

ZymoB OM CS®

A Comprehensive Solution for Microbiomics and Metagenomics













Standardizing Microbiomics











Optimizing Microbiomics Workflows

Advances in DNA sequencing and other genomeenabled technologies have lowered the cost and time requirements needed to sequence any organism. Next-Generation Sequencing of microbial communities has supercharged our ability to research and explore both human and environmental microbial ecosystems. This advancement in technology has allowed, for the first time, large-scale, multi-lab studies of microbial communites¹.

Early quality control studies of microbiomic research suggest that this vast new frontier of research is littered with potential sources for error and bias. From collection to sequencing, the potential for variation at each step in the microbiomic workflow is enormous.

During the collection and transportation phase, depending on the quality of the method, microbes can continue to grow and decay. Nucleic acids can also degrade during this phase. These two factors can lead to overall misrepresentation of the original community profile, causing downstream bias. In the extraction phase, inferior forms of lysis can fail to extract DNA from tough-to-lyse microbes (e.g. Gram-positive bacteria and yeast), leading to the underrepresentation of toughto-lyse microbes and overrepresentation of easy-tolyse microbes (e.g. Gram-negative bacteria). During sequencing, different library preparation methods can cause biased coverage depending on the GC content of the organisms.

As multi-lab, longitudinal microbiomic studies become more common, there is an urgent need for standards to establish validated methods for reproducible data².

At Zymo Research, we have made it our goal to eliminate bias across the entire microbiomic workflow. Our new product line, ZymoBIOMICS®, is a complete workflow, from collection to analysis, which offers streamlined collection, purification, and the first microbial community standards.

Zymo Research has endeavored to develop standards for the advancement and optimization of microbiomic workflows to allow researchers to have increased confidence in their microbiomics data. ZymoBIOMICS® Microbial Community Standards are groundbreaking community standards, containing a well-defined and characterized community of Gram-positive bacteria, Gram-negative bacteria and yeast. They are ideal for validating and optimizing microbiomics and metagenomic workflows from extraction to analysis.

At collection, DNA/RNA Shield® stabilizes nucleic acids and inactivates all organisms — including pathogens — in your sample, allowing for accurate community profiling. There is no degradation of nucleic acids, creating a perfect molecular snapshot of your sample at the time of collection.

Our ZymoBIOMICS® DNA Mini Kit ensures accurate community profiling by enabling total lysis from any sample, including feces, soil, water, biofilms, swabs, body fluid, etc. DNA extracted from this kit is ultra-pure, inhibitor-free, and ready for all downstream applications, including PCR 16S rRNA gene sequencing and shotgun sequencing.

If you would prefer to leave the work to us, we offer a comprehensive list of ZymoBIOMICS® Services covering all steps of a microbiomics workflow from collection to analysis. Simply send us your sample and we will handle the rest. All workflows are validated to be nonbiased using the ZymoBIOMICS® Microbial Community Standards and provide publication-ready data.

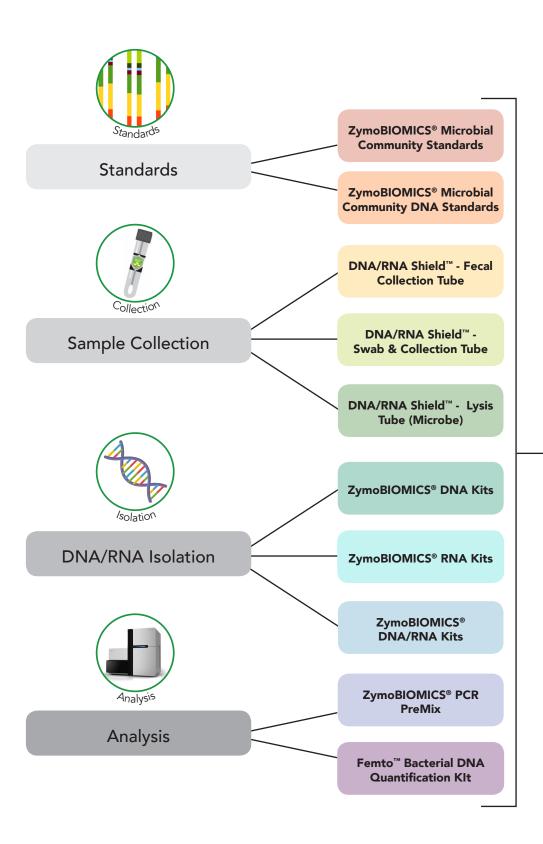
ZymoBIOMICS®- Standardizing Microbiomics

