Mass Spectrometry-Centered Multi-Omics: Advancing Galaxy Training Materials for Integrated Analysis and Community Adoption

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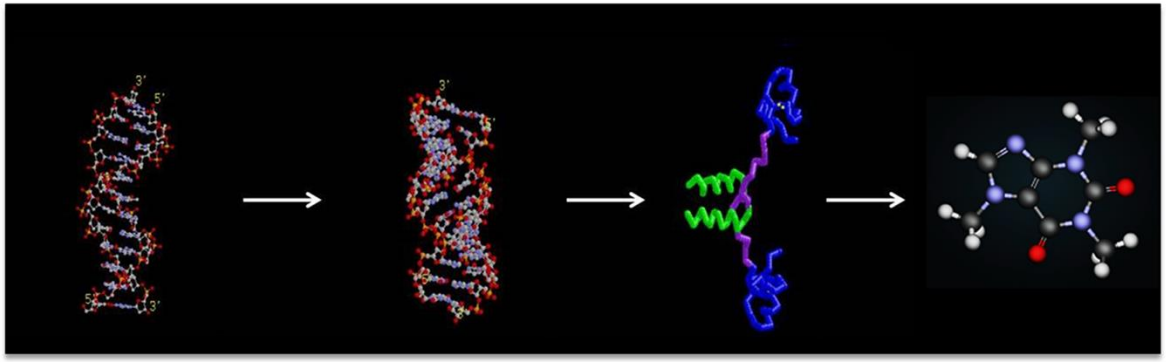
MS-Based Proteomics

Mass spectrometry (MS) revolutionized biological research

Enables high-throughput protein analysis

Crucial for multi-omics (Proteogenomics, Metaproteomics)

Multi-omics: flow of information



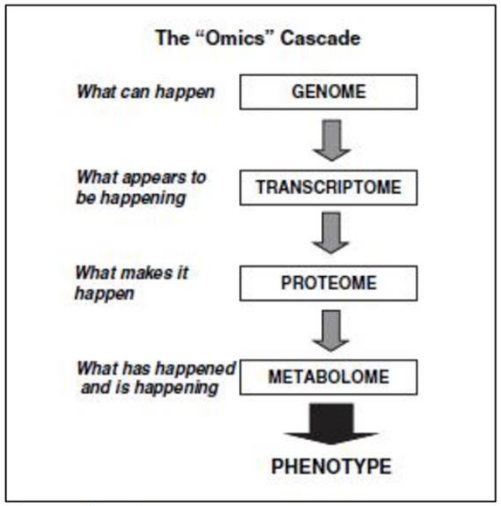


Image Source: http://fluorous.com/images/omics.JPG

Characterizing more proteoforms via multi-omics

(Original)

DNA sequence: A A T G C A T A T G C A

mRNA sequence: U U A C G U A U A C G U

amino acid sequence: Leu -- Arg -- Ile -- Arg

(Mutated)

DNA sequence: A A T **T** C A T A T G C A

mRNA sequence: U U A **A** G U A U A C G U

amino acid sequence: Leu -- **Ser** -- Ile -- Arg

Role in Multi-Omics

- Proteogenomics: Enhances genome annotation, reveals mutations/novel transcripts
- Metaproteomics: Explores functional roles of microbiomes
- Applications: Cancer research, personalized medicine, environmental microbiomes

Challenges

MS data is complex and requires robust computational tools

Need for accessible platforms and standardized workflows

Data Volume and Storage issues

Usability and Training Gaps

Reproducibility, Shareability and Benchmarking

Community Engagement and Sustainability

Solution

Galaxy PROJECT

Galaxy Training Network

Galaxy Training Network (GTN)

URL: HTTPS://TRAINING.GALAXYPROJECT.ORG/

PROVIDES CURATED TRAINING RESOURCES AND TUTORIALS

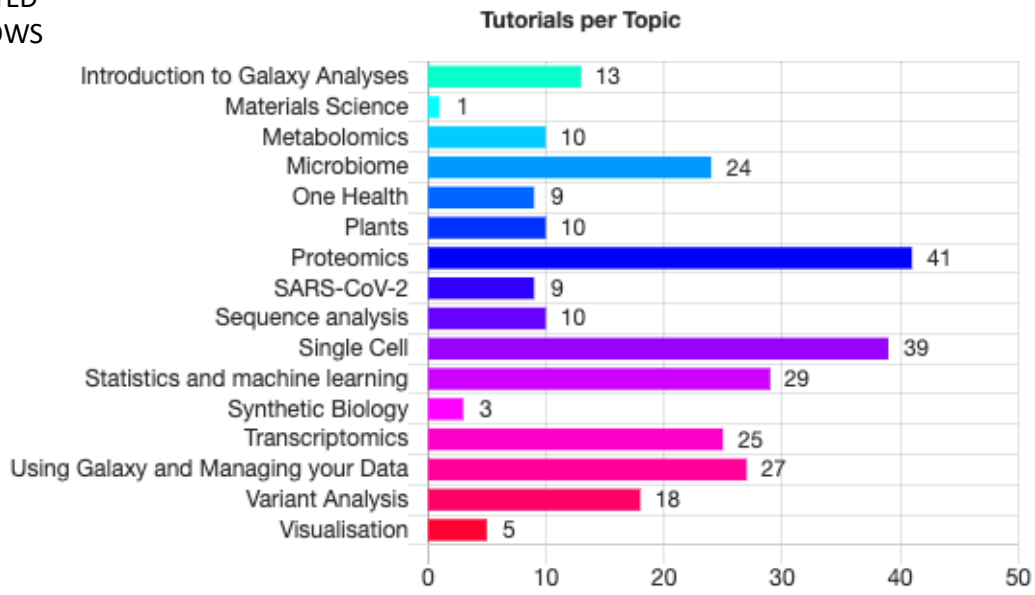
COLLABORATION WITH GTN FOR INTEGRATED WORKFLOWS

