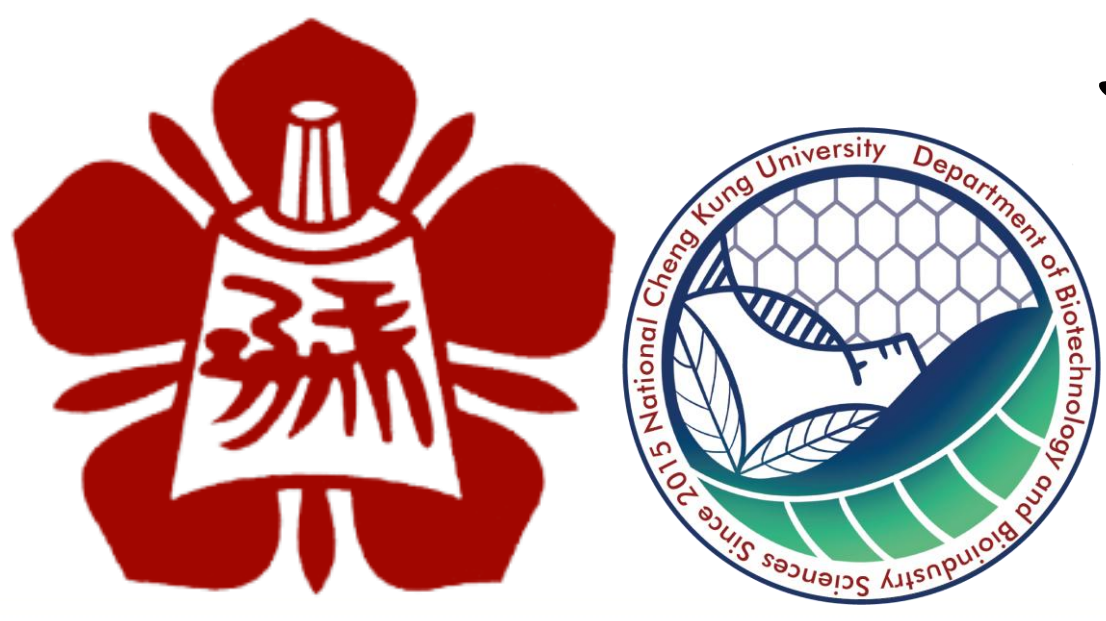




環境壓力對瘦素抑制石斑魚之生理調控之影響

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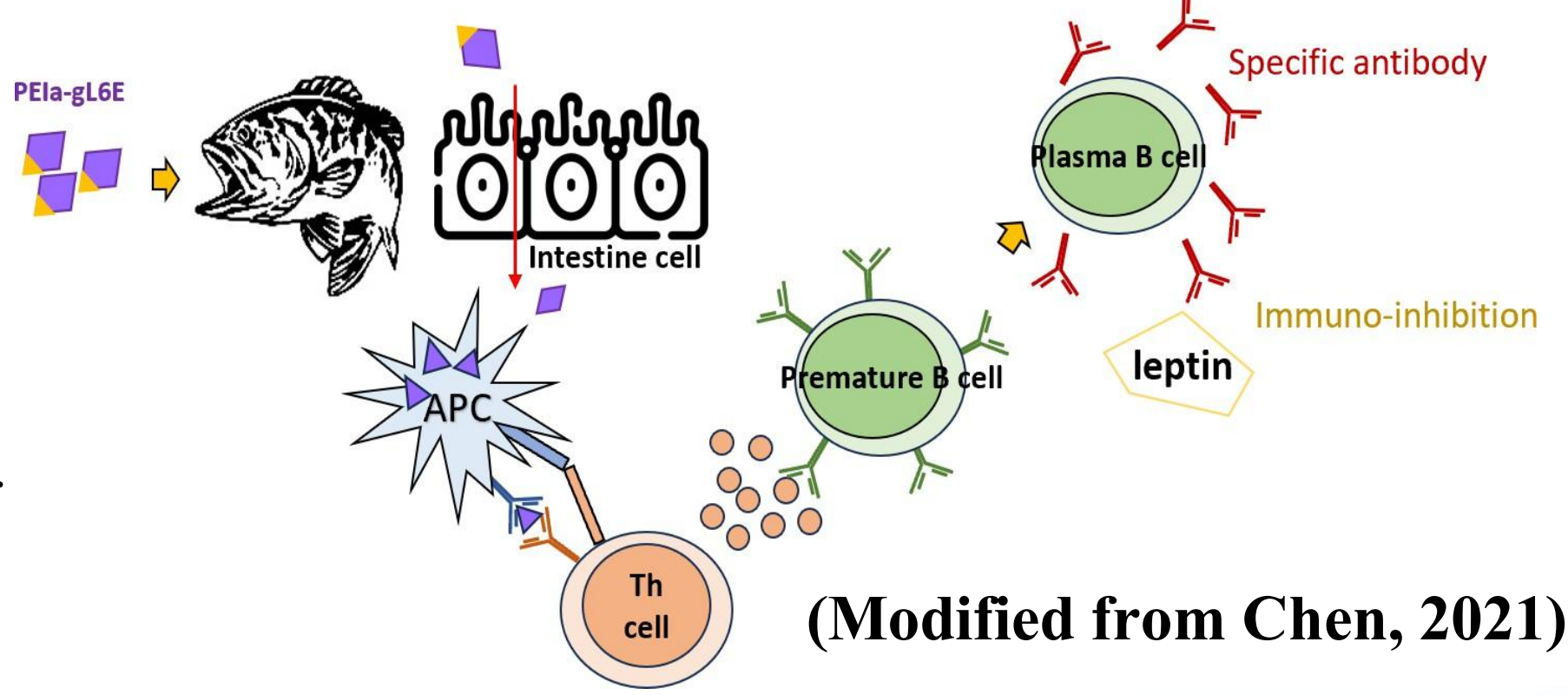
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Abstract

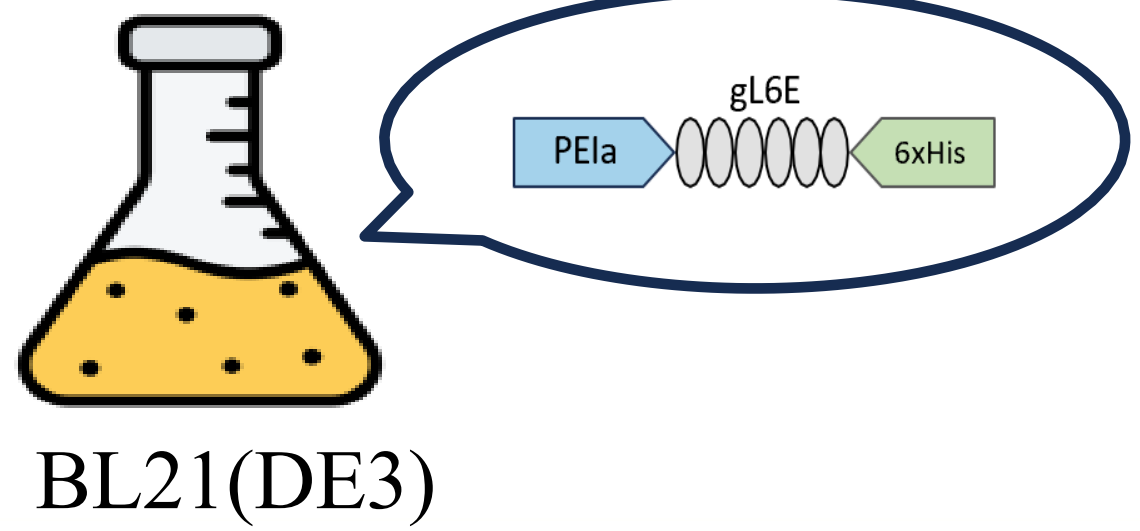
Grouper is one of the most important and economically valuable aquaculture species in Taiwan, with southern Taiwan serving as a major culture area. During the culture process, grouper require a relatively long period to develop from juveniles to adults. However, there are lots of factors that had made it difficult to further increase production efficiency. In addition, climate change has intensified environmental pressures and altered aquaculture conditions. Previous studies have demonstrated that leptin is an important protein involved in the growth regulation of grouper. Leptin is also a hormone synthesized primarily by white adipose tissue and plays an important role in regulating energy balance and appetite. Research on leptin-related physiological mechanisms in aquatic organisms has primarily focused on normal leptin function and leptin gene knockout, whereas studies investigating the physiological regulation associated with immunoinhibited remain limited. In this study, grouper subjected to leptin inhibition under environmental stress will be investigated by determining the levels of reactive oxygen species (ROS) and malondialdehyde (MDA). These parameters will be used to infer the regulatory responses of antioxidant enzymes. In addition, histological analyses will be conducted to evaluate the extent of cellular and tissue damage caused by environmental stress. The results of this study are expected to provide further insights into the physiological role of leptin in the stress response and immunoregulatory mechanisms of grouper. Ultimately, the findings may contribute to the development of feeding strategies involving dietary additives, enhance the efficiency and sustainability of grouper aquaculture, and provide innovative approaches for the sustainable development of the aquaculture industry in Taiwan.