Learn more at www.zymoresearch.com/zymobiomics

- 1. Sinha, Rashmi, et al. "The microbiome quality control project: baseline study design and future directions." Genome biology 16.1 (2015) 2. Stulberg, Elizabeth, et al. "An assessment of US microbiome research. "Nature Microbiology 1 (2016): 15015.



A Comprehensive Solution for Microbiomics and Metagenomics





ZymoBIOMICS® Services

- 16S and ITS Sequencing Services
- Shotgun Sequencing Services
- Custom Bioinformatics

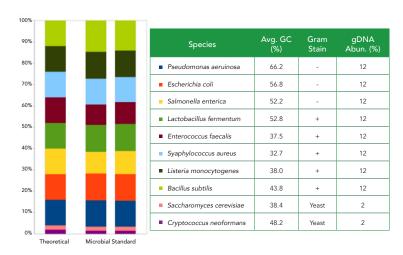
ZymoBIOMICS® Microbial Community Standards

Highlights

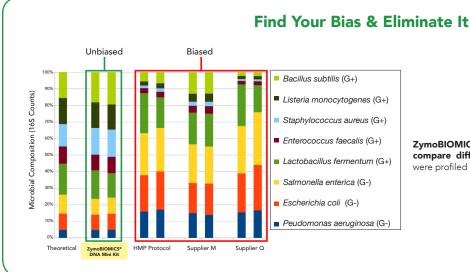
- Mock microbial community of well-defined composition.
- Ideal for the validation, optimization, and quality control of microbiomics and metagenomic workflows.
- Perfect for assessing bias of DNA extraction methods since it contains both tough and easy-to-lyse microbes.



Accurate Characterization



Containing three easy-to-lyse Gram-negative bacteria, five tough-to-lyse Gram-positive bacteria, and two tough-to-lyse yeasts, the ZymoBIOMICS® Microbial Community Standard is perfect for assessing bias in various DNA extraction methods. The microbial standards are accurately characterized, with a wide GC range (15%-85%) and contain negligible impurities (<0.01%), enabling easy exposure of artifacts, errors, and bias in microbiomics or metagenomic workflows.

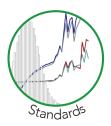


ZymoBIOMICS® Microbial Community Standard was used to compare different DNA extraction protocols. DNA samples were profiled by 16S rRNA gene targeted sequencing.

Product	Cat. No.	Size
ZymoBIOMICS® Microbial Community Standard	D6300	10 preps.



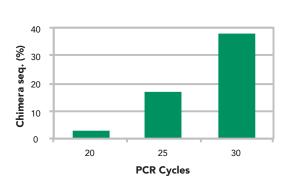
ZymoBIOMICS® Microbial Community DNA Standards



Highlights

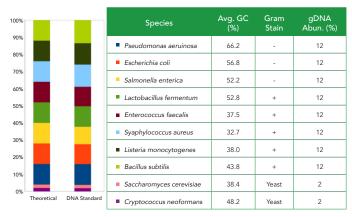
- A DNA standard of well-defined composition.
- Ideal for the validation, optimization, and quality control of microbiomics and metagenomics workflows.
- The DNA has a wide GC range of 15% 85%.

Address & Reduce PCR Chimera



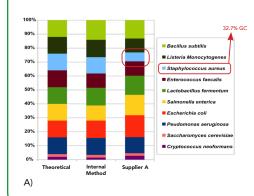
PCR chimera increase the number of PCR cycles during the library preparation process of 165 rRNA gene targeted sequencing. 20 ng ZymoBIOMICS® Microbial Community Standard was used a template. The PCR was performed with ZymoBIOMICS® Taq PreMix master mix and with primers that target the v3-4 region of 165 rRNA gene. Chimera percentage was determined with Uchime and using the 165 rRNA genes of the 8 bacterial strains in the standard as reference.

