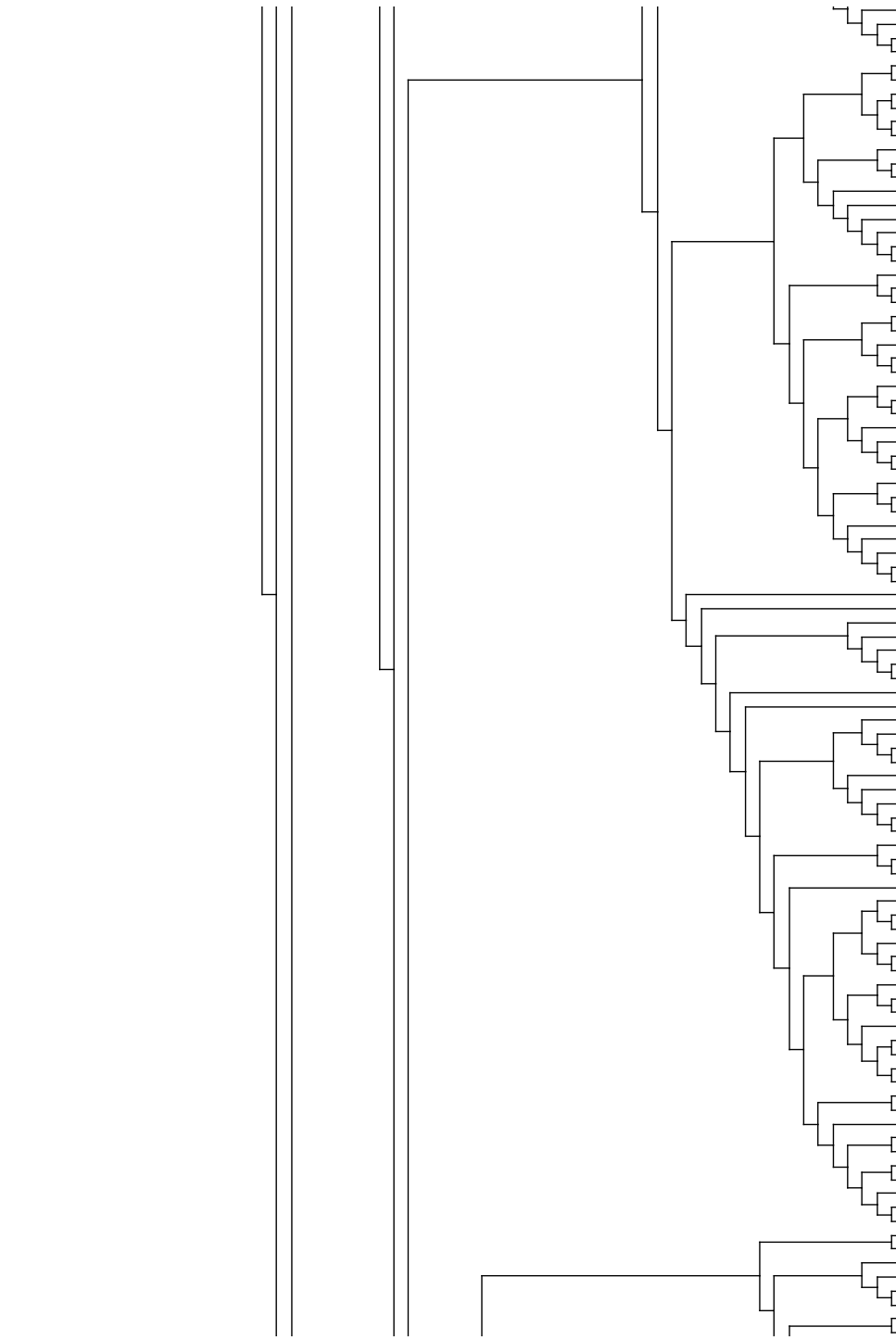


Phylogenetic tree showing relationships between various species, primarily Helictopleurus and Onthophagus. The tree is rooted on the left and branches out to the right. Species names are listed on the right side of the tree, often followed by accession numbers and database identifiers (e.g., NCBI, CS.idba). Some entries include MMG ANNOT FROM BARCODE or MMG ANNOT FROM TREE. The tree shows a clear division between Helictopleurus and Onthophagus, with Helictopleurus species generally clustered together in the upper part of the tree and Onthophagus species in the lower part. Within Onthophagus, there are several distinct clades, including those related to Scarabaeidae and other genera like Caccobius and Ciccobius. The tree is highly detailed, showing many sub-species and closely related forms.



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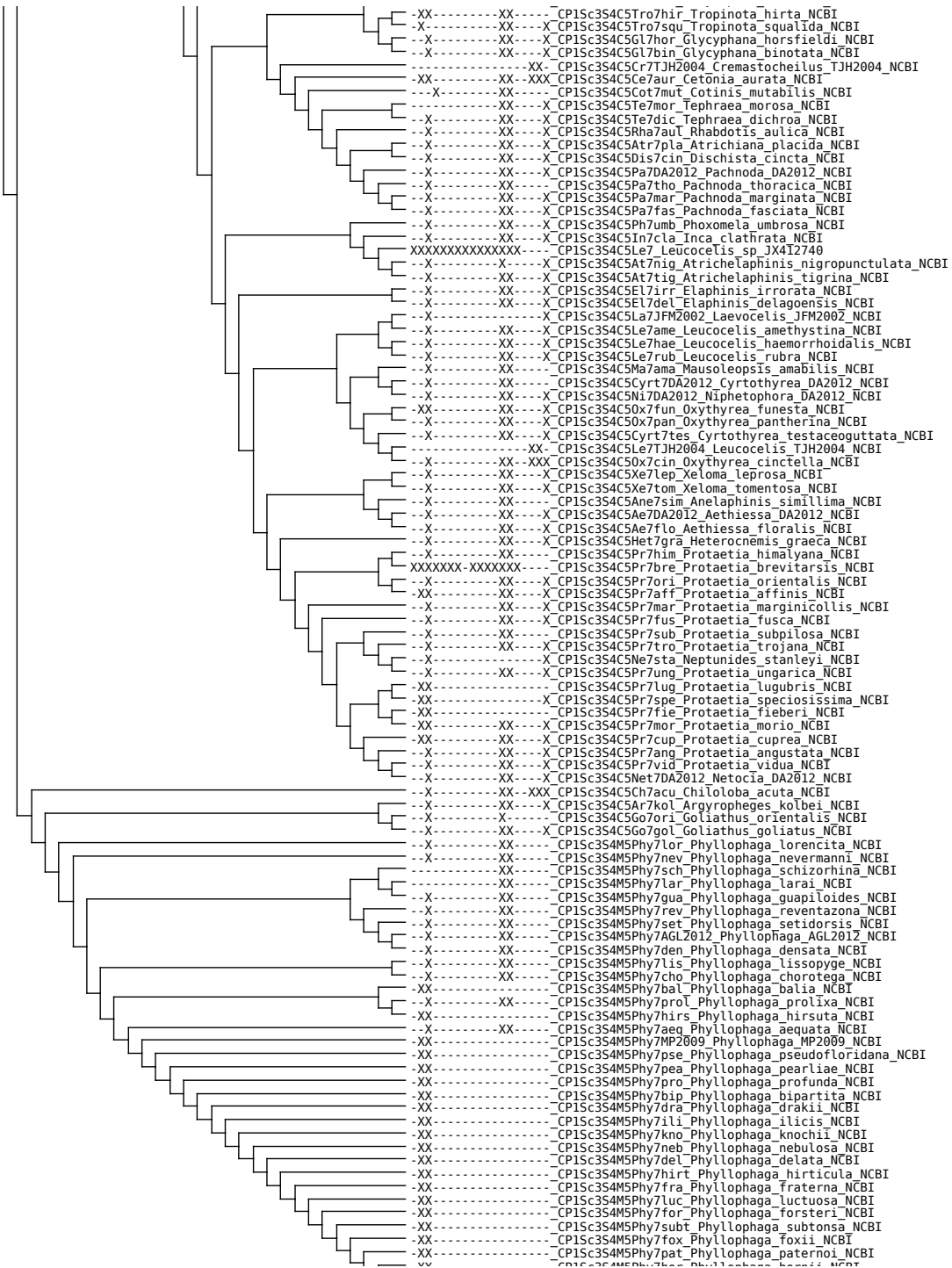


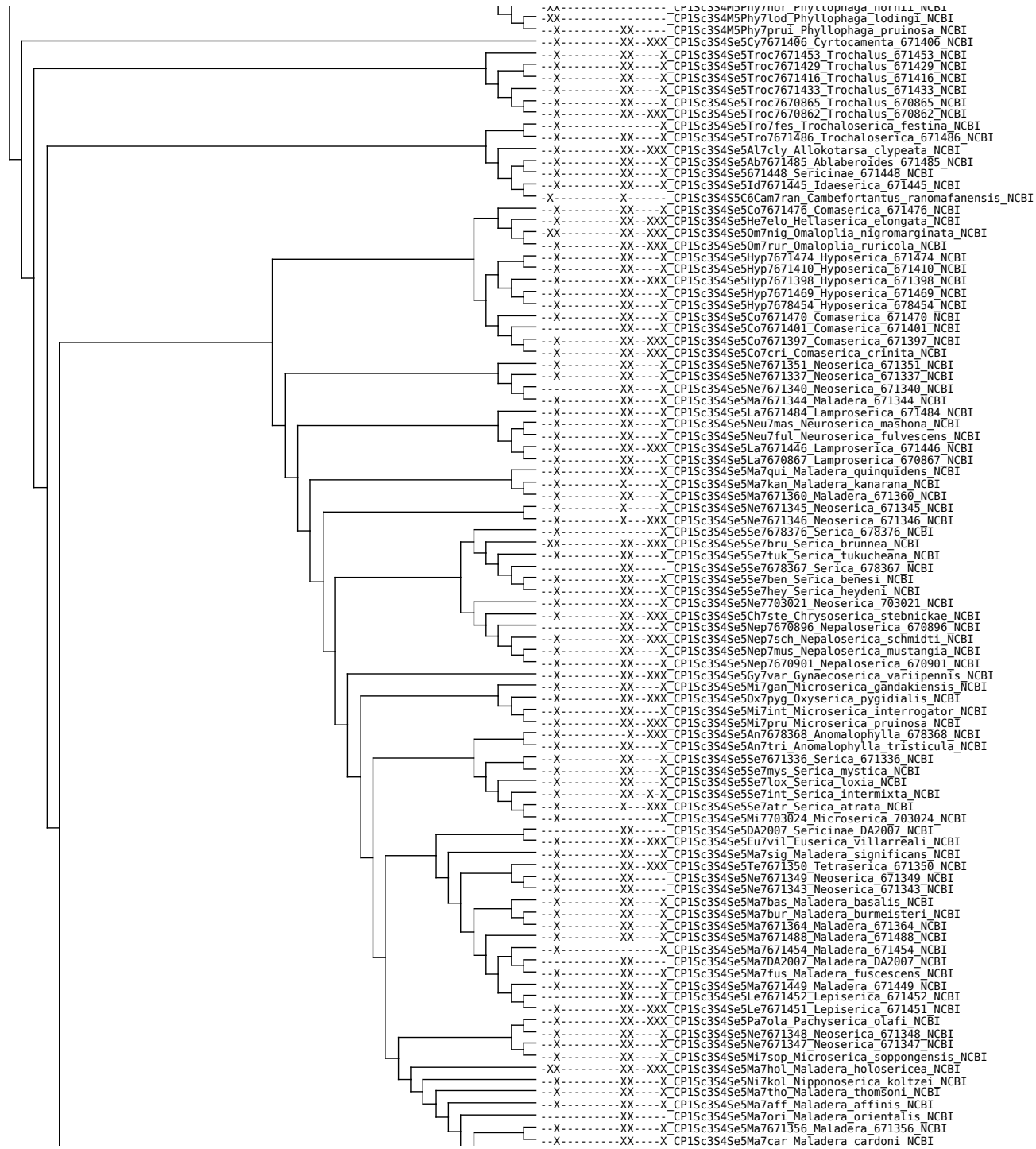
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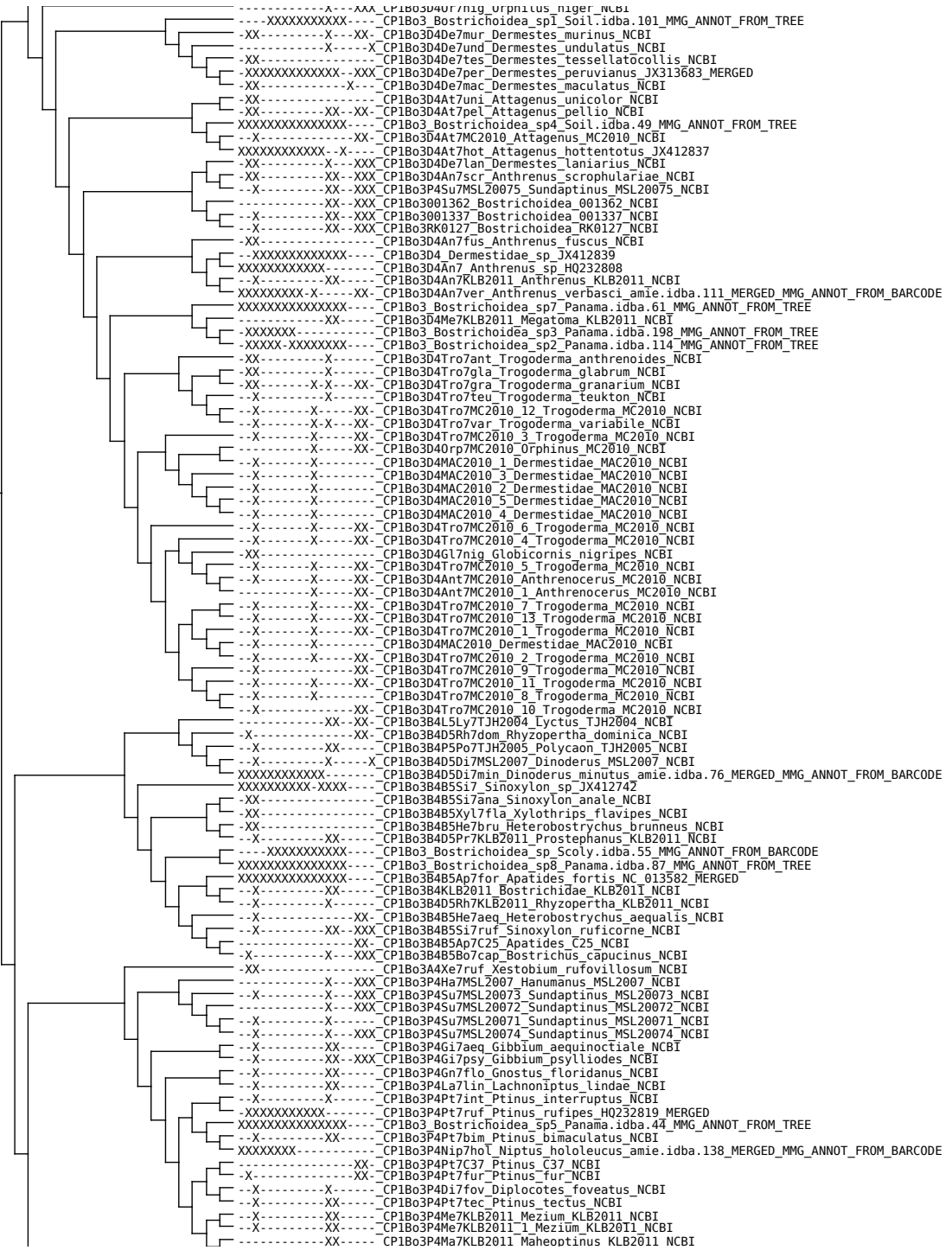
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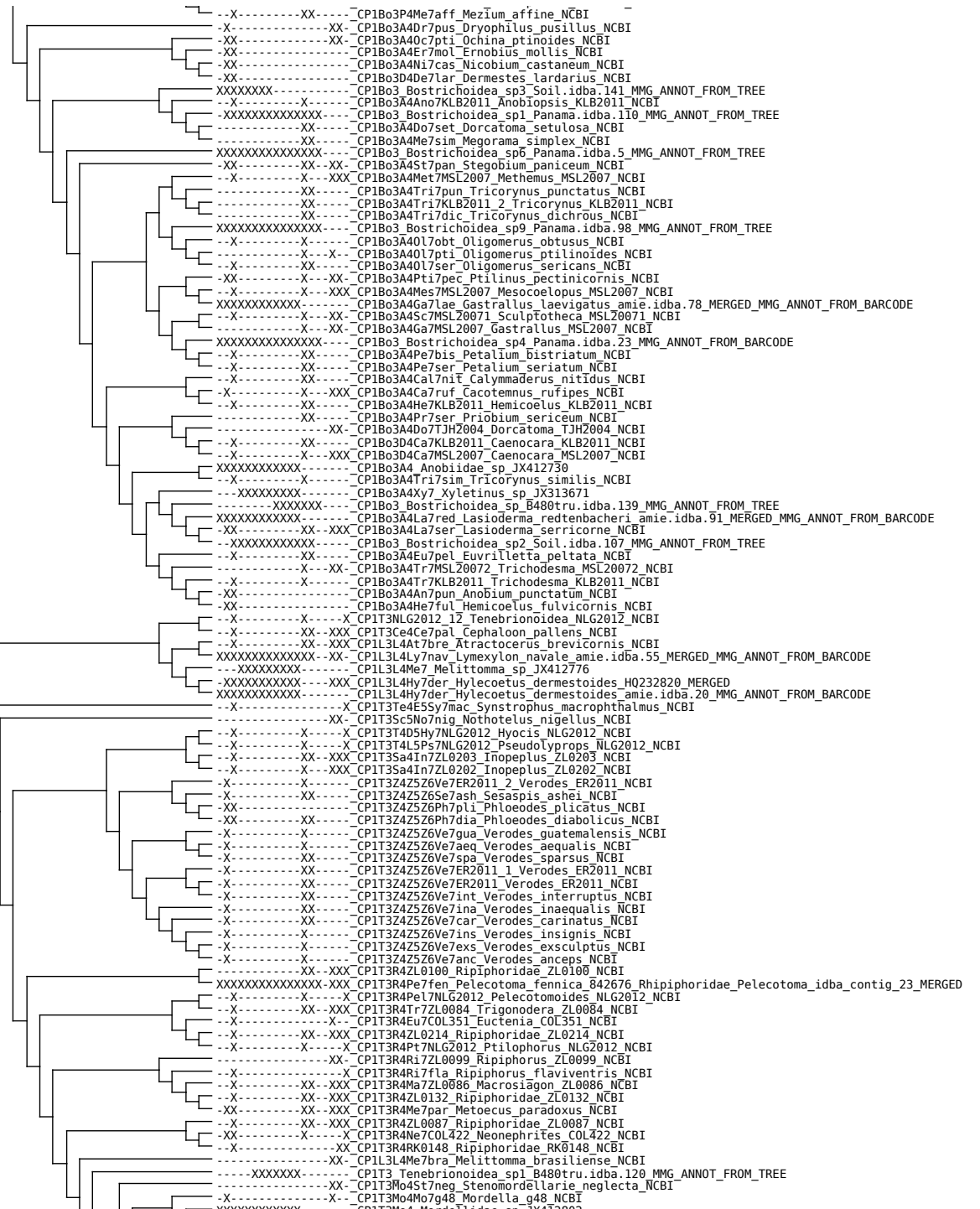












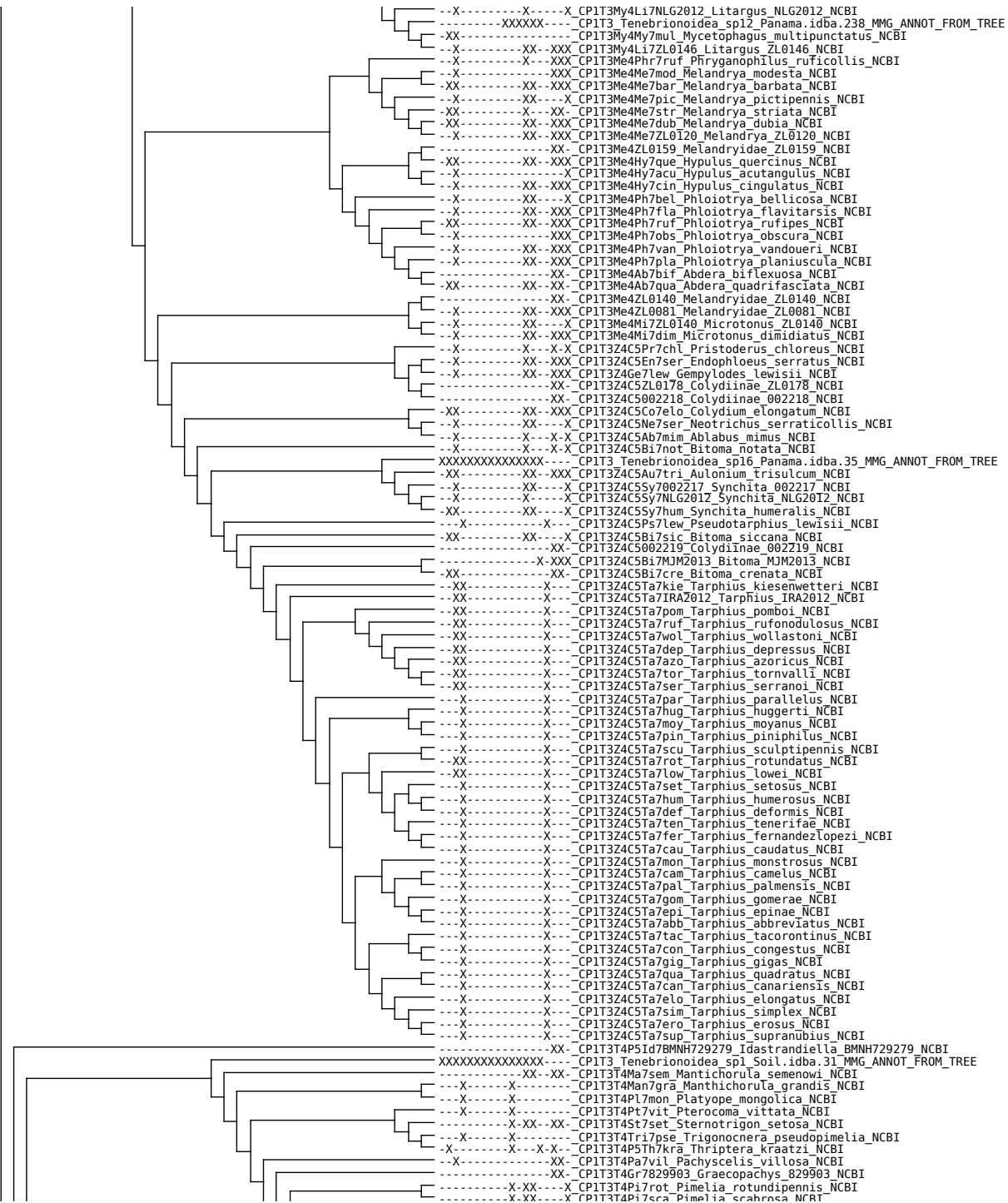








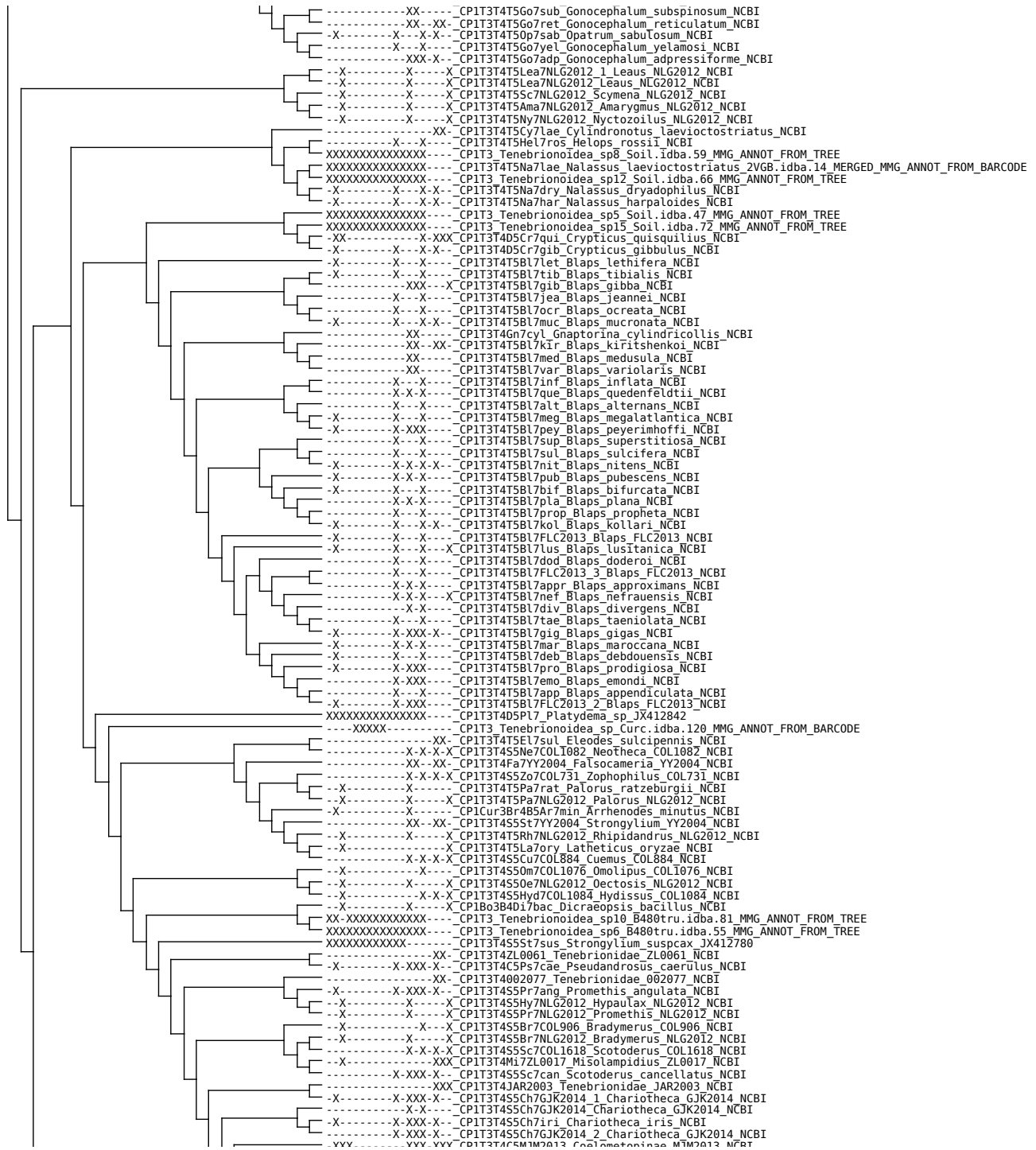




Phylogenetic tree showing relationships between various species, with labels on the right side. The tree is rooted on the left and branches out to the right. The labels include species names and accession numbers, such as CP1T3T4P17sub\_Pimelia\_subglobosa NCBI, CP1T3T4P17rug\_Pimelia\_rugosa NCBI, and CP1T3T4P5Le7col\_Leptoderis\_collaris NCBI. The tree is annotated with 'X' and 'XX' characters at various nodes, indicating specific characteristics or support values. The species names are listed in a column on the right, with some names truncated by 'NCBI'. The tree shows a complex branching pattern, with many species clustered together and others more distinct. The labels are aligned to the right of the tree branches.

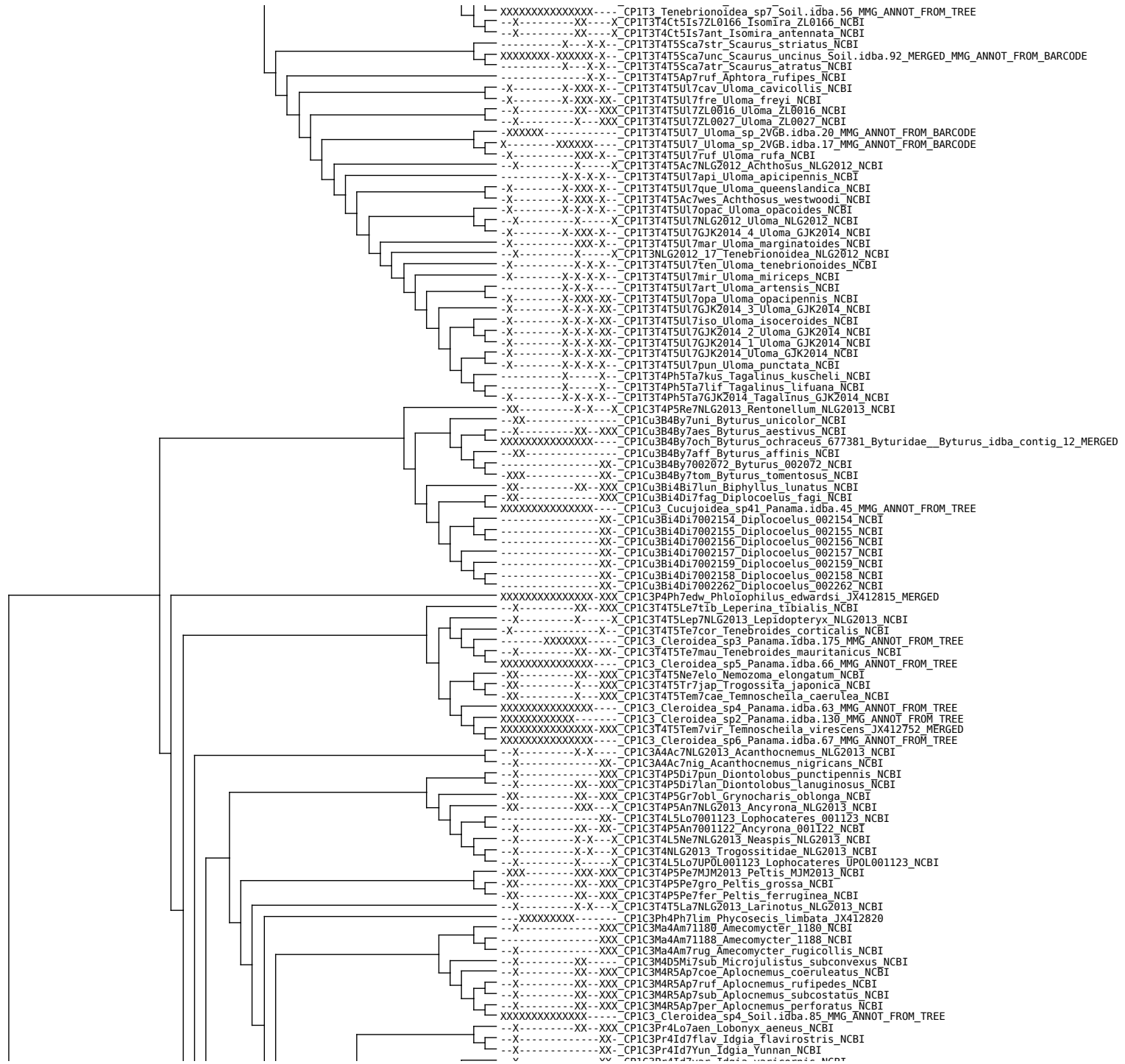


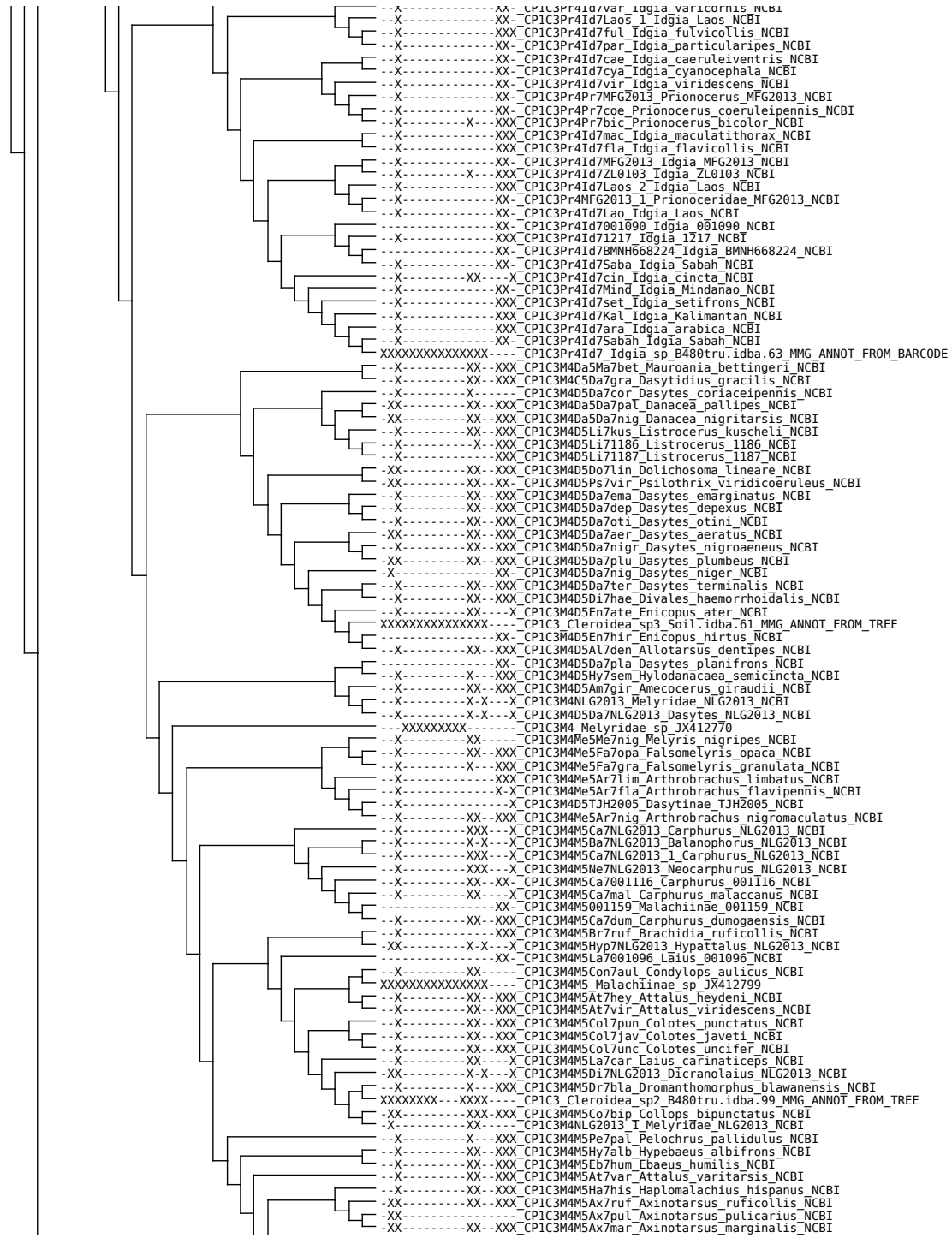




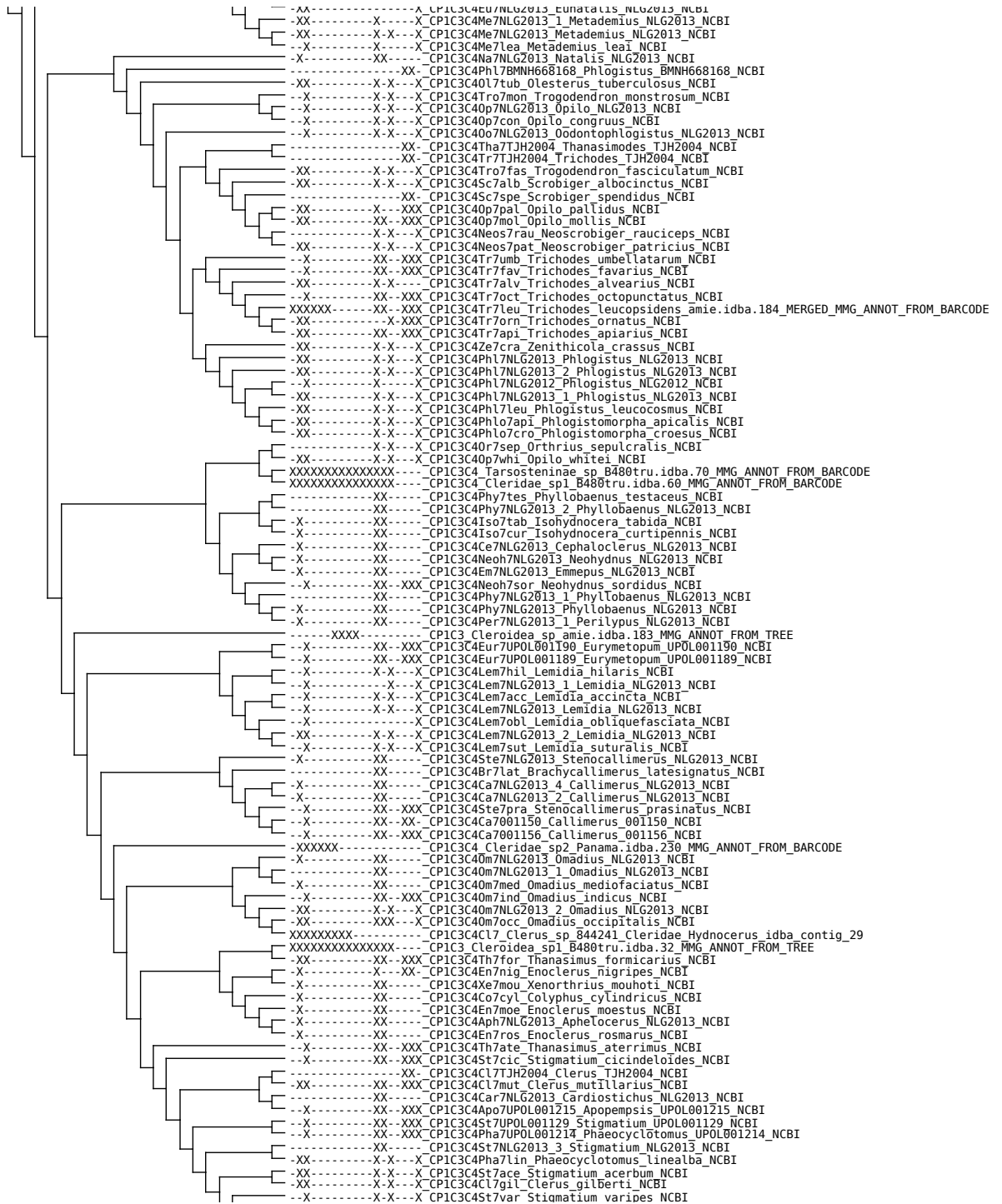




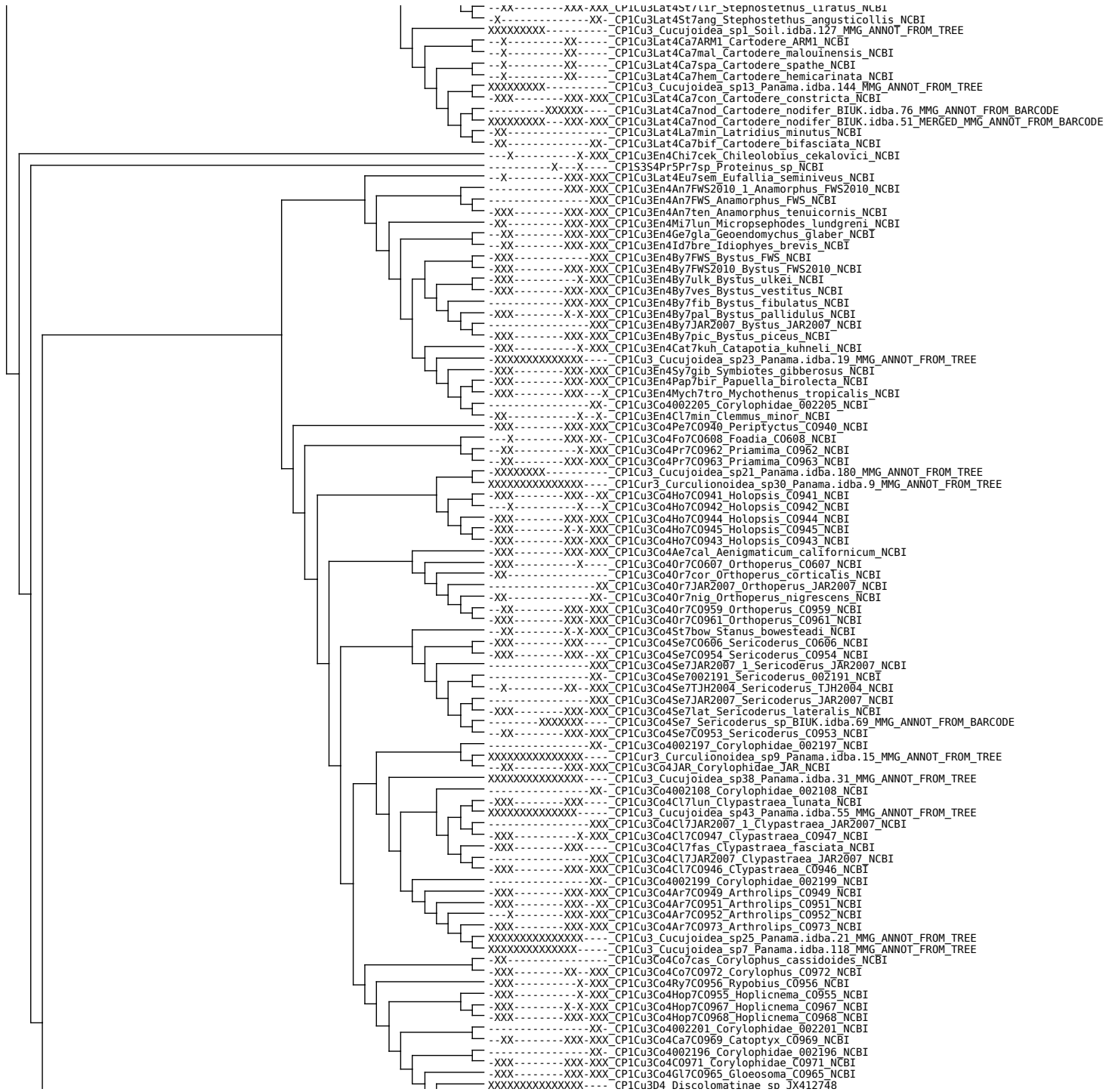


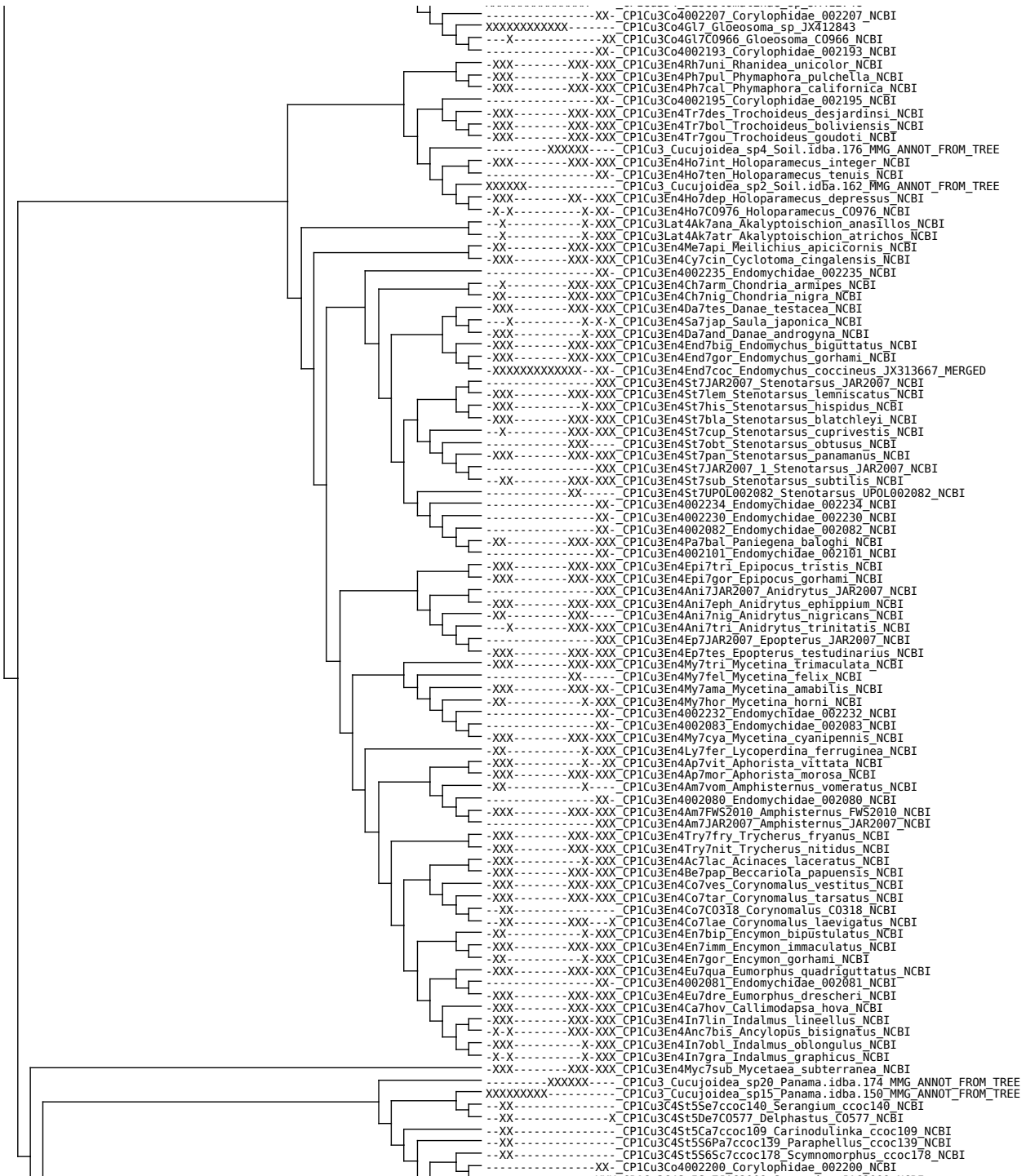




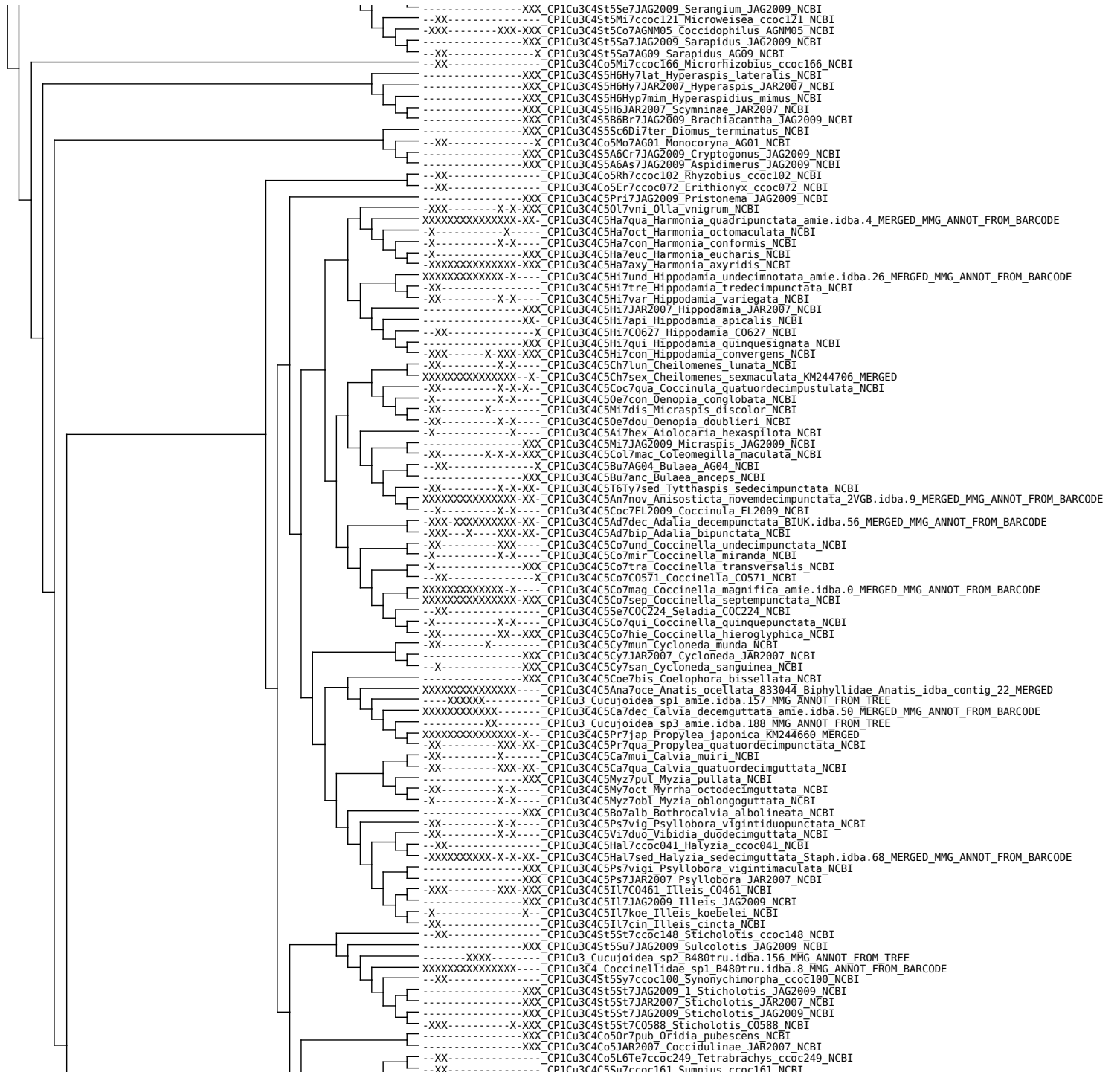














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-----XX- CP1Cu3C4St5Ch7AGNM04 Chilocorellus AGNM04 NCBI  
-----XX- X-X- CP1Cu3C4Ch5C6Ch7ren Chilocorus renipustulatus NCBI  
-----XX- X-X- CP1Cu3C4Ch5C6Ch7bip Chilocorus bipustulatus NCBI  
-----X- CP1Cu3C4Ch5C6Ch7sti Chilocorus stigma NCBI  
-----X- CP1Cu3C4Ch5C6Ch7rub Chilocorus rubidus NCBI  
-----XX- CP1Cu3C4Co5Po7ccoc088 Poorani\_ccoc088 NCBI  
-----XX- CP1Cu3C4Ch5C6Ex7nig Exochomus nigropictus NCBI  
-----XX- CP1Cu3C4Ch5C6Ex7ccoc214 Exochomus\_ccoc214 NCBI  
-----XX- XXX- CP1Cu3C4Ch5C6Ex7qua Exochomus quadripustulatus NCBI  
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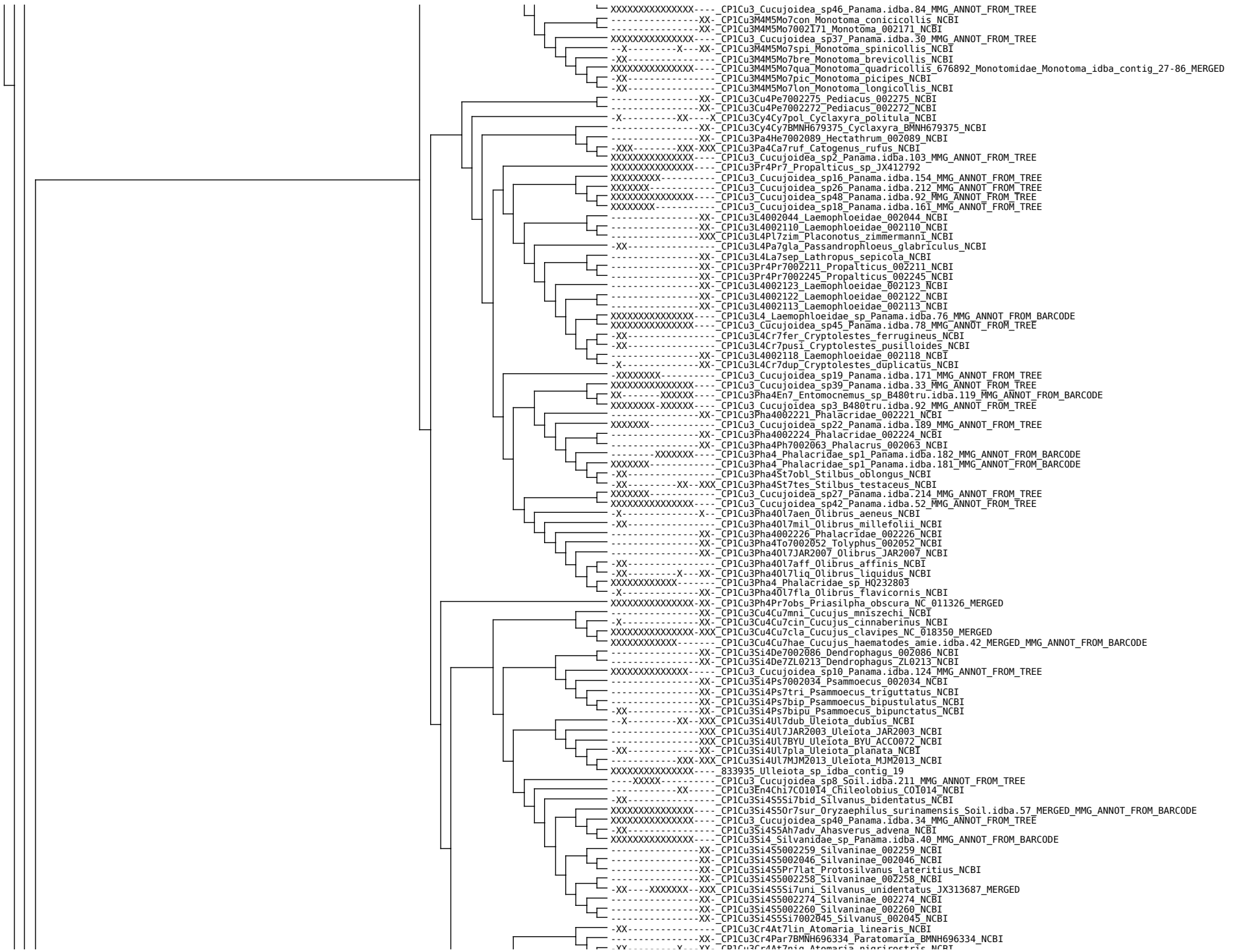


