

1991

Environmental DNA
Schmidt et al first reported environmental genomics by isolating and cloning environment DNA

1998

Metagenome
Handersman proposed the terms metagenomics

NGS sequencer
First NGS sequencer released by Roche 454. Metagenomic study of Human gut virome

2005

EMP Project
The Earth Microbiome Project (EMP) is an initiative founded

2010

2011

PacBio RS sequencer
PacBio RS sequencer was released, read length beyond 10 kb

2014

ONT MinION sequencer
ONT released the MinION sequencer

PacBio metagenome Project
Wichmann et al. were the first to report the Exploring ARGs in dairy cow manure with PacBio RS sequencer

2015

ONT metagenome Project
Greninger et al. were the first to report the utilization of real-time metagenomic detection for identifying viral pathogens in clinical specimens via MinION sequencing technology

PacBio Sequel sequencer
PacBio releases Sequel system, enhancing long-read metagenomic studies

2015

2019

ONT Flongle, PromethION sequencer
ONT released Flongle (small-scale sequencing applications) and PromethION (high-throughput long-read sequencing with R9.4.1 flowcell, average accuracy reached 92%).

2020

metaFlye assembler
The long-read metagenomic assembly software "metaFlye" was published in Nature Methods

2022

PacBio Revio sequencer hifiasm-meta assembler
Pacbio Revio upgrade increases throughput and guarantees that Hifi reads surpass Q30 precision. Then "hifiasm-meta" was published in Nature Method

2023

BASALT LR binners
BASALT (Binning Across a Series of Assembly Toolkit) released, which can binning and optimize short or long reads metagenomic

2024

Long read Metagenome Project pandaGUT
Huang et al combined Nanopore and PacBio long-read and Illumina short-read to established a high-quality panda gut microbiome catalogue(pandaGUT)

ONT R10.4.1 Flowcell Q20 chemistry
Nanopore released Q20 chemistry and R10.4.1 flowcell. Long-read-only metagenomics allows high-quality genome reconstruction without illumina correction

2024+

More expectation+