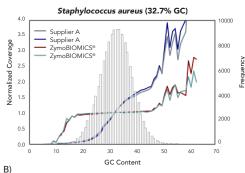
Accurate Characterization



DNA from Gram-negative bacteria, five Gram-positive bacteria, and two toughto-lyse yeasts. The ZymoBIOMICS® Microbial Community Standards are perfect for assessing bias in popular extraction methods. The microbial standards are accurately characterized, with a wide GC range (15%-85%) and contain negligible impurities (<0.01%), enabling easy exposure of artifacts, errors, and bias in microbiomics or metagenomic workflows.

Assess GC Bias & Eliminate It





A) Assessing bias of two different library preparation processes in shotgun metagenomic sequencing using ZymoBIOMICS® Microbial Community Standard. Compared to our ZymoBIOMICS® Services, the Supplier A kit has some bias due to GC content variation. Sequencing was performed on MiSeq (2 x 150 bp). B) Raw reads were mapped to the 10 microbial genomes to evaluate the potential effect of GC content on sequencing coverage. Normalized coverage was calculated by normalization with the average sequencing coverage of each genome.

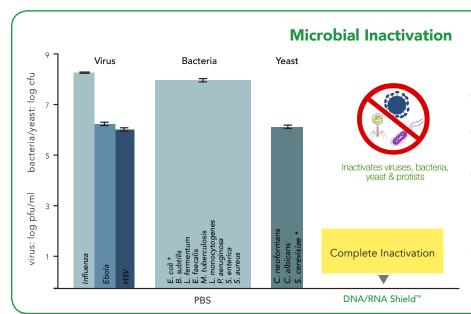
Product	Cat. No.	Size
ZymoBIOMICS® Microbial Community DNA Standard	D6305	200 ng
	D6306	2,000 ng



DNA/RNA Shield™ Collection Devices

Take a molecular snapshot of your sample with DNA/RNA Shield™. This stabilization reagent breaks the cold chain and ensures nucleic acid stability during sample storage/transport at ambient temperatures. DNA/RNA Shield™ effectively lyses cells and inactivates nucleases and infectious agents, and it is compatible with various collection and storage devices (vacuum tubes, swabs (nasal, buccal, fecal), etc.).

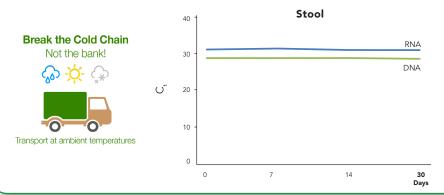




Viruses, bacteria and yeast are effectively inactivated by DNA/RNA Shield™. Samples containing the infectious agent (virus, bacteria, yeast) were treated for 5 minutes with DNA/RNA Shield™ or mock (PBS). Titer (PFU) was subsequently determined by plaque assay. Validated by: Influenza A - D. Poole and Prof. A. Mehle, Department of Medical Microbiology and Immunology, University of Wisconsin, Madison; Ebola (Kikwit) - L. Avena and Dr. A. Griffiths, Department of Virology and Immunology, Texas Biomedical Research Institute; HSV-1/2 - H. Oh, F. Diaz and Prof. D. Knipe, Virology Program, Harvard Medical School; E. coli, L. fermentum, B. subtilis, S. cerevisiae – Zymo Research Corporation).

*Disclaimer: This graph only displays results from *E. coli* inactivation. Each microbe was tested independently and were combined into one graph for brevity. Bacterial cultures were grown between 10^8 - 10^9 cells and yest cultures were grown between 10^7 - 10^8 cells.

Nucleic Acid Stabilization at Ambient Temperature



DNA and RNA in stool is effectively stabilized in DNA/RNA Shield™ at ambient temperature. Graphs show: DNA and RNA controls from stool purified at the indicated time points and analyzed by (RT)qPCR.