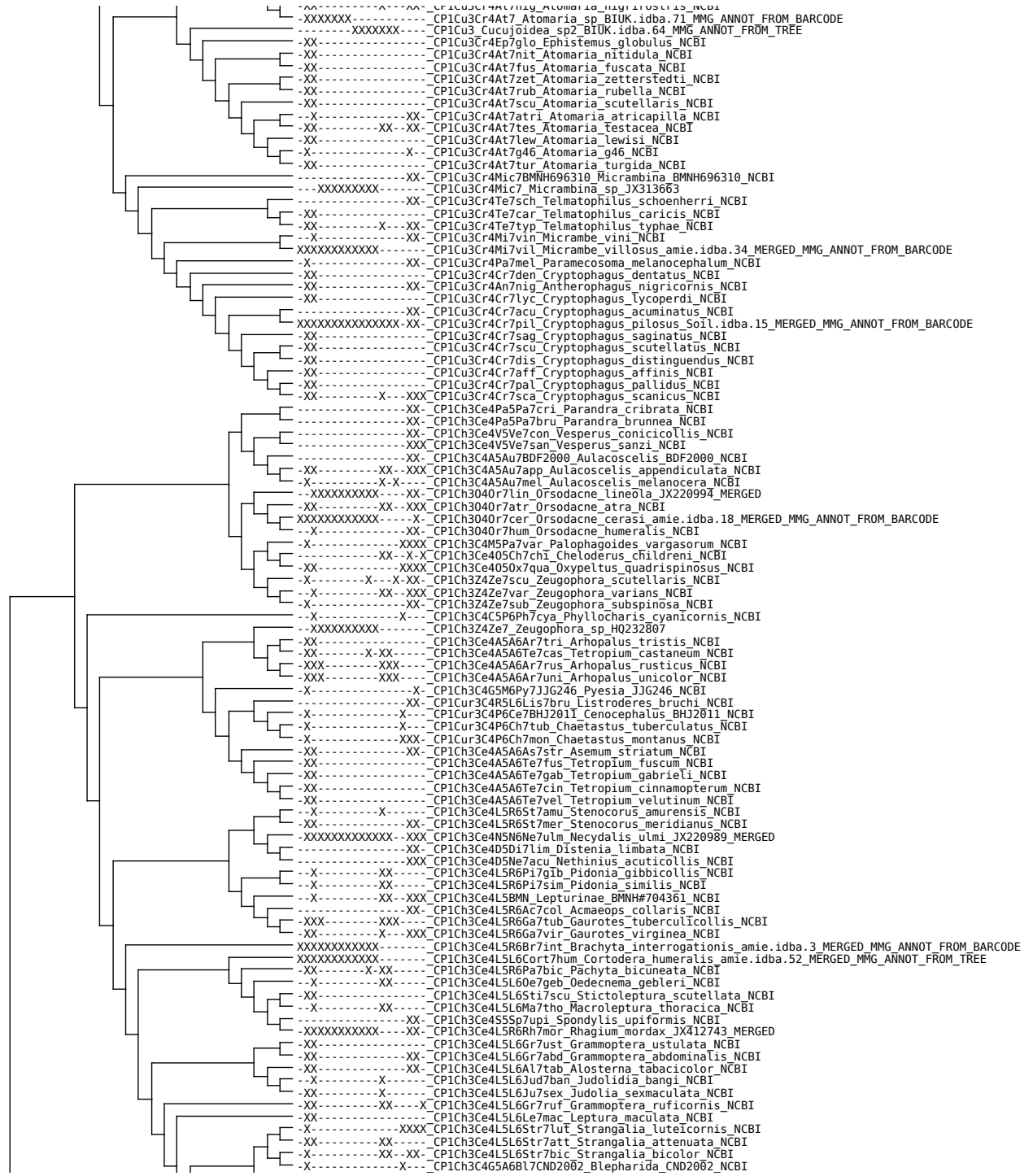




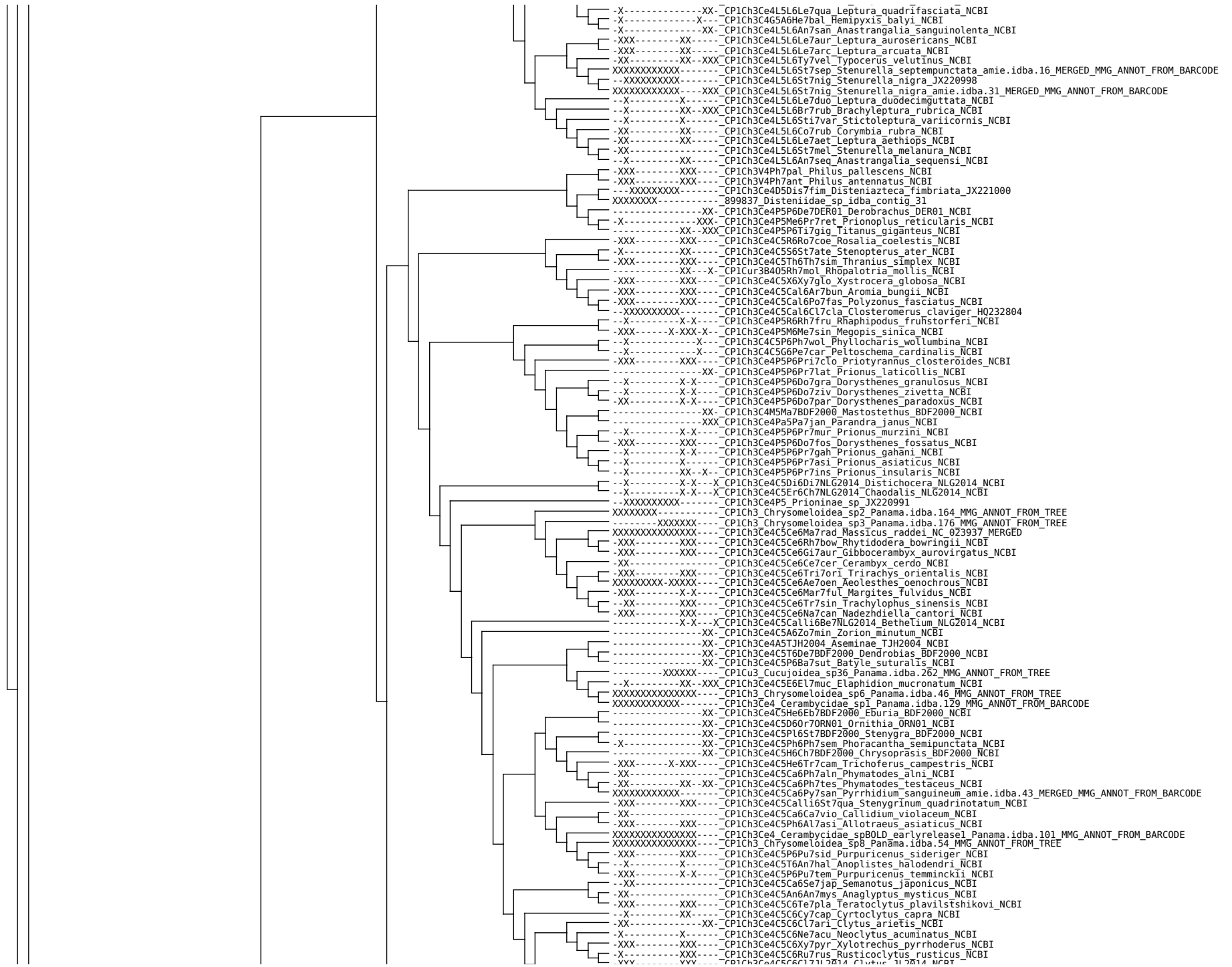
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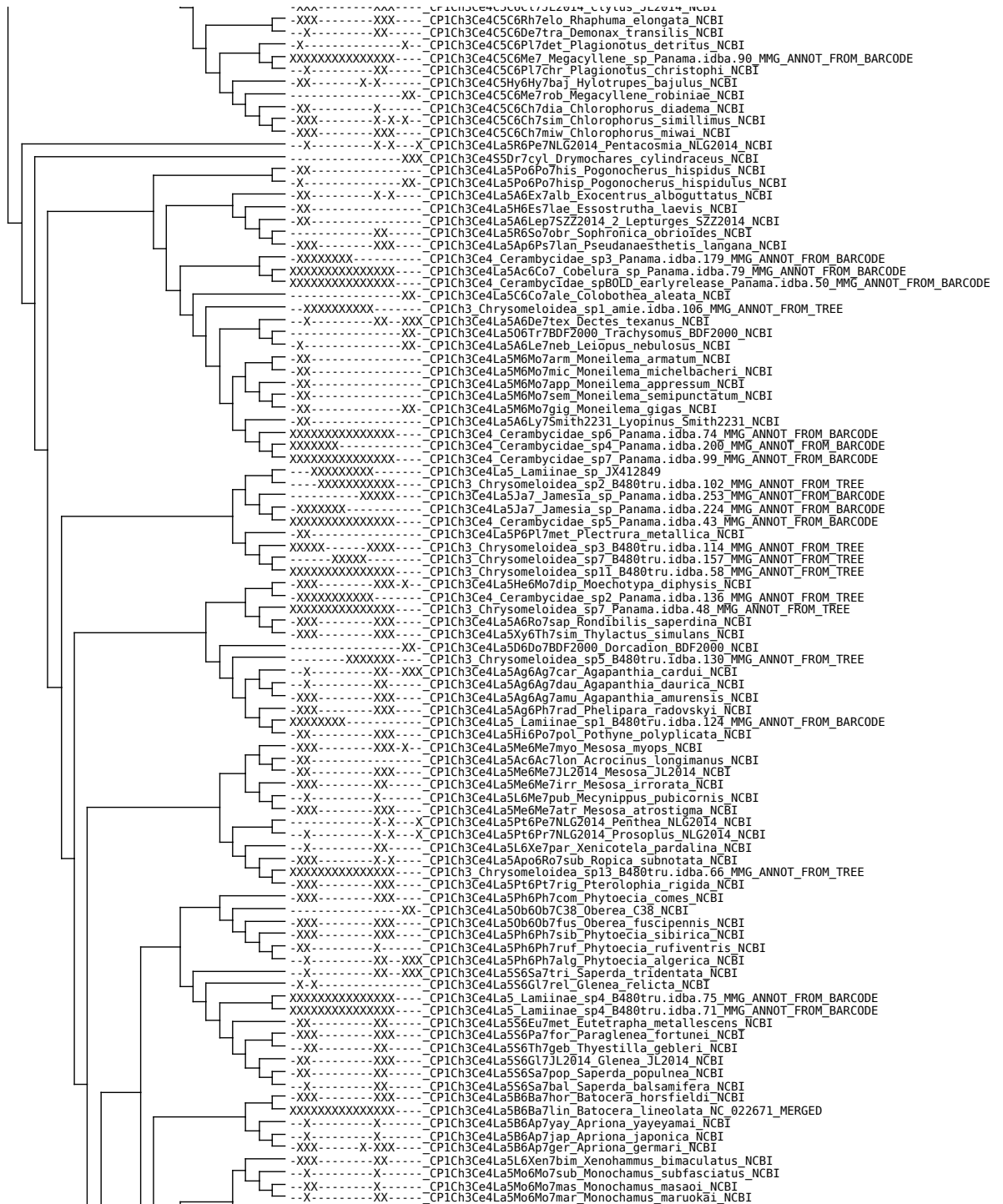




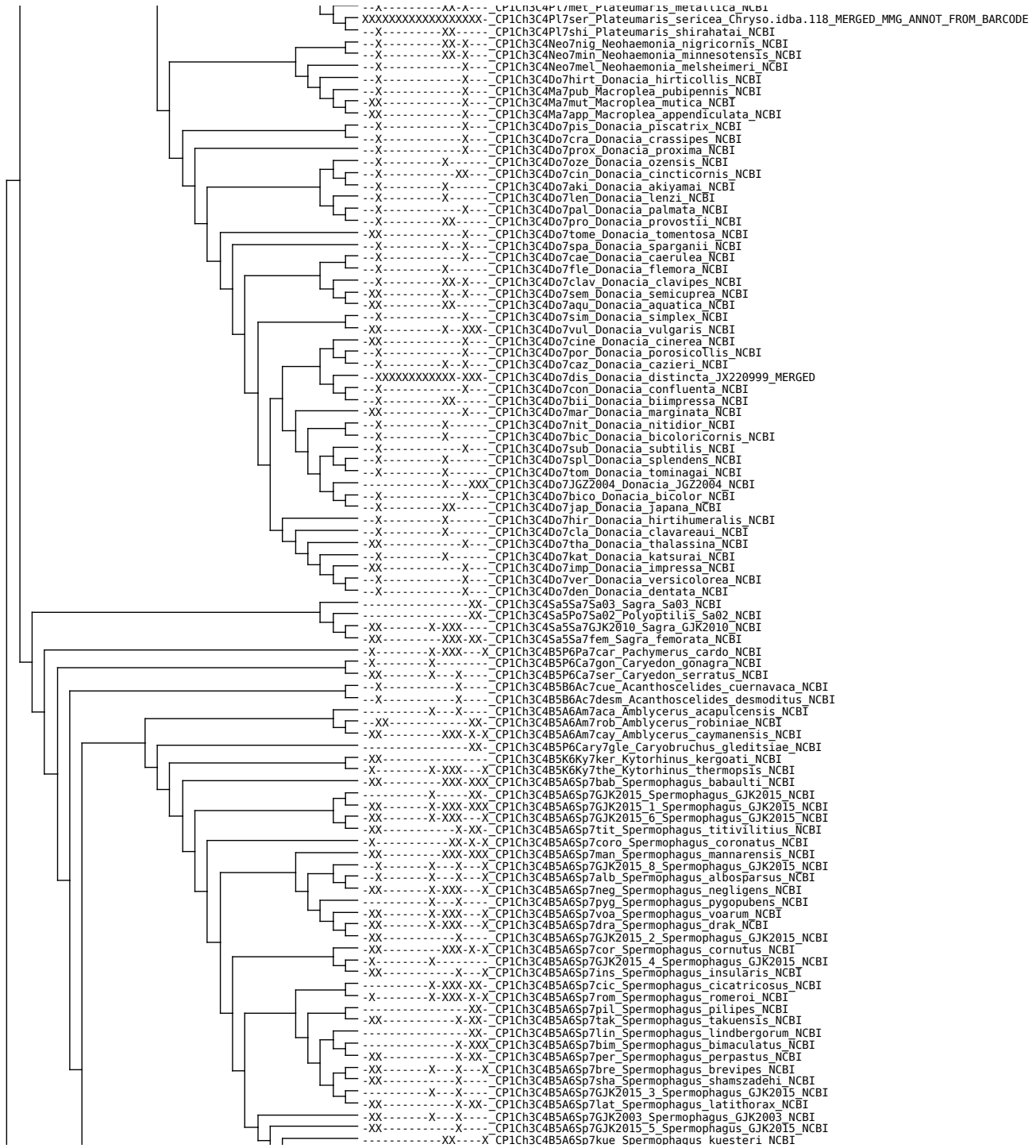


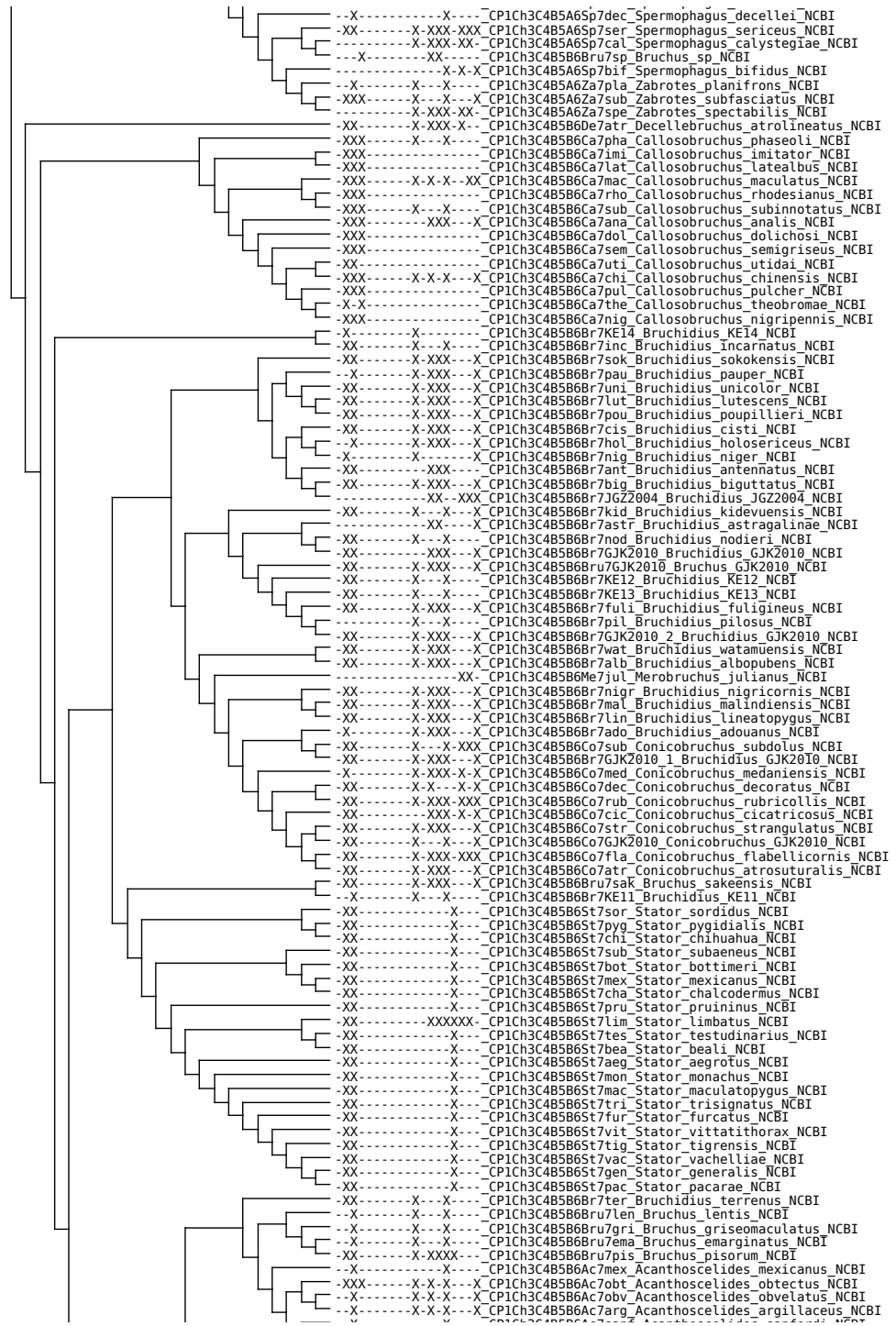


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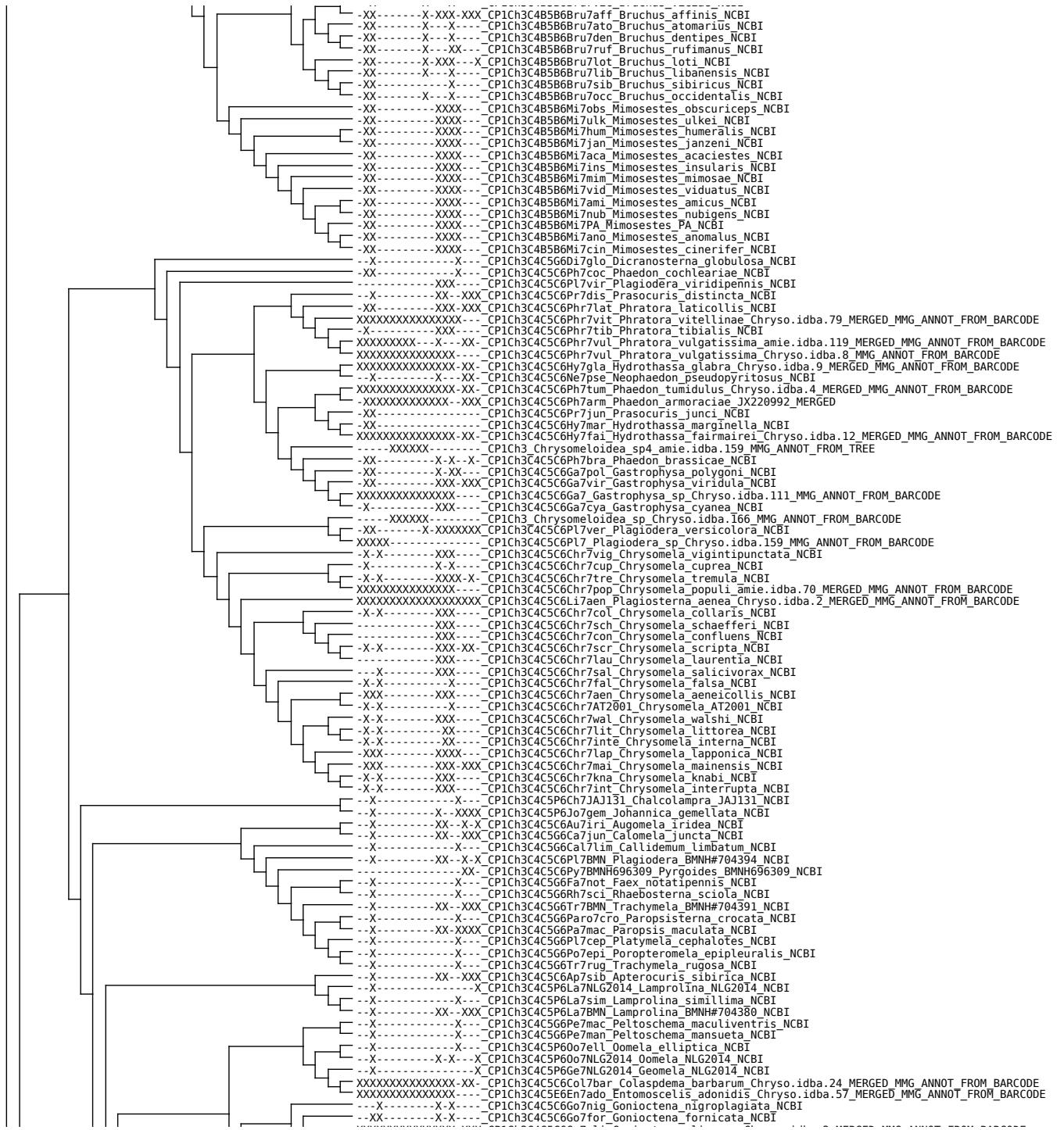






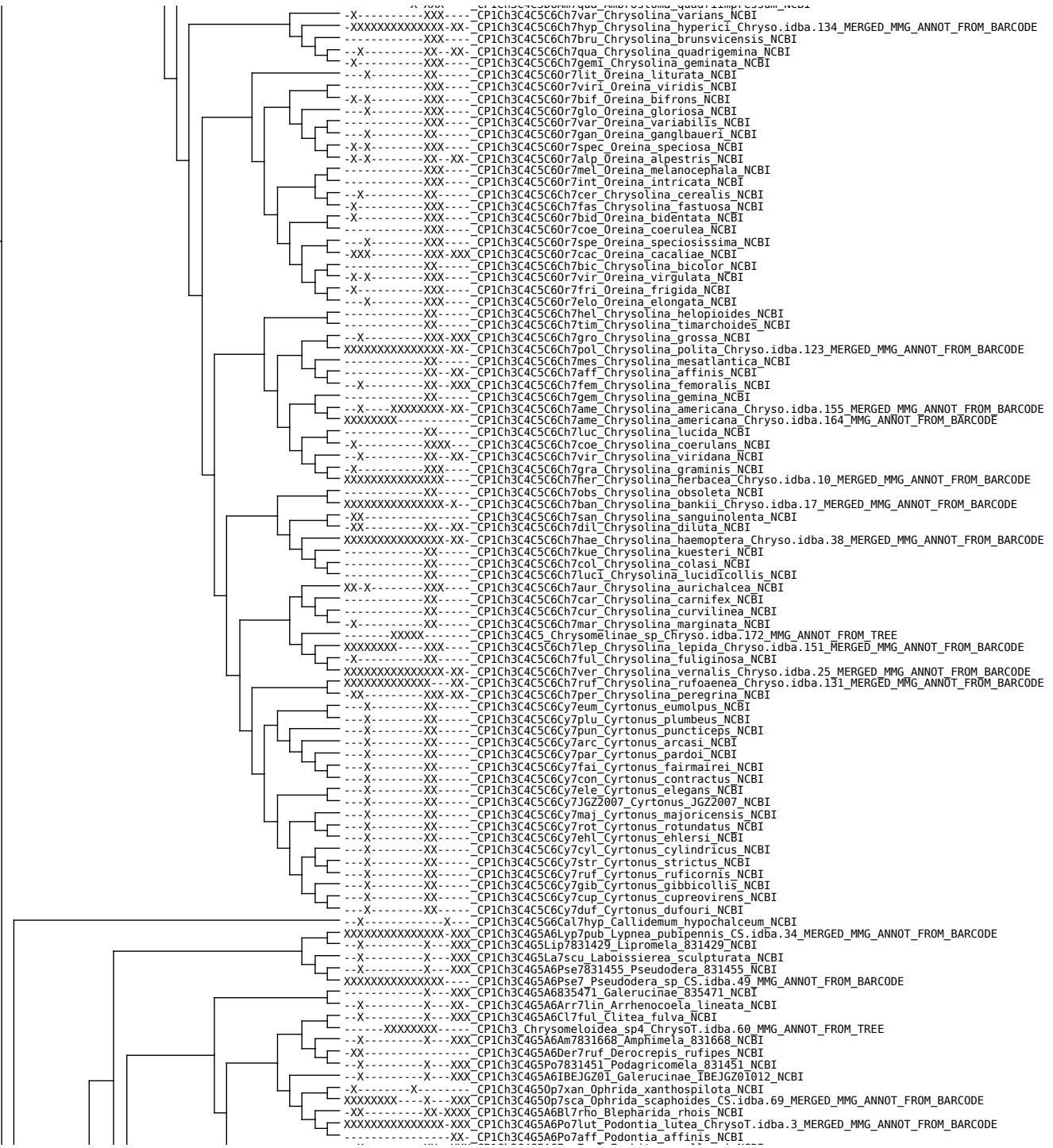




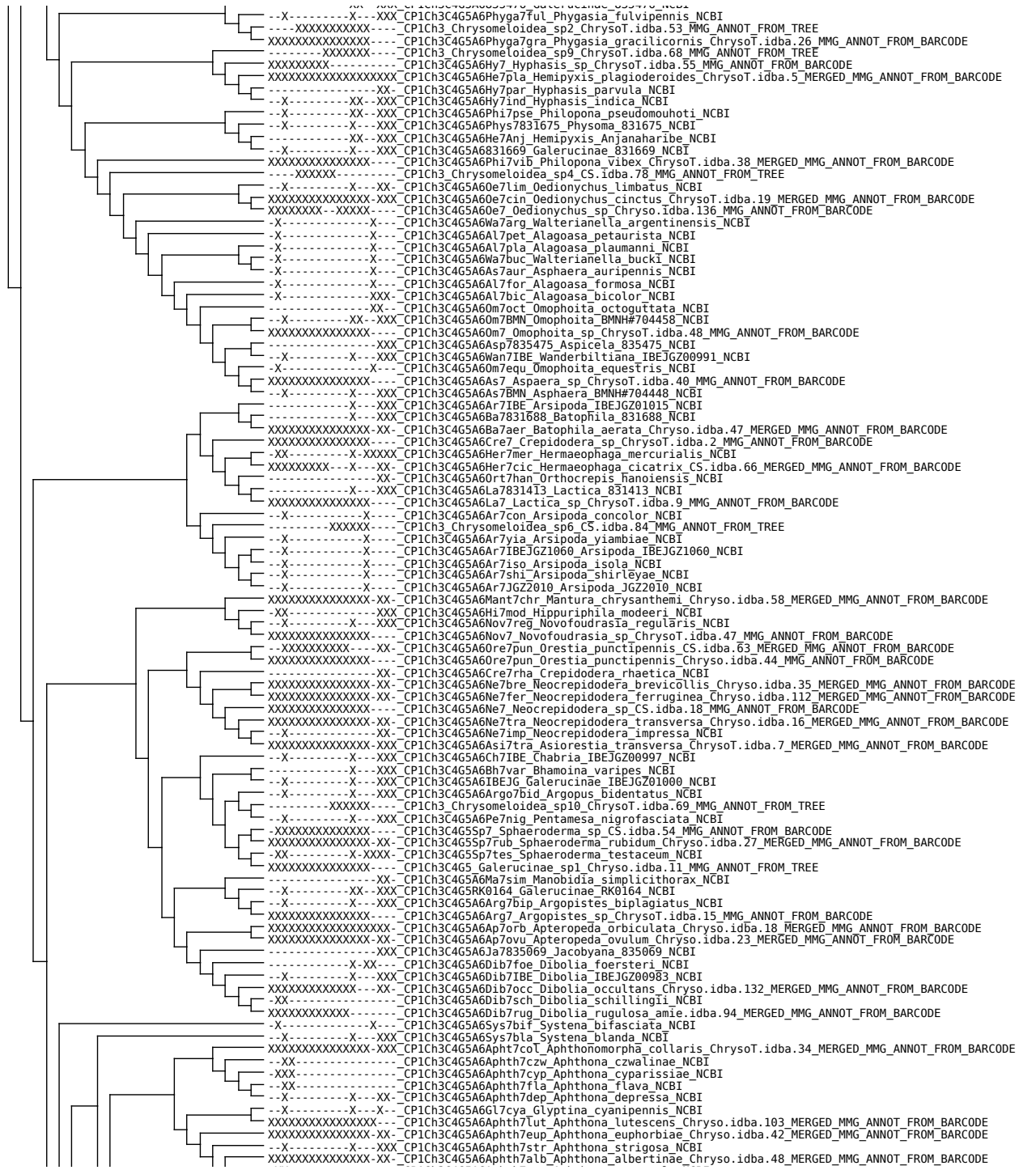






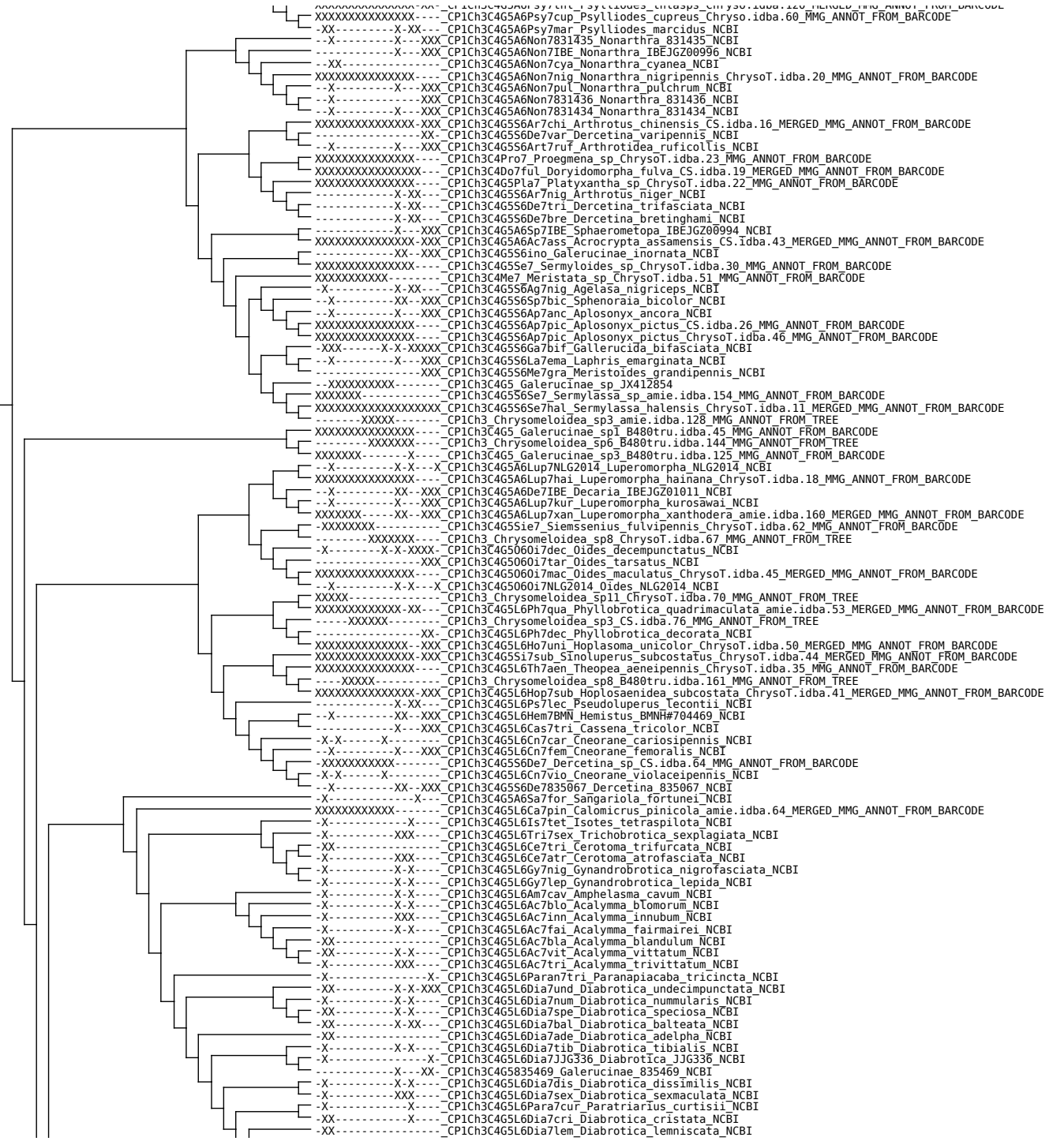


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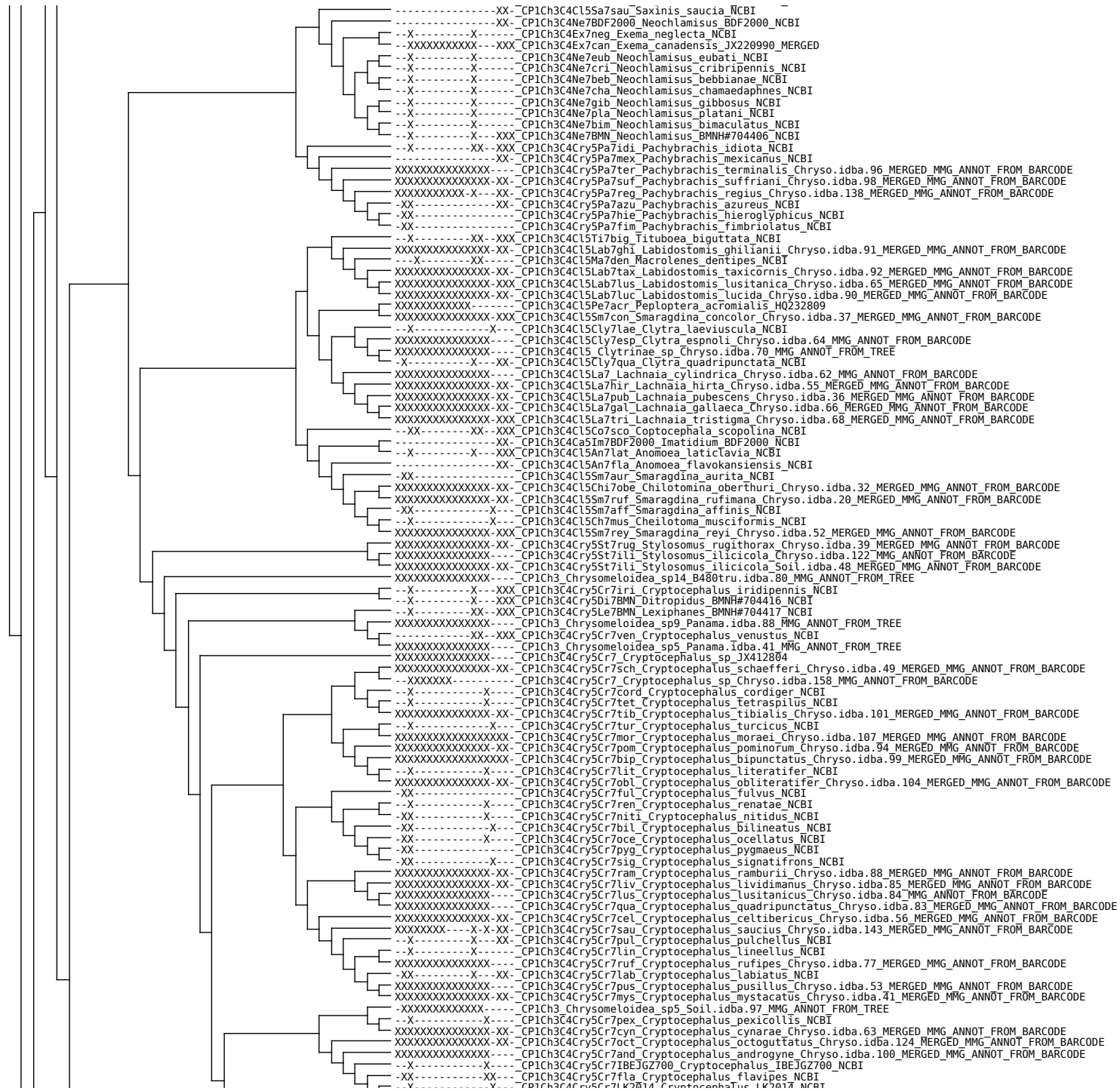




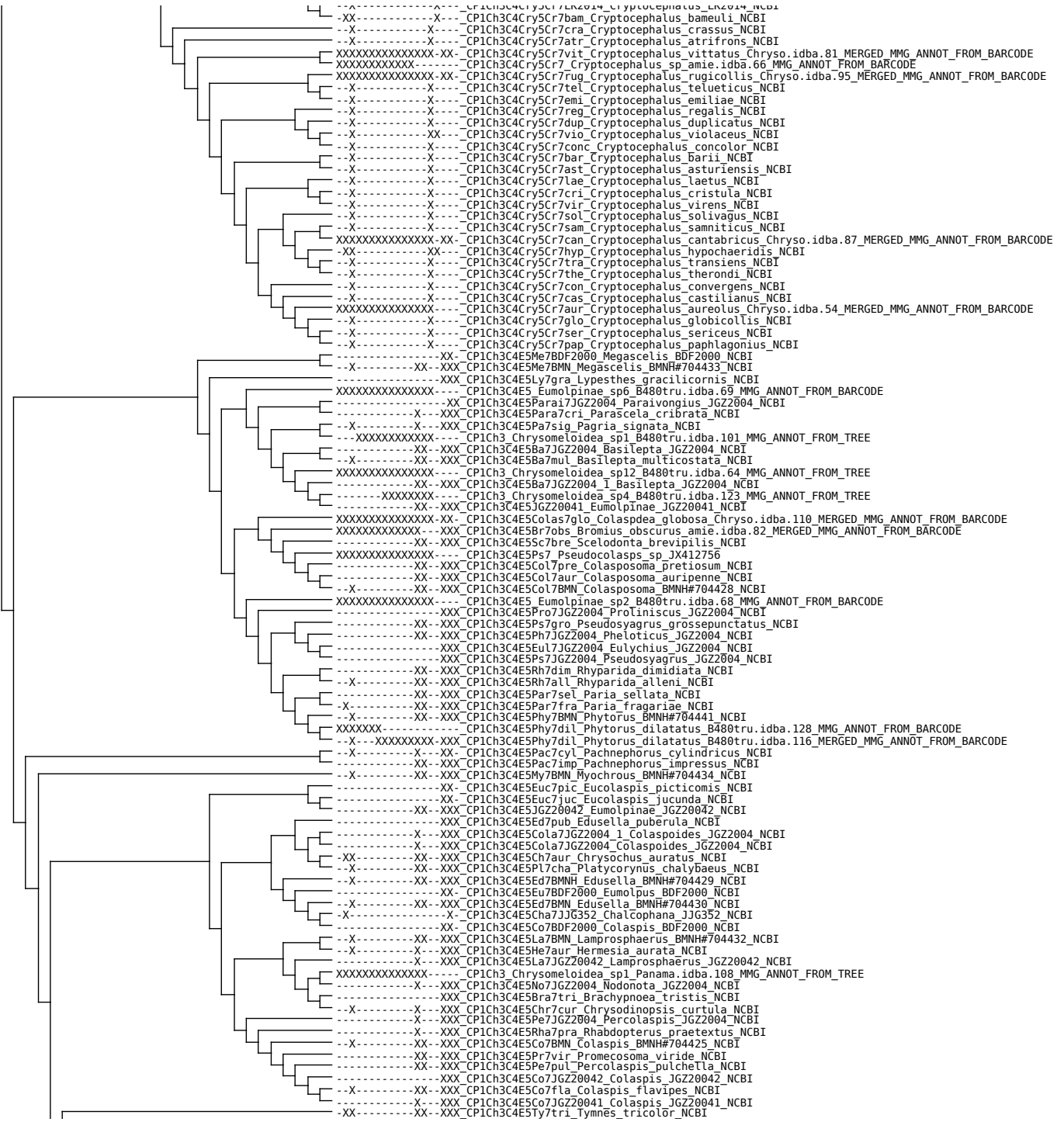
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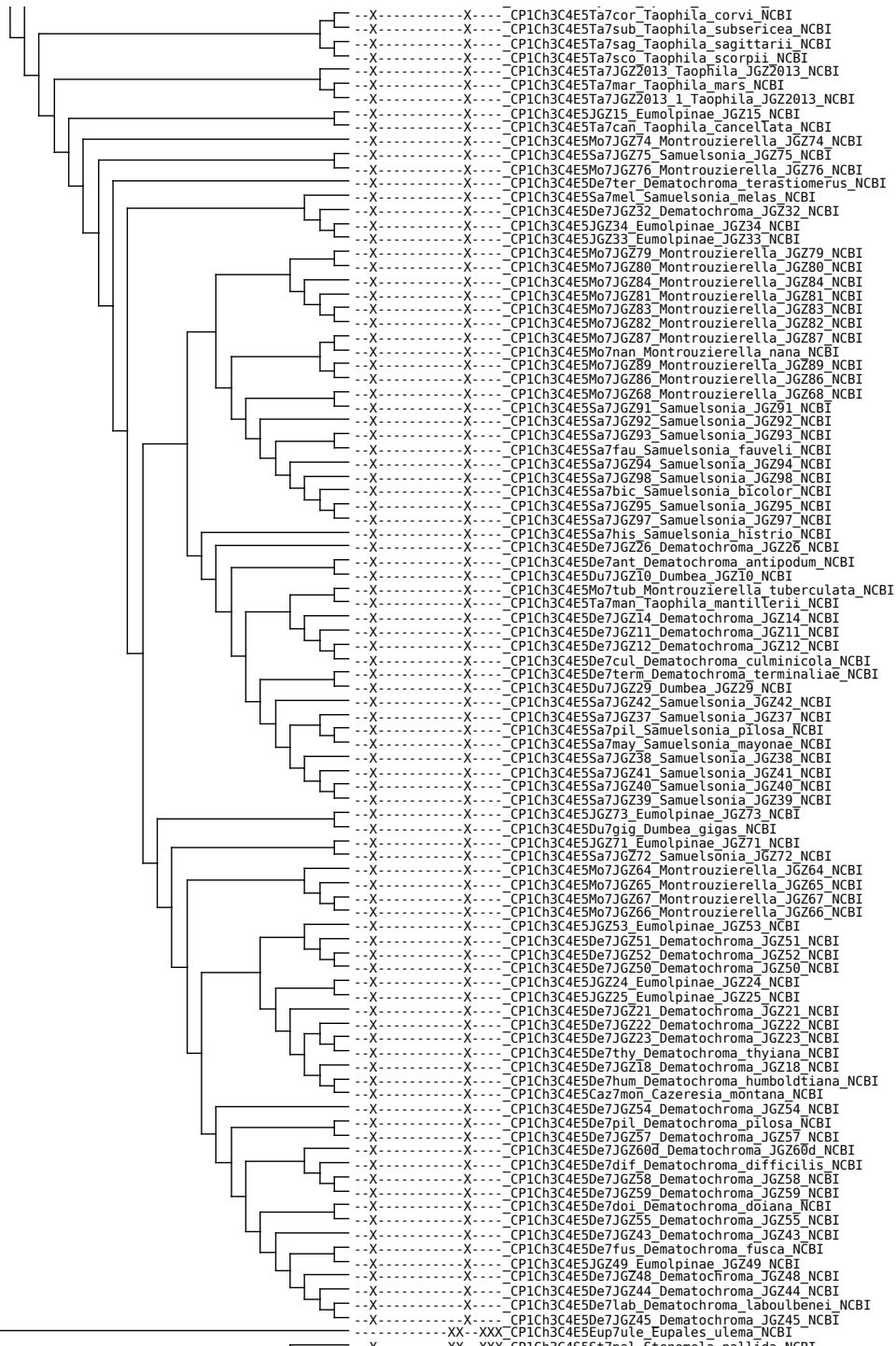