Schematic diagram of immuno-inhibition technique



Experimental Procedure

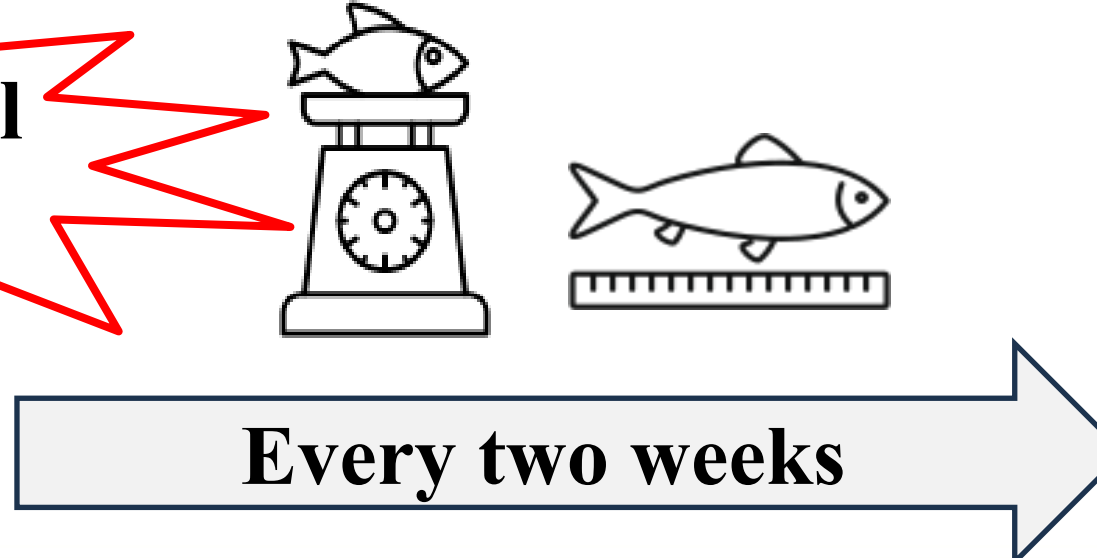
(1) PEIa-gL6E recombinant protein expression and dosage determination



