Francesco Beghini

PhD Candidate

Department of Cellular, Computational and Integrative Biology, University of Trento

+39 392 2793343 | ✉ francesco.beghini@unitn.it | 0000-0002-8105-9607 | fbeghini | chocophlan

Education

PhD in Biomolecular Sciences	*Trento, IT*
Università degli Studi di Trento	*2017 - current*
MSc in Cellular and Molecular Biotechnology - Neurobiology	*Trento, IT*
Università degli Studi di Trento	*2015 - 2017*
BSc Computer Science with specialization in Biomolecular Sciences	*Trento, IT*
Università degli Studi di Trento	*2012 - 2015*
HS Diploma in Industrial engineer in Computer Science	*Verona, IT*
Industrial Technical School Guglielmo Marconi	*2007 - 2012*

Positions

PhD Student at The Laboratory of Computational Metagenomics – CIBIO, UniTN *P.I. Prof. Nicola Segata*

I developed a novel method called ChocoPhlAn, able to build species-level pangenomic representations without the need of protein annotation or gene clustering by relying on UniRef and a full set of additional modules for updating tools included in the bioBakery suite (Huttenhower Lab and Segata Lab) *11/2017 - Current*

Internship at The Laboratory of Computational Metagenomics – CIBIO, UniTN *P.I. Prof. Nicola Segata*

I've collaborated with Prof. Levi Waldron, PhD (CUNY School of Public Health) analyzing the oral microbiome of subjects enrolled in the NYC-HANES II project to assess the effect of smoking on the oral microbiome. *11/2015 - 11/2017*

Internship at School of Public Health – City University of New York *P.I. Prof. Levi Waldron*

During my one-month internship, I've visited prof. Levi Waldron laboratory at the City University of New York and collaborated with prof. Heidi Jones on the NYC-HANES II oral microbiome smoking project. I also had the opportunity to give several talks with subject the oral microbiome of smokers and a small lesson for PhDs in Epidemiology *02/2017 - 03/2017*

Internship at The Laboratory of Computational Metagenomics – CIBIO, UNITN *P.I. Prof. Nicola Segata*

For my bachelor thesis, I investigated the presence, genetics and abundance of the Blastocystis parasite in the human gut microbiome from shotgun metagenomic data *11/2014 - 09/2015*

Volunteer at ITIS G. Marconi, Verona

Orientation volunteer for incoming middle school students *11/2011 and 11/2012*

Publications

Microbiome connections with host metabolism and habitual diet from 1,098 deeply phenotyped individuals.

ASNICAR F, BERRY SE, VALDES AM, NGUYEN LH, PICCINNO G, DREW DA, LEEMING E, GIBSON R, LE ROY C, KHATIB HA, FRANCIS L, MAZIDI M, MOMPEO O, SEGATA N

Nature medicine

2021-01

Precise phylogenetic analysis of microbial isolates and genomes from metagenomes using PhyloPhlAn 3.0

FRANCESCO ASNICAR, ANDREW MALTEZ THOMAS, FRANCESCO BEGHINI, CLAUDIA MENGONI, SERENA MANARA, PAOLO MANGHI, QIYUN ZHU, MATTIA BOLZAN, FABIO CUMBO, UYEN MAY, JON G. SANDERS, MORENO ZOLFO, EVGUENIA KOPYLOVA, EDOARDO PASOLLI, ROB KNIGHT, SIAVASH MIRARAB, CURTIS HUTTENHOWER, NICOLA SEGATA

Nature Communications

2020-12

Integrating taxonomic, functional, and strain-level profiling of diverse microbial communities with bioBakery 3

FRANCESCO BEGHINI, LAUREN J. MCIVER, AITOR BLANCO-MÍGUEZ, LEONARD DUBOIS, FRANCESCO ASNICAR, SAGUN MAHARJAN, ANA MAILYAN, ANDREW MALTEZ THOMAS, PAOLO MANGHI, MIREIA VALLES-COLOMER, GEORGE WEINGART, YANCONG ZHANG, MORENO ZOLFO, CURTIS HUTTENHOWER, ERIC A. FRANZOSA, NICOLA SEGATA

bioRxiv

2020-11

A step-by-step sequence-based analysis of virome enrichment protocol for freshwater and sediment samples