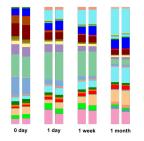
Sample in DNA/RNA Shield™ Simply add binding reagent Streamlined Purification Bind directly to a spin-column or MagBeads DNA/RNA ready to use

Highlights

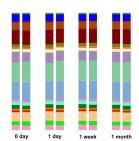
- Provides an accurate "molecular snapshot" of the sample at the time of collection by preserving nucleic acids at ambient temperature and inactivating microbes.
- Nucleic acid preservation (at ambient temperature; cold-free)
- Pathogen inactivation (bacteria, fungus, parasites & viruses)
- Streamlined purification (no reagent removal, universally compatible, automatable)

DNA/RNA Shield™ Preserves Microbial Composition at Ambient Temperature

Without DNA/RNA Shield™ -Composition Changes



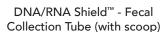
With DNA/RNA Shield™ -Accurate Composition



Microbial composition of stool is unchanged after one month at ambient temperature with DNA/RNA Shield™. Stool samples suspended in DNA/RNA Shield™ and stored at room temperature were compared to stool without preservative for one month. They were sampled at the indicated time points and processed with ZymoBIOMICS® DNA Mini Kit. The extracted DNA was then subjected to microbial composition profiling via 16S rRNA gene targeted sequencing. Samples stored with DNA/RNA Shield™ had a constant microbial composition while the samples stored without shifted dramatically.

Available DNA/RNA Shield™ Devices for Microbial Studies







DNA/RNA Shield™ - Swab & Collection Tube



DNA/RNA Shield™ - Lysis Tube (Microbe)

Product	Cat. No.	Size
DNA/RNA Shield™ - Lysis Tube (Microbe)	R1103	50 pack
DNA/RNA Shield™ - Lysis Tube (Microbe) with Swab	R1104	50 tubes/50 swabs
DNA/RNA Shield™ - Swab & Collection Tube	R1106	10 pack (1 ml fill)
	R1107	50 pack (1 ml fill)
	R1108	10 pack (2 ml fill)
	R1109	50 pack (2 ml fill)
DNA/RNA Shield™ - Fecal Collection Tube	R1101	10 pack

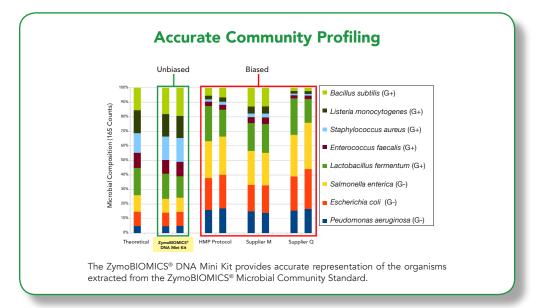


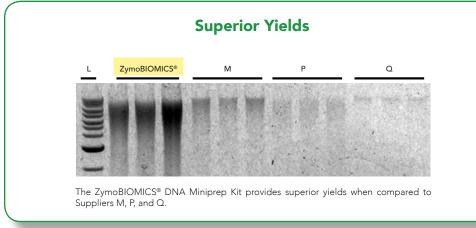
ZymoBIOMICS® DNA Kits

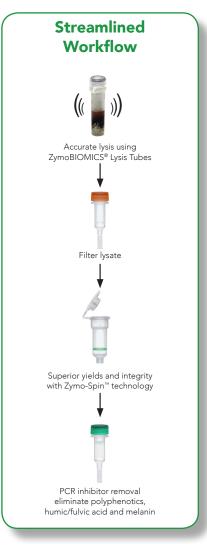
Highlights

- Ultra-pure, inhibitor-free DNA from many microbiomic sample types (feces, soil, water, biofilms, swabs, body fluid, etc.) that is ideal for all downstream applications including PCR, arrays, 16S rRNA gene sequencing, and shotgun sequencing.
- Innovative lysis system enables efficient and unbiased lysis of microbes including Gram-positive/negative bacteria, fungus, protozoans, and algae for accurate microbial community profiling.