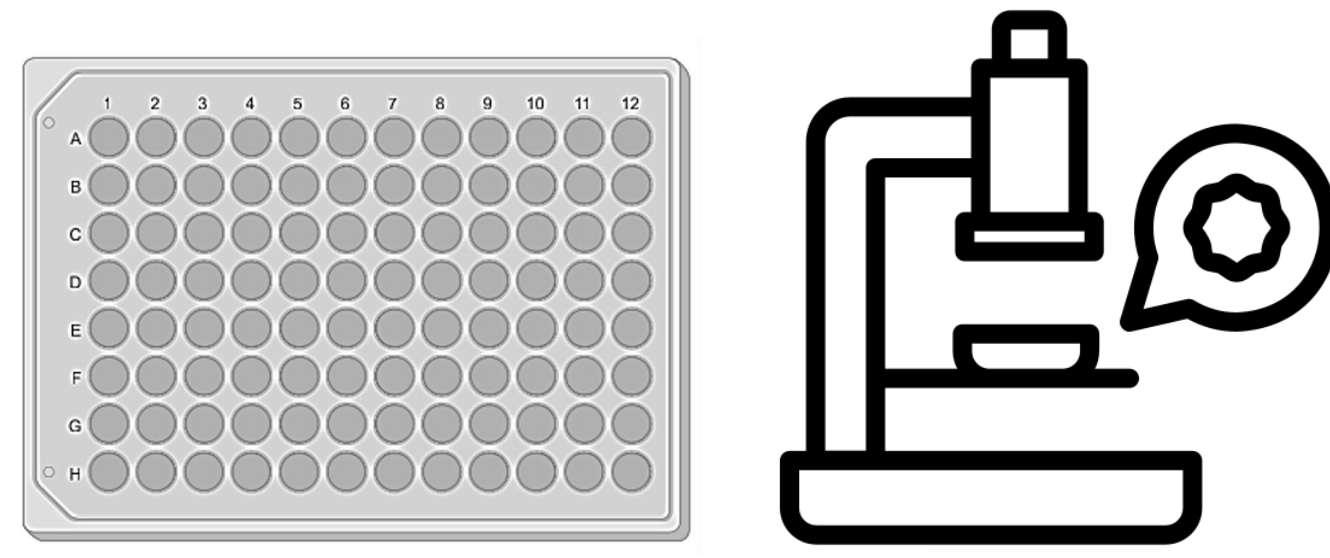
(2) Animal feeding test and Specific antibody analysis



