

## Characterization of protein content of fish meal

New functional and healthy products can be obtained from fish meal due to its high protein content helping to create new valuable products in the fishmeal production chain.



Fish meal from tuna fish

### Elemental analysis (w/w %)

C	40 ± 1
N	10.3 ± 0.3
H	5.8 ± 0.1
S	0.45 ± 0.07
Ashes	21.7 ± 0.2

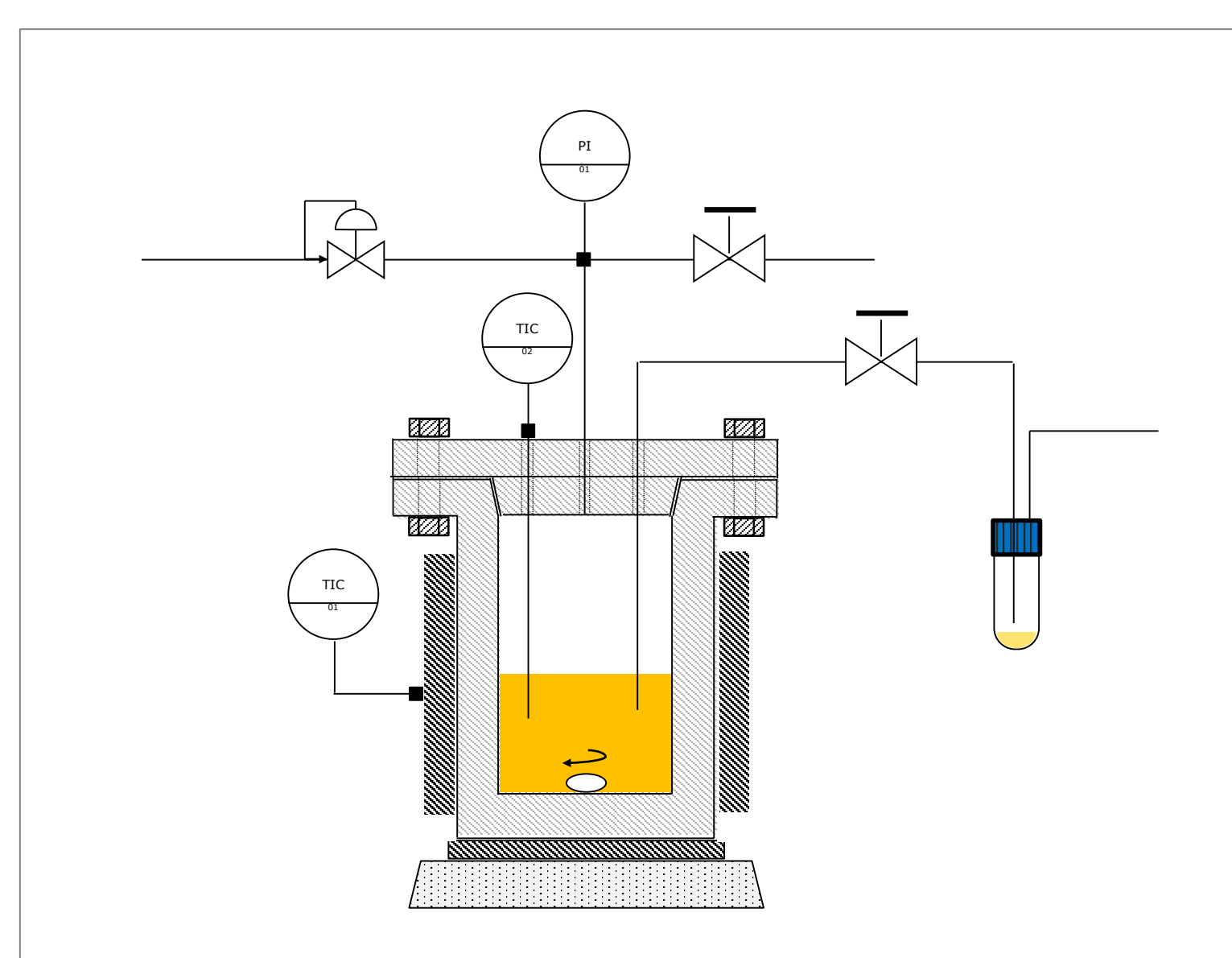
N-factor = 5.0  
(according to the amino profile)

