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INTRODUCTION

- The taxonomy of zoantharians is highly challenging due to a lack of clear morphological characters; although molecular techniques have helped to clarify high level-taxonomic relationships within the order.
- However, many issues remain at species level due to the limited resolution of DNA markers commonly used.
- Metabolomics approach showed promise to help distinguish closely related marine invertebrates like sponges¹ or even morphotypes for zoantharians².
- The Eastern Equatorial Pacific is one of the most poorly studied area for zoantharians diversity (Figs. 1 and 2).

OBJECTIVES

- Use a combined morphological and molecular approach to describe and classify zoantharians species of El Pelado marine protected area (Fig.1).
- Assess the potential of metabolomics to help identifying and characterizing zoantharian species.

STUDY AREA

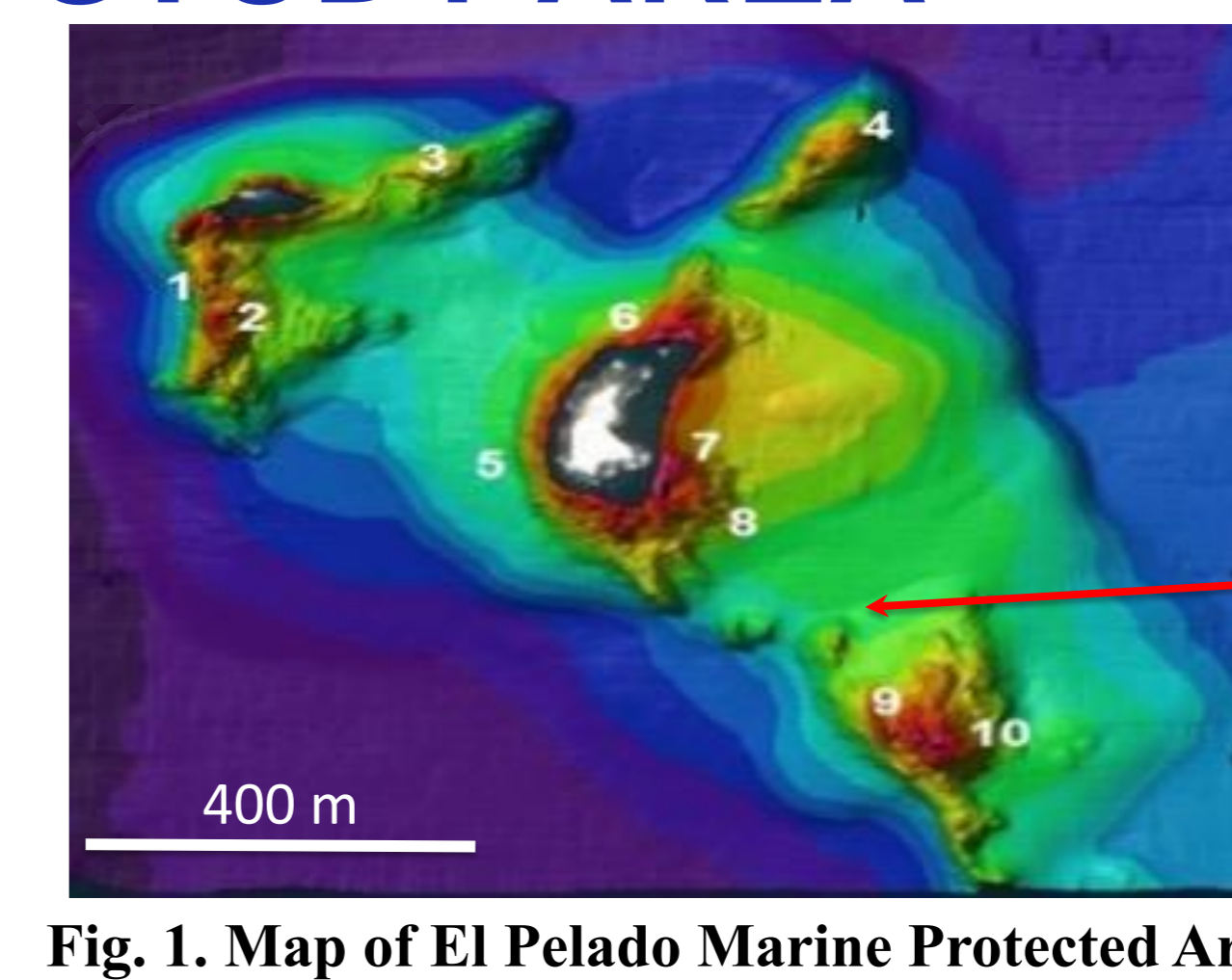


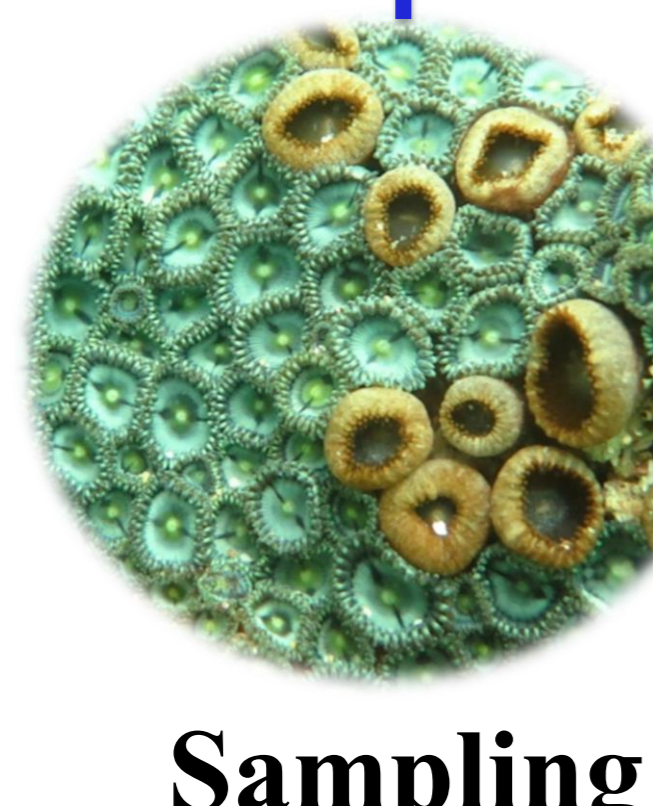
Fig. 1. Map of El Pelado Marine Protected Area



