

Signature lipids of deep ocean
rattail fishes: *Coryphaenoides*
armatus and *C. yaquinae*

C. F. Phleger, J. C. Drazen,
M. Guest, P. D. Nichols

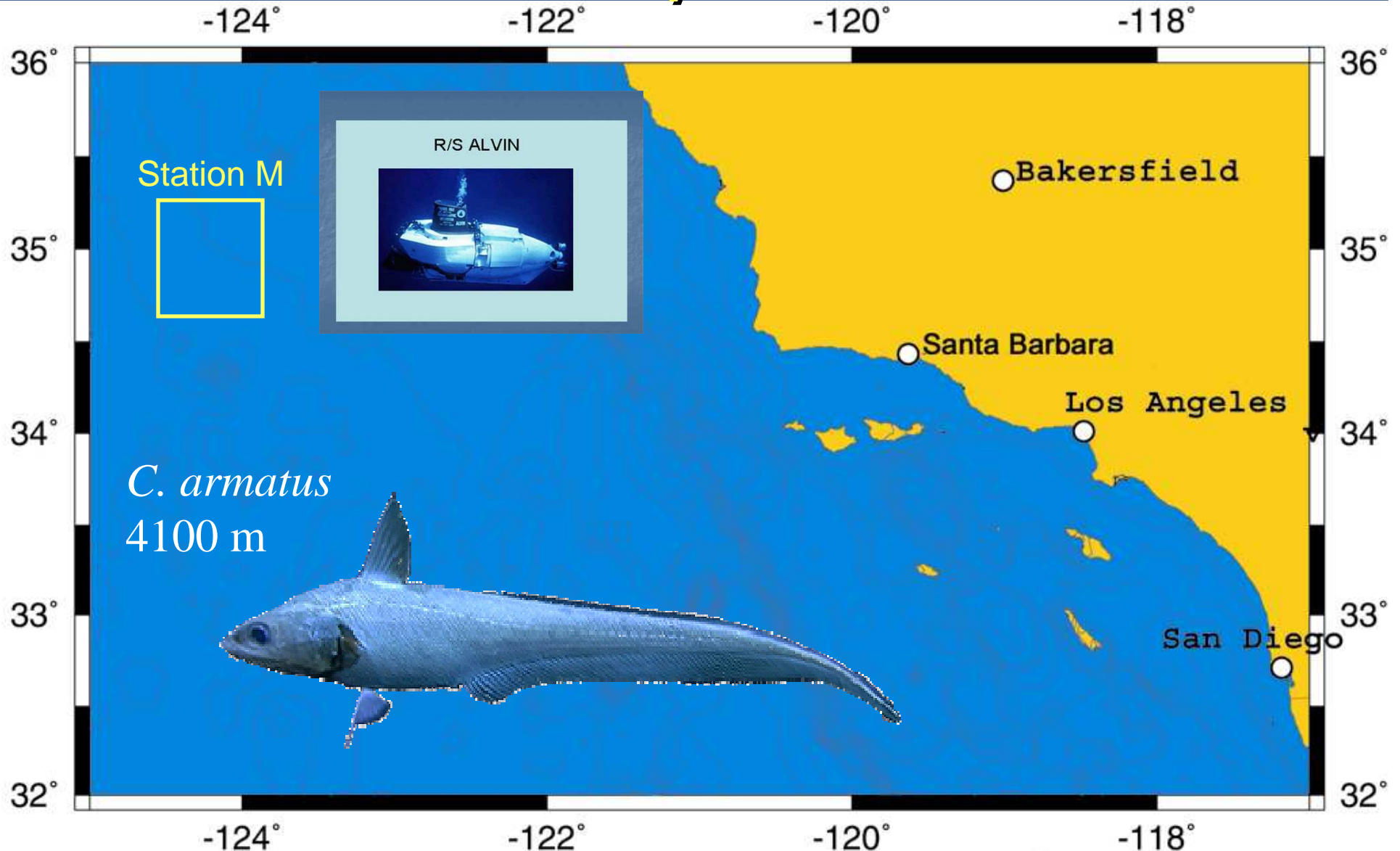
Summary

1. FA signature (PUFA & DHA) most closely resemble Humboldt squid *Dosidicus gigas*.
2. Squid carrion are possible food for rattails, reflecting recent increase of squid remains in deep sea Eastern Tropical Pacific.
2. FA signature of rattails did not match benthic invertebrates in area.
4. Large lipid-rich (TAG) livers serve as energy reserve. Cholesterol:PL ratio in rattail swimbladder membrane signature.