PINTO F, ZOLFO M, BEGHINI F, ARMANINI F, ASNICAR F, SILVERJ A, BOSCAINI A, SALMASO N, SEGATA N

2020-09

How inoculation affects the development and the performances of microalgal-bacterial consortia treating real municipal wastewater

SERENA PETRINI, PAOLA FOLADORI, FRANCESCO BEGHINI, FEDERICA ARMANINI, NICOLA SEGATA, GIANNI ANDREOTTOLA

Journal of Environmental Management

2020-06

Strengthening The Organizing and Reporting of Microbiome Studies (STORMS)

MIRZAYI C, RENSON A, ZOHRA F, ELSAFOURY S, KASSELMAN L, VAN DE WIJGERT J, SEGATA N, BEGHINI F, ECKENRODE K, DOWD J, JONES HE, WALDRON L

2020-06

Microbial genomes from non-human primate gut metagenomes expand the primate-associated bacterial tree of life with over 1000 novel species.

MANARA S, ASNICAR F, BEGHINI F, BAZZANI D, CUMBO F, ZOLFO M, NIGRO E, KARCHER N, MANGHI P, METZGER MI, PASOLLI E, SEGATA N

Genome biology

2019-12

Sociodemographic variation in the oral microbiome

AUDREY RENSON, HEIDI E. JONES, FRANCESCO BEGHINI, NICOLA SEGATA, CHRISTINE P. ZOLNIK, MYKHAYLO USYK, THOMAS U. MOODY, LORNA THORPE, ROBERT BURK, LEVI WALDRON, JENNIFER B. DOWD

Annals of Epidemiology

2019-07

Tobacco exposure associated with oral microbiota oxygen utilization in the New York City Health and Nutrition Examination Study

FRANCESCO BEGHINI, AUDREY RENSON, CHRISTINE P. ZOLNIK, LUDWIG GEISTLINGER, MYKHAYLO USYK, THOMAS U. MOODY, LORNA THORPE, JENNIFER B. DOWD, ROBERT BURK, NICOLA SEGATA, HEIDI E. JONES, LEVI WALDRON

Annals of Epidemiology

2019-06

Metagenomic analysis of colorectal cancer datasets identifies cross-cohort microbial diagnostic signatures and a link with choline degradation

ANDREW MALTEZ THOMAS, PAOLO MANGHI, FRANCESCO ASNICAR, EDOARDO PASOLLI, FEDERICA ARMANINI, MORENO ZOLFO, FRANCESCO BEGHINI, SERENA MANARA, NICOLAI KARCHER, CHIARA POZZI, SARA GANDINI, DAVIDE SERRANO, SONIA TARALLO, ANTONIO FRANCAVILLA, GAETANO GALLO, MARIO TROMPETTO, GIULIO FERRERO, SAYAKA MIZUTANI, HIROTSUGU SHIROMA, SATOSHI SHIBA, TATSUHIRO SHIBATA, SHINICHI YACHIDA, TAKUJI YAMADA, JAKOB WIRBEL, PETRA SCHROTZ-KING, CORNELIA M. ULRICH, HERMANN BRENNER, MANIMOZHIYAN ARUMUGAM, PEER BORK, GEORG ZELLER, FRANCESCA CORDERO, EMMANUEL DIAS-NETO, JOÃO CARLOS SETUBAL, ADRIAN TETT, BARBARA PARDINI, MARIA RESCIGNO, LEVI WALDRON, ALESSIO NACCARATI, NICOLA SEGATA

Nature Medicine

2019-04

Extensive Unexplored Human Microbiome Diversity Revealed by Over 150,000 Genomes from Metagenomes Spanning Age, Geography, and Lifestyle.

PASOLLI E, ASNICAR F, MANARA S, ZOLFO M, KARCHER N, ARMANINI F, BEGHINI F, MANGHI P, TETT A, GHENSI P, COLLADO MC, RICE BL, DULONG C, MORGAN XC, SEGATA N

Cell

2019-01

Mother-to-Infant Microbial Transmission from Different Body Sites Shapes the Developing Infant Gut Microbiome.