Fig. 2. Map of Ecuadorian coast

METHODS

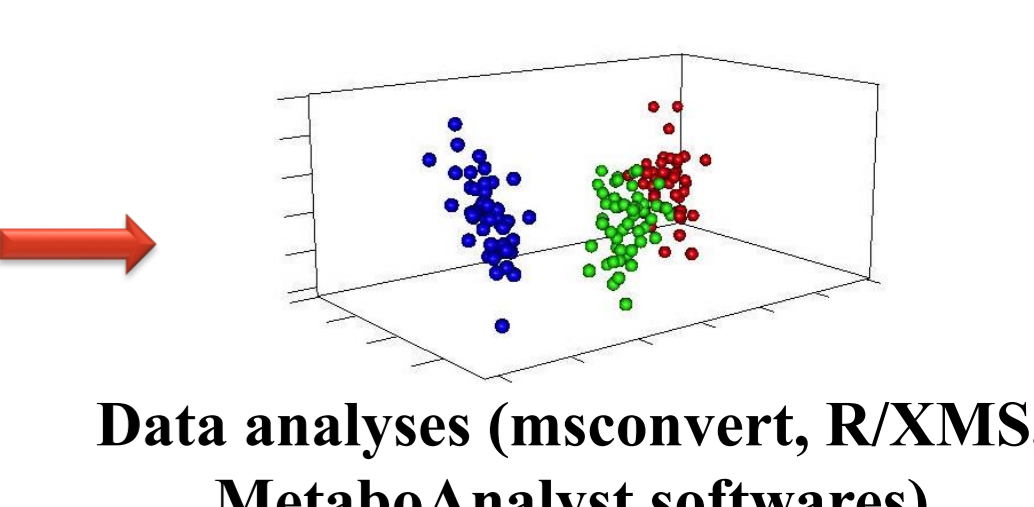
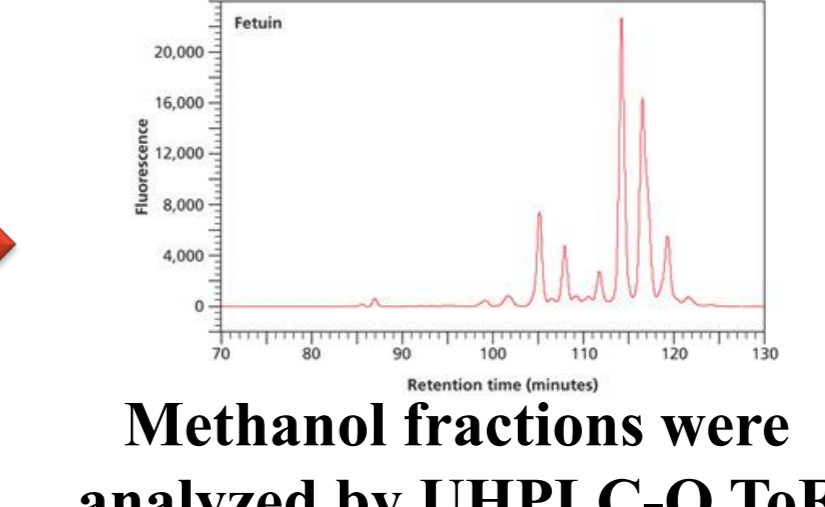
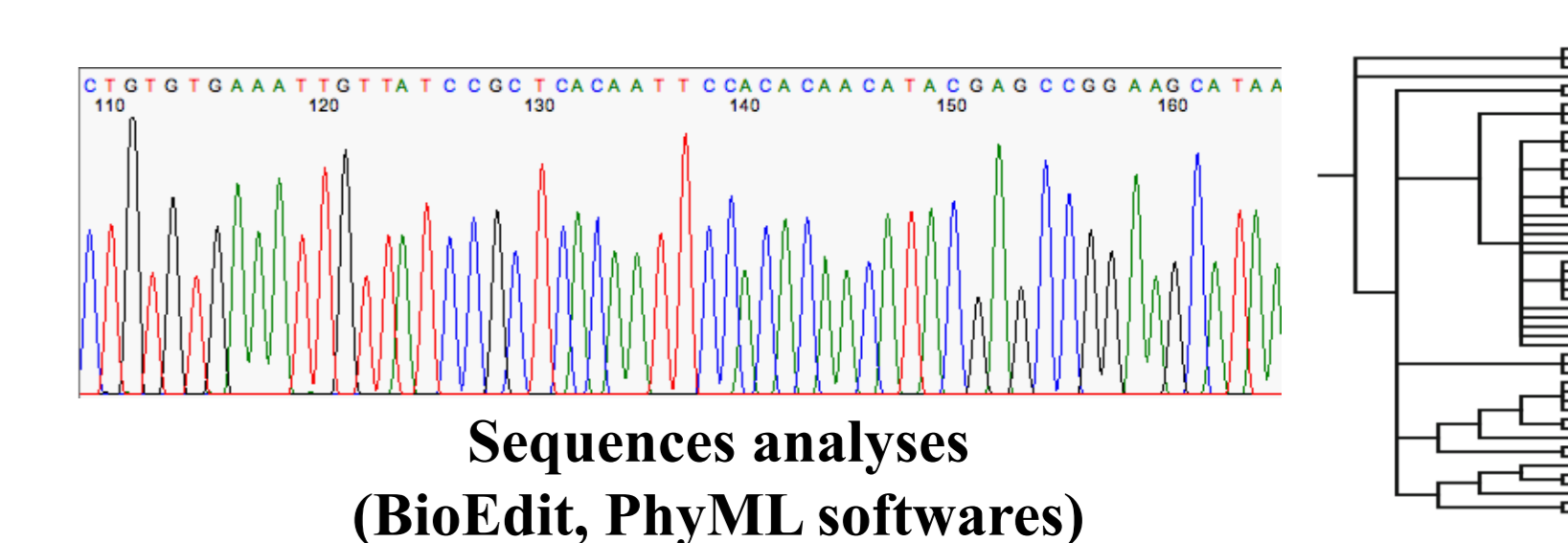