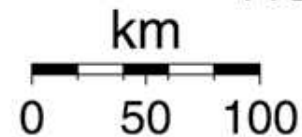
Introduction

- **Rattail fishes** (Macrouridae) - top predators in deep-sea
- **Vital role in deep-sea** by controlling prey populations & influencing community dynamics
- **Diet information** from gut content analyses & stable isotopes good, but gut contents provide only brief snapshot & stable isotopes often overlapping.
- **Signature lipids and fatty acids** provide longer term view of diet with less overlap

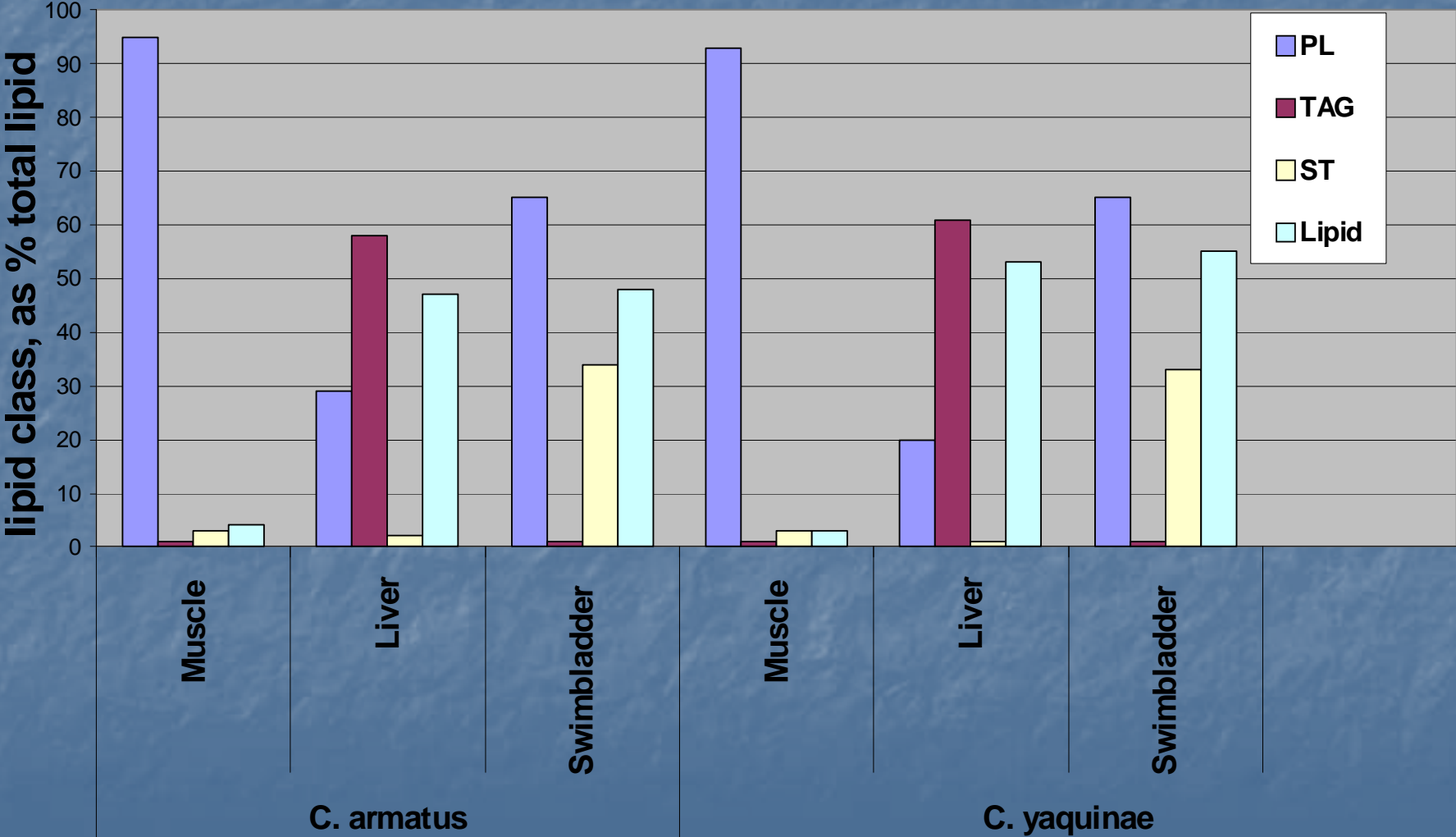
Study area



See Smith and Druffel 1998 and Smith et al 2002



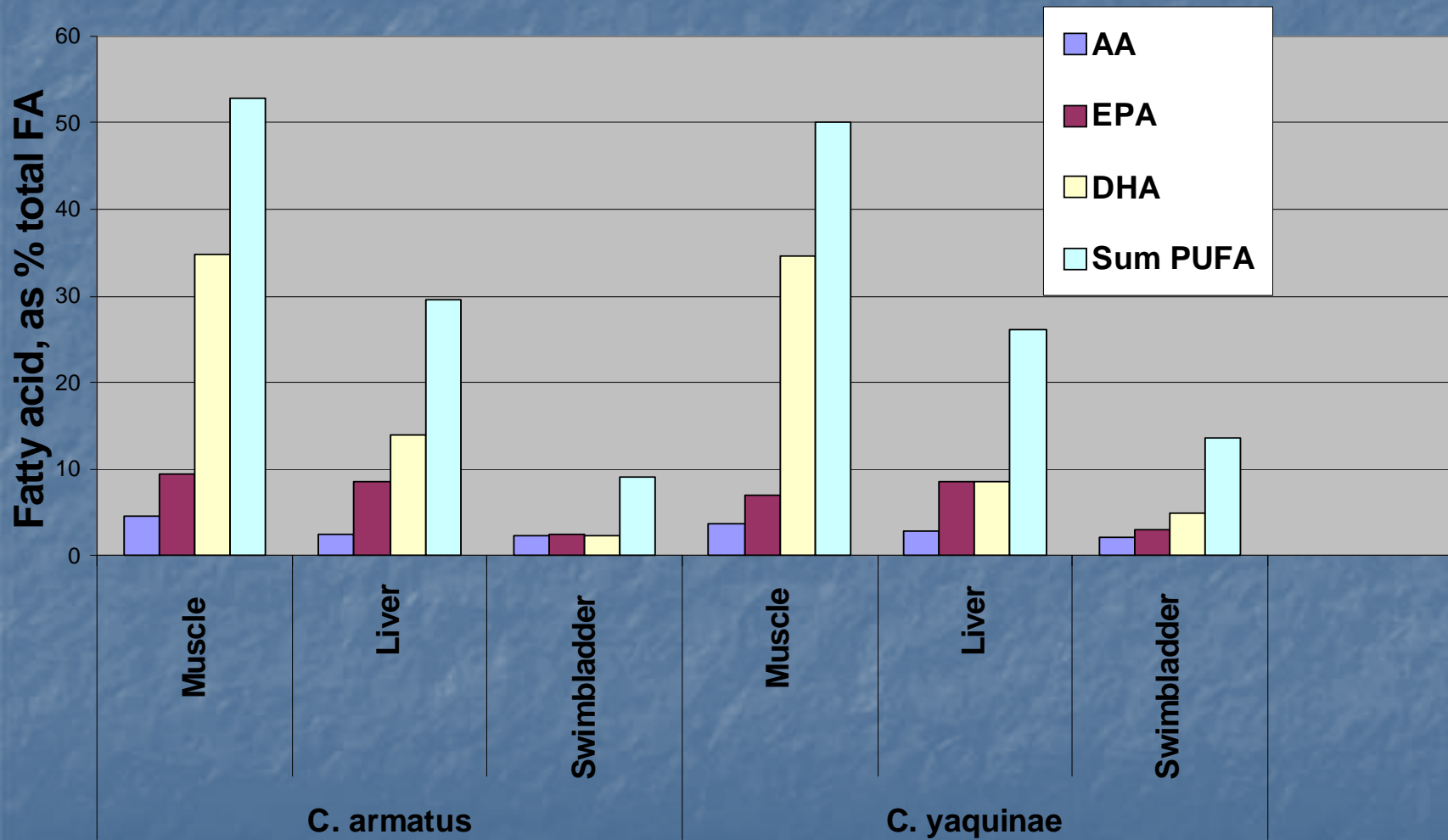