FERRETTI P, PASOLLI E, TETT A, ASNICAR F, GORFER V, FEDI S, ARMANINI F, TRUONG DT, MANARA S, ZOLFO M, BEGHINI F, BERTORELLI R, DE SANCTIS V, SEGATA N

Cell host and microbe

2018-07

Unexplored diversity and strain-level structure of the skin microbiome associated with psoriasis

npj Biofilms and Microbiomes

ADRIAN TETT, EDOARDO PASOLLI, STEFANIA FARINA, DUY TIN TRUONG, FRANCESCO ASNICAR, MORENO ZOLFO, FRANCESCO BEGHINI, FEDERICA ARMANINI, OLIVIER JOUSSON, VERONICA DE SANCTIS, ROBERTO BERTORELLI, GIAMPIERO GIROLOMONI, MARIO CRISTOFOLINI, NICOLA SEGATA

2017-12

Accessible, curated metagenomic data through ExperimentHub

Nature Methods

EDOARDO PASOLLI, LUCAS SCHIFFER, PAOLO MANGHI, AUDREY RENSON, VALERIE OBENCHAIN, DUY TIN TRUONG, FRANCESCO BEGHINI, FAIZAN MALIK, MARCEL RAMOS, JENNIFER B DOWD, CURTIS HUTTENHOWER, MARTIN MORGAN, NICOLA SEGATA, LEVI WALDRON

2017-11

Large-scale comparative metagenomics of Blastocystis, a common member of the human gut microbiome

The ISME Journal

FRANCESCO BEGHINI, EDOARDO PASOLLI, TIN DUY TRUONG, LORENZA PUTIGNANI, SIMONE M CACCIÒ, NICOLA SEGATA

2017-08

Accessible, curated metagenomic data through ExperimentHub

EDOARDO PASOLLI, LUCAS SCHIFFER, PAOLO MANGHI, AUDREY RENSON, VALERIE OBENCHAIN, DUY TIN TRUONG, FRANCESCO BEGHINI, FAIZAN MALIK, MARCEL RAMOS, JENNIFER B. DOWD, CURTIS HUTTENHOWER, MARTIN MORGAN, NICOLA SEGATA, LEVI WALDRON

2017-01

Precise phylogenetic analysis of microbial isolates and genomes from metagenomes using PhyloPhlAn 3.0

Nature Communications

ASNICAR, F., THOMAS, A.M., BEGHINI, F., MENGONI, C., MANARA, S., MANGHI, P., ZHU, Q., BOLZAN, M., CUMBO, F., MAY, U., SANDERS, J.G., ZOLFO, M., KOPYLOVA, E., PASOLLI, E., KNIGHT, R., MIRARAB, S., HUTTENHOWER, C., SEGATA, N.

How inoculation affects the development and the performances of microalgal-bacterial consortia treating real municipal wastewater

Journal of Environmental Management

PETRINI, S., FOLADORI, P., BEGHINI, F., ARMANINI, F., SEGATA, N., ANDREOTTOLA, G.

Microbial genomes from non-human primate gut metagenomes expand the primate-associated bacterial tree of life with over 1000 novel species

Genome Biology

MANARA, S., ASNICAR, F., BEGHINI, F., BAZZANI, D., CUMBO, F., ZOLFO, M., NIGRO, E., KARCHER, N., MANGHI, P., METZGER, M.I., PASOLLI, E., SEGATA, N.

Sociodemographic variation in the oral microbiome

Annals of Epidemiology

RENSON, A., JONES, H.E., BEGHINI, F., SEGATA, N., ZOLNIK, C.P., USYK, M., MOODY, T.U., THORPE, L., BURK, R., WALDRON, L., DOWD, J.B.

Tobacco exposure associated with oral microbiota oxygen utilization in the New York City Health and Nutrition Examination Study

Annals of Epidemiology

BEGHINI, F., RENSON, A., ZOLNIK, C.P., GEISTLINGER, L., USYK, M., MOODY, T.U., THORPE, L., DOWD, J.B., BURK, R., SEGATA, N., JONES, H.E., WALDRON, L.

