

# Application of menthol as an anesthetic for body size measurements and morphological observation of the genus *Clione* (Pteropoda: Gymnosomata)

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'Pteropoda' is an informal name for planktonic gastropods, including the orders Thecosomata (shelled pteropods) and Gymnosomata (naked pteropods), which are common in all marine environments from the poles to the equator, and from the ocean surface to bathypelagic depths. In addition to possessing a wing-shaped foot used in swimming, several features of their physiology are suggested to be associated with a holoplanktonic lifestyle: adept planktonic predation facilitated by the sensitive eyes of pteropods, the swimming behavior of some gymnosomes that aids their predation on thecosomes, and the antipredation compounds produced by some thecosomes, which reduce palatability. In the Pacific Ocean, 34 species of Thecosomata and 70 species of Gymnosomata have been recorded, including two species of Thecosomata and two species of Gymnosomata from the southern Okhotsk Sea.

Anesthetizers were tested on the two species of the southern Okhotsk Sea; *C. elegantissima* Dall, 1871 and *C. okhotensis* Yamazaki & Kuwahara, 2017, which expand and contract their bodies, to temporarily fix the body size and allow accurate length measurement. Standard solution of menthol preparation: 0.70 g of the menthol substance was dissolved in the 250.0 ml of the ethanol. Test solution preparation: 4.0 ml of the standard solution was dissolved in the 100.0 ml of the filtered seawater. Test solution was the effective and harmless, with all tested animals returning to normal behavior within 10 minutes. In this anesthetic, animals were motionless, and showed no reaction to pricking with forceps. Thus, we suggest this anesthetic method can be used as a new standard method for body observation and measurement of *Clione* species.

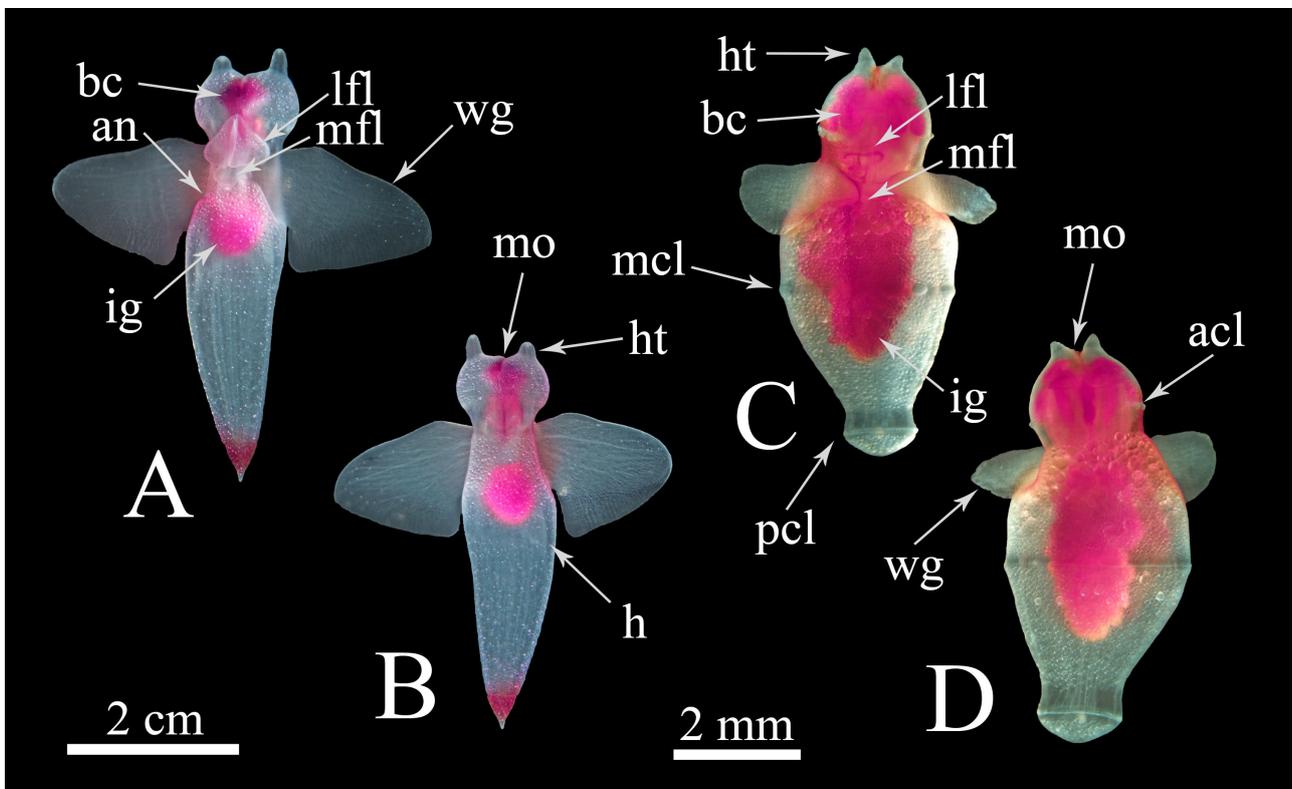


Figure 1. Anesthetized *Clione* species collected from the southern Okhotsk Sea. A-B: *C. elegantissima* Dall, 1871, C-D: *C. okhotensis* Yamazaki & Kuwahara, 2017, A, C: ventral view, B, D: dorsal view. Abbreviations: acl, anterior ciliated ring; an, anus; bc, buccal cones; h, heart; ht, head tentacle; ig, internal organs; lfl, lateral foot lobes; mfl, median foot lobe; mo, mouth; mcl, middle ciliated ring; pcl, posterior ciliated ring; wg, wing.