

NOAA Technical Memorandum NMFS



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PHOTOGRAPHIC CATALOG OF CALIFORNIA MARINE FISH OTOLITHS: PREY OF CALIFORNIA SEA LIONS (*Zalophus californianus*)

Mark S. Lowry

NOAA-TM-NMFS-SWFSC-483

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Science Center

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Mark S. Lowry

Protected Resources Division, Southwest Fisheries Science Center, National Marine Fisheries Service,
National Oceanic & Atmospheric Administration, 3333 N. Torrey Pines Ct., La Jolla, CA 92037

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U.S. DEPARTMENT OF COMMERCE

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National Oceanic and Atmospheric Administration

Jane Lubchenco, Undersecretary for Oceans and Atmosphere

National Marine Fisheries Service

Eric C. Schwaab, Assistant Administrator for Fisheries

Photographic catalog of California marine fish otoliths:

Prey of California sea lions (*Zalophus californianus*)

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INTRODUCTION

Fish otoliths have been used to identify prey in the diet of marine mammals, fish, and seabirds, and in remains from archaeological sites. Researchers have used otolith reference collections and/or drawings and photographs in publications to aid in these identifications. The standard (or most complete) otolith reference collection for the Northeast Pacific, the John Fitch Otolith Collection, resides at the Natural History Museum of Los Angeles County (LACM). Specimens from this collection were photographed and organized into a catalog. Otolith selection was based on fish species identified in California sea lion (*Zalophus californianus*) diet studies and includes other closely related species. This catalog can be used as an aide in the identification of marine fish otoliths recovered in scat samples, spewings, and stomach contents of piscivorous predators or of otoliths found in Native American middens. Species in the catalog each have multiple otoliths illustrated (with multiple views) to document within-species variability in otolith shape and form. As fish grow, otolith shape can change, so whenever possible, otoliths from different sizes or ages of fish were included in the catalog.

METHODS

High-resolution digital photographs of sagittal otoliths were taken with a Media Cybernetics Evolution MP color video camera mounted on a Zeiss Stemi 2000-C microscope. Media Cybernetics Image-Pro Plus 5.0 software was used to capture photographic images and save them into a Tagged Image File (.tif) format. The medial and distal surfaces and the dorsal rim edge of an otolith were photographed for almost all species. Whenever possible, these three views were photographed for different-sized otoliths within a species. The medial view is

always provided, however distal and edge views may not be included for some species. In the catalog, the left otolith usually appears on the lower left and the right otolith appears on the upper right side of paired otoliths; left or right otoliths may also appear side by side or above one another. Dorsal rim edge photographs show the left otolith below the right otolith, with the distal surface facing the ruler. A plastic millimeter ruler was placed next to the otoliths to provide scale (distance between two lines equals one millimeter). Adobe Photoshop Elements 5.0 or 8.0 were used to clean .tif-formatted photographic files, which were subsequently saved as a Portable Network Graphics (.png) formatted file. The high resolution .png files were imported into MS Word for creating the photographic catalog. The MS Word files were then imported into an Adobe PDF file.

Most otoliths in the catalog were from the John Fitch Otolith Collection at the Natural History Museum of Los Angeles County. Additional otoliths came from the author's otolith collection at the Southwest Fisheries Science Center (SWFSC) or from other sources. Each page of otolith photographs in the catalog gives the family name, scientific name, common name, and the museum specimen catalog number (e.g., LACM #####-#). Although the photographs are of paired otoliths, these do not necessarily come from the same fish because the otoliths in the Fitch Otolith Collection are stored in a single vial by species and contain otoliths from more than one individual fish. For many species, more than one page of photographs is provided for each species to show within-species individual variability. Some otoliths have had pencil lead rubbed on them to highlight features. Fish families are arranged in the order found in Nelson (2006). Genera and species within a family are in alphabetical order. Family, genera, species, and common names follow Nelson et al. (2004) and Eschmeyer (2010).

RESULTS AND DISCUSSION

The original intent of this catalog was to document otoliths of marine fish found in the diet of California sea lions in southern California. While the catalog was being created, it became apparent that including closely related species would also be helpful, as would be including species found in the diet of sea lions at other localities.

Otolith identification is a difficult process. Over time, I have learned many “tricks” to identifying an otolith to species level. Begin by matching otoliths of similar size and shape. Is the otolith thick (robust), thin (fragile), or in between? Next, examine the sulcus in the medial surface. Is it straight or curved? If curved, where does the curve begin and what is the angle? What is the shape of the sulcus? Is the sulcus long or short, deep or shallow, wide or narrow, centered on the otolith, or curved? Is the dorsal portion above the sulcus concave, convex, or flat? The distal surface is useful in distinguishing between species whose otoliths are very similar; examine patterns of the ridges, grooves, and lobes. The edge view helps to distinguish species; some otoliths are flat, others are curved, others are curved and twisted, while others form a bowl or a twisted bowl. Is the rostrum long, short, rounded, or pointed? In many instances, a dichotomous key would be expected in an identification guide, but the differences between species are often subtle and are not easily described in a dichotomous format.

As one would expect, otoliths of species within a genus are very similar, as are otoliths of genera within a family and closely related families. The classification and grouping of families in Nelson (2006) will provide clues to otolith identification. As an example, the species within the family Hexagrammidae can be mistaken for species within Cottidae, and vice versa. These families are closely related and otoliths from these fish have similar characteristics. Often, a

student of otolith identification will need to examine related families to derive the correct species identification.

ACKNOWLEDGMENTS

This catalog was made possible by using the collection amassed by the late John Fitch. I would like to thank Christine Thacker, Rick Feeney, Jeff Seigel, and Neftali Camacho from the Natural History Museum of Los Angeles County, which archives the Fitch Otolith Collection, for allowing me to borrow otoliths for creating the otolith photographic catalog. The equipment used to photograph otoliths was provided by Wayne Perryman and Morgan Lynn of the Southwest Fisheries Science Center. Rachel Struch assisted with creating the catalog. The manuscript was reviewed by Jay Barlow, Christine Thacker, Rick Feeney, Jeff Seigel, Margaret Neighbors, Bill Walker, and Susan Riemer.

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Nelson, J.S., E. J. Crossman, H. Espinosa-Pérez, L. T. Tindley, C. R. Gilbert, R. N. Lea, and J. D. Williams. 2004. Common and scientific names of fishes from the United States, Canada, and Mexico. 6th ed. American Fisheries Society Special Publication 29. Bethesda, Maryland. 386p.

Photographic catalog of fish otoliths

Species listed under each family name are in the catalog. Prey of California sea lions have asterisk (*)

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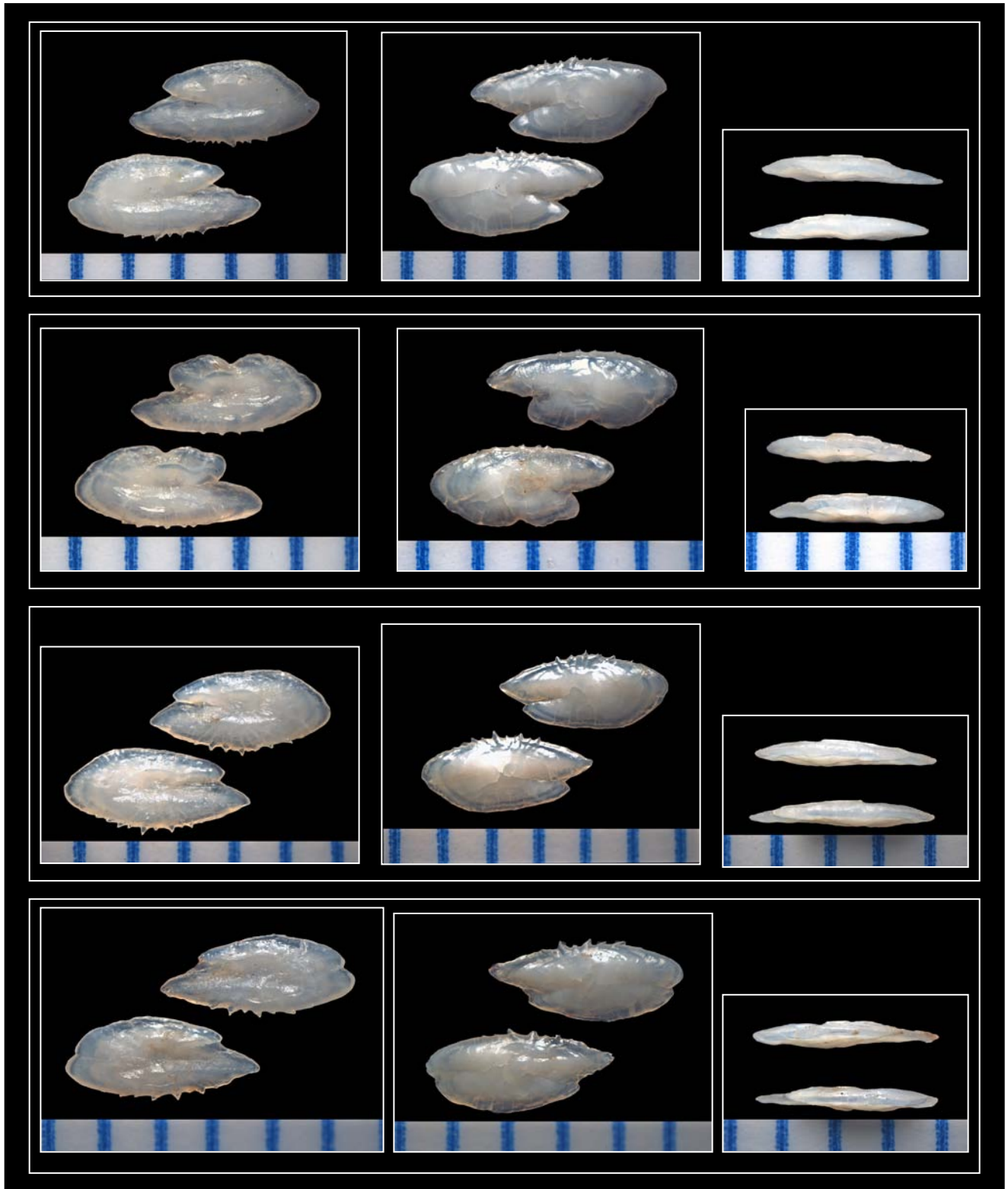
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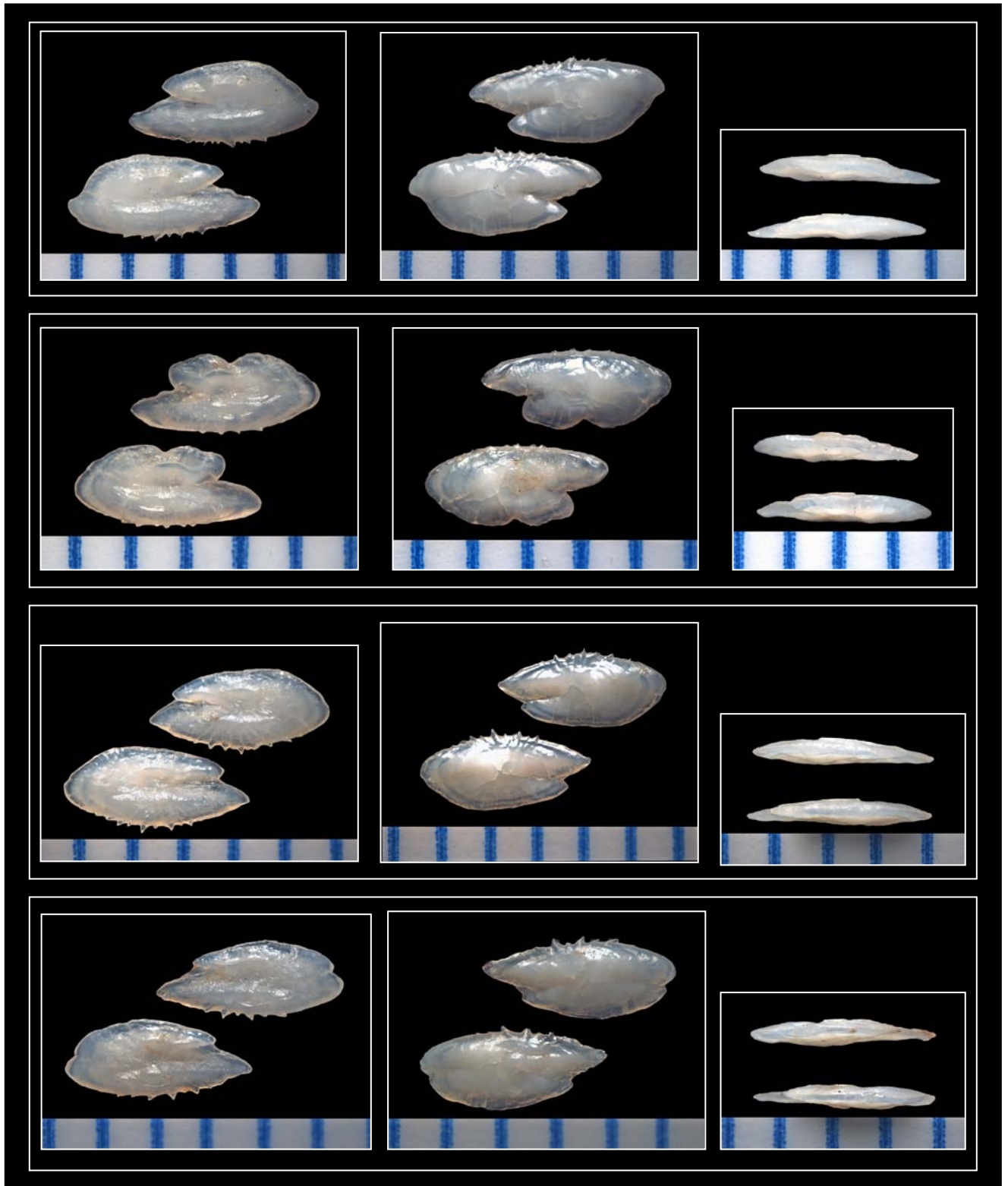
Engraulidae

Engraulis mordax, northern anchovy, LACM 56590-1



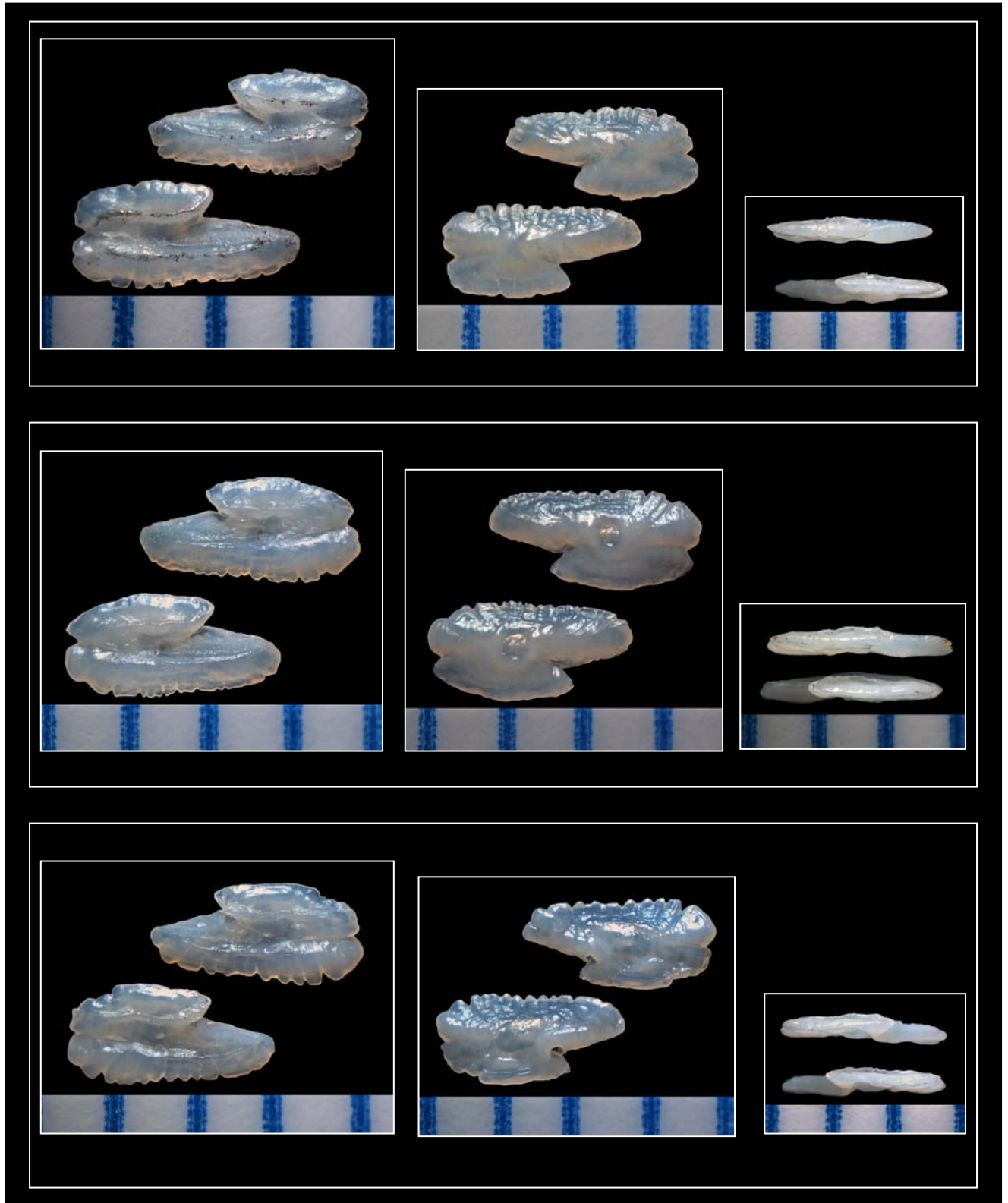
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Engraulis mordax, northern anchovy, LACM 56590-1



