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MRGM: Mouse reference gut microbiome enabling comprehensive comparison of gut microbiome between mouse and human

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The gut microbiome is associated with human diseases and interacts with dietary components and drugs. In vivo mouse models may be effective for studying diet and drug effects on the gut microbiome. Thus, establishing comprehensive catalogs of mouse gut microbial genomes will also facilitate our understanding of the human gut microbiome. We constructed a mouse reference gut microbiome (MRGM) which provides a catalog of 42,245 non-redundant genomes comprising 1,524 representative bacterial species and 11 million non-redundant protein (https://www.mbiomenet.org/MRGM/). In addition to the consolidated isolated genomes and MAGs available from the public repository, we deposited novel MAGs by conducting de novo assembly using public whole metagenomic sequencing (WMS) data from 1,837 mouse fecal or cecal samples and newly-generated WMS data from 40 mouse fecal samples. We constructed the genome database, using near-complete genome. We utilized MRGM to create pre-built databases for DNA-based and marker-based taxonomy profiling and compared them. Furthermore, we conducted comparisons with existing databases from previous studies. Despite the high overall functional similarity of the mouse and human gut microbiomes, only ~10% of MRGM species are shared with the human gut microbiome. While the mouse gut microbiome exhibits significant parallels with its human counterpart, the broader range of environments encountered by humans has led to the identification of many aspects specific to the human gut microbiome that are not present in mice.