‘EviMass’ user manual

Module 1

Intermicrobial Associations
This workflow enables users to view all the microbes associated with the selected microbe in literature.

Select Bacteria
Proceed

Module 2

Microbe-Disease Associations
Query by Disease
This workflow enables users to view all the microbes associated with the selected disease in literature.

Select Disease
Proceed

Query by Microbe
This workflow enables users to view all the diseases associated with the selected microbe in literature.

Select Bacteria
Proceed

Module 3

Analyse Experimental Data

From Microbial Network
Upload a microbial association network and the corresponding disease condition to get literature evidence for each association.

Upload Edge List (Tab Separated)
Choose file
No file chosen

Select Disease Condition
Select Disease
Proceed

OR

From a List of Microbes
Upload a list of differentially abundant microbes and the corresponding disease condition to get literature evidence for microbe.

Select Bacteria

Select Disease Condition
Select Disease

Proceed

Load Example
Download Example Data
Module 1

Search for a desired genera name using the searchable dropdown with autosuggest feature.
The selected genera along with its associated genera are displayed as a graph with the central node as the ‘query genus’ and connected peripheral nodes as the ‘associated genera’. The size of the node (and labels) are proportionally scaled to the reported number of associations.

Click here to view a bar plot version of the network.
Click (or search from the dropdown) on a node label to view the list of abstracts citing the selected association.
- Search and filter the PMID result tables for a specific keyword
- Export the list in multiple formats
- Most frequent words in the PMID result table can be viewed as a ‘word cloud’

Click (or search from the dropdown) on a node label to view the list of abstracts citing the selected association as well as view the association evidence statistics calculated using hyper-geometric tests.
Select and add one/more diseases and use the ‘Intersection’ radio button to filter and view only those associations present in a selected set of diseases.
Select and add one/more diseases and use the ‘Union’ radio button to view all associations present in a selected set of diseases.
Module 2a

Search for a disease name using the searchable dropdown with autosuggest feature.
The selected disease along with its associated genera are displayed as a graph with the central node as the ‘query disease’ and connected peripheral nodes as the ‘associated genera’. The size of the node (and labels) are proportionally scaled to the reported number of associations.

Click (or search from the dropdown) on a node label (genera name) to view the list of other diseases associated with it in form of a bar plot. Additionally the list of abstracts reporting the evidence for the association is also populated.

Nodes in pink represents the taxa identified to be significantly associated with the disease.
Clicking on the ‘View as Histogram’ button displays a bar plot for the selected disease and genera associations. The bar plot is sorted by the number of article evidences for the selected association.

Click (or search from the dropdown) on a node label (genera name) to view the list of other diseases associated with it in form of a bar plot. Additionally, the list of abstracts reporting the evidence for the association is also populated.

Bars in pink represents the taxa identified to be significantly associated with the disease.
Module 2b

Search for a genera name using the searchable dropdown with autosuggest feature
Click (or search from the dropdown) on a node label (genera name) to view the list of abstracts reporting the evidence for the association.
Search and filter the abstract POS tags for a specific keyword
Secondary search can be performed on the individual columns using the ‘column search boxes’
Export the list in multiple formats

The most frequently occurring words in a displayed table can be shown as a ‘word cloud’ as well as a frequency list of top 10 words
A new ‘word cloud’ can be generated by filtering the table for a custom query
Module 3a

Upload a tab delimited edge list file (see sample file ‘Download example data’) for microbial associations. Node names should be microbial genera names (as in RDP or Green genes database).
The uploaded microbial association network will be displayed showing only the edges whose information is available in the EviMass backend database. An edge can be manually selected (by mouse left click) or by using the dropdown search. Once an edge is selected, a tabulated evidence summary for the associations are displayed. The microbe names in the table are hyper linked to their individual association networks.

The edge thickness is mapped proportional to the evidence count observed for the microbe-microbe association.
In addition to the tabulated evidence indices, the list of abstracts reporting the selected association are also populated as a separate table below the plot. This table contains only the important keywords from each abstract which can be searched (and filtered) to list only the abstracts containing the desired keyword using the search boxes. The table can be explored in multiple formats and the most frequent words can be viewed as a ‘word cloud’.