Metagenomic analysis of colorectal cancer datasets identifies cross-cohort microbial diagnostic signatures and a link with choline degradation

Nature Medicine

THOMAS, A.M., MANGHI, P., ASNICAR, F., PASOLLI, E., ARMANINI, F., ZOLFO, M., BEGHINI, F., MANARA, S., KARCHER, N., POZZI, C., GANDINI, S., SERRANO, D., TARALLO, S., FRANCAVILLA, A., GALLO, G., TROMPETTO, M., FERRERO, G., MIZUTANI, S., SHIROMA, H., SHIBA, S., SHIBATA, T., YACHIDA, S., YAMADA, T., WIRBEL, J., SCHROTZ-KING, P., ULRICH, C.M., BRENNER, H., ARUMUGAM, M., BORK, P., ZELLER, G., CORDERO, F., DIAS-NETO, E., SETUBAL, J.C., TETT, A., PARDINI, B., RESCIGNO, M., WALDRON, L., NACCARATI, A., SEGATA, N.

Extensive Unexplored Human Microbiome Diversity Revealed by Over 150,000 Genomes from Metagenomes Spanning Age, Geography, and Lifestyle

Cell

PASOLLI, E., ASNICAR, F., MANARA, S., ZOLFO, M., KARCHER, N., ARMANINI, F., BEGHINI, F., MANGHI, P., TETT, A., GHENSI, P., COLLADO, M.C., RICE, B.L., DULONG, C., MORGAN, X.C., GOLDEN, C.D., QUINCE, C., HUTTENHOWER, C., SEGATA, N.

Mother-to-Infant Microbial Transmission from Different Body Sites Shapes the Developing Infant Gut Microbiome

Cell Host and Microbe

FERRETTI, P., PASOLLI, E., TETT, A., ASNICAR, F., GORFER, V., FEDI, S., ARMANINI, F., TRUONG, D.T., MANARA, S., ZOLFO, M., BEGHINI, F., BERTORELLI, R., DE SANCTIS, V., BARILETTI, I., CANTO, R., CLEMENTI, R., COLOGNA, M., CRIFÒ, T., CUSUMANO, G., GOTTARDI, S., INNAMORATI, C., MASÈ, C., POSTAI, D., SAVOI, D., DURANTI, S., LUGLI, G.A., MANCABELLI, L., TURRONI, F., FERRARIO, C., MILANI, C., MANGIFESTA, M., ANZALONE, R., VIAPPIANI, A., YASSOUR, M., VLAMAKIS, H., XAVIER, R., COLLADO, C.M., KOREN, O., TATEO, S., SOFFIATI, M., PEDROTTI, A., VENTURA, M., HUTTENHOWER, C., BORK, P., SEGATA, N.

Unexplored diversity and strain-level structure of the skin microbiome associated with psoriasis

npj Biofilms and Microbiomes

TETT, A., PASOLLI, E., FARINA, S., TRUONG, D.T., ASNICAR, F., ZOLFO, M., BEGHINI, F., ARMANINI, F., JOUSSON, O., DE SANCTIS, V., BERTORELLI, R., GIROLOMONI, G., CRISTOFOLINI, M., SEGATA, N.

Accessible, curated metagenomic data through ExperimentHub

Nature Methods

PASOLLI, E., SCHIFFER, L., MANGHI, P., RENSON, A., OBENCHAIN, V., TRUONG, D.T., BEGHINI, F., MALIK, F., RAMOS, M., DOWD, J.B., HUTTENHOWER, C., MORGAN, M., SEGATA, N., WALDRON, L.

Teaching

Tutor at CIBIO - University of Trento *Prof. Andrea Passerini*
"Computer Science" and "Computational Biology" tutor for CIBIO Undergraduate students *10/2015 - 06/2018*

Courses

San Michele all'Adige, Italy
EMBO Practical Course - Bioinformatics and genome analyses. Teaching assistant for the "Shotgun metagenomics" session *25/9/2019*

Talks

Yale University - New Haven
Shotgun metagenomics for species and strain-level analysis *01/10/2020*

University of Trento - Italy
Large-scale microbial genomics for strain-level metagenomic analysis *08/10/2019*

