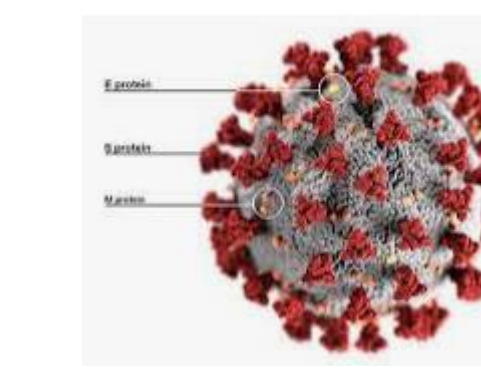




Proteomics Core Genome Center, UC Davis

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Brett Phinney – Core Director*

As long as the proteome of the organism is known, we can detect the proteins.



What can you find out from Proteomics

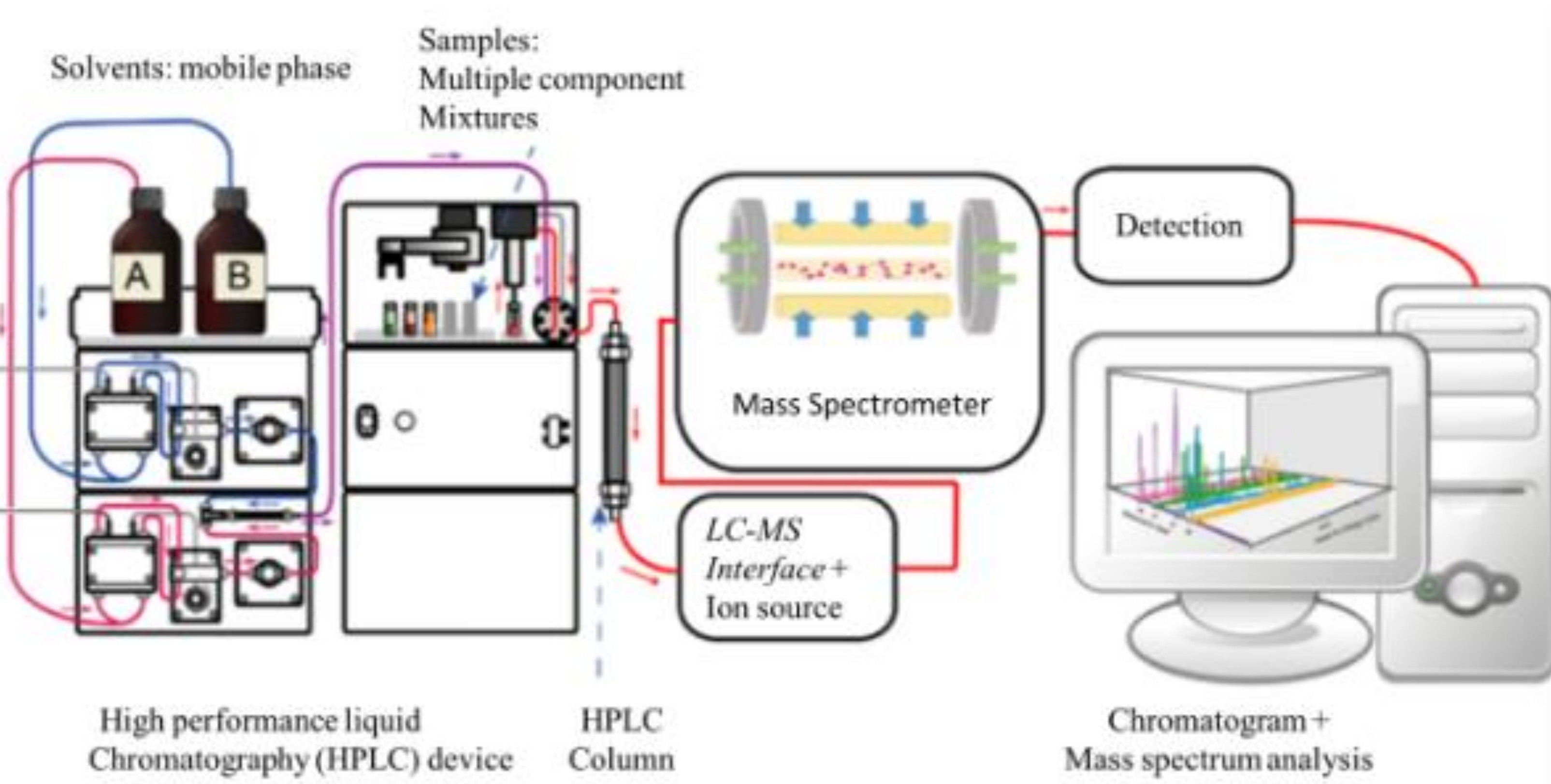
Proteomics can identify and monitor the proteome of an organism. One important application is in the area of biomarker discovery.