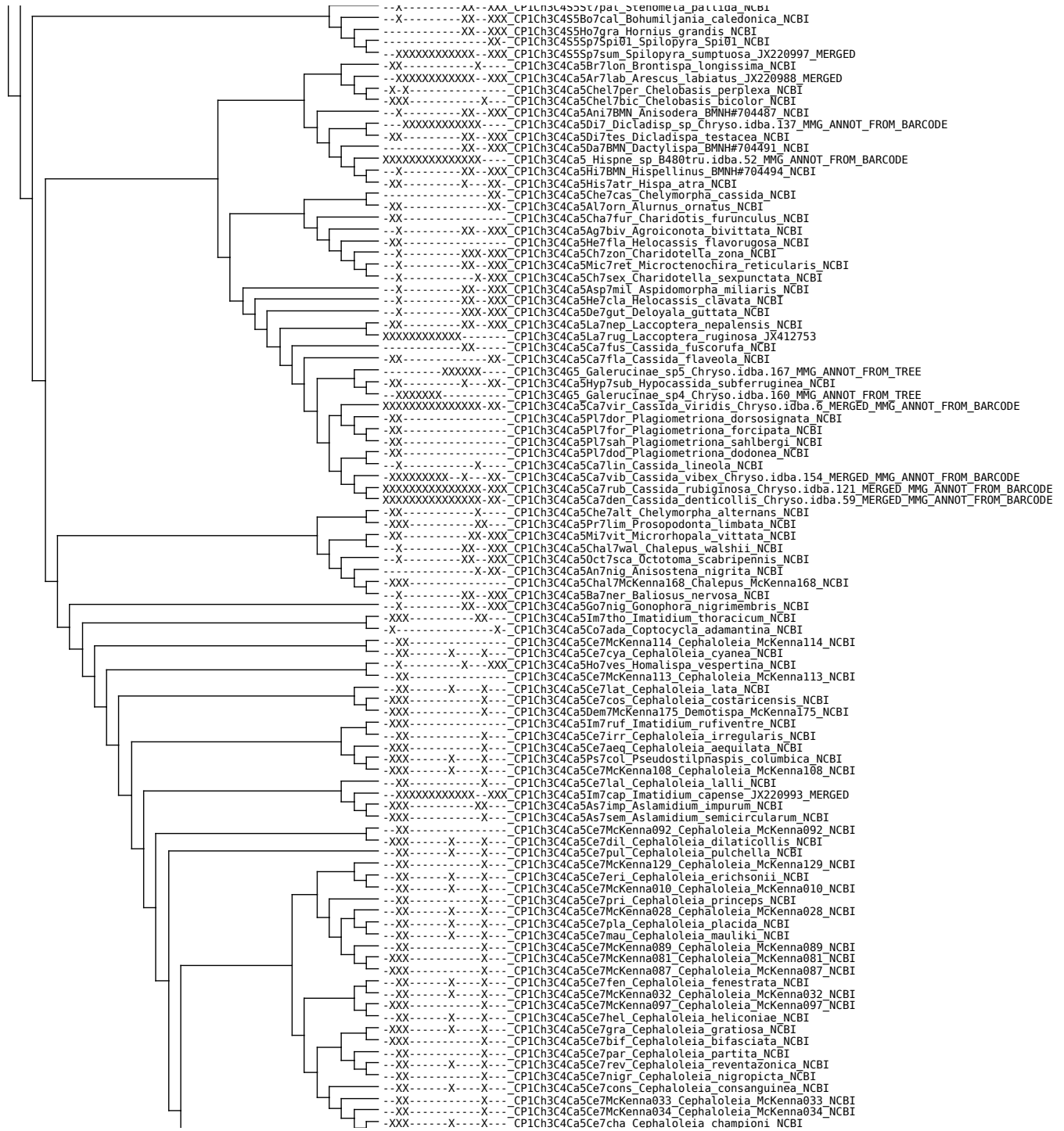


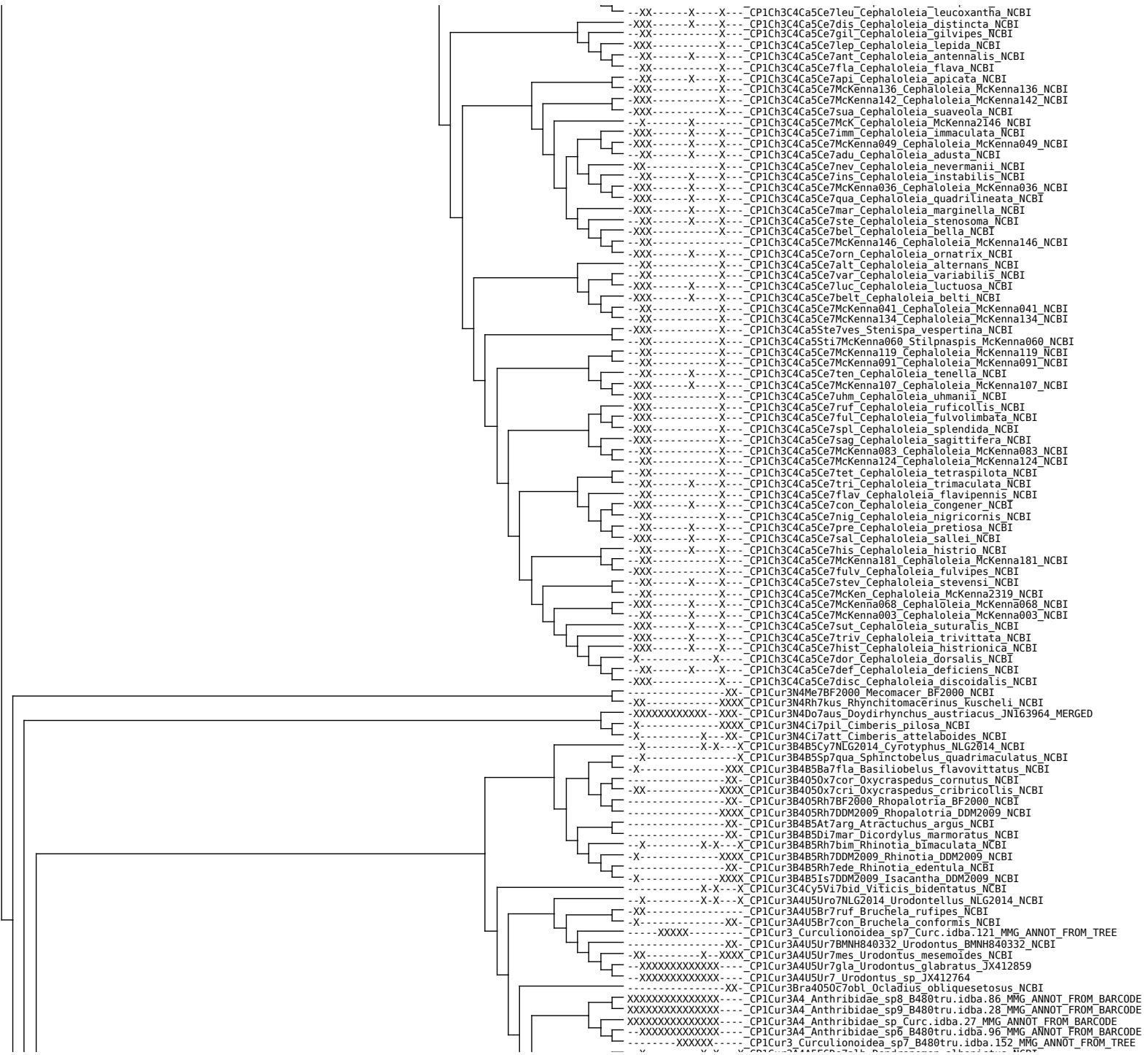


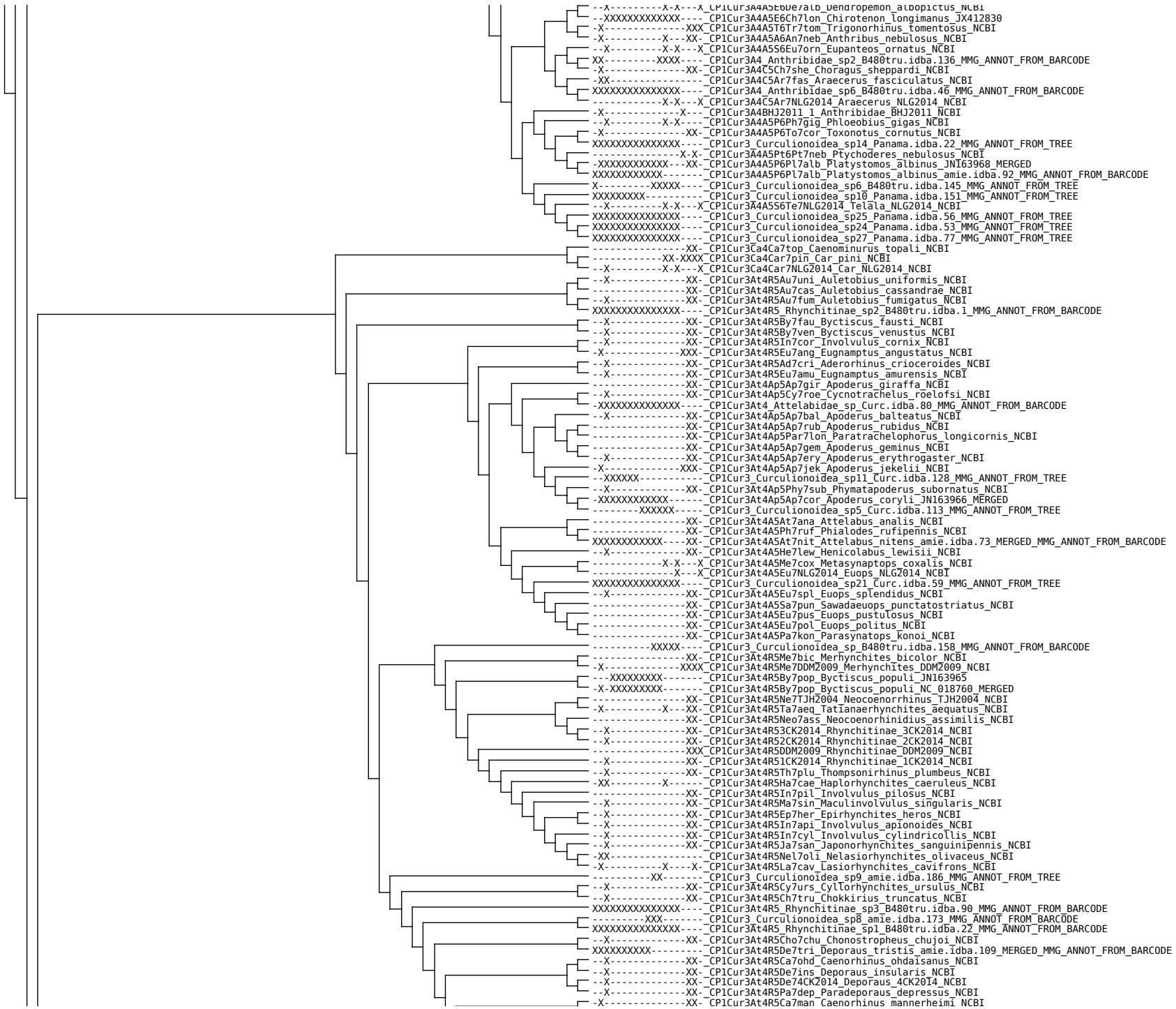


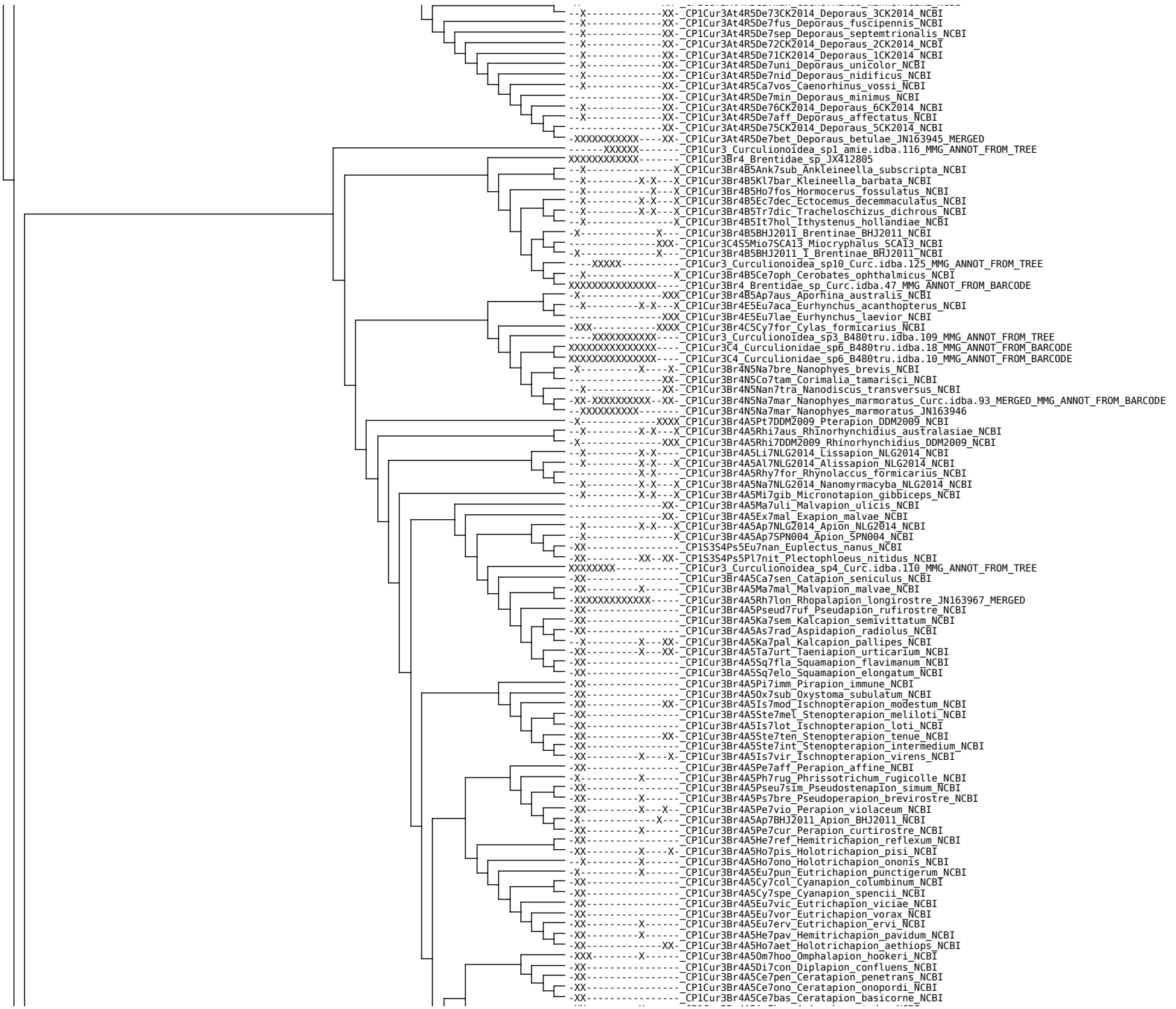


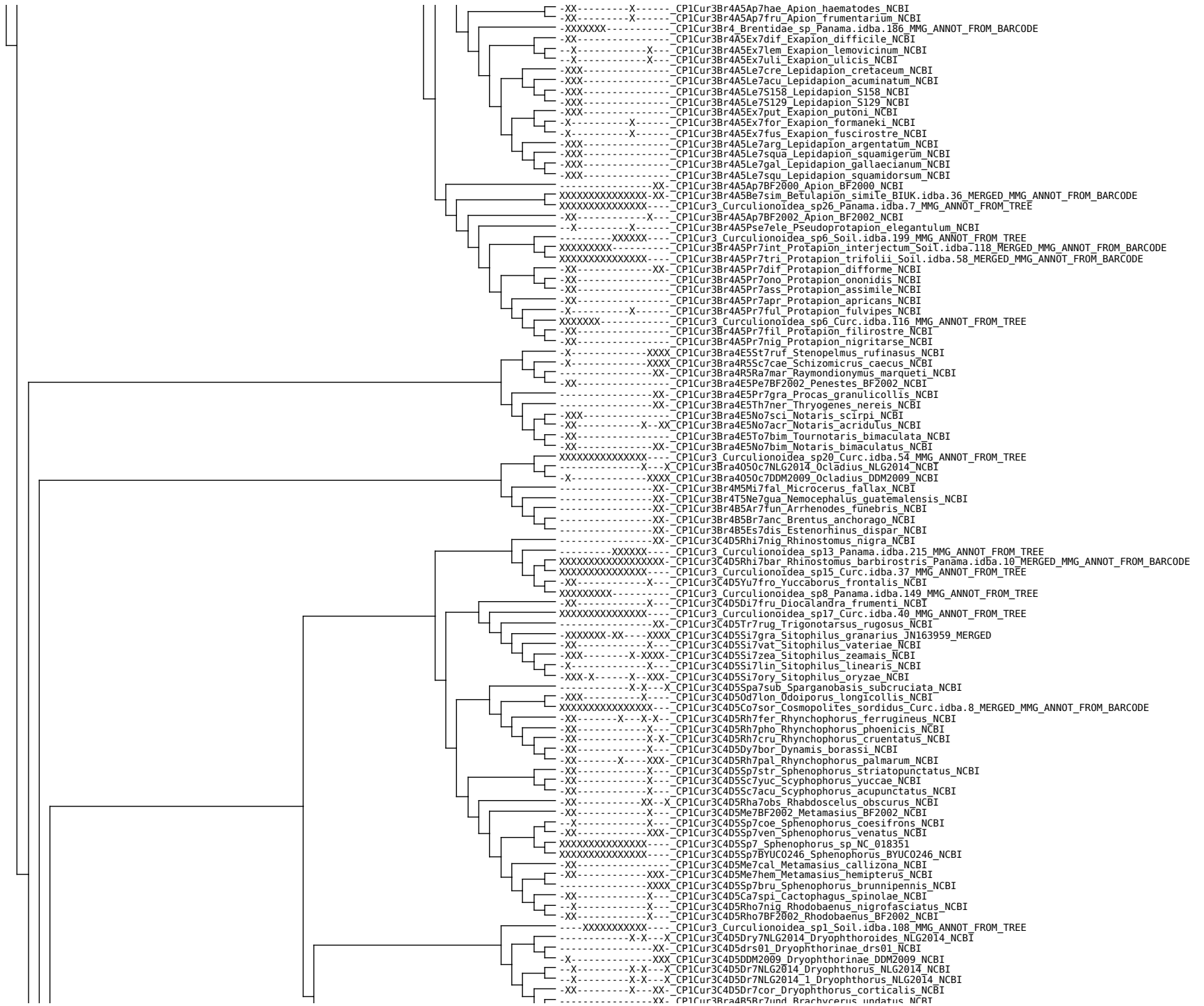


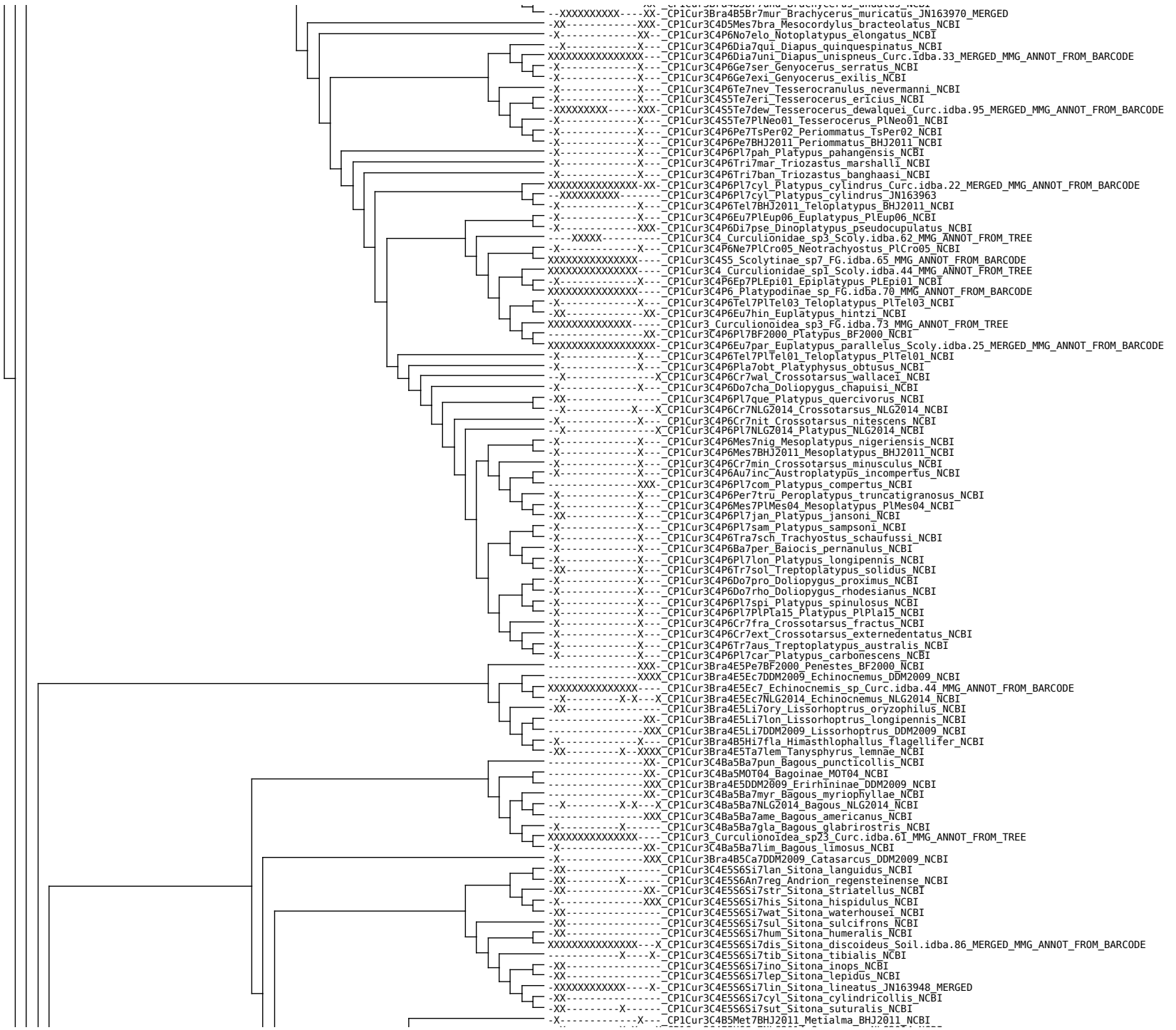






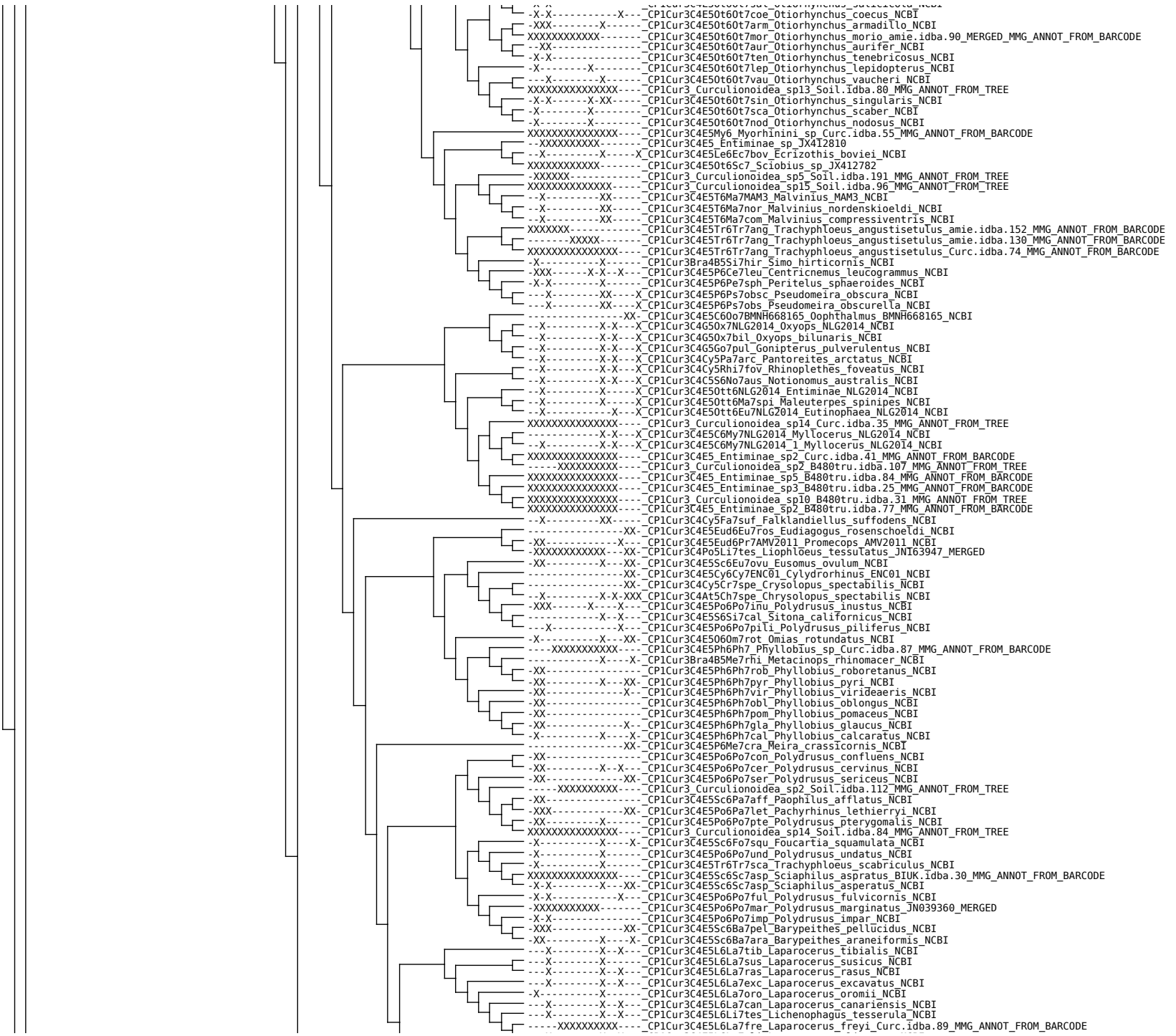


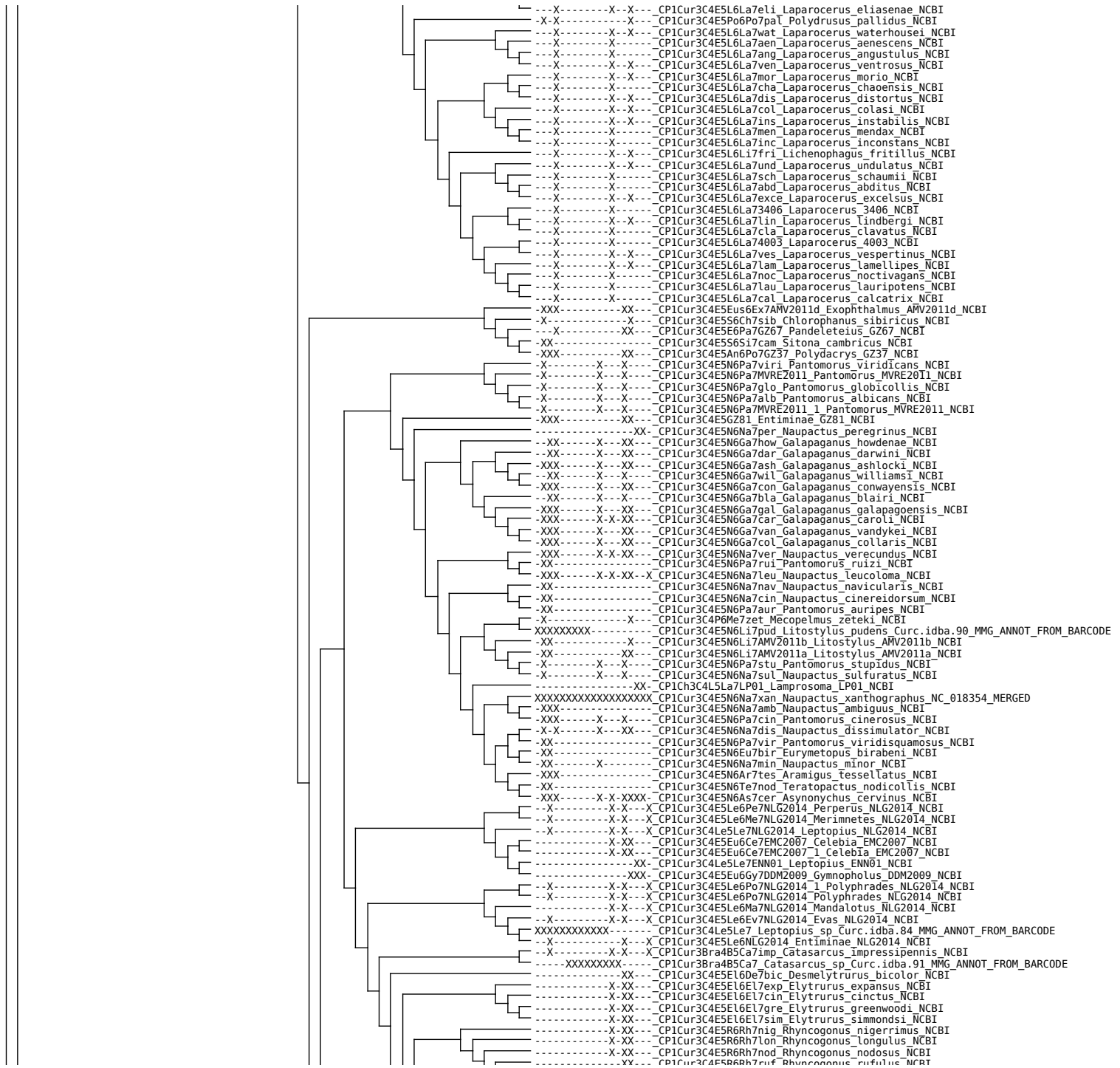




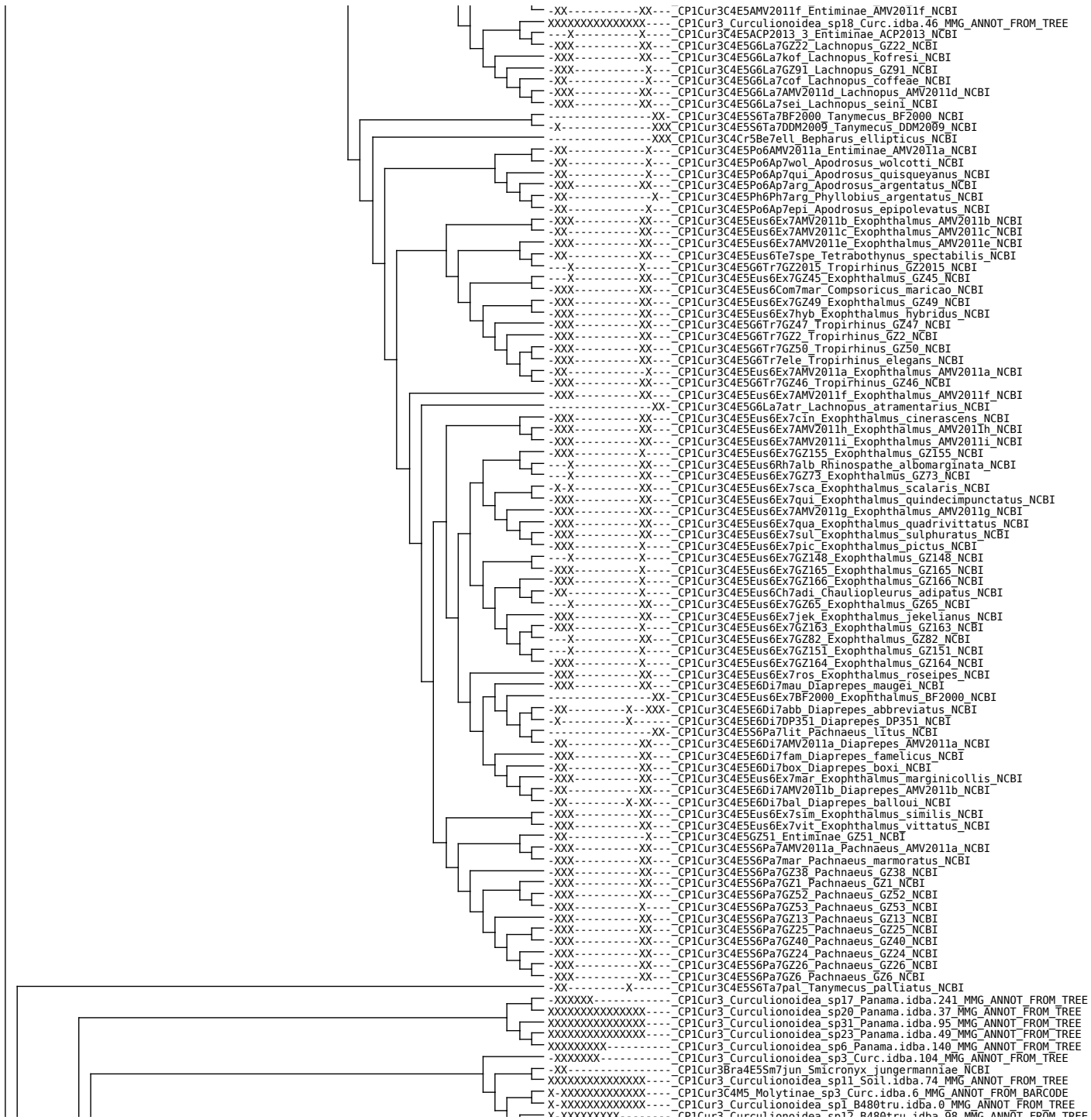




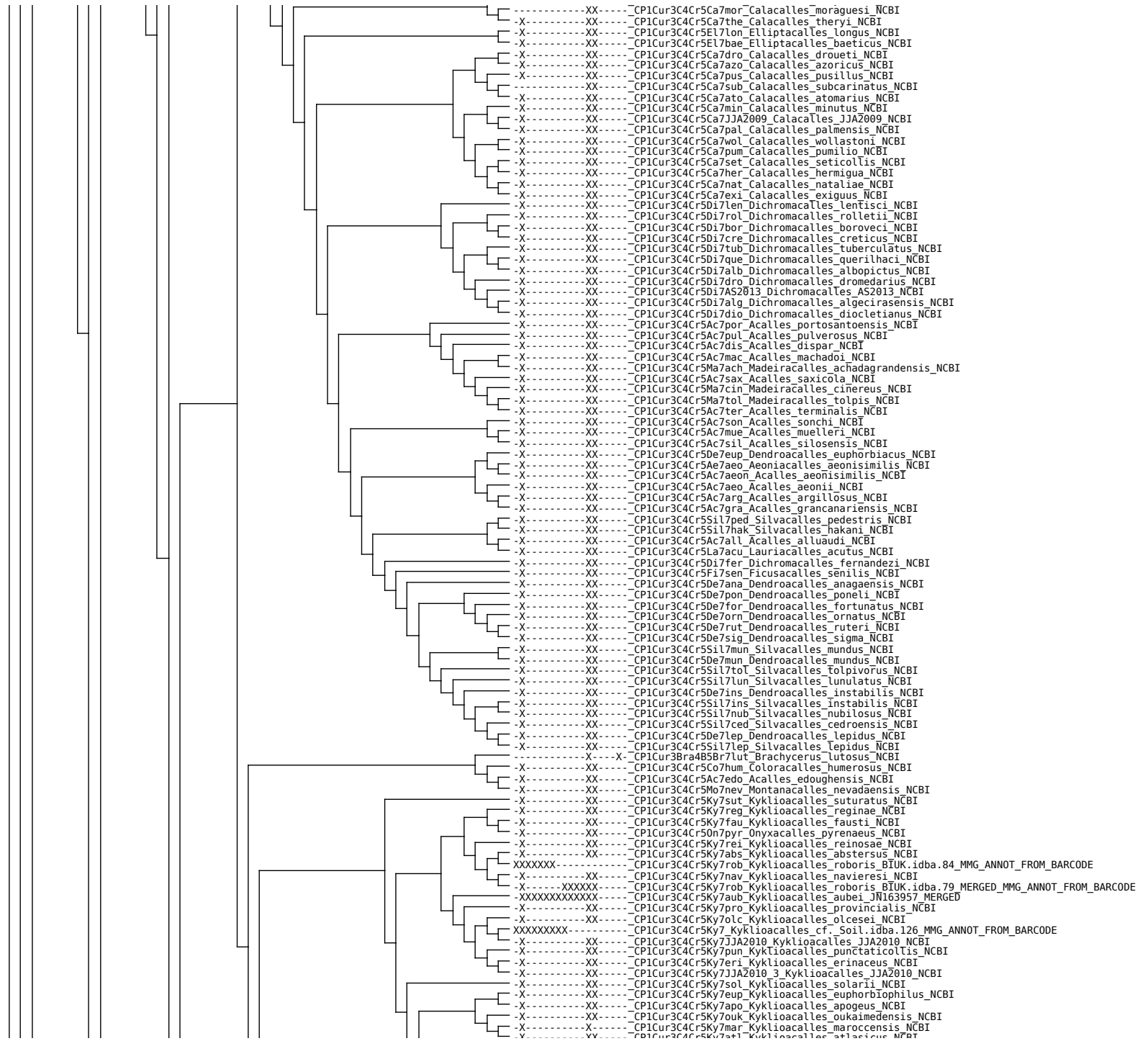


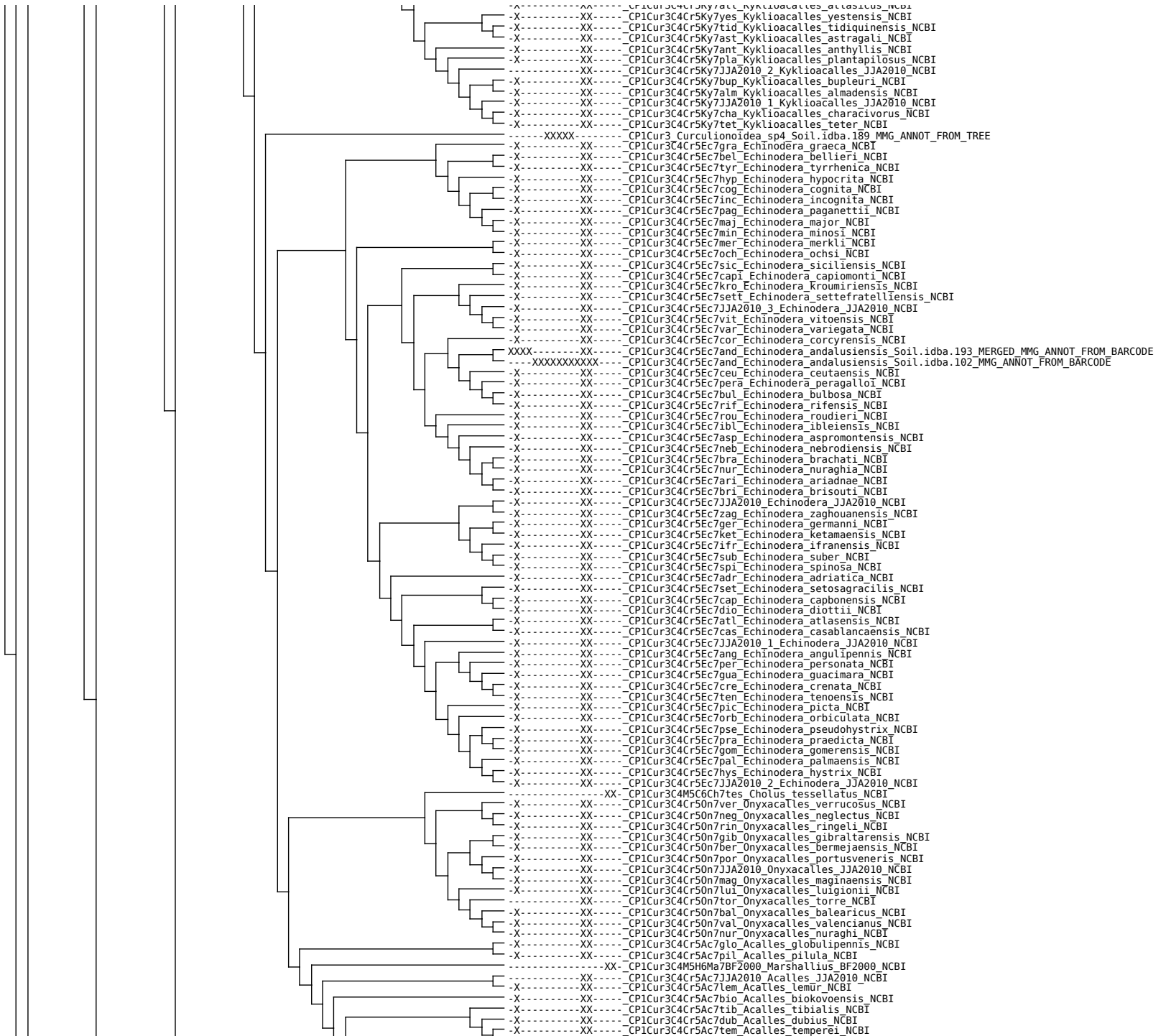








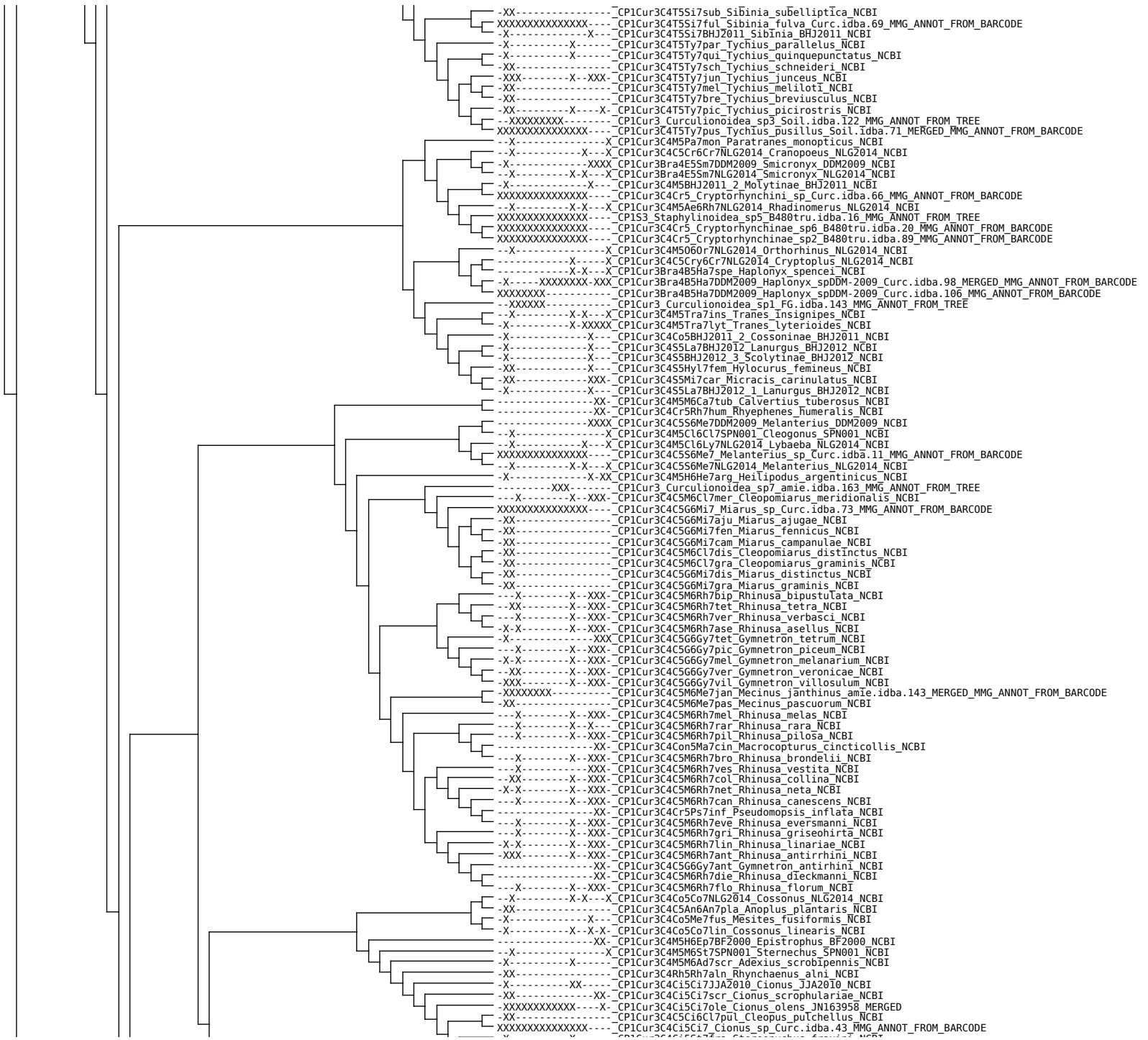




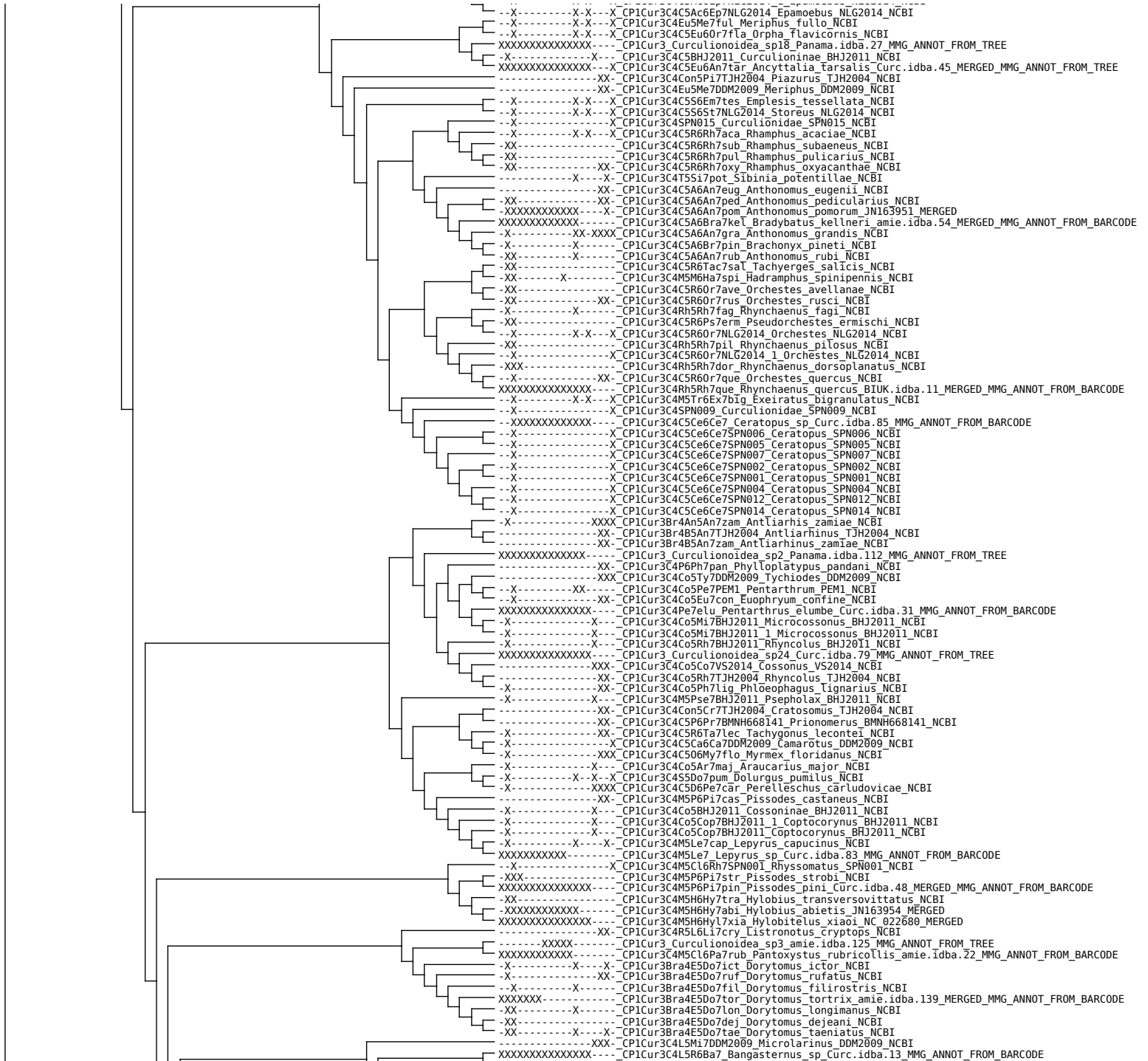


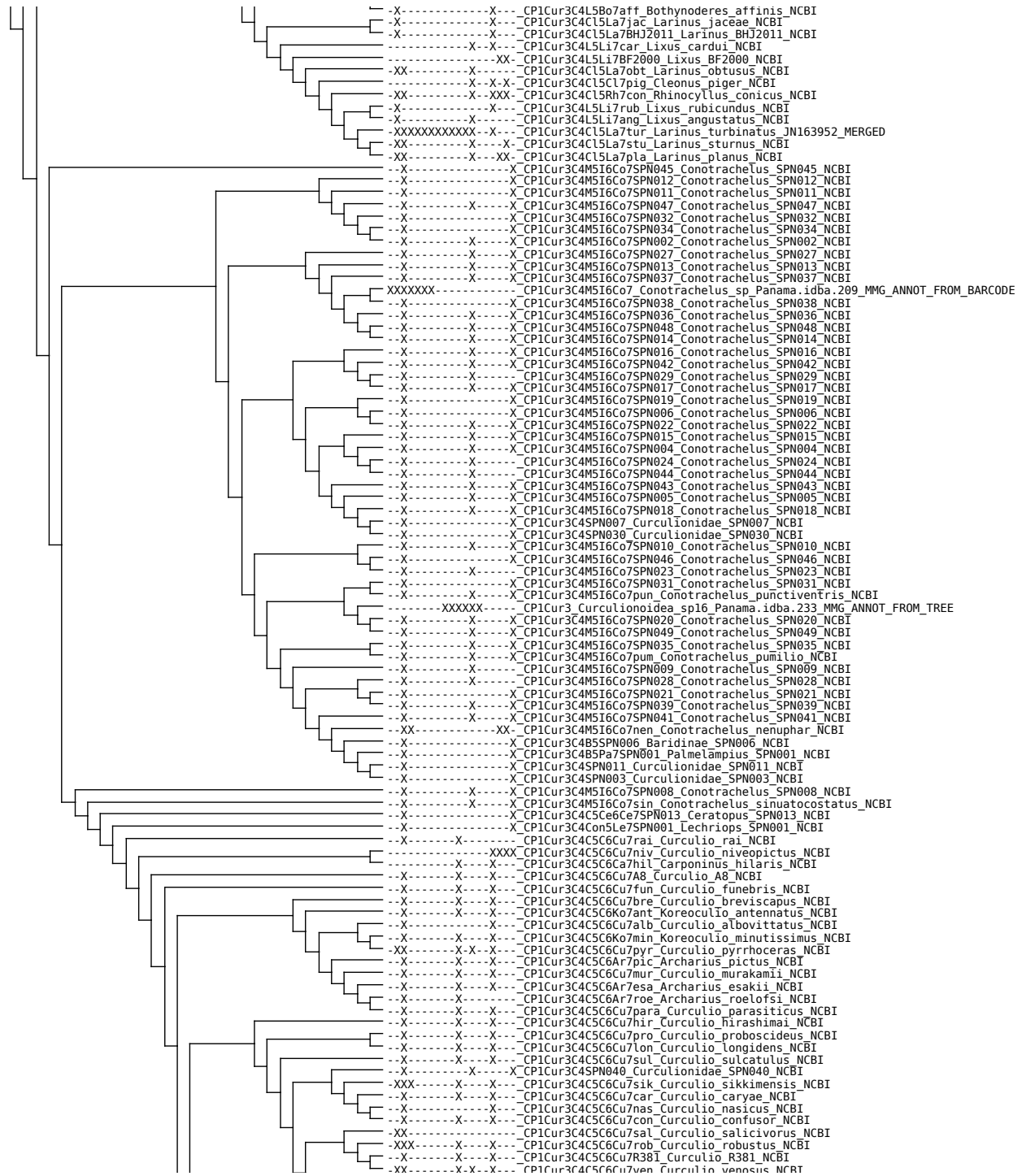




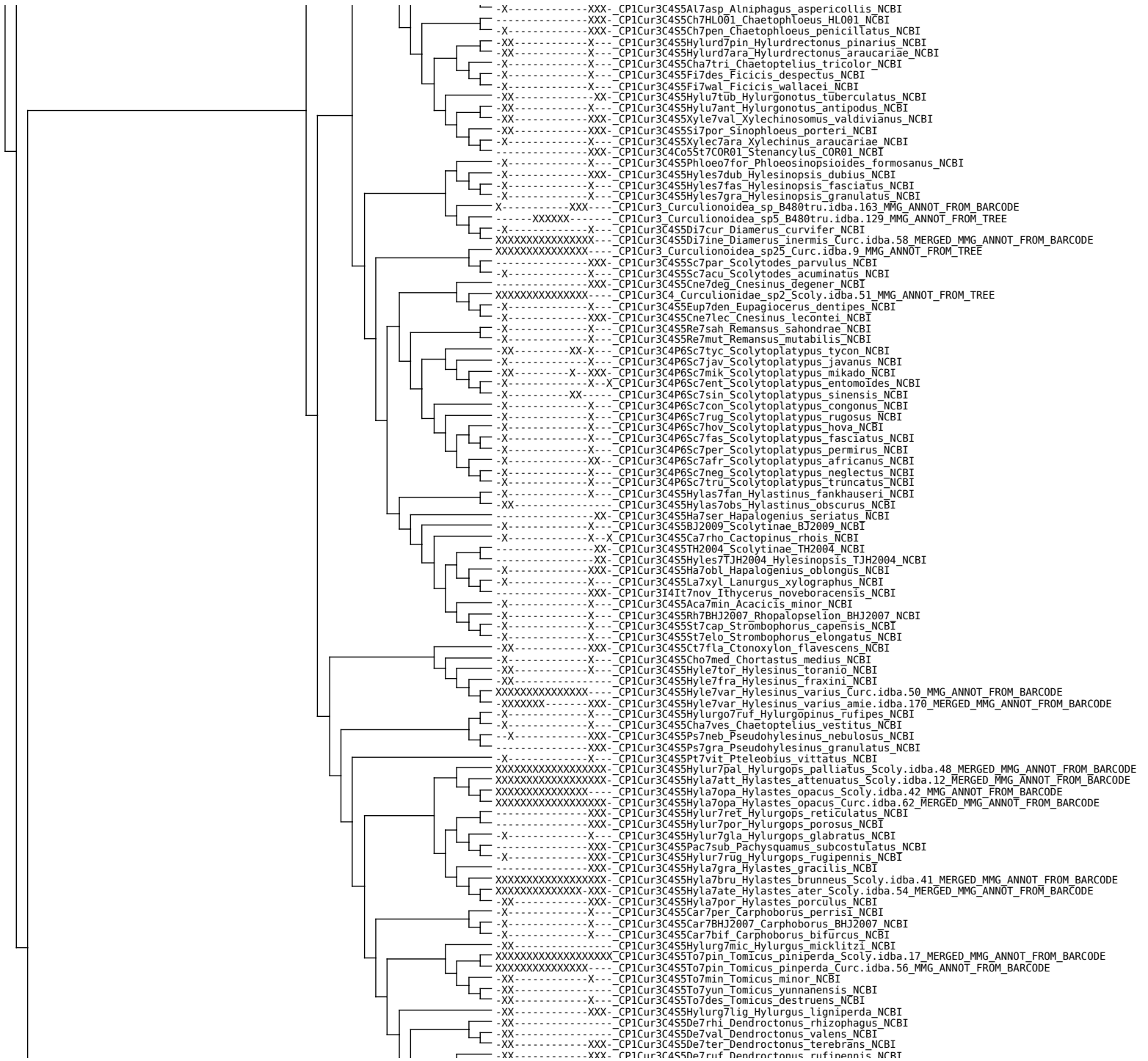








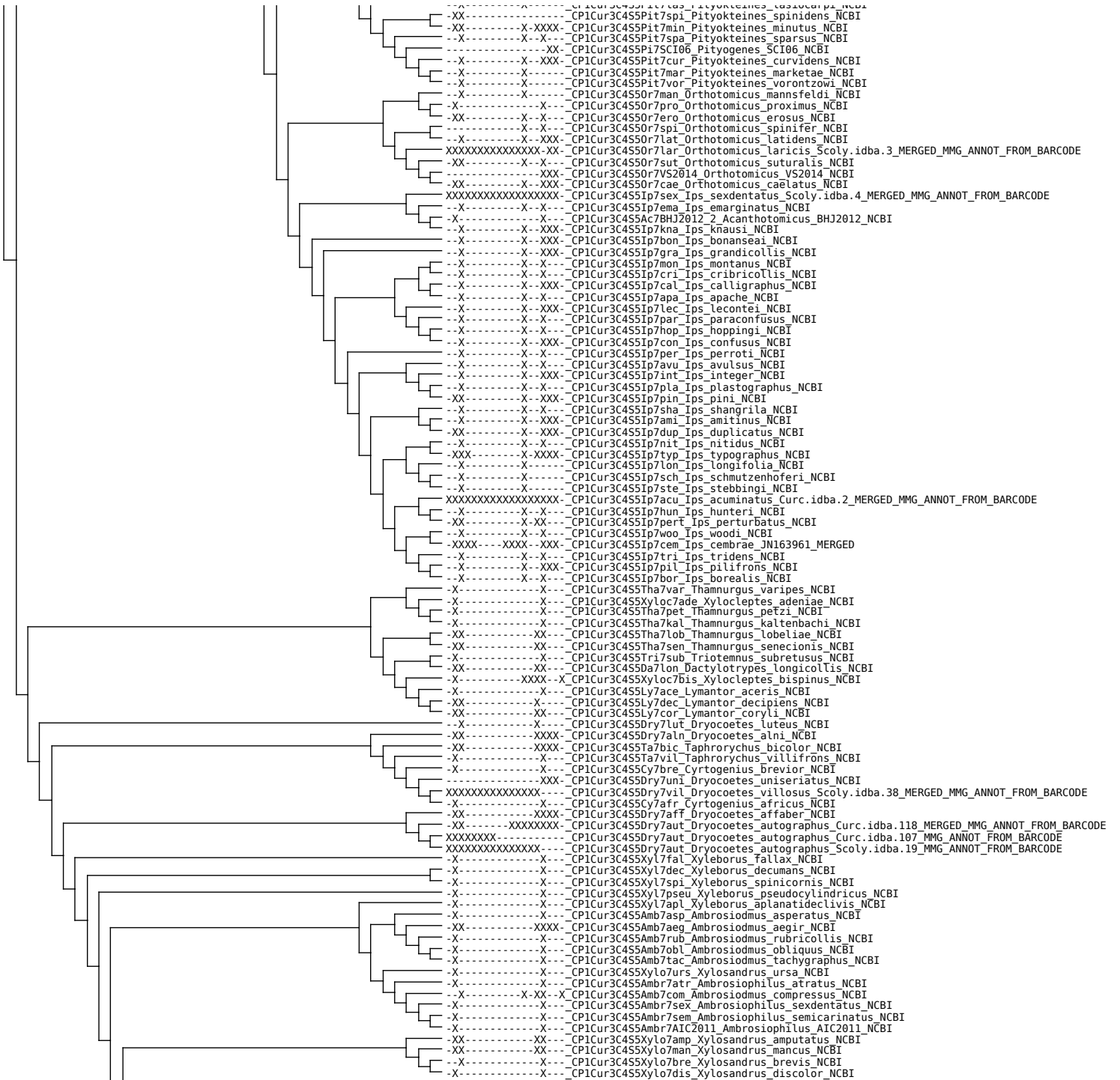




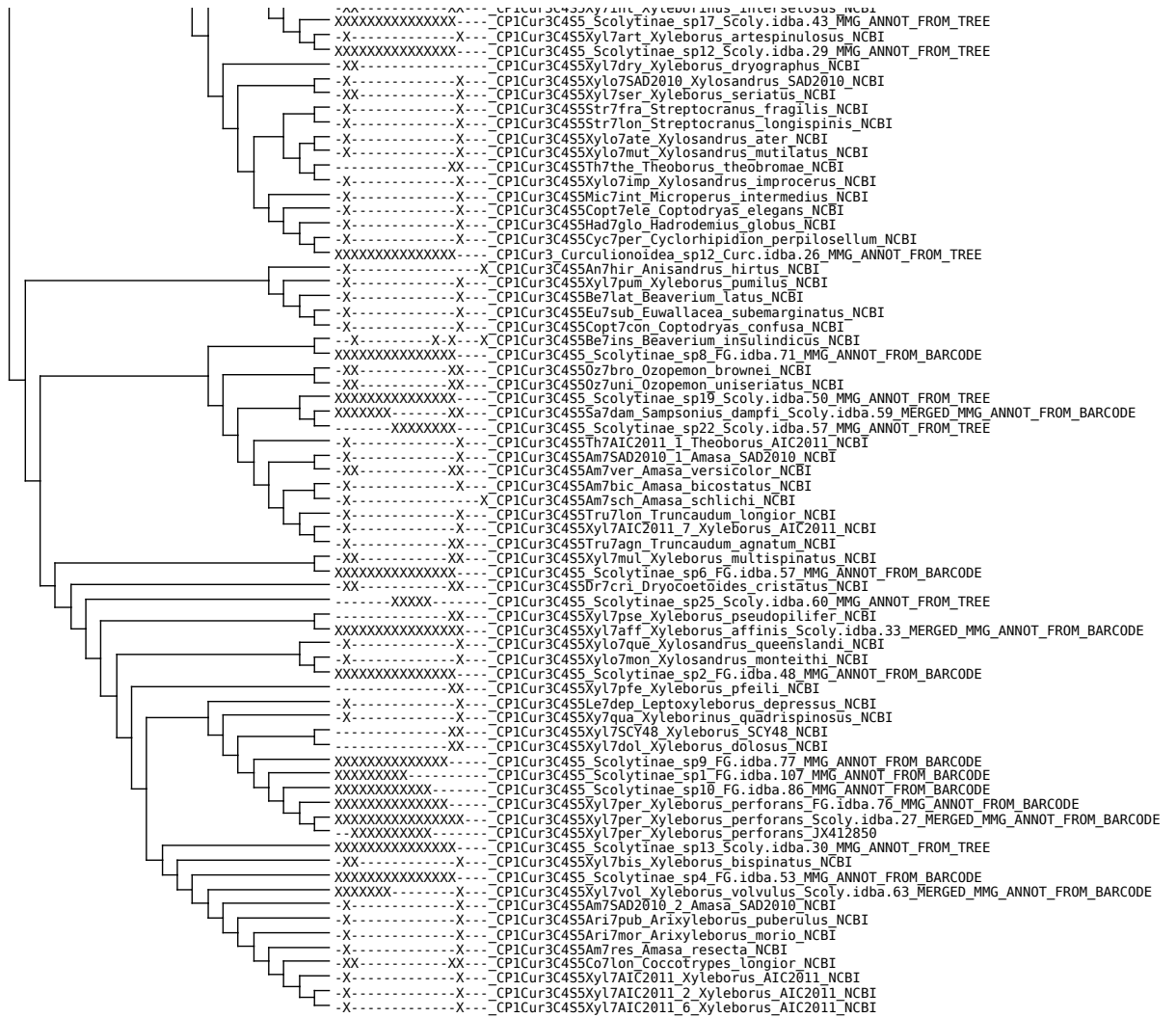


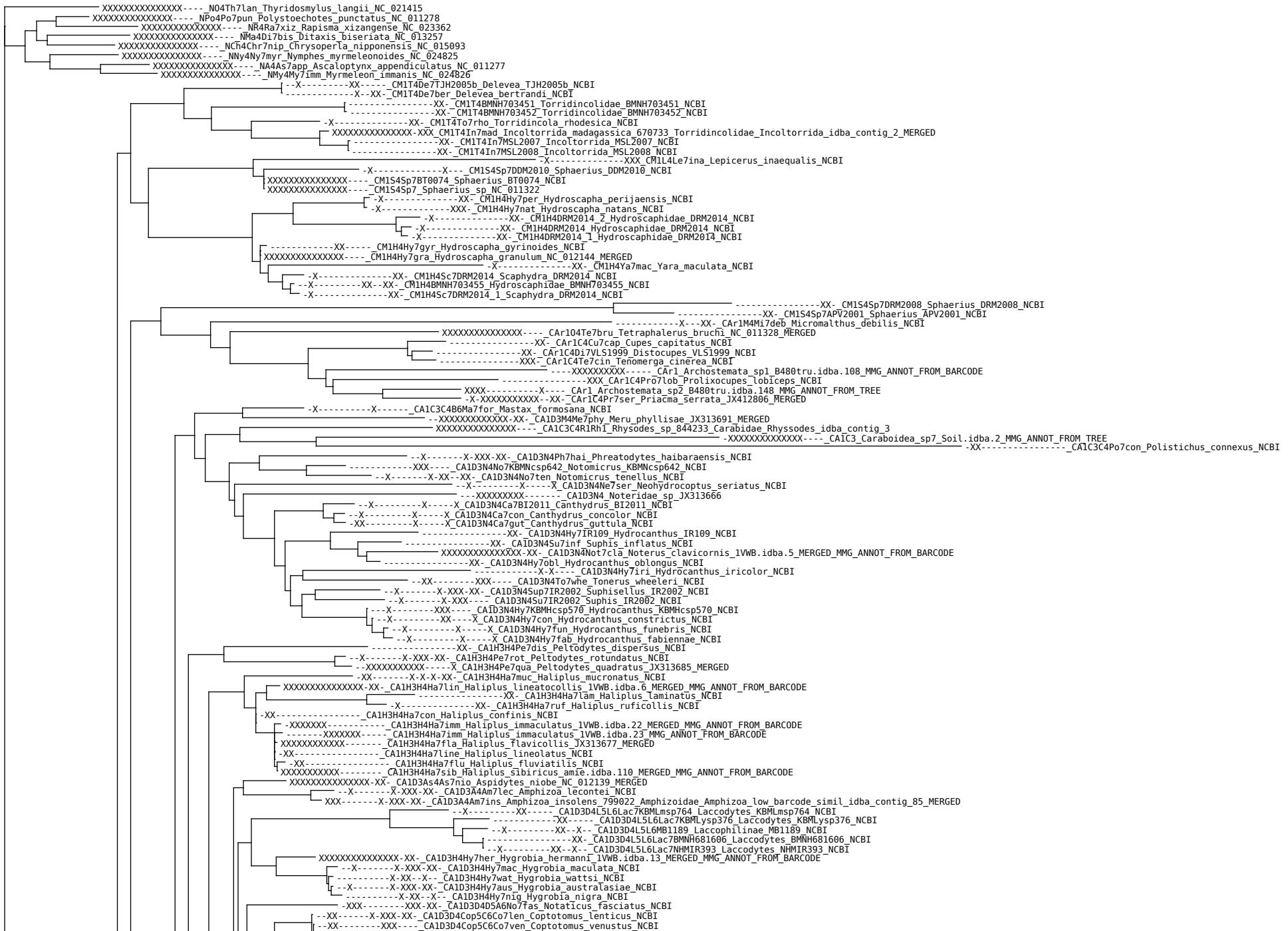












Phylogenetic tree showing relationships between various species, primarily from the genus *Ilybius* and related genera like *Platambus*, *Agabus*, and *Hydrotrupes*. The tree is rooted on the left and branches out to the right. Each terminal node is labeled with a taxon name and a support value (e.g., -X- or -XX-). The taxa are listed in descending order of support values from top to bottom. The tree shows a complex branching pattern with many nodes having high support values (XX- or XXX-), indicating strong confidence in the relationships. The species names are often followed by 'NCBI', indicating they are from the NCBI database. The tree is a cladogram, with branches of varying lengths representing evolutionary distances. The overall structure shows a large clade of *Ilybius* species, with other genera like *Platambus* and *Agabus* as sister groups or within larger clades. The support values are generally high, with many nodes having 'XX-' or 'XXX-' support, suggesting a well-resolved tree. The tree is a cladogram, with branches of varying lengths representing evolutionary distances. The overall structure shows a large clade of *Ilybius* species, with other genera like *Platambus* and *Agabus* as sister groups or within larger clades. The support values are generally high, with many nodes having 'XX-' or 'XXX-' support, suggesting a well-resolved tree.

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Phylogenetic tree showing relationships between various species, primarily from the genus *Copelatus* and related genera like *Agaporomorphus*, *Aglymbus*, and *Lacconectus*. The tree is rooted on the left and branches out to the right. Species names are listed on the right side of the tree, often followed by their NCBI accession numbers. The tree is annotated with 'X' marks at various nodes, indicating specific characteristics or relationships. The species names include:

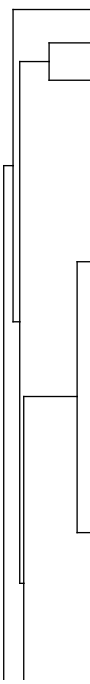
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- Lioperus* (e.g., *Lioperus atriceps*, *Lioperus aruensis*)
- Madaglymbus* (e.g., *Madaglymbus MTM2009*, *Madaglymbus MTM2009\_1*, *Madaglymbus MTM2009\_2*, *Madaglymbus MTM2009\_3*, *Madaglymbus MTM2009\_4*, *Madaglymbus MTM2009\_5*, *Madaglymbus MTM2009\_6*, *Madaglymbus MTM2009\_7*, *Madaglymbus MTM2009\_8*, *Madaglymbus MTM2009\_9*, *Madaglymbus MTM2009\_10*, *Madaglymbus MTM2009\_11*, *Madaglymbus MTM2009\_12*)
- Agaporomorphus* (e.g., *Agaporomorphus silvaticus*, *Agaporomorphus tambopatensis*, *Agaporomorphus knischi*)
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- Lacconectus* (e.g., *Lacconectus ER9*, *Lacconectus sabahensis*, *Lacconectus 693509*, *Lacconectus regimbarti*, *Lacconectus andrewesi*, *Lacconectus MB043*, *Lacconectus krikkeni*, *Lacconectus JH2010*, *Lacconectus atlas*, *Lacconectus peguensis*)
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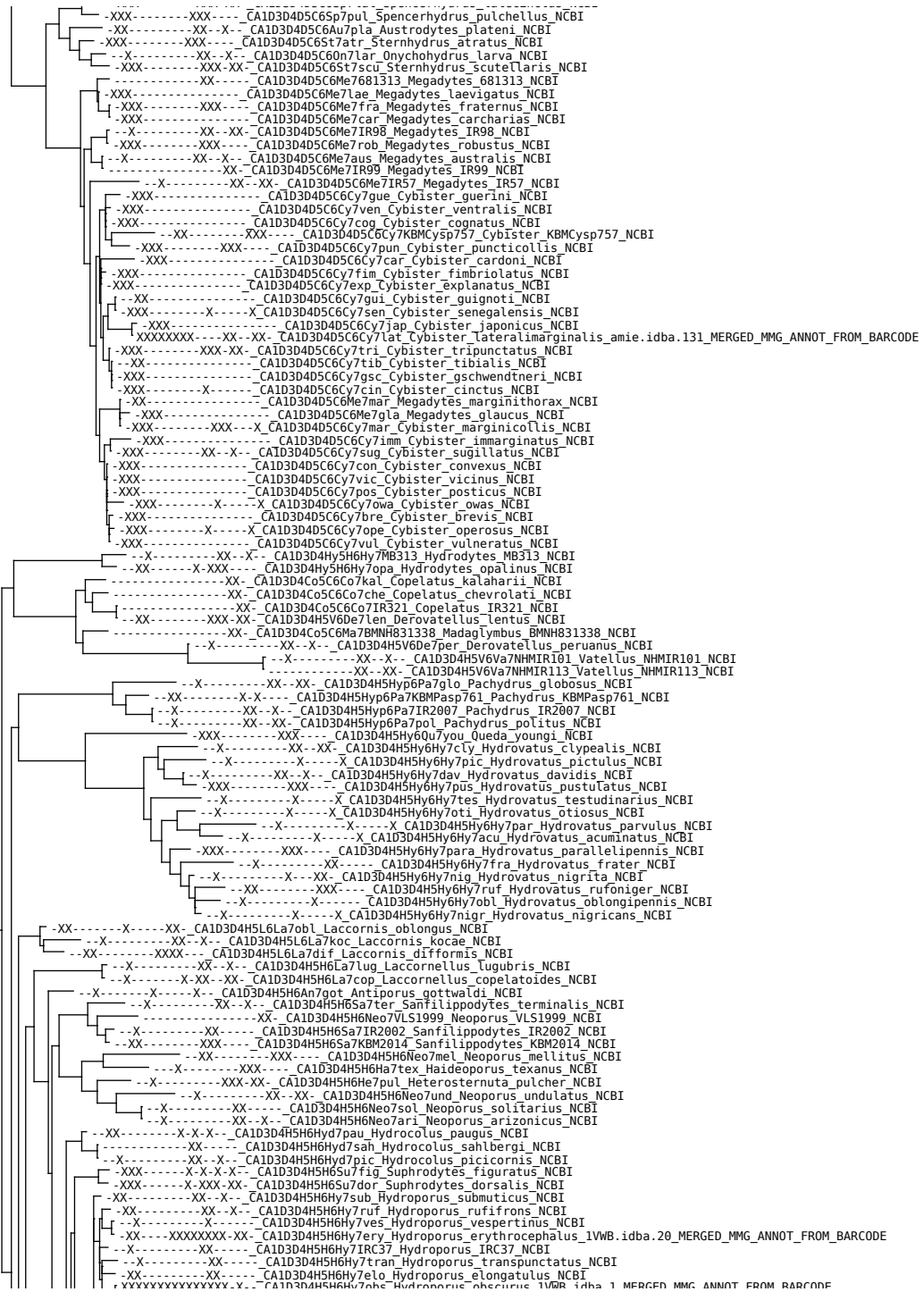
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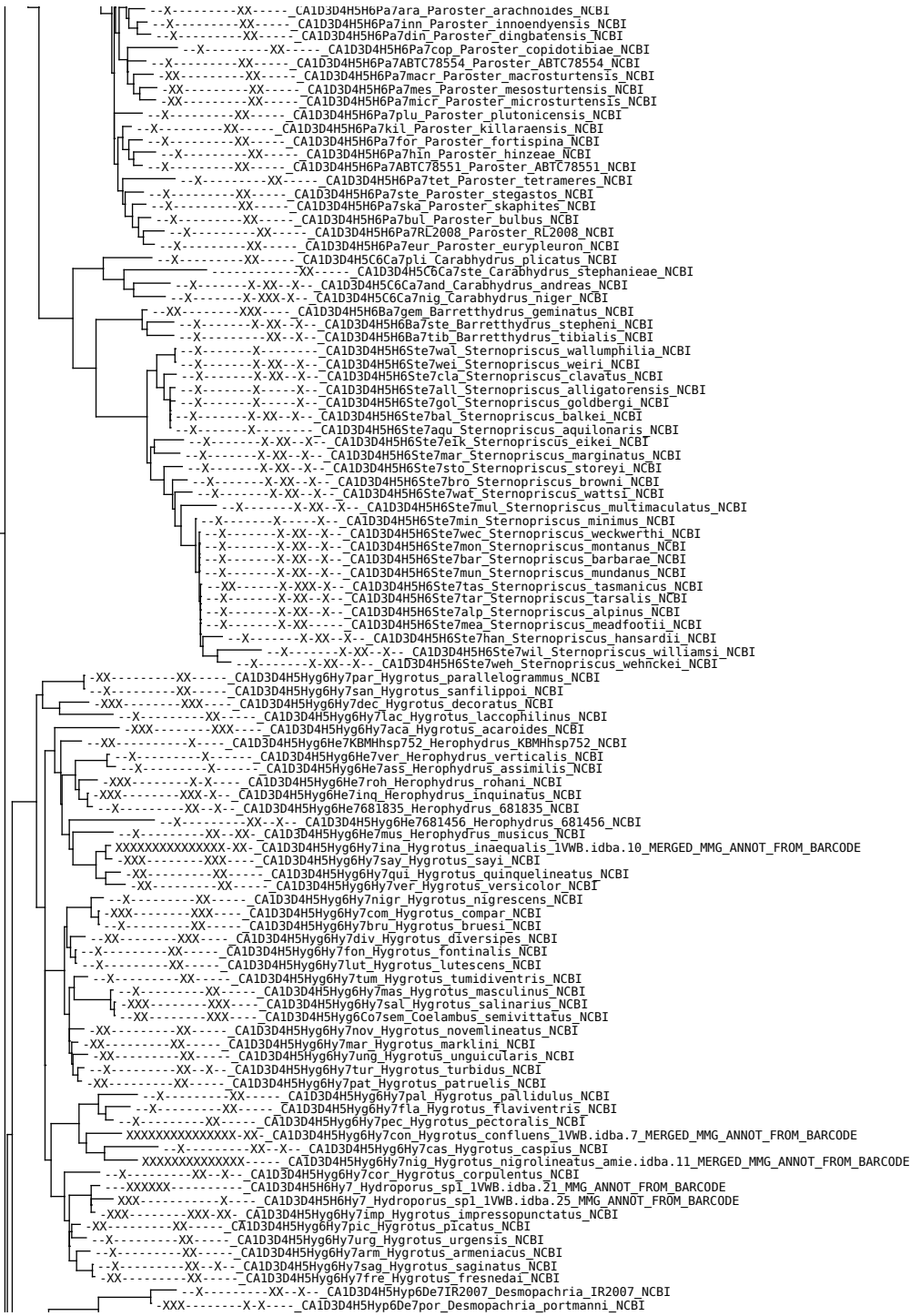
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CA1D3D4H5H6Rh7bim\_Rhithrodytes\_bimaculatus\_NCB1



Phylogenetic tree showing relationships between various species, with bootstrap values indicated by 'X' marks. The tree is rooted on the left and branches out to the right. The species names are listed on the right side of the tree, often followed by their NCBI accession numbers. The bootstrap values are represented by 'X' marks at the nodes of the tree.

Species names include:

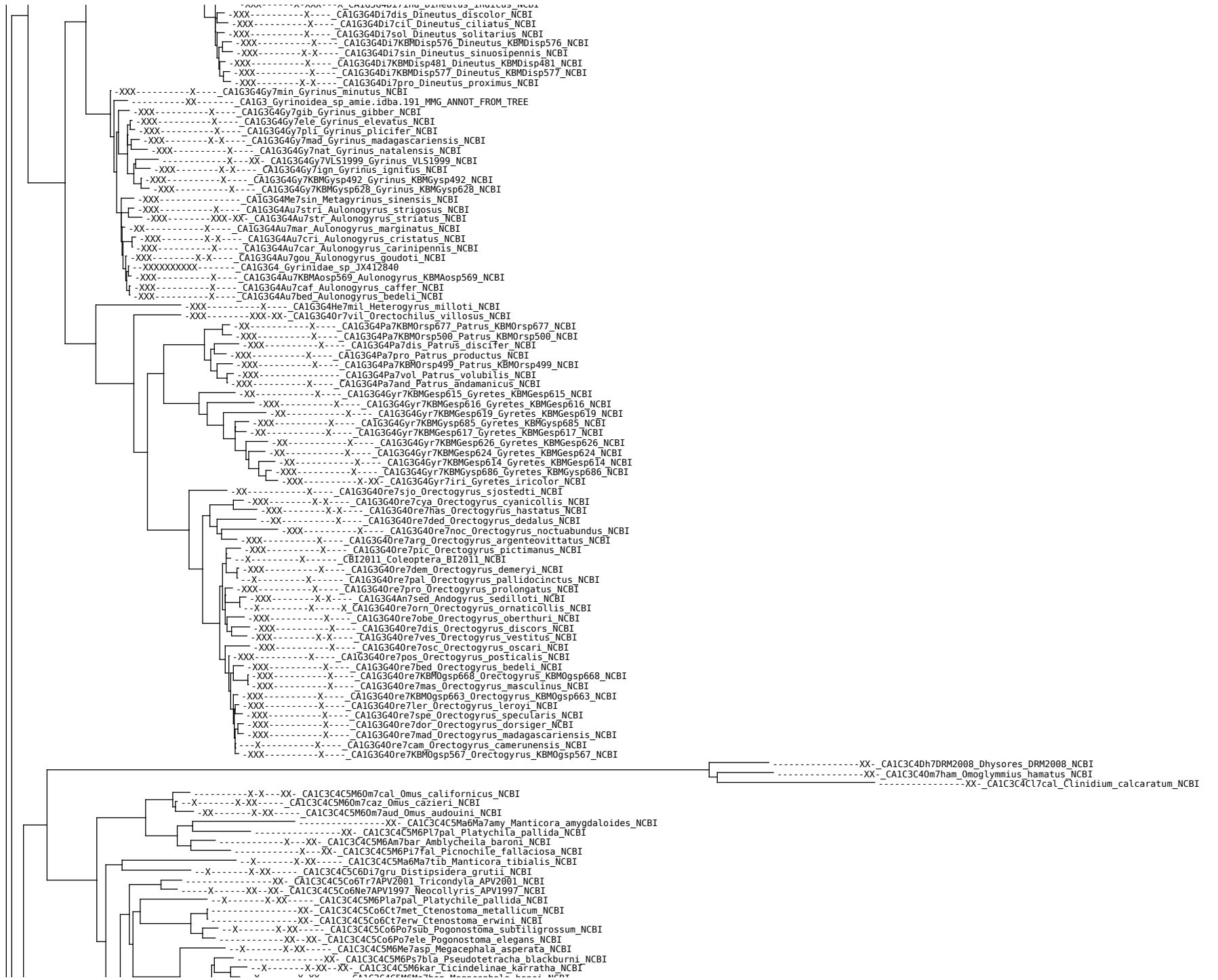
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- Stictonectes vicinus* NCBI
- Stictonectes lepidus* NCBI
- Stictonectes escheri* NCBI
- Stictonectes PA313* NCBI
- Stictonectes PA312* NCBI
- Stictonectes rufulus* NCBI
- Stictonectes samai* NCBI
- Stictonectes canariensis* NCBI
- Stictonectes optatus* NCBI
- Stictonectes azruensis* NCBI
- Stictonectes epipleuricus* NCBI
- Stictonectes MNCNAH72* NCBI
- Stictonectes occidentalis* NCBI
- Metaporus naturaconservatus* NCBI
- Metaporus meridionalis* NCBI
- Porphydrus KBMPosp754* NCBI
- Graptodytes flavipes* NCBI
- Graptodytes veteri* NCBI
- Graptodytes bilineatus* NCBI
- Graptodytes sedilloti* NCBI
- Graptodytes granularis* NCBI
- Graptodytes pictus* NCBI
- Graptodytes aequalis* NCBI
- Graptodytes castilianus* NCBI
- Graptodytes siculus* NCBI
- Graptodytes pietrii* NCBI
- Graptodytes atlantis* NCBI
- Graptodytes eremitus* NCBI
- Graptodytes delectus* NCBI
- Graptodytes kuchtai* NCBI
- Graptodytes varius* NCBI
- Graptodytes fractus* NCBI
