



# Isolating the Isolate: Proteomic Profiling of Triclabendazole-Susceptible and Resistant *Fasciola hepatica*

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## Background

Fascioliasis is a disease caused by *Fasciola hepatica*, which infects livestock and humans and thus poses a substantial threat to food security and human health [1]. The overdependence on triclabendazole (TCBZ) for the control and management of fascioliasis has led to the establishment of TCBZ-resistant *F. hepatica* [2]. Recent work has identified a major locus and the gene content likely conferring TCBZ resistance [3]. Hence, there is a need to further confirm potential TCBZ resistance targets, particularly at the protein level.

## Aim

The current study aims to utilize an in-depth proteomic approach to confirm the protein profiles from isolates of *F. hepatica* varying in their TCBZ susceptibility.

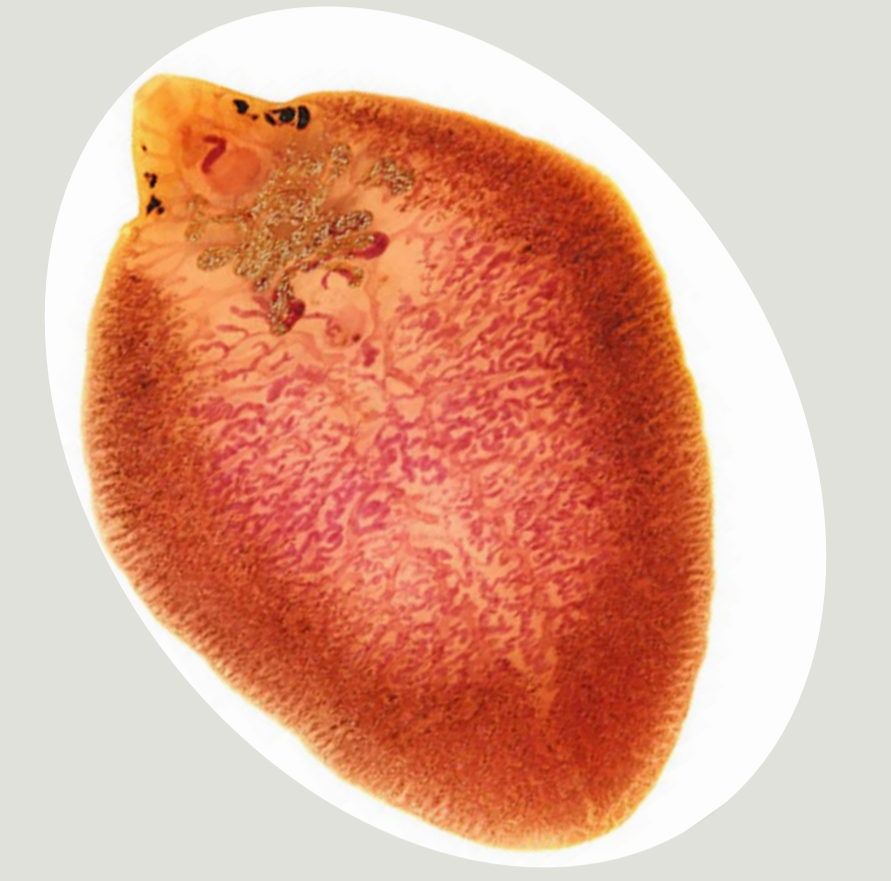
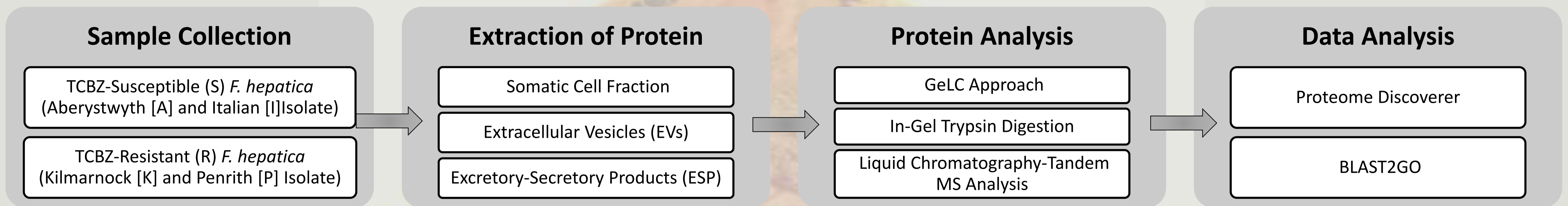


Figure 1: Image of *Fasciola hepatica* [4]

## Approach



## Results (Somatic Analysis)

A total of 1236 proteins of high confidence were identified across the four isolates of *F. hepatica*. **Table 1** demonstrates the number of unique proteins within the isolates and between TCBZ status. Notably, this analysis revealed the two TCBZ-Resistant isolates share a commonality in possessing the **Microtubule-actin cross-linking factor 1 isoforms 1/2/3/5**.