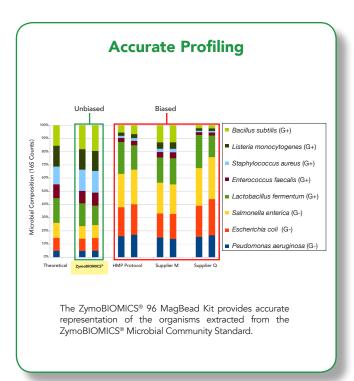
Product	Cat. No.	Size
7 DIOMICC® DNIA Mississus Via	D4300	50 preps.
ZymoBIOMICS® DNA Miniprep Kit	D4300T	10 preps.
ZymoBIOMICS® DNA Miniprep Kit (Lysis Matrix Not Included)	D4304	50 preps.
ZymoBIOMICS® DNA Microprep Kit	D4301	50 preps.
ZymoBIOMICS® 96 DNA Kit (includes ZR BashingBead™ Lysis Rack)	D4303	2 x 96 preps.
ZymoBIOMICS® 96 DNA Kit (includes ZR BashingBead™ Lysis Tubes)	D4309	2 x 96 preps.
ZymoBIOMICS® 96 DNA Kit (Lysis Matrix Not Included)	D4307	2 x 96 preps.

ZymoBIOMICS® 96 Magbead DNA Kit

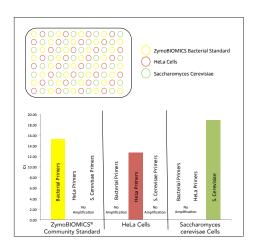


Highlights

- High-throughput purification of high quality, inhibitor-free DNA from any sample including feces, soil, water, biofilms, swabs, saliva, and body fluids.
- The ZymoBIOMICS® innovative lysis system enables efficient and unbiased lysis of microbes including Gram-positive/negative bacteria, fungi, protozoans, algae, etc.
- The automation friendly workflow enables samples to be processed in as little as 90 minutes for 96 preps.



No Cross-Contamination



The ZymoBIOMICS® 96 MagBead DNA Kit provides cross-contamination free samples across a standard 96-well plate purification performed on a liquid handler. Samples were evaluated using quantitative PCR with primer sets targeted at the bacterial 16S gene, the human LINE gene, and the fungal ITS gene. PCR was performed in technical duplicates.

No Precipitation or Centrifugation Required Ouick Bind, Wash, Elute Workflow Superior Yields and Integrity Ultra-Pure DNA

Product	Cat. No.	Size
ZymoBIOMICS® 96 MagBead DNA Kit (includes ZR BashingBead™ Lysis Rack)	D4302	2 x 96 preps.
ZymoBIOMICS® 96 MagBead DNA Kit (Lysis Matrix Not Included)	D4306	2 x 96 preps.
ZymoBIOMICS® 96 MagBead DNA Kit (includes ZR BashingBead™ Lysis Tubes)	D4308	2 x 96 preps.

Learn more and view additional formats at www.zymoresearch.com/zymobiomics



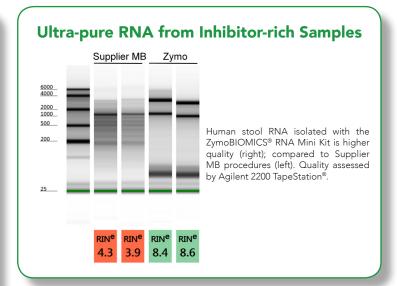
ZymoBIOMICS® RNA Kits

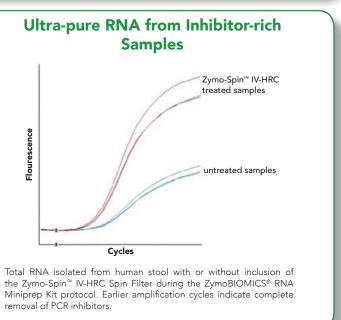
Highlights

- Rapid, robust, and simple purification of high quality, inhibitor-free total RNA (including small/micro RNAs) from any sample including feces, soil, water, biofilms, swabs, saliva, and body fluids, etc.
- ZymoBIOMICS® innovative lysis system enables efficient and unbiased lysis of microbes including Gram-positive/negative bacteria, fungus, protozoans, algae, viruses, etc.
- DNA-free RNA is ready for use in any downstream application. DNase I included.