- Graptodytes ignotus* NCBI
- Sekaliporus kriegi* NCBI
- Tiporus tambreyi* NCBI
- Tiporus centralis* NCBI
- Tiporus josepheni* NCBI
- Tiporus lachlani* NCBI
- Tiporus undecimmaculatus* NCBI
- Antiporus jenniferae* NCBI
- Antiporus collaris* NCBI
- Antiporus hollingsworthi* NCBI
- Antiporus wilsoni* NCBI
- Antiporus bakewellii* NCBI
- Antiporus blakeii* NCBI
- Antiporus femoralis* NCBI
- Antiporus MB1421* NCBI
- Antiporus interrogatioris* NCBI
- Antiporus strigosulus* NCBI
- Antiporus gilbertii* NCBI
- Chostonectes johnsoni* NCBI
- Chostonectes nebulosus* NCBI
- Chostonectes sharpi* NCBI
- Chostonectes gigas* NCBI
- Megaporus wilsoni* NCBI
- Megaporus natvigi* NCBI
- Megaporus rufipes* NCBI
- Megaporus ruficeps* NCBI
- Megaporus solidus* NCBI
- Megaporus howittii* NCBI
- Megaporus gardneri* NCBI
- Megaporus hamatus* NCBI
- Necterosoma susanna* NCBI
- Necterosoma regulare* NCBI
- Necterosoma penicillatum* NCBI
- Necterosoma dispar* NCBI
- Necterosoma undecimlineatum* NCBI
- Necterosoma darwini* NCBI
- Necterosoma aphroditae* NCBI
- Necterosoma schmetzi* NCBI
- Paroster couagesi* NCBI
- Paroster michaelsoni* NCBI
- Paroster nigroadumbratus* NCBI
- Paroster melroseensis* NCBI
- Paroster darlotensis* NCBI
- Paroster RL2008\_1* NCBI
- Paroster insculptilis* NCBI
- Paroster niger* NCBI
- Paroster pallescens* NCBI
- Paroster baylyi* NCBI
- Paroster peeleni* NCBI
- Paroster pentameris* NCBI
- Paroster gibbi* NCBI
- Paroster napperbyensis* NCBI
- Paroster macrocephalus* NCBI
- Paroster newhavenensis* NCBI
- Paroster wedgensis* NCBI
- Paroster megamacrocephalus* NCBI
- Paroster spnMtWedge* NCBI
- Paroster Newhaven* NCBI
- Paroster RL2008\_2* NCBI
- Paroster verrucosus* NCBI
- Paroster milgunensis* NCBI
- Paroster hamoni* NCBI
- Paroster extraordinarius* NCBI
- Paroster byroensis* NCBI



Phylogenetic tree showing relationships between various species, primarily from the order Deronectidae. The tree is rooted on the left and branches out to the right. Each terminal node is labeled with a taxon name and a NCBI accession number. The labels are preceded by a series of dashes and 'X's, likely representing support values or specific markers. The taxa are organized into several major clades, including: *Desmopachria*, *Hovahydrus*, *Hyphydrus*, *Canthyporus*, *Deronectes*, *Boreonectes*, *Oreodytes*, and *Stictotarsus*. The tree shows a high degree of branching, indicating a large number of species within these groups. The labels are truncated on the right side of the image.







Phylogenetic tree showing relationships among various species, primarily from the order Siphonophora. The tree is rooted on the left and branches out to the right. Each terminal node is labeled with a taxon name and a source code (e.g., NCBI). The labels include accession numbers (e.g., CA13C4C5M6Me7bos) and species names (e.g., Megacephala bostockii, Pseudotetracha mendacia, etc.). The tree shows a complex branching pattern, with many species having bootstrap support values indicated by 'X' or 'XX' at the nodes. The species names are often followed by 'NCBI'.

Species listed include:

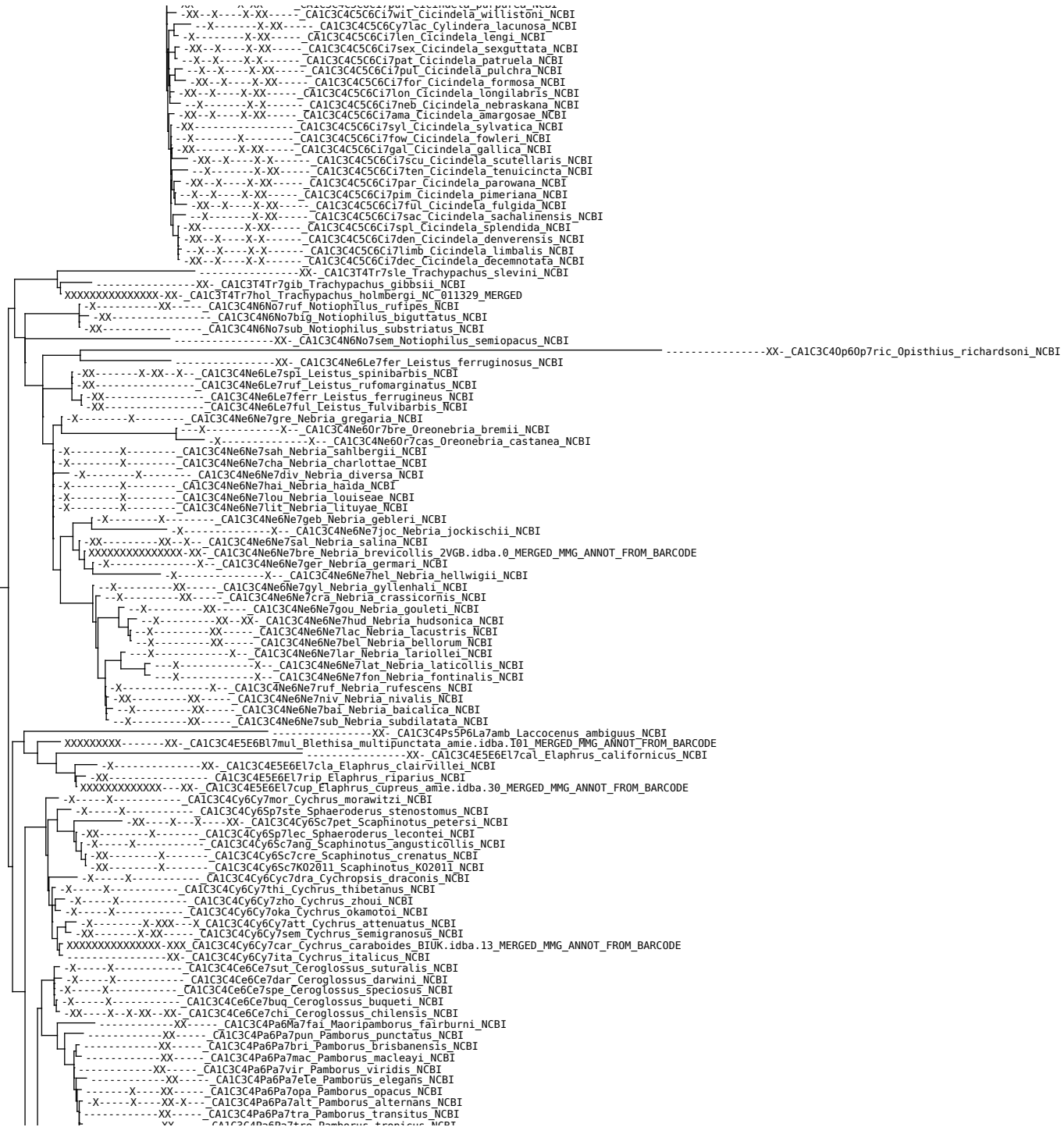
- Megacephala bostockii
- Pseudotetracha mendacia
- Megacephala hirtiventris
- Aniara sepulchralis
- Phaeoxantha klugi
- Phaeoxantha aequinoctialis
- Metriocheila nigricollis
- Tetracha virginica
- Cheiloxya APV2001
- Oxycheila nigroaenea
- Pseudoxycheila bipustulata
- Pseudoxycheila nitidicollis
- Pseudoxycheila chaudiroi
- Pseudoxycheila atahualpa
- Eucallia boussingaultii
- Therates APV2001
- Pentacomia rugipennis
- Odontocheila cayennensis
- Odontocheila vermiculata
- Cenothyra consobrina
- Odontocheila confusa
- Caledonia BMNH703844
- Cheilonycha auripennis
- Oxygonia gloriola
- Cicindela birramosa
- Hypaetha birramosa
- Pometon singularis
- Peridexia fulvipes
- Physodeutera alluaudi
- Physodeutera fairmairei
- Antennaria BMNH703685
- Habroscelamorpha schwarzi
- Microthylax sinaloae
- Microthylax dugeti
- Microthylax schrammeli
- Cylindera paradoxa
- Cicindela belfragei
- Oplidia leuconoe
- Oplidia macrocnema
- Lophyra multiguttata
- Cicindela regalis
- Cicindela caligramma
- Cicindela angulicollis
- Cicindela princeps
- Cicindela aurofasciata
- Cicindela APV2001
- Cicindela saetigera
- Jansenia westermanni
- Dromica furcata
- Waltherhornia speculifera
- Microthylax bradti
- Eurymorpha cyanipes
- Hypaetha pseudorafflesia
- Cicindela laetescripta
- Cylindera unipunctata
- Lophyra tetradia
- Cicindela trifasciata
- Cicindela antatsima
- Lophyra catena
- Lophyra striatifrons
- Lophyra boreodilatata
- Lophyra cancellata
- Lophyra flexuosa
- Lophyra abbreviata
- Lophyra saraliensis
- Cicindela mimula
- Cicindela clarki
- Cicindela soalalae
- Antennaria crassicornis
- Zecicindela feredayi
- Zecicindela hamiltoni
- Zecicindela austromontana
- Zecicindela helmsi
- Zecicindelinae JP2010
- Zecicindela giveni
- Zecicindela brevilunata
- Zecicindela perhispidata
- Zecicindela campbelli
- Cicindela JP15a
- Cicindela JP42
- Cicindela JP12a
- Cicindela JP117
- Cicindela JP114
- Cicindela JP94b
- Cicindela JP76
- Cicindela JP76
- Cicindela JP121
- Cicindela JP120
- Cicindela JP4
- Cicindela JP5
- Cicindela JP48
- Cicindela JP39
- Cicindela JP19
- Cicindela JP6
- Cicindela JP10
- Cicindela JP14b
- Cicindela JP9
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- Cicindela JP115