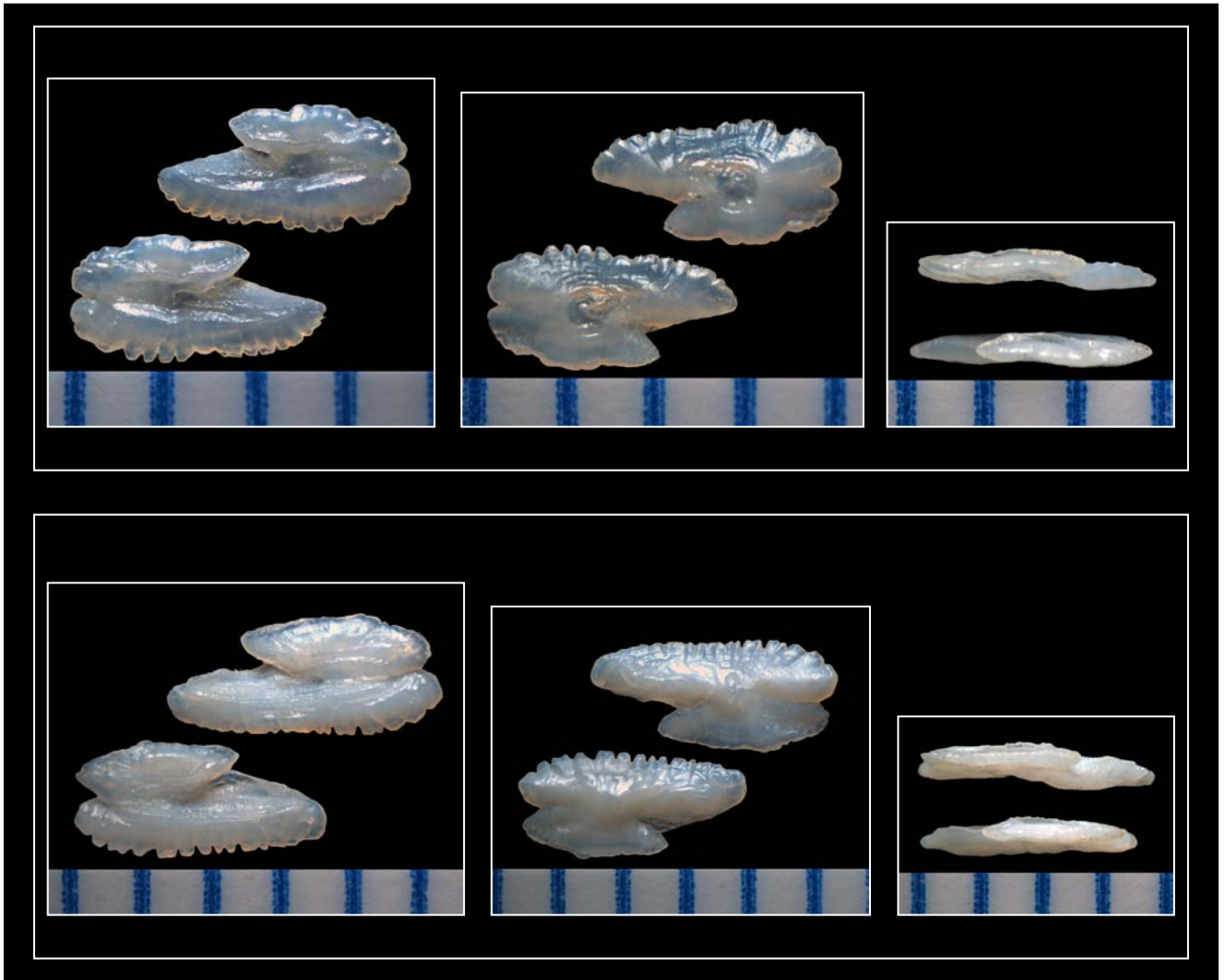
Clupeidae

Clupea pallisii, Pacific herring, LACM 56595-1



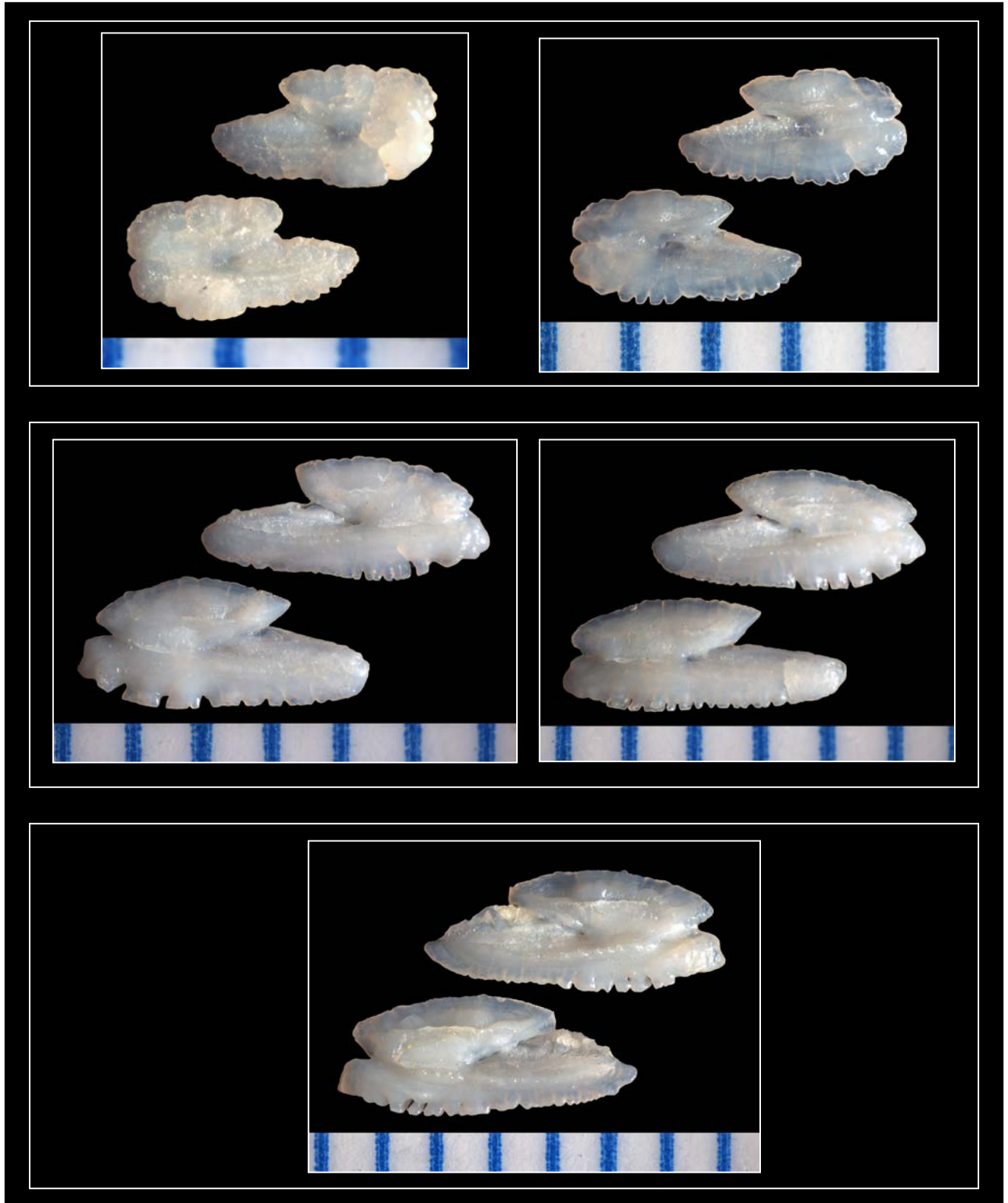
Clupeidae

Clupea pallisii, Pacific herring, LACM 56595-1



Clupeidae

Clupea pallisii, Pacific herring, LACM 56595-1



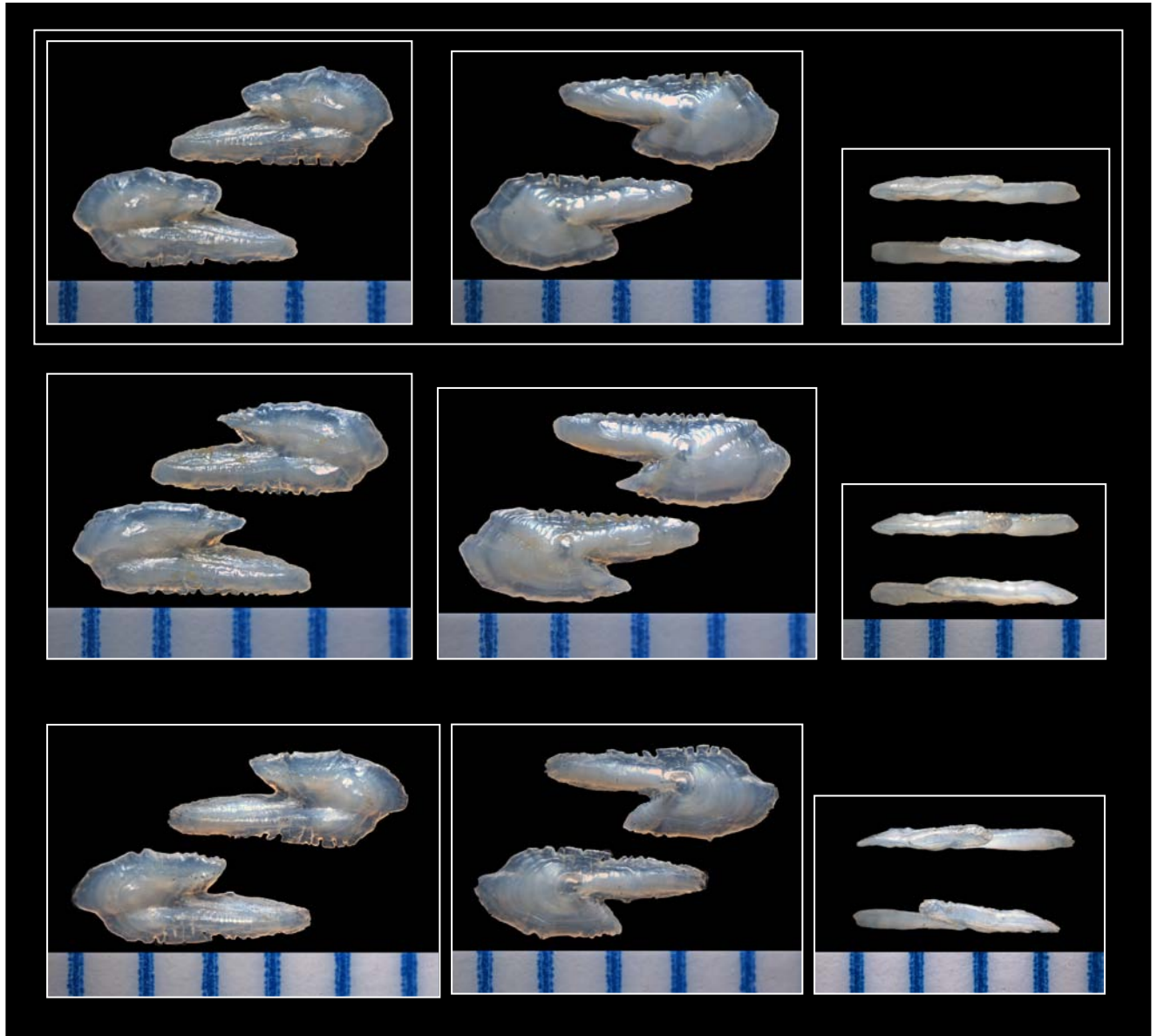
Clupeidae

Sardinops sagax, Pacific sardine, LACM 56608-1



Clupeidae

Sardinops sagax, Pacific sardine, LACM 56608-1



Argentinidae

Argentina sialis, Pacific argentine, LACM 56654-1



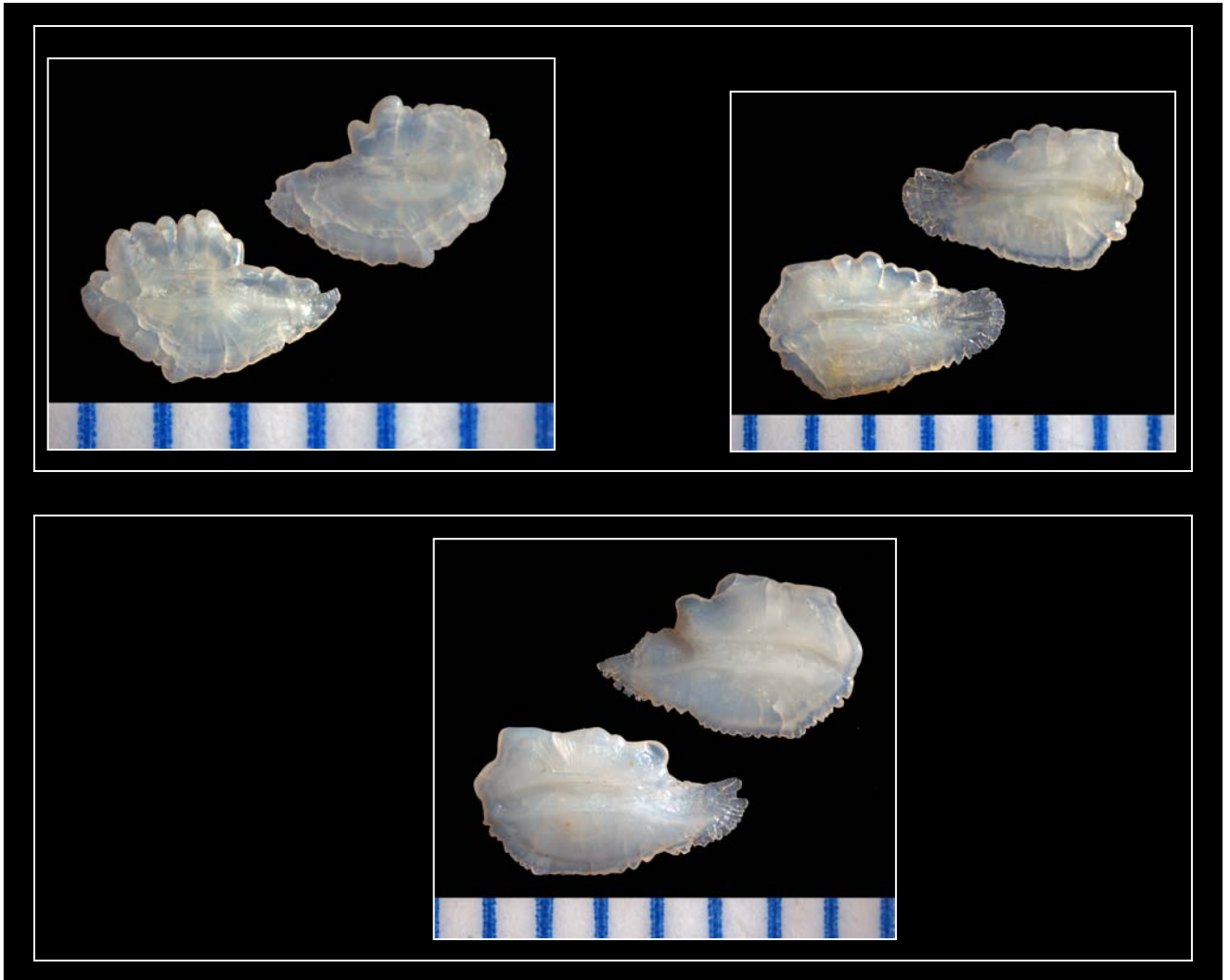
Microstomatidae

Leuroglossus stilbius, California smoothtongue, LACM 56609-1



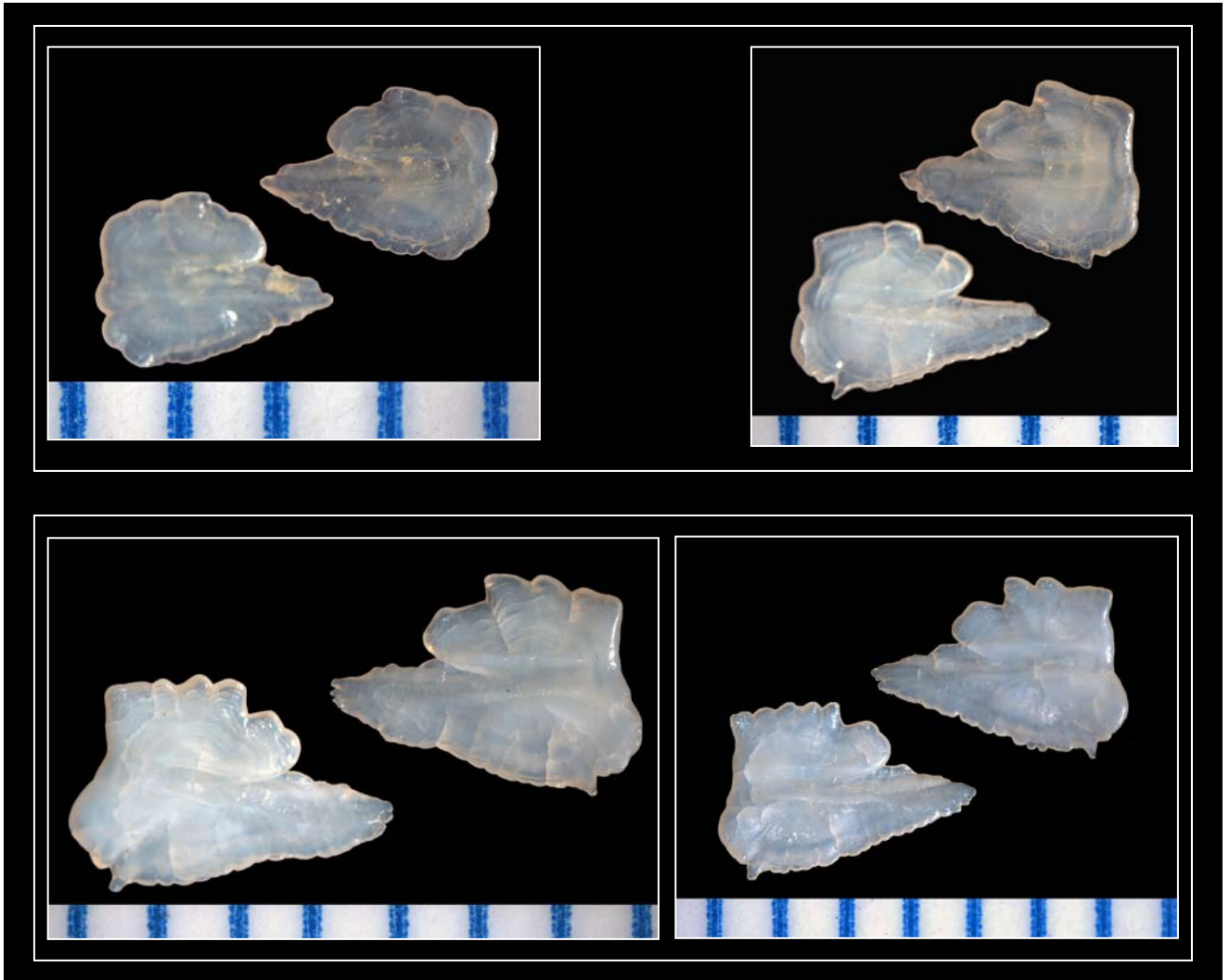
Osmeridae

Hypomesus pretiosus, surf smelt, LACM 56597-1



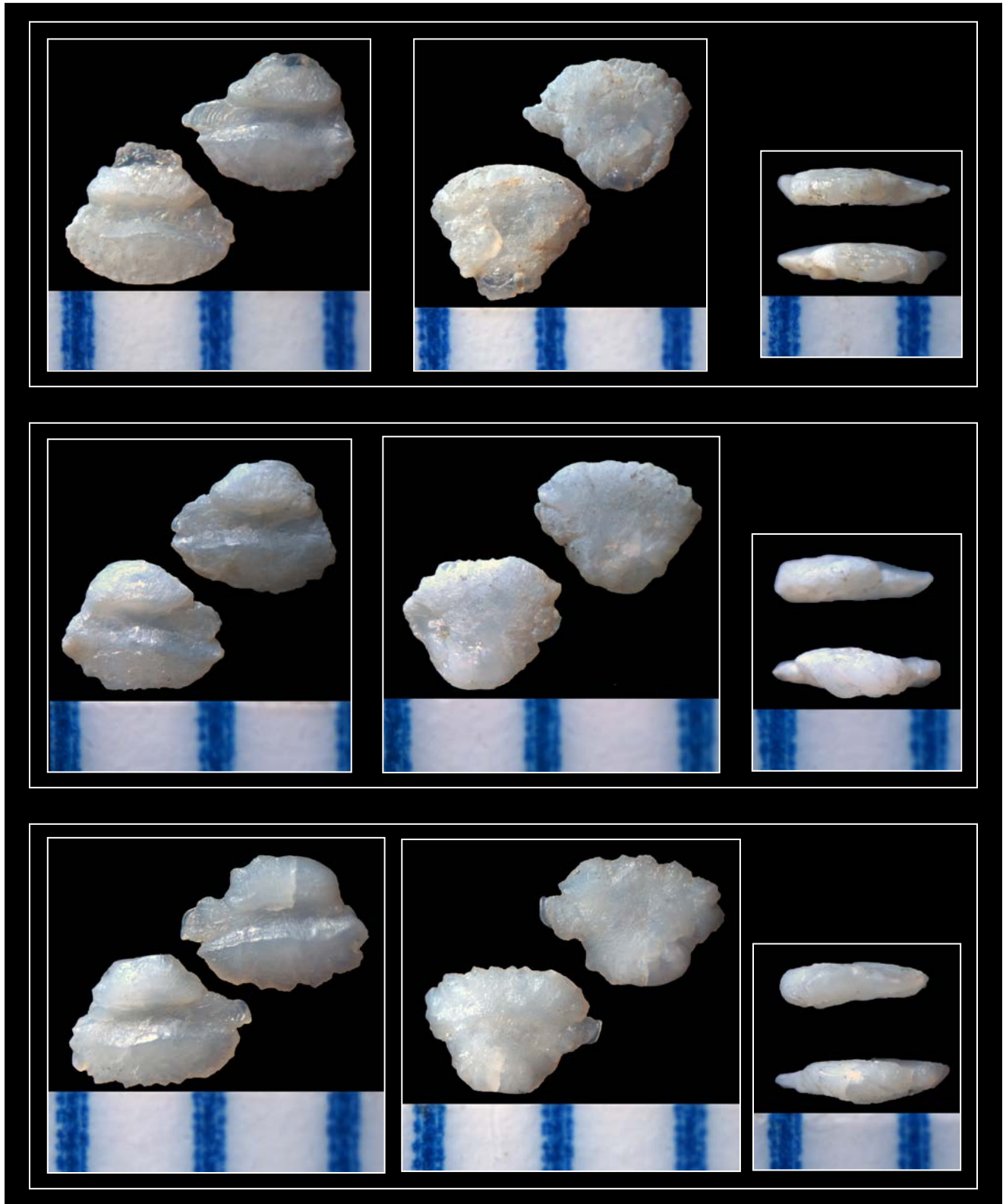
Osmeridae

Thaleichthys pacificus, eulachon, LACM 56594-1



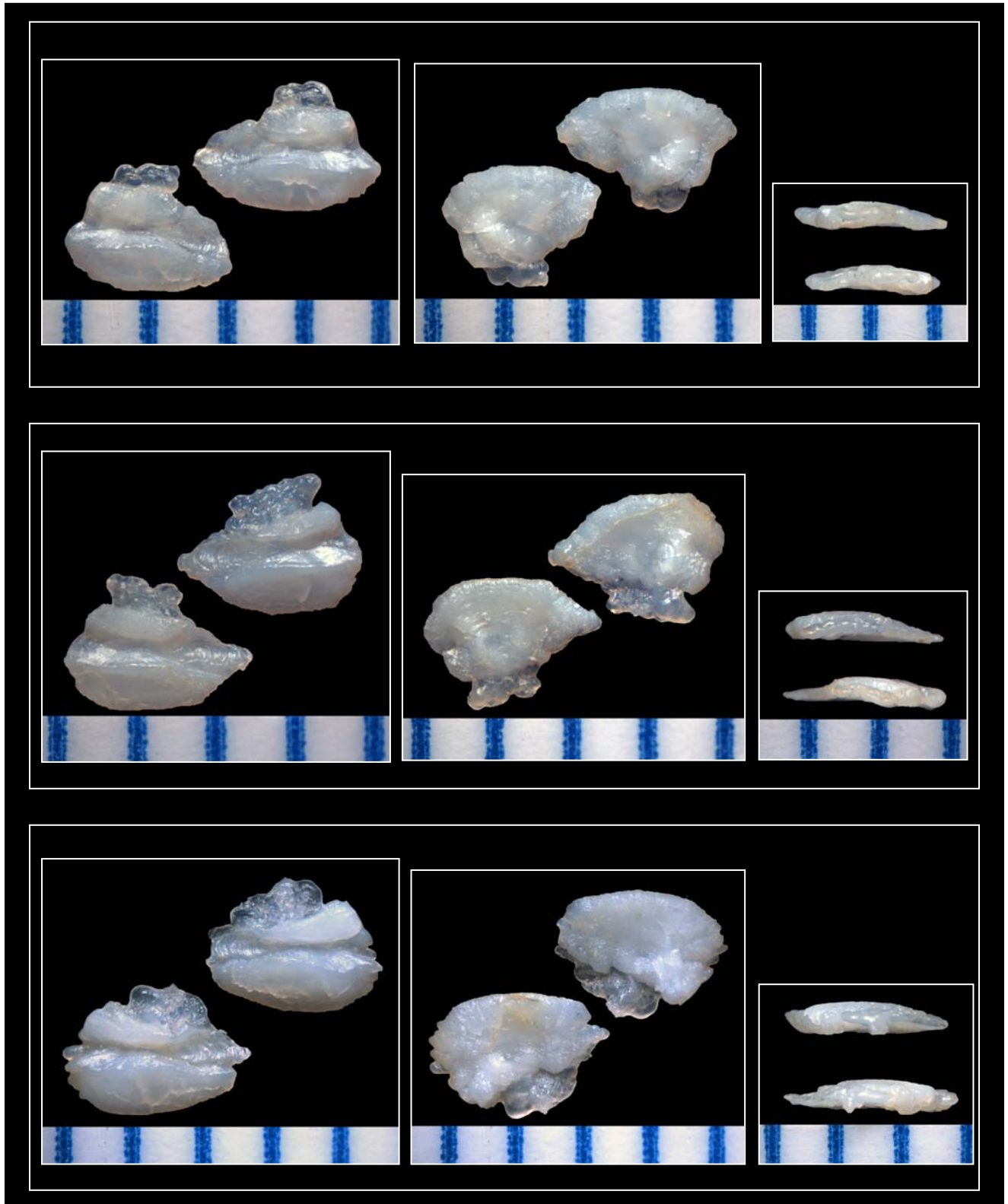
Salmonidae

Oncorhynchus gorbuscha, pink salmon, LACM 56167-1



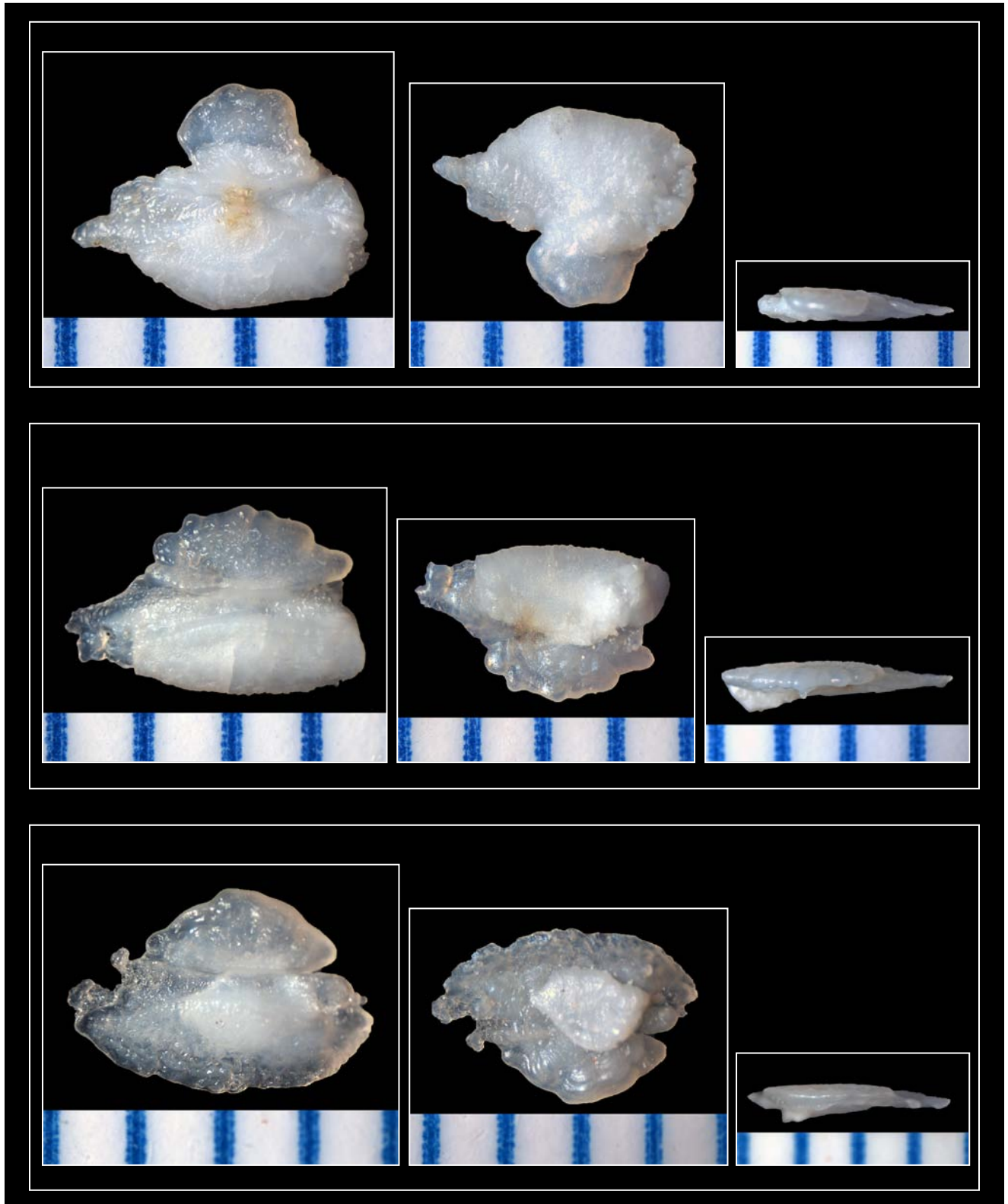
Salmonidae

Oncorhynchus gorbuscha, pink salmon, LACM 56167-1



Salmonidae

Oncorhynchus gorbuscha, pink salmon, LACM 56167-1



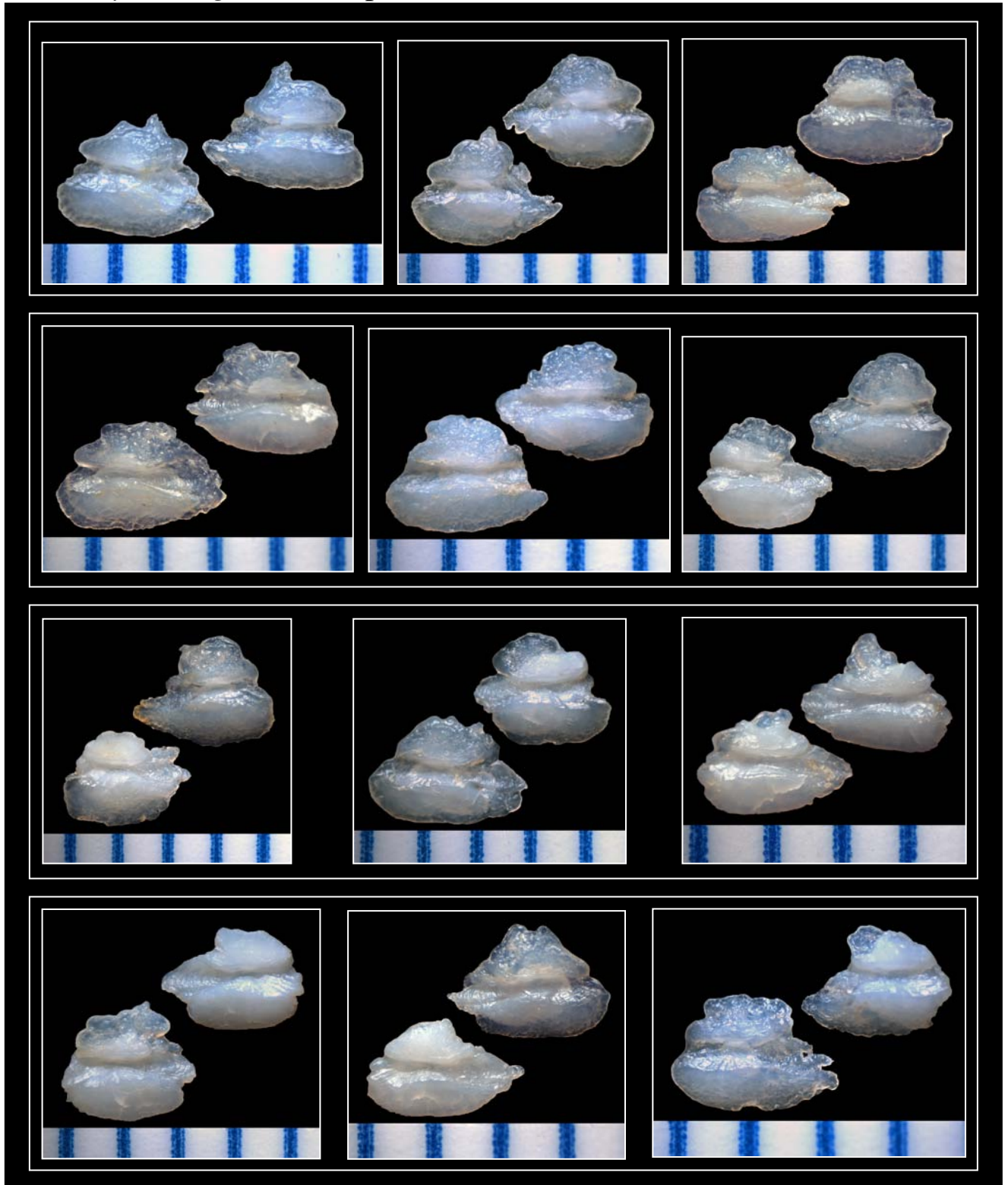
Salmonidae

Oncorhynchus gorbuscha, pink salmon, LACM 56167-1



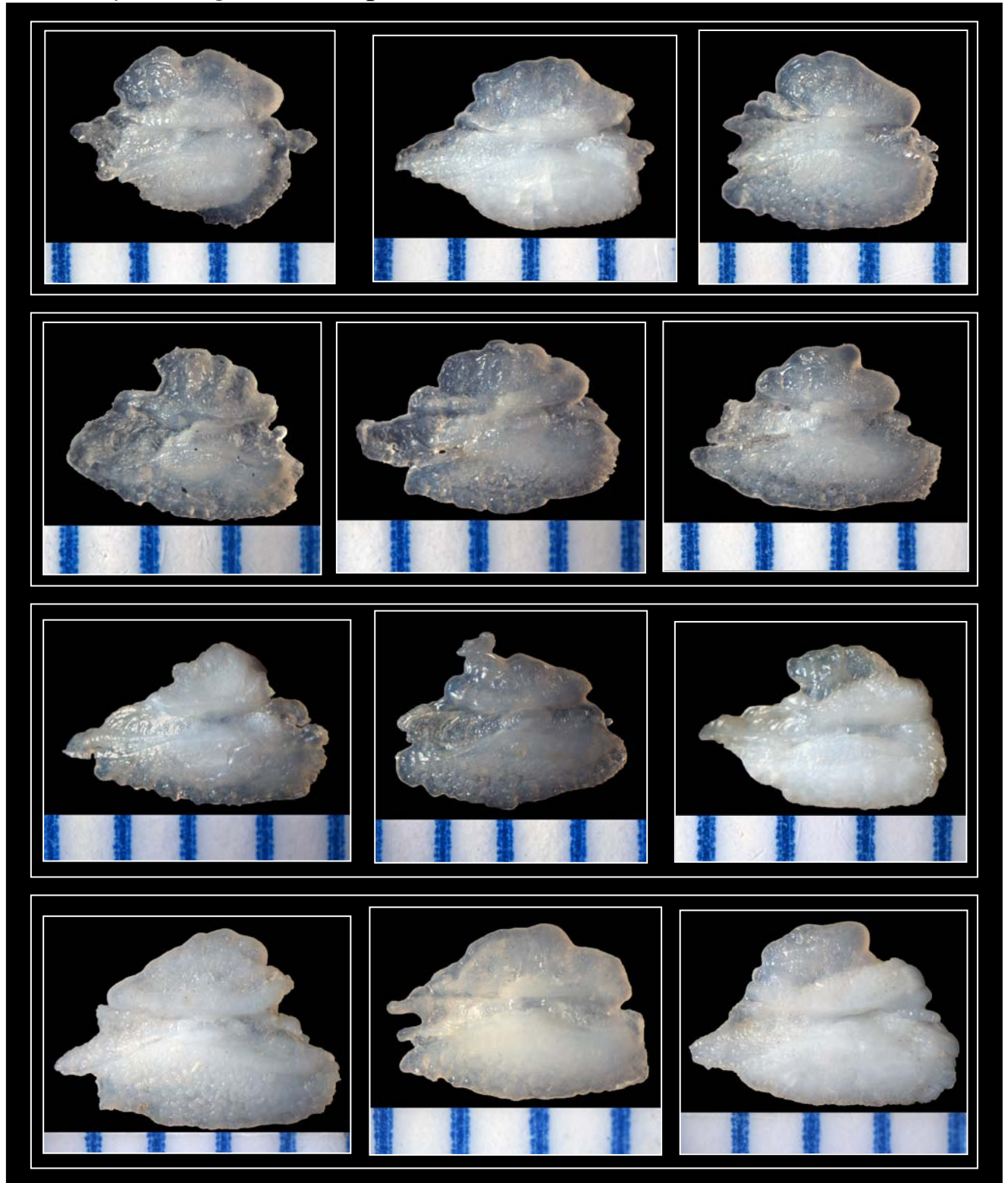
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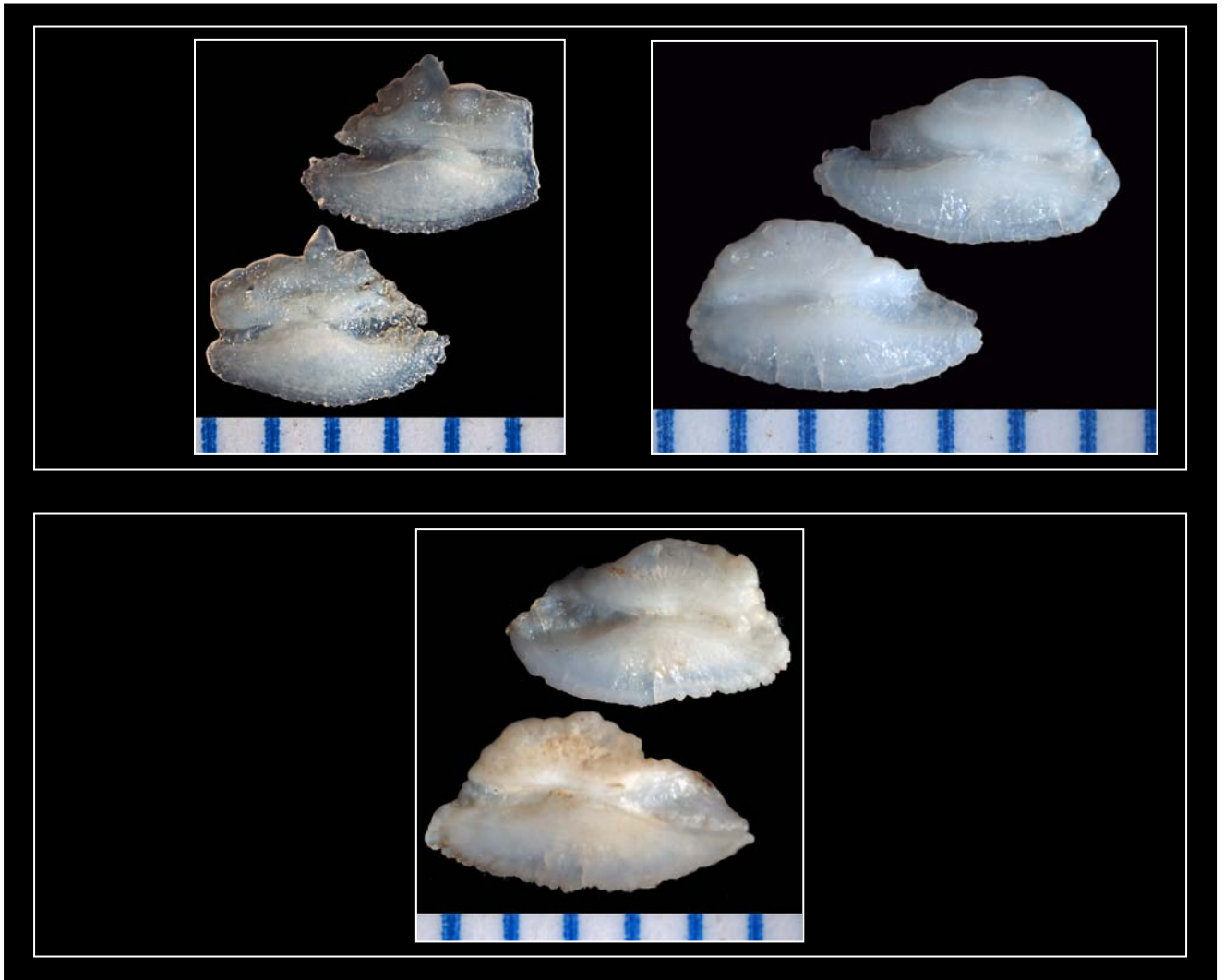
Salmonidae