i.e., in the field of veterinary studies, by analyzing the proteins in the animals' tissues, body fluids such as urine, serum, spinal fluid, one can get info to:

- quantitatively assess the levels of the proteins and monitor changes in amount or on an even subtler level
- more subtle than identification: monitor the post-translational level changes (protein levels same, but PTMs change)
- provide a comprehensive map of protein interactions associated with disease pathways

Methodology:

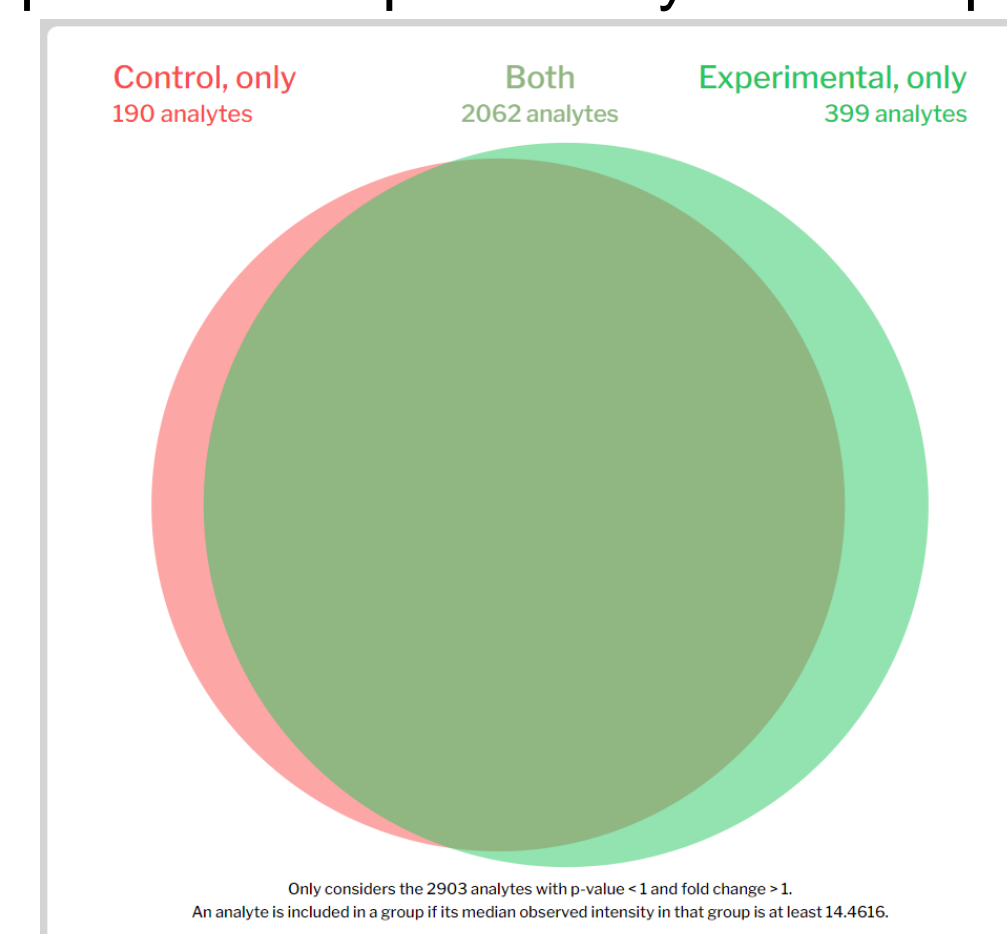
- ❖ Extract proteins from sample by solubilizing them in a RIPA-similar buffer
- ❖ Cut proteins into peptides
- ❖ Analyse/detect peptides via Liquid Chromatography / Mass Spectrometry (LC/MS)