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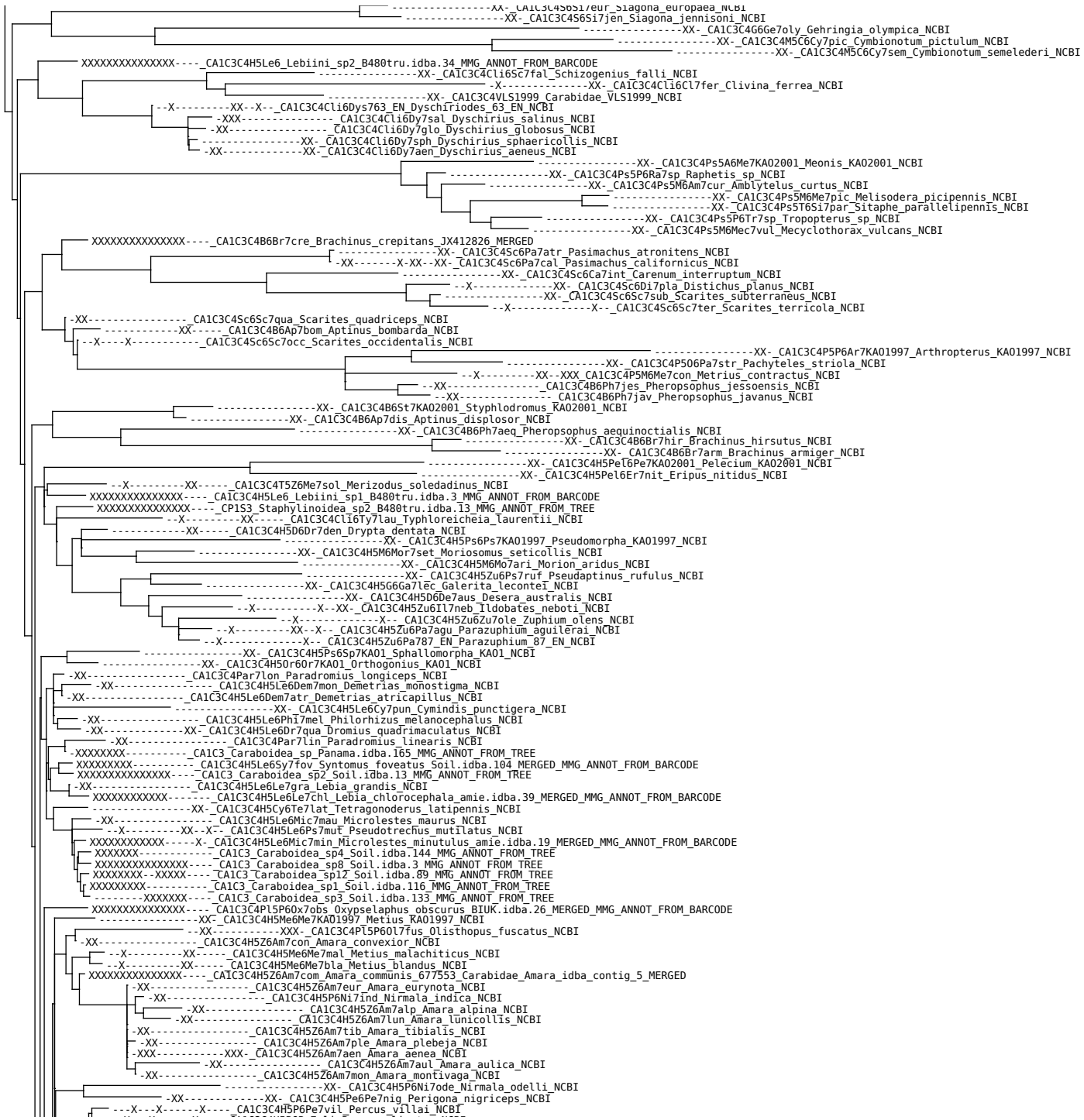
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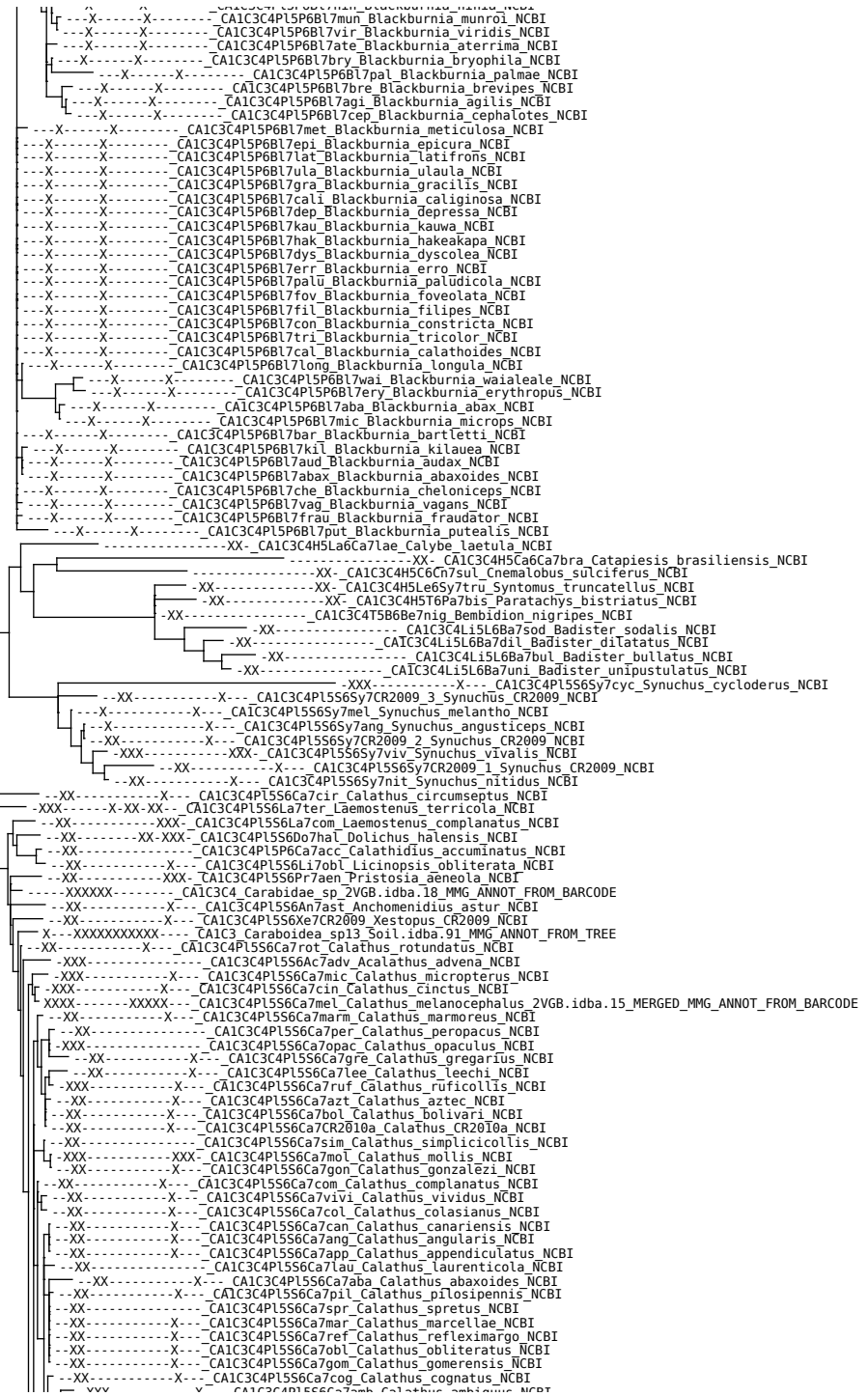
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-XX-XX- CA1C3C4T5T6T7r7gla Trechus\_glacialis\_NCBI  
-XX-XX- CA1C3C4T5T6T7r7ham Trechus\_hampeii\_NCBI  
-X-X-XX- CA1C3C4T5T6T7r7bre Trechus\_brembanus\_NCBI  
-XX-XX- CA1C3C4T5T6T7r7lon Trechus\_longobardus\_NCBI  
-X-X- CA1C3C4T5T6T7r7scha Trechus\_schaumii\_NCBI  
-X-X- CA1C3C4T5T6T7r7int Trechus\_intrusus\_NCBI  
-X-X- CA1C3C4T5T6T7r7pyg Trechus\_pygmaeus\_NCBI  
-X-XX- CA1C3C4T5T6T7r7hil Neotrechus\_hilfi\_NCBI  
-XX-XX- CA1C3C4T5T6T7r7su Neotrechus\_suturalis\_NCBI  
-X-XX- CA1C3C4T5T6T7r7mav Spotrechus\_mavetii\_NCBI  
-X-XX- CA1C3C4T5T6A7AF2013 Adriaephaenops\_AF2013\_NCBI  
-X-XX- CA1C3C4T5T6A7bol Allegrettia\_boldorii\_NCBI  
-X-XX- CA1C3C4T5T6I7dim Italaphaenops\_dimaii\_NCBI  
-X-XX- CA1C3C4T5T6A7pav Allegrettia\_pavani\_NCBI  
-X-XX- CA1C3C4T5T6Le7AF2013 Lessinodytes\_AF2013\_NCBI  
-XX-XX- CA1C3C4T5T6Bo7car Boldoriella\_carminatii\_NCBI  
-XX-XX- CA1C3C4T5T6Bo7foc Boldoriella\_focarilei\_NCBI  
-XX-XX- CA1C3C4T5T6Bo7hum Boldoriella\_humeralis\_NCBI  
-XX-XX- CA1C3C4T5T6Bo7mon Boldoriella\_monguzzi NCBI  
-XX-XX- CA1C3C4T5T60r7vic Orotrechus\_vicentinus\_NCBI  
-XX-XX- CA1C3C4T5T60r7gio Orotrechus\_giordani NCBI  
-XX-XX- CA1C3C4T5T60r7mon Orotrechus\_montellensis\_NCBI  
-XX-XX- CA1C3C4T5T60r7jam Orotrechus\_jamae NCBI  
-XX-XX- CA1C3C4T5T60r7mes Orotrechus\_messai NCBI  
-XX-XX- CA1C3C4T5T60r7car Orotrechus\_carinthiacus\_NCBI  
-XX-XX- CA1C3C4T5T60r7har Orotrechus\_haraldi NCBI  
-XX-XX- CA1C3C4T5T60r7mue Orotrechus\_muellerianus\_NCBI  
-XX-XX- CA1C3C4T5T60r7spr Orotrechus\_springeri NCBI  
-XX-XX- CA1C3C4T5T60r7glo Orotrechus\_globulipennis\_NCBI  
-XX-XX- CA1C3C4T5T60r7hol Orotrechus\_holdhausi NCBI  
-XX-XX- CA1C3C4T5T60r7tor Orotrechus\_torretassoi NCBI  
-XX-XX- CA1C3C4T5T60r7for Orotrechus\_forotulensis\_NCBI  
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-XX-XX- CA1C3C4T5T6T7aur Trechus\_auroxi NCBI  
-XX-XX- CA1C3C4T5T6T7kah Trechus\_kahleri NCBI  
-XX-XX- CA1C3C4T5T6T7schw Trechus\_schwienbacheri NCBI  
-XX-XX- CA1C3C4T5T6T7AF2013\_1 Trechus\_AF2013\_NCBI  
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-XX-XX- CA1C3C4T5T6T7car Trechus\_cardioiderus\_NCBI  
-XX-XX- CA1C3C4T5T6T7fai Trechus\_fairmairei NCBI  
-XX-XX- CA1C3C4T5T6T7AF2013\_3 Trechus\_AF2013\_NCBI  
-XX-XX- CA1C3C4T5T6T7AF2013\_2 Trechus\_AF2013\_NCBI  
-XX-XX- CA1C3C4T5T6T7poc Trechus\_pochoni NCBI  
-XX-XX- CA1C3C4T5T6T7esc Trechus\_escalerae NCBI  
-XX-XX- CA1C3C4T5T6T7lep Trechus\_lepontinus NCBI  
-XX-XX- CA1C3C4T5T6T7lig Trechus\_liguricus NCBI  
-XX-XX- CA1C3C4T5T6T7gra Trechus\_gracilitarsis\_NCBI  
-XX-XX- CA1C3C4T5T6T7delh Trechus\_delhermi NCBI  
-XX-XX- CA1C3C4T5T6Je7bir Jeanneilius\_birsteini NCBI  
-XX-XX- CA1C3C4T5T6Je7glo Jeanneilius\_gloriosus\_NCBI  
-XX-XX- CA1C3C4T5T6T7sen Trechus\_sendraii NCBI  
-XX-XX- CA1C3C4T5T6T7lae Trechus\_lallemantii NCBI  
-XX-XX- CA1C3C4T5T6T7zor Trechus\_zoerensis NCBI  
-XX-XX- CA1C3C4T5T6T7ibl Trechus\_iblanensis NCBI  
-XX-XX- CA1C3C4T5T6T7len Trechus\_lencinai NCBI  
-XX-XX- CA1C3C4T5T6T7mar Trechus\_martinezi NCBI  
-XX-XX- CA1C3C4T5T6T7ali Trechus\_alicantinus\_NCBI  
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-XX-XX- CA1C3C4T5T6T7abe Trechus\_abeillei NCBI  
-XX-XX- CA1C3C4T5T6Apo7ans Apoduvalius\_ansiiformis\_NCBI  
-XX-XX- CA1C3C4T5T6T7kar Trechus\_karadenizus NCBI  
-XX-XX- CA1C3C4T5T6T7nav Trechus\_navaricus NCBI  
-XX-XX- CA1C3C4T5T6T7bor Trechus\_bordei NCBI  
-XX-XX- CA1C3C4T5T6T7arr Trechus\_arribasi NCBI  
-XX-XX- CA1C3C4T5T6T7bon Trechus\_bonvouloiri NCBI  
-XX-XX- CA1C3C4T5T6T7dist Trechus\_distinctus\_NCBI  
-XX-XX- CA1C3C4T5T6T7aub Trechus\_aubryi NCBI  
-XX-XX- CA1C3C4T5T6T7sax Trechus\_saxicola NCBI  
-XX-XX- CA1C3C4T5T6T7AF2012 Trechus\_AF2012\_NCBI  
-XX-XX- CA1C3C4T5T6T7gre Trechus\_grenieri NCBI  
-XX-XX- CA1C3C4T5T6Apo7AF106 Apoduvalius\_AF106\_NCBI  
-XX-XX- CA1C3C4T5T6T7jea Trechus\_jeannei NCBI  
-XX-XX- CA1C3C4T5T6T7uha Trechus\_uhagoni NCBI  
-XX-XX- CA1C3C4T5T6T7bru Trechus\_bruckii NCBI  
-XX-XX- CA1C3C4T5T6T7pie Trechus\_pieltaini NCBI  
-XX-XX- CA1C3C4T5T6T7beu Trechus\_beusti NCBI



Phylogenetic tree showing relationships between various species, with taxonomic names and accession numbers listed on the right. The tree is rooted on the left and branches out to the right. Species names are often followed by their source or database, such as NCBI, iDBA, or MERGED MMG ANNOT FROM BARCODE. Some entries include accession numbers like CP153540x5P17mit, CP153540x5P17pat, etc. The tree shows a complex branching pattern, with many species having multiple accessions or being grouped together in clades. The names are mostly in the format CA1C3C4H5P6Pe7... followed by the species name and source. Some species names are in italics, indicating they are validly published. The tree is a cladogram, with branches representing evolutionary relationships. The root is on the left, and the tips of the branches represent the species being analyzed. The tree is quite dense, with many closely related species. The names are listed in a specific order, likely corresponding to the order of the tips in the tree. The tree is a black and white line drawing, with lines representing the branches and dots representing the nodes. The text is in a monospaced font, likely a terminal font. The tree is a cladogram, with branches representing evolutionary relationships. The root is on the left, and the tips of the branches represent the species being analyzed. The names are mostly in the format CA1C3C4H5P6Pe7... followed by the species name and source. Some species names are in italics, indicating they are validly published. The tree shows a complex branching pattern, with many species having multiple accessions or being grouped together in clades. The names are listed in a specific order, likely corresponding to the order of the tips in the tree. The tree is a black and white line drawing, with lines representing the branches and dots representing the nodes. The text is in a monospaced font, likely a terminal font.

-XX-----CA1C3C4H5P6Pt7ver\_Pterostichus\_venalis\_NCB1  
-XX-----CA1C3C4H5P6Pt7L02012\_1\_Pterostichus\_L02012\_NCB1  
-XX-----CA1C3C4H5P6Pt7min\_Pterostichus\_minor\_NCB1  
-XXX-----CA1C3C4H5P6Pt7luc\_Pterostichus\_luctuosus\_NCB1  
-XX-----CA1C3C4H5P6Pt7nigr\_Pterostichus\_nigrita\_NCB1  
-XX-----CA1C3C4H5P6Pt7rha\_Pterostichus\_rhaeticus\_NCB1  
-XX-----CA1C3C4H5P6Pt7sex\_Cyclotrachelus\_seximpressus\_NCB1  
-XX-----CA1C3C4H5P6Pt7p1l\_Pterostichus\_pilifer\_NCB1  
-XX-----CA1C3C4H5P6Pt7com\_Pterostichus\_cometes\_NCB1  
-XX-----CA1C3C4H5P6Pt7ango\_Pterostichus\_angoarnigi\_NCB1  
-XX-----CA1C3C4H5P6Pt7gon\_Eutrichopus\_gonzalezi\_NCB1  
-XX-----CA1C3C4H5P6Pt7pseudo\_Pterostichus\_pseudoharmandi\_NCB1  
-XX-----CA1C3C4H5P6Pt7jan\_Pterostichus\_janbritoi\_NCB1  
-XX-----CA1C3C4H5P6Pt7L02012\_5\_Pterostichus\_L02012\_NCB1  
-XX-----CA1C3C4H5P6Pt7L02012\_Pterostichus\_L02012\_NCB1  
-XX-----CA1C3C4H5P6Pt7bal\_Pterostichus\_balachowskyi\_NCB1  
-XX-----CA1C3C4H5P6Pt7ganj\_Pterostichus\_ganja\_NCB1  
-XX-----CA1C3C4H5P6Pt7fri\_Pterostichus\_fritzheikei\_NCB1  
-XX-----CA1C3C4H5P6Pt7ger\_Pterostichus\_gerdi\_NCB1  
-XX-----CA1C3C4H5P6Pt7L02012\_6\_Pterostichus\_L02012\_NCB1  
-XX-----CA1C3C4H5P6Pt7mats\_Pterostichus\_matsumurai\_NCB1  
-XX-----CA1C3C4H5P6Pt7cona\_Pterostichus\_conaensis\_NCB1  
-XX-----CA1C3C4H5P6Pt7gan\_Pterostichus\_ganesh\_NCB1  
-XX-----CA1C3C4H5P6Pt7nep\_Pterostichus\_nepalensis\_NCB1  
-XX-----CA1C3C4H5P6Pt7mm\_Pterostichus\_immarginatus\_NCB1  
-XX-----CA1C3C4H5P6Pt7chus\_Pterostichus\_chainapani\_NCB1  
-XX-----CA1C3C4H5P6Pt7jug\_Pterostichus\_juga\_NCB1  
-XX-----CA1C3C4H5P6Pt7ola\_Pterostichus\_olafi\_NCB1  
-XX-----CA1C3C4H5P6Pt7tul\_Pterostichus\_tulobalu\_NCB1  
-XX-----CA1C3C4H5P6Pt7gom\_Pterostichus\_gompanus\_NCB1  
-XX-----CA1C3C4H5P6Pt7let\_Pterostichus\_letensis\_NCB1  
-XX-----CA1C3C4H5P6Pt7har\_Pterostichus\_hartmanni\_NCB1  
-XX-----CA1C3C4H5P6Pt7dho\_Pterostichus\_dhorpatanicus\_NCB1  
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-XX-----CA1C3C4H5P6Pt7gaq\_Pterostichus\_gaggates\_NCB1  
-XX-----CA1C3C4H5P6Pt7kle\_Pterostichus\_kleinfeldi\_NCB1  
-XX-----CA1C3C4H5P6Pt7deu\_Pterostichus\_deuvei\_NCB1  
-XX-----CA1C3C4H5P6Pt7nige\_Pterostichus\_niger\_NCB1  
-XX-----CA1C3C4H5P6Pt7trin\_Pterostichus\_trinitensis\_NCB1  
-XX-----CA1C3C4H5P6Pt7feny\_Pterostichus\_fenyesi\_NCB1  
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-X-X-----CA1C3C4H5P6Pt7ate\_Scarites\_aterimus\_NCB1  
-XX-----CA1C3C4H5P6Pt7mor\_Pterostichus\_morionides\_NCB1  
-X-----CA1C3C4H5P6Pt7ado\_Pterostichus\_adoxus\_NCB1  
-XXX-----CA1C3C4H5P6Pt7tri\_Pterostichus\_trinitensis\_NCB1  
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-XX-----CA1C3C4H5P6Pt7lam\_Pterostichus\_lama\_NCB1  
-XX-----CA1C3C4H5P6Pt7ser\_Pterostichus\_serripes\_NCB1  
-XX-----CA1C3C4H5P6Pt7men\_Pterostichus\_menestriesii\_NCB1  
-XX-----CA1C3C4H5P6Pt7alg\_Pterostichus\_algidus\_NCB1  
-XX-----CA1C3C4H5P6Pt7fas\_Pterostichus\_fasciatopunctatus\_NCB1  
-XX-----CA1C3C4H5P6Pt7glo\_Pterostichus\_globosus\_NCB1  
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-X-----CA1C3C4H5P6Pt7ple\_Pterostichus\_plesiomorphus\_NCB1  
-X-----CA1C3C4H5P6Pt7shi\_Pterostichus\_shibanus\_NCB1  
-X-----CA1C3C4H5P6Pt7scu\_Pterostichus\_scurra\_NCB1  
-X-----CA1C3C4H5P6Pt7rap\_Pterostichus\_raptor\_NCB1  
-X-----CA1C3C4H5P6Pt7pseud\_Pterostichus\_pseudopachinus\_NCB1  
-XX-----CA1C3C4H5P6Pt7cav\_Pterostichus\_cavazzutii\_NCB1  
-X-----CA1C3C4H5P6Pt7spho\_Pterostichus\_sphodriiformis\_NCB1  
-X-----CA1C3C4H5P6Pt7mas\_Pterostichus\_masidai\_NCB1  
-X-----CA1C3C4H5P6Pt7kyu\_Pterostichus\_kyushuensis\_NCB1  
-X-----CA1C3C4H5P6Pt7macro\_Pterostichus\_macrocephalus\_NCB1  
-X-----CA1C3C4H5P6Pt7yak\_Pterostichus\_yakushimanus\_NCB1  
-X-----CA1C3C4H5P6Pt7muc\_Pterostichus\_mucronatus\_NCB1  
-X-----CA1C3C4H5P6Pt7abac\_Pterostichus\_abaciformis\_NCB1  
-X-----CA1C3C4H5P6Pt7sin\_Pterostichus\_sincerus\_NCB1  
-X-----CA1C3C4H5P6Pt7prae\_Pterostichus\_praedo\_NCB1  
-X-----CA1C3C4H5P6Pt7macr\_Pterostichus\_macrogenys\_NCB1  
-X-----CA1C3C4H5P6Pt7koh\_Pterostichus\_koheii\_NCB1  
-X-----CA1C3C4H5P6Pt7seu\_Pterostichus\_seunglaki\_NCB1  
-X-----CA1C3C4H5P6Pt7micr\_Pterostichus\_microps\_NCB1  
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-X-----CA1C3C4H5P6Pt7spic\_Pterostichus\_spiculifer\_NCB1  
-X-----CA1C3C4H5P6Pt7dan\_Pterostichus\_dandonis\_NCB1  
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-X-----CA1C3C4H5P6Pt7bie\_Pterostichus\_biexcisus\_NCB1  
-X-----CA1C3C4H5P6Pt7fuj1\_Pterostichus\_fujimurai\_NCB1  
-X-----CA1C3C4H5P6Pt7shib\_Pterostichus\_shibatai\_NCB1  
-X-----CA1C3C4H5P6Pt7tao\_Pterostichus\_taoi\_NCB1  
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-X-----CA1C3C4H5P6Pt7dai\_Pterostichus\_daisenicus\_NCB1  
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-X-----CA1C3C4H5H6Br7sha\_Bradycellus\_sharpi\_NCB1

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-XX-----XX-CA1C3C4H5H6St7lec\_Stenolophus\_lecontei NCBI  
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-XX-----XX-CA1C3C4H5H6Ha7rub\_Harpalus\_rubripes NCBI  
-XX-----XX-CA1C3C4H5H6Ha7ruf\_Harpalus\_rufipalpis NCBI  
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-XX-----XX-CA1C3C4H5H6Op7lat\_Ophonus\_laticollis NCBI  
-XX-----XX-CA1C3C4H5H6Dix7sph\_Dixus\_sphaerocephalus NCBI  
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-XXX-----CA1C3C4H5H6Cry7ten\_Cryptophonus\_tenebrosus amie.idba.193\_MERGED\_MMG\_ANNOT\_FROM\_BARCODE  
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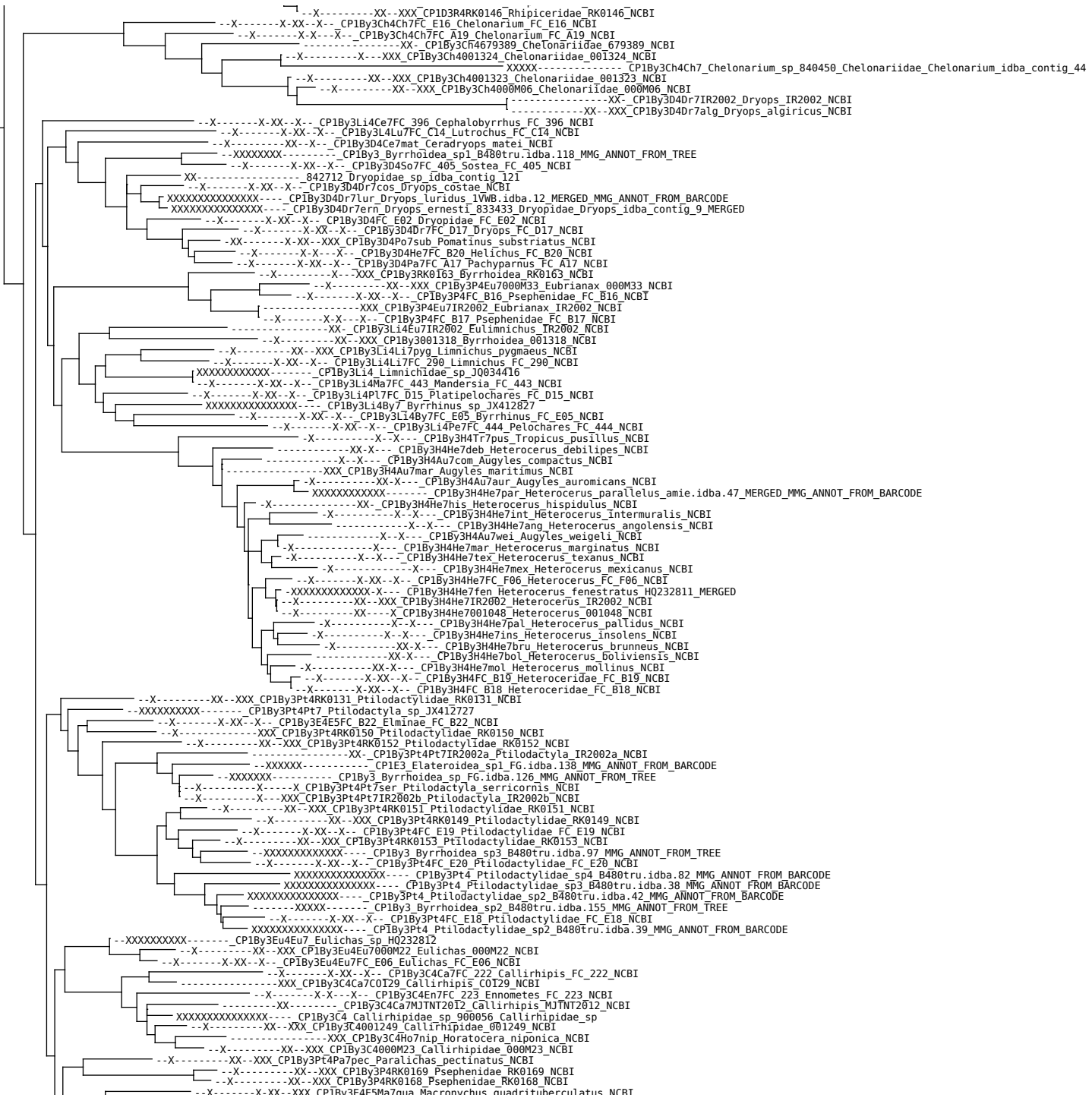


Phylogenetic tree showing relationships between various species, primarily in the Scirtidae and Pseudomicrocra genera. The tree is rooted on the left and branches out to the right. Species names are listed on the right side of the tree, often followed by their NCBI accession numbers. The tree is annotated with 'X' and 'XX' characters, likely indicating specific characteristics or data points for each species. The species names include:

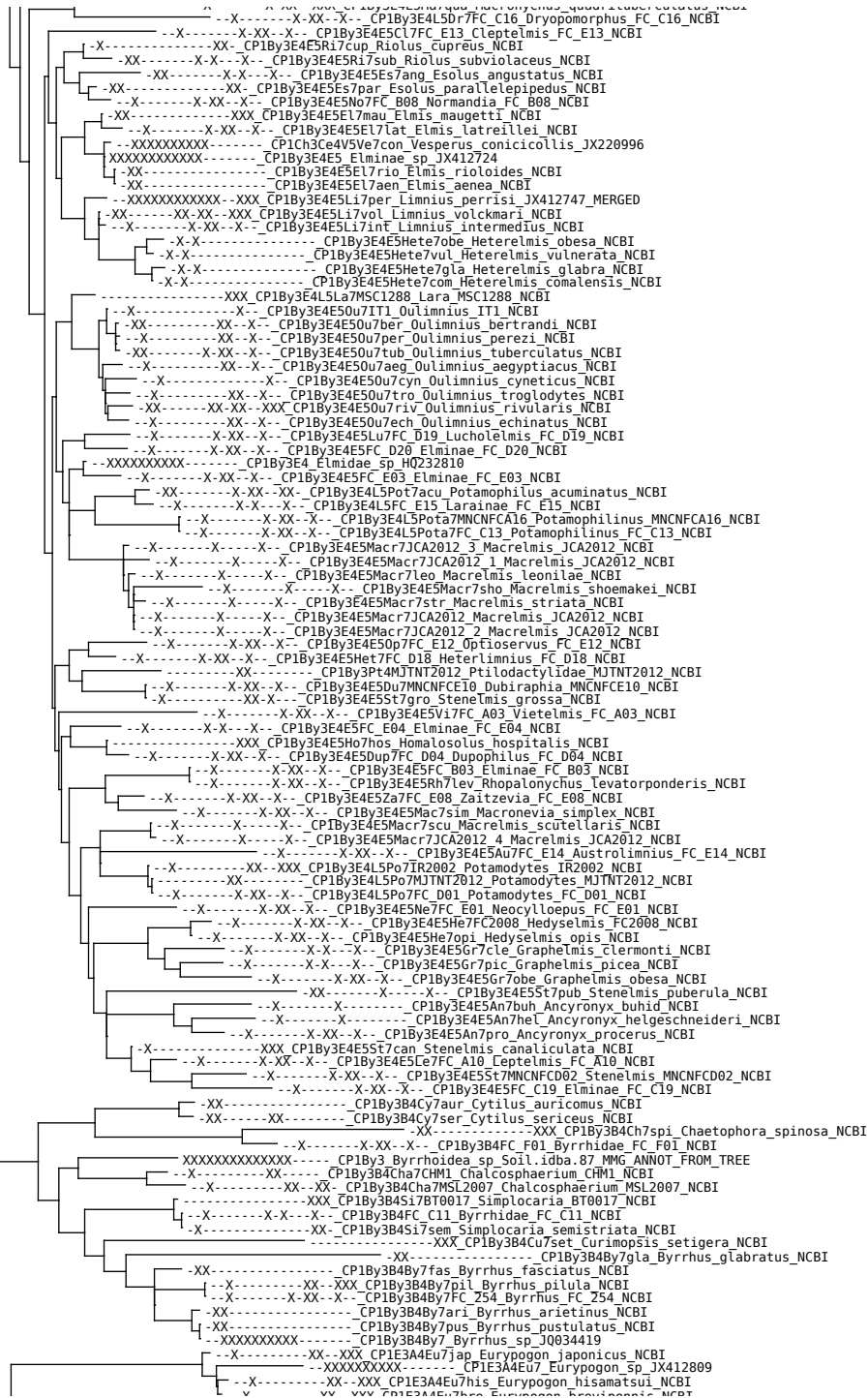
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- CP1Sci354Pr7sex Prionocyphon sexmaculatus NCBI
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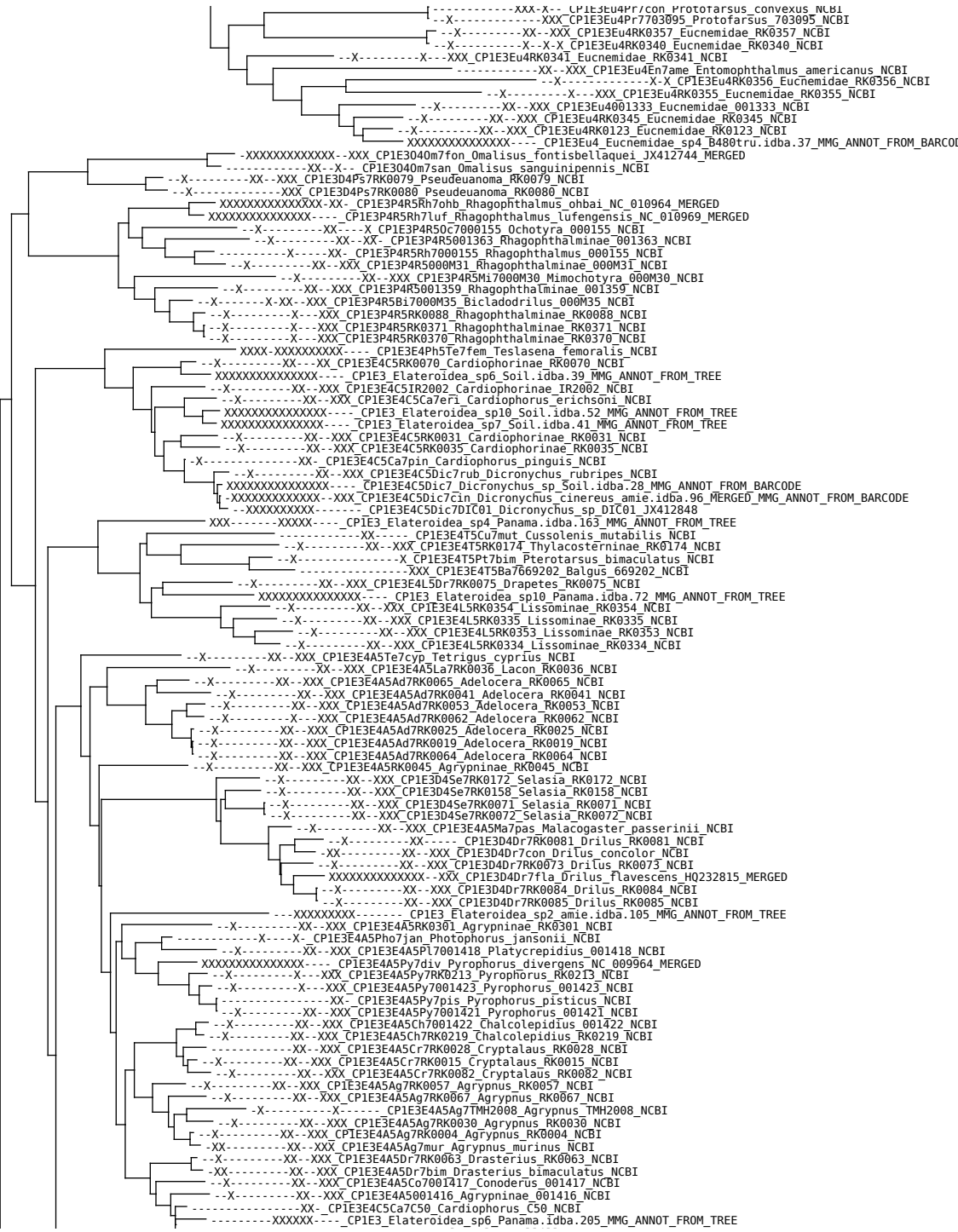




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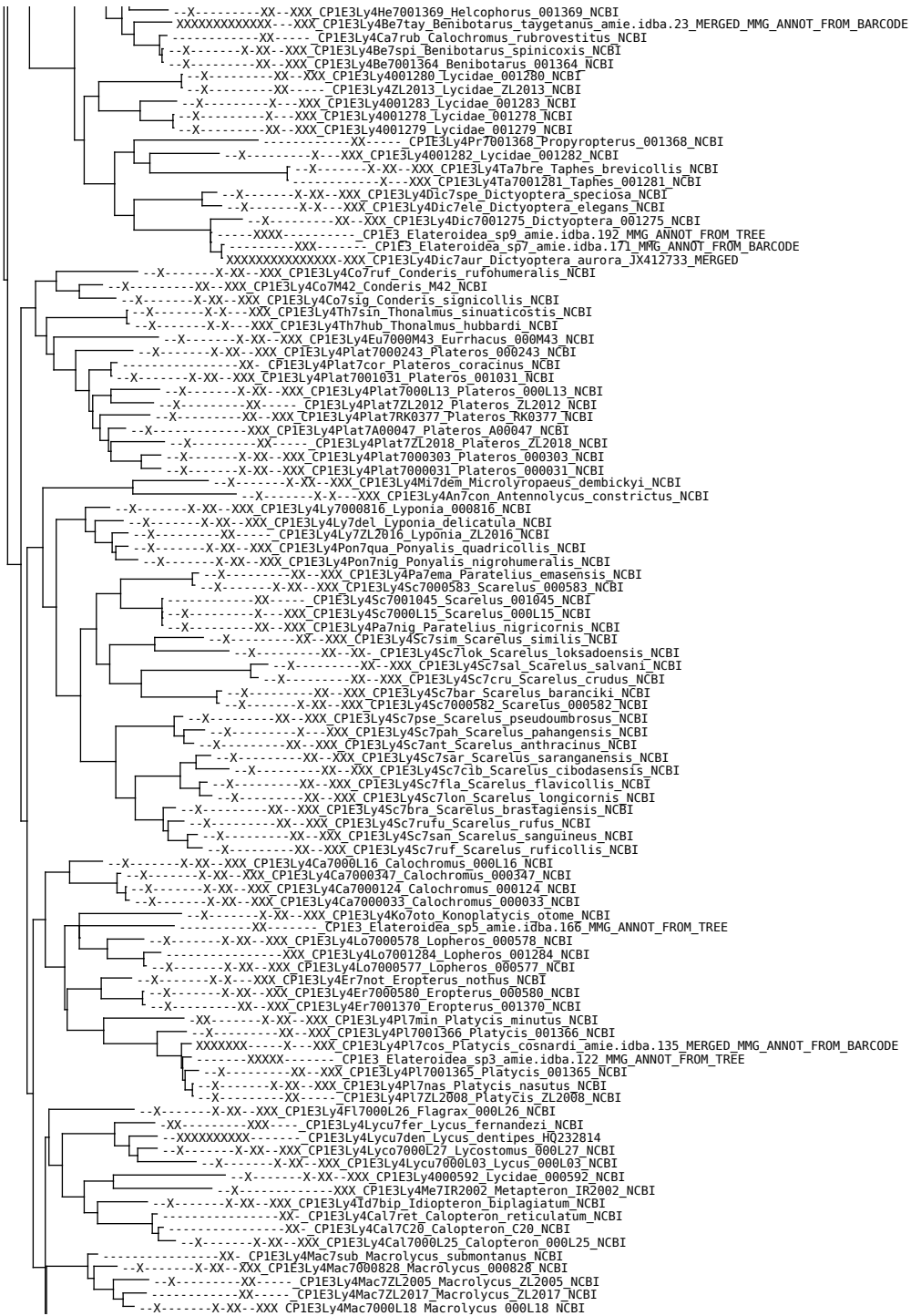