Accurate lysis using DNA/RNA Shield™ Lysis Tube (Microbe) Purification Spin Wash Elute DNA-free RNA Complete PCR inhibitor removal using Zymo-Spin™ IV-HRC Spin Filters Ultra-pure Total RNA





Product	Cat. No.	Size
ZymoBIOMICS® RNA Miniprep Kit	R2001	50 preps.

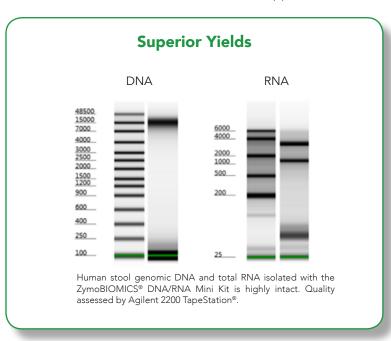


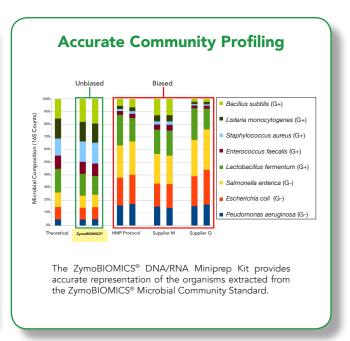
ZymoBIOMICS® DNA/RNA Miniprep Kit

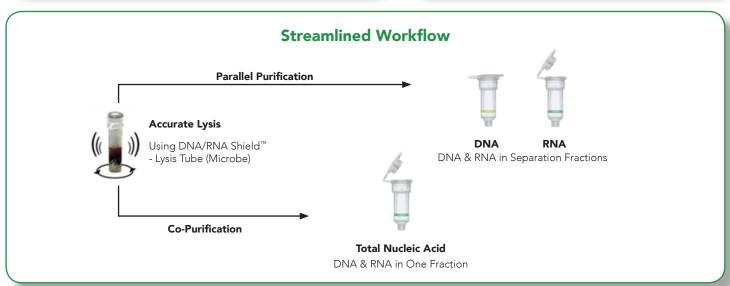


Highlights

- Rapid, robust, and simple purification of high quality, inhibitor-free DNA and total RNA (including small/micro RNAs) from any sample including feces, soil, plant, water, biofilms, swabs, saliva, body fluids, etc.
- ZymoBIOMICS® innovative lysis system enables efficient and unbiased lysis of microbes including Gram-positive/negative bacteria, fungus, protozoans, algae, viruses, etc.
- High-quality DNA and DNA-free RNA is ready for use in any downstream application. DNase I included.







Product	Cat. No.	Size
ZymoBIOMICS® DNA/RNA Miniprep Kit	R2002	50 preps.



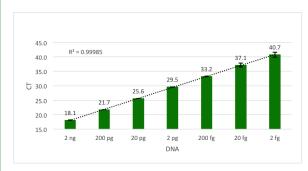
ZymoBIOMICS® PCR PreMix

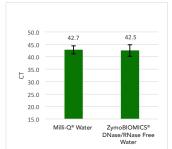
Highlights

- Simply add water, DNA, primers and go!
- Certified low-bioburden.
- Robust amplification for the detection of low copy DNA.
- Ideal for highly sensitive applications.



Sensitive Detection Range Free of Bacterial DNA



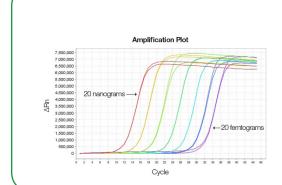


Quantification of no template controls (NTCs) via real-time PCR was determined by amplification of the 16S rRNA gene, after the addition of 2.5 μ M SYTO® 9 to a 20 μ l reaction volume. Real-time PCR was performed for 45 cycles to determine the amount of bacterial contamination. NTCs include Millipore filtered water and DEPC treated Millipore filtered water.

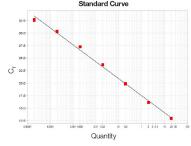
Femto™ Bacterial DNA Quantification KIt

Highlights

- Quantify as little 20 femtograms of DNA in as little as 1 μl of sample.
- High specificity and sensitivity for DNA in a background of non-target DNA.
- Fast and simple: add samples to the PreMix... and quantify.