SUPPORTS REPRODUCIBILITY AND ACCESSIBILITY

TRAINING OR INTRODUCING NEW USERS TO THE PLATFORM VIA SMORGASBORD/ GALAXY TRAINING ACADEMY

GTN Statistics

35 Topics	477 Tutorials	25 Learning Paths	476 FAQs
490 Contributors	10.0 Years	115 News Posts	214 Videos (146.6h)



Overview of GTN Proteomics Tutorials

41 total tutorials on proteomics

20 contributed by Galaxy-P:

3	5	5	7
proteogenomics	metaproteomics	clinical metaproteomics	neoantigen prediction

Step-by-Step Tutorial Strengths

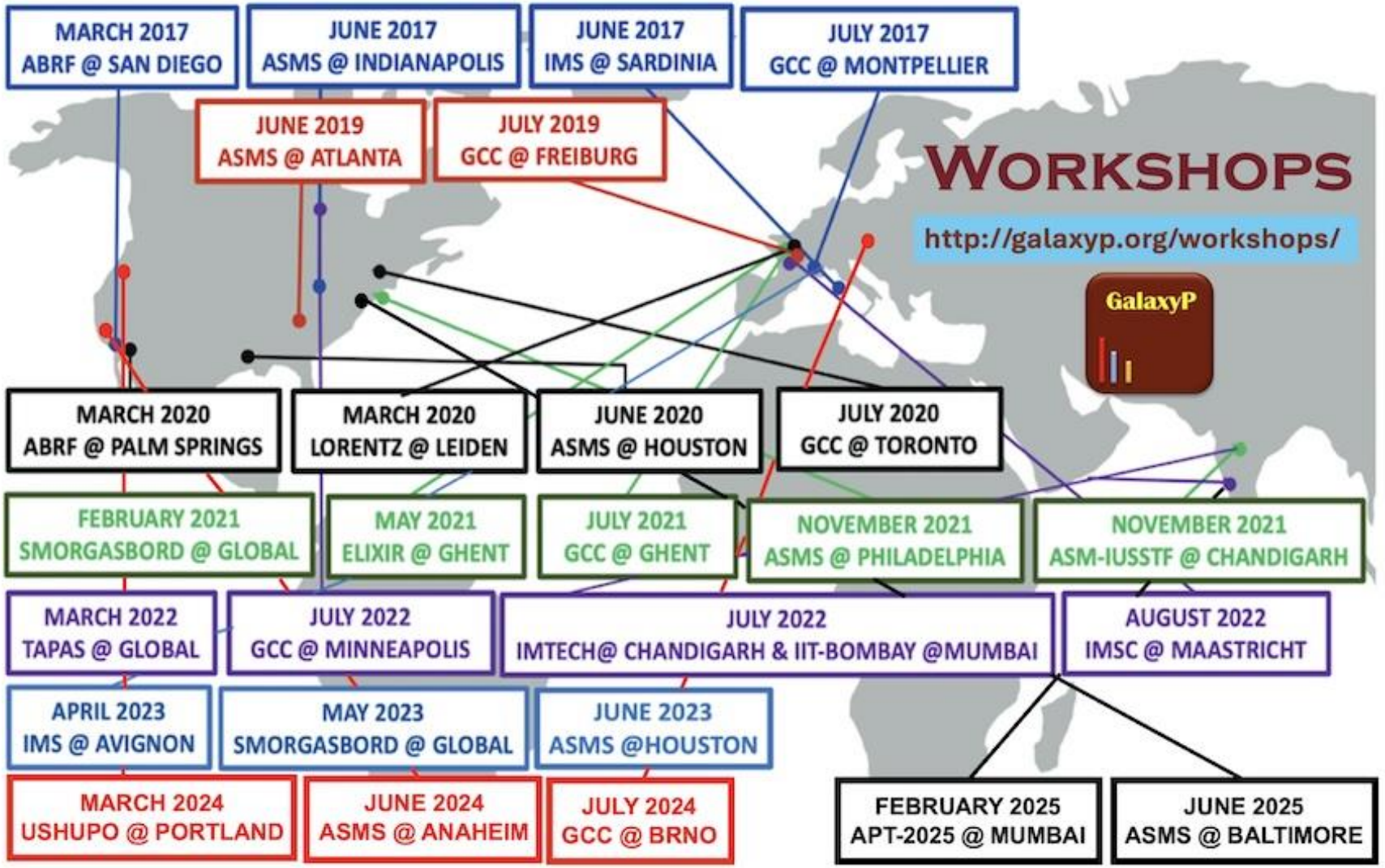