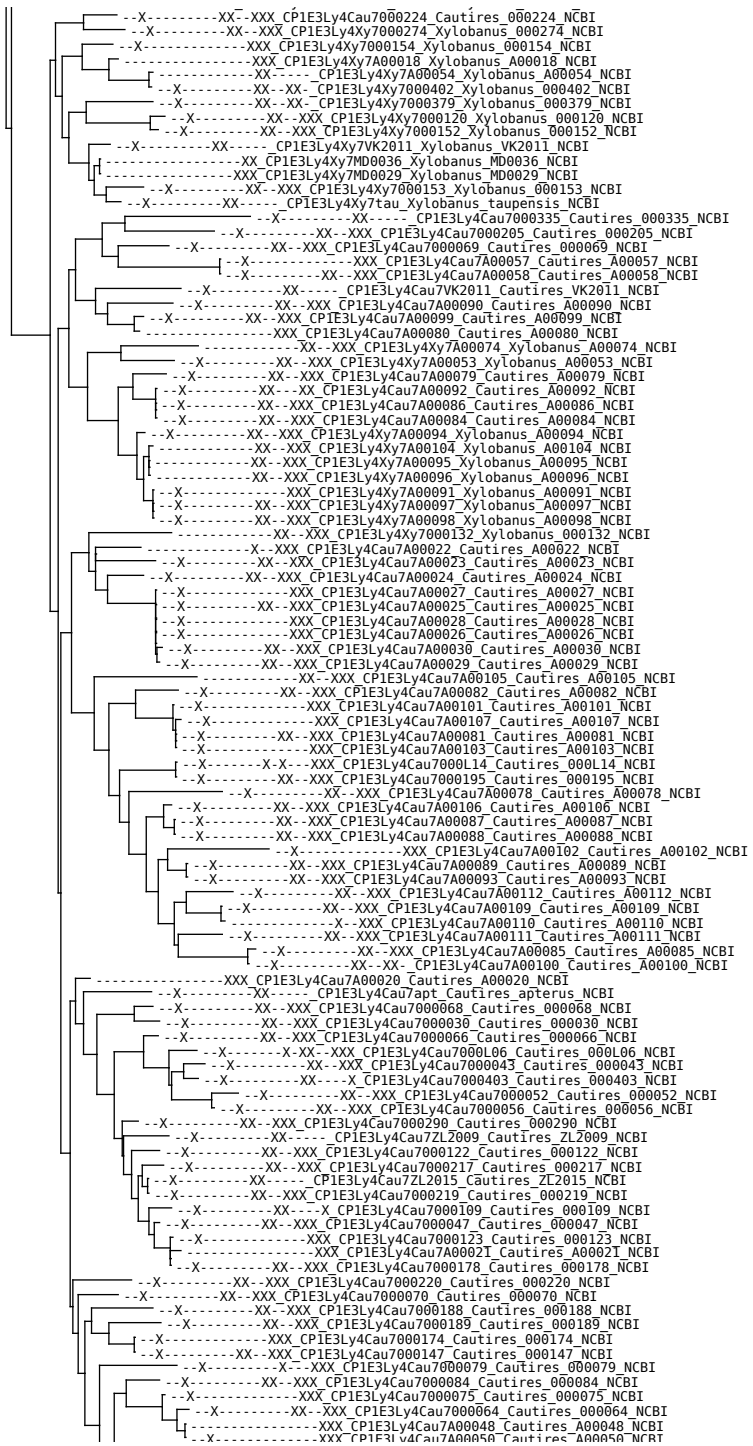




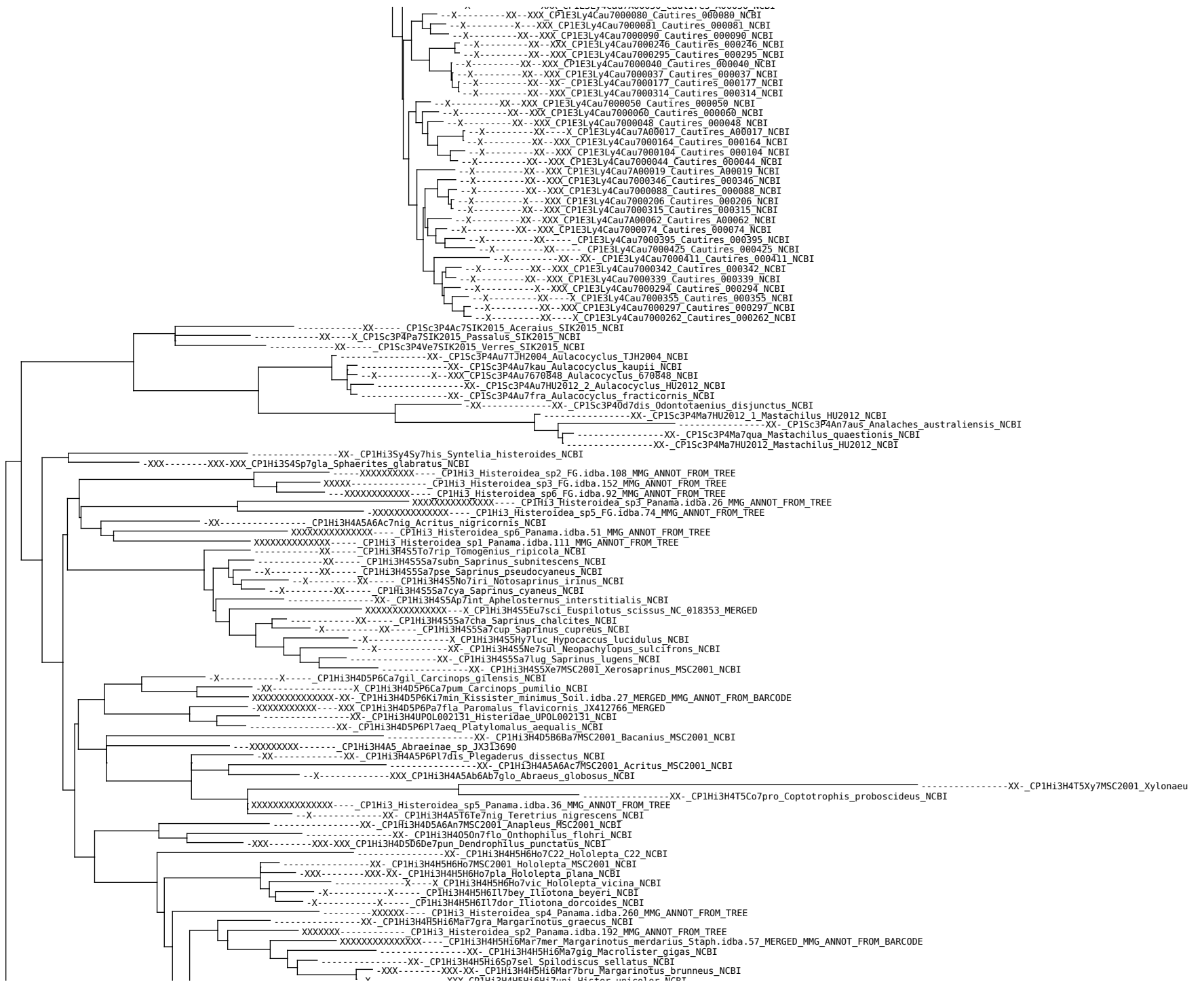


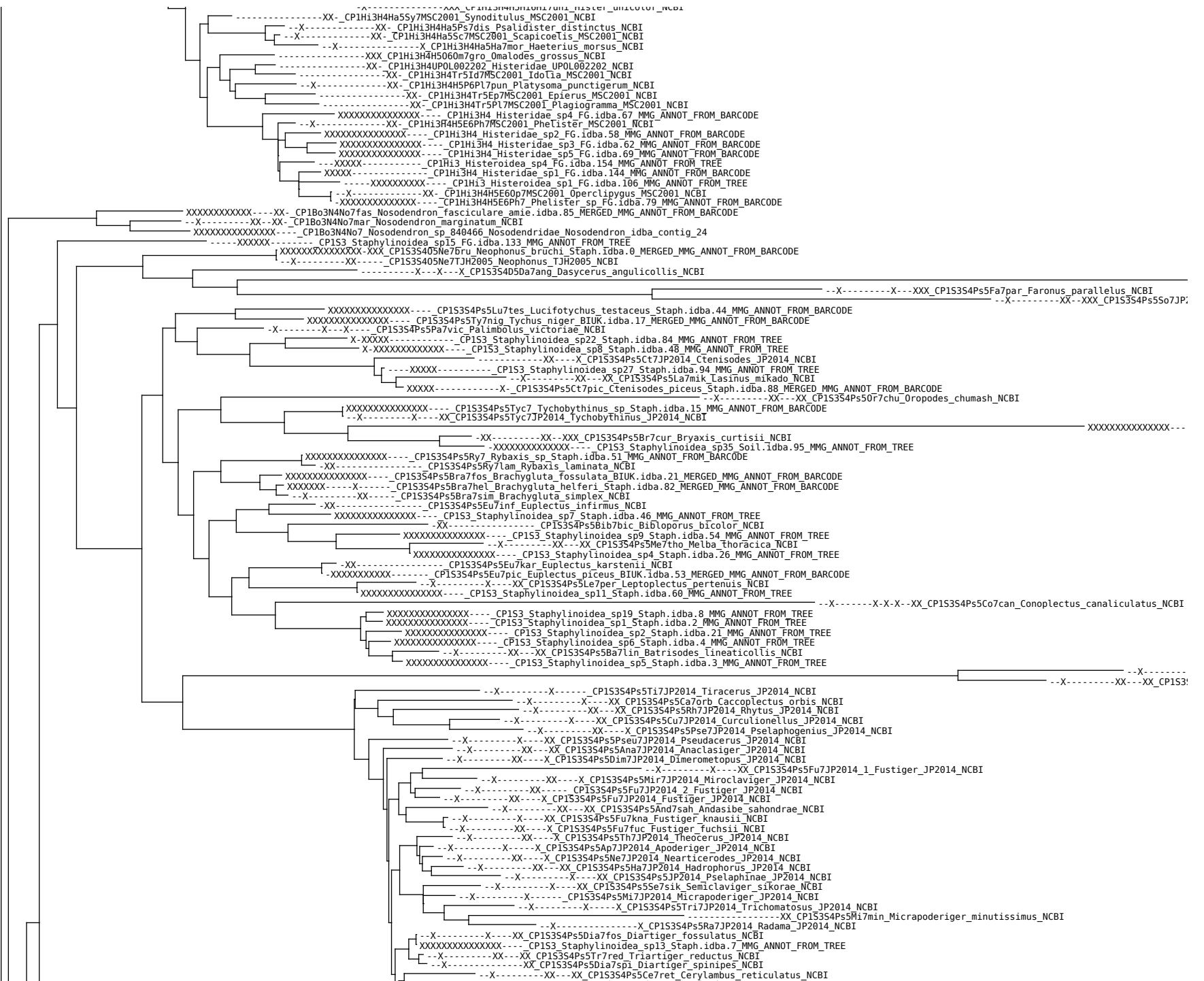




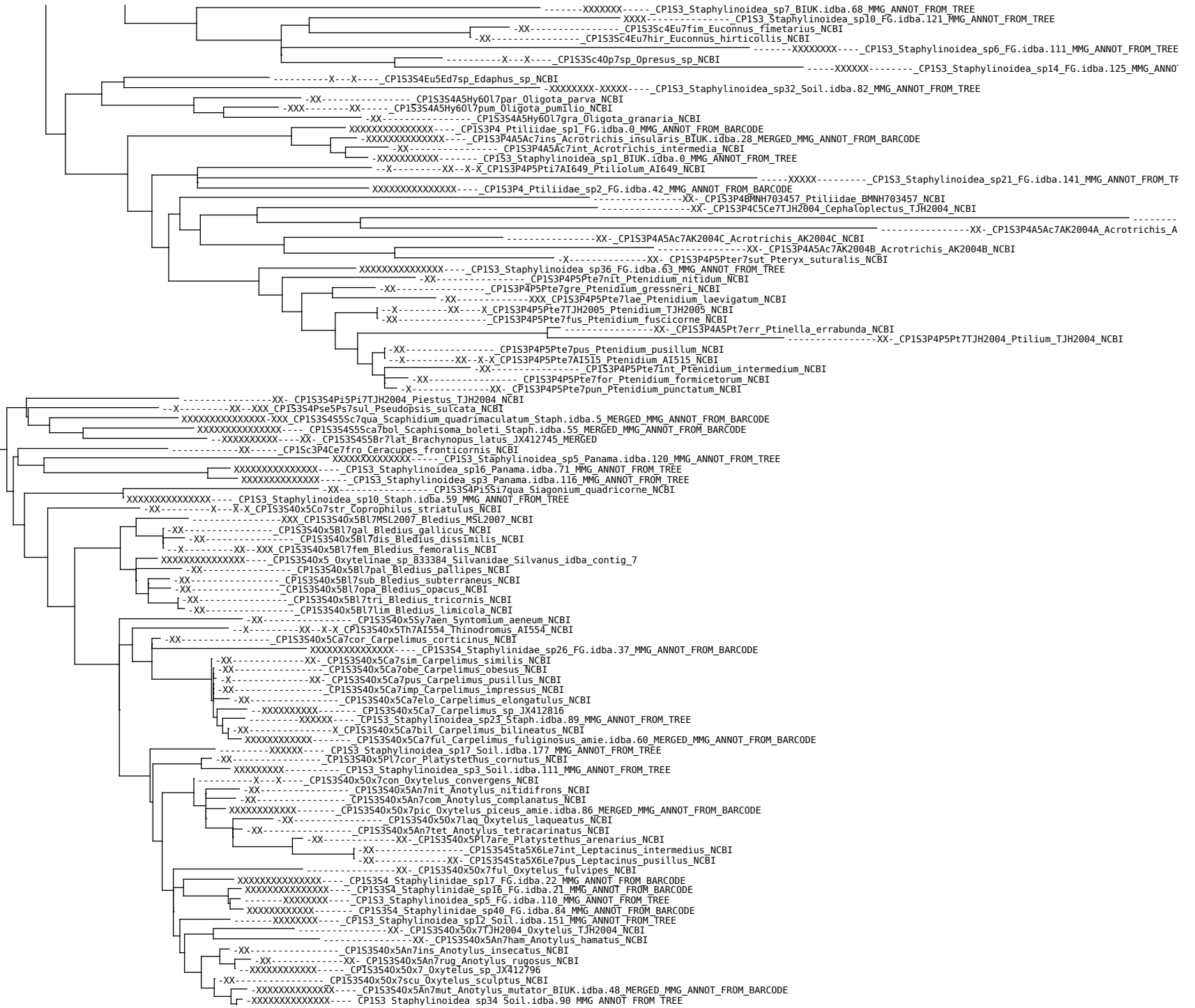


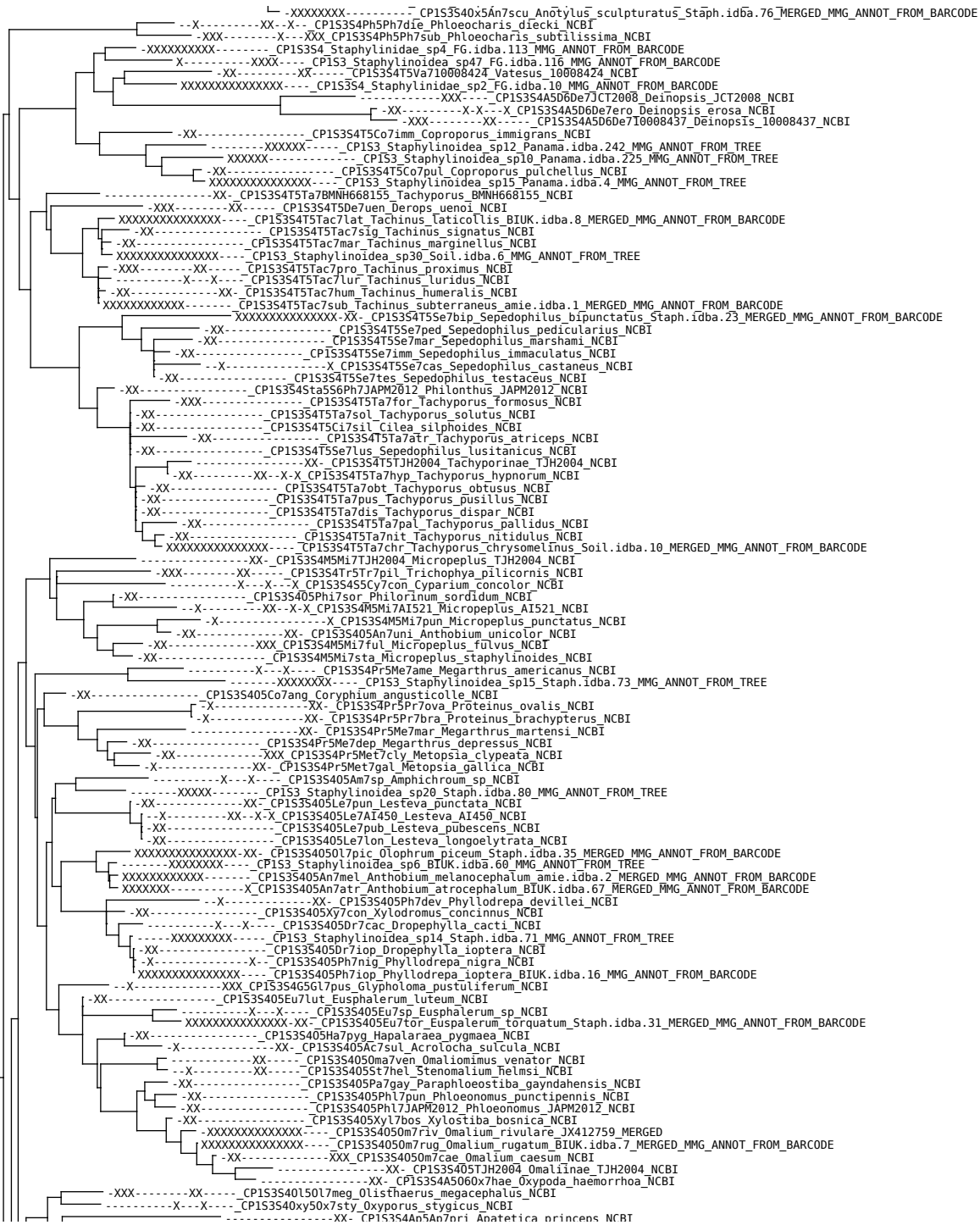






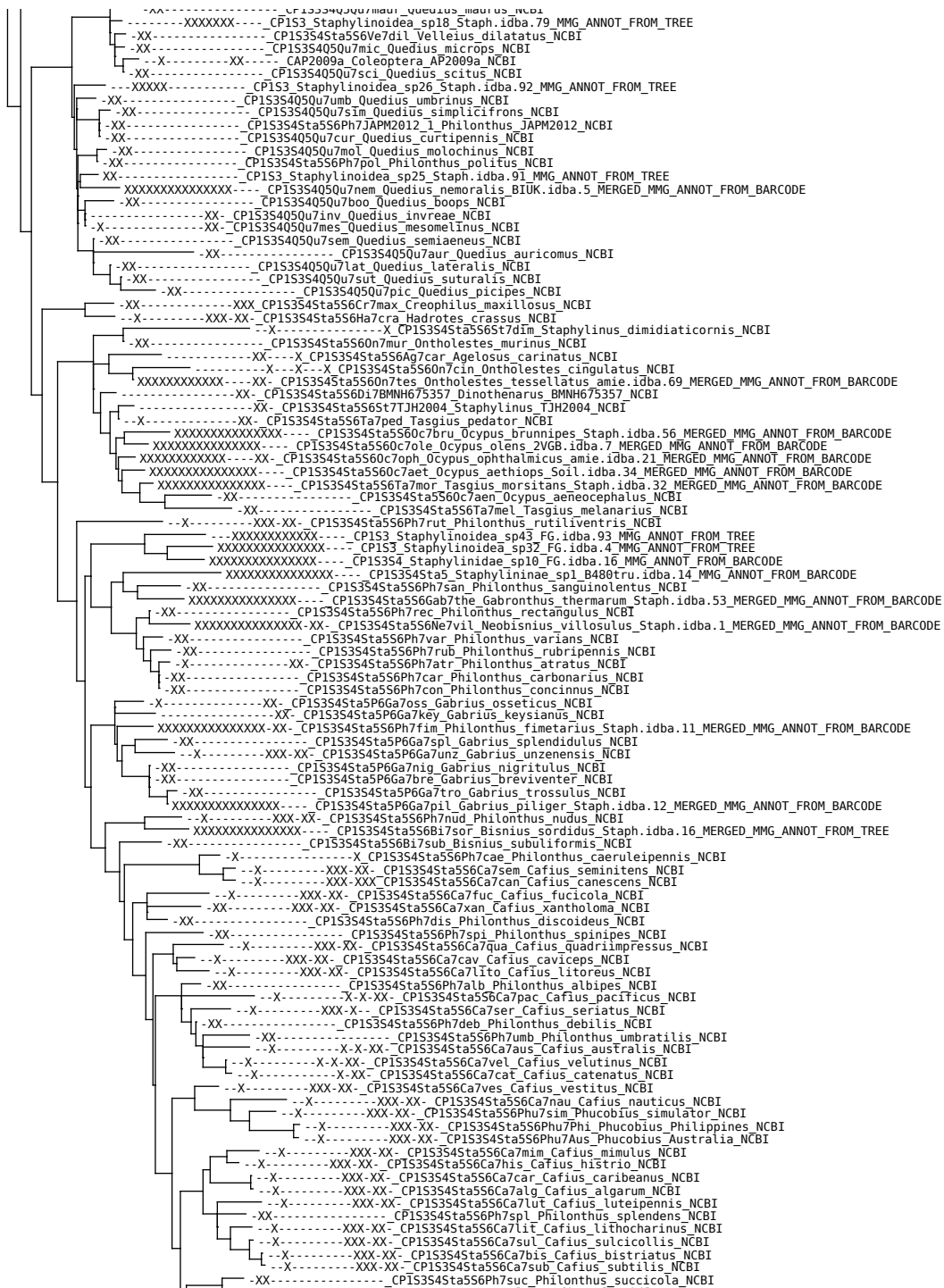






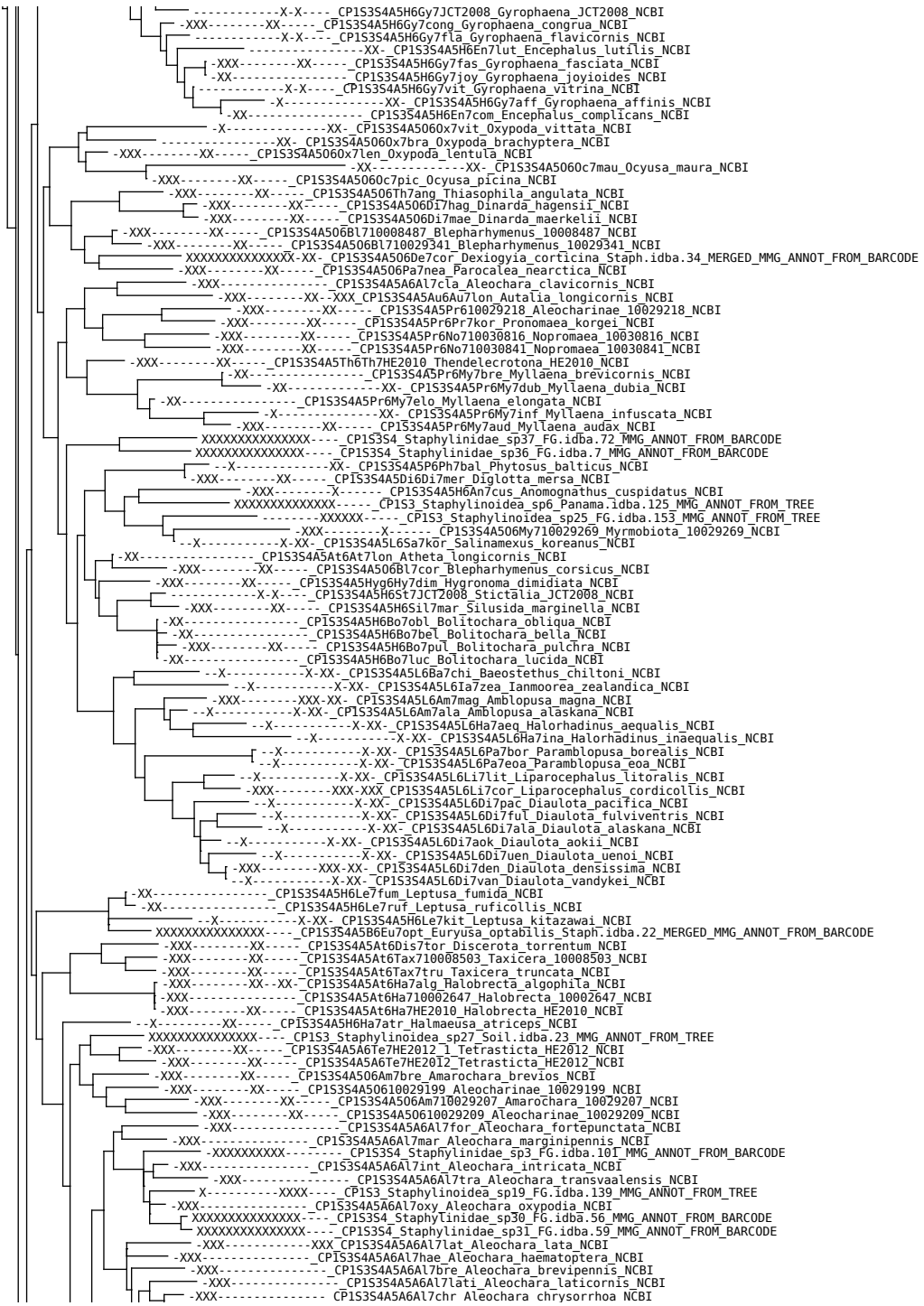


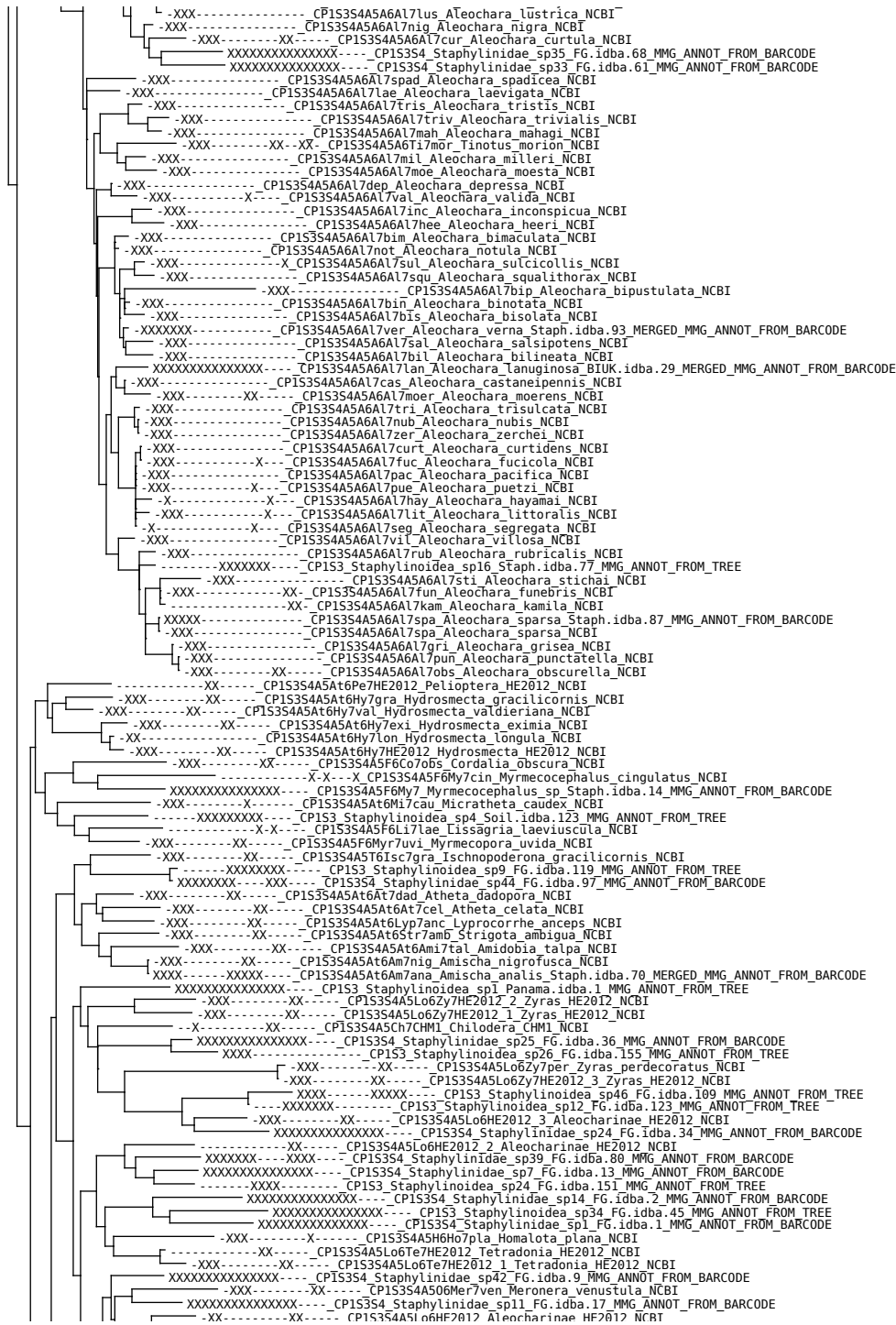












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CP1S3S4A5A6A17triv *Aleochara trivialis* NCBI  
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CP1S3S4A5A6A17sti *Aleochara stichai* NCBI  
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CP1S3S4A5A6A17HE2012 *Hydrosmehta HE2012* NCBI  
CP1S3S4A5A6A17obs *Cordulia obscura* NCBI  
CP1S3S4A5A6A17F6M7 *Myrmecocephalus cingulatus* NCBI  
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CP1S3S4A5A6A17cau *Microtheta caudex* NCBI  
CP1S3 Staphylinidae sp4 Soil.idba.123 MMG\_ANNOT\_FROM\_TREE  
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CP1S3 Staphylinidae sp26 FG.idba.155 MMG\_ANNOT\_FROM\_TREE  
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CP1S3 Staphylinidae sp46 FG.idba.109 MMG\_ANNOT\_FROM\_TREE  
CP1S3 Staphylinidae sp12 FG.idba.123 MMG\_ANNOT\_FROM\_TREE  
CP1S3S4A5A6A17HE2012\_3 *Aleocharinae HE2012* NCBI  
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CP1S3S4 Staphylinidae sp14 FG.idba.2 MMG\_ANNOT\_FROM\_BARCODE  
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CP1S3S4 Staphylinidae sp1 FG.idba.1 MMG\_ANNOT\_FROM\_BARCODE  
CP1S3S4A5A6A17pla *Homalota plana* NCBI  
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CP1S3S4A5A6A17HE2012 *Aleocharinae HE2012* NCBI

Phylogenetic tree showing relationships between various species, with labels such as CP153545Lo6HE2012\_1\_Aleocharinae\_HE2012\_NCBI, CP15354 Staphylinidae\_sp15\_FG.idba.19\_MMG\_ANNOT\_FROM\_BARCODE, and CP153545Lo6Eci7HE2012\_Ecitolonia\_HE2012\_NCBI. The tree is rooted on the left and branches out to the right, with species names listed next to the branches. Some labels include accession numbers and identifiers like 'MMG\_ANNOT\_FROM\_BARCODE' or 'MERGED\_MMG\_ANNOT\_FROM\_BARCODE'. The tree is a complex network of lines representing evolutionary relationships, with some branches being more prominent than others. The labels are in a monospaced font, typical of a terminal window or a text-based document. The overall structure is a hierarchical tree, with the root at the top left and the tips of the branches extending to the right. The labels are aligned with the tips of the branches, providing a clear mapping between the species names and their positions in the tree. The tree is a detailed representation of the genetic relationships between the listed species, showing how they are related to each other and to their common ancestors. The labels are a mix of species names, accession numbers, and identifiers, providing a comprehensive list of the taxa included in the analysis. The tree is a valuable tool for understanding the evolutionary history and relationships of the species shown, and the labels provide the necessary information to identify each taxon and its corresponding position in the tree. The tree is a complex and detailed representation of the genetic relationships between the listed species, and the labels are a key component of this representation, providing the necessary information to identify each taxon and its corresponding position in the tree. The tree is a valuable tool for understanding the evolutionary history and relationships of the species shown, and the labels provide the necessary information to identify each taxon and its corresponding position in the tree.

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-XXX-XX- CP15354A5At6Alp7HE2010 Alpinia HE2010 NCBI  
-XXX-XX- CP15354A5At6Alp7HE2012 Alpinia HE2012 NCBI  
-XX- CP15354A5At6Li7lon Liogluta longiuscula NCBI  
XXXXXXXXXXXXXXXXX CP15354A5At6Li7mic Liogluta longiuscula BIUK.idba.24 MERGED\_MMG\_ANNOT\_FROM\_BARCODE  
XXXXXXXXXXXXXXXXX CP15354A5At6L17mic Liogluta microptera Staph.idba.33 MMG\_ANNOT\_FROM\_BARCODE  
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-XX- CP15354A5At6At7bos Atheta bosnica NCBI  
-XX- CP15354A5At6At7mig Atheta nigripes NCBI  
-XX- CP15354A5At6Al7lins Aloconota insecta NCBI  
-XX- CP15354A5At6At7obl Atheta oblita NCBI  
-XXX-XX- CP15354A5At6Ph7deb Philhygra debilis NCBI  
-XX-XX- CP15354A5At6Am7dec Amischa decipiens NCBI  
-XXX-XX- CP15354A5At6Ph7ite Philhygra iterans NCBI  
XXXXXXXXXXXXXXXXX CP15354A5At6At7vol Atheta volans Staph.idba.63 MERGED\_MMG\_ANNOT\_FROM\_BARCODE  
XXXXXXXXXXXXXXXXX CP15354A5At6At7 Atheta\_sp BIUK.idba.9 MMG\_ANNOT\_FROM\_BARCODE  
-XXX-XX- CP15354A5At6At7vag Atheta vaga NCBI  
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-XXX-XX- CP15354A5At6Ph7fal Philhygra fallaciosa NCBI  
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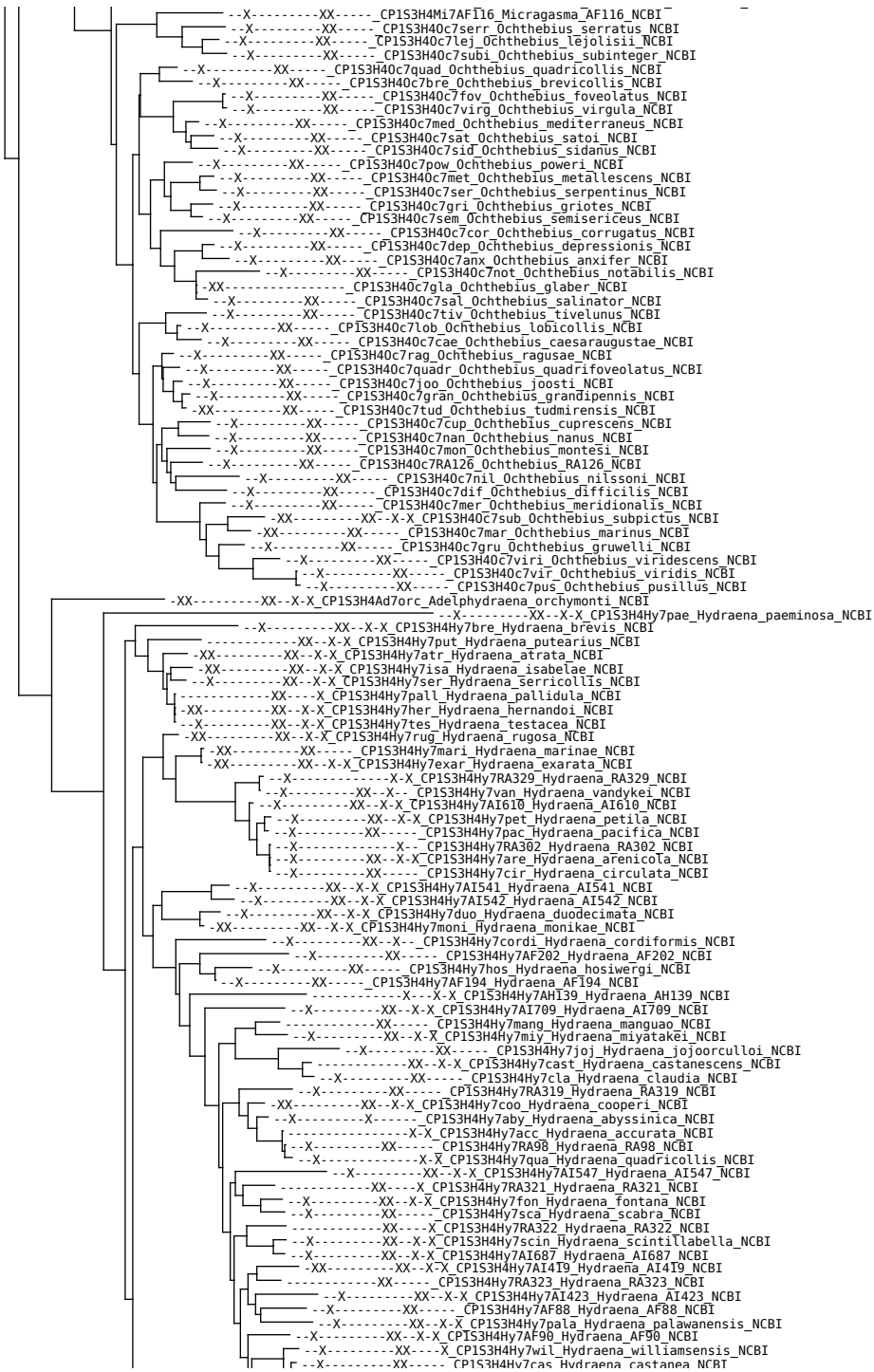
Phylogenetic tree showing relationships between various species, with bootstrap values indicated by 'X' marks. The tree is rooted on the left and branches out to the right. Species names are listed on the right side of the tree, often followed by 'NCBI'. Some species names are truncated. Bootstrap values are represented by 'X' marks of varying lengths and positions along the branches. Some nodes are marked with 'XXXXXX' or 'XXXXXXXXXXXXXXXXXX'. The tree shows a complex branching pattern, with many species having high bootstrap support (indicated by multiple 'X's).

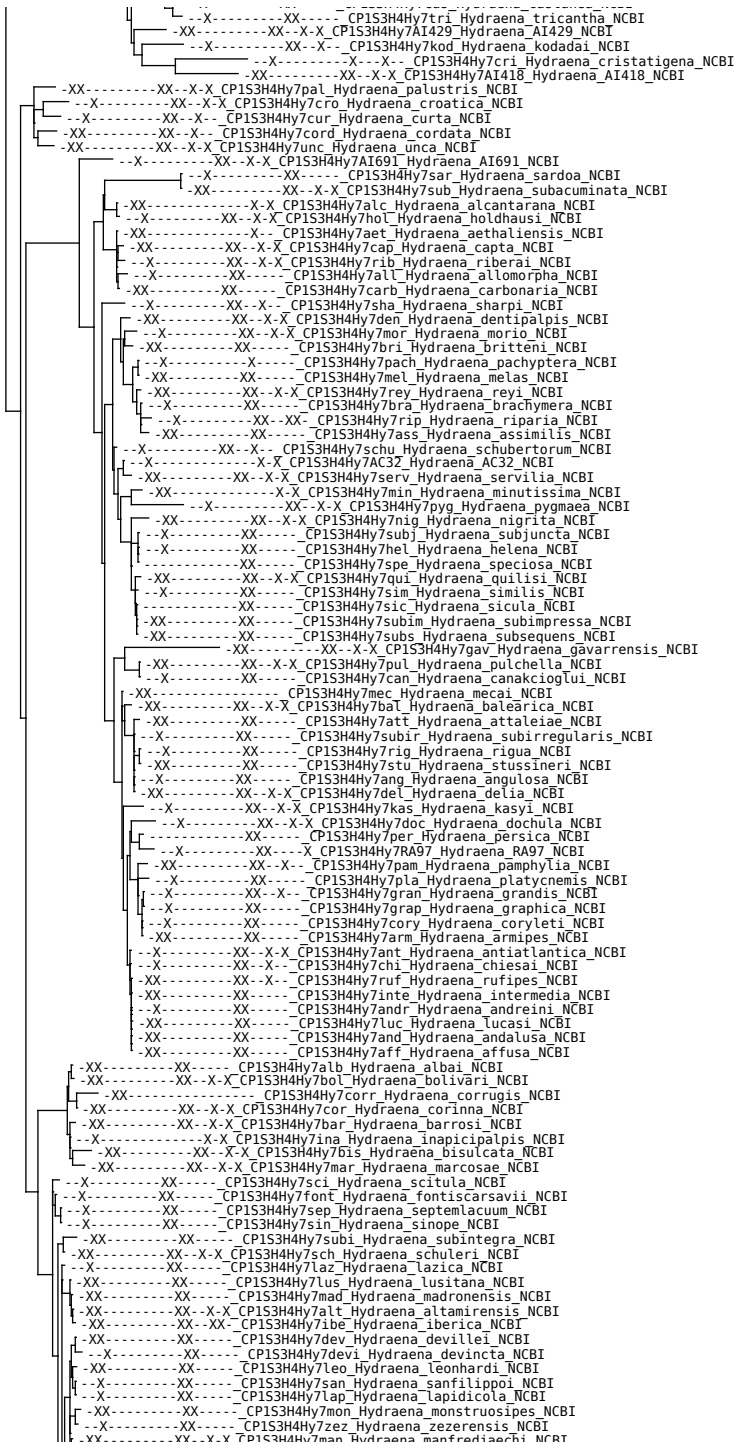
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- Anillochlamys\_subtruncatus*
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- Quaestus\_arcanus*
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- Quaestus\_cisnerosi*
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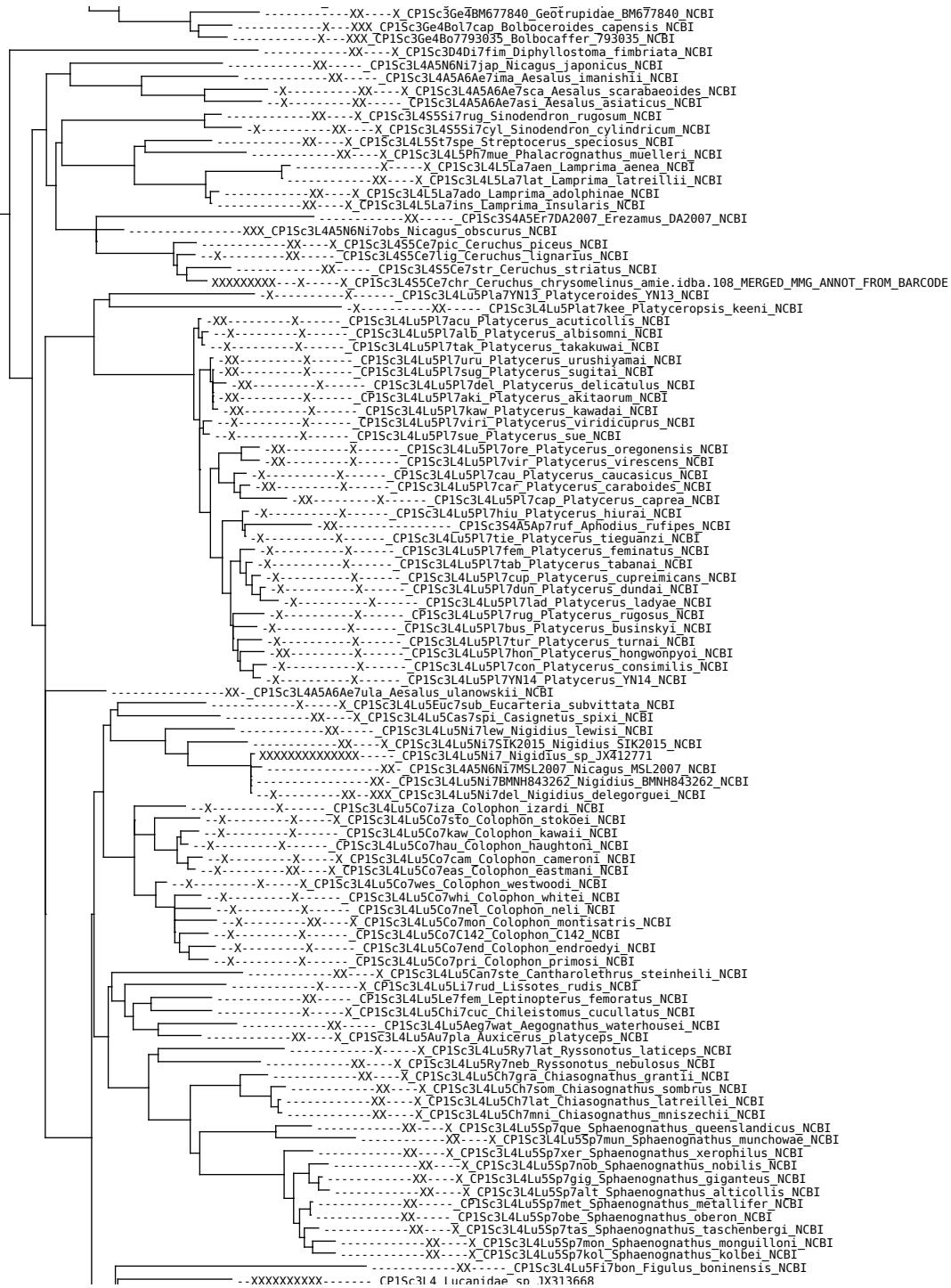
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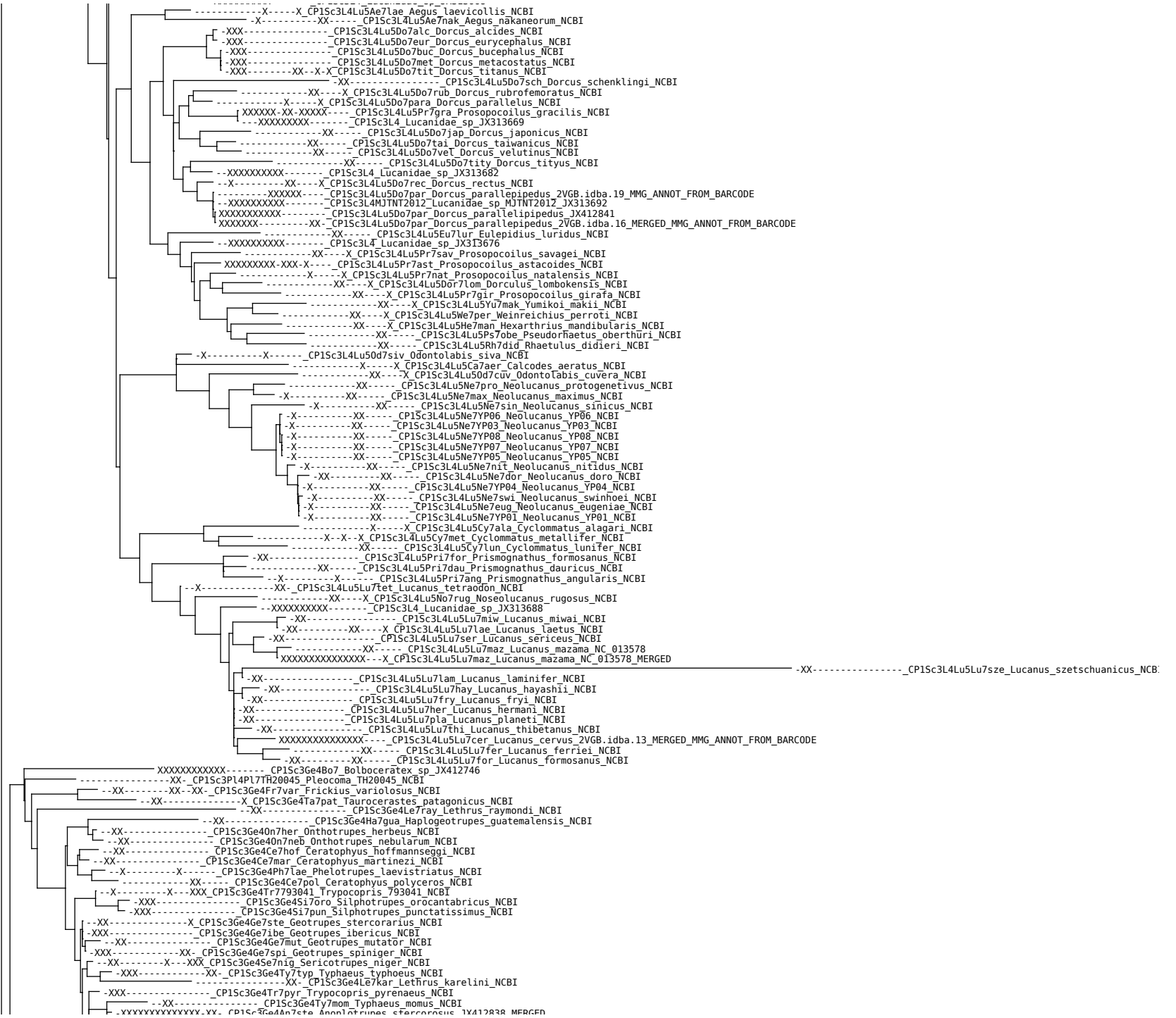
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XXXXXXXXXXXXXXXX-----CP1H3H4H5T7BYUC0166 Tropisternus BYUC0166 NCBI  
-XX-----XX-----X-----CP1H3H4H5Ho7wal Horelophus walkeri NCBI  
-XX-----XX-----X-----CP1H3H4H5C7M5C1819 Crenitis MSC1819 NCBI  
-X-----X-----XX-----XX-----CP1H3H4H5An7sul Anacaena suturalis NCBI  
-X-----X-----XX-----XX-----CP1H3H4H5An7sol Anacaena solstitialis NCBI  
-XX-----X-----X-----CP1H3H4H5An7hir Anacaena hirsuta NCBI  
-XX-----X-----X-----CP1H3H4H5An7SLE0346 Anacaena SLE0346 NCBI  
-XX-----XX-----X-----CP1H3H4H5Th7SLE0127 Thysanarthra SLE0127 NCBI  
-XXX-----X-----X-----CP1H3H4H5Ch7sem Chaetarthria seminulum NCBI  
-XX-----XX-----XX-----CP1H3H4H5Ch7TJH2004 Chaetarthria TJH2004 NCBI  
-XX-----XX-----X-----CP1H3H4H5Ch7SLE0410 Chaetarthria SLE0410 NCBI  
-XX-----XX-----X-----CP1H3H4H5Gu7SLE0411 Guyanobius SLE0411 NCBI  
-XX-----XX-----XX-----CP1H3H4H5Gu7lac Guyanobius lacuniventris NCBI  
-X-----X-----X-----X-----CP1H3H4H5Ch7inc Chaetarthria incisa NCBI  
-XX-----XX-----XX-----CP1H3H4H5He7ser Hemisphaera seriatoapunctata NCBI  
-XX-----X-----X-----CP1H3H4H5Ch7MF247 Chaetarthria MF247 NCBI  
-XX-----X-----X-----Pseudorygmopus versicolor NCBI  
-X-----X-----X-----CP1H3H4H5An7line Anacaena lineata NCBI  
-XX-----XX-----XX-----CP1H3H4H5An7luc Anacaena lucida NCBI  
-XX-----X-----X-----CP1H3H4H5An7lin Anacaena lindi NCBI  
-XX-----X-----X-----CP1H3H4H5An7lan Anacaena lanzhujii NCBI  
-XX-----XX-----CP1H3H4H5An7MF198 Anacaena MF198 NCBI  
-XXX-----XX-----CP1H3H4H5An7glo Anacaena globulus NCBI  
-XXX-----X-----XX-----CP1H3H4H5An7lim Anacaena limbata NCBI  
-X-----X-----X-----X-----CP1H3H4MTM2009\_3 Hydrophilidae MTM2009 NCBI  
-X-----X-----X-----X-----CP1H3H4H5He7MTM2009 Hemisphaera MTM2009 NCBI  
-XX-----XX-----XX-----CP1H3H4H5He7SLE0031 Helobata SLE0031 NCBI  
-XX-----XX-----X-----CP1H3H4H5He7SLE0240 Helochaeres SLE0240 NCBI  
-X-----X-----X-----CP1H3H4A5Ag7MTM2009 Agraphydrus MTM2009 NCBI  
-XX-----XX-----X-----XX-----CP1H3H4A5G17SLE0027 Globulosis SLE0027 NCBI  
-XX-----XX-----X-----CP1H3H4SLE0102 Hydrophilidae SLE0102 NCBI  
-X-----X-----X-----CP1H3H4SLE0101 Hydrophilidae SLE0101 NCBI  
-XX-----XX-----XX-----CP1H3H4A5T07sul Tobochaeres sulcatus NCBI

Phylogenetic tree showing relationships between various species, primarily from the Hydrophilidae and Enochrus genera. The tree is rooted on the left and branches out to the right. Species names are listed on the right side of the tree, often followed by their NCBI accession numbers. The tree is annotated with 'X' and 'XX' symbols, likely indicating specific characteristics or data points for each species. The species names include:

- CP1H3H4A5Lew159 Hydrophilidae SLE0159 NCBI
- CP1H3H4A5Ch7SLE0080 Chasmogenus SLE0080 NCBI
- CP1H3H4A5Ch7SLE0077 Chasmogenus SLE0077 NCBI
- CP1H3H4A5Ch7SLE0078 Chasmogenus SLE0078 NCBI
- CP1H3H4A5Ch7rui Chasmogenus ruidus NCBI
- CP1H3H4MTM2009\_23 Hydrophilidae MTM2009 NCBI
- CP1H3H4A5H67han Horelophopsis hanseni NCBI
- CP1H3H4A5Ag7SLE0252 Agraphydrus SLE0252 NCBI
- CP1H3H4MTM2009\_21 Hydrophilidae MTM2009 NCBI
- CP1H3H4MTM2009\_22 Hydrophilidae MTM2009 NCBI
- CP1H3H4A5Ag7MTM2009\_2 Agraphydrus MTM2009 NCBI
- CP1H3H4A5Ag7MTM2009 Agraphydrus MTM2009 NCBI
- CP1H3H4A5Ag7MTM2009\_1 Agraphydrus MTM2009 NCBI
- CP1H3H4H5An7lut Anacaena lutescens NCBI
- CP1H3H4H5min Helophorus minutus NCBI
- CP1H3H4H5bre Helophorus brevipalpis NCBI
- CP1H3H4A5He7SLE0034 Helochares SLE0034 NCBI
- CP1H3H4A5He7MTM2009\_3 Helochares MTM2009 NCBI
- CP1H3H4A5He7MTM2009\_2 Helochares MTM2009 NCBI
- CP1H3H4A5He7MTM2009\_1 Helochares MTM2009 NCBI
- CP1H3H4MTM2009\_24 Hydrophilidae MTM2009 NCBI
- CP1H3H4H5obs Helochares obscurus NCBI
- CP1H3H4A5He7 Helochares sp. lVNB.idba.18 MMG\_ANNOT\_FROM\_BARCODE
- CP1H3H4A5He7liv Helochares lividus NCBI
- CP1H3H4A5He7MTM2009\_4 Helochares MTM2009 NCBI
- CP1H3H4A5He7MTM2009\_6 Helochares MTM2009 NCBI
- CP1H3H4MTM2009\_5 Hydrophilidae MTM2009 NCBI
- CP1H3H4A5He7MTM2009\_5 Helochares MTM2009 NCBI
- CP1H3H4MTM2009\_18 Hydrophilidae MTM2009 NCBI
- CP1H3H4MTM2009\_17 Hydrophilidae MTM2009 NCBI
- CP1H3H4MTM2009\_14 Hydrophilidae MTM2009 NCBI
- CP1H3H4MTM2009\_10 Hydrophilidae MTM2009 NCBI
- CP1H3H4H5An7MTM2009\_5 Anacaena MTM2009 NCBI
- CP1H3H4MTM2009\_6 Hydrophilidae MTM2009 NCBI
- CP1H3H4H5An7MTM2009 Anacaena MTM2009 NCBI
- CP1H3H4MTM2009\_7 Hydrophilidae MTM2009 NCBI
- CP1H3H4MTM2009\_15 Hydrophilidae MTM2009 NCBI
- CP1H3H4H5An7MTM2009\_4 Anacaena MTM2009 NCBI
- CP1H3H4H5An7MTM2009\_7 Anacaena MTM2009 NCBI
- CP1H3H4H5An7MTM2009\_8 Anacaena MTM2009 NCBI
- CP1H3H4H5An7MTM2009\_1 Anacaena MTM2009 NCBI
- CP1H3H4H5An7MTM2009\_3 Anacaena MTM2009 NCBI
- CP1H3H4MTM2009\_9 Hydrophilidae MTM2009 NCBI
- CP1H3H4MTM2009\_12 Hydrophilidae MTM2009 NCBI
- CP1H3H4MTM2009\_8 Hydrophilidae MTM2009 NCBI
- CP1H3H4H5An7MTM2009\_2 Anacaena MTM2009 NCBI
- CP1H3H4H5An7MTM2009\_6 Anacaena MTM2009 NCBI
- CP1H3H4MTM2009\_13 Hydrophilidae MTM2009 NCBI
- CP1H3H4H5C7mar Cymbiodyta margineella amie.idba.89\_MERGED\_MMG\_ANNOT\_FROM\_BARCODE
- CP1H3H4H5No7lip Notionotus liparus NCBI
- CP1H3H4H5Hel7bif Helocombus bifidus NCBI
- CP1H3H4H5No7SLE0092 Notionotus SLE0092 NCBI
- CP1H3H4H5En7IBEA887 Enochrus IBEA887 NCBI
- CP1H3H4H5En7mas Enochrus mastersii NCBI
- CP1H3H4H5C7sem Cymbiodyta semistriata NCBI
- CP1H3H4H5En7IBEA895 Enochrus IBEA895 NCBI
- CP1H3H4H5En7SLE0241 Enochrus SLE0241 NCBI
- CP1H3H4H5En7tal Enochrus talamanca NCBI
- CP1H3H4H5En7IBEA326 Enochrus IBEA326 NCBI
- CP1H3H4H5En7IBEA889 Enochrus IBEA889 NCBI
- CP1H3H4H5En7IBEA888 Enochrus IBEA888 NCBI
- CP1H3H4H5En7fim Enochrus fimbriatus NCBI
- CP1H3H4H5En7mor Enochrus morenae NCBI
- CP1H3H4H5En7cin Enochrus cinctus NCBI
- CP1H3H4H5En7IBEA884 Enochrus IBEA884 NCBI
- CP1H3H4H5En7pic Enochrus piceus NCBI
- CP1H3H4H5En7nat Enochrus natalensis NCBI
- CP1H3H4H5En7IBEA310 Enochrus IBEA310 NCBI
- CP1H3H4H5En7coa Enochrus coarctatus NCBI
- CP1H3H4H5En7och Enochrus ochraceus NCBI
- CP1H3H4H5En7aff Enochrus affinis NCBI
- CP1H3H4H5En7nig Enochrus nigrinus NCBI
- CP1H3H4H5En7MTM2009\_3 Enochrus MTM2009 NCBI
- CP1H3H4H5En7MTM2009\_2 Enochrus MTM2009 NCBI
- CP1H3H4H5En7MTM2009\_1 Enochrus MTM2009 NCBI
- CP1H3H4MTM2009 Hydrophilidae MTM2009 NCBI
- CP1H3H4MTM2009\_4 Hydrophilidae MTM2009 NCBI
- CP1H3H4H5En7MTM2009\_4 Enochrus MTM2009 NCBI
- CP1H3H4H5En7fal Enochrus falcarius NCBI
- CP1H3H4H5En7hami Enochrus hamifer NCBI
- CP1H3H4H5En7dif Enochrus diffusus NCBI
- CP1H3H4H5En7ham Enochrus hamiltoni NCBI
- CP1H3H4H5En7ate Enochrus ater NCBI
- CP1H3H4H5En7pol Enochrus politus NCBI
- CP1H3H4H5En7hal Enochrus halophilus NCBI
- CP1H3H4H5En7fus Enochrus fuscipennis NCBI
- CP1H3H4H5En7qua Enochrus quadripunctatus NCBI
- CP1H3H4H5En7tes Enochrus testaceus NCBI
- CP1H3H4H5En7IBEA55 Enochrus IBEA55 NCBI
- CP1H3H4H5En7ochr Enochrus ochropterus NCBI
- CP1H3H4H5En7sal Enochrus salomonis NCBI
- CP1H3H4H5En7IBERA490 Enochrus IBERA490 NCBI
- CP1H3H4H5En7bic Enochrus bicolor NCBI
- CP1H3H4H5En7IBERA194 Enochrus IBERA194 NCBI
- CP1H3H4H5En7seg Enochrus segmentinotatus NCBI
- CP1H3H4H5Bentap Badiolobus tapanti NCBI
- CP1H3H4H5Cy7gla Cylomissus glabratus NCBI
- CP1H3H4H5S5a7SLE0099 Saphydrus SLE0099 NCBI
- CP1H3H4H5Hy7fro Hydrostygnus frontalis NCBI











Phylogenetic tree showing relationships between various species, with labels such as CP1Sc354A5D17tru, CP1Sc354A5A7fri, and CP1Sc354A5A7ann. The tree is rooted on the left and branches out to the right. Species names are listed next to their corresponding branches, often preceded by a series of dashes (e.g., -X-, -XX-, -XXX-) indicating support or classification levels. Some labels include accession numbers and database identifiers like 'Soil.idba.32\_MERGED\_MMG\_ANNOT\_FROM\_BARCODE' or 'Soil.idba.115\_MERGED\_MMG\_ANNOT\_FROM\_TREE'. The tree structure is complex, with many closely related species and some more distinct lineages. The labels are oriented vertically along the branches.

Phylogenetic tree showing relationships between various species, with bootstrap values indicated by 'X' marks. The tree is rooted at the top left and branches downwards. Species names are listed on the right side of the tree, often followed by their source or accession information. The tree shows a complex branching pattern with many nodes supported by bootstrap values. The species names include various genera and species, such as Epactoides, Apotolamprus, Nanos, Uroxys, Eurysternus, and Catharsius. The tree is highly detailed, showing many closely related species and their evolutionary relationships.