Oncorhynchus gorbuscha, pink salmon, LACM 56167-1



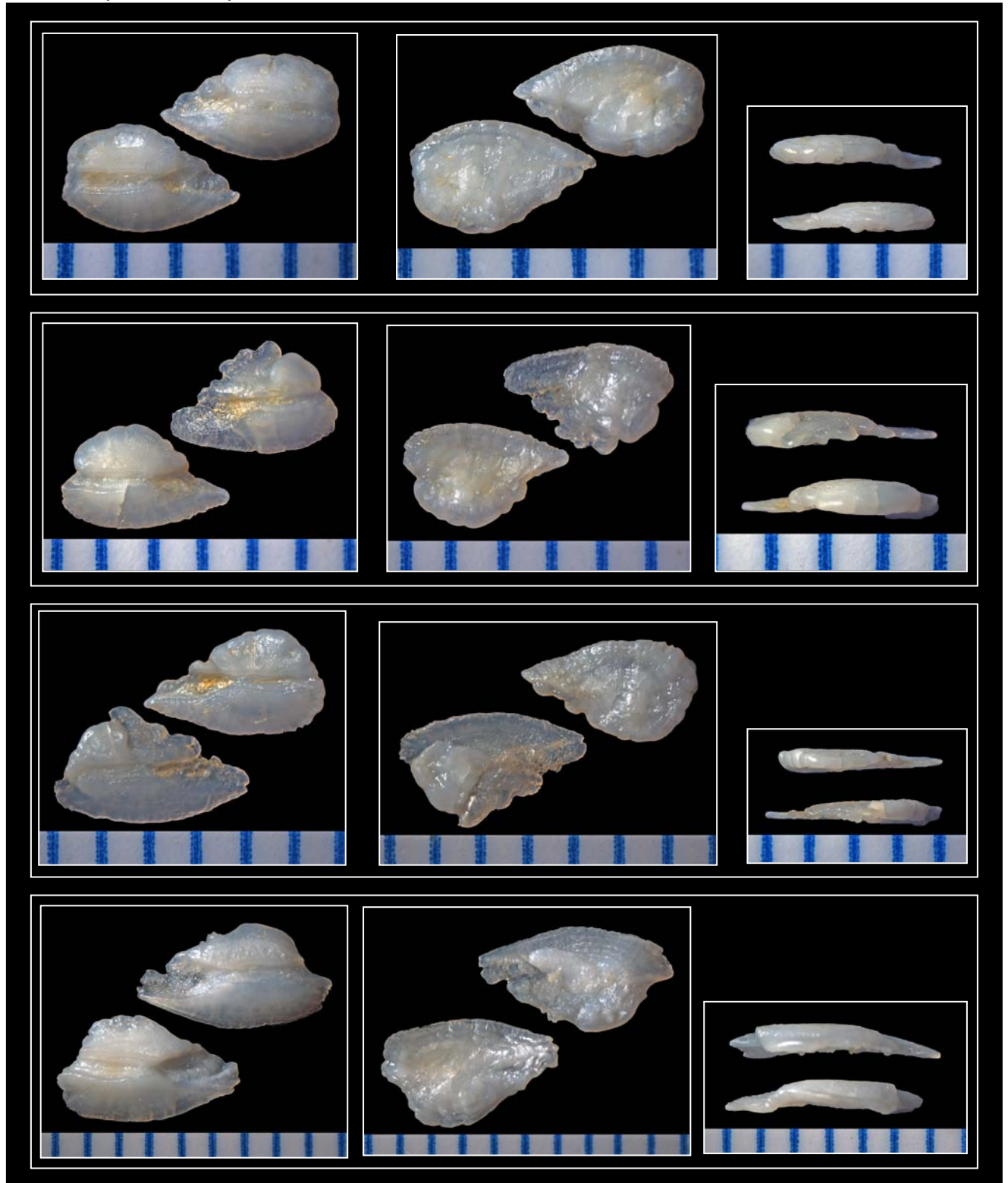
Salmonidae

Oncorhynchus kisutch, coho salmon, LACM 56596-1



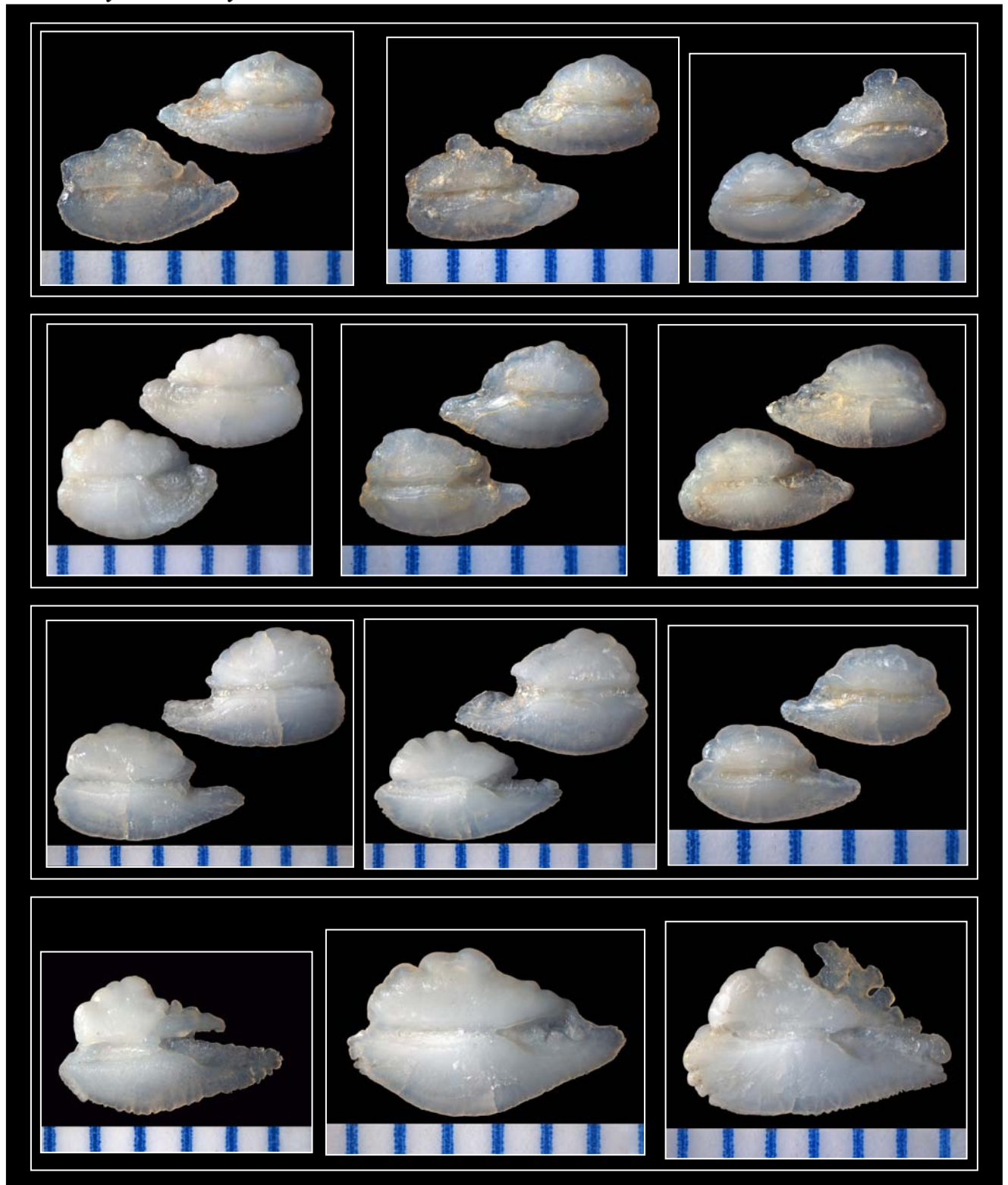
Salmonidae

Oncorhynchus mykiss, rainbow trout, LACM 56656-1



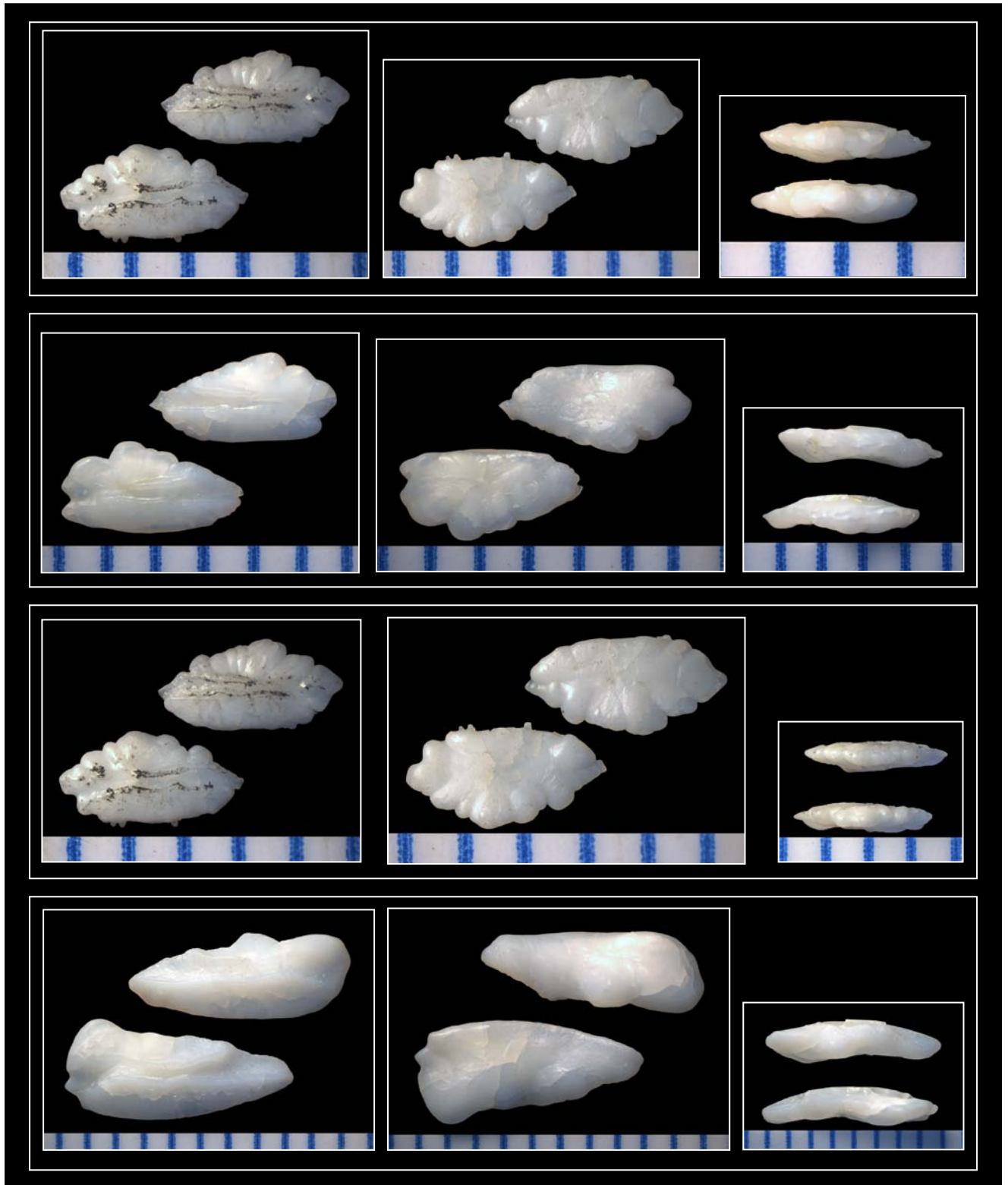
Salmonidae

Oncorhynchus mykiss, rainbow trout, LACM 56656-1



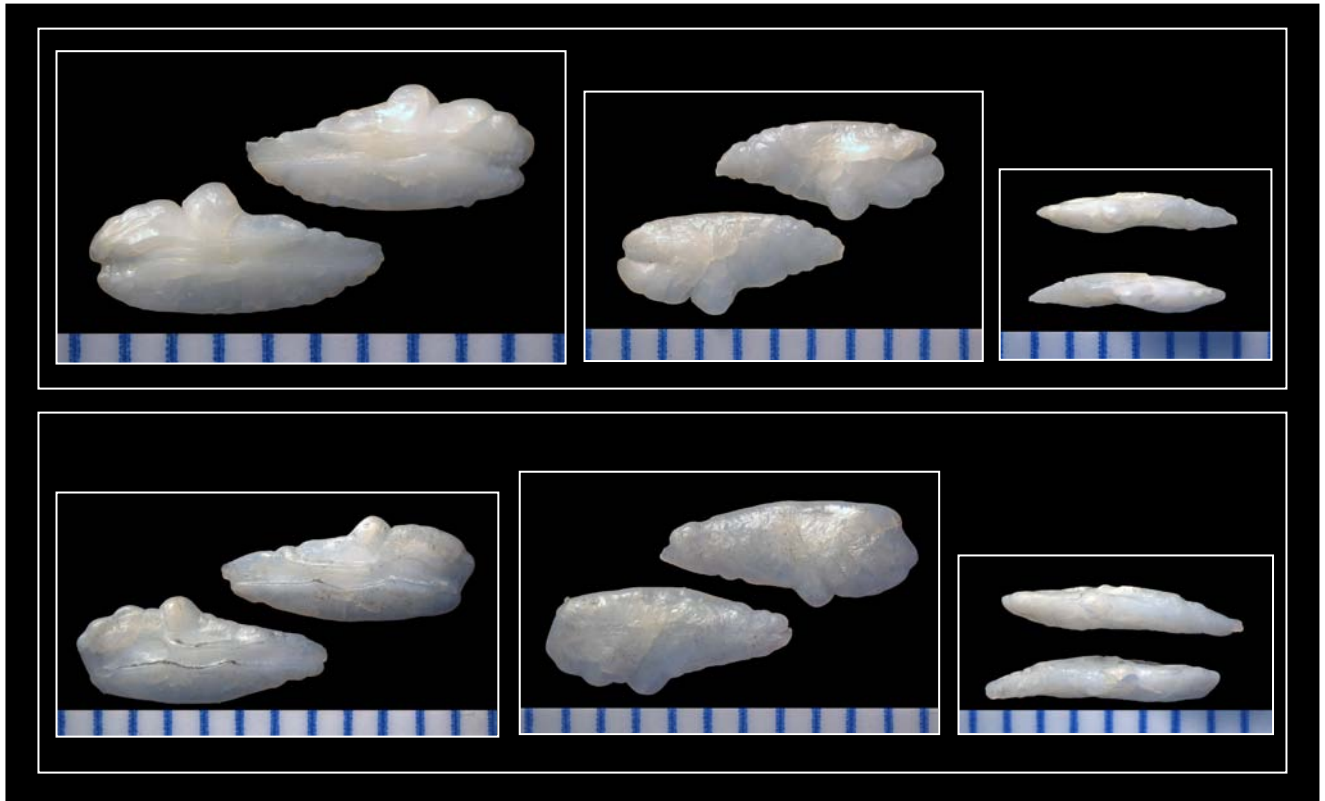
Synodontidae

Synodus lucioiceps, California lizardfish, LACM 56697-1



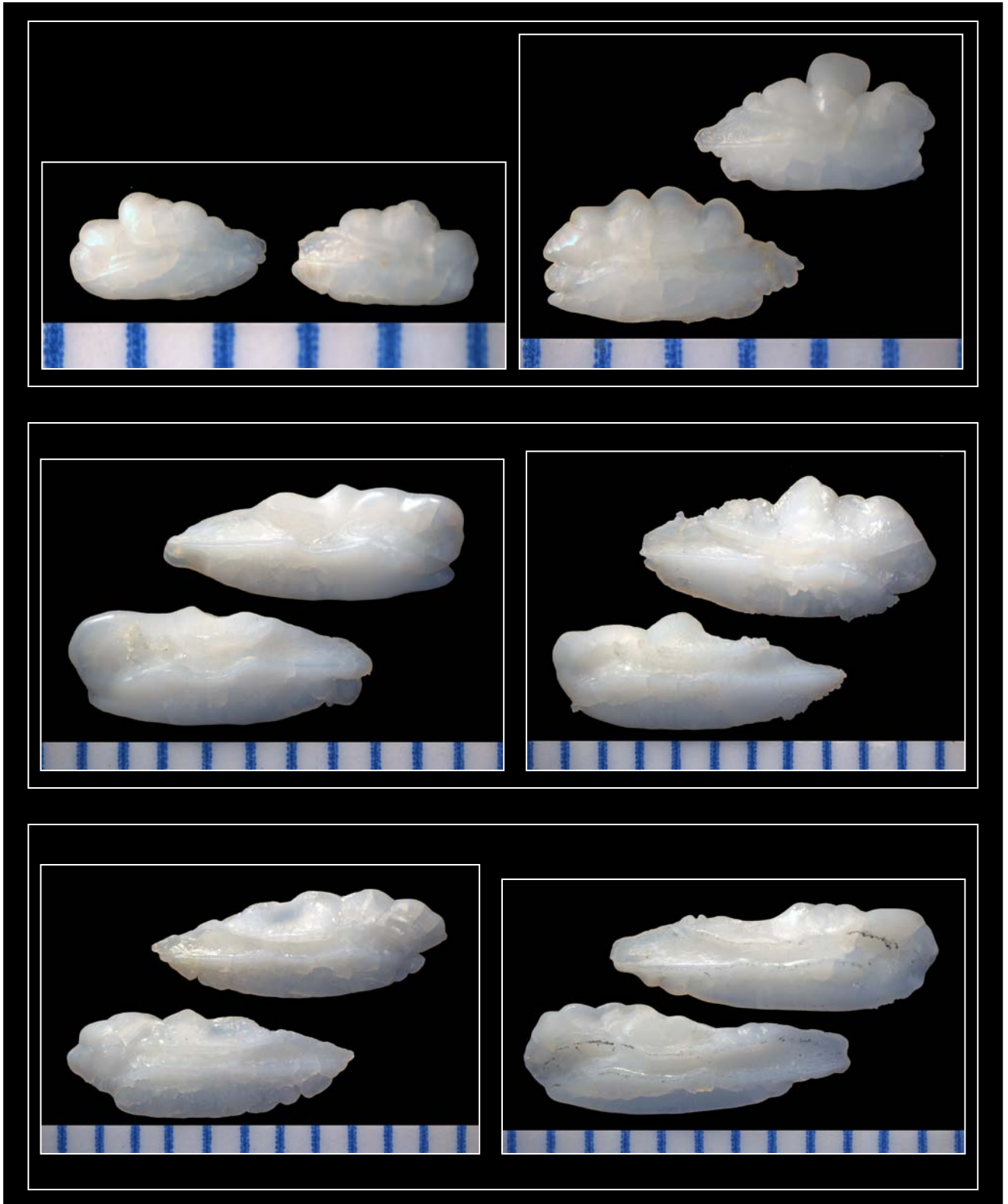
Synodontidae

Synodus lucioceps, California lizardfish, LACM 56697-1



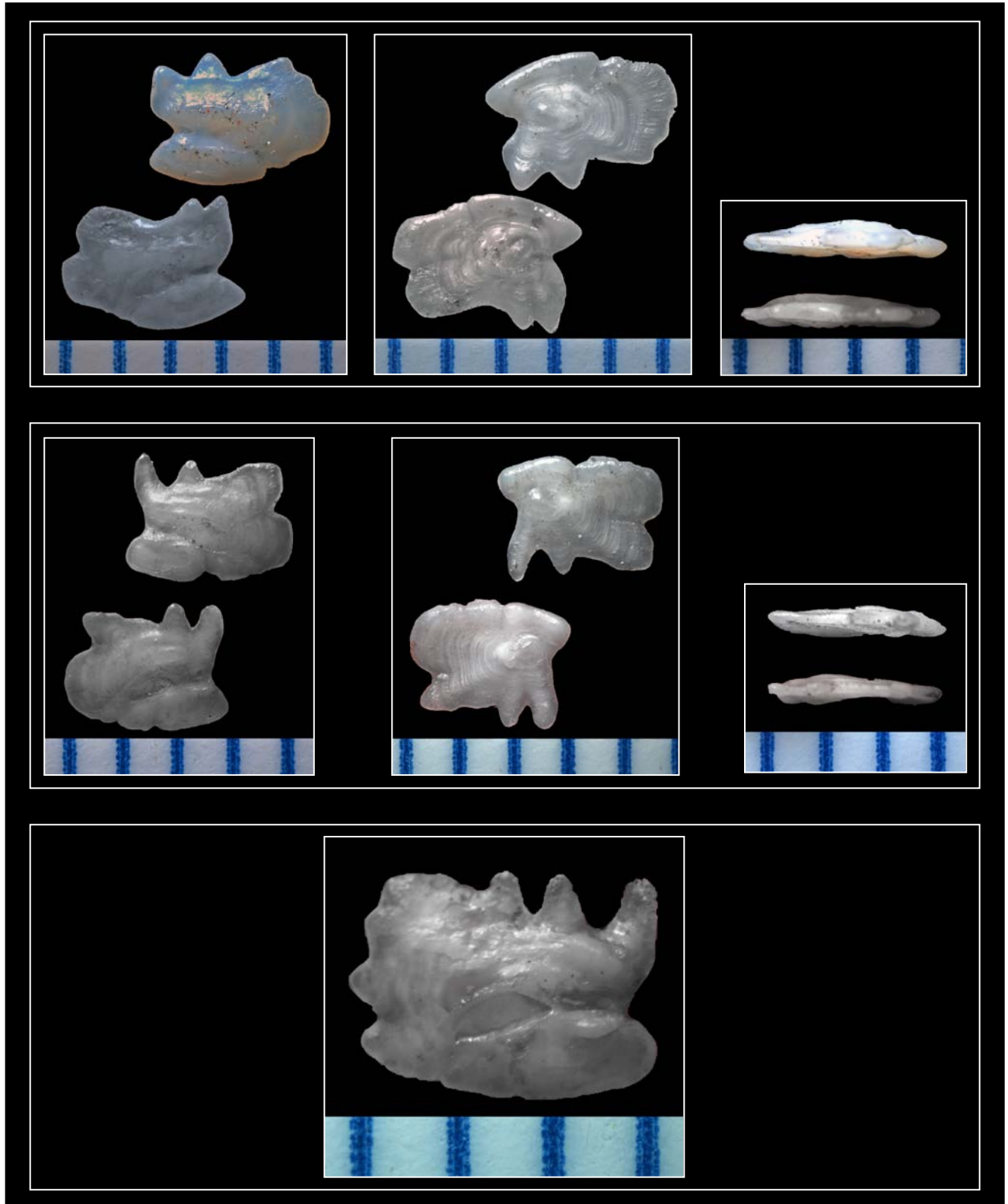
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Synodus lucioceps, California lizardfish, LACM 56697-1



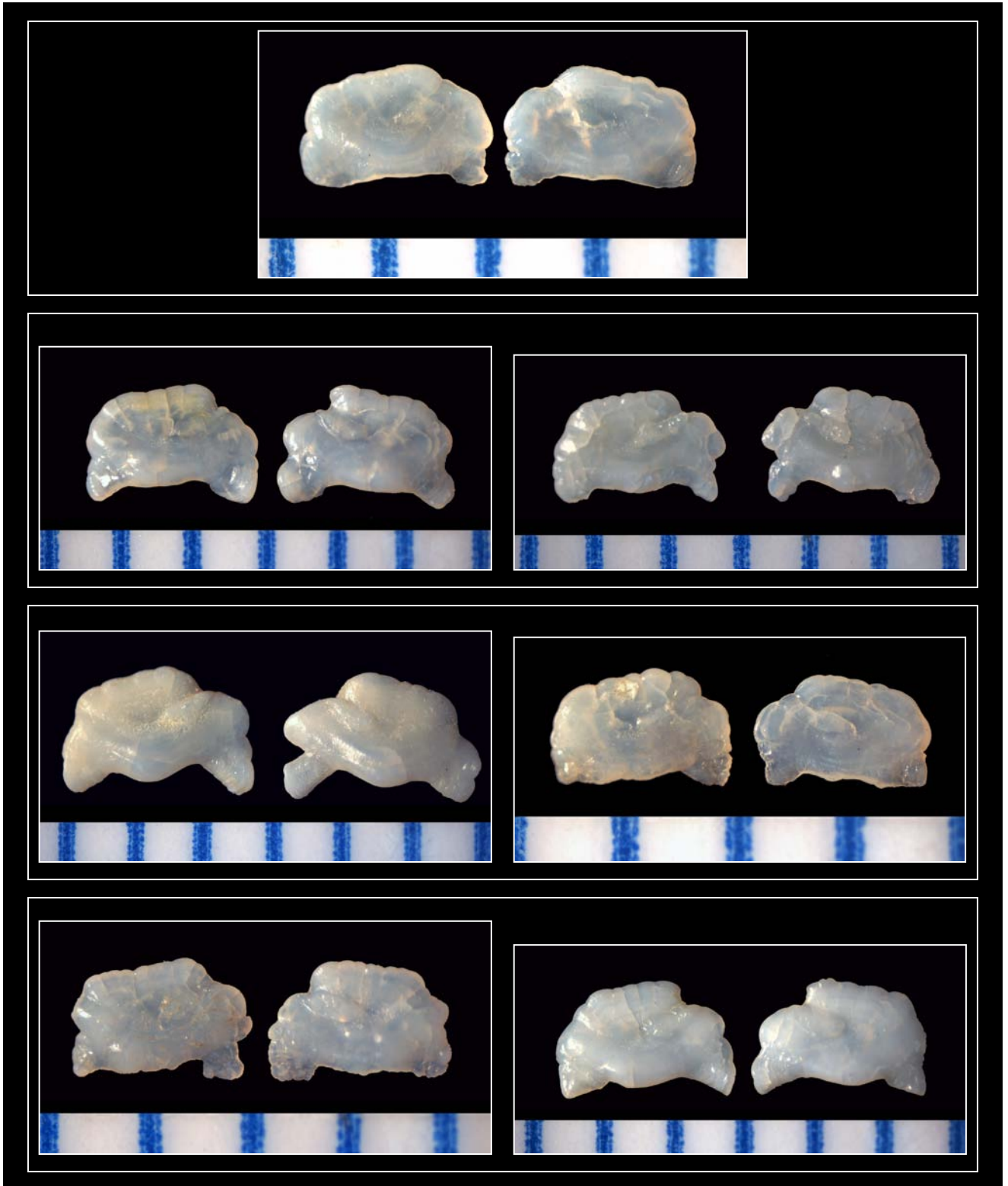
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Benthalbella dentata, northern pearleye, LACM 57262-1