Table 1: Quantitative Comparison of Proteins in Different *F. hepatica* Isolate

<i>Fasciola hepatica</i> Isolate	Unique Proteins
Aberystwyth (S)	14
Italian (S)	17
Kilmarnock (R)	33
Penrith (R)	6
Aberystwyth and Italian (S)	20
Kilmarnock and Penrith (R)	4

The heatmap shows the abundance levels of proteins in the different *F. hepatica* isolates (**Figure 2**). Notably, the susceptible isolates cluster together with Kilmarnock most distant.

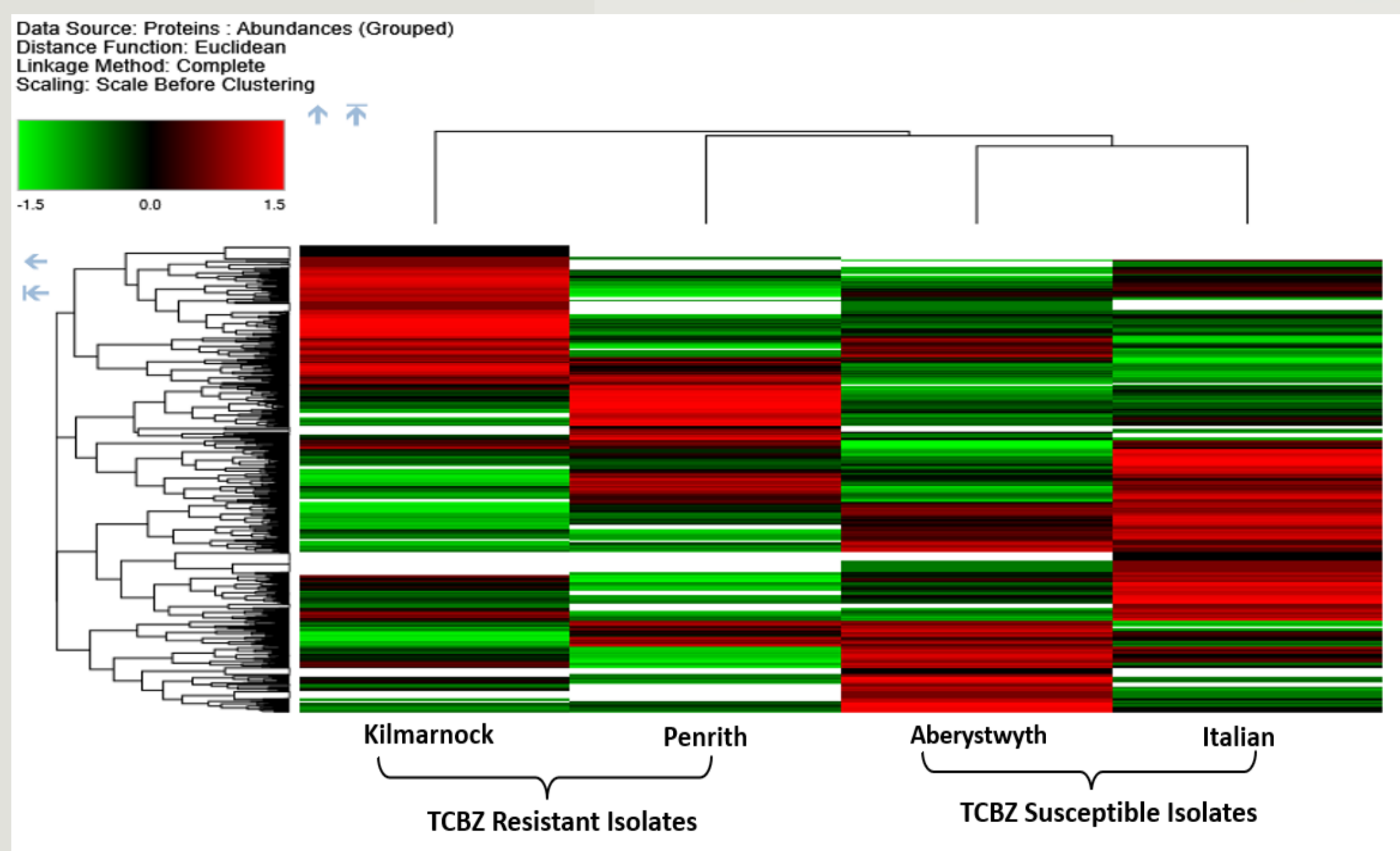


Figure 2: Heatmap of *F. hepatica* Somatic cells proteomic data

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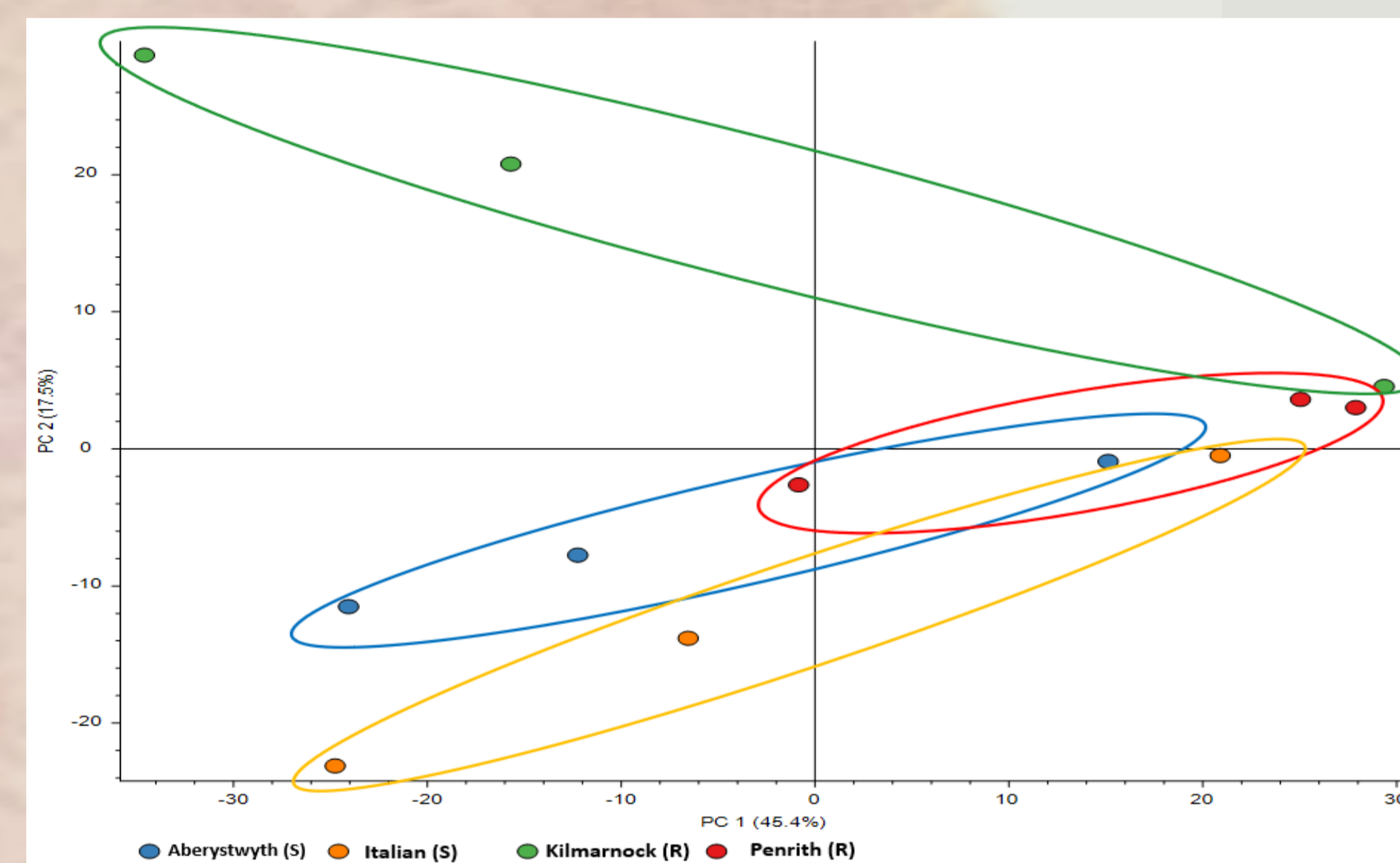