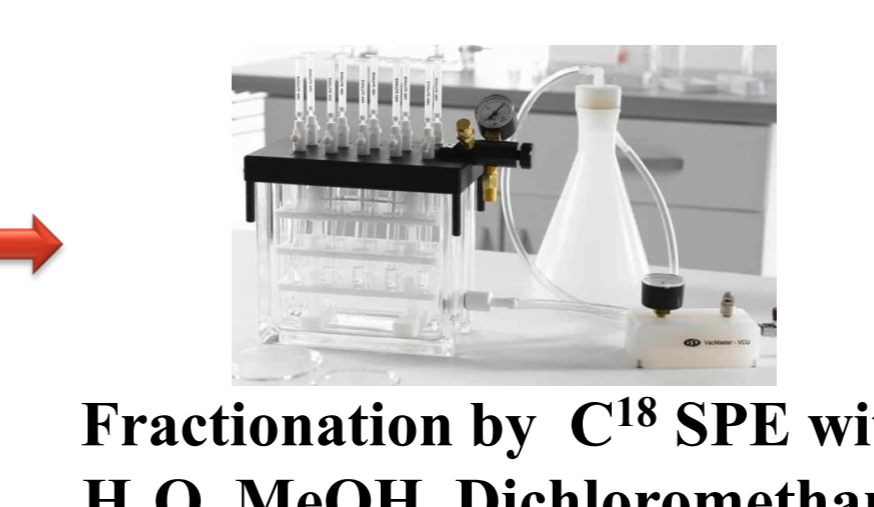
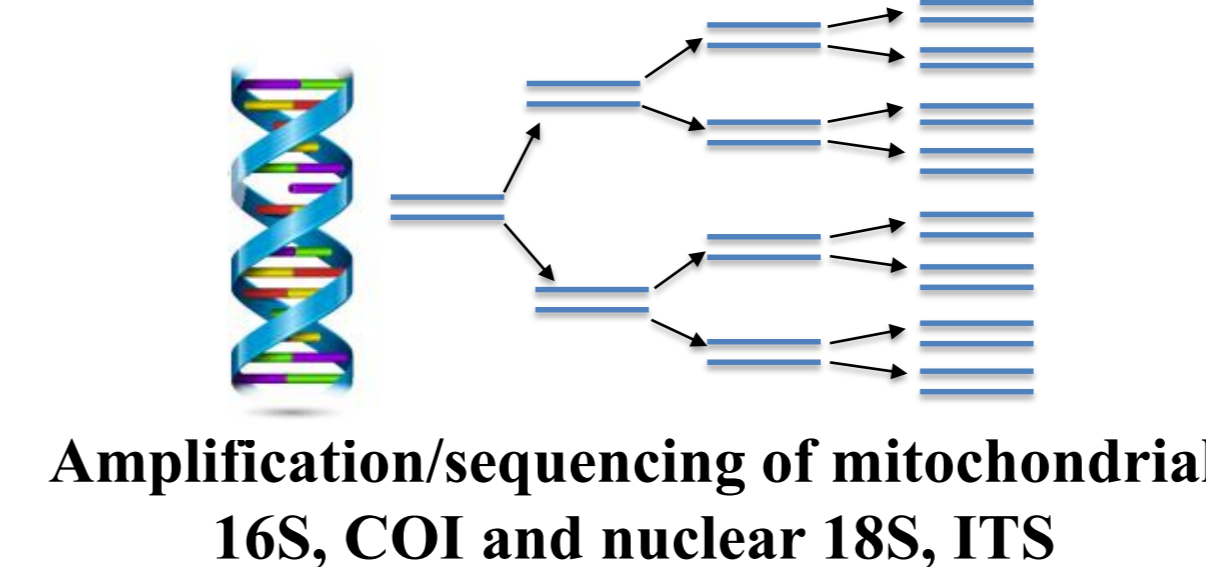
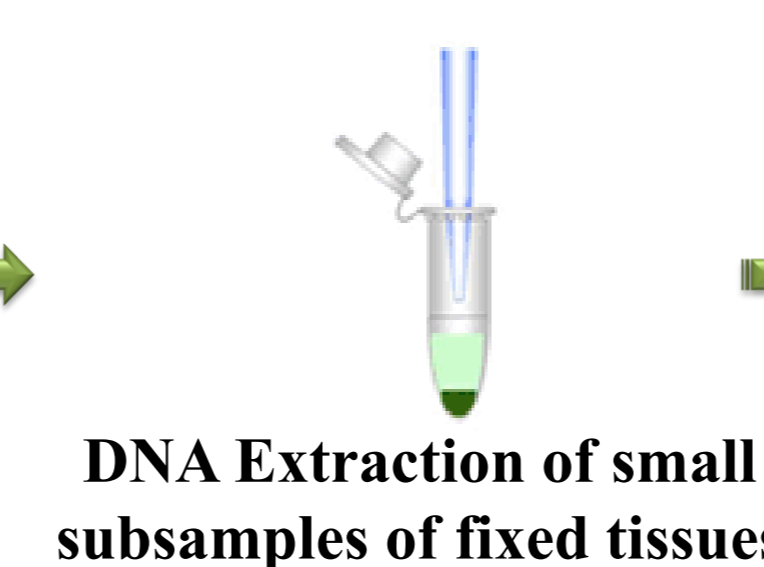
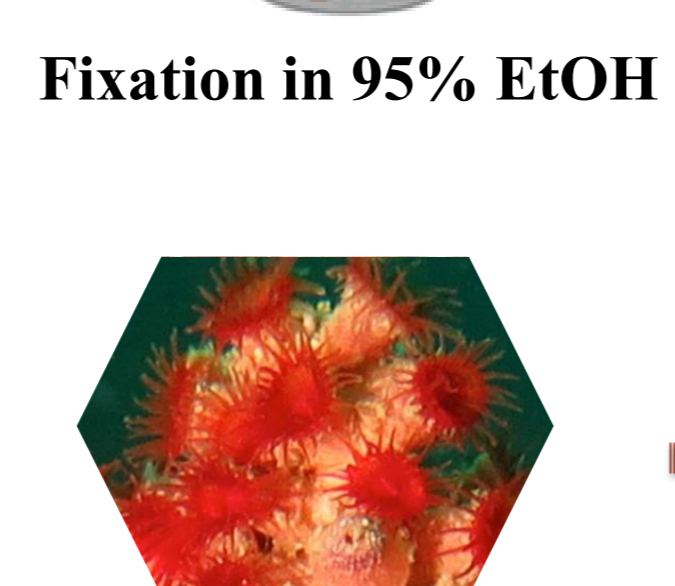
Morphological observation