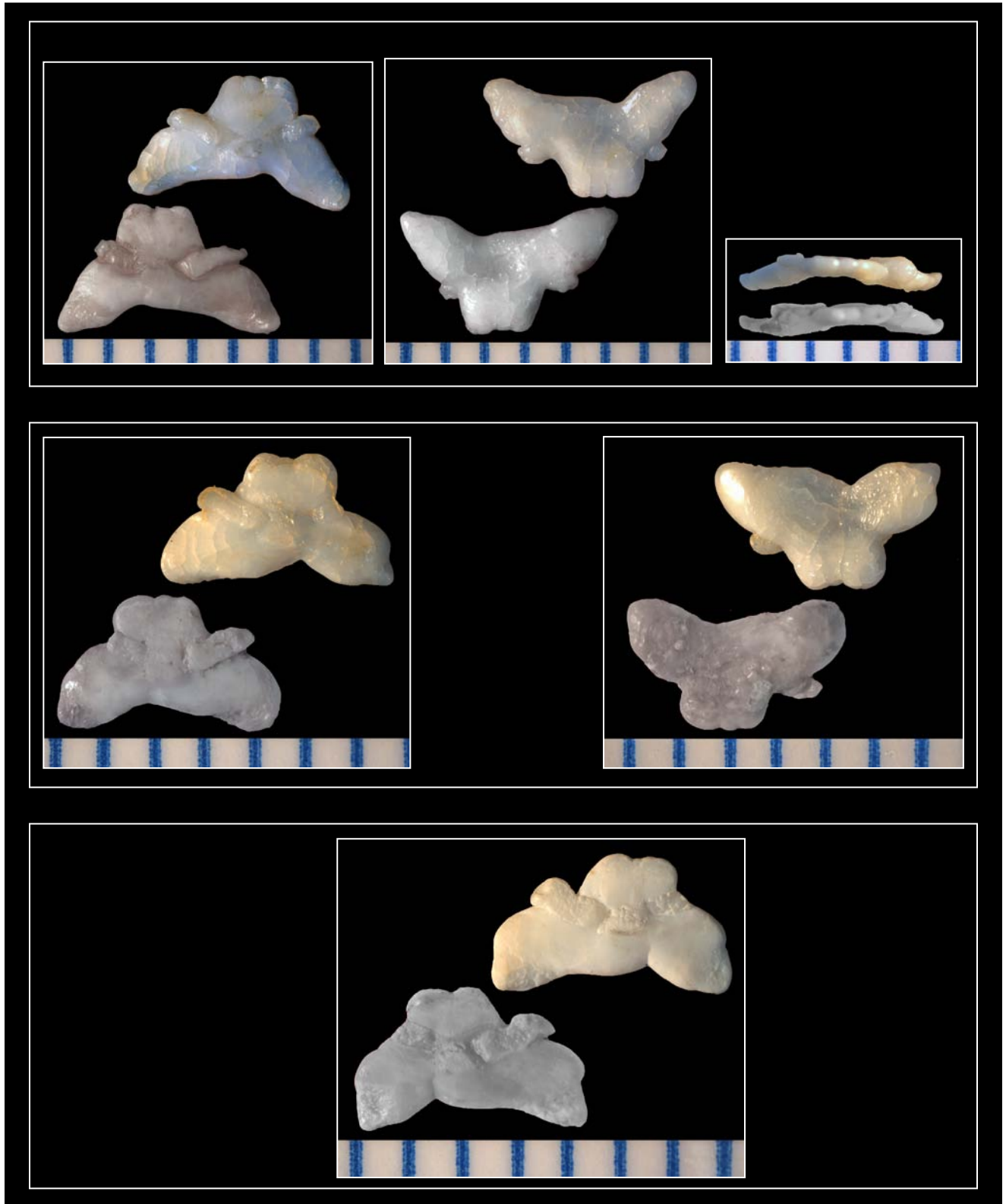
Paralepididae

Lestidiops ringens, slender barracudina, LACM 56641-1



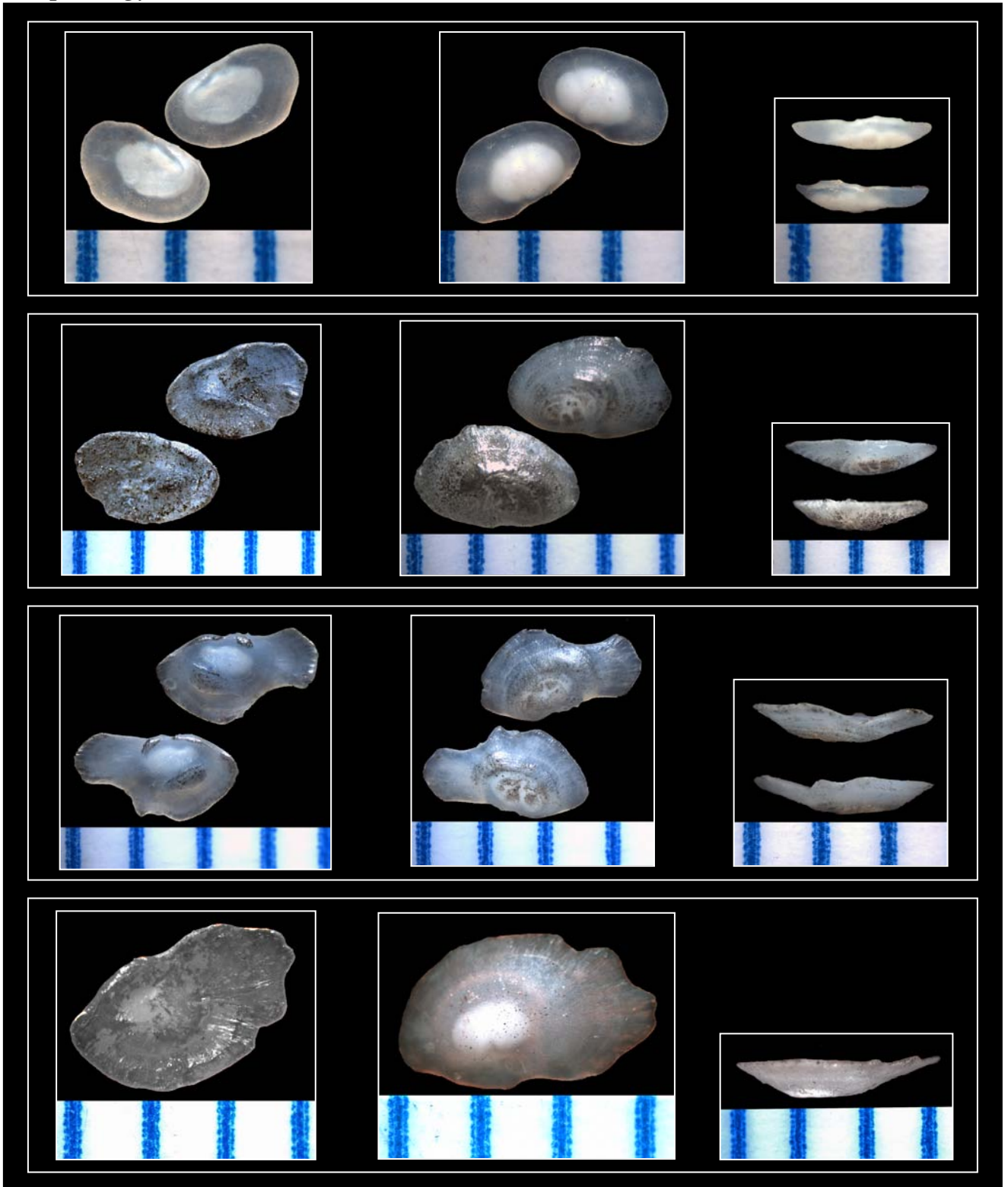
Paralepididae

Magnisudis atlantica, Atlantic barracudina, LACM 56659-1



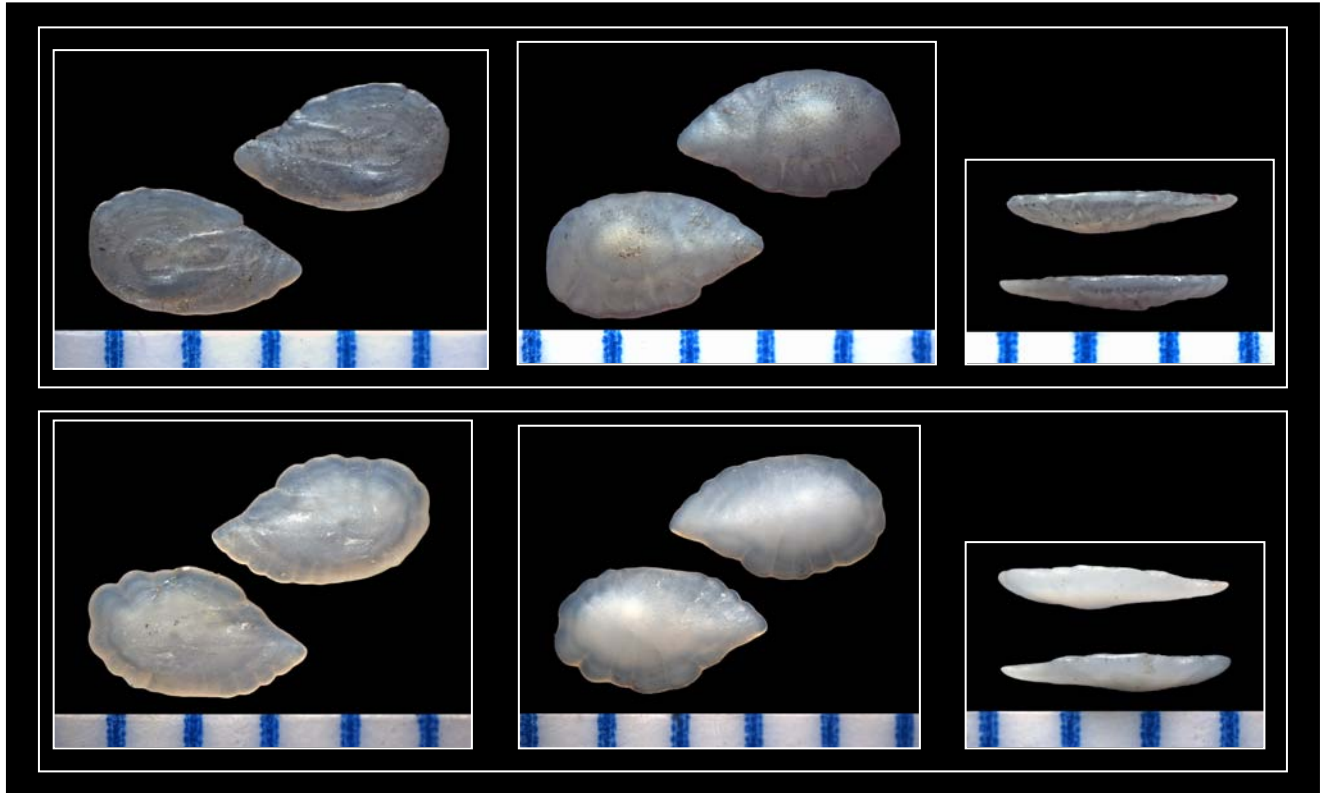
Neoscopelidae

Scopelengys tristis, Pacific blackchin, LACM 57261-1



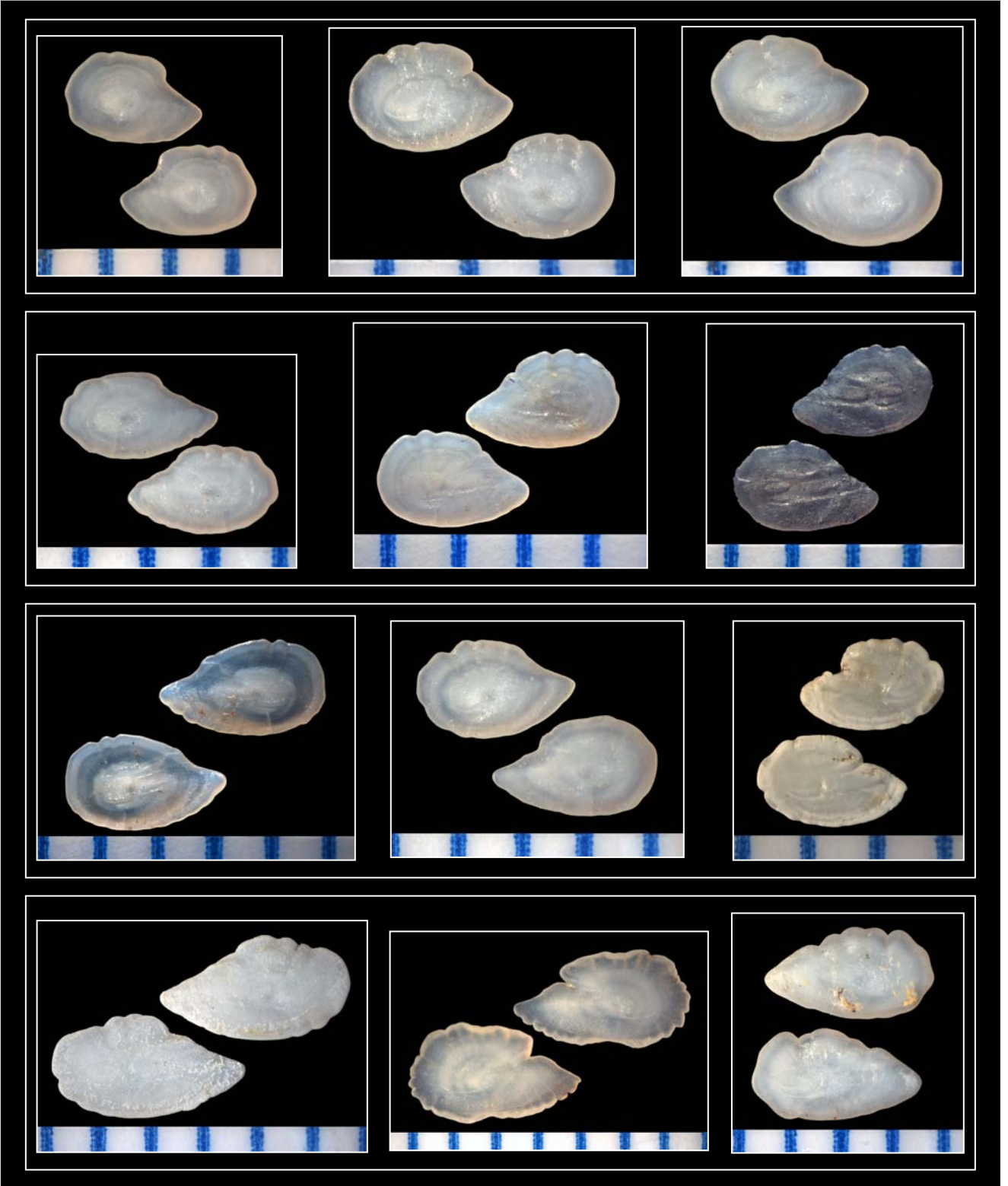
Myctophidae

Ceratoscopelus townsendi, dogtooth lampfish, LACM 56642-1



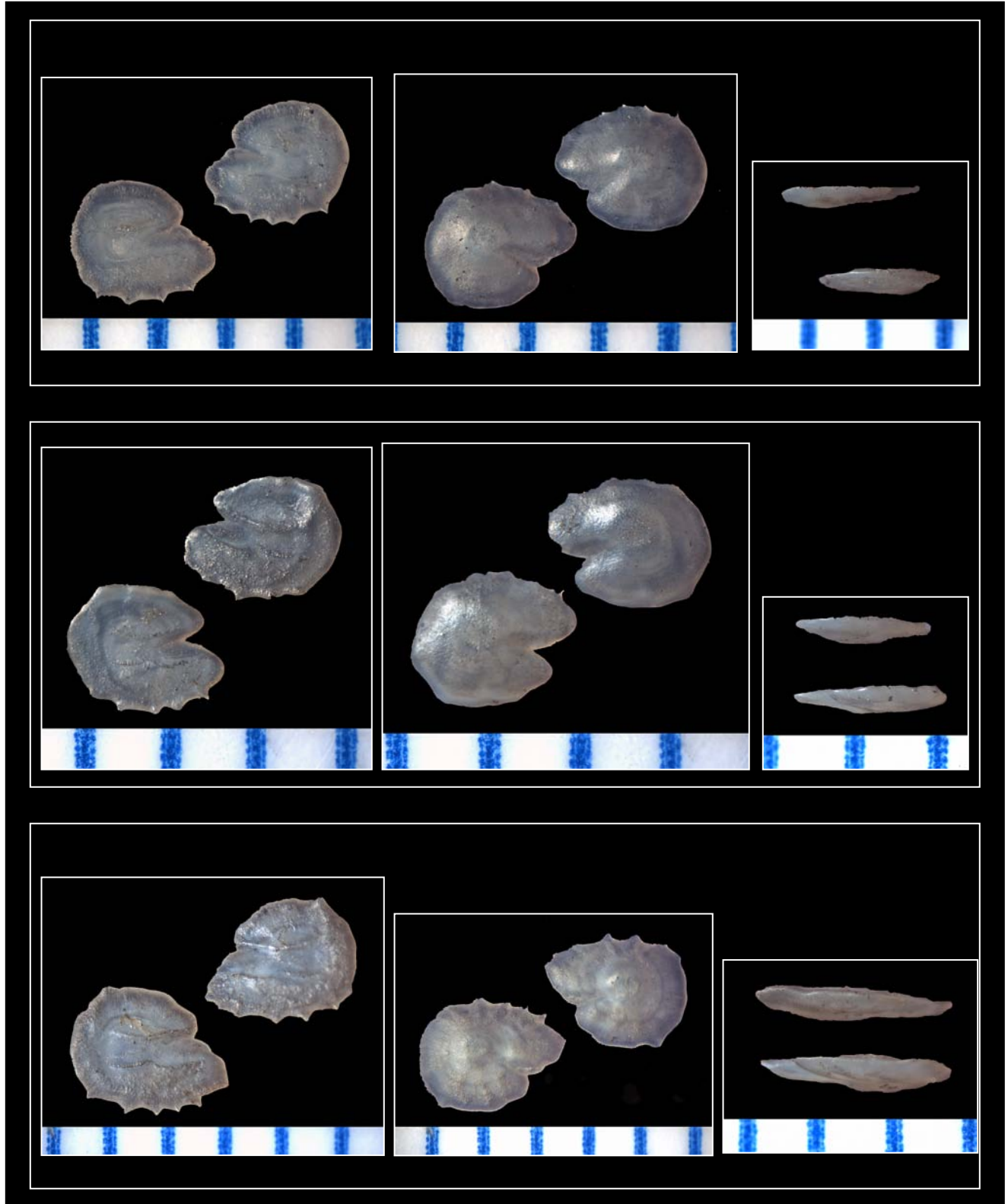
Myctophidae

Ceratoscopelus townsendi, dogtooth lampfish, LACM 56642-1



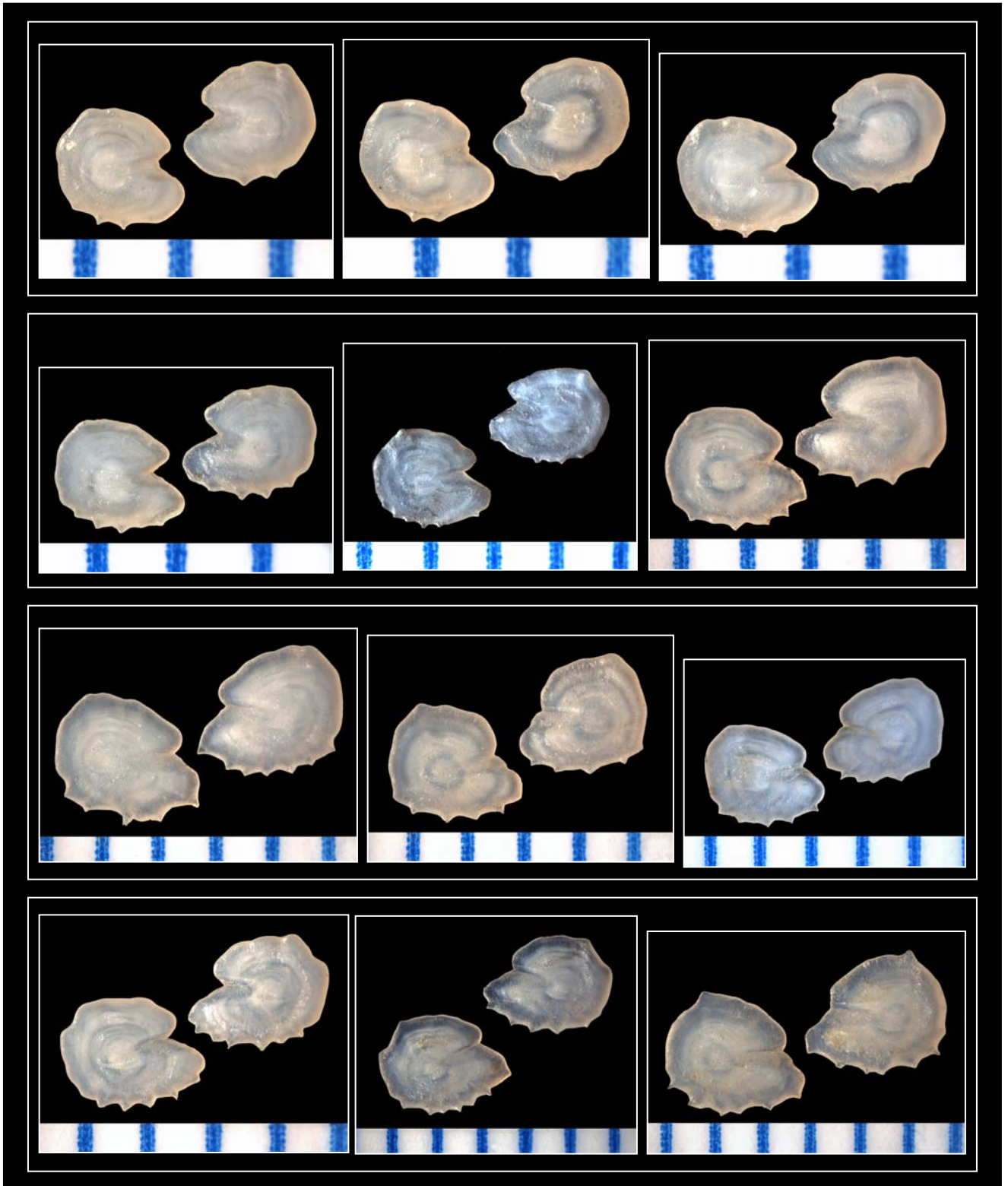
Myctophidae

Diaphus theta, California headlightfish, LACM 56636-1



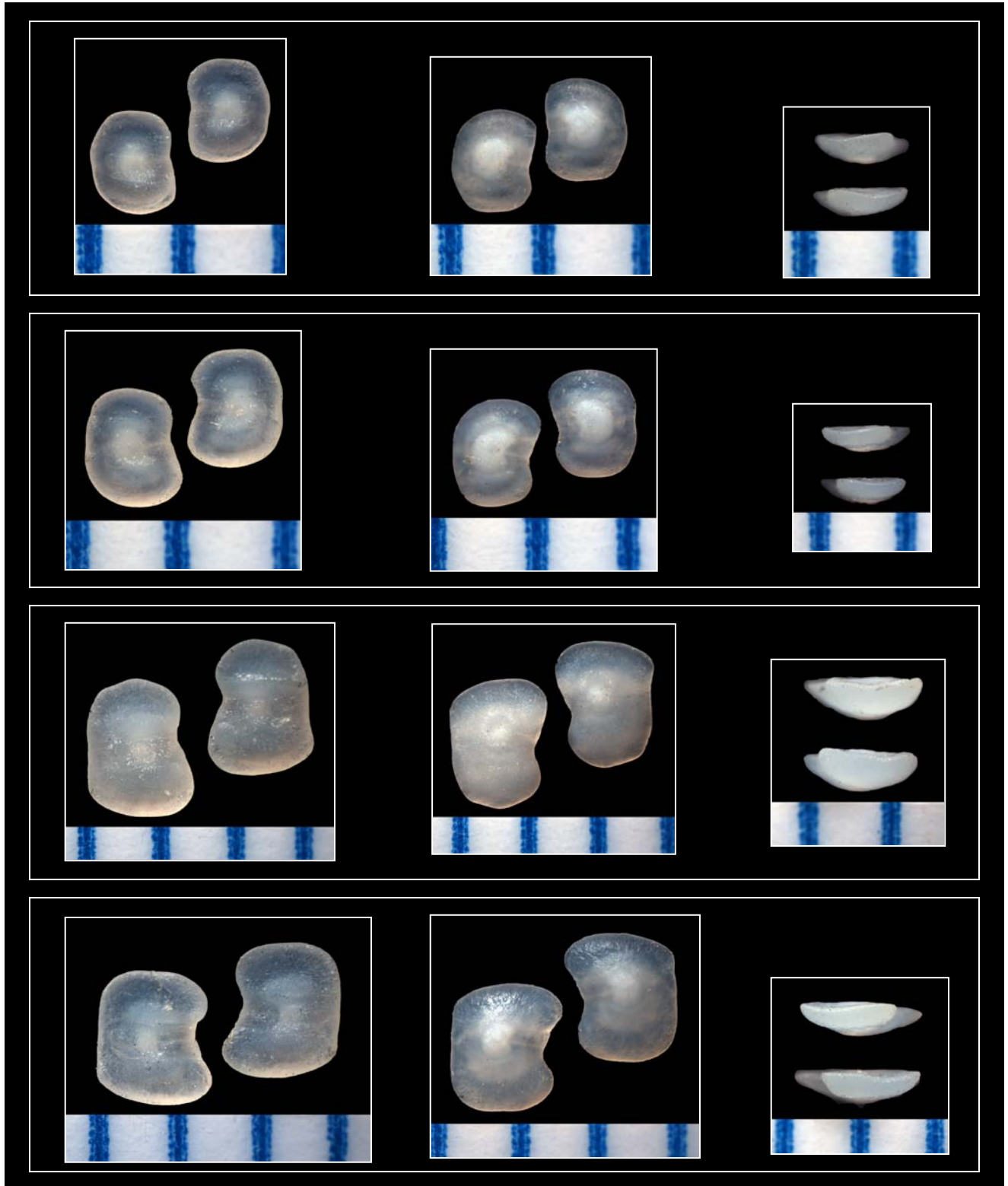
Myctophidae

Diaphus theta, California headlightfish, LACM 56636-1



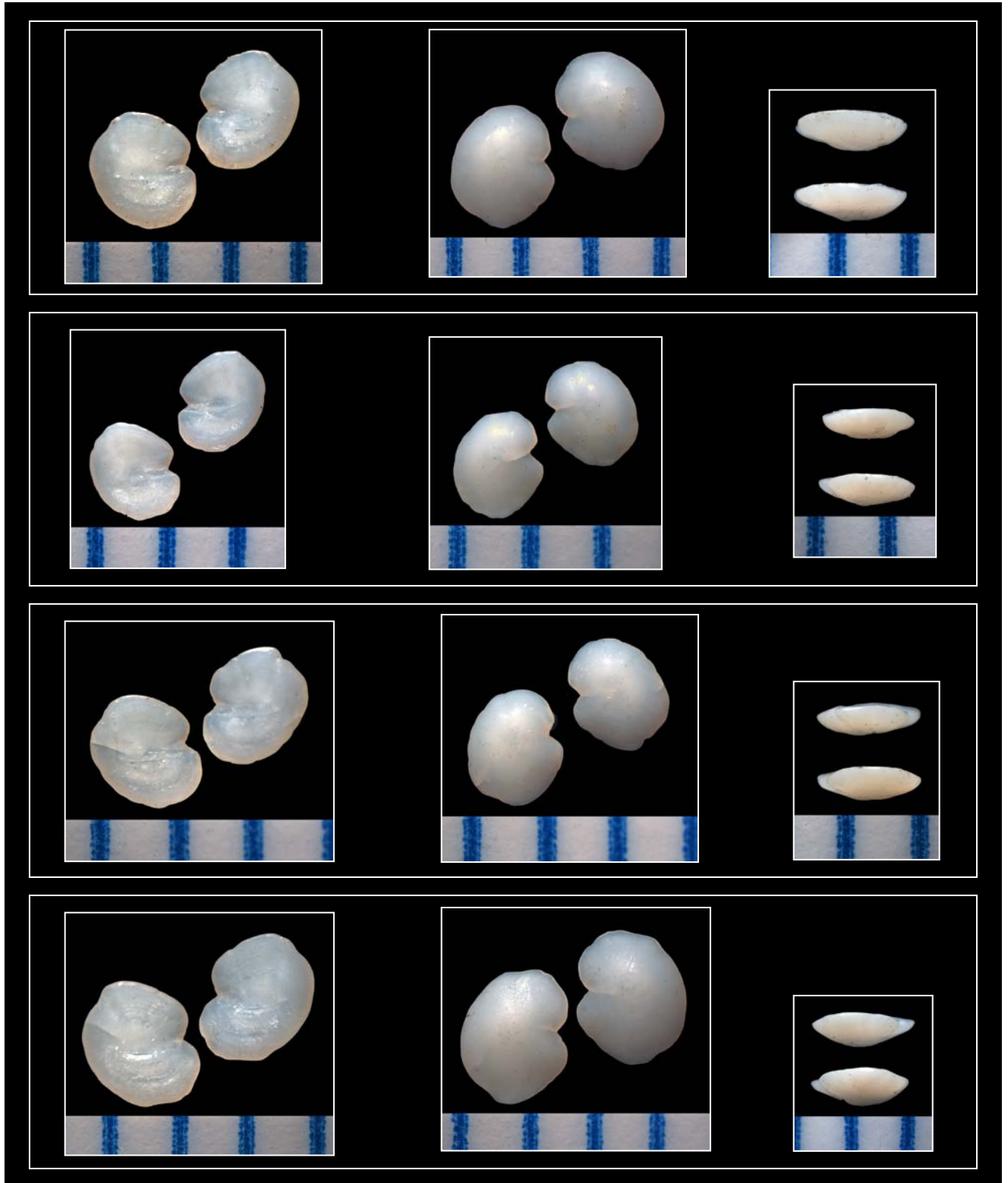
Myctophidae

Nannobrachium ritteri, broadfin lampfish, LACM 56929-1



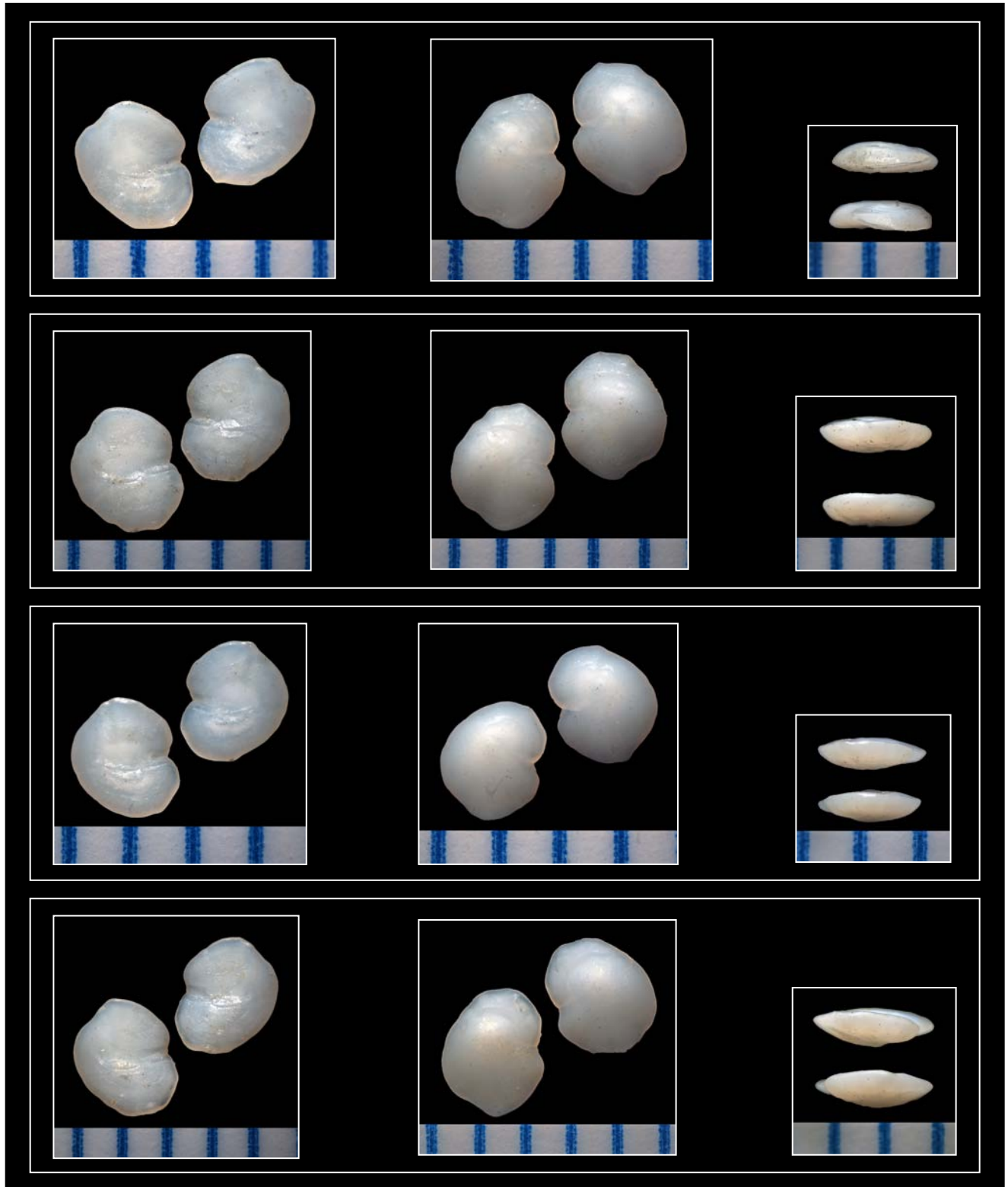
Myctophidae

Protomyctophum crockeri, California flashlightfish, LACM 56927-1



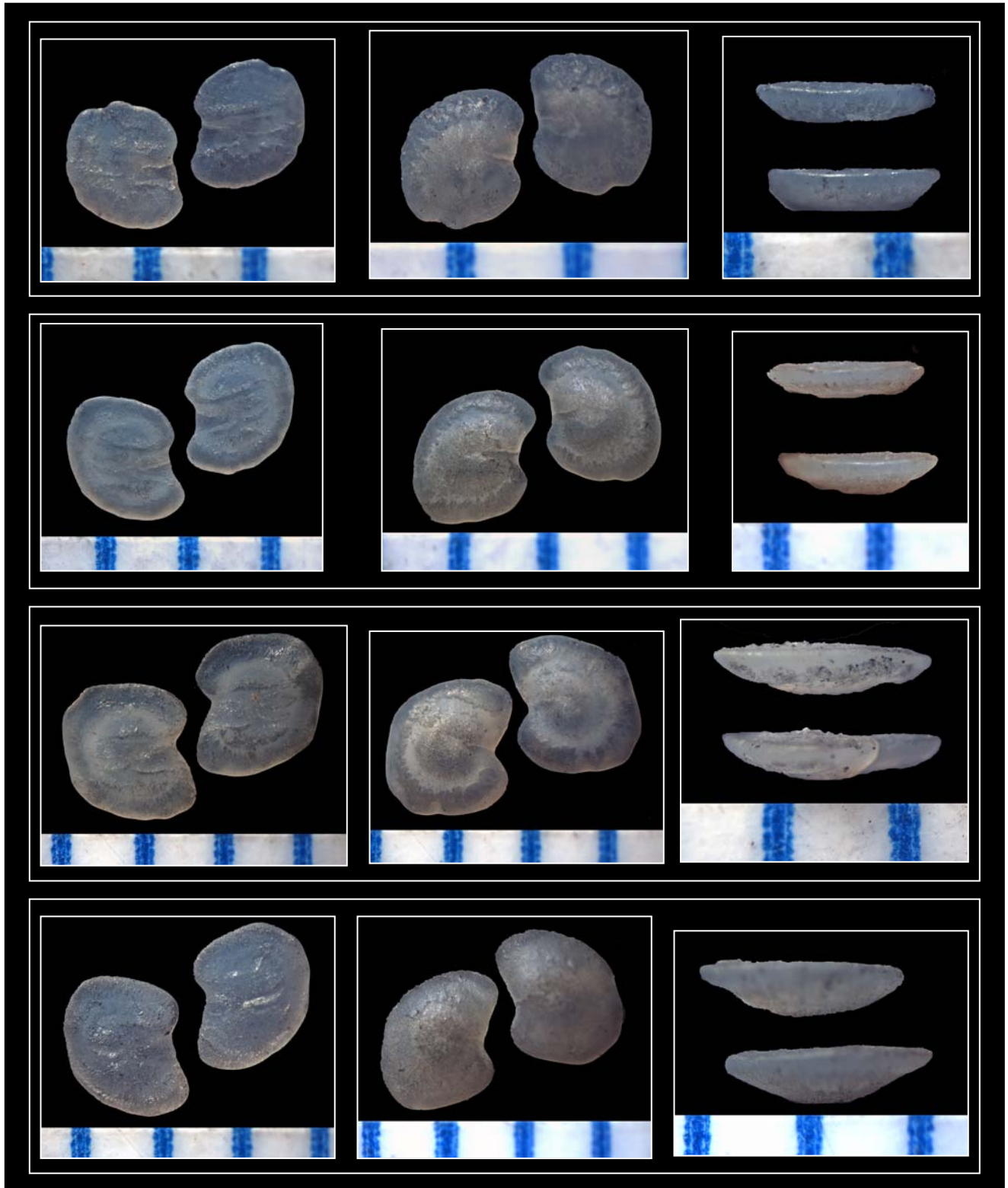
Myctophidae