(3) Growth record with leptin immuno-inhibition



(4) Measuring antioxidant enzyme activity and observing biopsy



Results

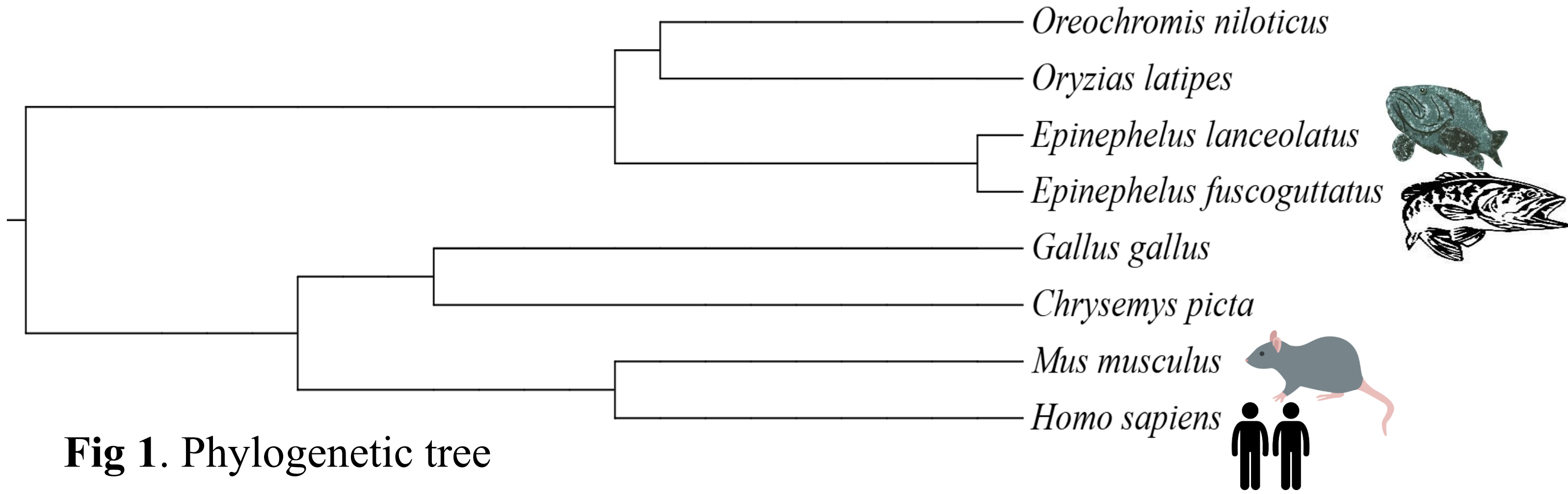


Fig 1. Phylogenetic tree

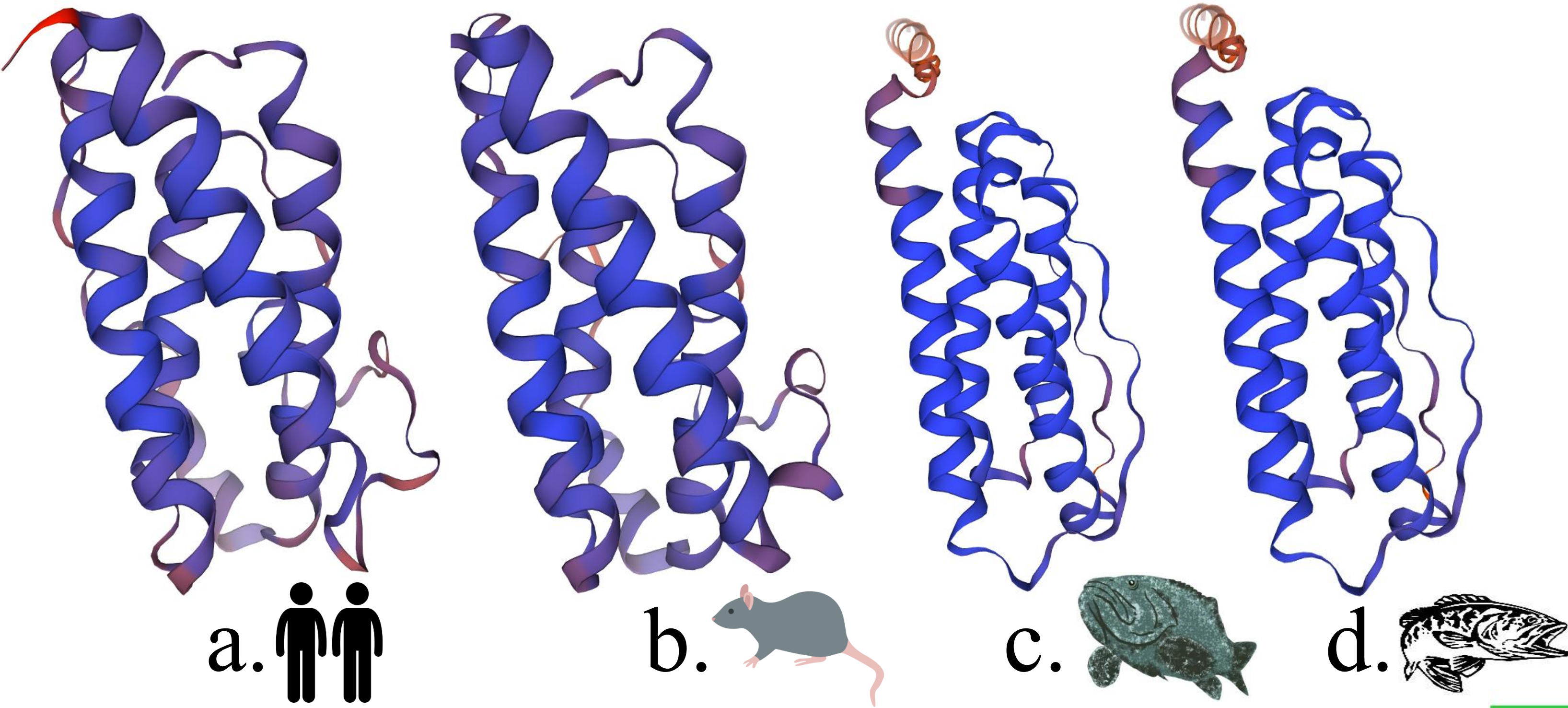


Fig 2. Leptin structure in four species. (a) human (b) mouse (c) giant grouper (d) tiger grouper



