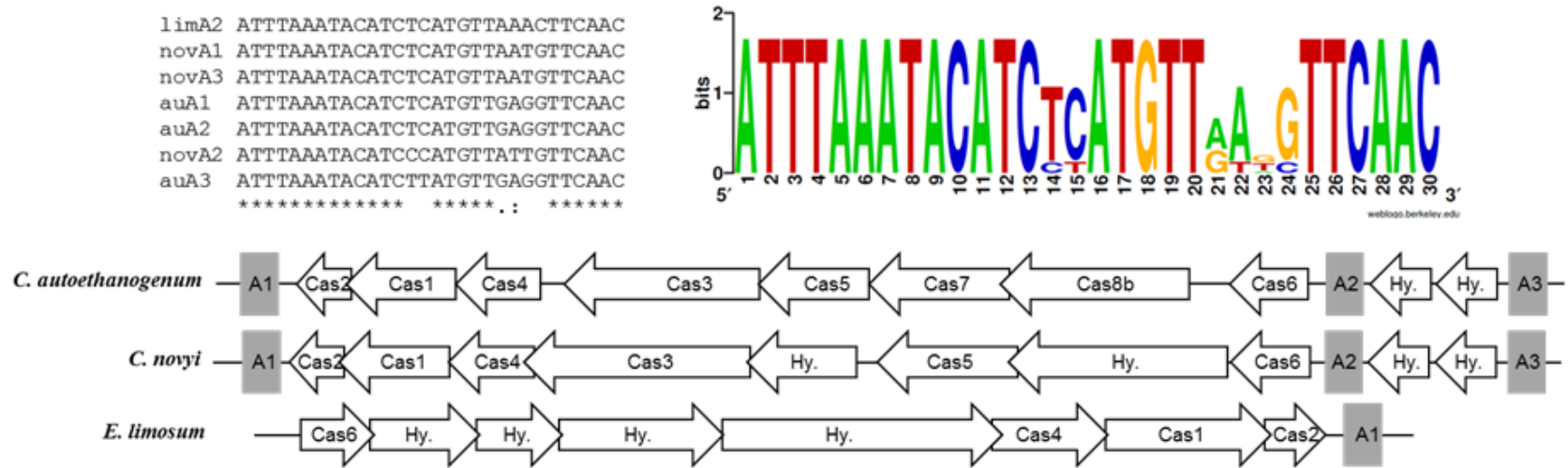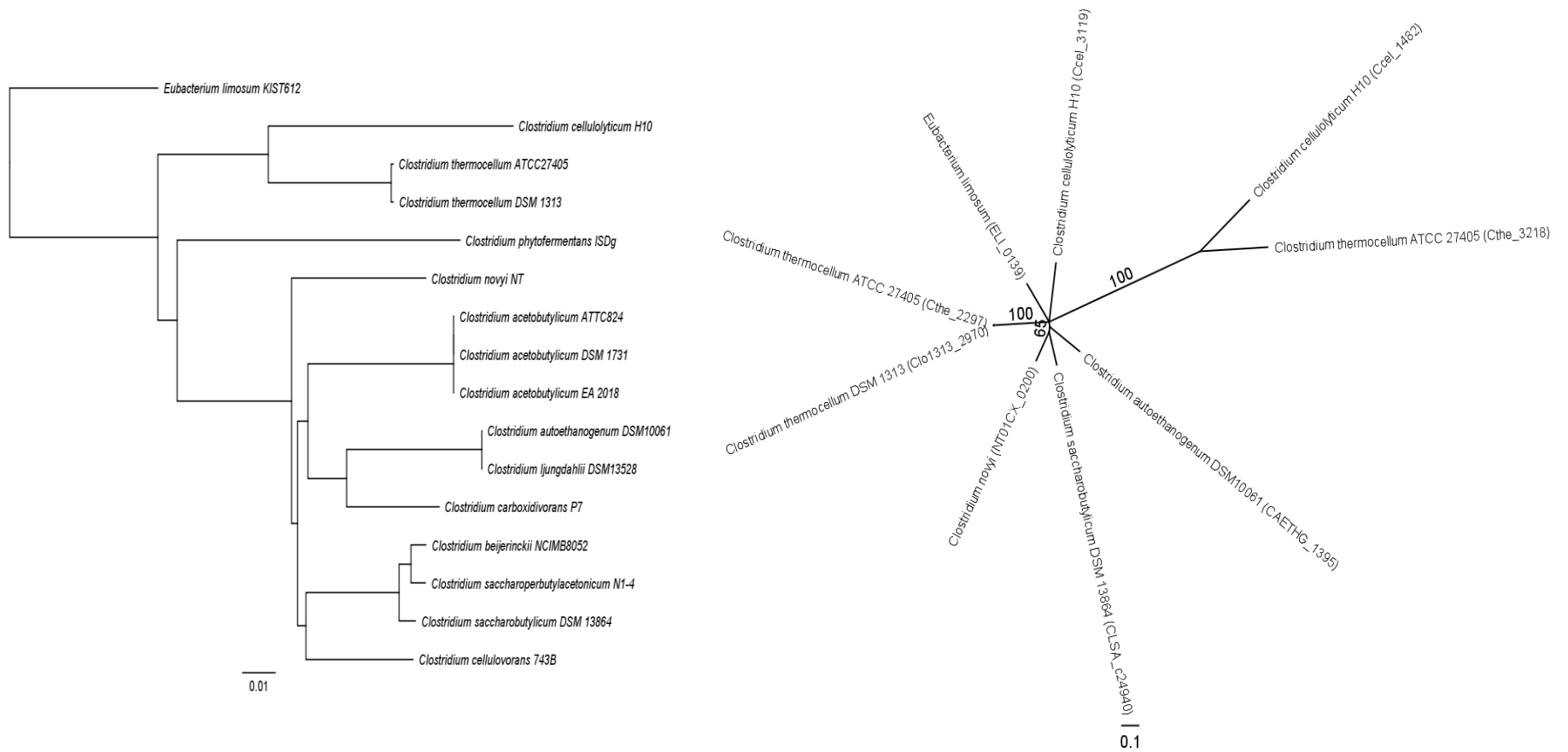Additional file 12. Phylogenetic classification of industrial relevant Clostridia based on 16s rRNA and CRISPR systems.

```
limA2  ATTTAAATACATCTCATGTTAAACTTCAAC
novA1  ATTTAAATACATCTCATGTTAATGTTCAAC
novA3  ATTTAAATACATCTCATGTTAATGTTCAAC
auA1   ATTTAAATACATCTCATGTTGAGGTTCAAC
auA2   ATTTAAATACATCTCATGTTGAGGTTCAAC
novA2  ATTTAAATACATCCCATGTTATTGTTCAAC
auA3   ATTTAAATACATCTTATGTTGAGGTTCAAC
       *************  *****.:  ******
```


Comparison of CRISPR-*cas* system between *C. autoethanogenum*, *C. novyi* and *E. limosum*. Each section includes alignment of CRISPR repeats, sequence logo and graphic representation of CRISPR-*cas* system.

Phylogenetic classification of industrial relevant Clostridia strains based 16S rRNA (left) on *cas1* gene sequences (right). Phylogenetic tree was generated using Geneious software by Neighbor-joining method and the bootstrap values are indicated.