Protomyctophum crockeri, California flashlightfish, LACM 56927-1



Myctophidae

Stenobranchius leucopsarus, northern lampfish, LACM 56642-1



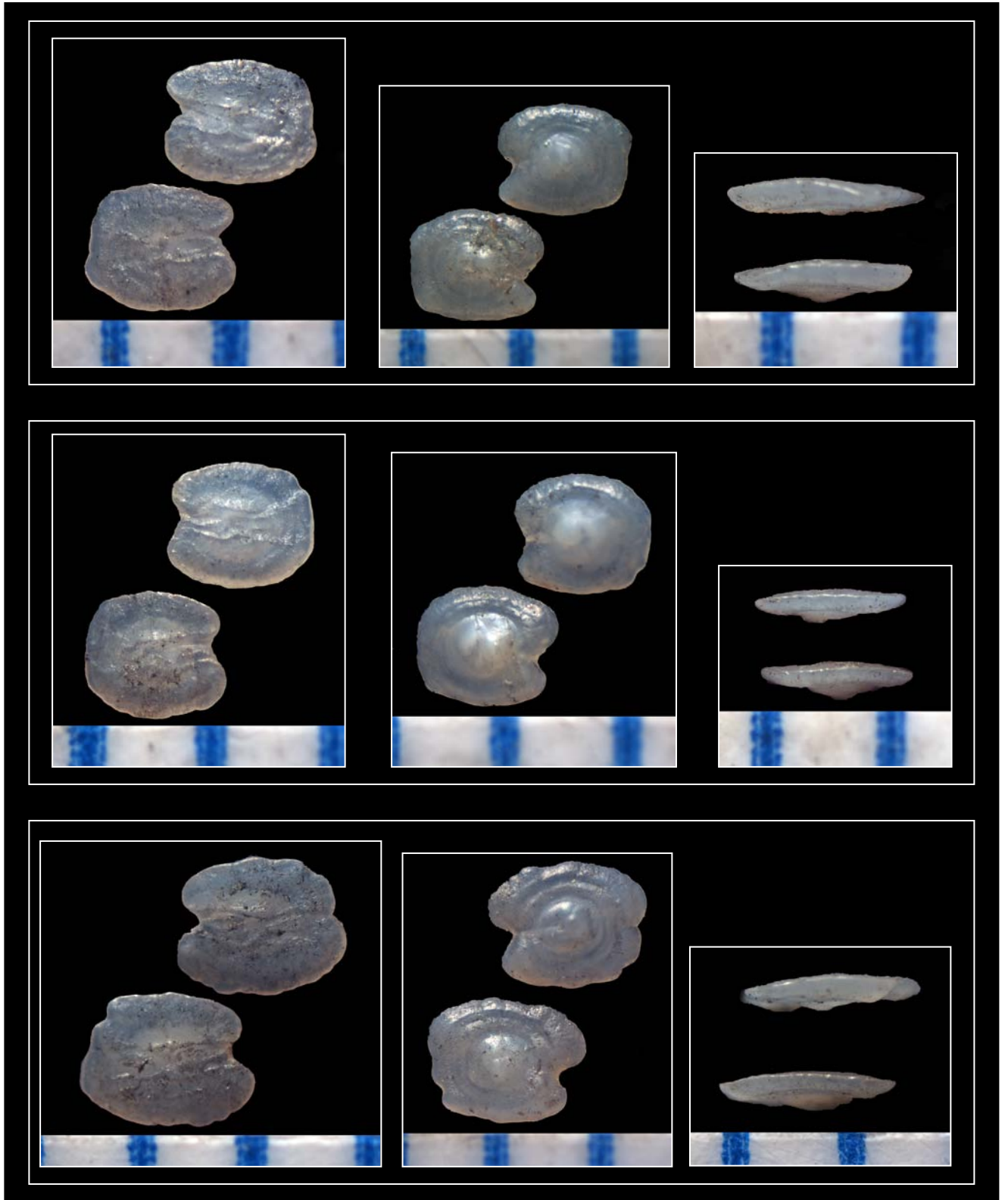
Myctophidae

Symbolophorus californiensis, California lanternfish, LACM 56643-1



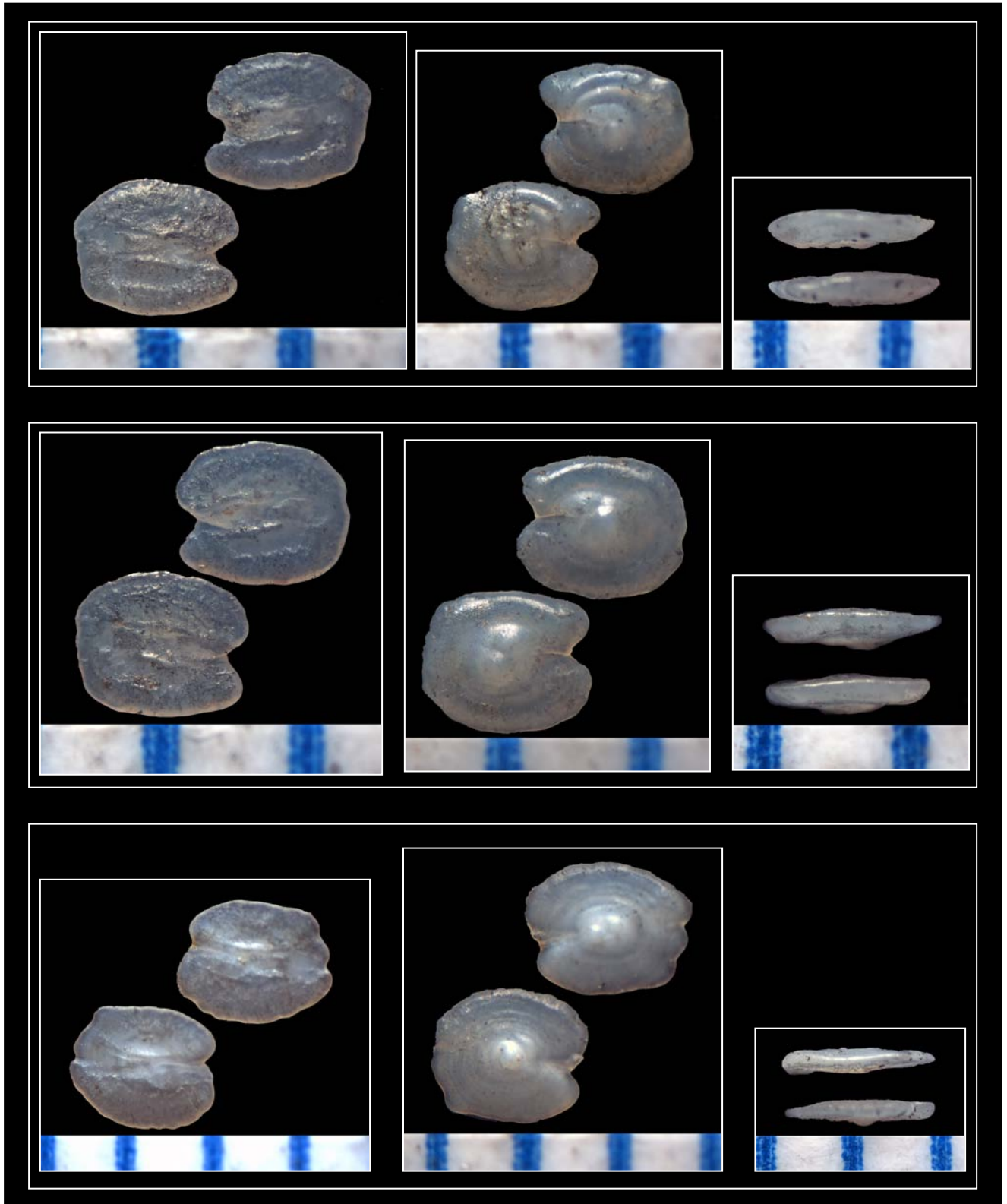
Myctophidae

Tarletonbenia crenularis, blue lanternfish, LACM 56594-1



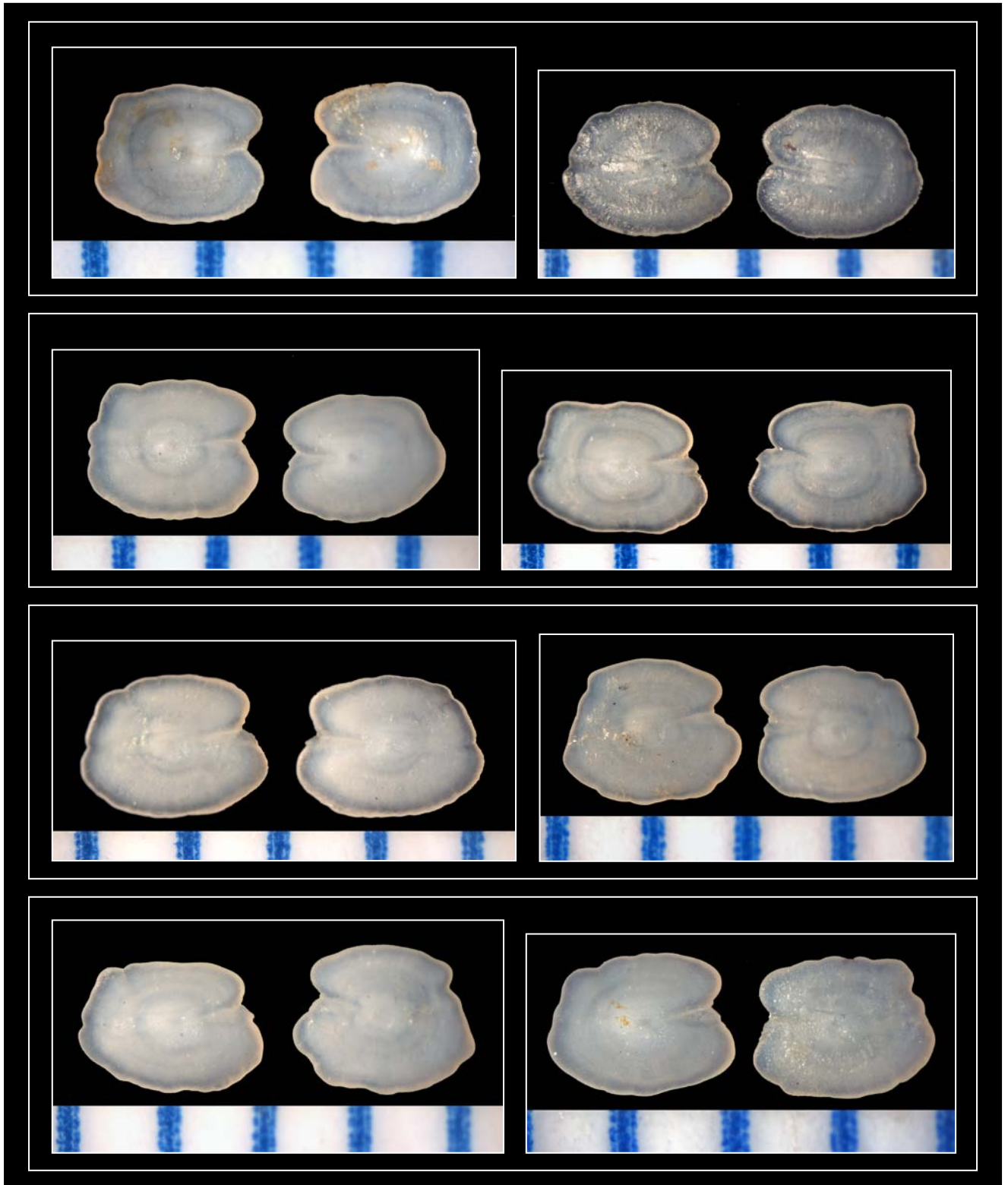
Myctophidae

Tarletonbenia crenularis, blue lanternfish, LACM 56594-1



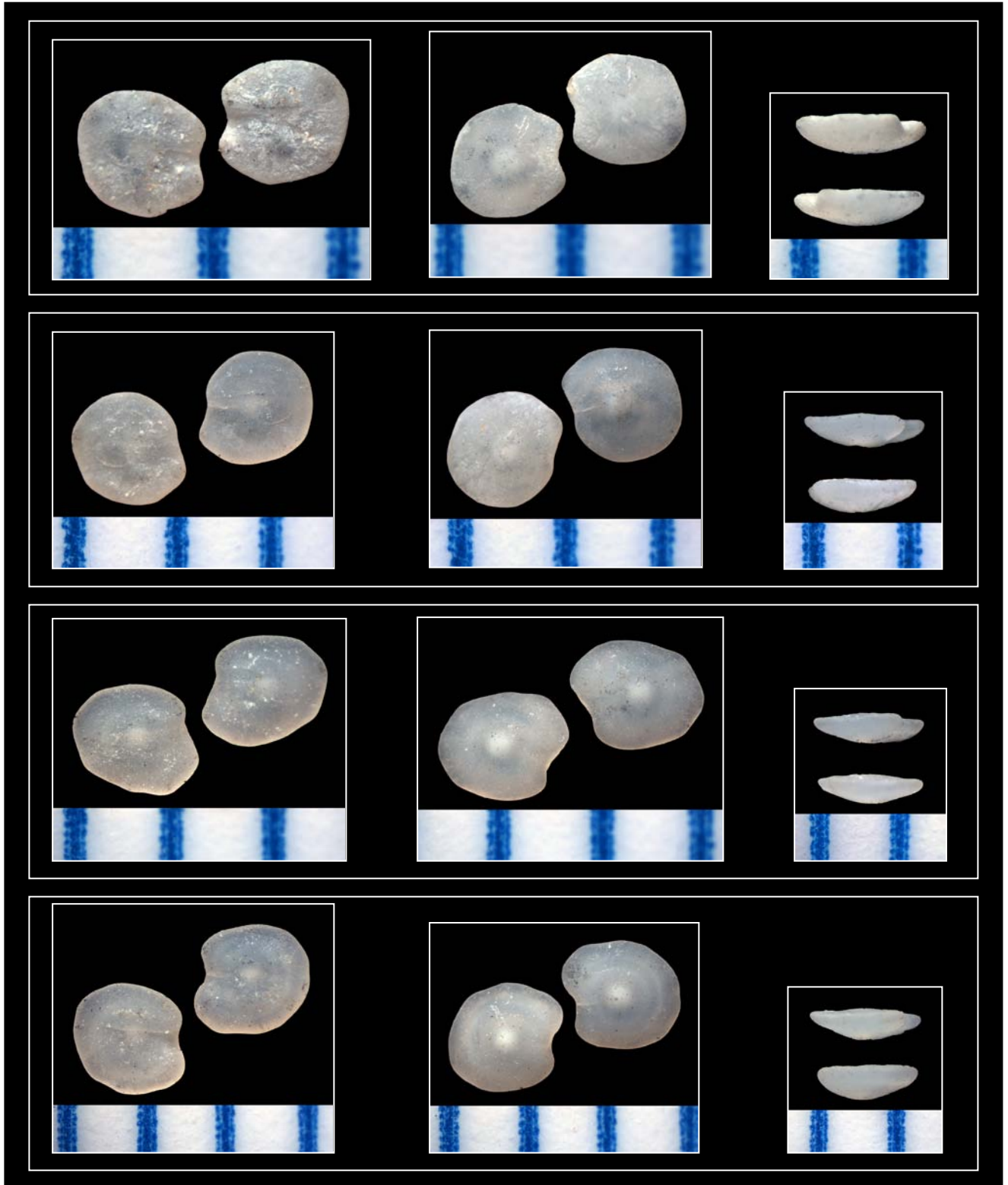
Myctophidae

Tarletonbenia crenularis, blue lanternfish, LACM 56594-1



Myctophidae

Triphoturus mexicanus, Mexican lampfish, LACM 56926-1



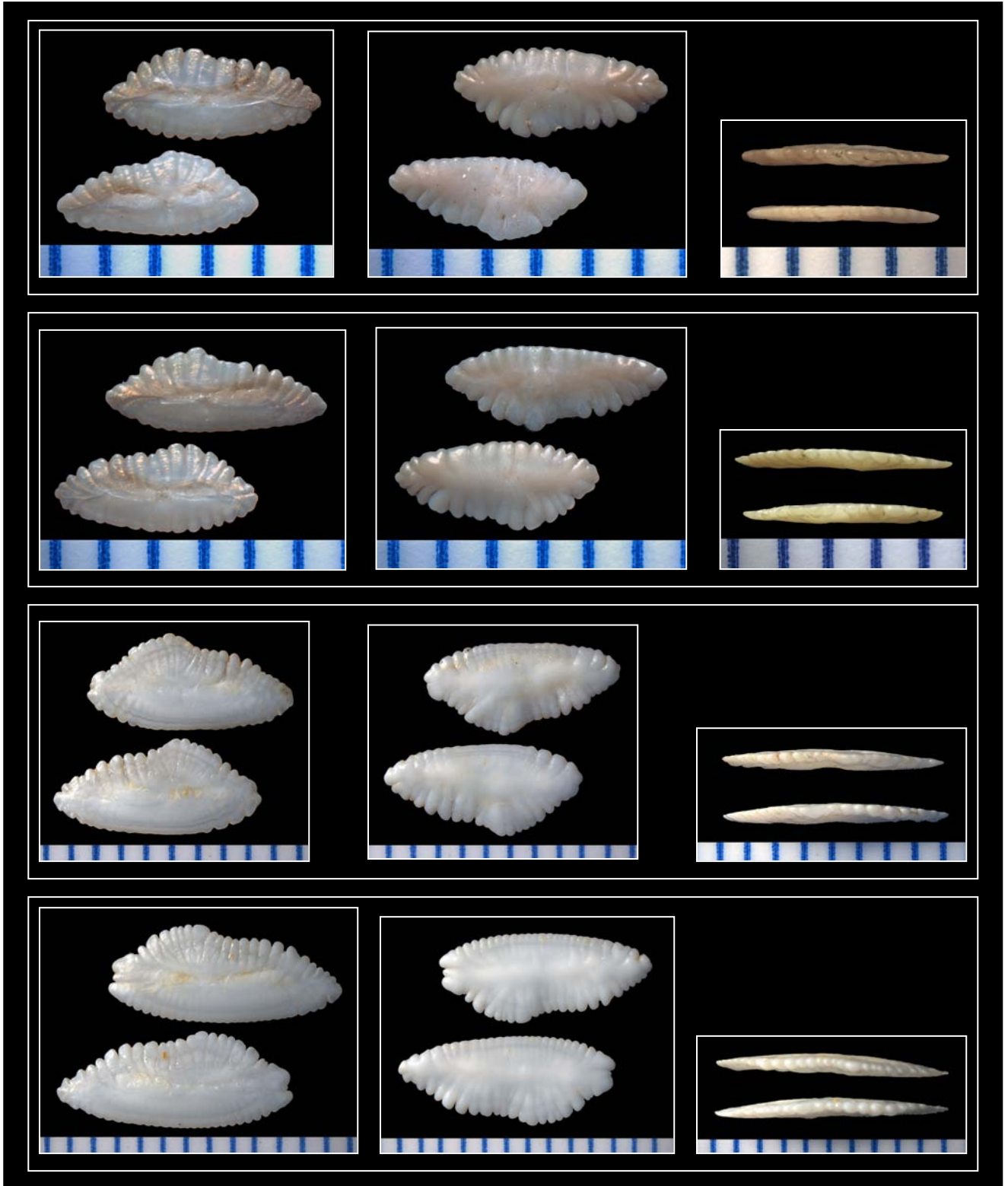
Moridae

Physiculus rastrelliger, hundred-fathom codling, LACM 56710-1



Merluccidae

Merluccius productus, Pacific hake, LACM 56591-1



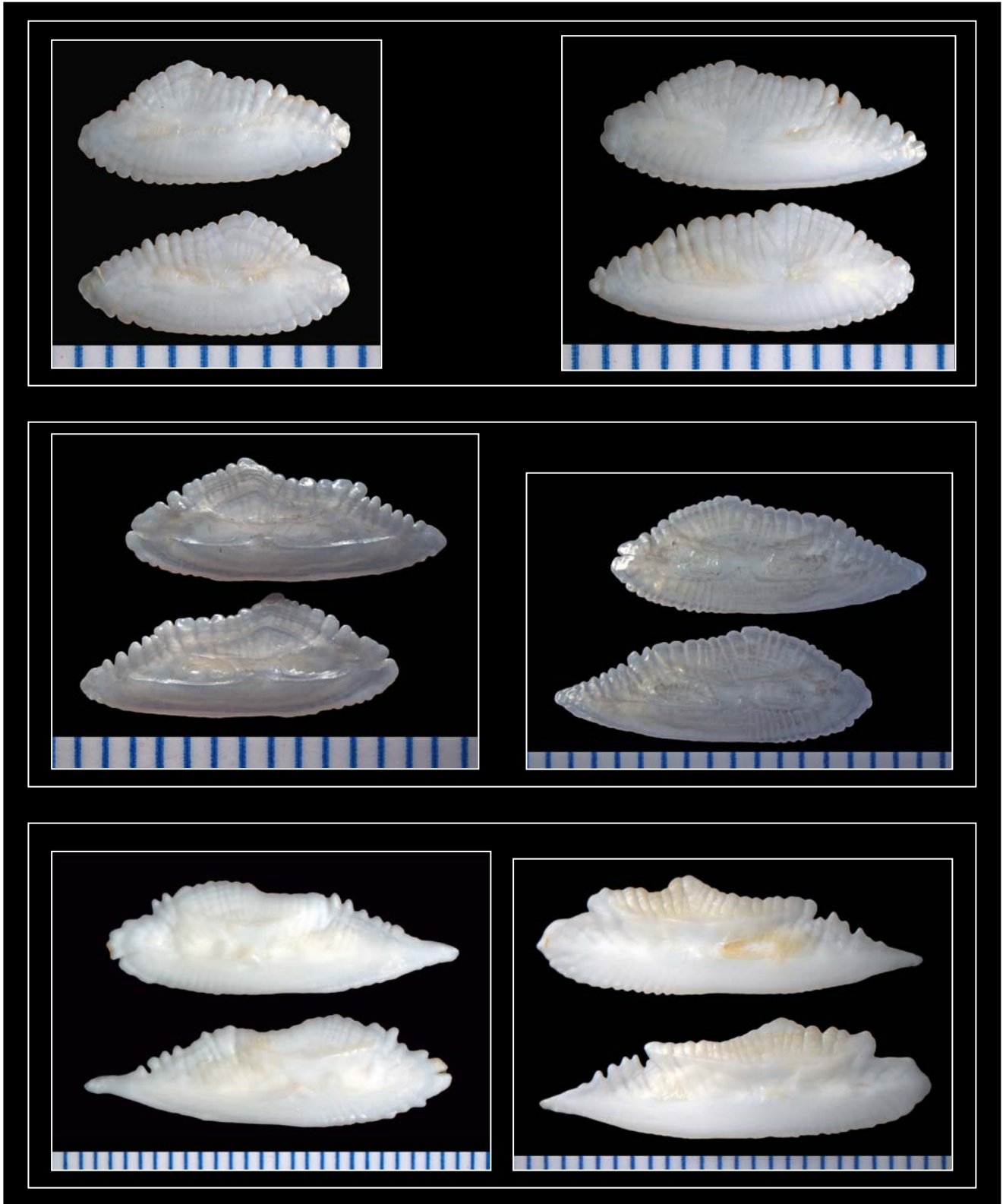
Merluccidae

Merluccius productus, Pacific hake, LACM 56591-1



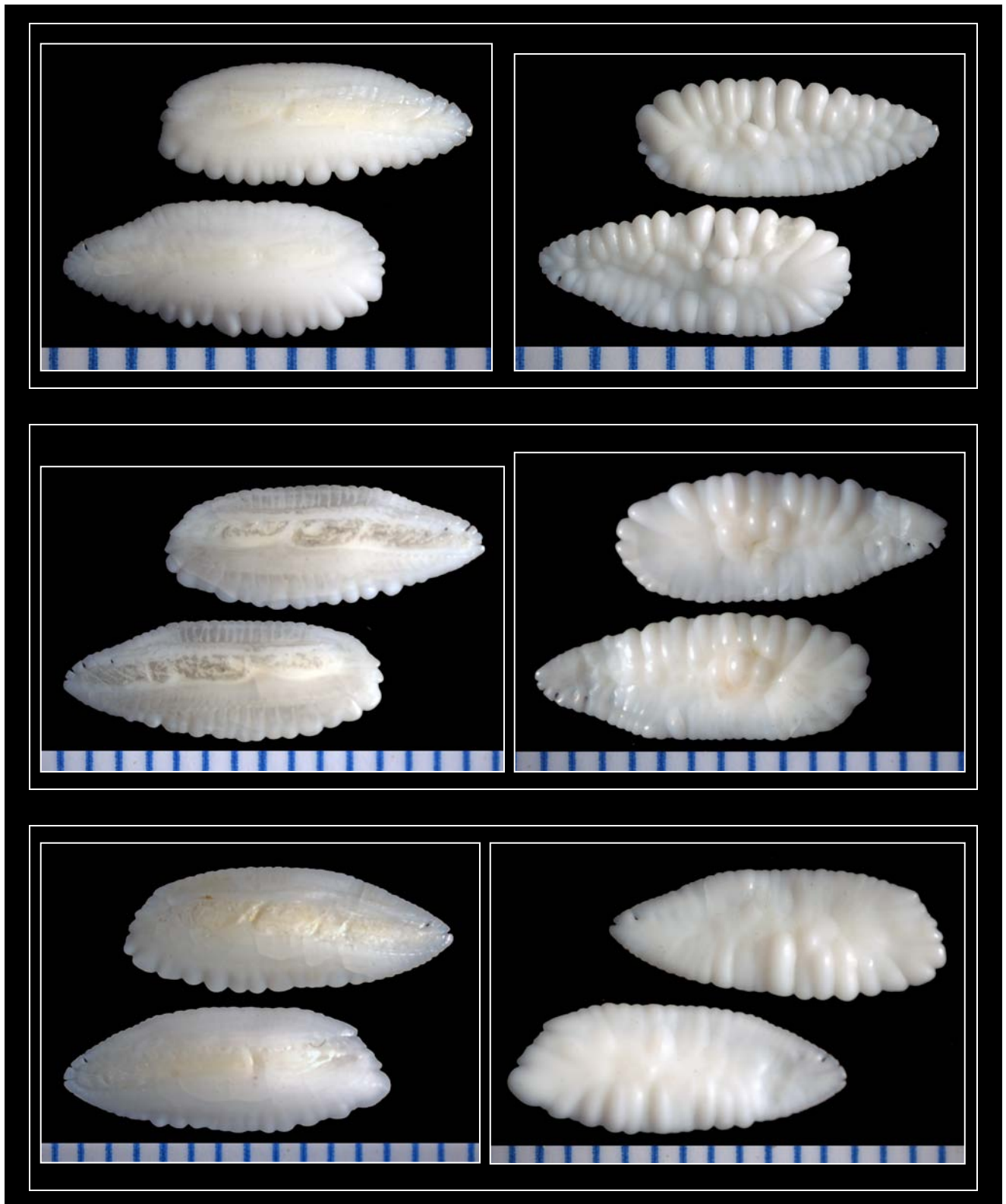
Merluccidae

Merluccius productus, Pacific hake, LACM 56591-1



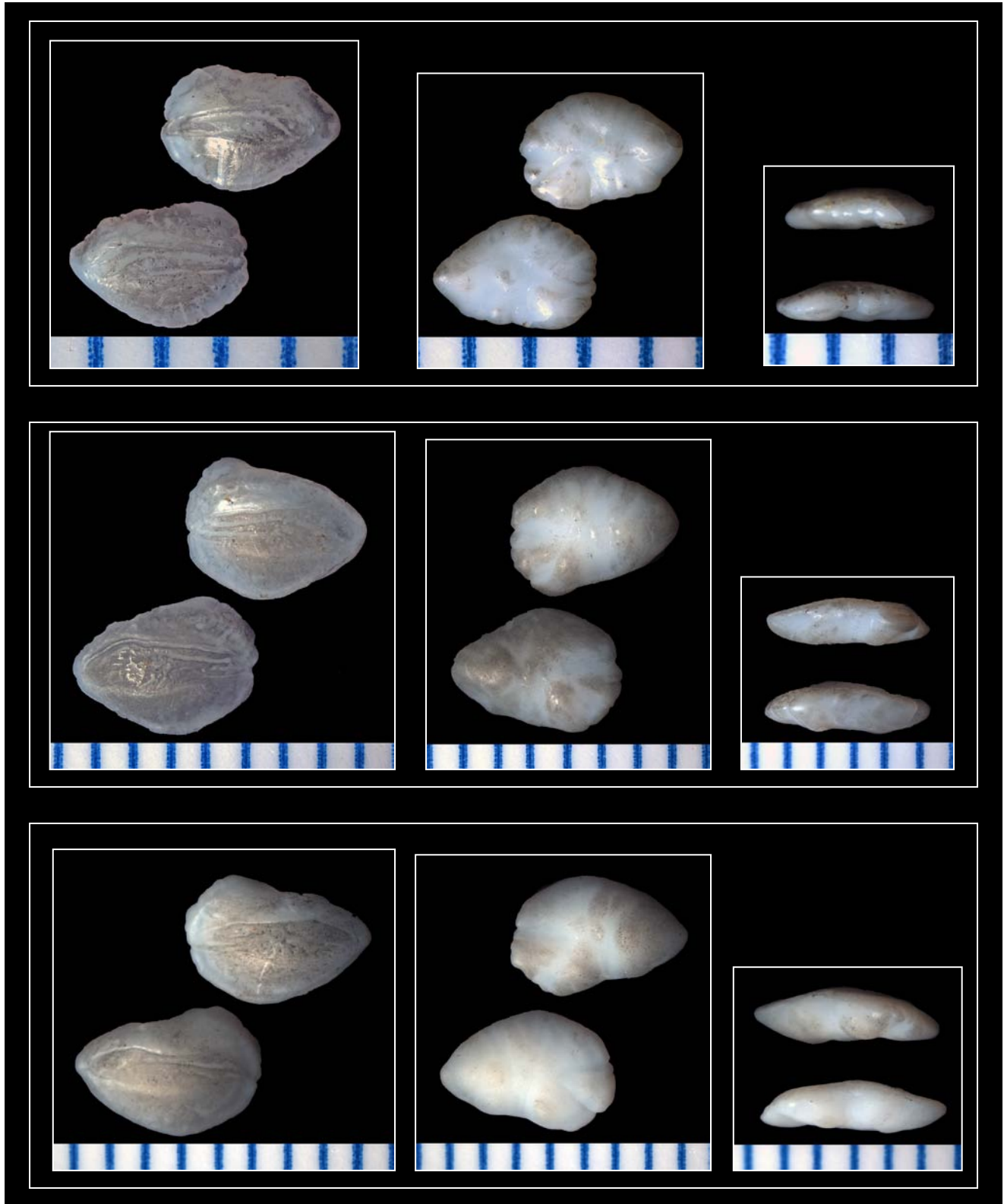