Molecular analyses

Chemical analyses

Sampling



RESULTS

Phylogenetic analyses

- In El Pelado Marine Protected Area, zoantharians are important components of the benthic fauna.
- Several species found at El Pelado MPA were reported from the Galapagos Islands^{3,4} and Machalilla National Park⁵.

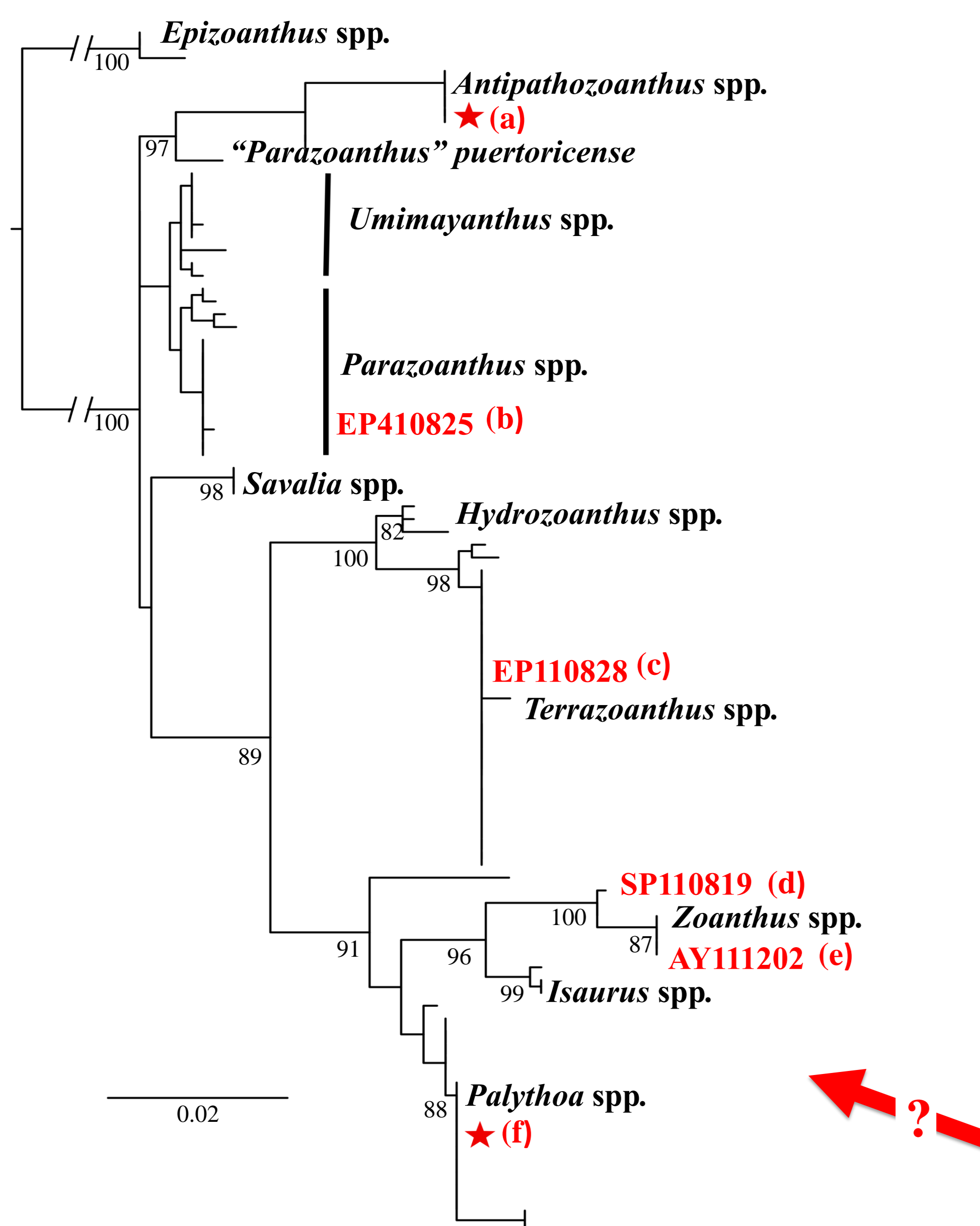


Fig. 3. Maximum Likelihood phylogenetic tree based on cytochrome c oxidase subunit I. Ecuadorian samples are indicated in red. Stars indicate predicted position based on morphological identification. Bootstrap support values >80% are indicated by the nodes.