Control on 16th week



70µg PEIa-gL6E on 16th week



140µg PEIa-gL6E on 16th week



280µg PEIa-gL6E on 16th week

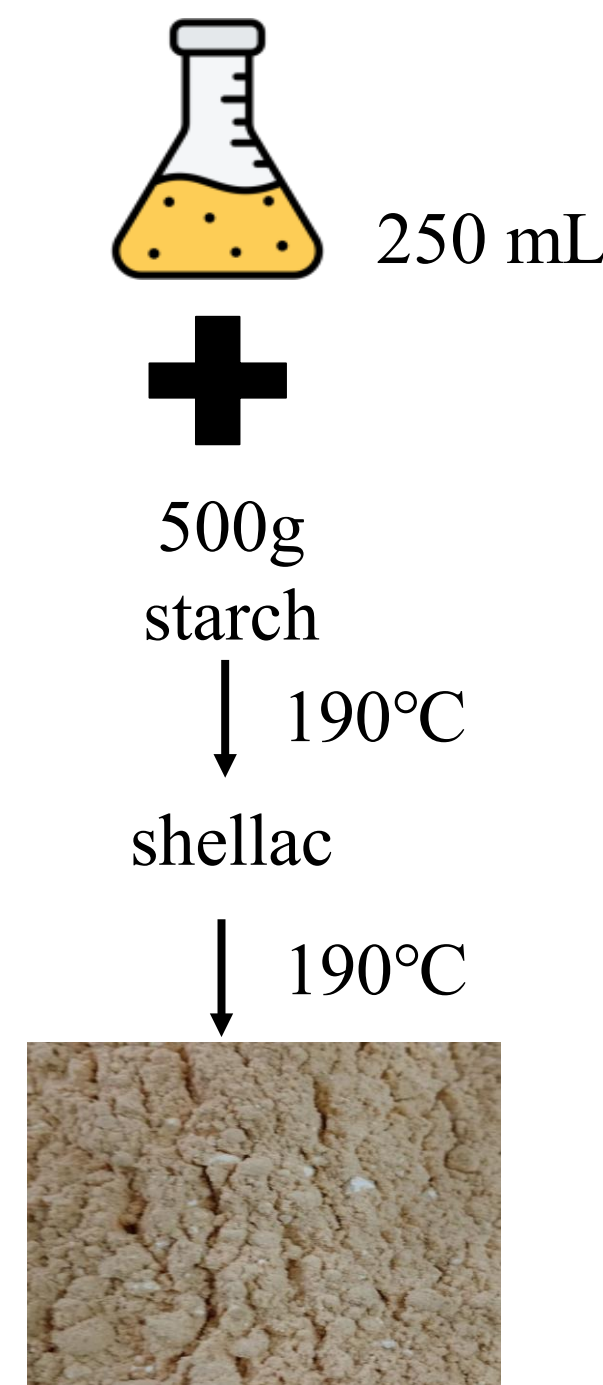
Fig 4. The body length on 16th week

Conclusion

The recombinant PEIa-gL6E protein was successfully expressed and purified, and its biological effects were evaluated through a long-term feeding experiment in grouper. Oral-inhibition with PEIa-gL6E affected grouper growth and physiological responses in a body shape and length. The results suggest that gL6E play an important role in regulating growth. This research will focus on the antioxidant enzyme activity and the tissue biopsy when leptin oral-inhibited grouper under environmental stress.