Gadidae

Microgadus proximus, Pacific tomcod, LACM 56593-1



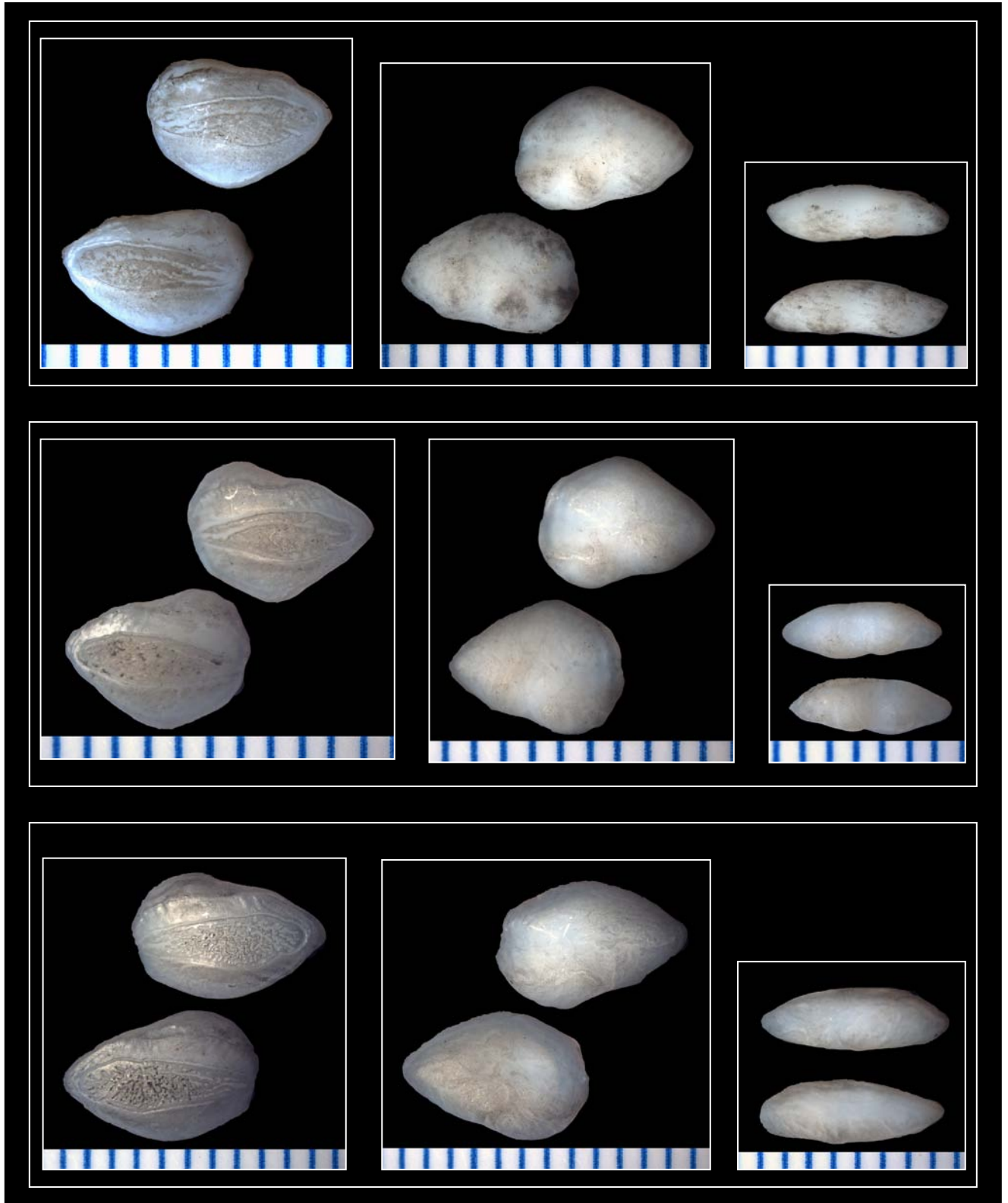
Ophidiidae

Chilara taylori, spotted cusk-eel, LACM 56603-1



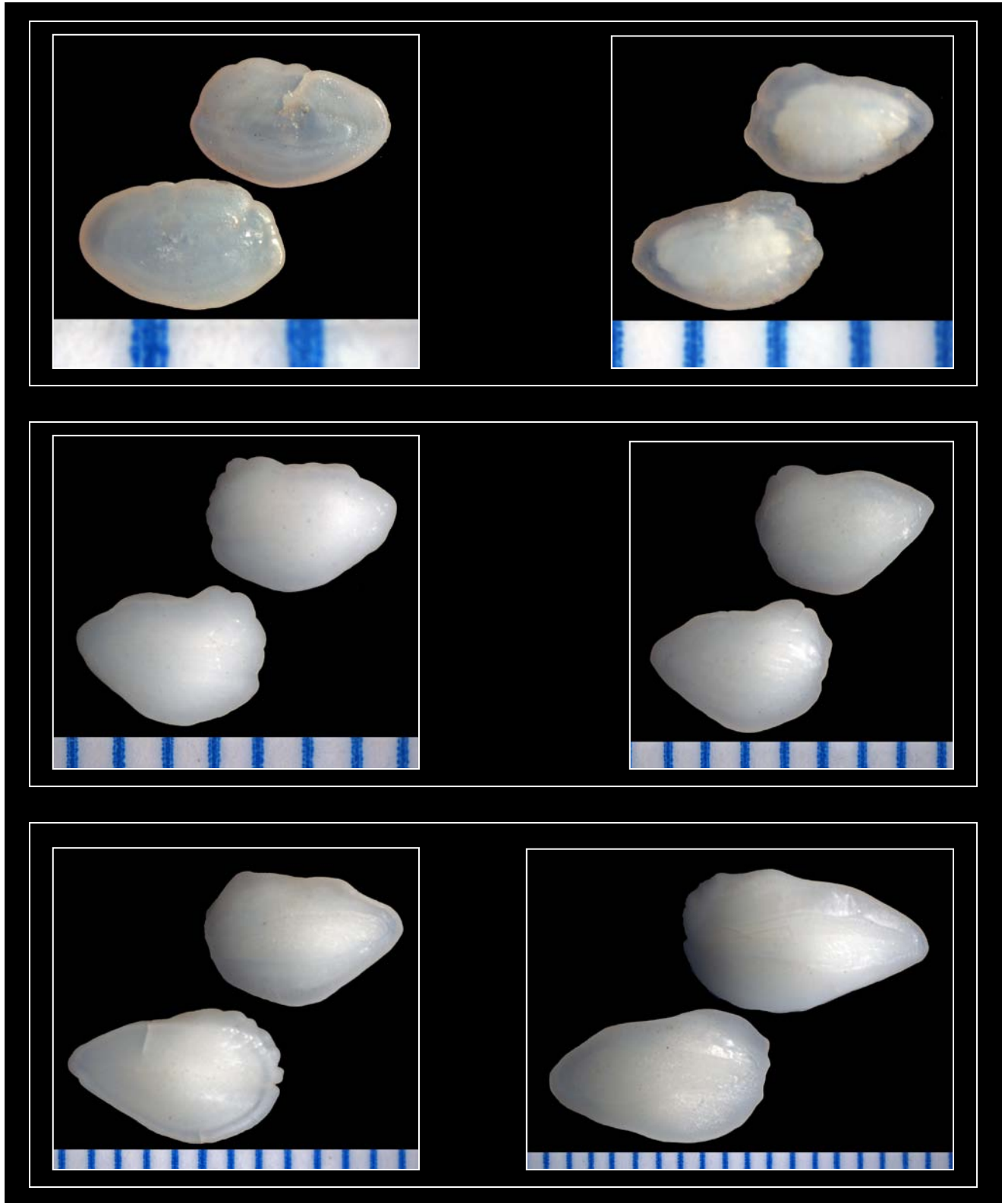
Ophidiidae

Chilara taylori, spotted cusk-eel, LACM 56603-1



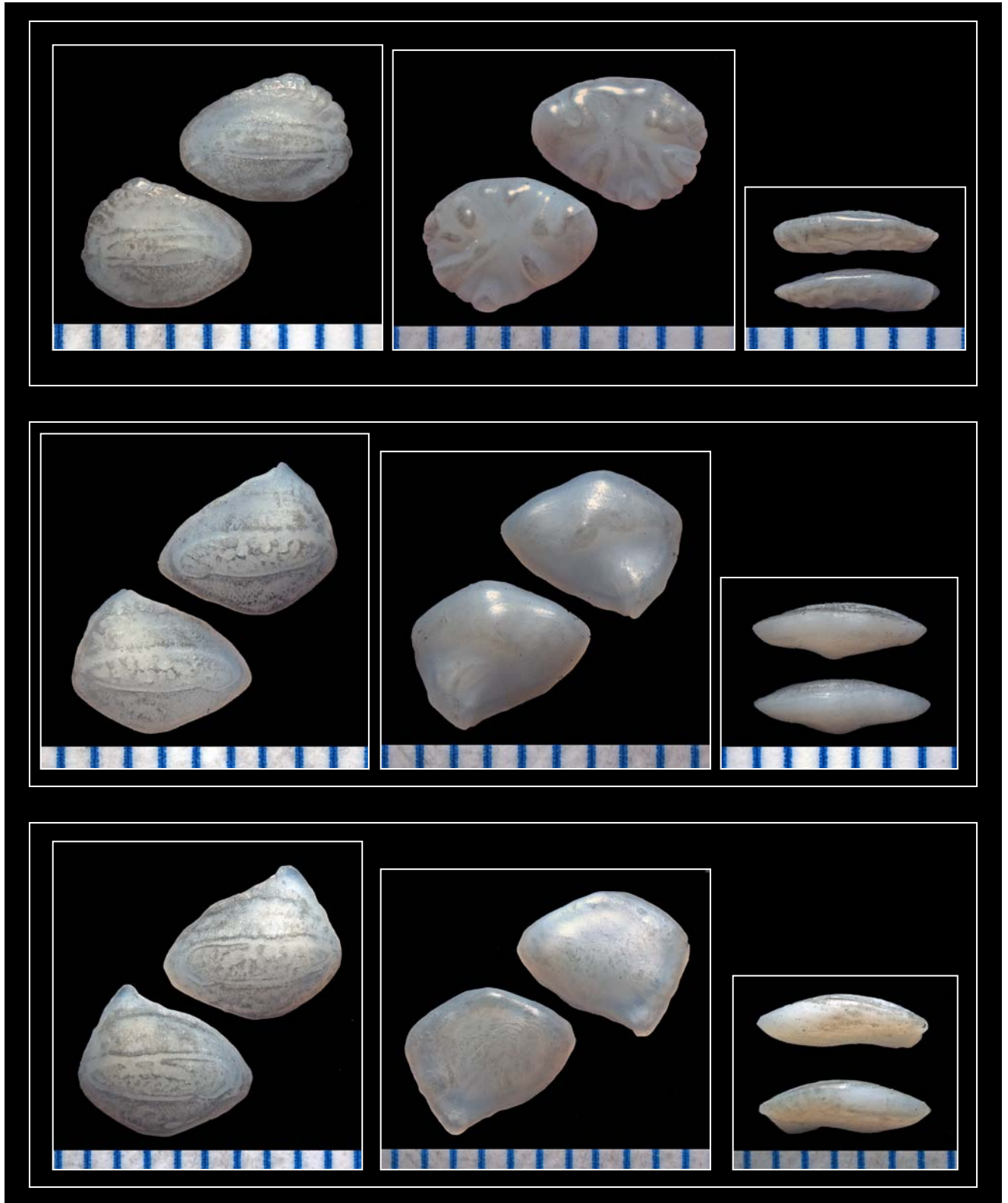
Ophidiidae

Chilara taylori, spotted cusk-eel, LACM 56603-1



Ophidiidae

Ophidion scrippsae, basketweave cusk-eel, LACM 56722-1



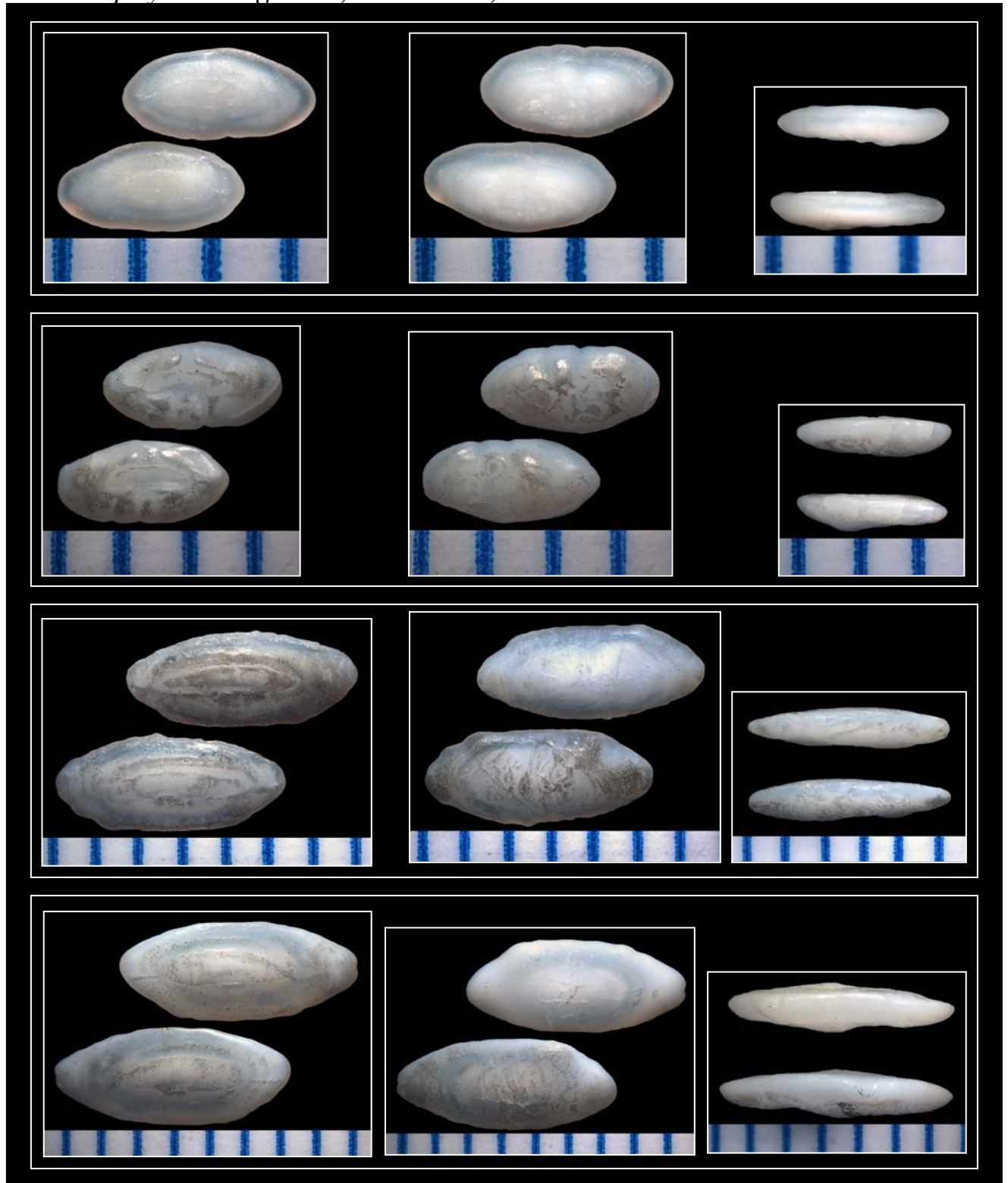
Ophidiidae

Ophidion scrippsae, basketweave cusk-eel, LACM 56722-1



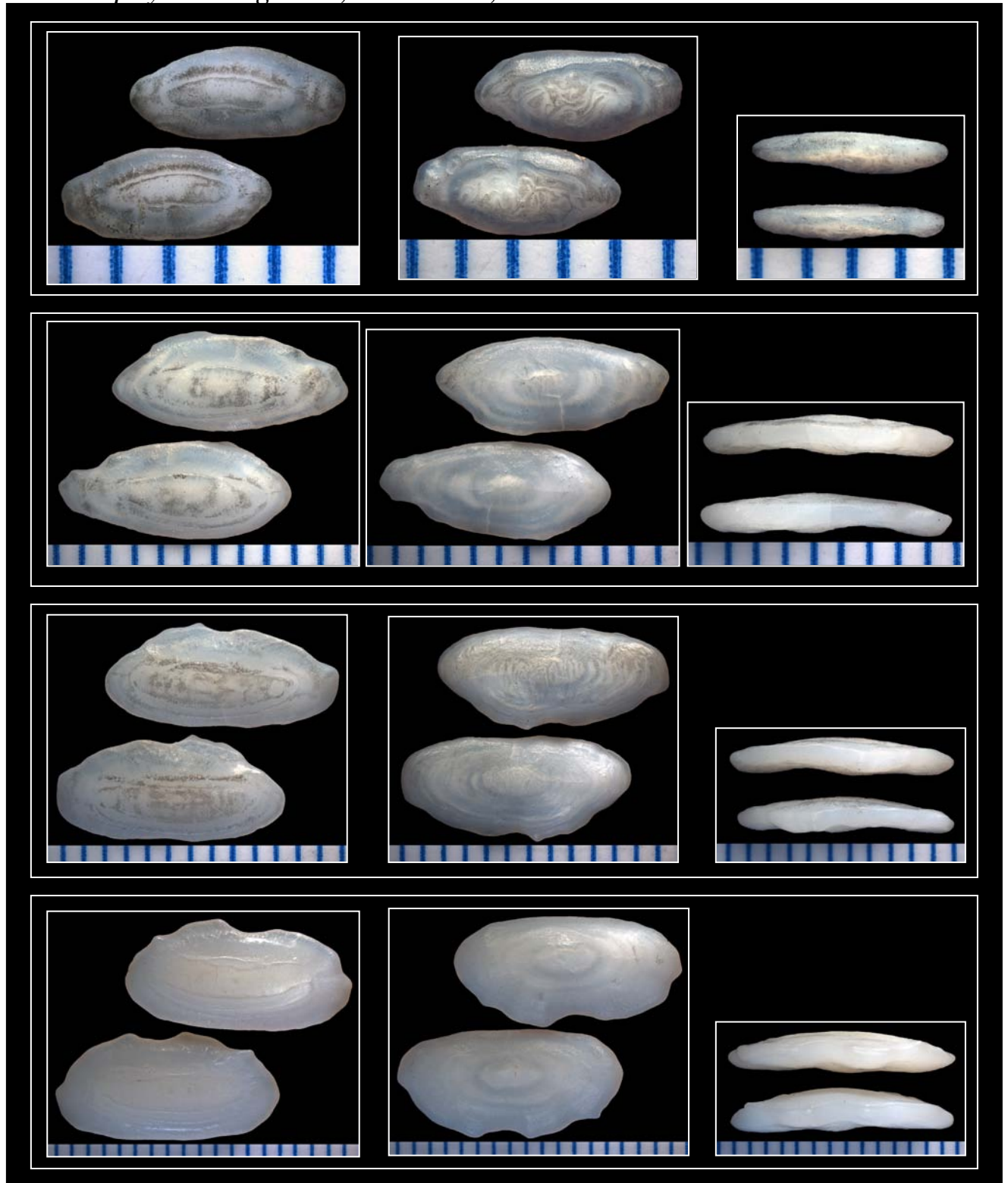
Bythitidae

Brosmophysis marginata, red britula, LACM 57263-1



Bythitidae

Brosmophysis marginata, red britula, LACM 57263-1



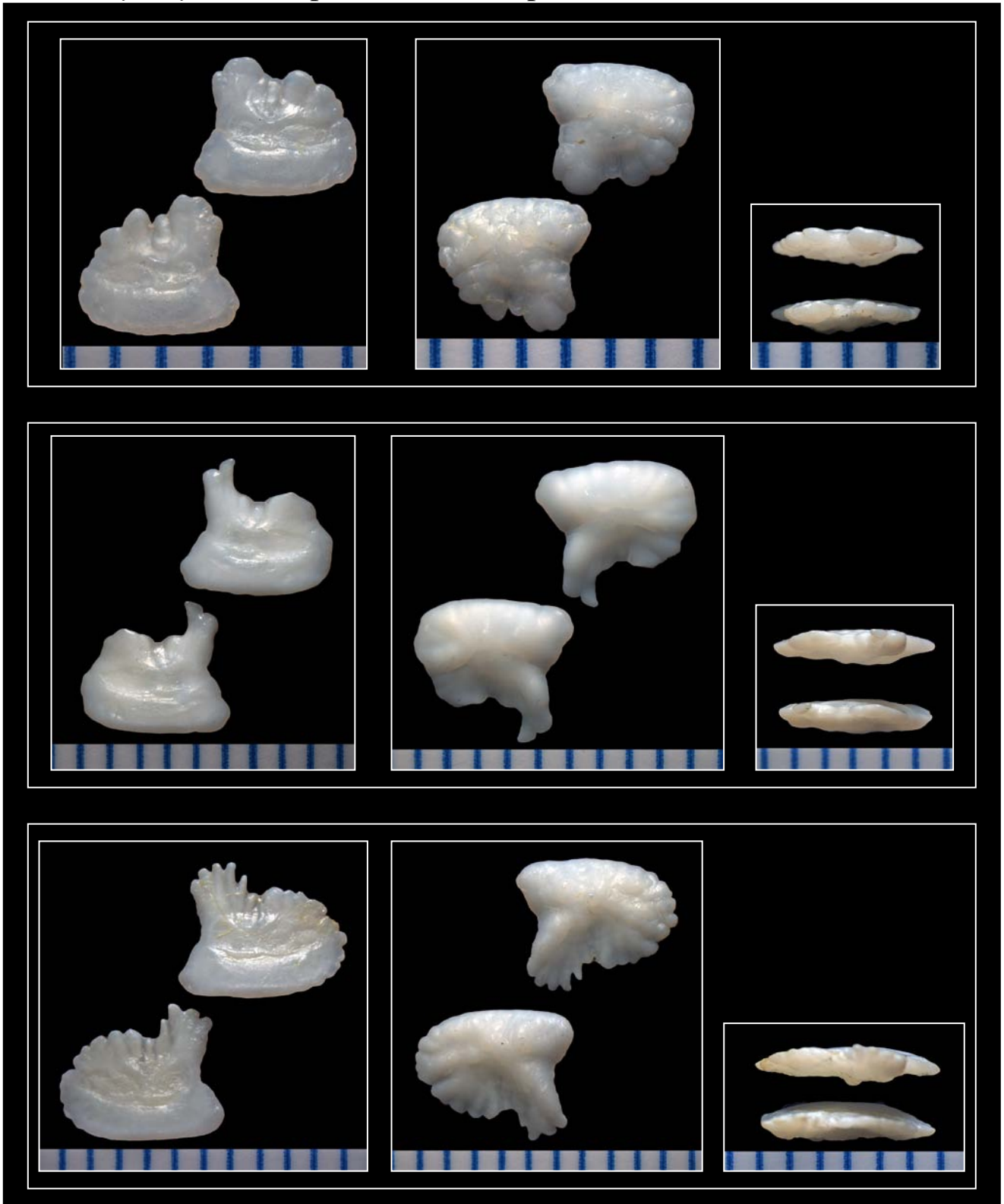
Bythitidae

Brosmophysis marginata, red britula, LACM 57263-1



Batrachoididae

Porichthys myriaster, specklefin midshipman, LACM 56925-1



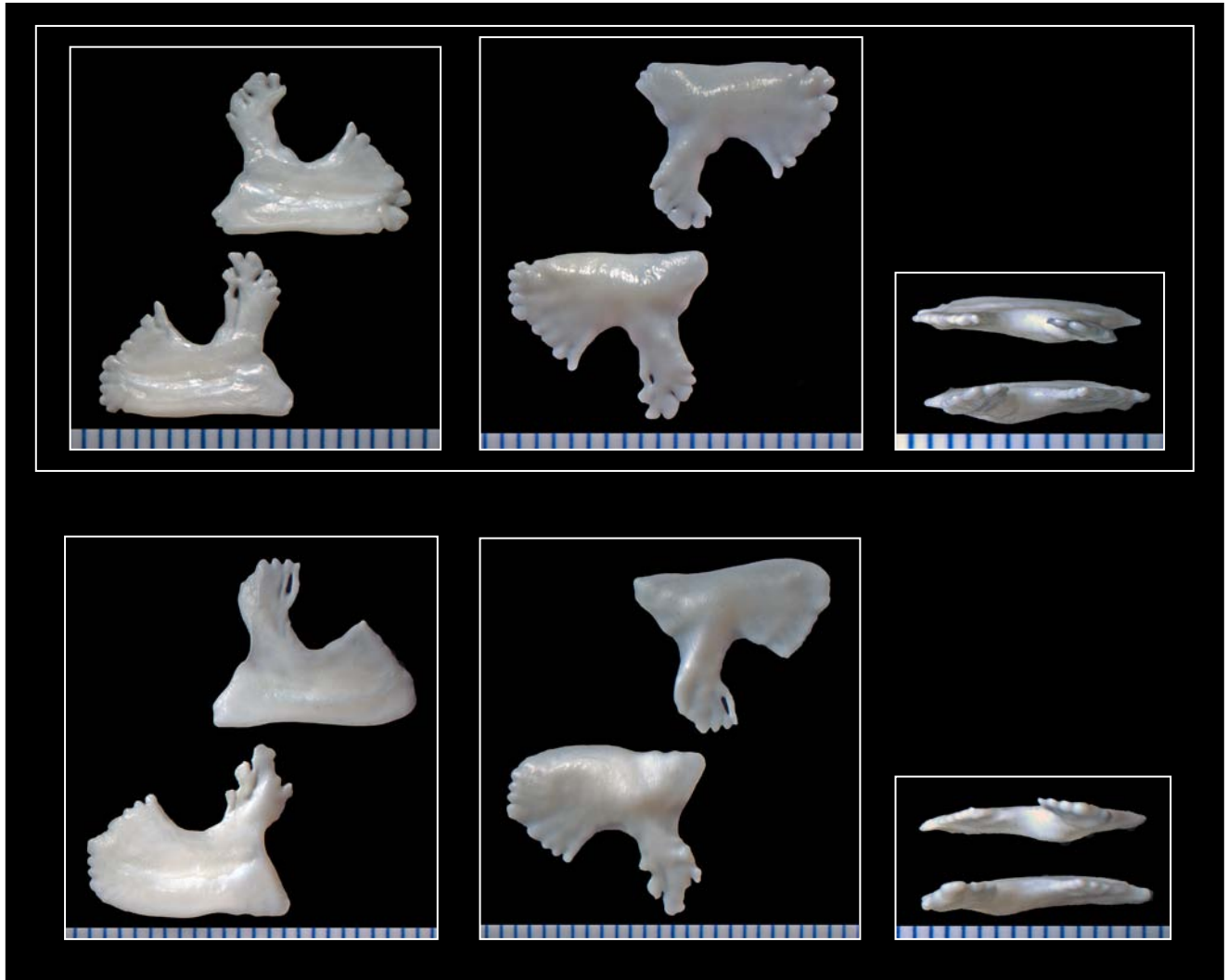
Batrachoididae

Porichthys myriaster, specklefin midshipman, LACM 56925-1



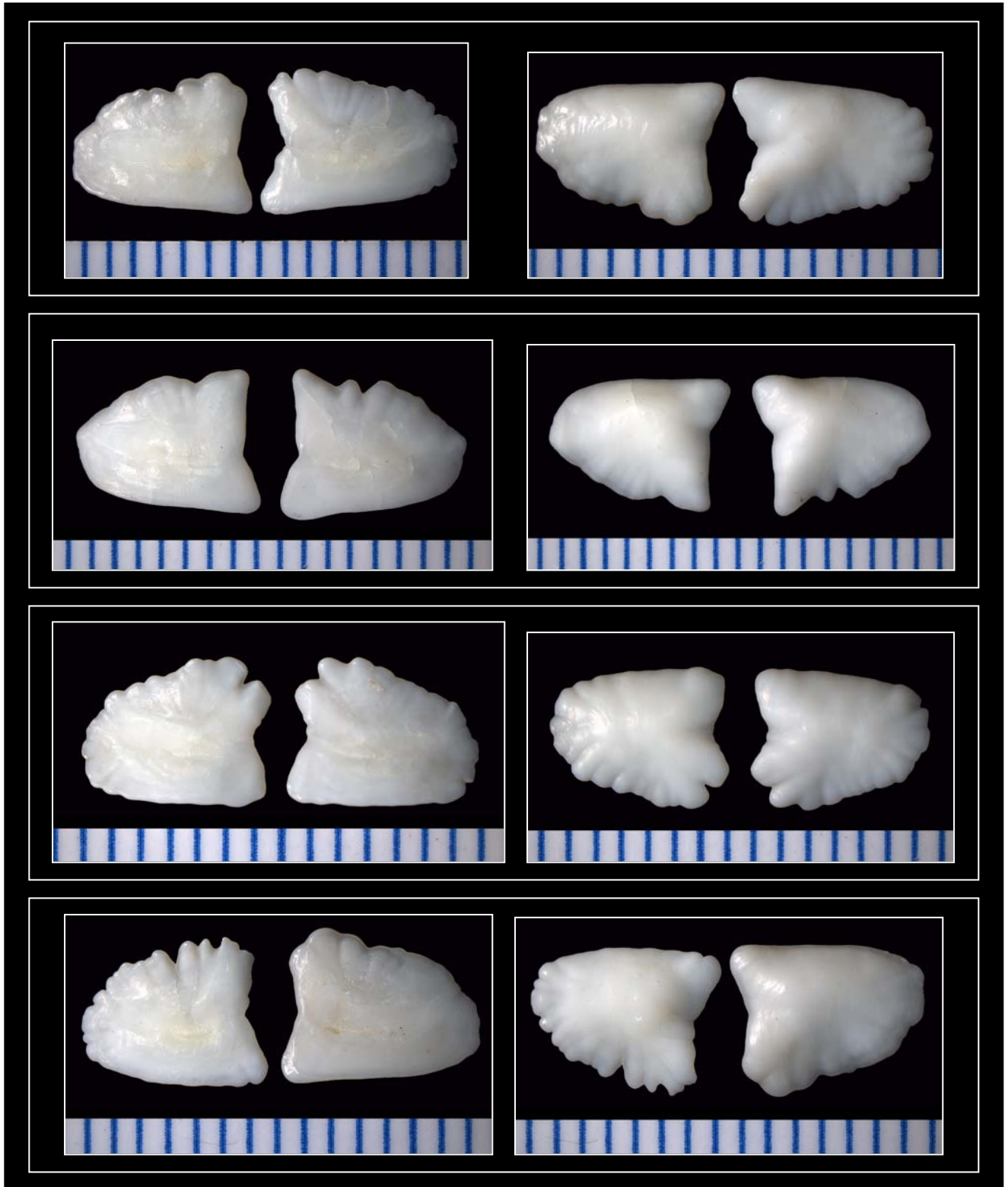
Batrachoididae