City University of New York - New York
Brief lesson given to Epidemiology PhD students about metagenomics, oral microbiome and the NYC-HANES II project *02/03/2017*

Columbia University - New York
Smoking and the oral microbiome in the New York City Health and Nutrition Examination Study (NYC-HANES II) *23/02/2017*

City University of New York - New York
Smoking and the oral microbiome in the New York City Health and Nutrition Examination Study (NYC-HANES II) *22/02/2017*

Albert Einstein Medical College of Medicine - New York
Smoking and the oral microbiome in the New York City Health and Nutrition Examination Study (NYC-HANES II) *14/02/2017*

New York University - New York
Smoking and the oral microbiome in the New York City Health and Nutrition Examination Study (NYC-HANES II) *13/02/2017*

Awards

Prêmio Octavio Frias de Oliveira
Co-recipient of the award for the paper "Metagenomic analysis of colorectal cancer datasets identifies cross-cohort microbial diagnostic signatures and a link with choline degradation" *08/2019*

Microbiome in Health and Disease – Keystone Symposia, Colorado, USA
I was awarded 1,200$ as recipient of the Keystone Symposia "Future of Science" scholarship and selected for a poster entitled "Large-scale metagenomic analysis of Blastocystis in the human gut revealed high prevalence and association with BMI and archaeal abundance" *02/2017*

Thesis supervisor

Eleonora Nigro (MSc Quantitative and Computational Biology - CIBIO) *Supervisor: Prof. Nicola Segata*
Expanding the genetic diversity of the Elusimicrobia bacterial phylum by multi-environment metagenomic analysis *2019*

Posters

An integrated pipeline for large-scale phylogenetic characterization of genomes and metagenomes *BITS - Turin, Italy*
Asnicar Francesco, Beghini Francesco, Bolzan Mattia, Manara Serena, Pasolli Edoardo, Mirarab Siavash, Huttenhower Curtis, Segata Nicola *06/2018*

Nutrient removal and microbial community analysis of a stable microalgal-bacterial consortium treating real municipal wastewater

Leading Edge Conference on Water and Wastewater Technologies - Edinburgh, UK

PETRINI SERENA, FOLADORI PAOLA, BEGHINI FRANCESCO, ARMANINI FEDERICA, SEGATA NICOLA, ANDREOTTOLA GIANNI

06/2018

Large-scale metagenomic analysis of Blastocystis in the human gut revealed association with Body Mass Index and archaeal abundance

Microbiome in Health and Disease – Keystone Symposia, Colorado, USA

FRANCESCO BEGHINI, EDOARDO PASOLLI, DUY TIN TRUONG, LORENZA PUTIGNANI, SIMONE M. CACCIÒ, NICOLA SEGATA

02/2017

Genomic and metagenomic-based epidemiology and transmission networks of MRSA in two Italian hospitals

ECCMID – Wien, Austria

SERENA MANARA, EDOARDO PASOLLI, DANIELA DOLCE, FEDERICA ARMANINI, FRANCESCO BEGHINI, NOVELLA RAVENNI, ERICA CAMERA, GRAZIA DINNELLA, PAOLA GUALDI, MICHELE SCHINELLA, SILVIA CAMPANA, ERMANNO BALDO, GIOVANNI TACCETTI, NICOLA SEGATA

04/2017

Strain-level bacterial and viral diversity in the MetaSUB dataset

CAMDA2017 – Prague, Czech Republic

MORENO ZOLFO, FEDERICA PINTO, FRANCESCO ASNICAR, FRANCESCO BEGHINI, PAOLO MANGHI, EDOARDO PASOLLI, ADRIAN TETT AND NICOLA SEGATA

07/2017

Languages

Italian: Mother tongue

Spanish: Bilingual proficiency

English: Professional working proficiency

Skills

I have a very good experience with Linux and Windows OS' with a good knowledge of bioinformatic and several computational biology tools.

I use Bash, R and Python every day. Other known programming languages are Java, C/C++/C#, JavaScript, PHP, HTML, SQL and .NET framework.

During the laboratory trainee activities in my BSc and MSc I acquired some molecular biology related skills and during my internship at the Waldron Lab I acquired statistical and basic epidemiology skills.