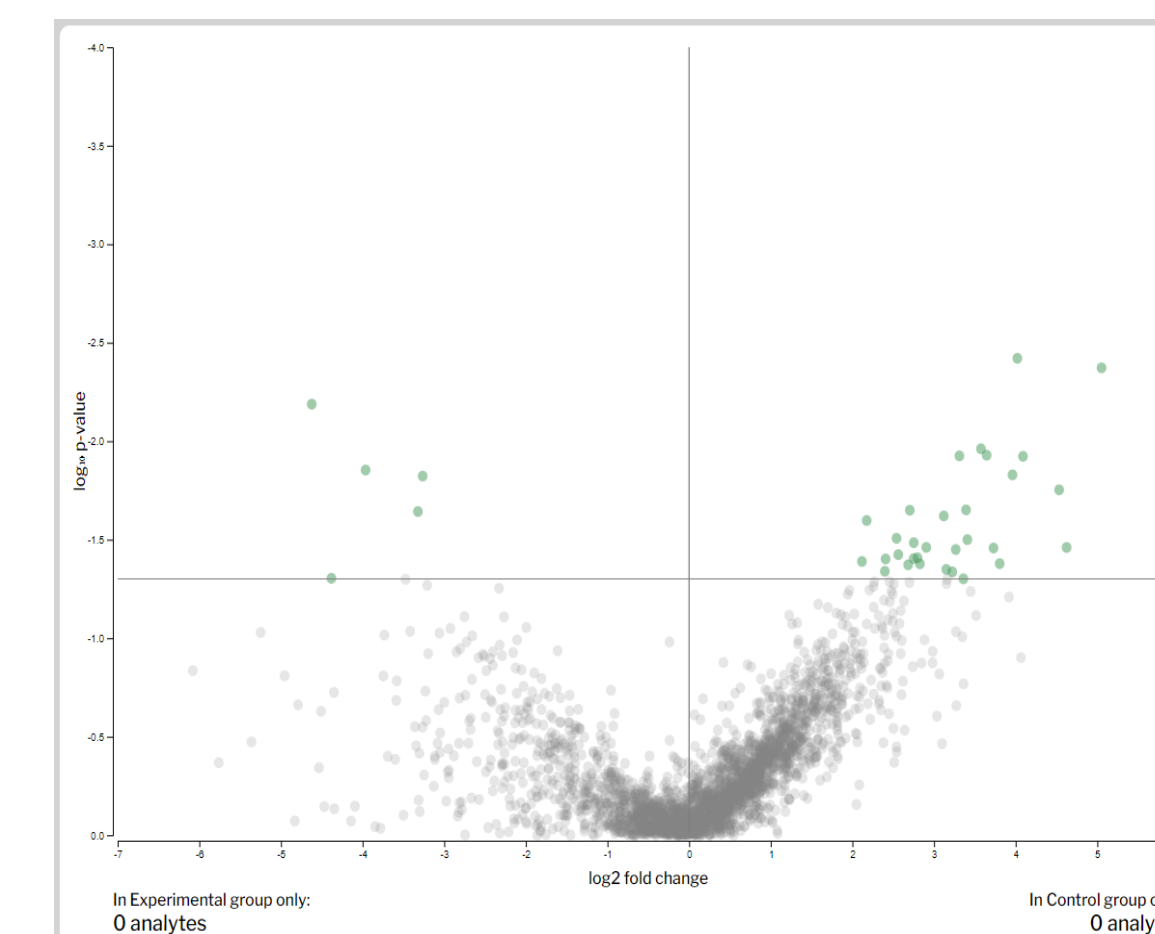
Example of Results we can give you:

- List of detected and quantified proteins
- Contextualise data via various statistical analysis figures:

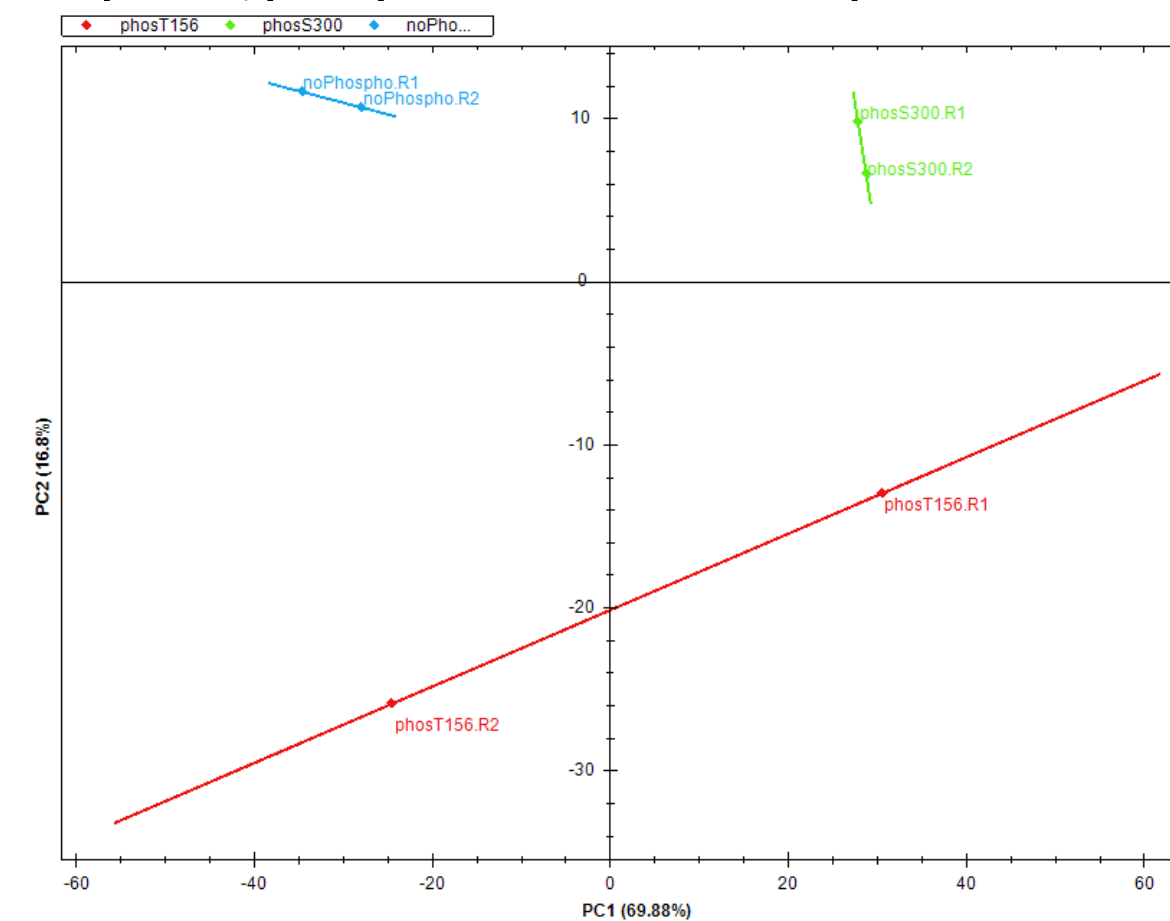
Venn Diagram: detected proteins appear in multiple or only one sample