Porichthys myriaster, specklefin midshipman, LACM 56925-1



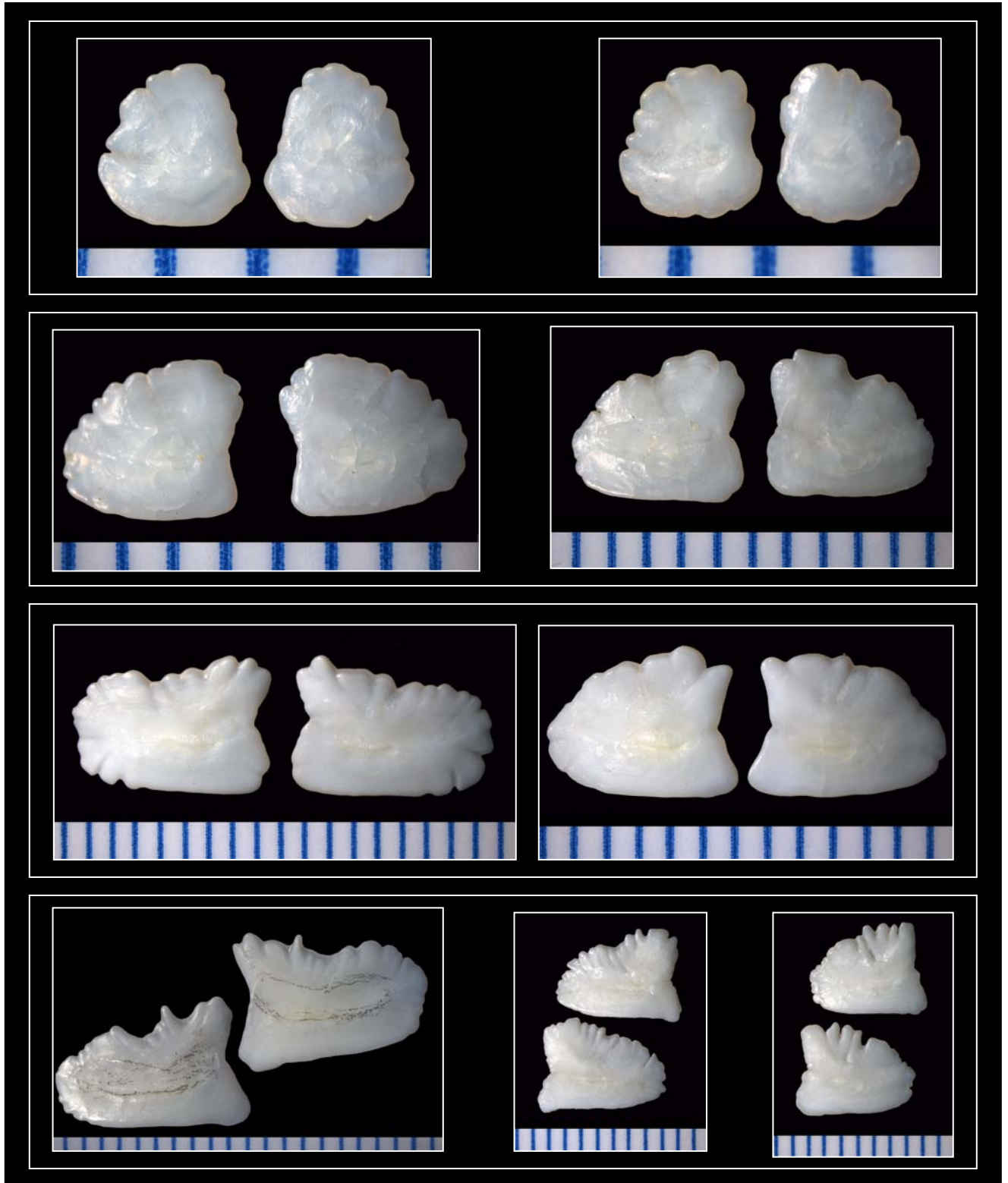
Batrachoididae

Porichthys notatus, plainfin midshipman, LACM 56644-1



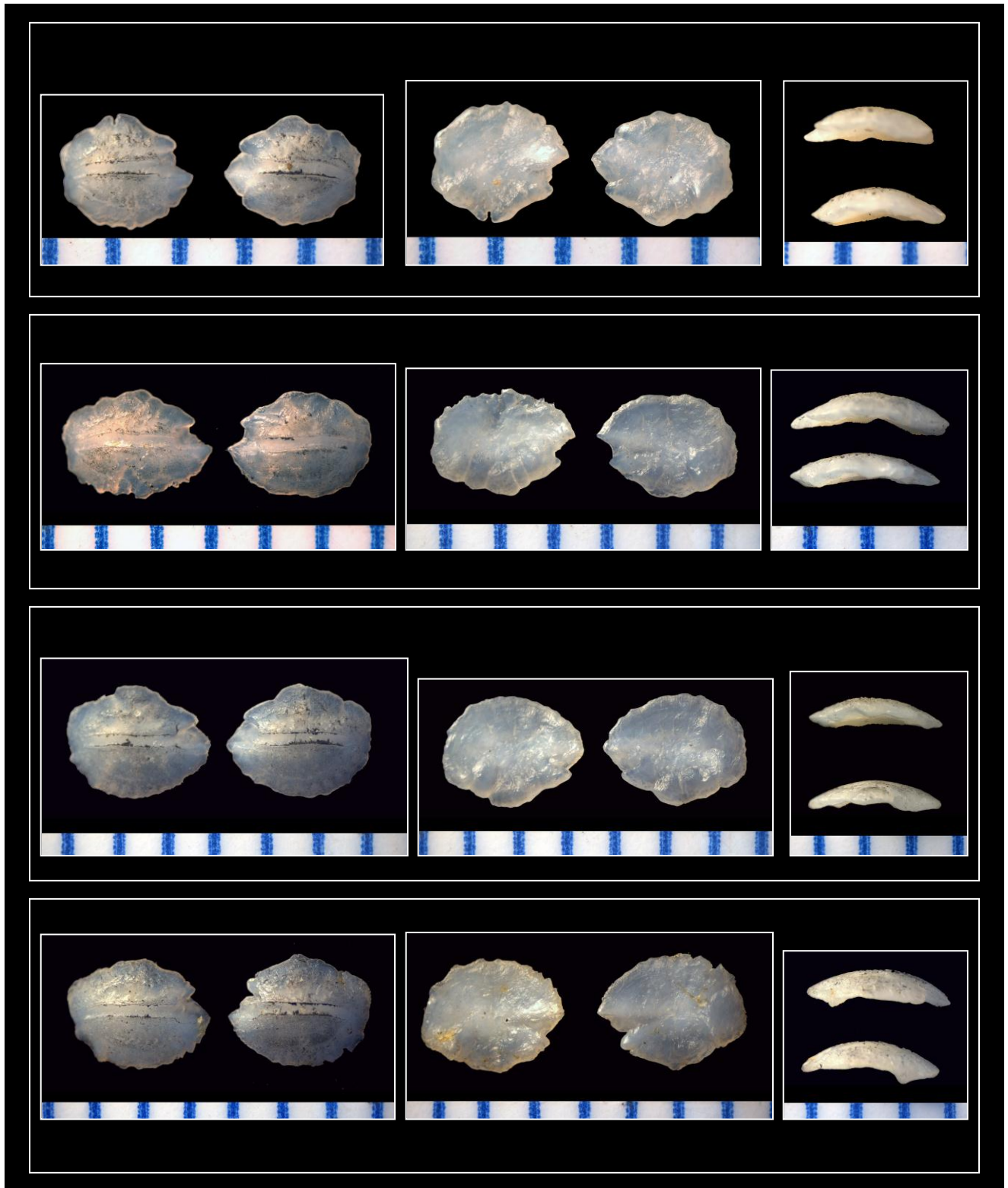
Batrachoididae

Porichthys notatus, plainfin midshipman, LACM 56644-1



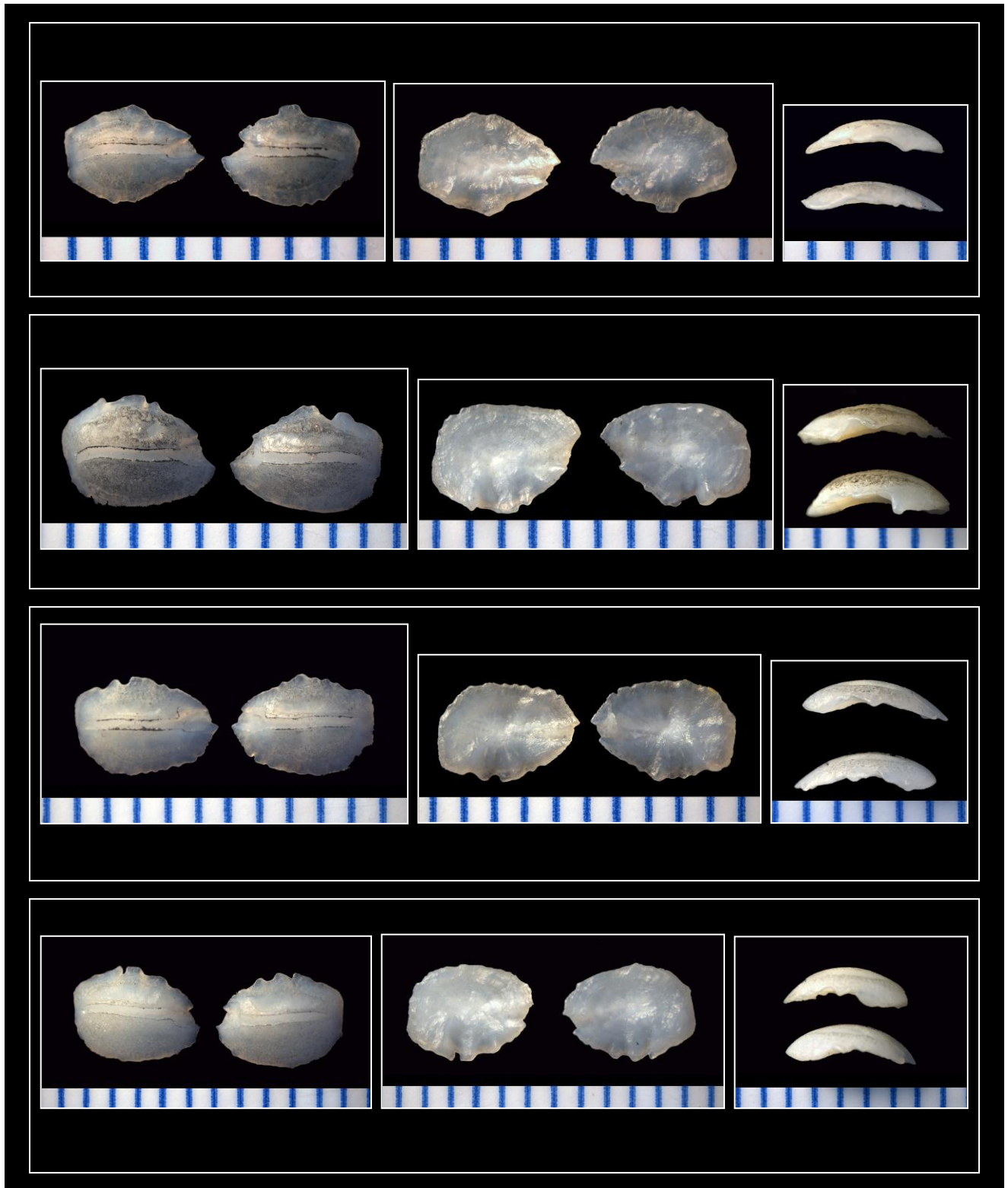
Atherinopsidae

Atherinops affinis, topsmelt, LACM 56666-1



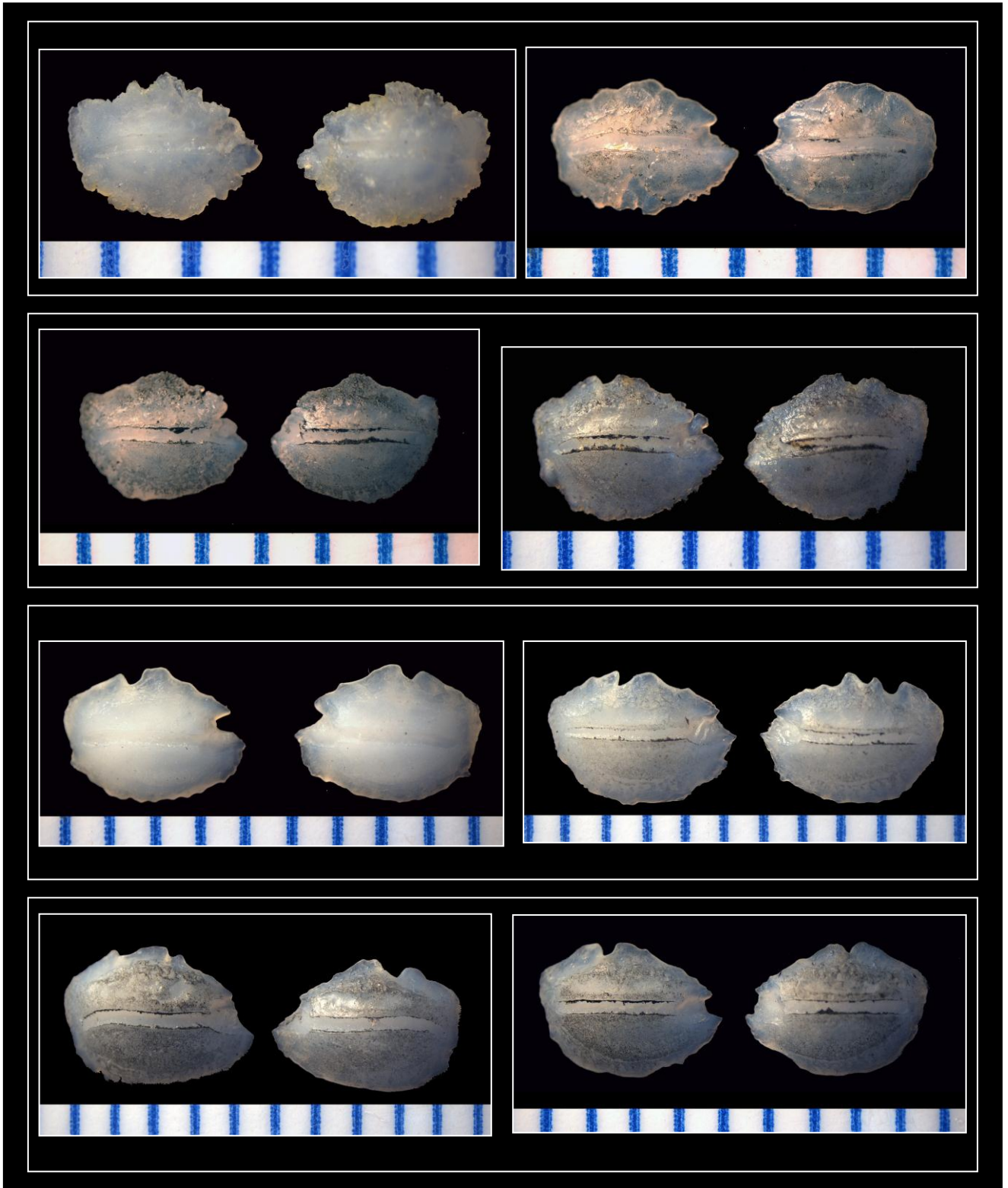
Atherinopsidae

Atherinops affinis, topsmelt, LACM 56666-1



Atherinopsidae

Atherinops affinis, topsmelt, LACM 56666-1



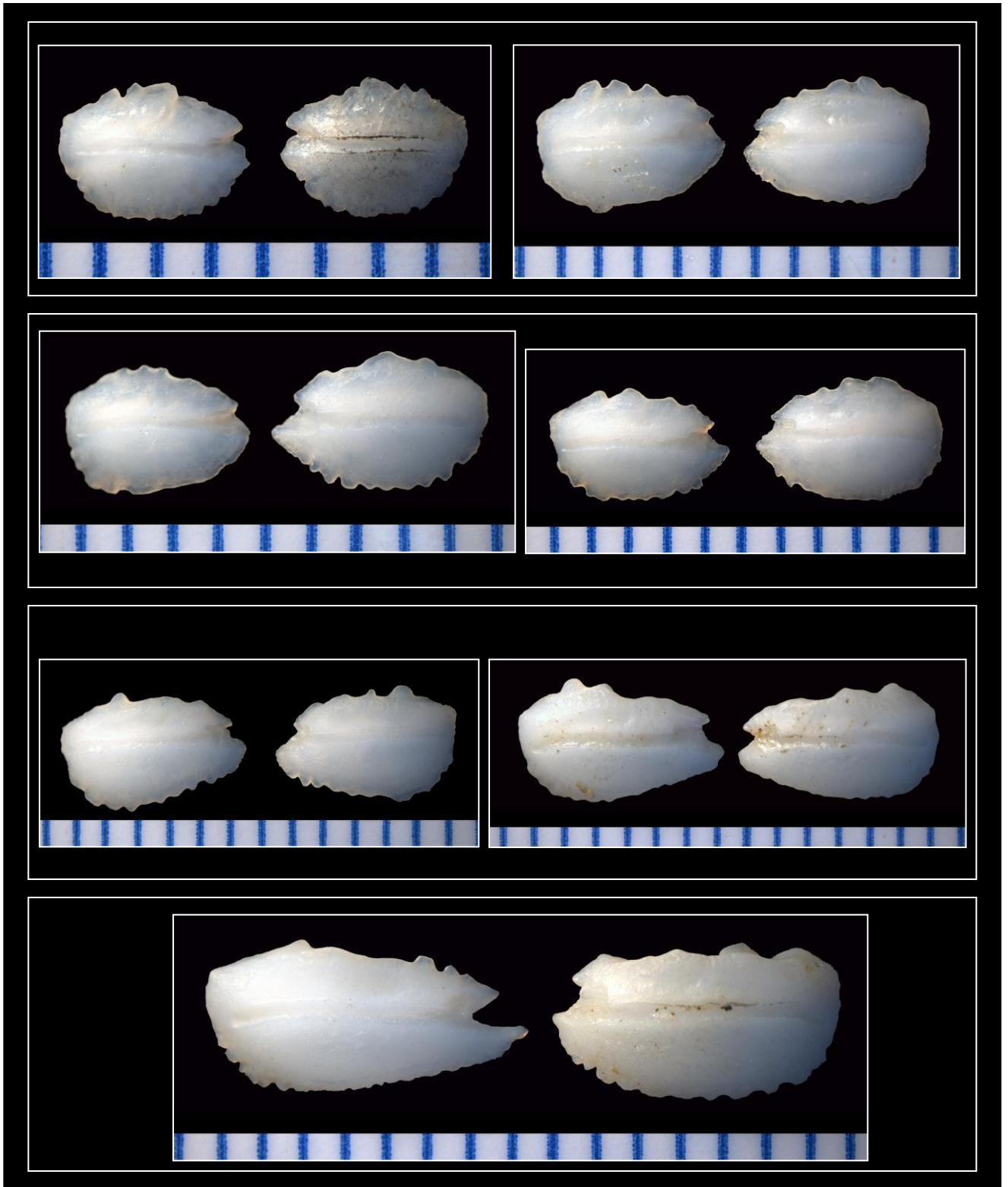
Atherinopsidae

Atherinopsis californiensis, jacksmelt, LACM 56667-1



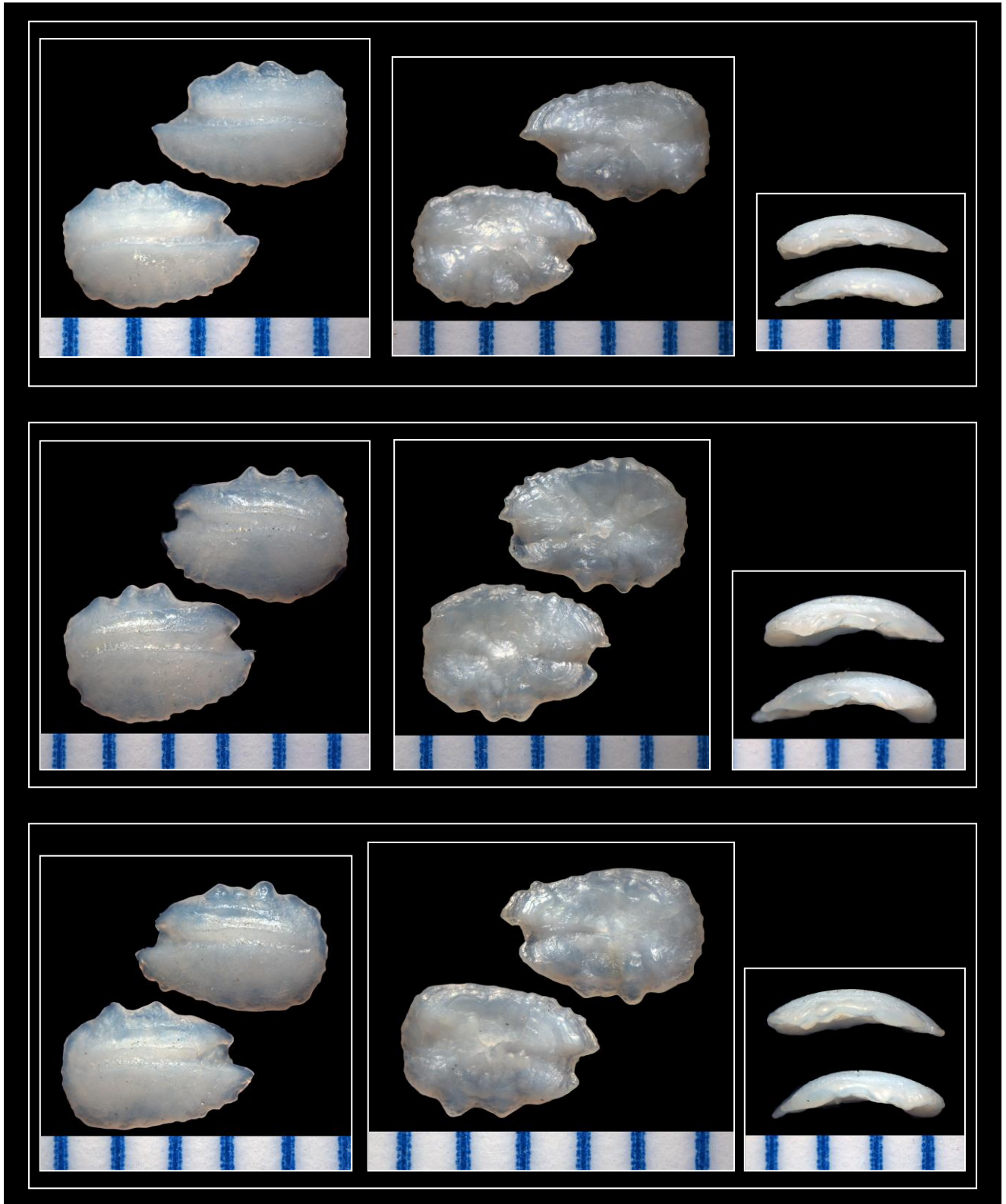
Atherinopsidae

Atherinopsis californiensis, jacksmelt, LACM 56667-1



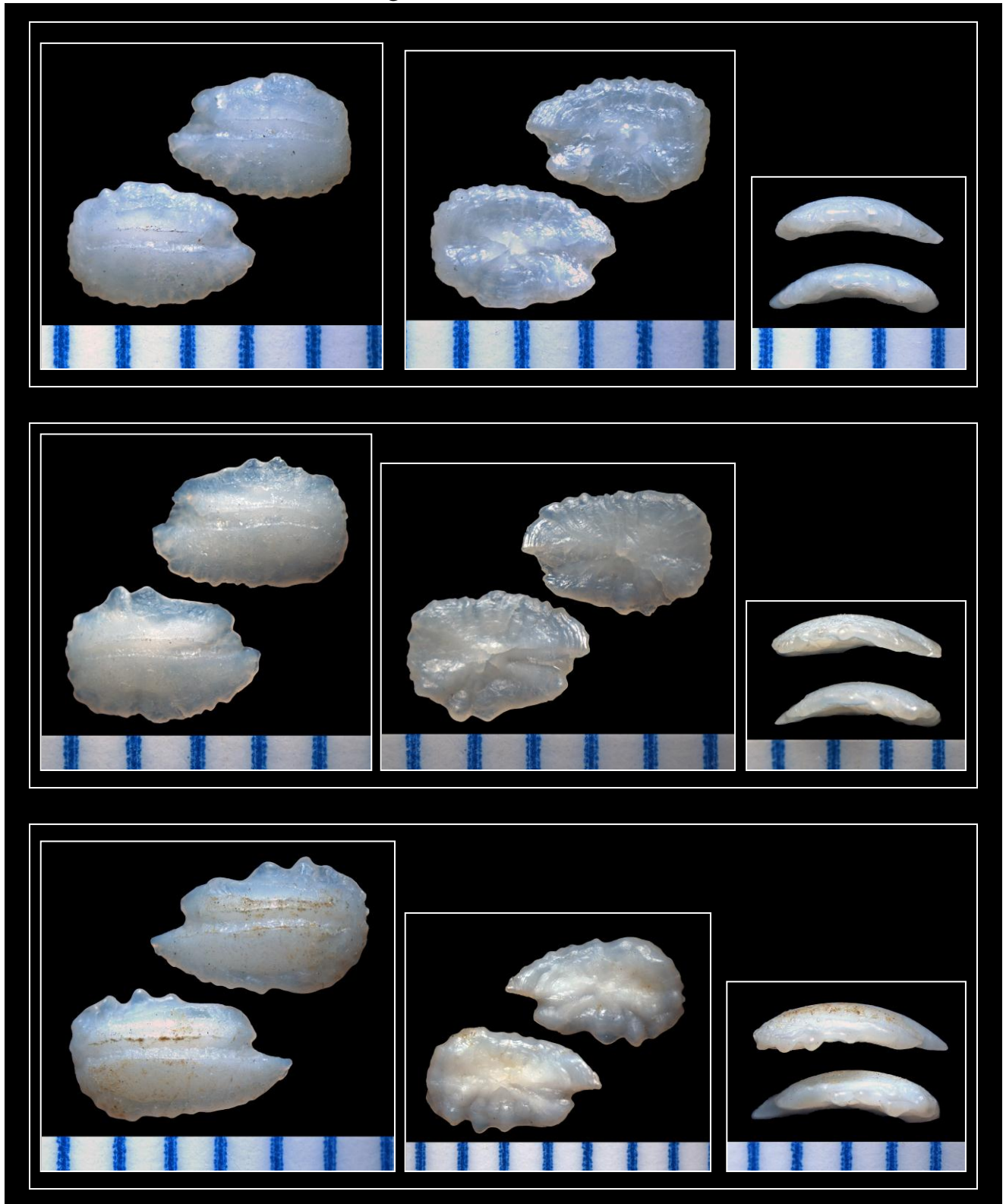
Atherinopsidae

Leuresthes tenuis, California grunion, LACM 56928-1



Atherinopsidae

Leuresthes tenuis, California grunion, LACM 56928-1



Exocoetidae

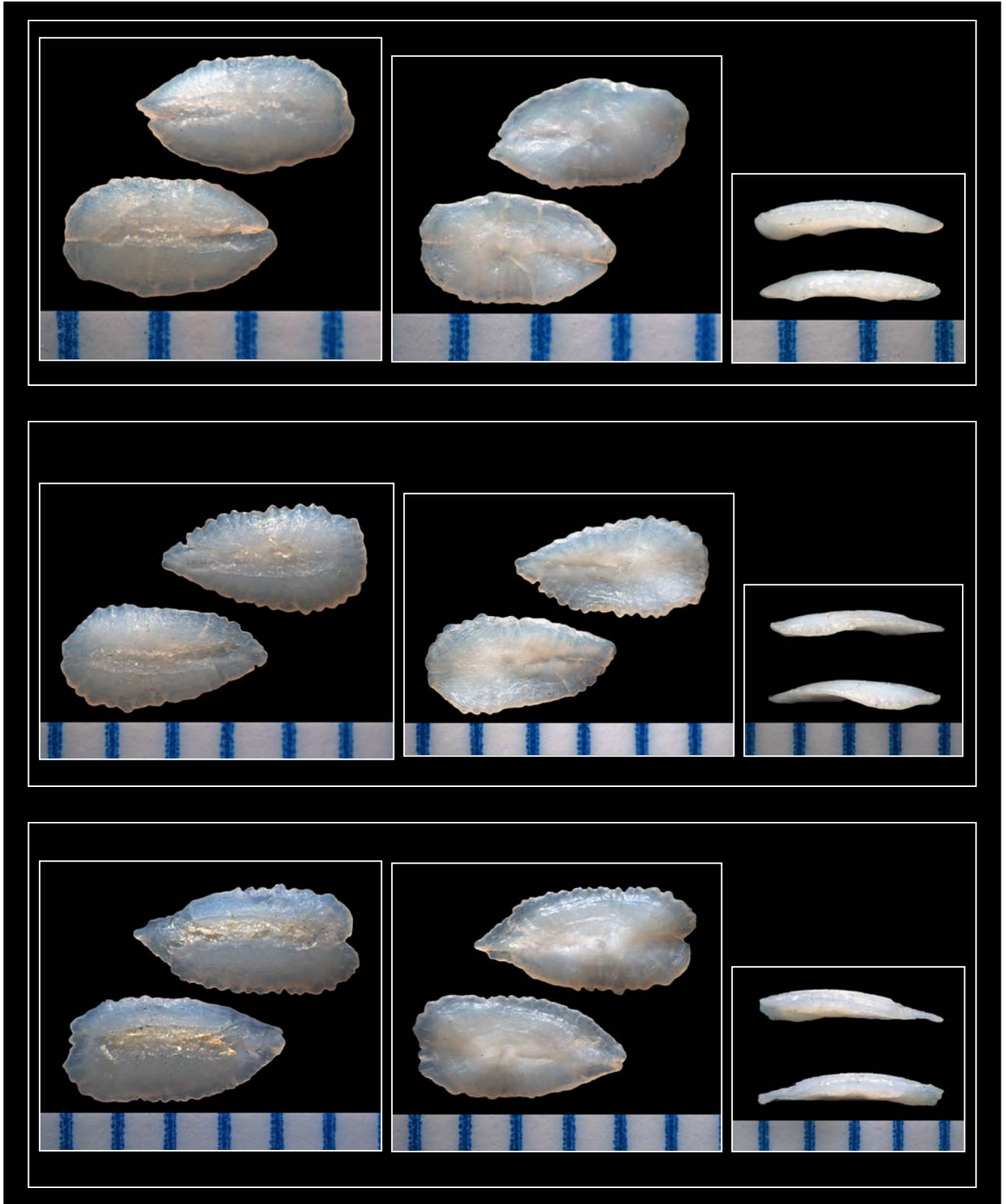
Cheilopogon pinnatibarbatus californicus, California flyingfish,