El Pelado - Ecuador zoantharian diversity

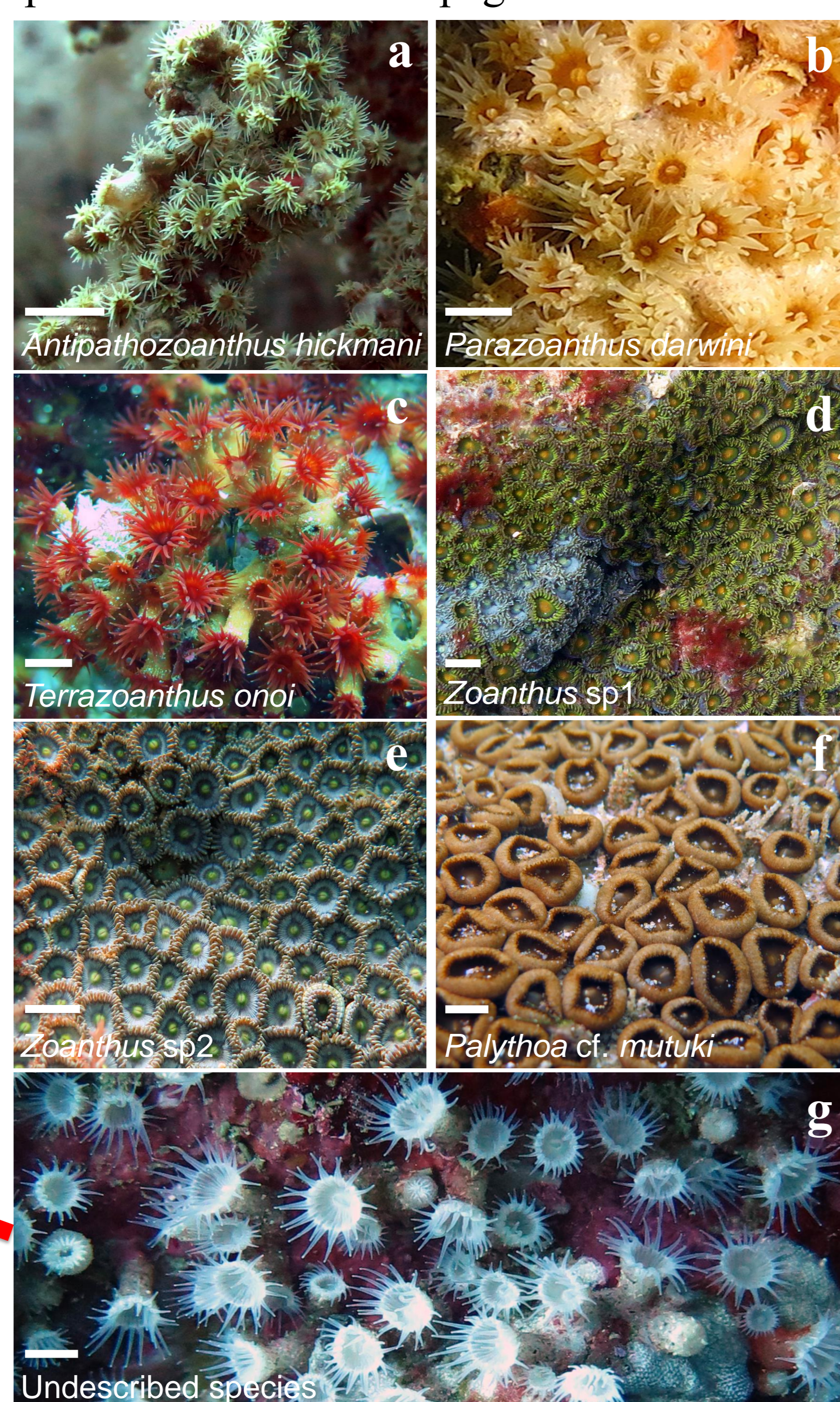


Fig. 4. In situ photographs of the 7 species found at El Pelado MPA. Scale above the names indicate approximately 1 cm.

Metabolomics analyses

- Metabolomic profiles were both consistent between all replicates within a species and distinct between species, despite specimens being collected at different times, depths and locations.
- According to metabolomics data, the undescribed species might be related to *Terrazoanthus* from a taxonomic point of view.