Phylogenetic tree showing relationships between various species, primarily from the order Hymenoptera. The tree is rooted on the left and branches out to the right. Species names are listed on the right side of the tree, often followed by accession numbers and source information. The tree is divided into several major clades, including:

- **Ichneumonidae**: Includes species like *CP1Sc35455C6Me7can\_Megathoposoma\_candezei*, *CP1Sc35455C6Ha7aff\_Hansreia\_affinis*, *CP1Sc35455C6Eu7dyt\_Eudinopus\_dytiscoides*, *CP1Sc35455C6Ca7ind\_Canthon\_indigaeus*, *CP1Sc35455C6Ca7vir\_Canthon\_viridis*, *CP1Sc35455C6Ca7lut\_Canthon\_luteicollis*, *CP1Sc35455C6Ca7aeq\_Canthon\_aequinoctalis*, *CP1Sc35455C6Ca7doe\_Canthon\_doebergi*, *CP1Sc35455C6Ca7lam\_Canthon\_lamprimus*, *CP1Sc35455C6Ca7pan\_Anomolopus\_panamensis*, *CP1Sc35455C6Ca7doe\_Canthon\_doebergi*, *CP1Sc35455C6Ca7BMNH670496\_Canthon\_BMNH670496*, *CP1Sc35455G6Gy7BMNH676998\_Gymnopleurus\_BMNH676998*, *CP1Sc35455G6Gy7fla\_Gymnopleurus\_Flagellatus*, *CP1Sc35455G6Gy7hum\_Gymnopleurus\_humanus*, *CP1Sc35455G6Gy7mop\_Gymnopleurus\_mopsus*, *CP1Sc35455G6Gy7vir\_Gymnopleurus\_virens*, *CP1Sc35455G6A17tha\_Allogymnopleurus\_thalassinus*, *CP1Sc35455G6G7nit\_Garreta\_nitens*, *CP1Sc35455G6P7str\_Paragymnopleurus\_striatus*, *CP1Sc35455G6P7dgi1\_Paragymnopleurus\_dgii*, *CP1Sc35455G6P7mau\_Paragymnopleurus\_maurus*, *CP1Sc35455C6De7gib\_Deltochilum\_gibbosum*, *CP1Sc35455C6De7ama\_Deltochilum\_amazonicum*, *CP1Sc35455C6De7car\_Deltochilum\_carinatum*, *CP1Sc35455C6De7bar\_Deltochilum\_barbipes*, *CP1Sc35455C6De7pse\_Deltochilum\_pseudoparile*, *CP1Sc35455Co6Li7mut\_Litocopris\_muticus*, *CP1Sc35455Co6Co7lun\_Copris\_lunaris*, *CP1Sc35455Co6Co7agn\_Copris\_agnus*, *CP1Sc35455Co6Co7tri\_Copris\_tripartitus*, *CP1Sc35455Co6Co7lug\_Copris\_lugubris*, *CP1Sc35455Co6Co7aen\_Copris\_aeneus*, *CP1Sc35455Co6Co7amy\_Copris\_amytor*, *CP1Sc35455Co6Co7dgi1\_Copris\_dgii*, *CP1Sc35455Cat7SM2012\_Catharsius\_SM2012*, *CP1Sc35455Co6Co7cor\_Copris\_cornifrons*, *CP1Sc35455Co6Co7his\_Copris\_hispanicus*, *CP1Sc35455Co6Co7con\_Copris\_confucius*, *CP1Sc35455Co6Co7sin\_Copris\_sinicus*, *CP1Sc35455A6At7dgi1\_Ateuchus\_dgii*, *CP1Sc35455A6A7aur\_Canthidium\_aurifex*, *CP1Sc35455A6A7chr\_Chrysopyge*, *CP1Sc35455A6At7CWC2007\_Ateuchus\_CWC2007*, *CP1Sc35455A6At7ecu\_Ateuchus\_ecuadorensis*, *CP1Sc35455E6En7lob\_Ennearabdus\_tobocephalus*, *CP1Sc35455E6Eu7ara\_Eucranium\_arachnoides*, *CP1Sc35455E6G17ste\_Glyphoderus\_sterquilinus*, *CP1Sc35455E6An7bil\_Anomiopsoides\_biloba*, *CP1Sc35455E6An7het\_Anomiopsoides\_heteroclyta*, *CP1Sc35455Pha7sal\_Phanaeus\_sallei*, *CP1Sc35455Pha7cam\_Phanaeus\_cambeforti*, *CP1Sc35455Dx7con\_Oxyteron\_conspicillatum*, *CP1Sc35455Dla7mim\_Diabroctis\_mim*, *CP1Sc35455Pha7dem\_Phanaeus\_demon*, *CP1Sc35455Pha7CWC2007\_Phanaeus\_CWC2007*, *CP1Sc35455Cop7lan\_Coprophanæus\_lancifer*, *CP1Sc35455Den7bah\_Dendropaemon\_bahianum*, *CP1Sc35455Pha7end\_Phanaeus\_endymion*, *CP1Sc35455Cop7tel\_Coprophanæus\_telamon*, *CP1Sc35455Cop7dgi1\_Coprophanæus\_dgii*, *CP1Sc35455Cop7Coprophanæus\_sp\_CS\_idba.11*, *CP1Sc35455Gr7aer\_Gromphas\_aeruginosa*, *CP1Sc35455Ja7SM2013\_Janssensantus\_SM2013*, *CP1Sc35455C6Ta7SM2013\_Tanzanelus\_SM2013*, *CP1Sc35455A6Ca7har\_Canthidium\_haroldi*, *CP1Sc35455A6Ca7ruf\_Canthidium\_rufinum*, *CP1Sc35455A6Ca7gua\_Canthidium\_guanacaste*, *CP1Sc35455A6Ca7tha\_Canthidium\_thalassinum*, *CP1Sc35455Di7sat\_Dichotomius\_satanas*, *CP1Sc35455Di7dgi1\_Dichotomius\_dgii*, *CP1Sc35455Di7bor\_Dichotomius\_boreus*, *CP1Sc35455Di7yuc\_Dichotomius\_yucatanus*, *CP1Sc35455Di7par\_Dichotomius\_parcepunctatus*, *CP1Ch3485B6Ac7pall\_Acanthoscelides\_pallidipennis*, *CP1Sc35455Di7nis\_Dichotomius\_nisus*, *CP1Sc35455Di7lae\_Dichotomius\_laevicollis*, *CP1Sc35455Di7bos\_Dichotomius\_bos*, *CP1Sc35455Di7sem\_Dichotomius\_semisquamosus*, *CP1Sc35455Di7ser\_Dichotomius\_sericeus*, *CP1Sc35455Di7gem\_Dichotomius\_geminatus*, *CP1Sc35455C6Ar7mor1\_Arachnoides\_morio*, *CP1Sc35455C6Ar7cup\_Arachnoides\_cuparius*, *CP1Sc35455C6Ar7MTM2009\_10\_Arachnoides\_MTM2009*, *CP1Sc35455C6Ar7kel\_Arachnoides\_kelifeyi*, *CP1Sc35455C6Ar7MTM2009\_9\_Arachnoides\_MTM2009*, *CP1Sc35455C6Ar7HKW2010\_Arachnoides\_HKW2010*, *CP1Sc35455C6Ar7mah\_Arachnoides\_mahafalyensis*, *CP1Sc35455C6Ar7sap\_Arachnoides\_saprinoides*, *CP1Sc35455C6Ar7MTM2009\_2\_Arachnoides\_MTM2009*, *CP1Sc35455C6Ar7MTM2009\_5\_Arachnoides\_MTM2009*, *CP1Sc35455C6Ar7pus\_Arachnoides\_pusillus*, *CP1Sc35455C6Ar7MTM2009\_4\_Arachnoides\_MTM2009*, *CP1Sc35455C6Ar7and\_Arachnoides\_andrei*, *CP1Sc35455P57sem\_Pseudoarachnoides\_semichalceus*

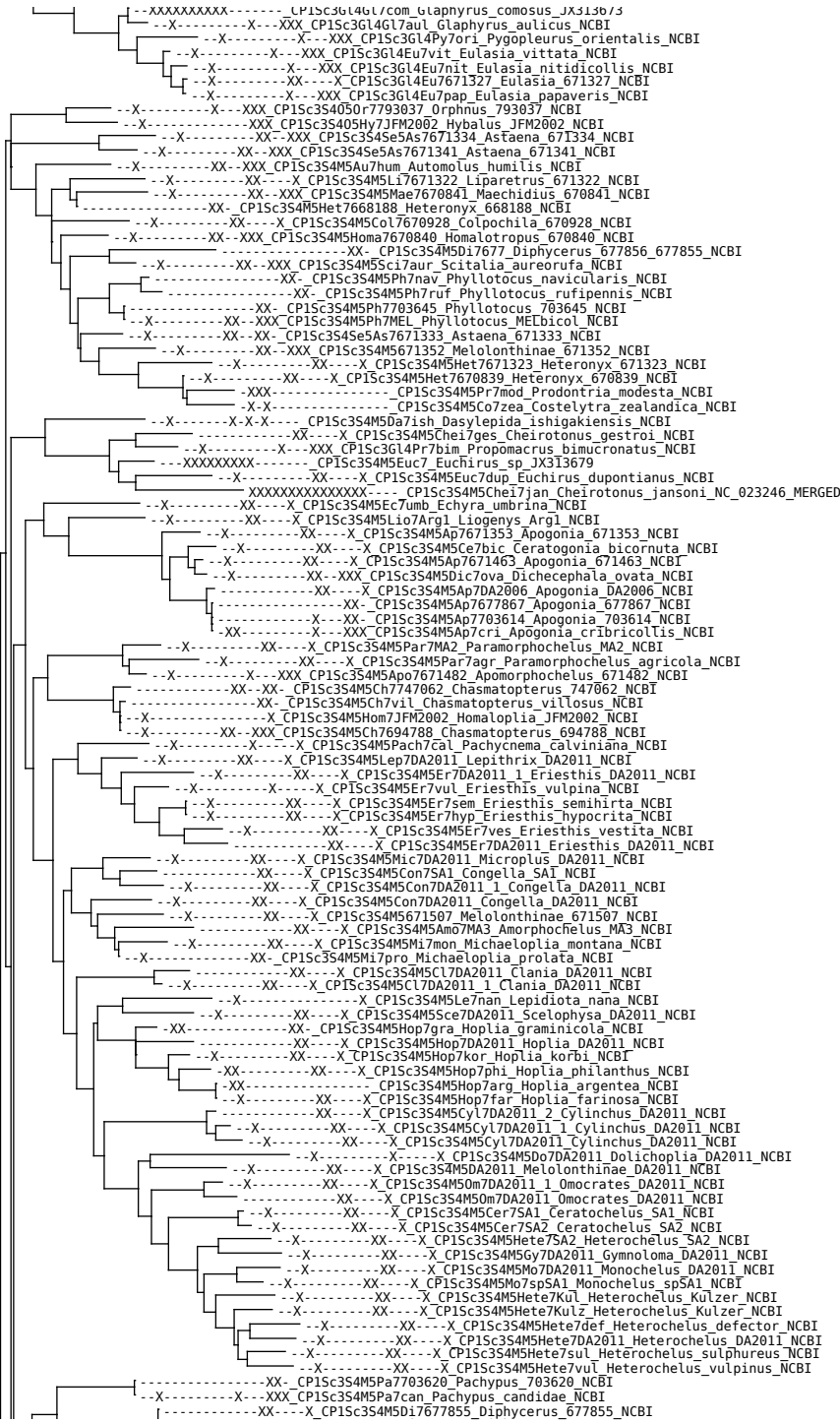


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Phylogenetic tree showing relationships between various species, primarily from the genus *Onthophagus*. The tree is rooted on the left and branches out to the right. Each node and branch is labeled with a species name and its corresponding accession number (e.g., CP1Sc354550nt7pul). The labels are arranged in a columnar format, with some species names truncated for brevity. The tree structure is complex, with many internal nodes and branches, indicating a large number of species being compared. The labels include species names, accession numbers, and sometimes additional information like 'MMG\_ANNOT\_FROM\_BARCODE' or 'MMG\_ANNOT\_FROM\_TREE'. The tree shows a high degree of genetic differentiation among the species, with many distinct clusters and sub-clusters. The labels are in a monospaced font, and the tree lines are thin and black. The overall layout is dense and detailed, typical of a scientific phylogenetic tree visualization.









Phylogenetic tree showing relationships between various species, primarily from the genus *Anomala* and related genera. The tree is rooted at the top left and branches downwards. Species names are listed on the right side of the tree, often followed by their source (NCBI) or a specific identifier. The tree is highly branched, indicating a large number of species and complex evolutionary relationships. The species names include:

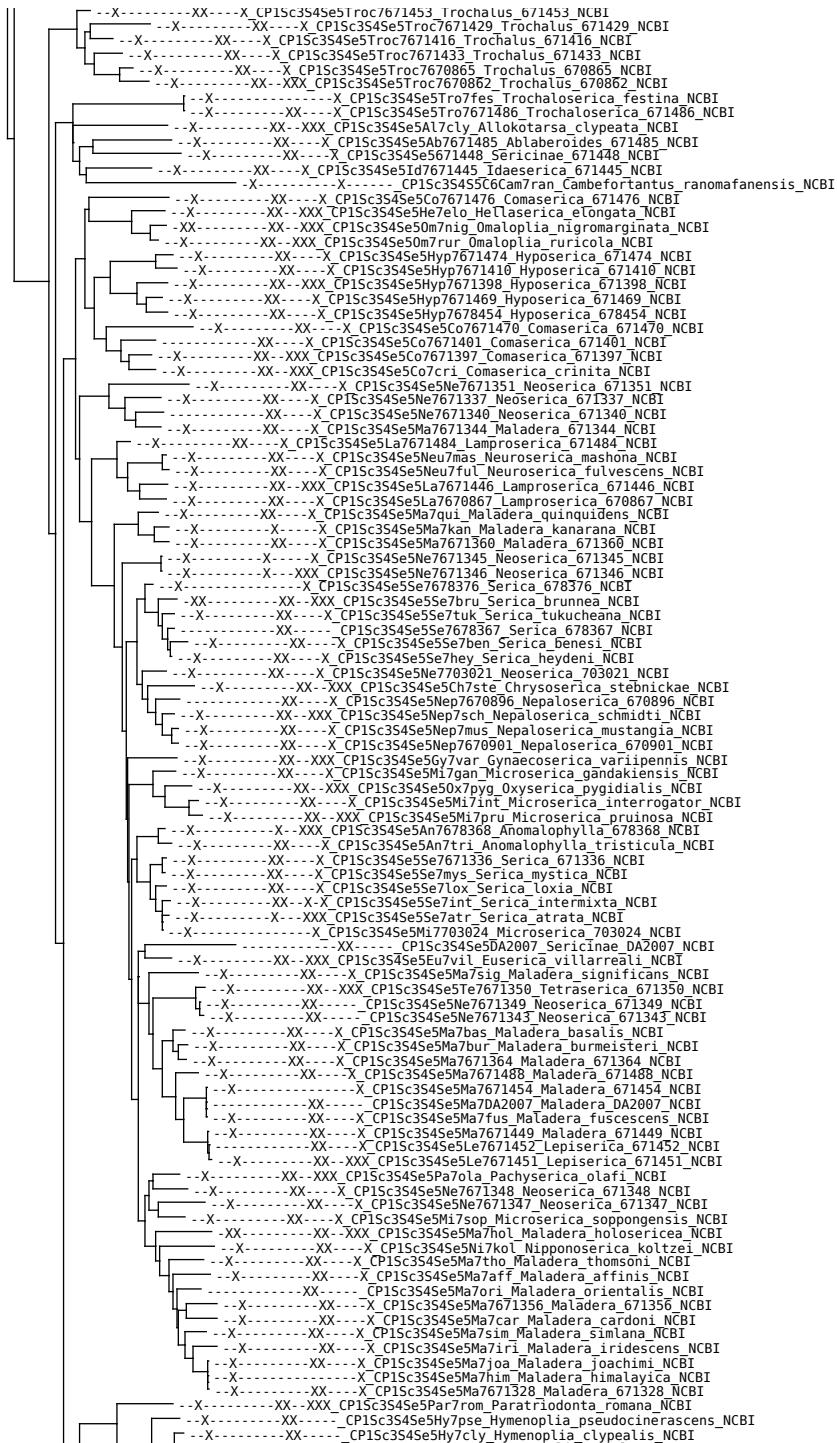
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- CP1Sc354D5Ph7dio Phyllognathus dionysius NCBI*
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- CP1Sc354D5Ho7qua Homophileurus quadratuberculatus NCBI*
- CP1Sc354D5He7dys Hemiphileurus dyscritus NCBI*
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- CP1Sc354D5Phi7you Phileurus youngi NCBI*
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- CP1Sc354R5An7dor Anomala dorsalis NCBI*
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- CP1Sc354R5Mi7sil Mimela siliguria NCBI*
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- CP1Sc354R5An7pol Anomala polita NCBI*
- CP1Sc354R5An7aul Anomala aulax NCBI*
- CP1Sc354R5An7luc Anomala luculenta NCBI*
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- CP1Sc354R5Ani7dis Anisoplia dispar NCBI*
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- CP1Sc3L4Lu5Lu7dat Lucanus datunensis NCBI*
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- CP1Sc3L4Lu5Lu7kur Lucanus kurosawai NCBI*
- CP1Sc3L4Lu5Lu7kan Lucanus kanoi NCBI*
- CP1Sc3L4Lu5Lu7mac Lucanus maculifemoratus NCBI*
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- CP1Sc354R5An7cupr Anomala cupricollis NCBI*
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- CP1Sc354R5An7AGL2012\_6 Anomala AGL2012\_NCBI*
- CP1Sc354R5An7AGL2012\_3 Anomala AGL2012\_NCBI*
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- CP1Sc354R5An7chap Anomala chapini NCBI*
- CP1Sc354R5An7cal Anomala calligrapha NCBI*
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- CP1Sc354R5An7euc Anomala eucoma NCBI*
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- CP1Sc354R5An7tra Anomala trapezifera NCBI*
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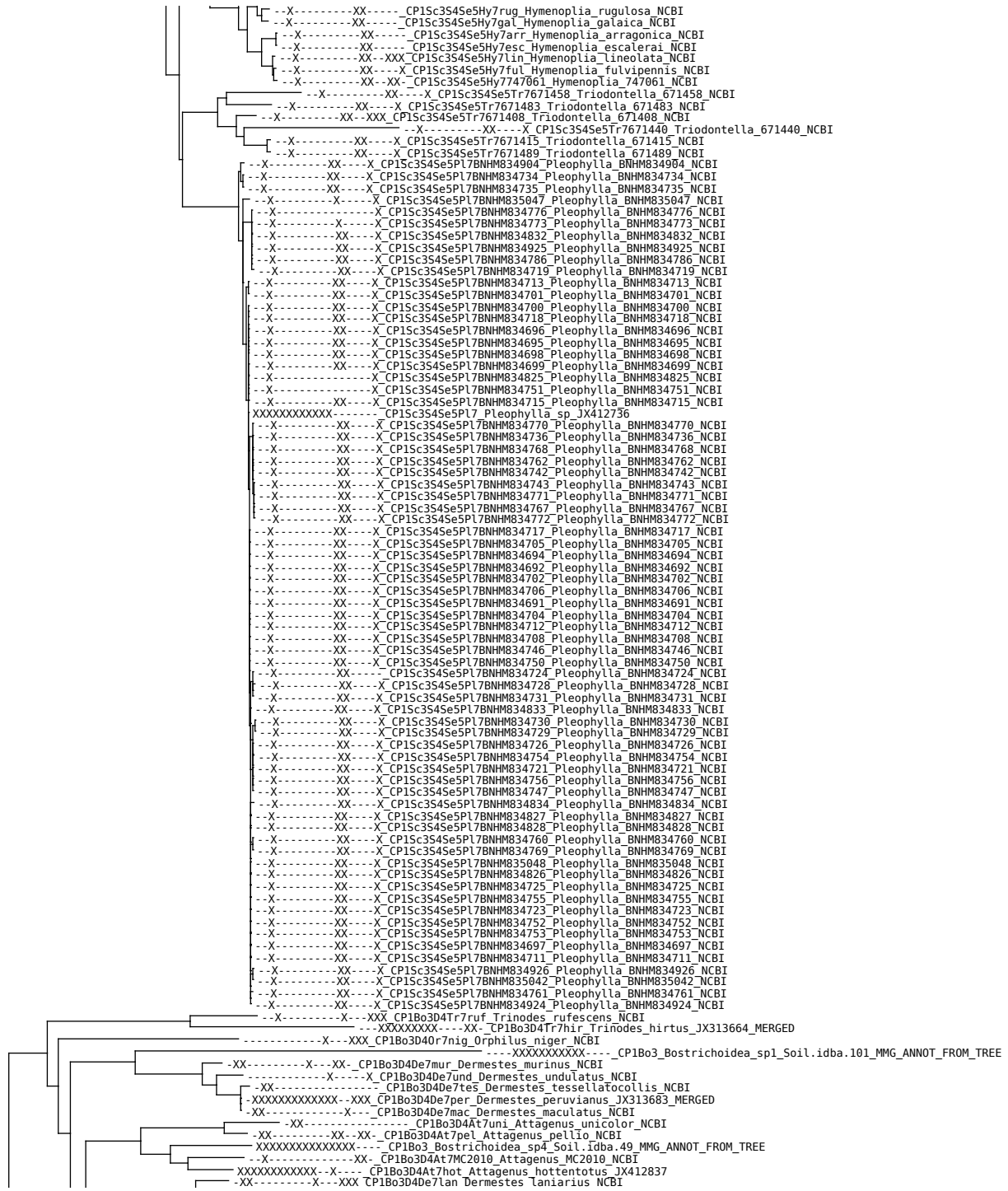


Phylogenetic tree showing relationships between various species, with taxonomic names and accession numbers listed on the right side of the branches. The tree is rooted on the left and branches out to the right. The species names are listed on the right side of the branches, often followed by their accession numbers in parentheses. The tree shows a complex branching pattern, indicating a diverse group of species. The species names are listed on the right side of the branches, often followed by their accession numbers in parentheses. The tree shows a complex branching pattern, indicating a diverse group of species.

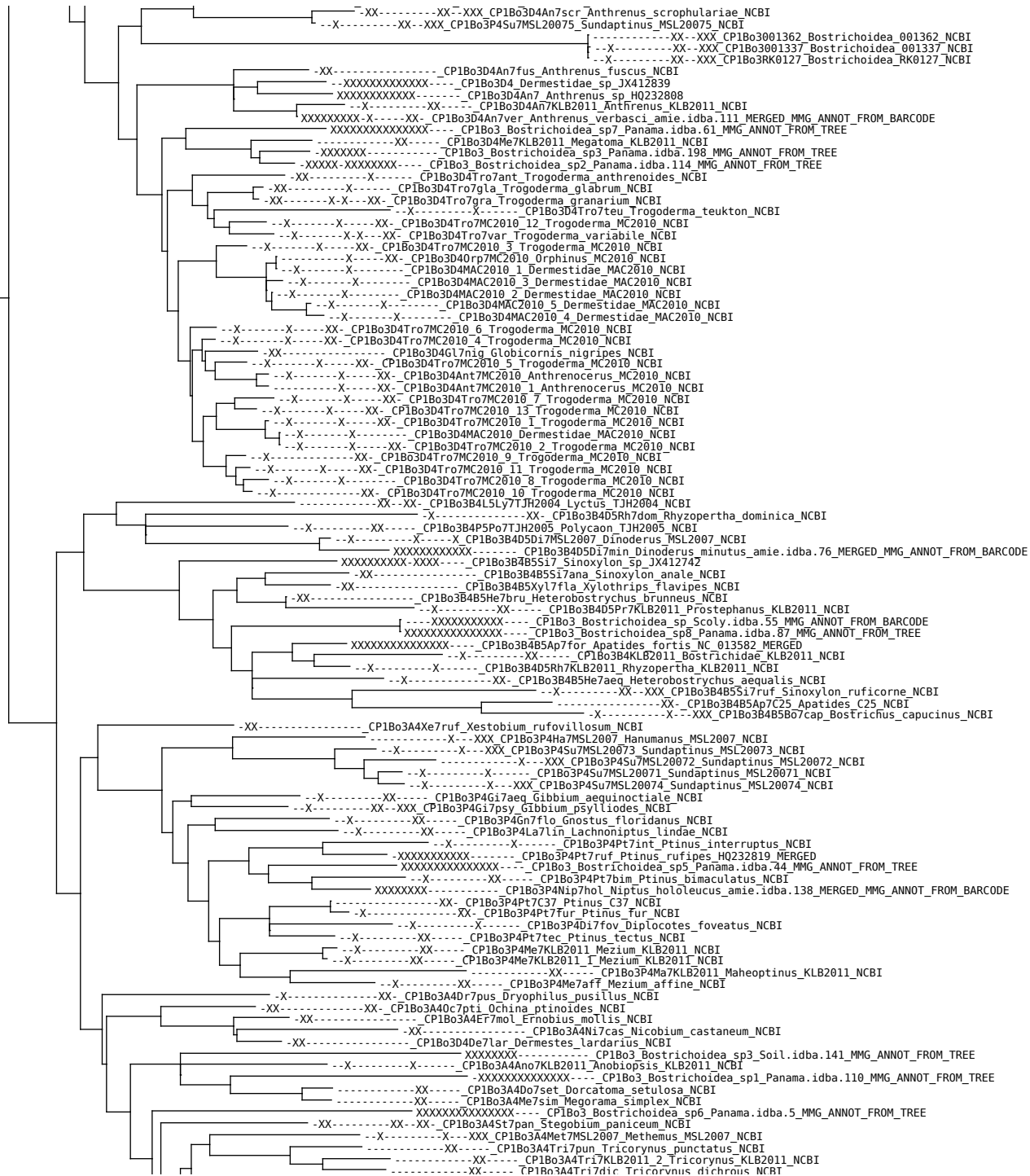
Species names and accession numbers listed on the right side of the branches include:

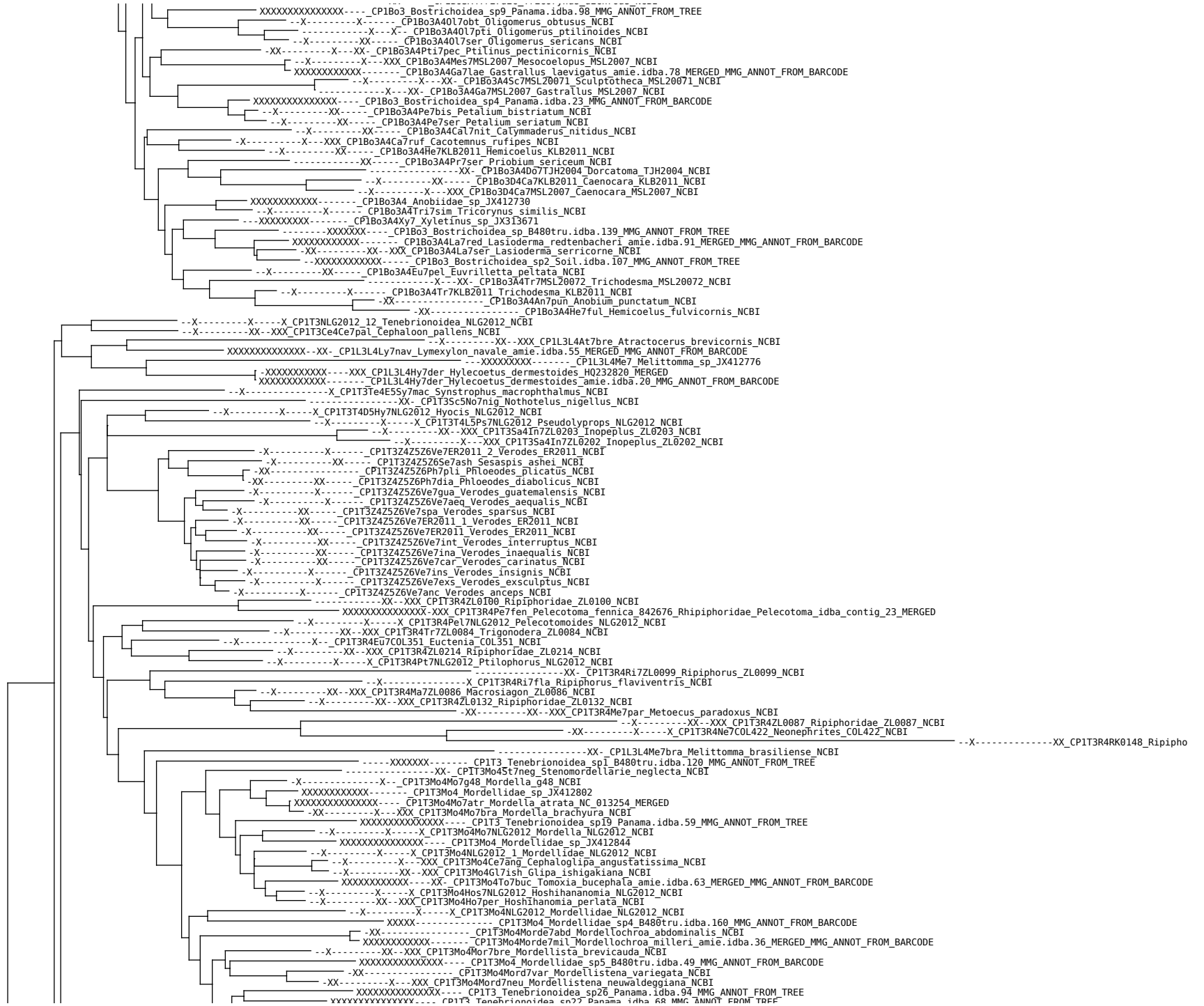
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- CP1Sc354C5In7cla\_Inca\_clathrata NCBI
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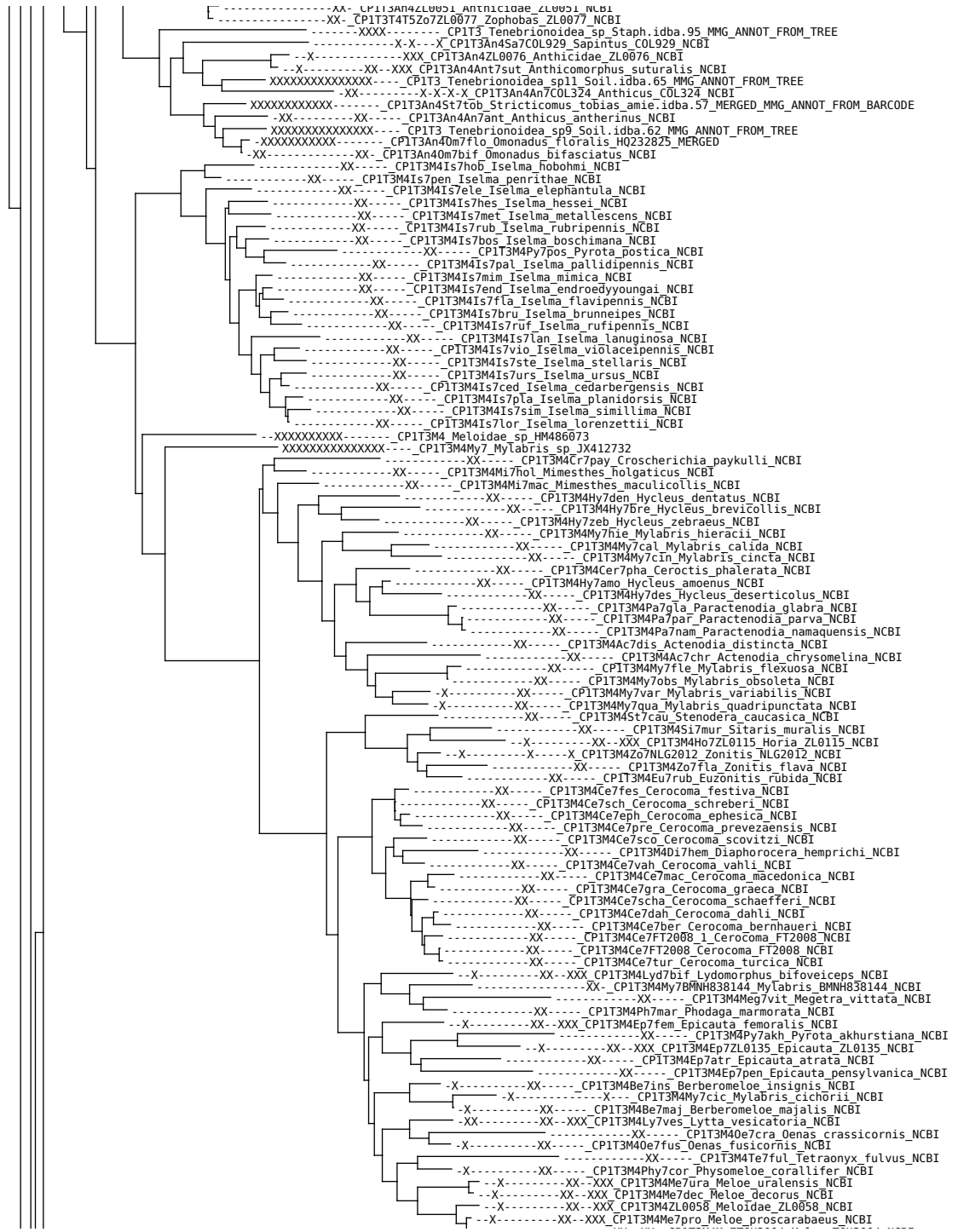




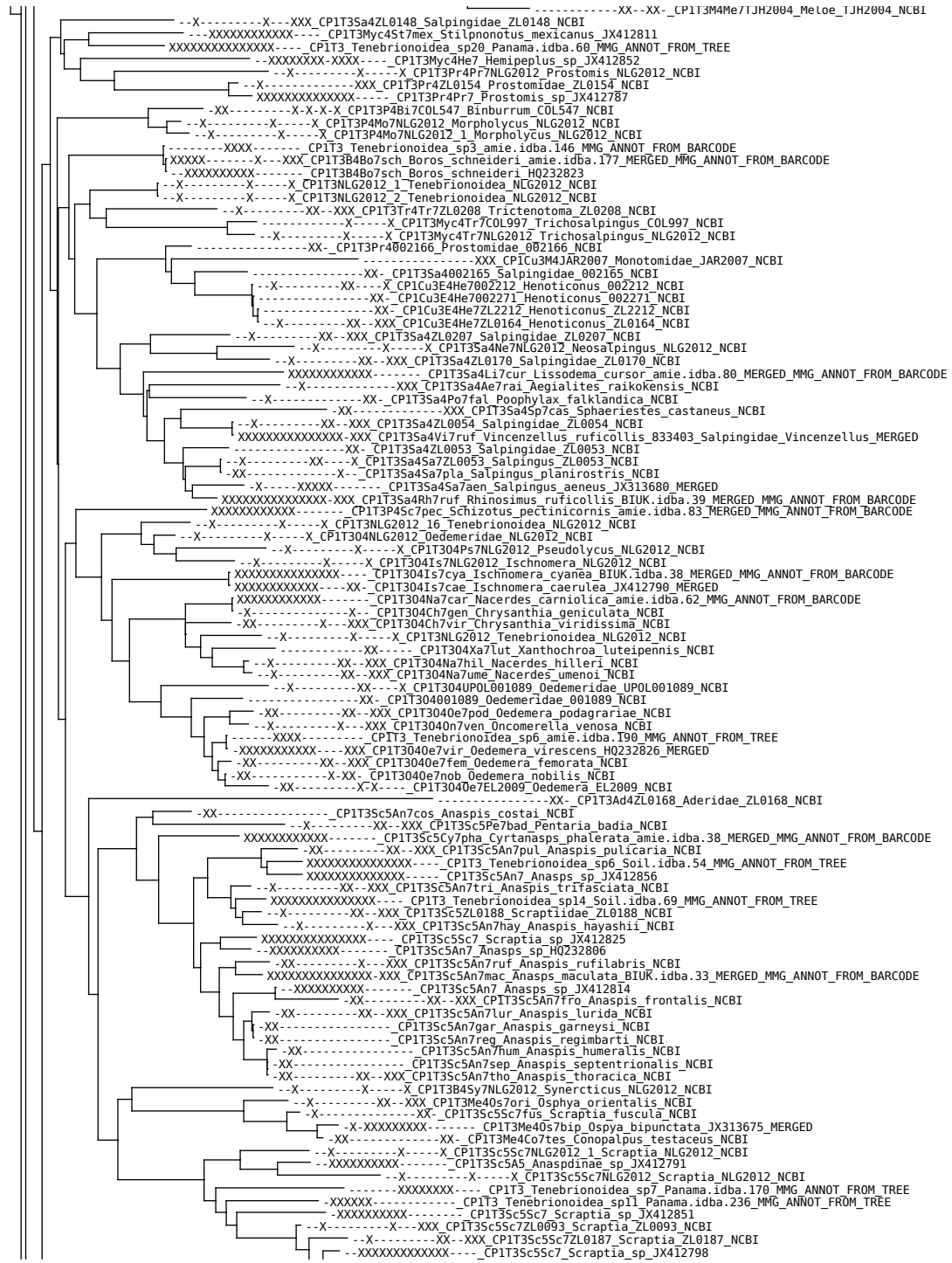


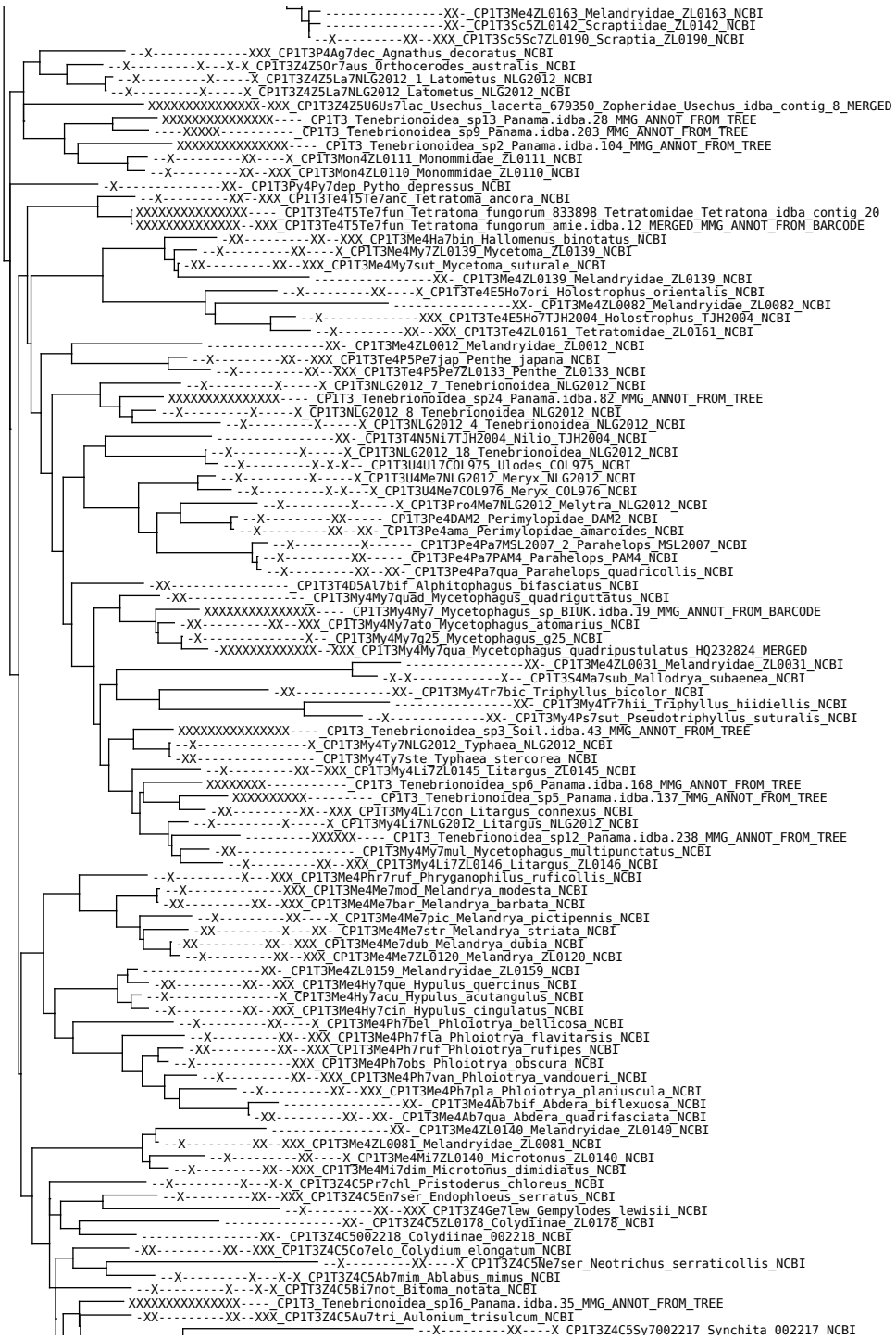


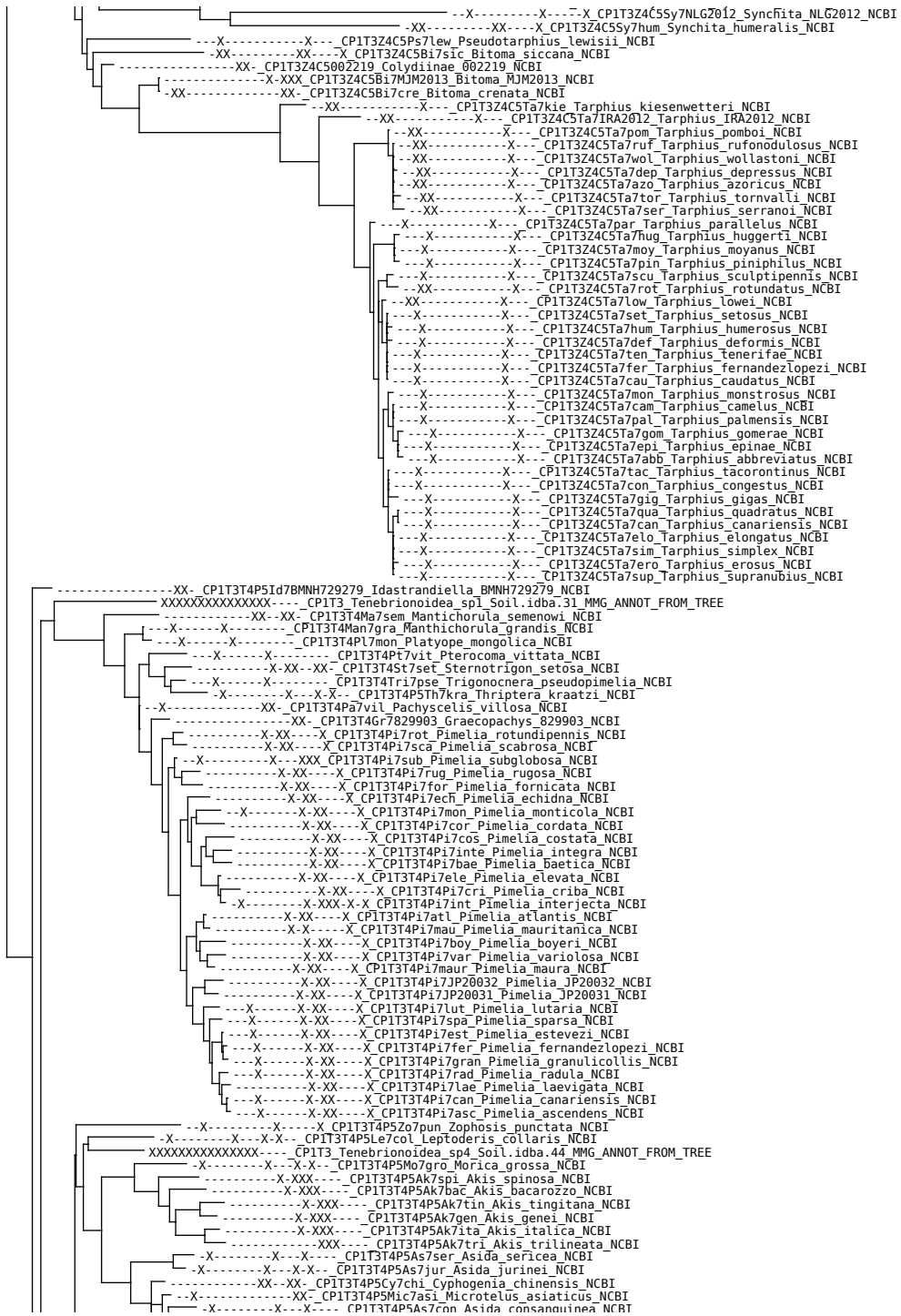




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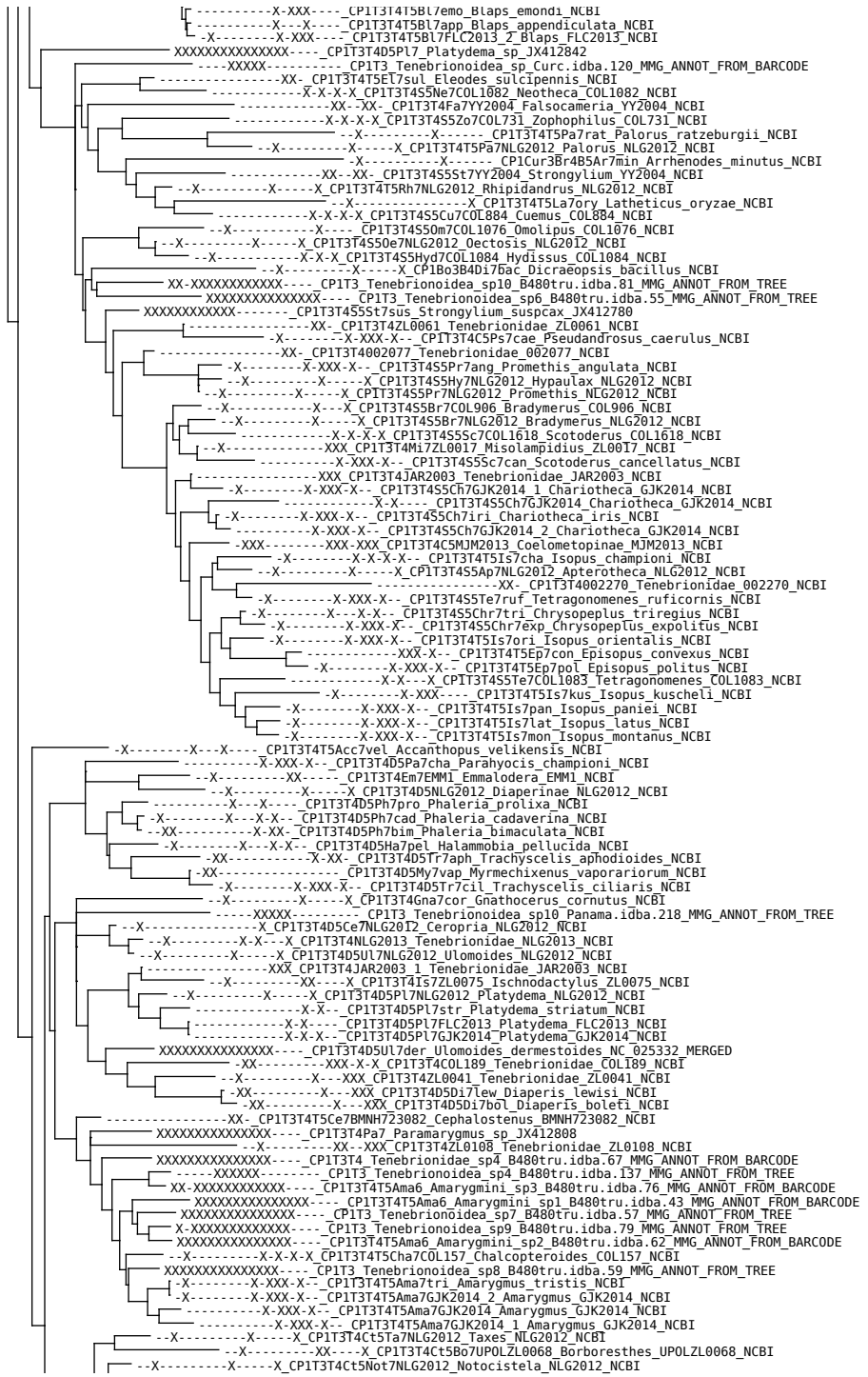








Phylogenetic tree showing relationships between various species, with labels such as CP1T3T4T5Lea7NLG2012\_1, CP1T3T4T5Lea7NLG2012\_2, and CP1T3T4T5Lea7NLG2012\_3. The tree is rooted on the left and branches out to the right. Species names are listed on the right side of the tree, often followed by their NCBI accession numbers. The tree is annotated with 'X' and 'XX' characters, likely indicating specific characteristics or data points for each species. The tree is highly branched, showing a complex evolutionary history. The labels are in a monospace font, and the tree structure is represented by vertical and horizontal lines.







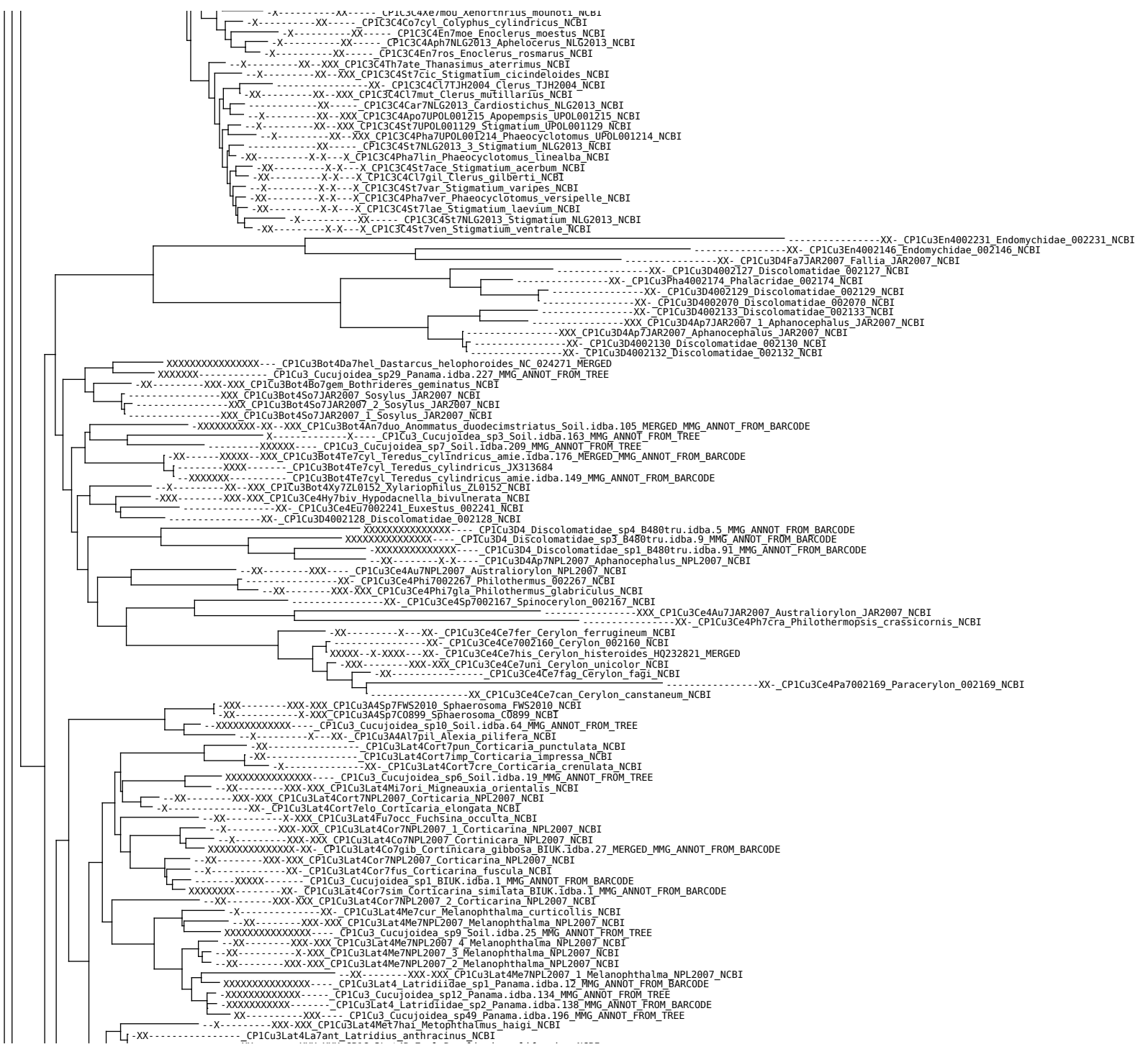


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Phylogenetic tree showing relationships between various species, with taxonomic labels and accession numbers. The tree is rooted on the left and branches out to the right. Labels include species names and accession numbers, often followed by database identifiers like NCBI or MMG\_ANNOT\_FROM\_BARCODE. The tree is highly branched, indicating a large number of species and their evolutionary relationships.