Reliable Quantification



Reliable standards for the qualification of bacterial DNA: Bacterial DNA Standards (measured in dupliactes) comprise a 10-fold dilution series ranging from 20 ng to 20 fg.

Product	Cat. No.	Size
ZymoBIOMICS® PCR Premix	E2056	50 rxns.
ZymoBIOMICS® PCR Premix	E2057	200 rxns.
Femto™ Bacterial DNA Quantification Kit	E2006	100 rxns.



ZymoBIOMICS® Services



Highlights

- Zymo Research offers the most comprehensive services for 16S rRNA and Shotgun sequencing from any sample type.
- ZymoBIOMICS® Services are validated using the ZymoBIOMICS® Community Standards to ensure accurate, publication-quality data.
- Services include low-bioburden processing and DNA/RNA isolation using the ZymoBIOMICS® product line for the most accurate taxonomic profiling.

A Comprehensive Solution for Microbiomics and Metagenomics



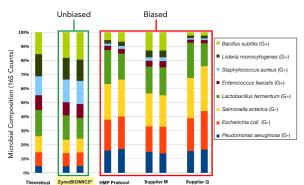






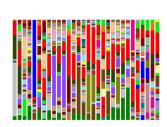


Validated, Accurate Workflows from Collection to Analysis

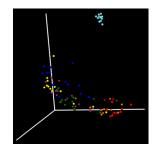


ZymoBIOMICS® Services are validated using the ZymoBIOMICS® Microbial Community Standards for unbiased, accurate community profiling

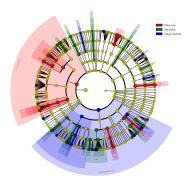
Comprehensive, Customizable Bioinformatics & Data Analysis



Composition Barplots



Beta-Diversity

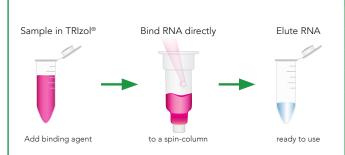


LEfSe Cladogram



Related Products

Direct-zol™ RNA Kits

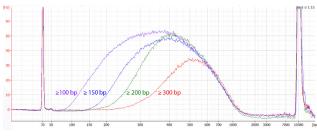


From TRIzol® to high-quality RNA in 7 minutes without phase separation

<u>'</u>		
Product	Size	Cat. No.
Direct-zol™ RNA MiniPrep Plus	50 preps	R2070; R2071*
	200 preps	R2072; R2073*
Direct-zol™ RNA MiniPrep	50 preps	R2050; R2051*
	200 preps	R2052; R2053*
Direct-zol™ RNA MacroPrep	50 preps	R2060; R2061*
	200 preps	R2062; R2063*
	2 x 96 preps	R2054; R2055*
Direct-zol™-96 RNA MiniPrep Plus	4 x 96 preps	R2056; R2057*

*Supplied with TRI Reagent®

Select-a-Size DNA Clean & Concentrator® Kits

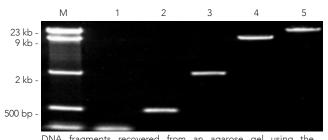


Select-a-Size™ DNA Clean and Concentrator® allows for selection at ≥300 bp, ≥200 bp, ≥150 bp, ≥100 bp and ≥50 bp.

Select for DNA species ≥ 50 bp, ≥ 150 bp, ≥ 200 bp, ≥ 300 bp, ≥ 700 bp or perform double size selection

Product	Size	Cat. No.
Select-a-Size™ DNA Clean & Concentrator®	25 preps	D4080

Zymoclean™ DNA Gel Recovery



DNA fragments recovered from an agarose gel using the Zymoclean™ Gel DNA Recovery Kit. Lanes: M: DNA Ladder; 1-5: individual ladder DNA fragments.