Lipid content and classes of rattails

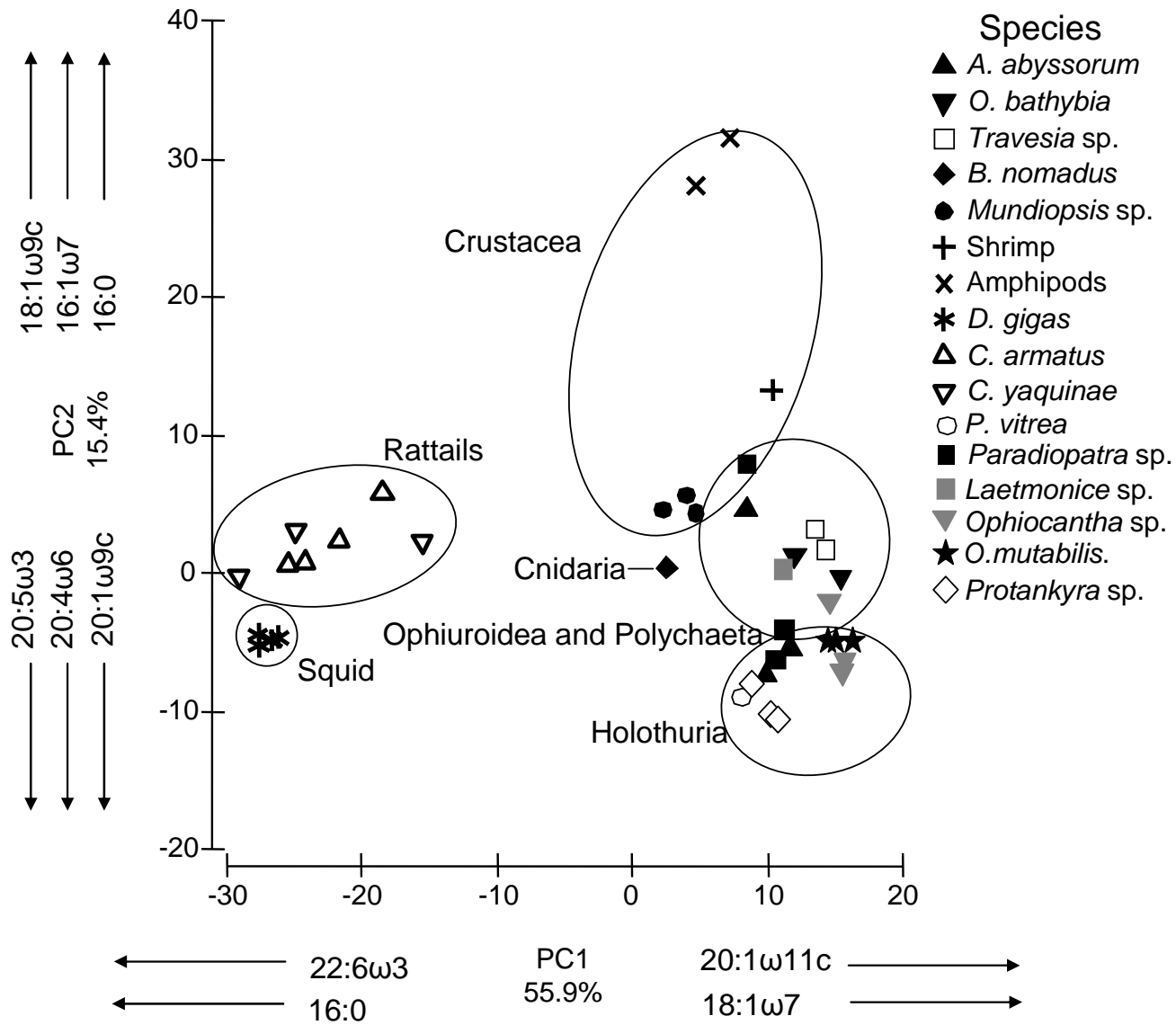


Rattail PUFA

- **Total PUFA highest in muscle (53%)** which has mostly PL, **less in liver (26-29%)** which has mostly TAG, & **least in swimbladder foam.**
- AA, EPA, & DHA follow this trend; most in muscle & least in swimbladder foam
- Low PUFA in swimbladder foam may be caused by auto-oxidation from **hyperbaric oxygen in swimbladder,** &/or distinct functional role.

Rattail PUFA





Giant Humboldt squid (*Dosidicus gigas*) populations have increased dramatically as top predators (tuna, billfish) have declined 90% (biomass) due to overfishing. Squid spawn & die after 1-2 years & sink to abyss



Conclusions –

- (1) **Signature lipids** have helped determine diet (likely to be carrion, e.g. squid) of these deep ocean fishes which has **not been possible in past** due to loss of gut contents upon ascent from depth
- (2) **Liver lipid** energy stores help **survival** during low food availability periods deep sea
- (3) **Swimbladder unique buoyancy** mechanism – **cholesterol/sphingomyelin/oxygen** may influence buoyancy by change in density of **swimbladder membranes**

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