Fig 3. A Schematic diagram of PEIa-gL6E/pET-21b

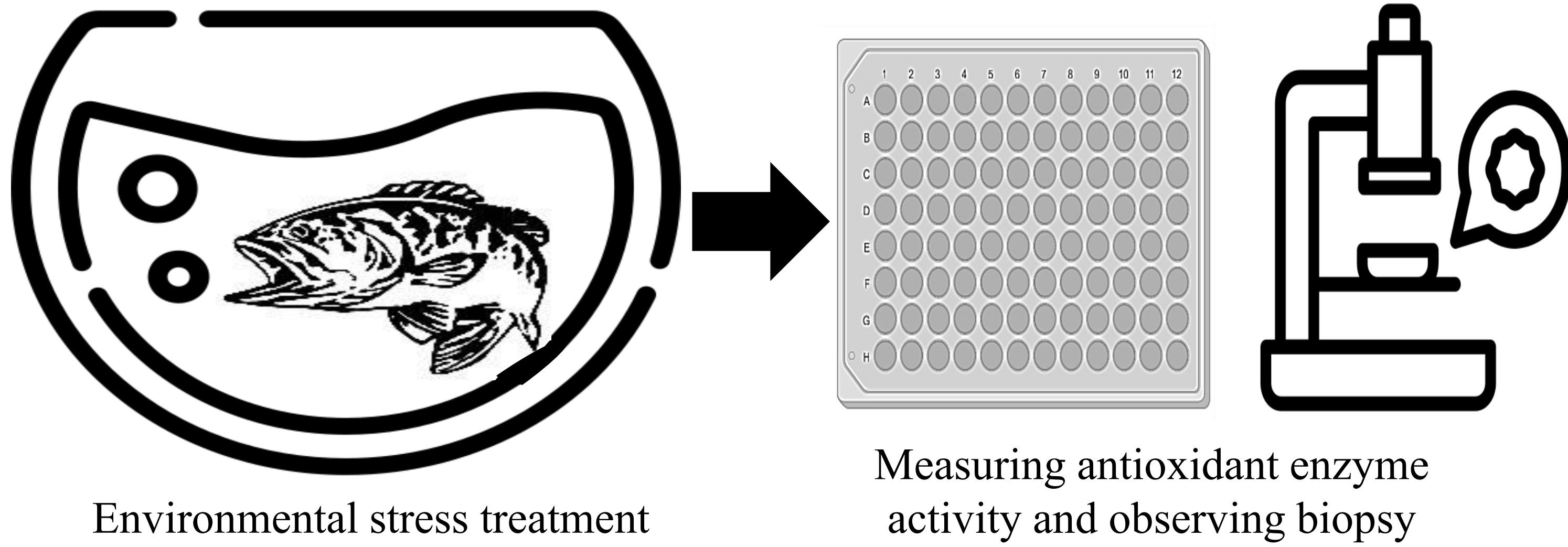
Production of oral-inhibitor



Experimental feed recipe

Feed ingredient (%)	Control	Low dose	Medium dose	High dose
Fish meal	39.43	39.43	39.43	39.43
Corn protein concentrate	10.00	10.00	10.00	10.00
Fish oil	0.61	0.61	0.61	0.61
Soy lecithin	1	1	1	1
Corn starch	23.10	17.31	11.6	0
PEIa-gL6E corn starch	0.00	5.79	11.5	23.1
Wheat gluten	10	10	10	10
Scallop meal	5	5	5	5
Squid meal	5	5	5	5
Choline chloride	0.1	0.1	0.1	0.1
Vitamin premix ¹	1	1	1	1
Mineral premix ²	2	2	2	2
Carboxymethylcellulose	2	2	2	2
Cellulose	0.76	0.76	0.76	0.76

Table 1. Experiment feed recipe showing the percentage of PEIa-gL6E. Dosage form low to high: 70,140,280 µg PEIa-gL6E. This recipe is designed and produced by Dr. Yu Hung Lin of the National Pingtung University of Science and Technology.



Acknowledgement

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