Protein content = 51 ± 2 % (w/w)

Water extraction at 80 °C

Water soluble protein (WSP) fraction = 14.1 ± 0.5 g<sub>WSP</sub> / 100 g<sub>dry fish meal</sub>  
28% of the total protein

## Hydrolysis of water soluble protein fraction by subcritical water (subW)



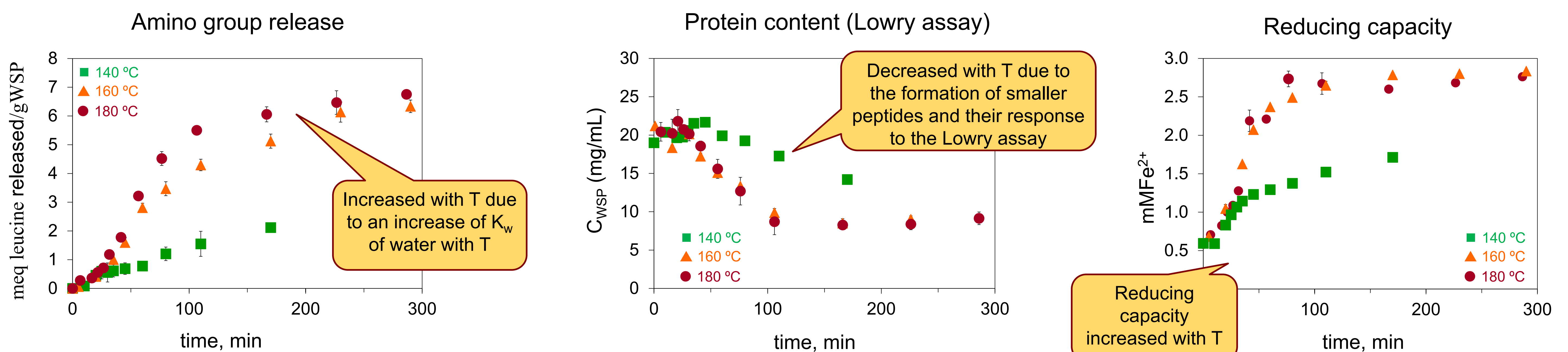
Discontinuous reactor

### Hydrolysis conditions

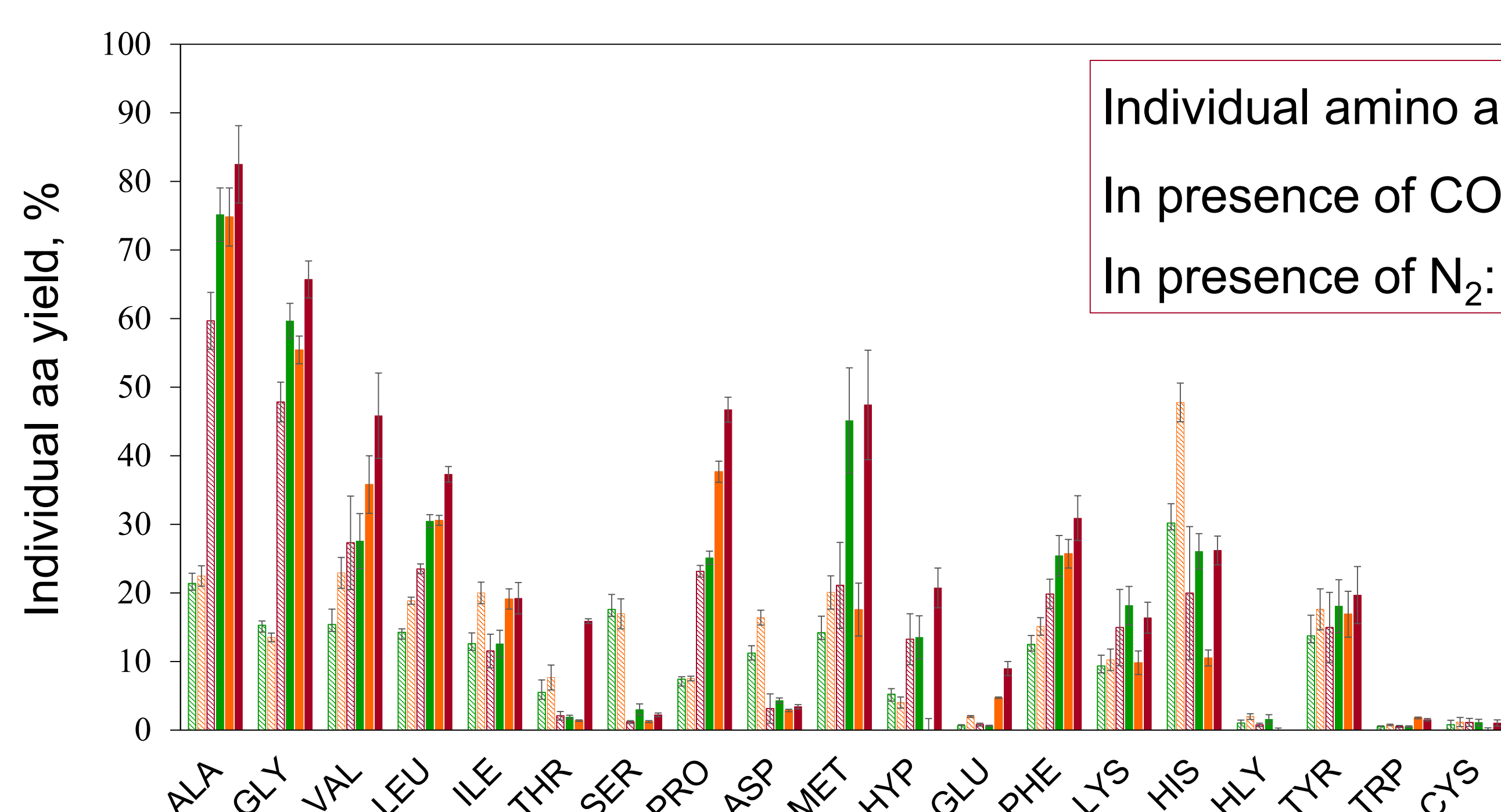
p, MPa	50
T, °C	140-180
Pressurization agent	CO <sub>2</sub> or N <sub>2</sub>

- Determination of **amino group release (ninhydrin assay)**
- Analysis of **total protein content (Lowry assay)**
- Analysis of **free amino acid profile (by derivatization + GC)**
- **Antioxidant capacity** of subW hydrolysates (**FRAP assay**)

### Hydrolysis in the presence of CO<sub>2</sub>



### Individual amino acid yield

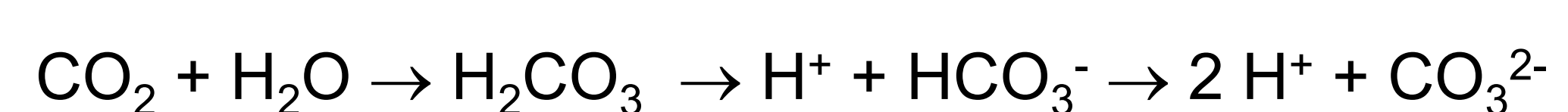


Individual amino acid yield obtained by subW with different pressurization agents and temperatures.

In presence of CO<sub>2</sub>: ■ 140 °C, ■ 160 °C, ■ 180 °C

In presence of N<sub>2</sub>: ■ 140 °C, ■ 160 °C, ■ 180 °C

Higher free amino acid yield was obtained when using CO<sub>2</sub> as pressurization agent than when using N<sub>2</sub>, due to the formation of carbonic acid that serves as a catalyst:



## CONCLUSIONS

Protein hydrolysates from fish meal can be an excellent source of nitrogen for different food applications. Different analytical techniques helped to characterize the protein hydrolysis by subcritical water exploring alternatives to conventional chemical hydrolysis process.

### ACKNOWLEDGEMENTS

To AEI projects [PID2019-104950RB-I00, PID2020-116716RJ-I00, TED2021-129311B-I00 and PDC2022-133443-I00]

To JCyL and ERDF project [grant number BU05P20]

To JCyL for P. Barea and P. Alonso-Riaño predoctoral contracts ORDEN EDU/1868/2022 and EDU/556/2019

R. Melgosa acknowledges Beatriz Galindo Research Fellowship [BG20/00185]