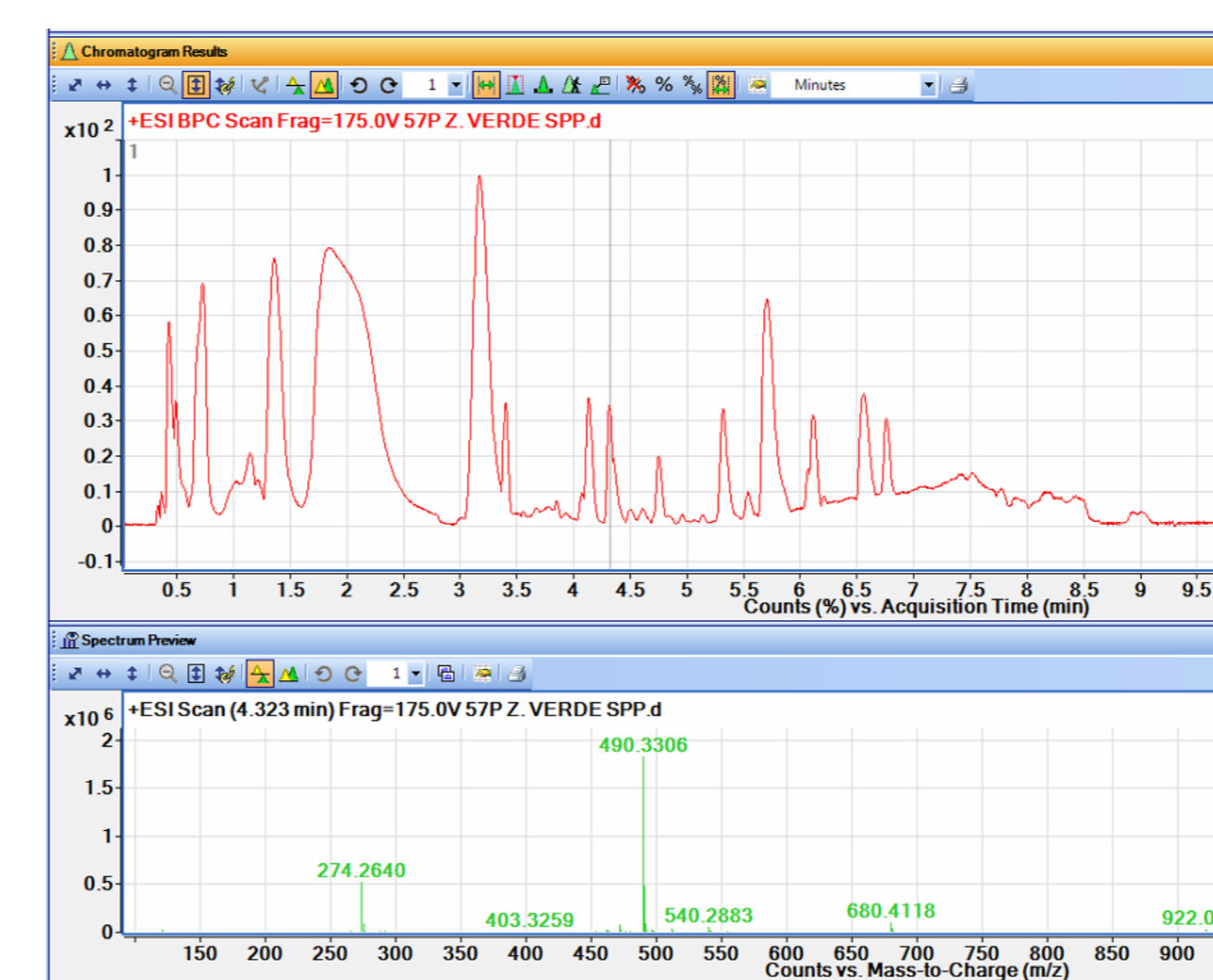


Fig. 5. Chromatographic profile of one replicate of *Zoanthus* sp1