Figure 3: PCA of *F. hepatica* Somatic cells proteomic data

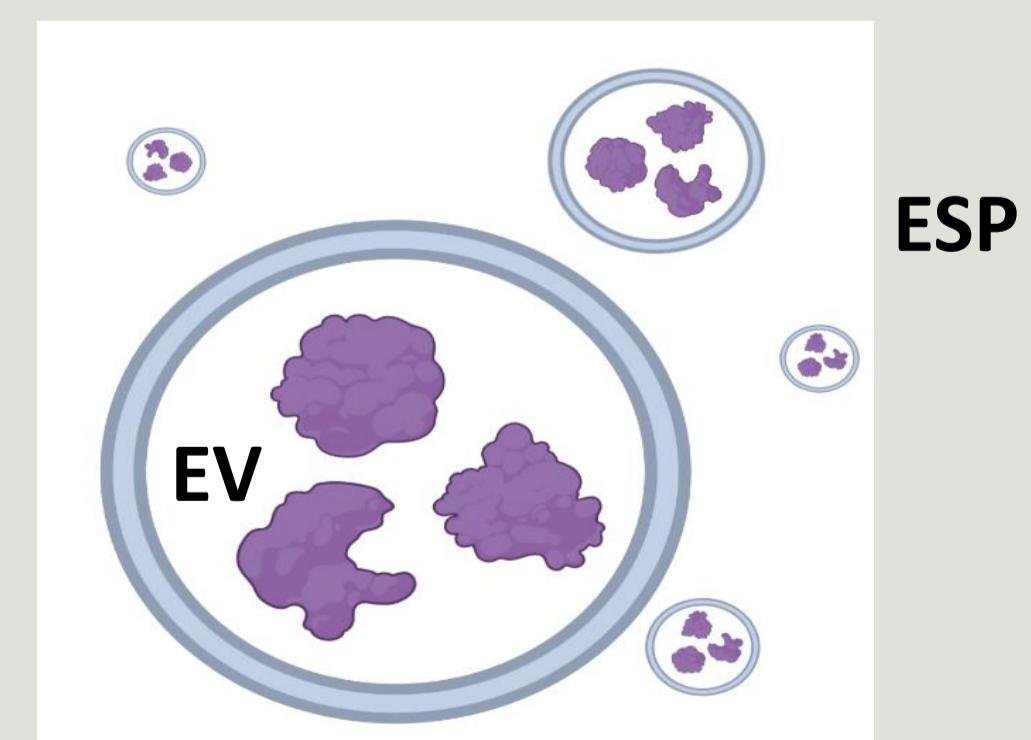
This study identified seven proteins from the 30 proteins Beesley *et al.* [3] noted within the locus likely conferring TCBZ resistance (Table 2).

Table 2: Proteins that confers TCBZ resistance in *Fasciola hepatica* according to Beesley *et al.* [3]

S/N	SeqName	Description	Isolate
1.	maker-scaffold10x_157_pilon-snap-gene-0.197-mRNA-1	ADP-ribosylation factor	ALL
2.	maker-scaffold10x_157_pilon-snap-gene-0.187-mRNA-1	Fatty acid binding protein V	ALL
3.	maker-scaffold10x_1853_pilon-snap-gene-0.14-mRNA-1	26S proteasome non-ATPase regulatory subunit	ALL
4.	maker-scaffold10x_157_pilon-snap-gene-0.190-mRNA-1	Ubiquitin carboxyl-terminal hydrolase	A & I
5.	maker-scaffold10x_157_pilon-snap-gene-0.207-mRNA-1	Ubiquitin carboxyl-terminal hydrolase	A, I & K
6.	maker-scaffold10x_157_pilon-augustus-gene-0.89-mRNA-1	Ubiquitin carboxyl-terminal hydrolase	All
7.	maker-scaffold10x_157_pilon-snap-gene-0.182-mRNA-1	Ras-related protein Rap-1	A

## Ongoing Direction

1. Isolation of *F. hepatica* EVs from ES products using size exclusion chromatography (SEC).
2. Confirmation of EVs by using GeLC proteomics searching against the *F. hepatica* genome, EVs marker identification and TEM.
3. GELC proteomics on *F. hepatica* membrane-bound proteins.



## References

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