Supports beginners and advanced users

Real datasets with context

Promotes community adoption

Equips researchers with critical computational skills

Global Outreach



Summary and Takeaways

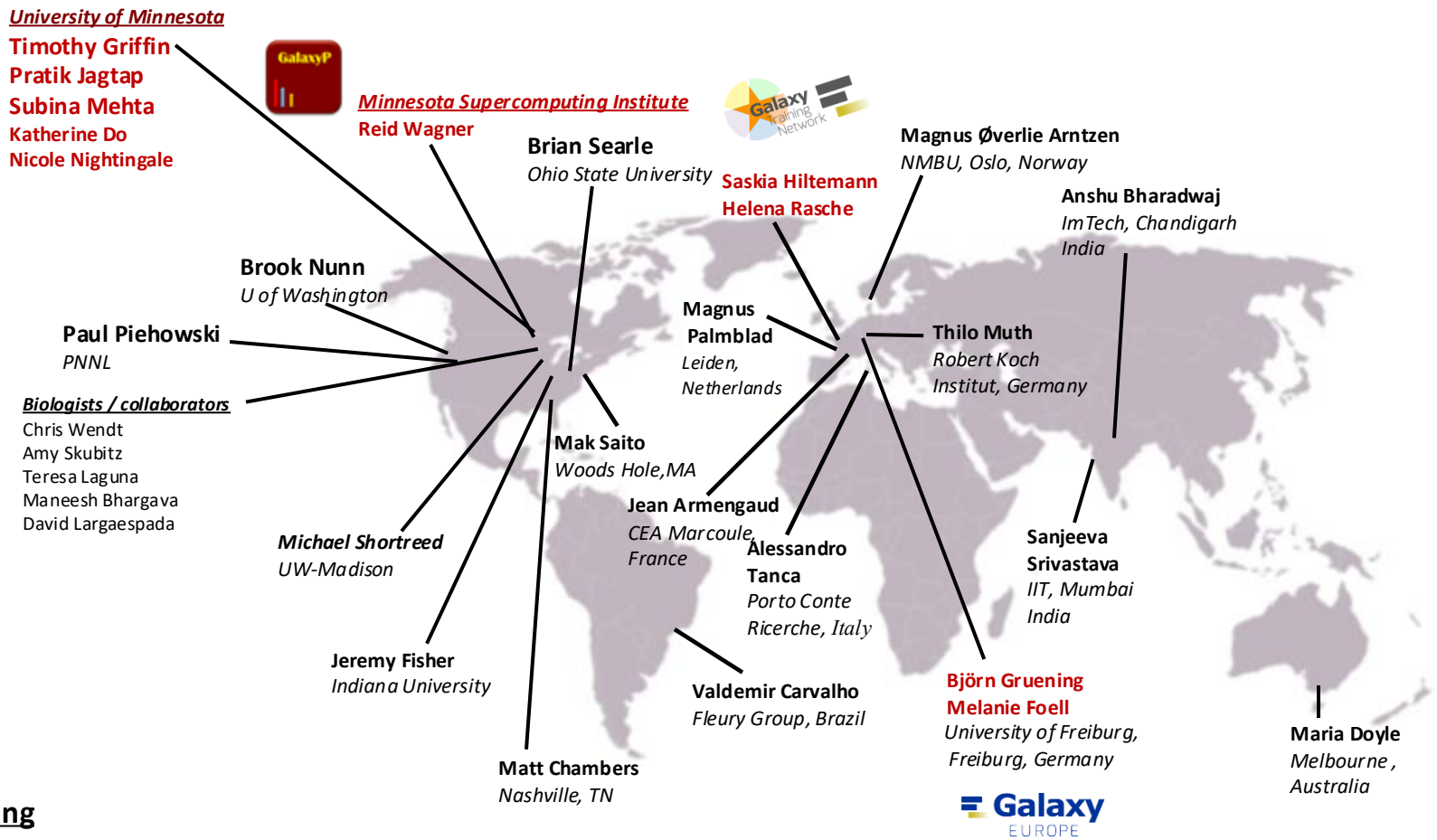
MS is central to multi-omics

Galaxy-P and GTN address training and accessibility

GTN resources empower diverse scientific communities

Broad adoption fosters better science through reproducibility

ACKNOWLEDGMENTS



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