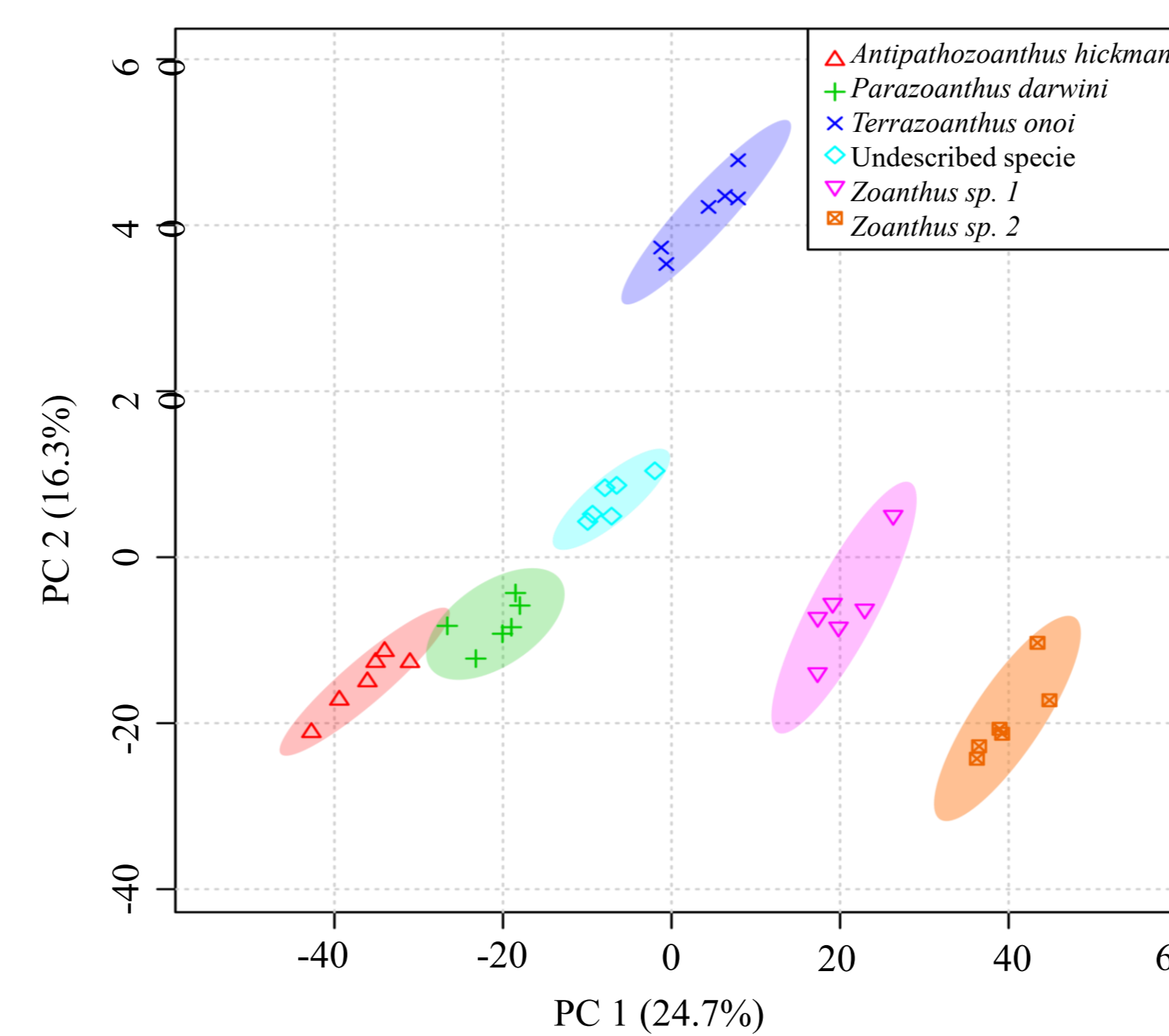


Fig. 6. Scores plot between the most significant PCs. The explained variances are shown in brackets.