Key species and accession numbers visible in the tree include:

- CP1C3C4Epi7bas\_Epiclines\_basalis\_NCBI
- CP1C3C4De7san\_Dermestoides\_sanguinicollis\_NCBI
- CP1C3C4Cleridae\_sp2\_B480tru.idba.47\_MMG\_ANNOT\_FROM\_BARCODE
- CP1C3C4Te7UPOL001158\_Tenerus\_UPOL001158\_NCBI
- CP1C3C4Te7abb\_Tenerus\_abbreviatus\_NCBI
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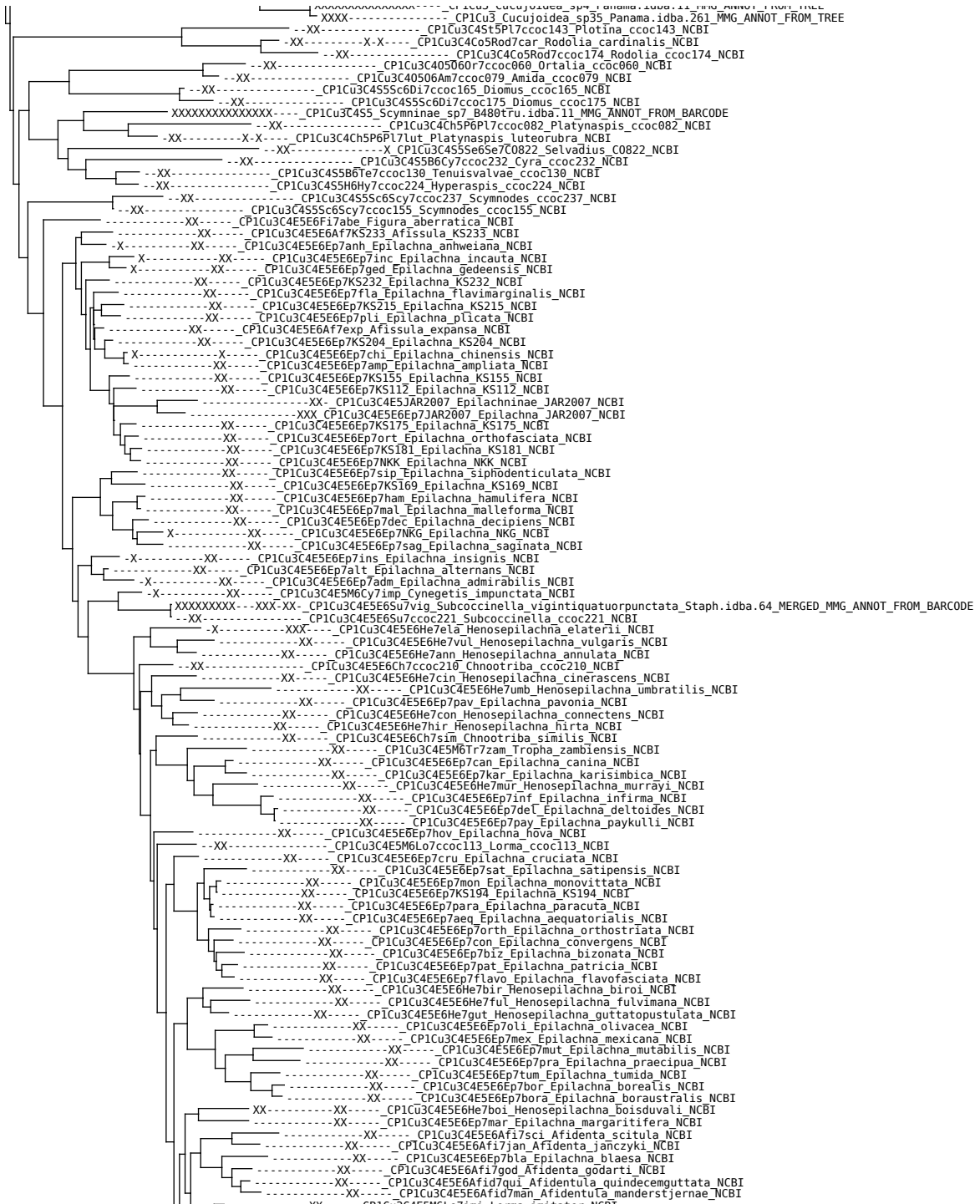


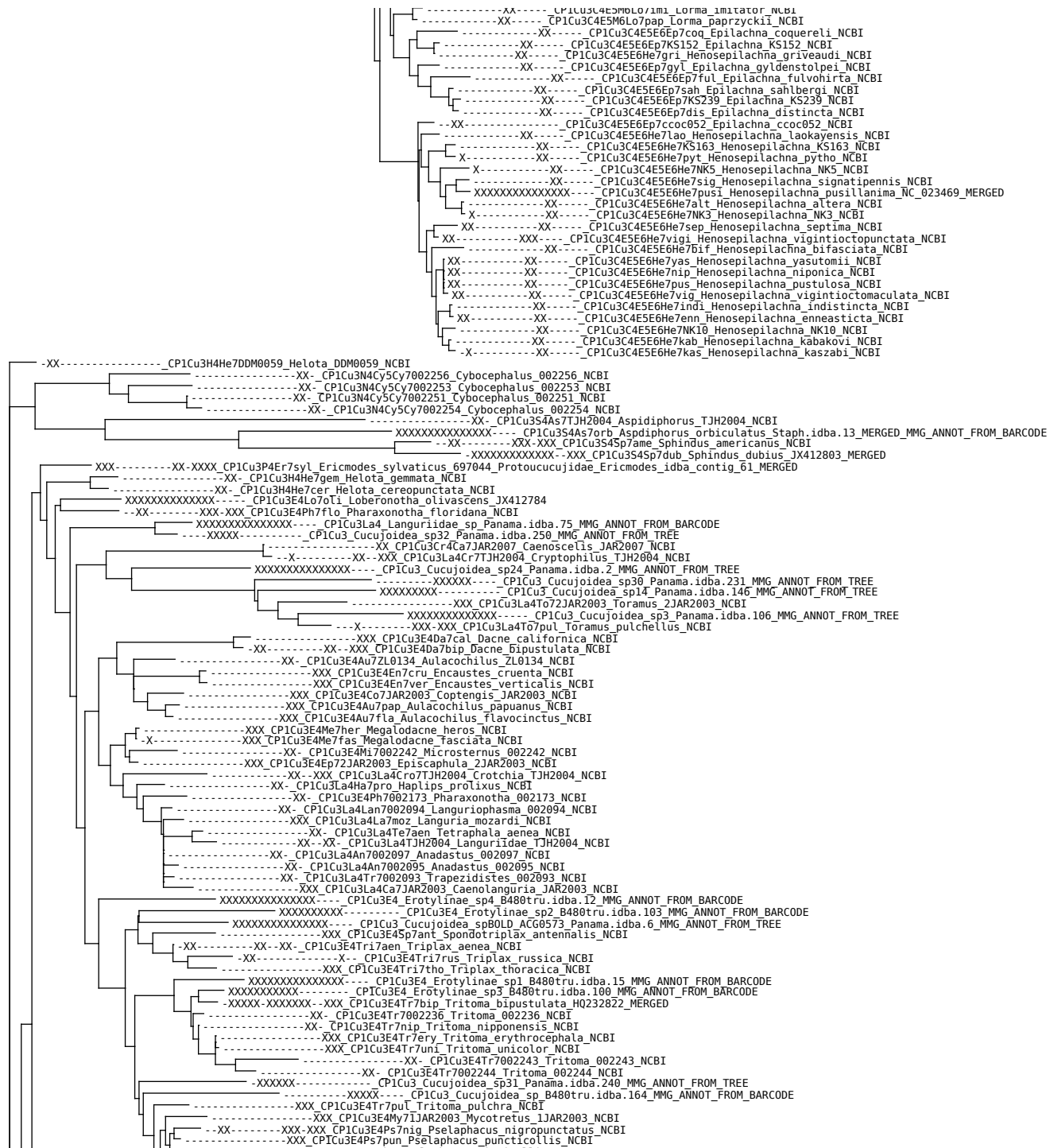








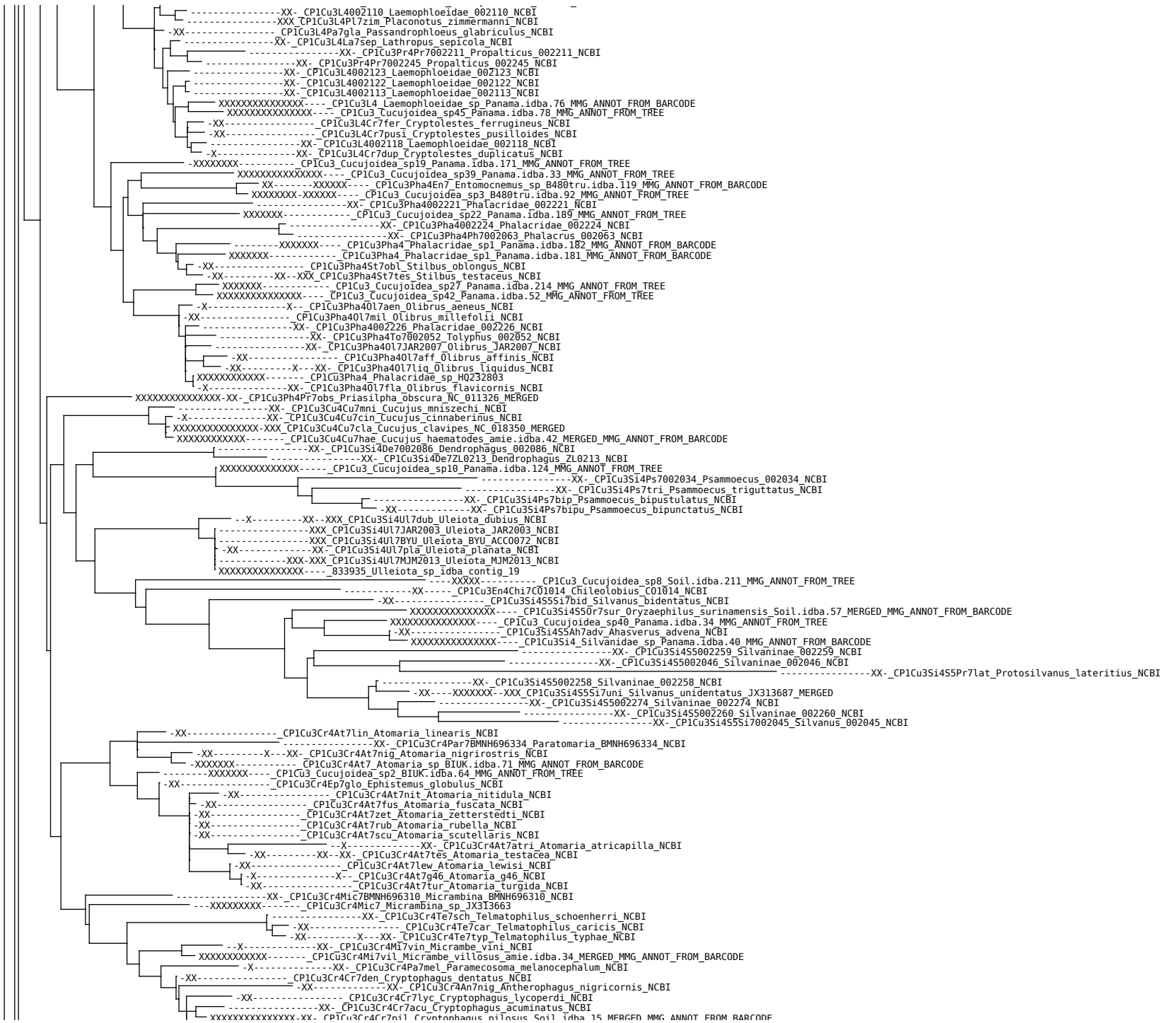








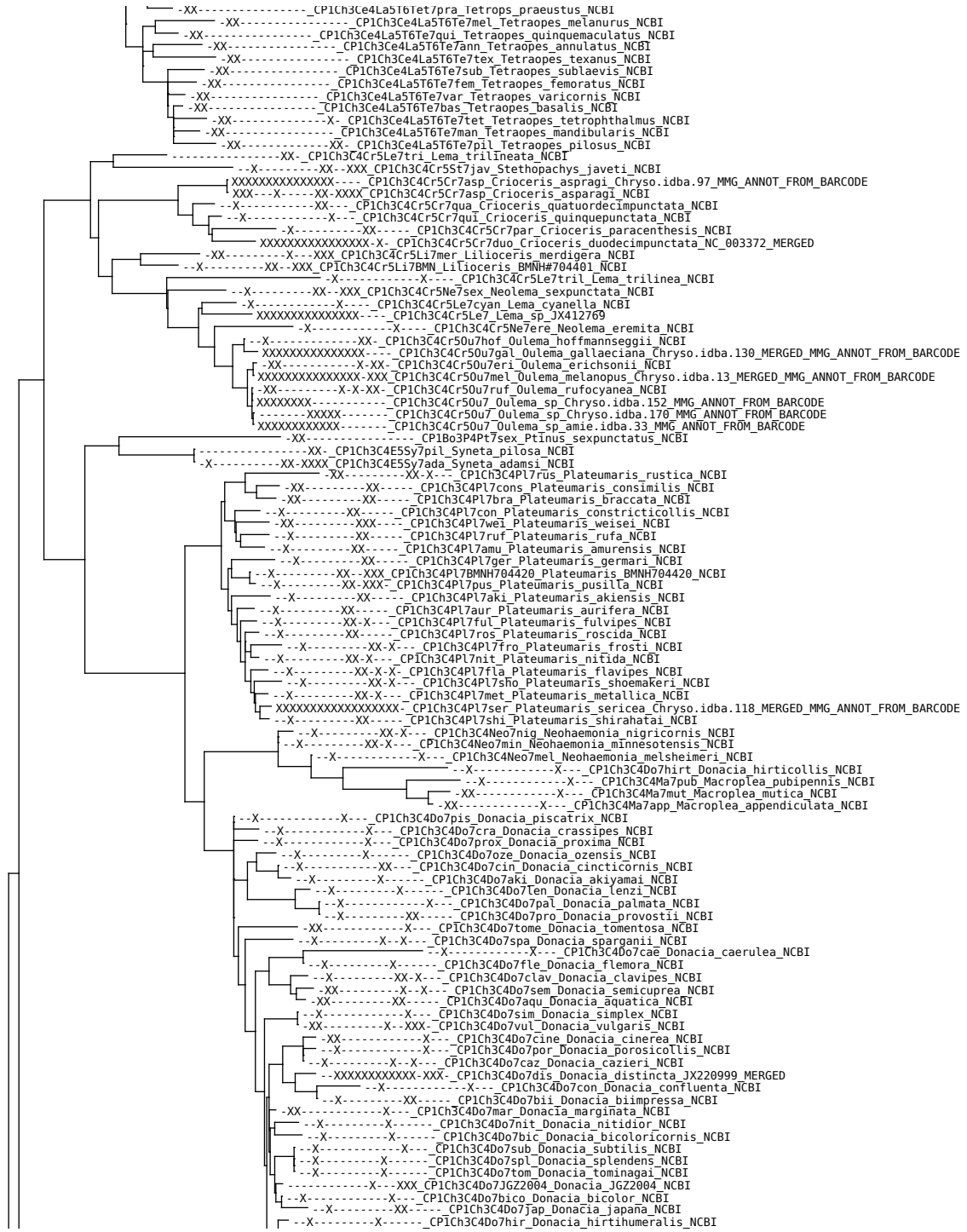


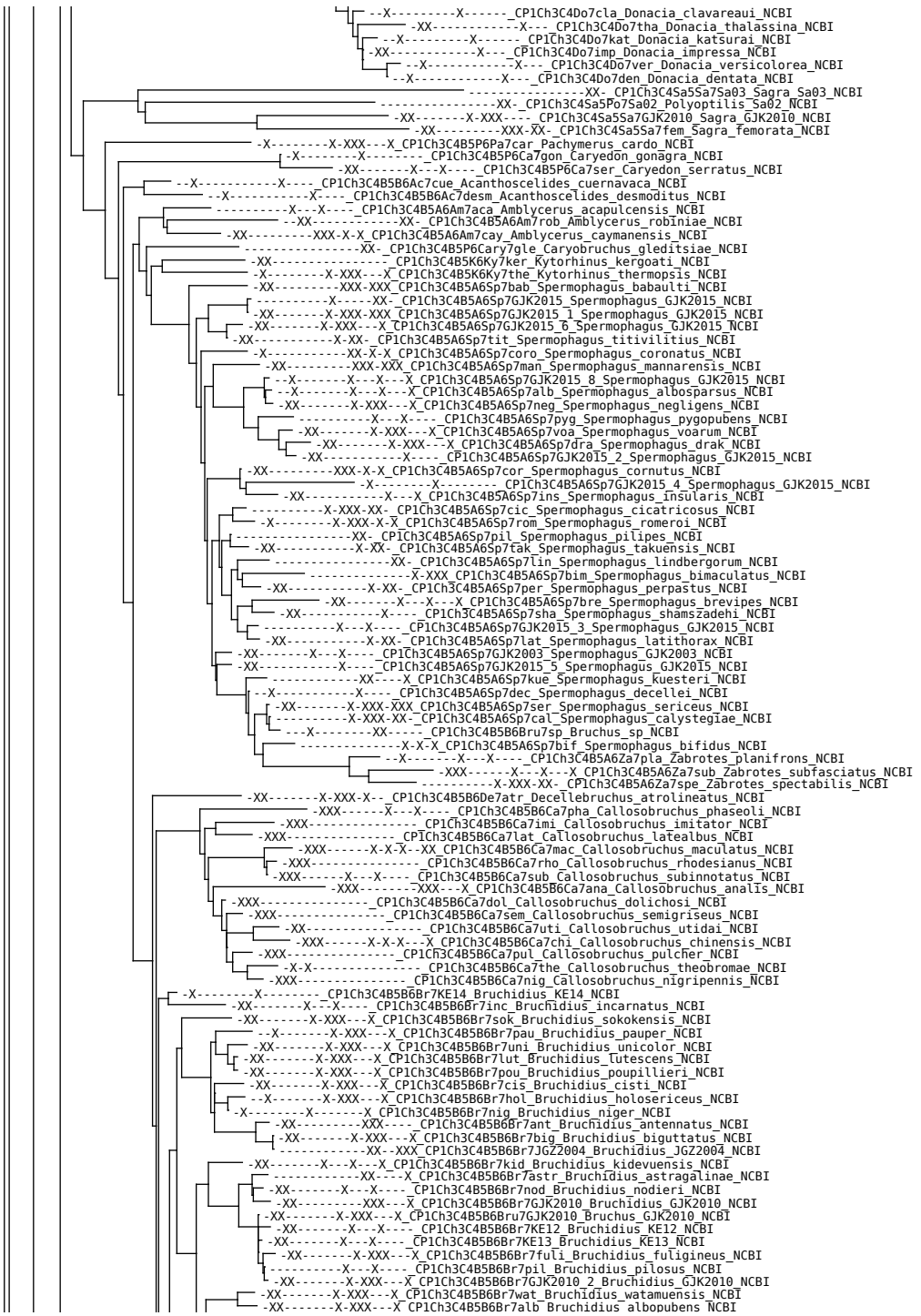






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Phylogenetic tree showing relationships between various species of Bruchidae, including *Merobruchus julianus*, *Bruchidius nigricornis*, *Bruchidius malindensis*, *Bruchidius lineatopygus*, *Conicobruchus subdolos*, *Bruchidius GJK2010*, *Conicobruchus medaniensis*, *Conicobruchus decoratus*, *Conicobruchus rubricollis*, *Conicobruchus cicatricosus*, *Conicobruchus strangulatus*, *Conicobruchus GJK2010*, *Conicobruchus flabellicornis*, *Conicobruchus atrosuturalis*, *Bruchus sakeensis*, *Bruchidius Kell*, *Stator sordidus*, *Stator pygidialis*, *Stator chihuahua*, *Stator subaeneus*, *Stator bottimeri*, *Stator mexicanus*, *Stator chalcodermis*, *Stator pruininus*, *Stator limbatus*, *Stator testularius*, *Stator beali*, *Stator aegrotus*, *Stator monachus*, *Stator maculatus*, *Stator trisignatus*, *Stator furcatus*, *Stator vittathorax*, *Stator tigris*, *Stator vachelliae*, *Stator generalis*, *Stator parvae*, *Bruchidius terrenus*, *Bruchus lentis*, *Bruchus griseomaculatus*, *Bruchus emarginatus*, *Bruchus pisorum*, *Acanthoscelides mexicanus*, *Acanthoscelides obtectus*, *Acanthoscelides obvelatus*, *Acanthoscelides argillaceus*, *Acanthoscelides sanfordi*, *Acanthoscelides desmodicola*, *Stylinus styliifer*, *Bruchidius niokotobaensis*, *Bruchidius cadei*, *Bruchidius pygidiopictus*, *Bruchidius urbanus*, *Bruchidius campylacanthae*, *Bruchidius dichrostachydis*, *Bruchidius KE07*, *Bruchidius natalensis*, *Bruchidius sinensis*, *Bruchidius KE05*, *Pygobruchidius latiorithorax*, *Bruchidius KE04*, *Tuberculobruchus babaulti*, *Bruchidius KE08*, *Bruchinae sp. JX412832*, *Bruchidius saundersi*, *Tuberculobruchus albizziarum*, *Bruchidius KE09*, *Bruchidius rubicundus*, *Bruchidius KE10*, *Bruchidius submaculatus*, *Tuberculobruchus silaceus*, *Bruchidius KE01*, *Bruchidius auratopubens*, *Bruchidius flavovirens*, *Bruchidius aureus*, *Bruchidius lineolatus*, *Bruchidius quadrisignatus*, *Bruchidius sparsomaculatus*, *Tuberculobruchus subuniformis*, *Bruchidius KE02*, *Bruchidius Kiliwaensis*, *Bruchidius SE01*, *Bruchidius chloroticus*, *Bruchidius securiger*, *Bruchidius centromaculatus*, *Bruchidius grandemaculatus*, *Bruchidius KE03*, *Bruchidius KE06*, *Bruchidius uberatus*, *Bruchidius raddianae*, *Bruchidius aurivillii*, *Bruchidius saudicus*, *Bruchidius astragali*, *Bruchidius caninus*, *Bruchidius marginalis*, *Bruchidius lividimanus*, *Bruchidius villosus*, *Bruchidius tuberculatus*, *Bruchidius RMNH#704365*.





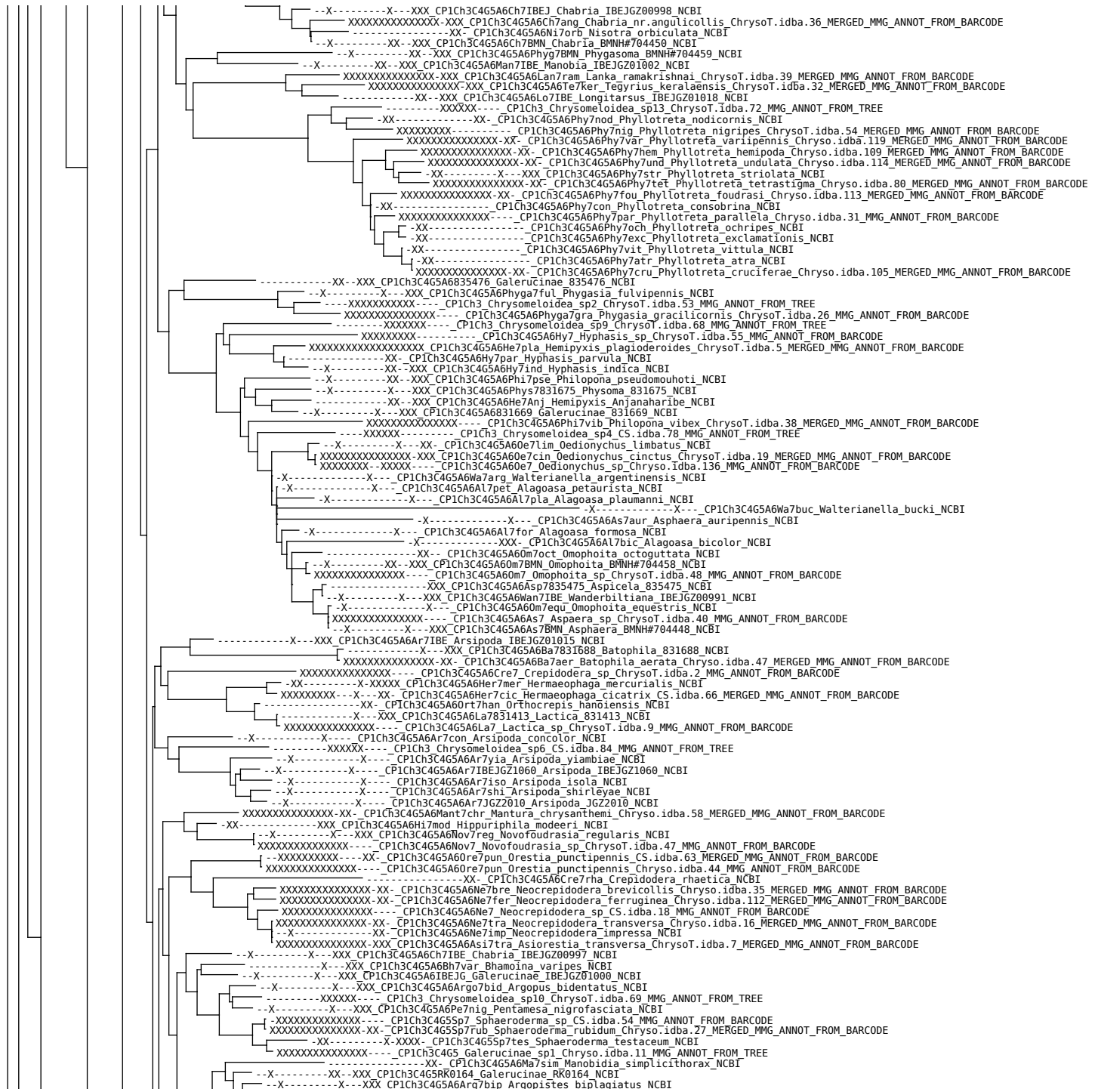


Phylogenetic tree showing relationships between various species, primarily focusing on the Chrysolinidae and Cyrtonus genera. The tree is rooted on the left and branches out to the right. Each terminal node is labeled with a species name and its corresponding NCBI accession number. The labels are preceded by a series of 'X' characters indicating the support or inclusion of that node in the analysis. The species names are often followed by their source database, such as 'Chryso.idba.123\_MERGED\_MMG\_ANNOT\_FROM\_BARCODE'.

Species listed include:

- Calligrapha amator* NCBI
- Calligrapha scalaris* NCBI
- Calligraphaalni* NCBI
- Chrysomelinae* BMNH#704396 NCBI
- Chrysomelidae* sp. JX412783
- Platyphora vespertina* NCBI
- Platyphora kollari* NCBI
- Platyphora albivirens* NCBI
- Platyphora heliogenae* NCBI
- Platyphora arangoi* NCBI
- Platyphora bella* NCBI
- Platyphora haefoldi* NCBI
- Platyphora panamensis* NCBI
- Platyphora petulans* NCBI
- Platyphora boucardi* NCBI
- Platyphora spectabilis* NCBI
- Platyphora ligata* NCBI
- Platyphora opima* NCBI
- Platyphora eucosma* NCBI
- Platyphora decorata* NCBI
- Platyphora AT2001* NCBI
- Platyphora sphaerica* NCBI
- Platyphora amabilis* NCBI
- Platyphora microspina* NCBI
- Platyphora salvigny* NCBI
- Desmogramma lunghi* NCBI
- Doryphora* BMNH#704376 NCBI
- Proseicela bivittata* NCBI
- Leptinotarsa cacica* NCBI
- Labidomera clivicollis* NCBI
- Leptinotarsa haldemani* NCBI
- Leptinotarsa decemlineata* NCBI
- Sphaerasterix* BMNH#704390 NCBI
- Ambrostoma quadrimpressum* NCBI
- Chrysolina varians* NCBI
- Chrysolina hyperici* Chryso.idba.134\_MERGED\_MMG\_ANNOT\_FROM\_BARCODE
- Chrysolina brunsvicensis* NCBI
- Chrysolina quadrigemina* NCBI
- Chrysolina geminata* NCBI
- Oreina liturata* NCBI
- Oreina viridis* NCBI
- Oreina bifrons* NCBI
- Oreina gloriosa* NCBI
- Oreina variabilis* NCBI
- Oreina ganglbaueri* NCBI
- Oreina speciosa* NCBI
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- Chrysolina fastuosa* NCBI
- Oreina bidentata* NCBI
- Oreina coerulea* NCBI
- Oreina speciosissima* NCBI
- Oreina cacaliae* NCBI
- Chrysolina bicolor* NCBI
- Oreina virgulata* NCBI
- Oreina frigida* NCBI
- Oreina elongata* NCBI
- Chrysolina helopioides* NCBI
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- Chrysolina polita* Chryso.idba.123\_MERGED\_MMG\_ANNOT\_FROM\_BARCODE
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- Chrysolina affinis* NCBI
- Chrysolina femoralis* NCBI
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- Chrysolina graminis* NCBI
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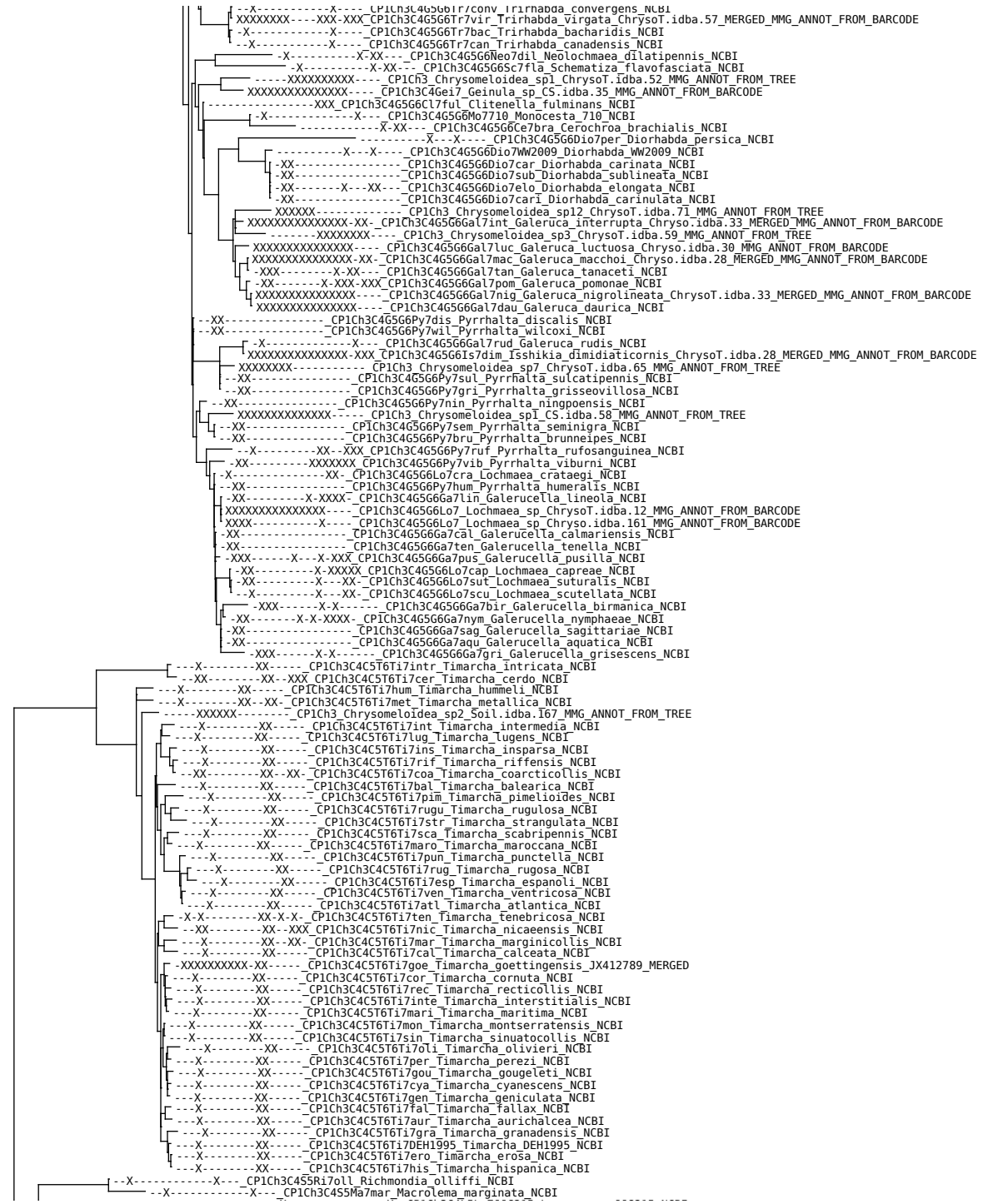




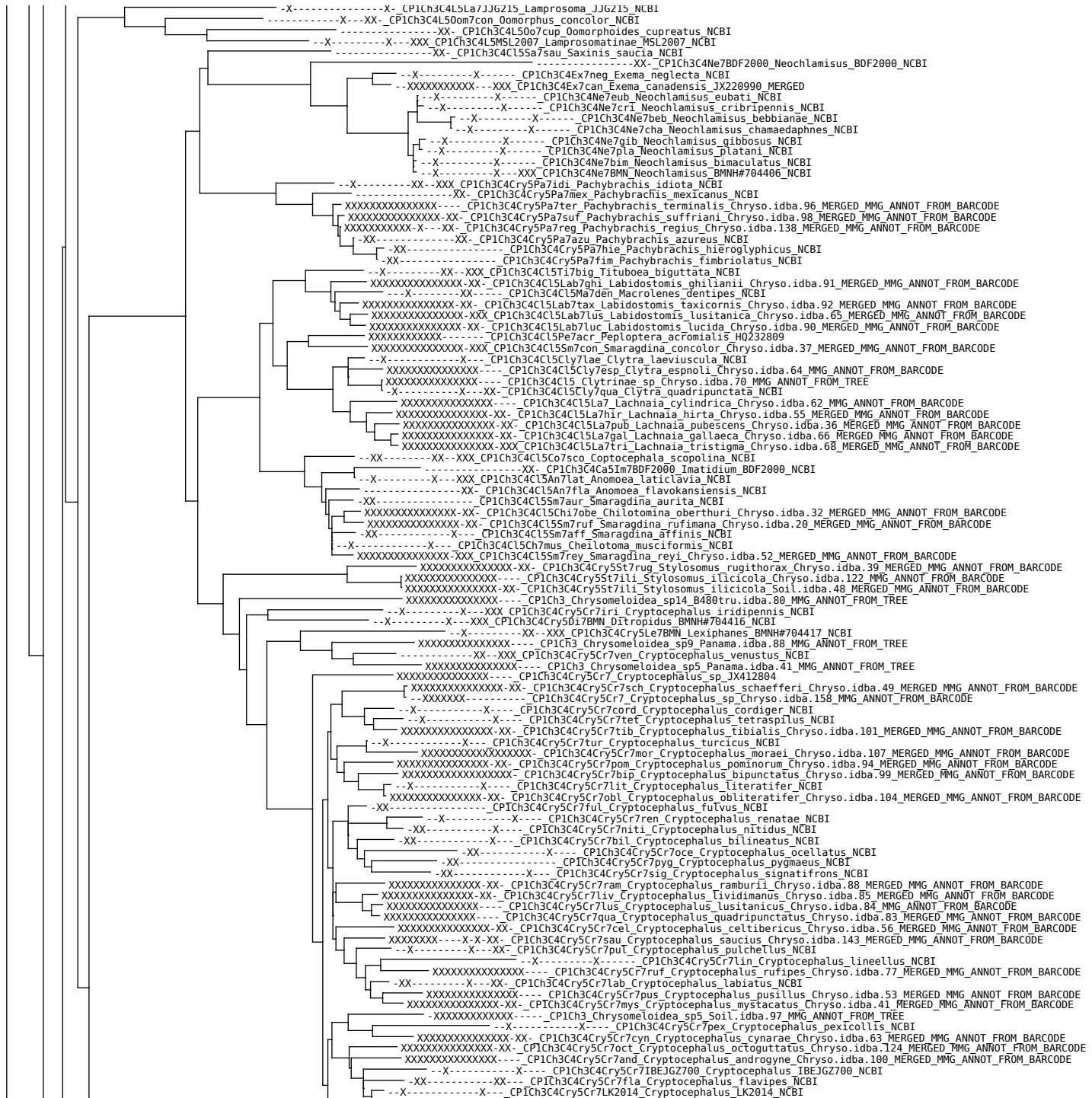
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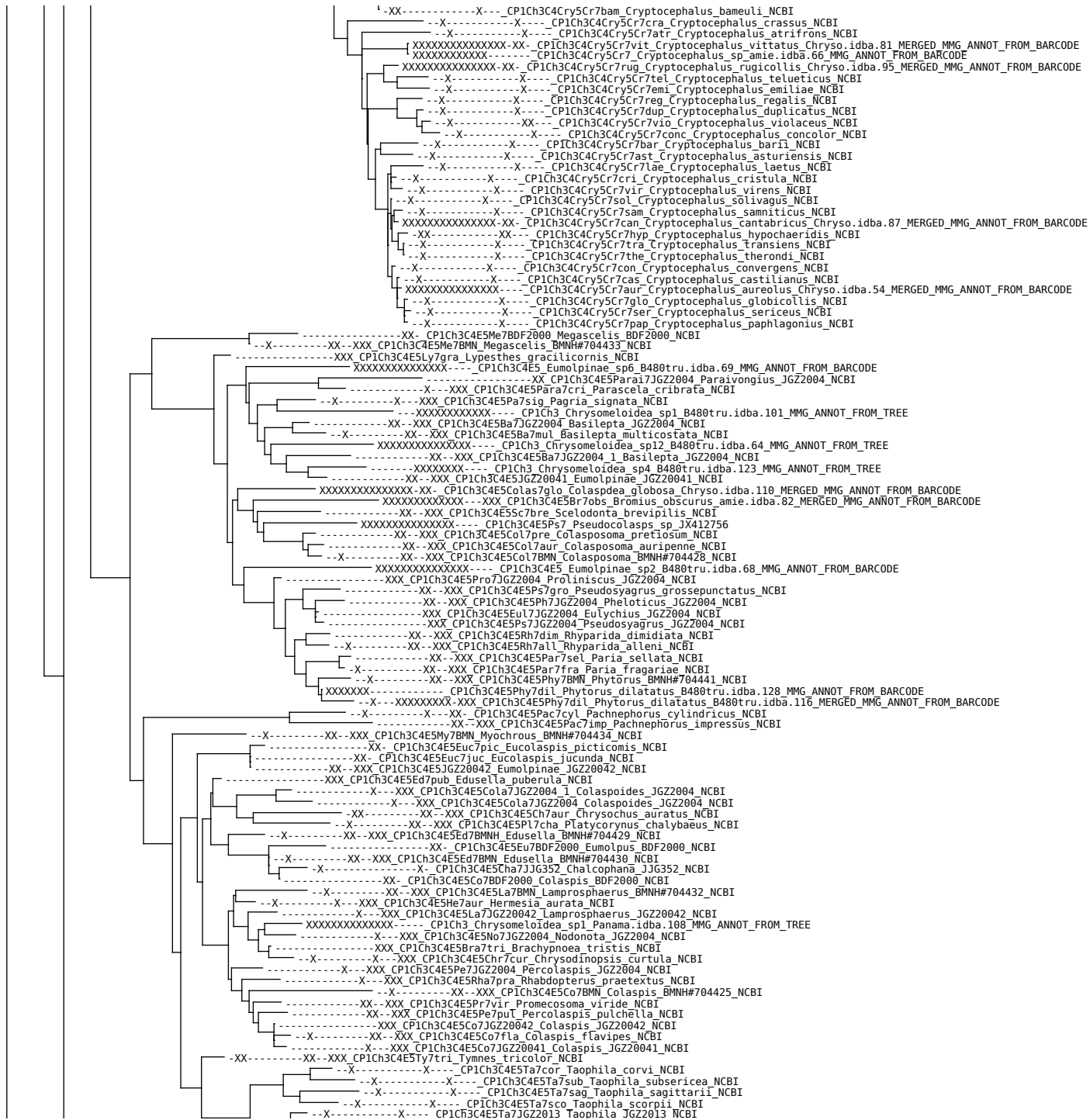


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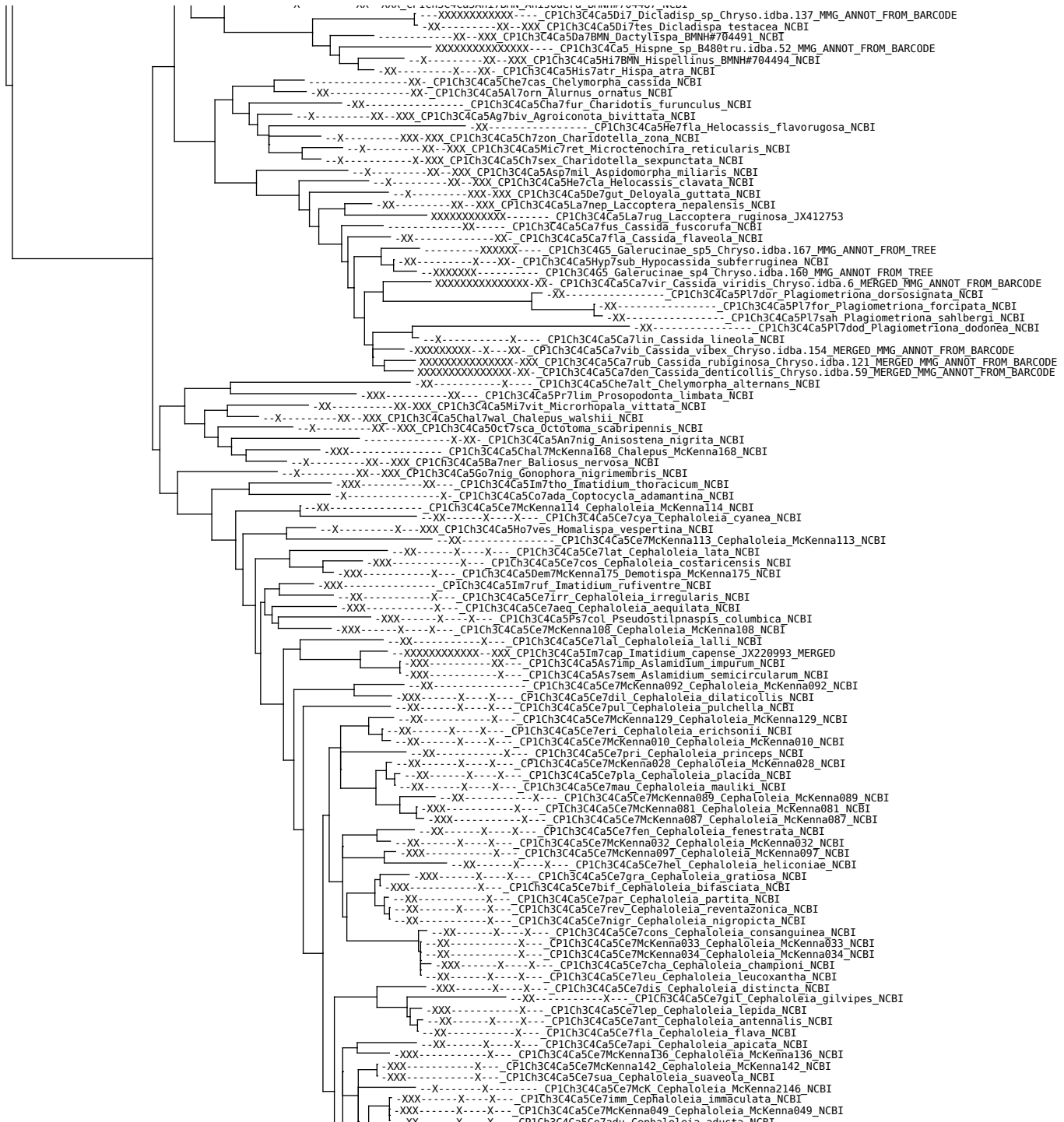








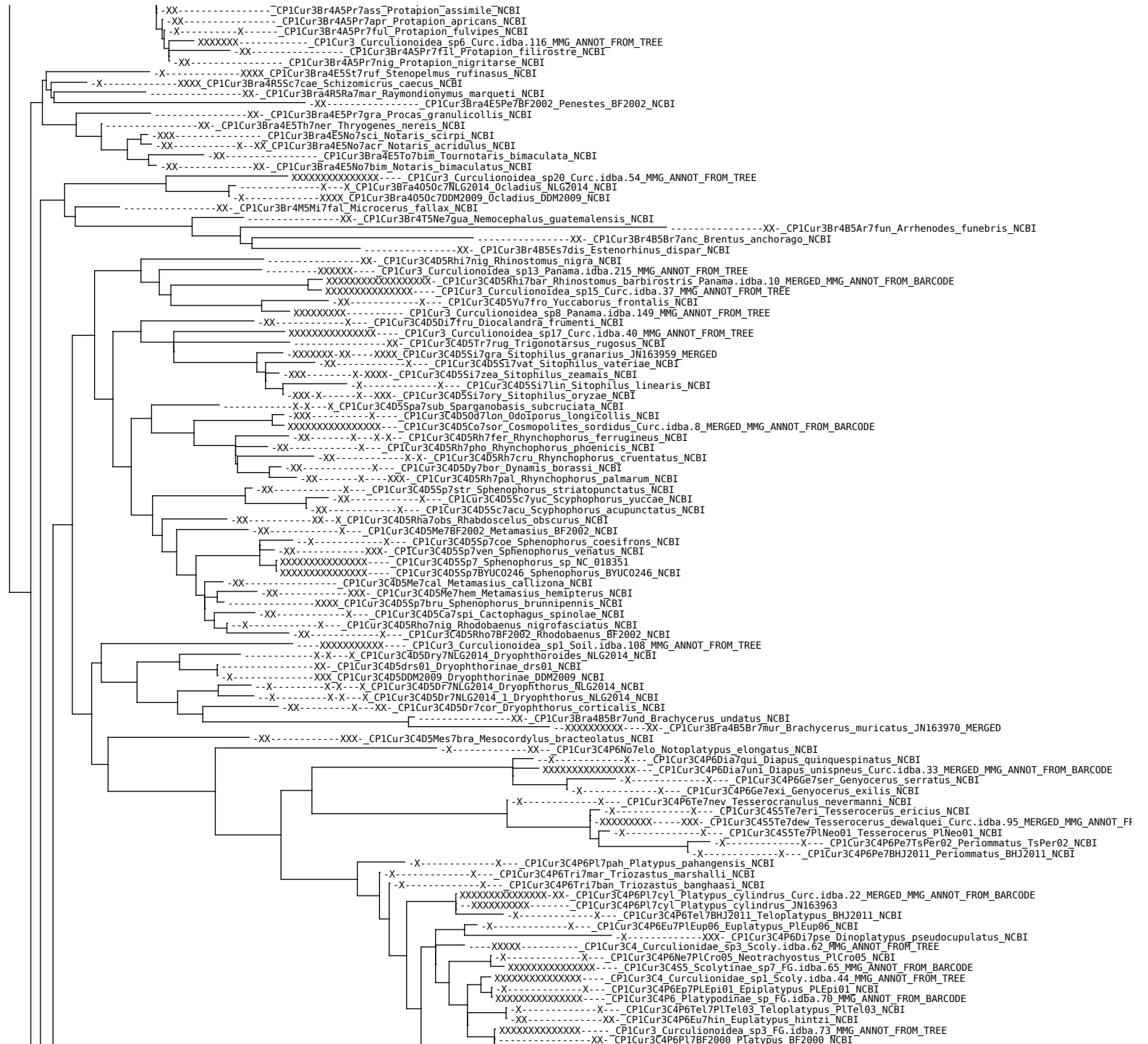




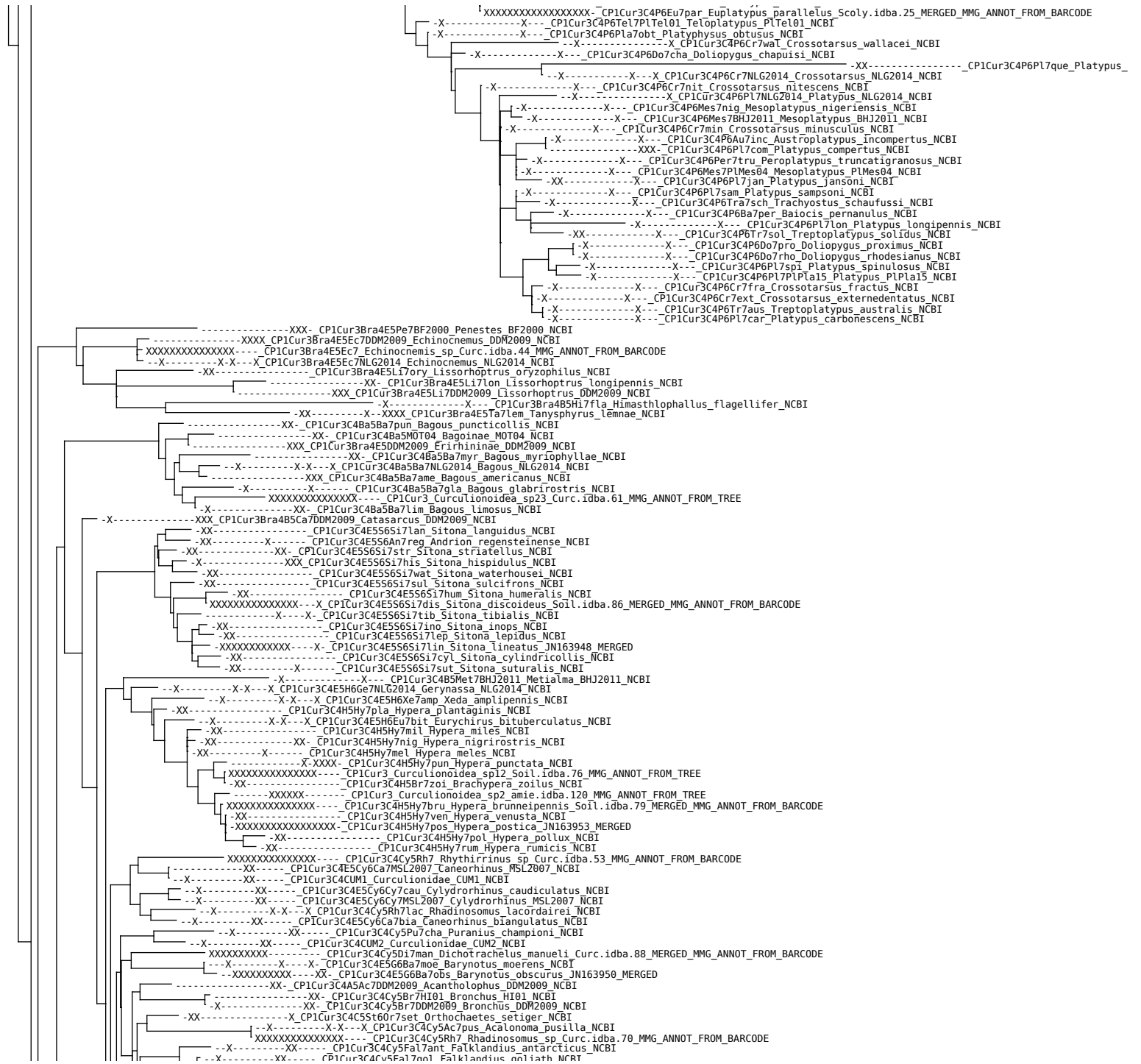












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