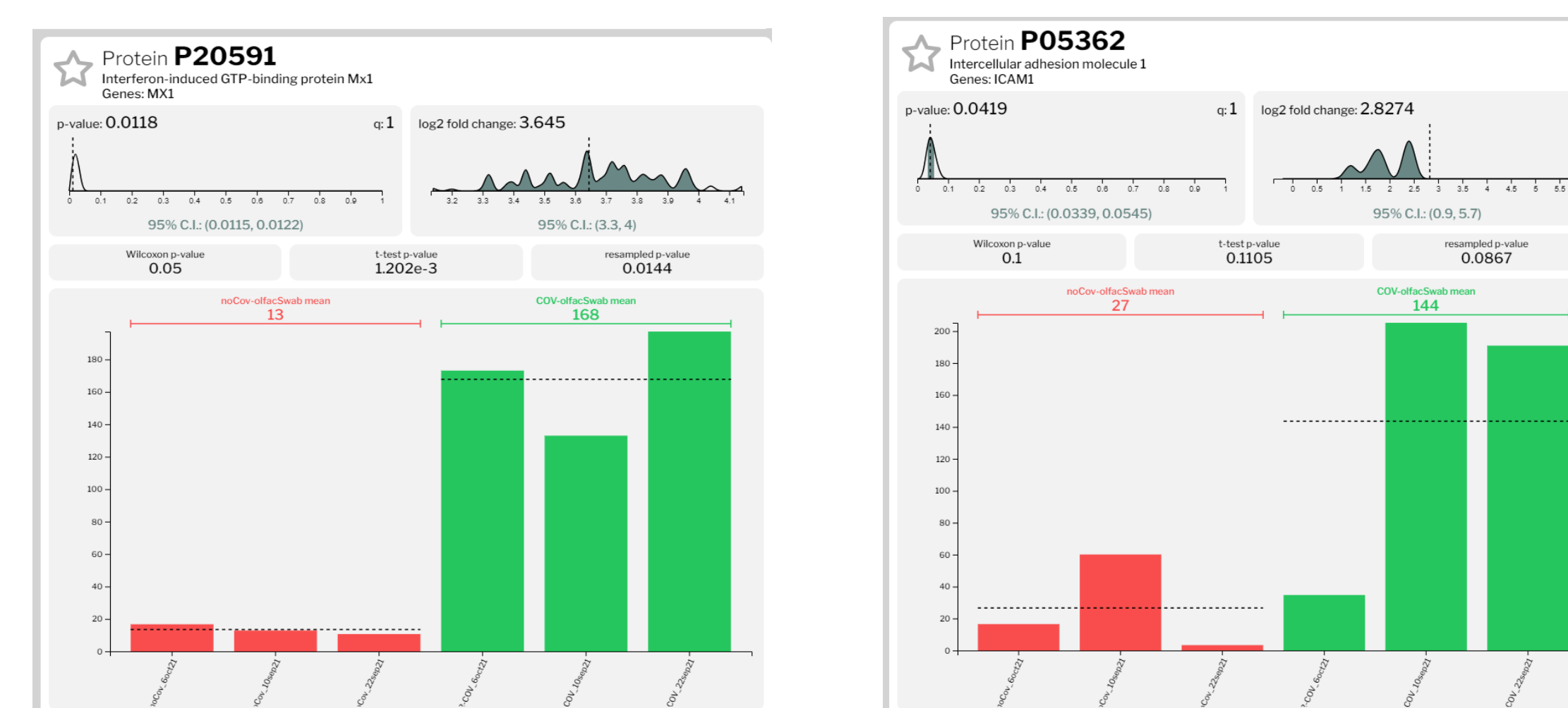
Volcano plot: shows which proteins are significantly differentially expressed



PCA analysis: the samples group based on sample characteristic



Examples of antiviral proteins and critical signaling pathway, from table, showing differential expression in COVID versus non-COVID swabs



- C. Protein pathway, location within the cell/organism

List of pathways and the proteins that most significantly differentiate in the non-COVID versus COVID subject' olfactory cleft region:

Pathway name	Pathway ID R-HAS-xxx	Pathway p-value	Antiviral proteins and critical signaling pathway
ISG15 antiviral mechanism	-1169408	3.6e-16	P05161 Ubiquitin-like protein ISG15
			P42224 Signal transducer and activator of transcription 1-alpha/beta
			P20591 Interferon-induced GTP-binding protein Mx1
			P09914 Interferon-induced protein with tetratricopeptide repeats 1
			P41226 Ubiquitin-like modifier-activating enzyme 7
Interferon alpha/beta signaling	-909733	4.7e-12	P095786 Antiviral innate immune response receptor RIG-I
			P05161 Ubiquitin-like protein ISG15
			P20591 Interferon-induced GTP-binding protein Mx1
			P09914 Interferon-induced protein with tetratricopeptide repeats 1
			O14879 Interferon-induced protein with tetratricopeptide repeats 3
Interleukin-4 and -13 signaling	-6785807	8.26e-10	P29728 2'-5'-oligoadenylate synthase 2
			P42224 Signal transducer and activator of transcription 1-alpha/beta
			PODJ18 Serum amyloid A-1 protein
DDX58/IFIH1-mediated induction of interferon-alpha/beta	-168928	9.37e-10	P80188 Neutrophil gelatinase-associated lipocalin
			P05362 Intercellular adhesion molecule 1
			P05161 Ubiquitin-like protein ISG15
Interferon gamma signaling	-877300	4.29e-9	P41226 Ubiquitin-like modifier-activating enzyme 7
			O95786 Antiviral innate immune response receptor RIG-I
			P01911 HLA class II histocompatibility antigen, DRB1 beta chain
			P29728 2'-5'-oligoadenylate synthase 2
			P32455 Guanylate-binding protein 1
			P05362 Intercellular adhesion molecule 1