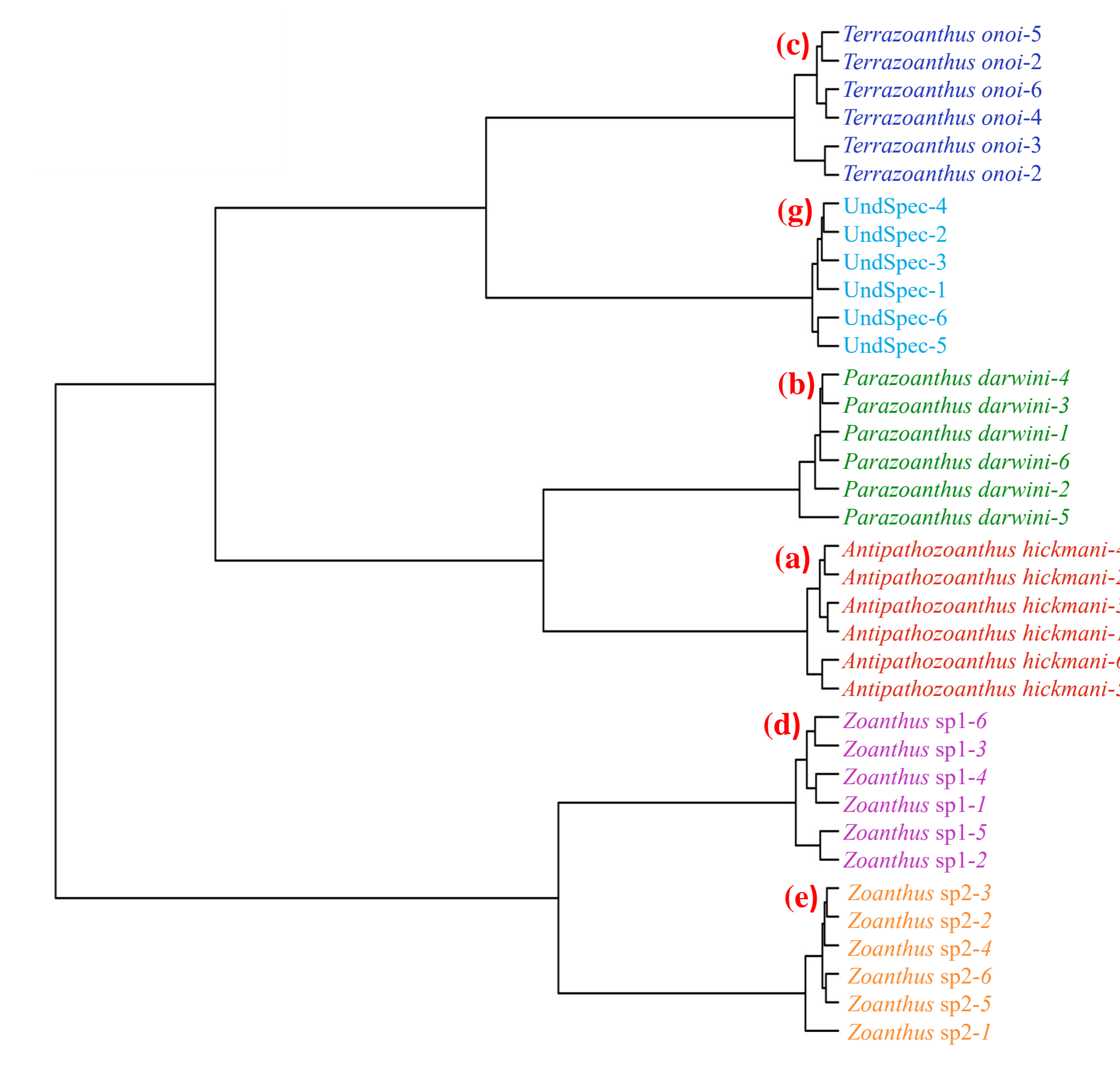


Fig. 7. Hierarchical Clustering Dendrogram of the metabolomic data obtained with Pearson's distances and Ward's linkage algorithm.

DISCUSSION

- Despite its small geographical area, El Pelado MPA has a similar or even higher zoantharian diversity than the whole Galapagos region.
- The results of metabolomics analyses performed on 6 species strongly support that this approach is useful as a complementary tool to morphological and molecular taxonomy of zoantharians.
- Using the metabolomics approach, the undescribed species might be related to *Terrazoanthus*.

PERSPECTIVES

- Expand our investigations on zoantharians all along the mainland coast of Ecuador.
- Use metabolomics analyses for comparison with other zoantharians in the Pacific and more generally to all oceans in order to contribute to the revision of the systematics of this complex group.

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References: 1. Ivanišević et al. 2011 *Metabolomics* 7 (2): 289-304; 2. Cachet et al. 2015 *Sci. Rep* 5:8282; 3. Reimer & Fujii. 2010 *ZooKeys* 42:1-36; 4. Reimer & Hickman. 2008 *Coral Reefs* 27: 641-654; 5. Bo et al. 2012 *Pacific Science*, vol. 66, no. 1:63-81.