Boost recoveries from agarose gels to > 80%

Product	Size	Cat. No.
Zymoclean™ Gel DNA Recovery Kit (uncapped)	50 preps	D4001
	200 preps	D4002
7	50 preps	D4007
Zymoclean™ Gel DNA Recovery Kit (capped)	200 preps	D4008
ZR-96 Zymoclean™ Gel DNA Recovery Kit	2 x 96 preps	D4021
	4 x 96 preps	D4022
	25 preps	D4045
Zymoclean™ Large Fragment DNA Recovery Kit	100 preps	D4046

ZymoBIOMICS® Products



Product	Size	Cat. No.
ZymoBIOMICS™ Microbial Community Standards	10 preps.	D6300
	200 ng	D6305
ZymoBIOMICS™ DNA Standards	2,000 ng	D6306



Product	Size	Cat. No.
DNA/RNA Shield™ Reagent	50 ml	R1100-50
	250 ml	R1100-250
DNA/RNA Shield™ Reagent (2X concentrate)	25 ml	R1200-25
	125 ml	R1200-125
DNA/RNA Shield™ - Lysis Tube (Microbe)	50 pack	R1103
DNA/RNA Shield™ - Lysis Tube (Microbe) with Swab	50 tubes/50 swabs	R1104
DNA/RNA Shield™ - Swab & Collection Tube	10 pack (1 ml fill)	R1106
	50 pack (1 ml fill)	R1107
	10 pack (2 ml fill)	R1108
	50 pack (2 ml fill)	R1109
DNA/RNA Shield™ - Fecal Collection Tube	10 pack	R1101



Product	Size	Cat. No.
ZymoBIOMICS™ DNA Mini Kit	50 preps.	D4300
ZymoBIOMICS™ DNA Micro Kit	50 preps.	D4301
ZymoBIOMICS™-96 Magbead DNA Kit	2 x 96 preps.	D4302
ZymoBIOMICS™-96 DNA Kit	2 x 96 preps.	D4303
	4 x 96 preps.	D4304
ZymoBIOMICS™ RNA Mini Kit	50 preps.	R2001
ZymoBIOMICS™ DNA/RNA Mini Kit	50 preps.	R2002



Product	Size	Cat. No.
ZymoBIOMICS™ PCR Premix	50 rxns.	E2056
	200 rxns.	E2057
Femto™ Bacterial DNA Quantification	100 rxns.	E2006
Femto™ Human DNA Quantification	100 rxns.	E2005
Femto™ Fungal DNA Quantification	100 rxns.	E2007



For inquiries about our ZymoBIOMICS® Services and any other related products, visit www.zymoresearch.com/zymobiomics



Innovation. Pure & Simple.™



Since its inception in 1994, Zymo Research has been proudly serving the scientific community by providing innovative, reliable, and high quality research tools at affordable prices. Our vision... "The Beauty of Science is to Make Things Simple" is now truer than ever. Whether it's epigenetics, DNA, RNA, *E. coli*, or yeast based research, our philosophy remains the same: To provide the highest quality products in the industry while ensuring they are both simple to use and reliable in their performance.

Zymo Research stands on three pillars which form the foundation of our company: Innovation, Quality, and Customer Service. These pillars are fundamental to our culture and ensure our products meet your needs.

Innovation

Zymo Research is historically recognized for its innovation of high quality nucleic acid purification technologies. Under the branding DNA Purification Made Simple® and RNA Purification Made Simple®, our technologies are pushing the limits of what is possible with nucleic acid isolation. As The Epigenetics Company™, Zymo Research has also received much attention for its rapidly expanding portfolio of epigenetics products and services. It is our objective to develop and provide the most comprehensive set of tools for DNA, RNA, and epigenetic research and analysis available today. Thousands of peer-reviewed scientific publications from researchers around the world feature our technologies. Through innovation, our scientists have made streamlined DNA methylation detection possible, pioneered the micro-elution column for DNA and RNA purification, developed the simplest and the most sophisticated methods for high-quality plasmid DNA purification, and patented the first RNA purification directly from Trizol® without phase separation among many other leading technologies in the industry.

Quality

We are committed to quality and guarantee that all of our products and service will meet and exceed your expectations. Our products are constantly evaluated by scientists like you to help ensure their reliability and the highest standard of quality.

Customer Service

We strive for excellence in how we support your scientific endeavors. We pledge to be honest and responsible for everything we do with you. We will treat you as we would like to be treated. Together, we will build a brighter future.

Cat. No. B1007 Version 01