| PMID  | Words | Author | Journal | Date | Search Taxa and Trends |
|-------|-------|--------|---------|------|------------------------|
| 12145727 | multicenter study findings sinusitis adults Seventy aerobic anaerobic pathogens patients baseline therapy anaerobes Prevotella species streptococci Fusobacterium species aerobes Streptococcus species Haemophilus influenzae Pseudomonas aeruginosa Staphylococcus aureus Moraxella catarrhalis Recurrences signs symptoms sinusitis anaerobes aerobes counts anaerobes 10 cfu mL role Granulicatella species cases sinusitis time | Finegold | Clin Infect Dis | 2002 | Fusobacterium(0), Prevotella(0), Moraxella(0), Granulicatella(0), Haemophilus(0), Staphylococcus(0), Streptococcus(0), Pseudomonas(0), Pseudomonas aeruginosa(0), Staphylococcus aureus(0), Haemophilus influenza(0) |
| 12808082 | Chronic sinusitis inflammatory condition role infection Bacteria sinuses role chronicity inflammation objective study bacteria samples sinusitis diversity present Washes tissue samples sinus surgery patients sinusitis PCR amplification rDNA primer pairs samples presence bacteria fung culture methods bacteria rDNA sinus samples patients sinus samples PCR culture methods PCR culture Thirteen species Abiotrophia defectiva Enterococcus avium Eubacterium sp Granulicatella Neisseria sp Prevotella sp Pseudomonas aeruginosa Serratia Staphylococcus aureus Stenotrophomonas maltophilia Streptococcus gordoni Streptococcus mitis Streptococcus oralis Streptococcus sp Fungi patient Streptococcus mitis Streptococcus oralis patient Pseudomonas aeruginosa sinus cavity PCR primers results bacteria half sinusitis cases | Paju | J Med Microbiol | 2003 | Staphylococcus(0), Enterococcus(0), Granulicatella(0), Pseudomonas(0), Serratia(0), Stenotrophomonas(0), Streptococcus(0), Neisseria(0), Abiotrophia(0), Eubacterium(0), Prevotella(0), Serrata marcescens(0), Pseudomonas aeruginosa(0), Stenotrophomonas maltophilia(0), Staphylococcus aureus(0), Abiotrophia defectiva(0), Streptococcus sp(0) |
Enter a list of microbial genera reported in an experiment along with the disease name to view the literature evidences supporting the microbe-disease associations.
The selected disease along with its associated genera are displayed as a graph with the central node as the ‘query disease’ and connected peripheral nodes as the ‘associated genera’. The size of the node (and labels) are proportionally scaled to the reported number of associations. An enrichment analysis is also performed on the uploaded microbe list specific to the disease and the p-value for enrichment is reported.

Click (or search from the dropdown) on a node label (genera name) to view the list of other diseases associated with it in a bar plot along with the evidence indices.
Clicking on the ‘View as Histogram’ button displays a bar plot for the selected disease and genera associations. The bar plot is sorted by the number of article evidences for the selected association.
The list of abstracts reporting the selected association are also populated as a separate table below the plot. This table contains only the important keywords from each abstract which can be searched (and filtered) to list only the abstracts containing the desired keyword using the search box. The table can be explored in multiple formats.

| PMID    | Words                                                                 | Author | Journal      | Date | Taxa and Trends                        |
|---------|-----------------------------------------------------------------------|--------|--------------|------|----------------------------------------|
| 20052417| environment infancy protects infections exacerbations airway microbiota levels adult patients asthma condition COPD controls lavage children controls FINDINGS rRNA sequences subjects species tree mean genomes cm surface Pathogenic Proteobacteria Haemophilus spp bronchi adult asthmatics patients COPD controls increases Proteobacteria children Bacteroidetes Prevotella spp controls adult asthmatics COPD patients results tree microbiota microbiota airways | Hilty  | PLoS One     | 2010 | Prevotella(0), Haemophilus(0)           |
| 23711849| interaction microbiota diseases bacteria inception progression asthma others protection asthma mechanisms bacteria harm regard study bacteria effects functions eosinophils effector cells inflammation asthma Eosinophils adult volunteers Percoll density gradient centrifugation bead selection microbeads kinds bacteria asthma Staphylococcus aureus SA Haemophilus influenzae HI Prevotella sp PS effects secretion neurotoxin EDN generation superoxides production cytokines chemokines SA HI PS EDN release manner Superoxide generation species SA production eosinophils HI PS cytokine HI PS SA CONCLUSIONS Bacteria effects eosinophils results SA exacerbation HI PS inhibition inflammation asthma | Hosoki | Int Arch Allergy Immunol | 2013 | Prevotella(0), Haemophilus(0), Staphylococcus aureus(0), Haemophilus influenzae(0) |
| 25179236| studies airways colonization commensal microbiota Prevotella spp properties bacteria respiratory system respiratory response commensal Prevotella strains Prevotella melaninogenica Prevotella nanceiensis Prevotella salivae Proteobacteria lungs patients disease COPD Haemophilus influenzae B Haemophilus influenzae Moraxella catarrhalis commensal Prevotella spp Proteobacteria differences capacities murine lung cells vitro vivo mice H influenzae Toll like receptor TLR2 inflammation airway neutrophilia expression cytokine chemokine profile lung tissue lung immunopathology comparison P nanceiensis airway inflammation lung pathology airway response bacteria P nanceiensis findings inflammatory properties airway commensal Prevotella spp colonization bacteria respiratory immune system | Larsen | Immunology    | 2015 | Prevotella(0), Haemophilus(0), Moraxella(0), Prevotella nanceiensis(0), Haemophilus influenzae(0), Prevotella melaninogenica(0) |