LACM 56683-1



Belonidae

Strongylura exilis, California needlefish, LACM 56931-1



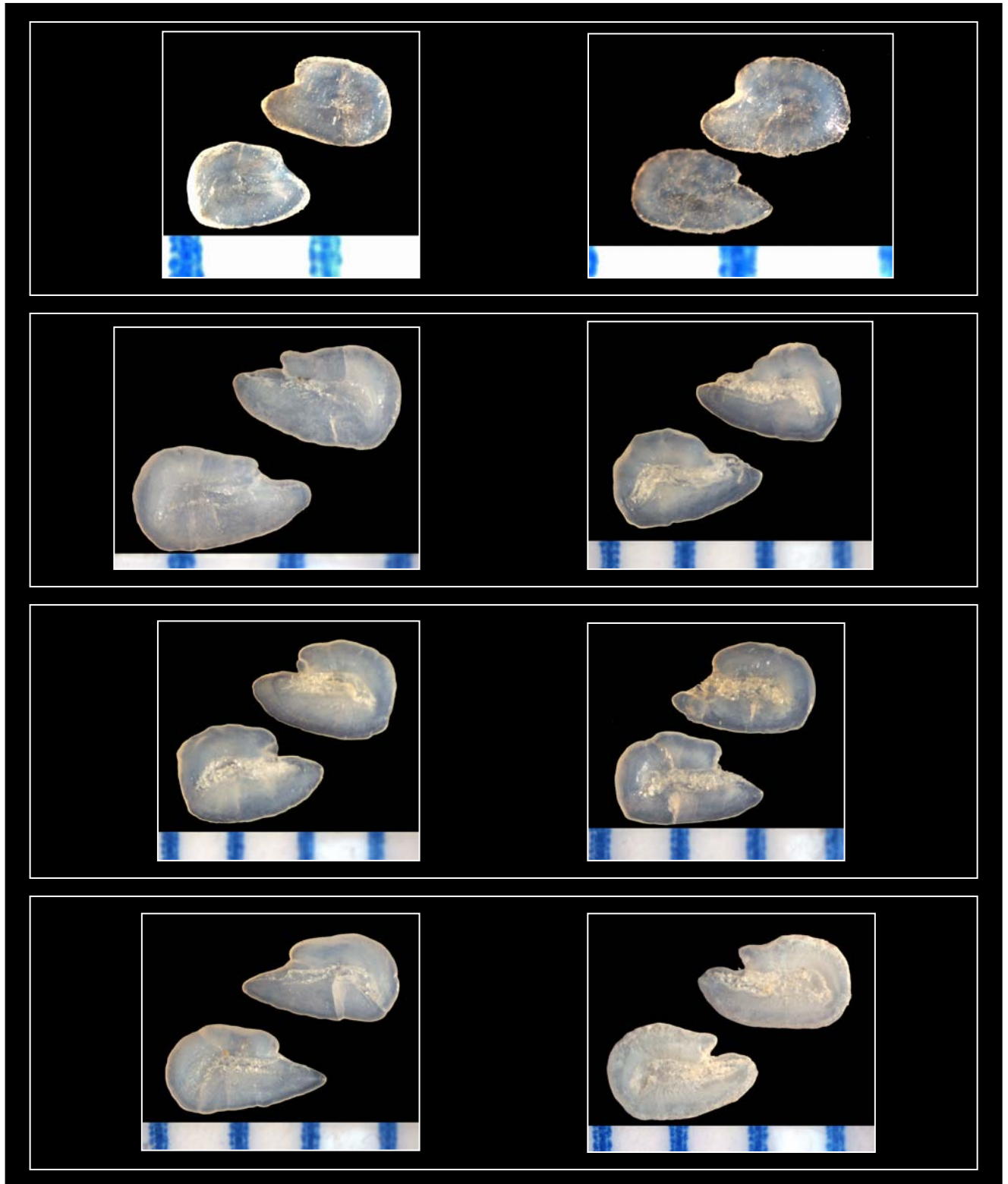
Belonidae

Strongylura exilis, California needlefish, LACM 56931-1



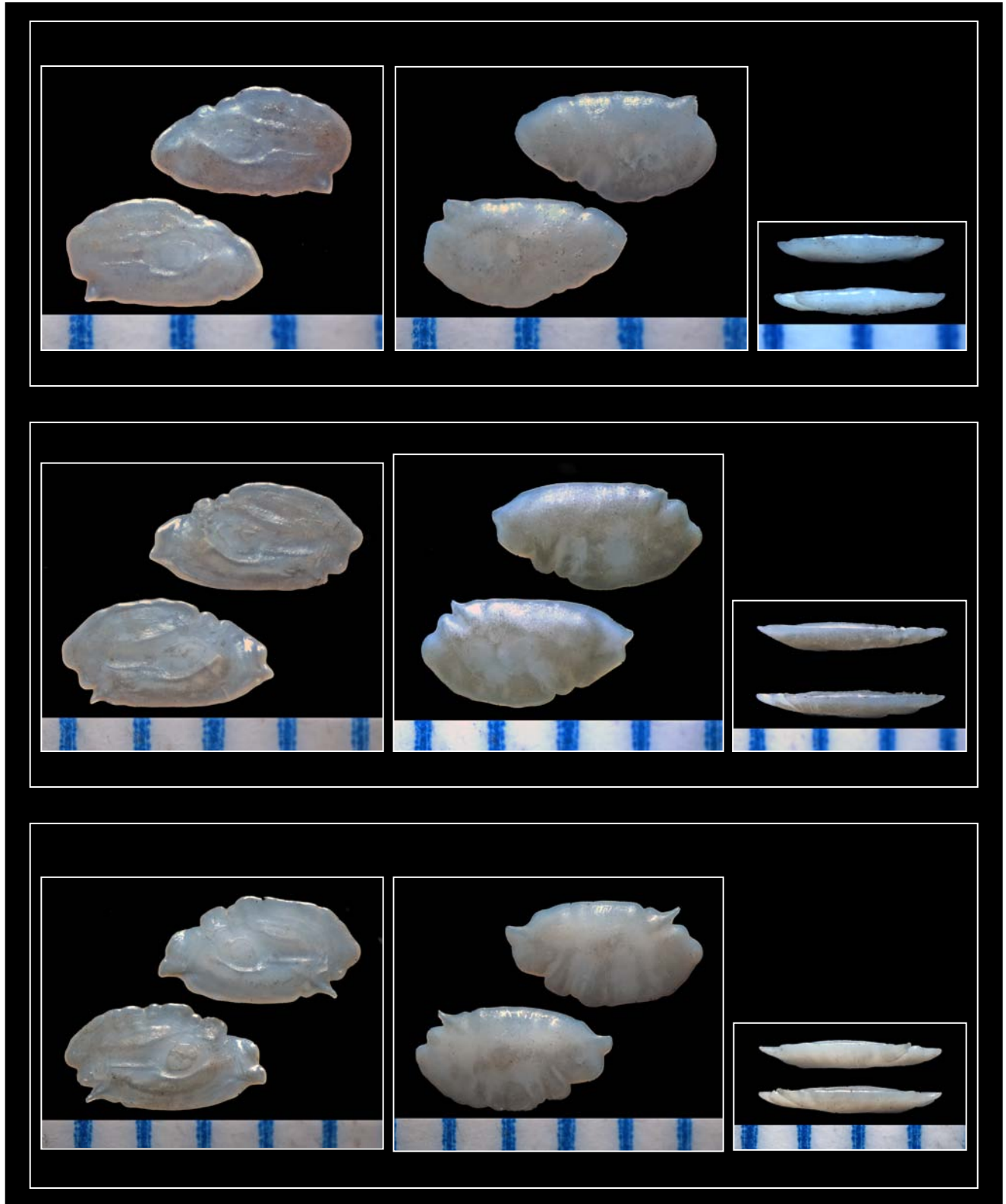
Scomberesocidae

Cololabis saira, Pacific saury, LACM 56605-1



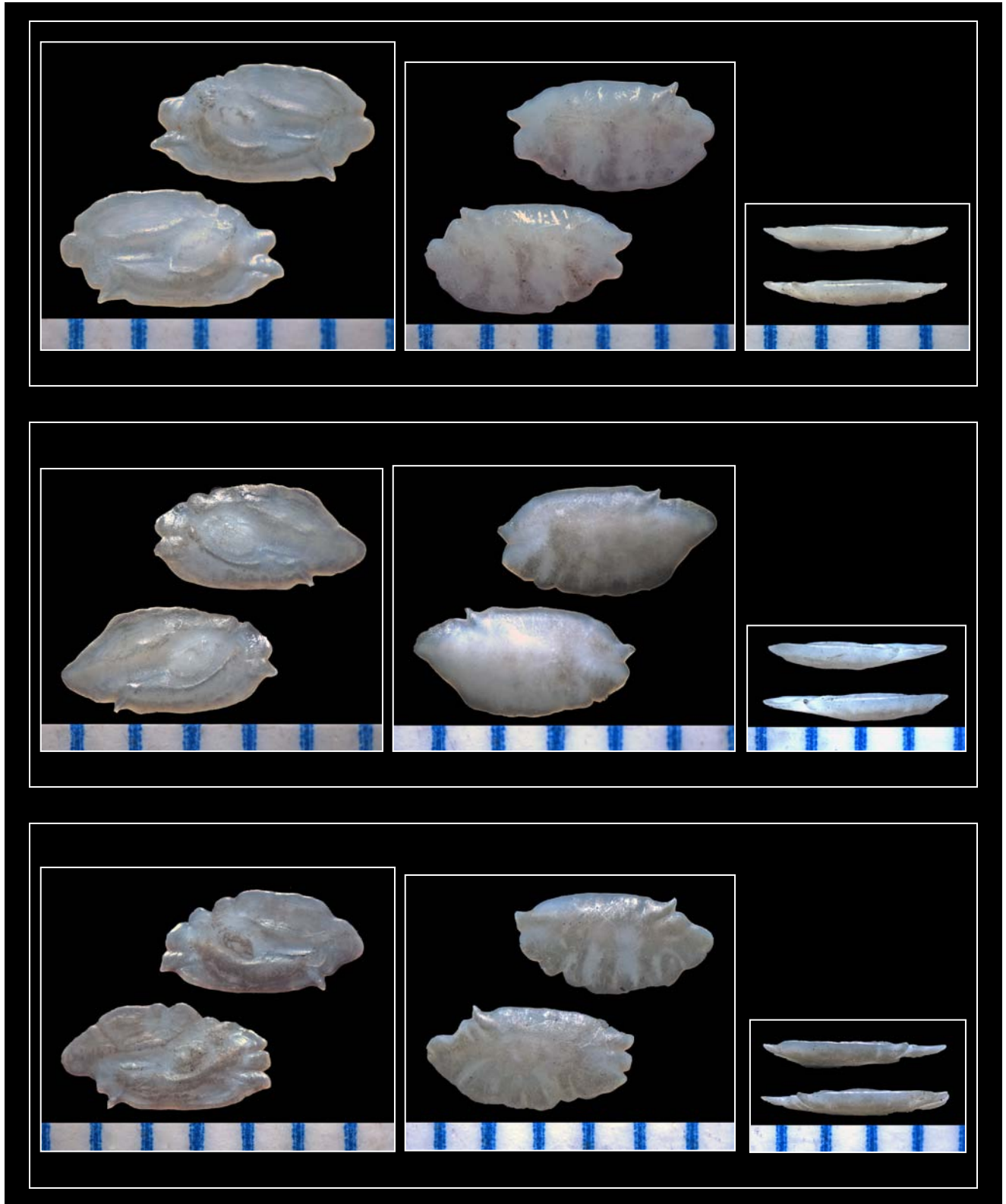
Melamphaidae

Melamphaes lugubris, highsnout bigscale, LACM 56723-1



Melamphaidae

Melamphaes lugubris, highsnout bigscale, LACM 56723-1



Scorpaenidae

Sebastes aurora, aurora rockfish, LACM 56714-1



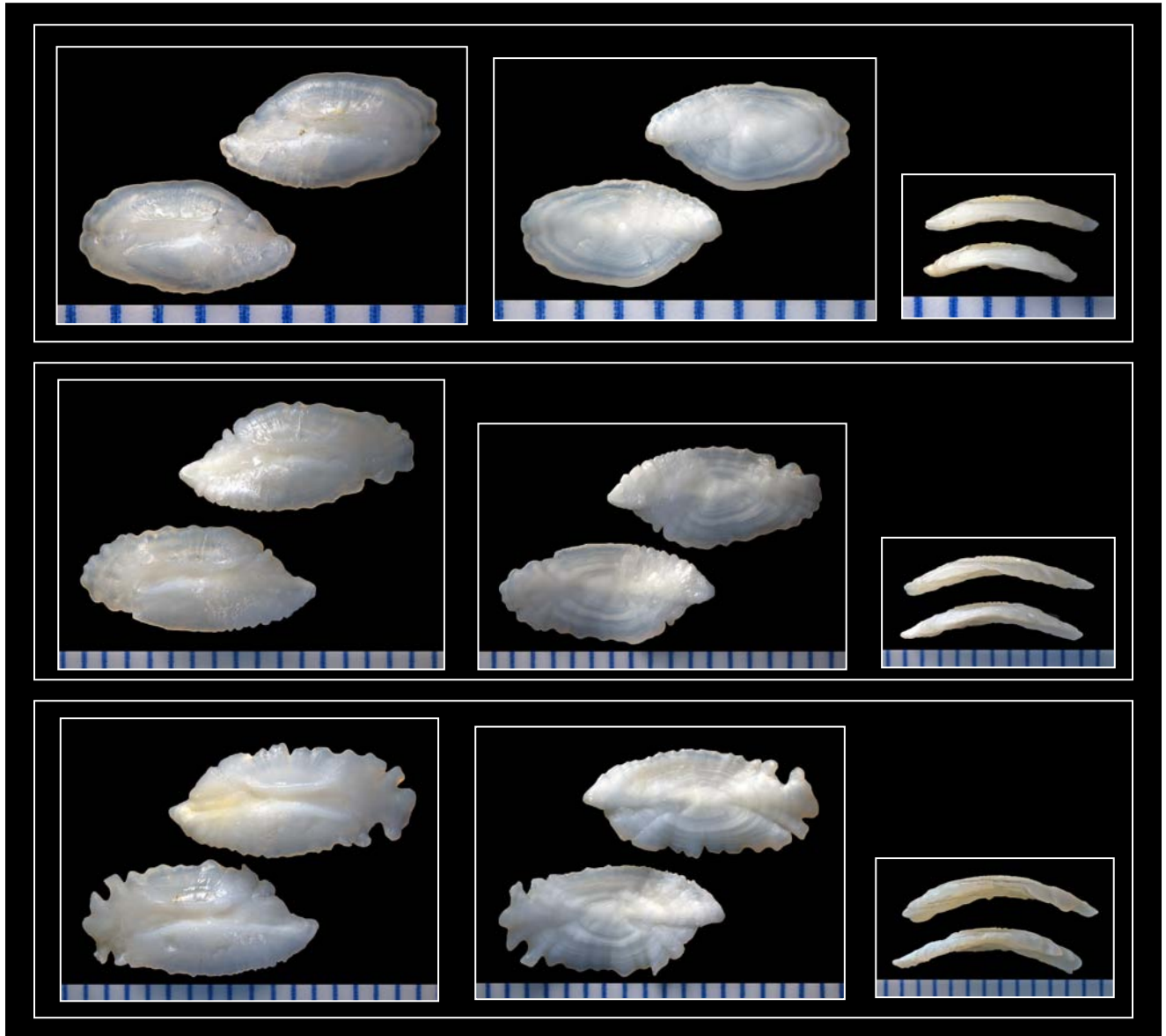
Scorpaenidae

Sebastes aurora, aurora rockfish, LACM 56714-1



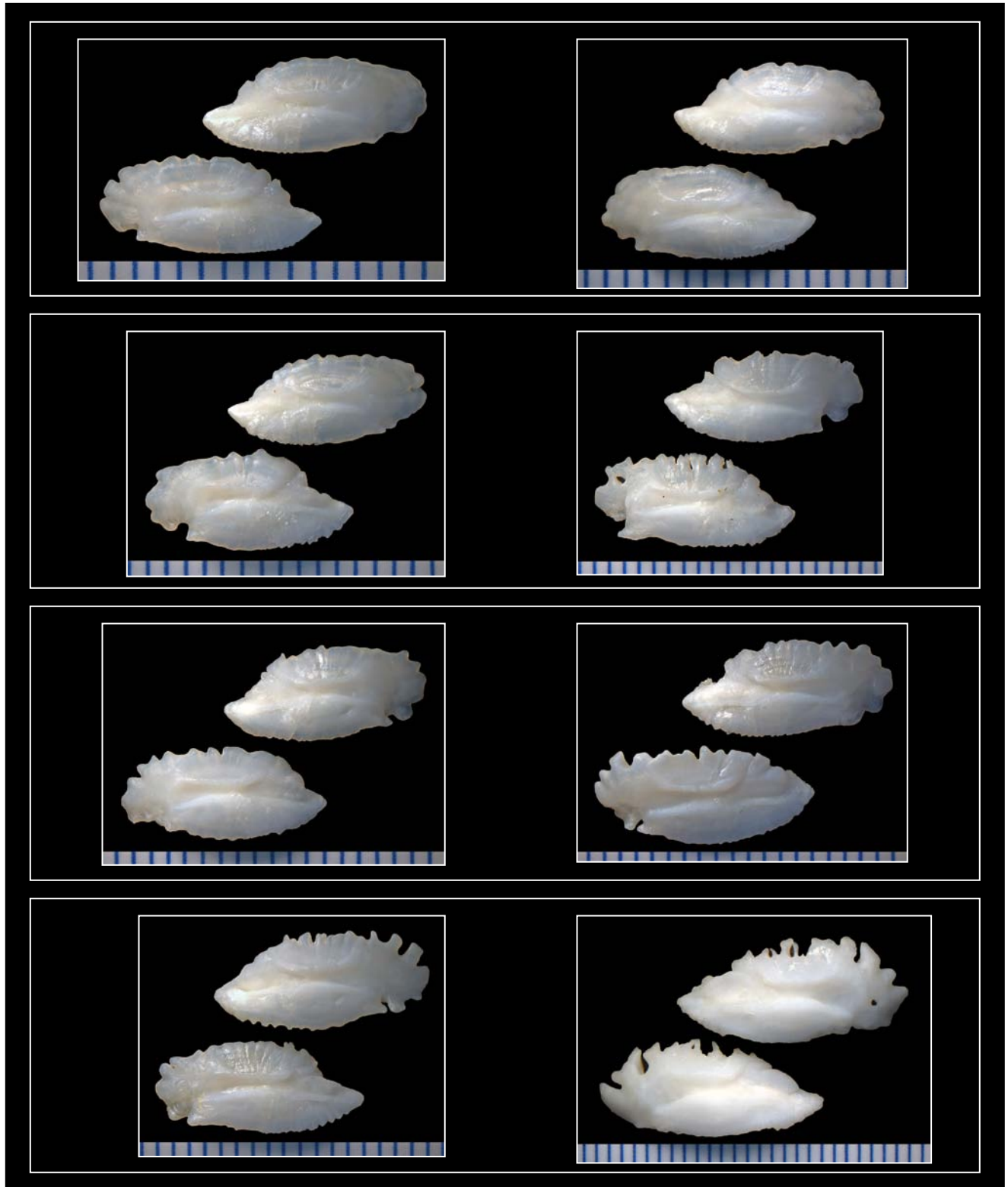
Scorpaenidae

Sebastes caurinus, copper rockfish, LACM 56693-1



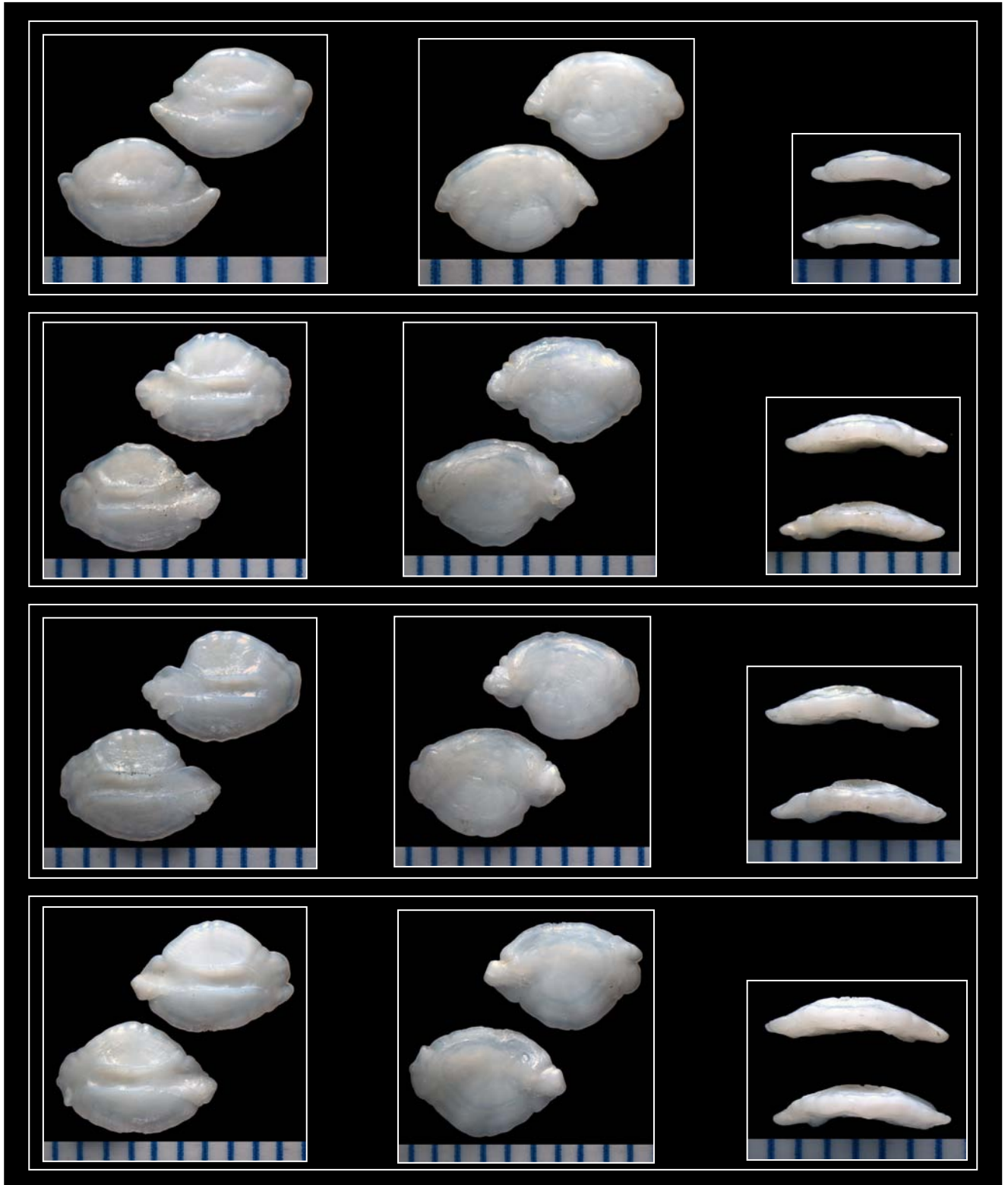
Scorpaenidae

Sebastes caurinus, copper rockfish, LACM 56693-1



Scorpaenidae

Sebastes diploproa, splitnose rockfish, LACM 56655-1



Scorpaenidae

Sebastes diploproa, splitnose rockfish, LACM 56655-1



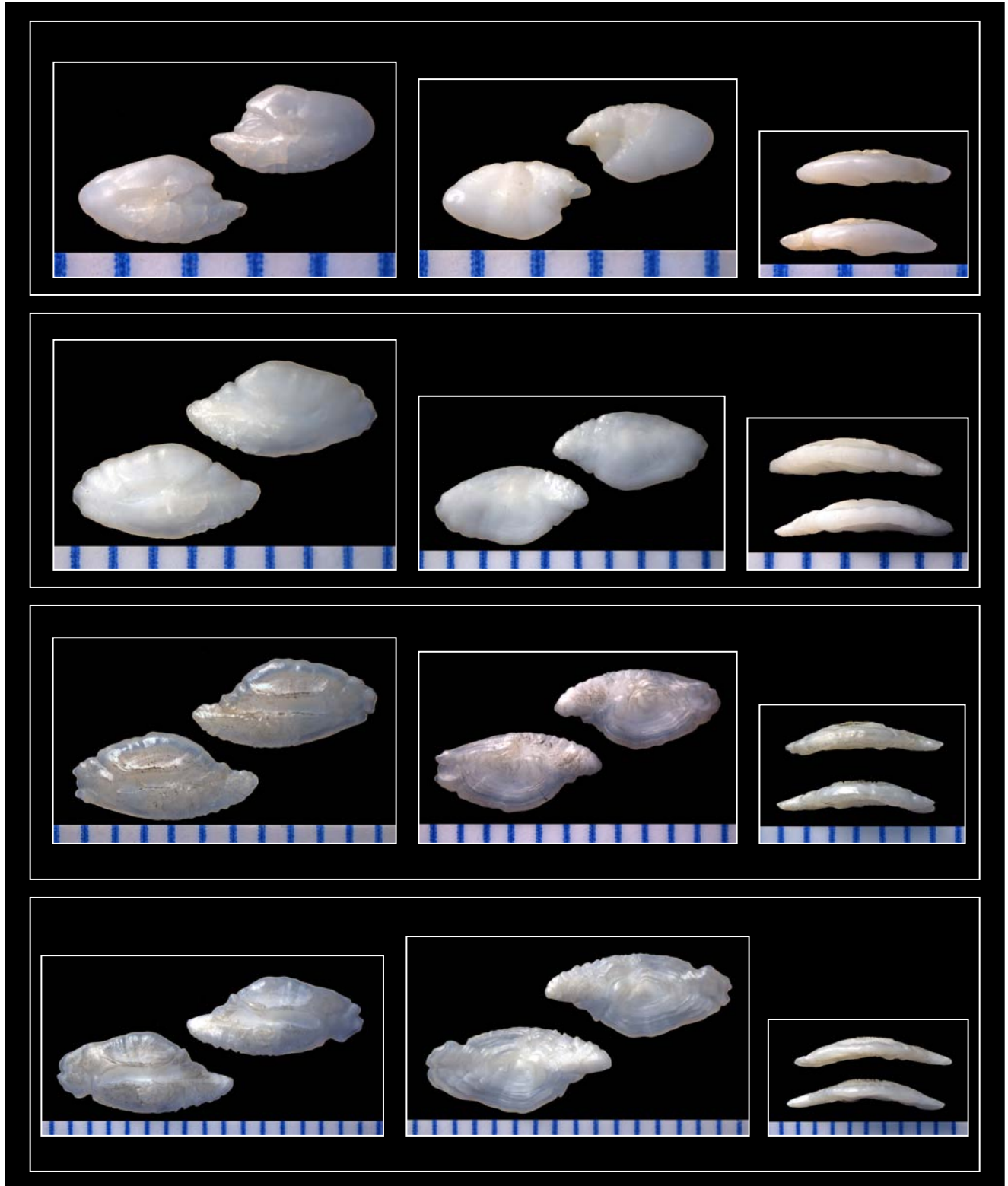
Scorpaenidae

Sebastes diploproa, splitnose rockfish, LACM 56655-1



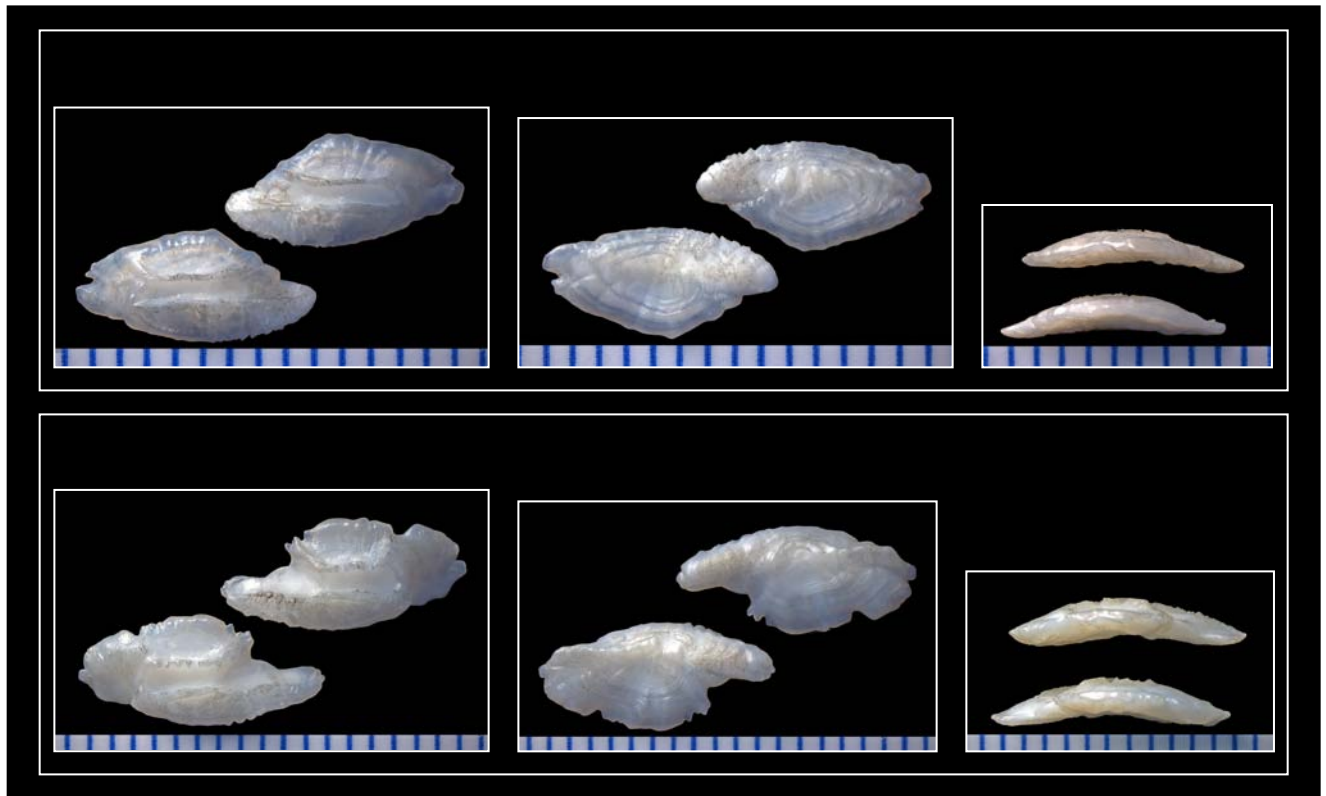
Scorpaenidae

Sebastes elongatus, greenstriped rockfish, LACM 56680-1



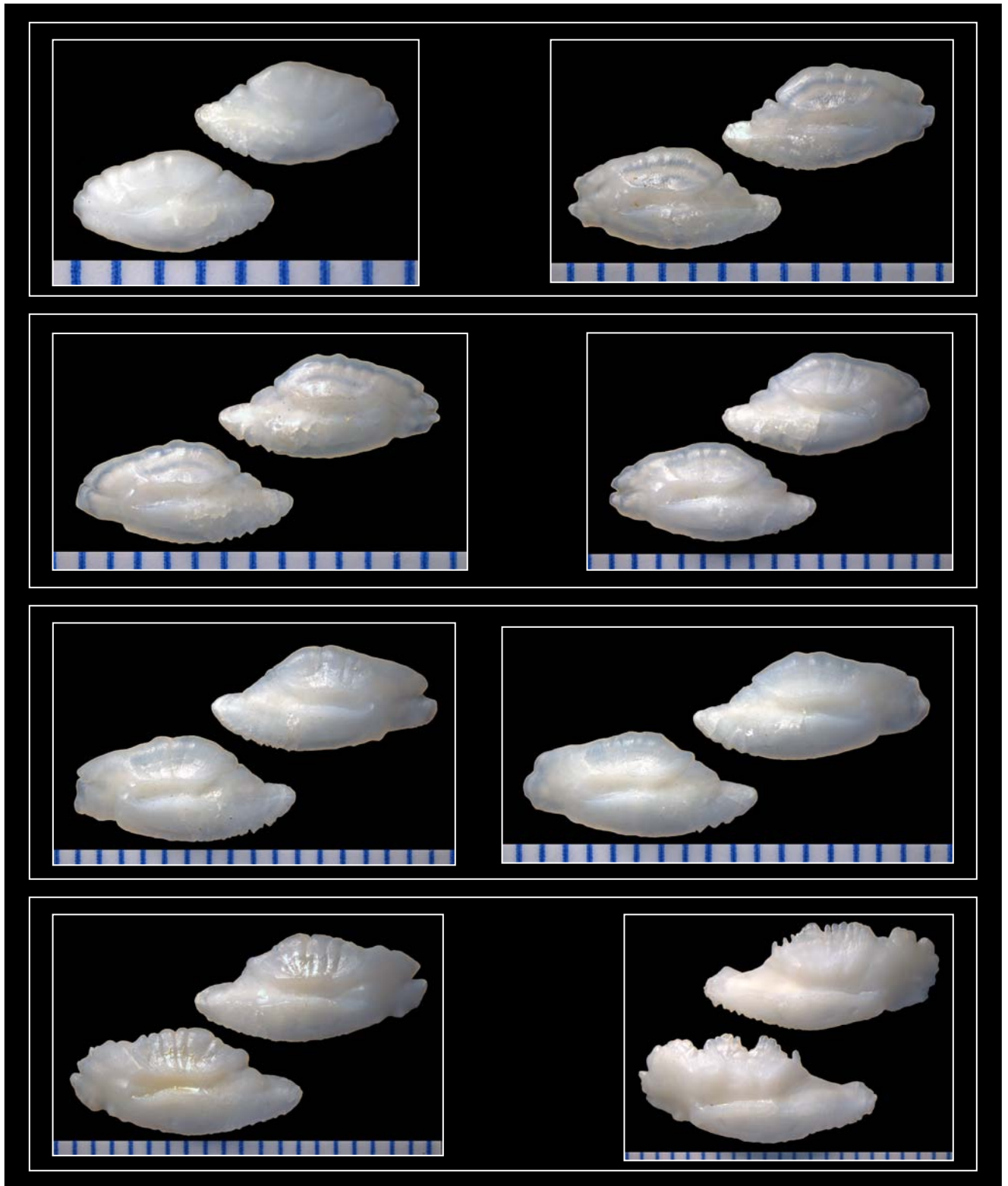
Scorpaenidae

Sebastes elongatus, greenstriped rockfish, LACM 56680-1



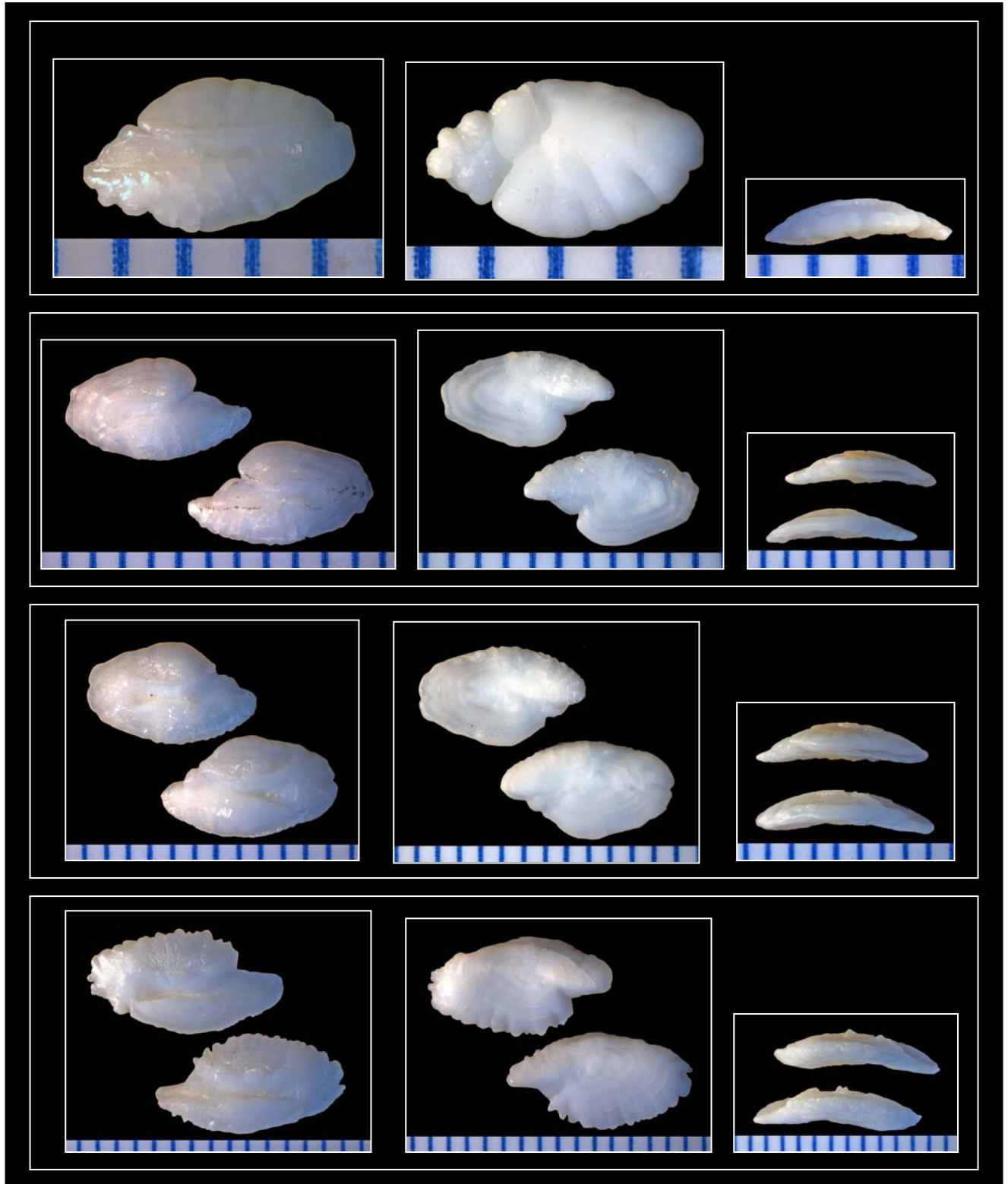
Scorpaenidae

Sebastes elongatus, greenstriped rockfish, LACM 56680-1



Scorpaenidae

Sebastes ensifer, swordspine rockfish, LACM 56657-1



Scorpaenidae

Sebastes ensifer, swordspine rockfish, LACM 56657-1



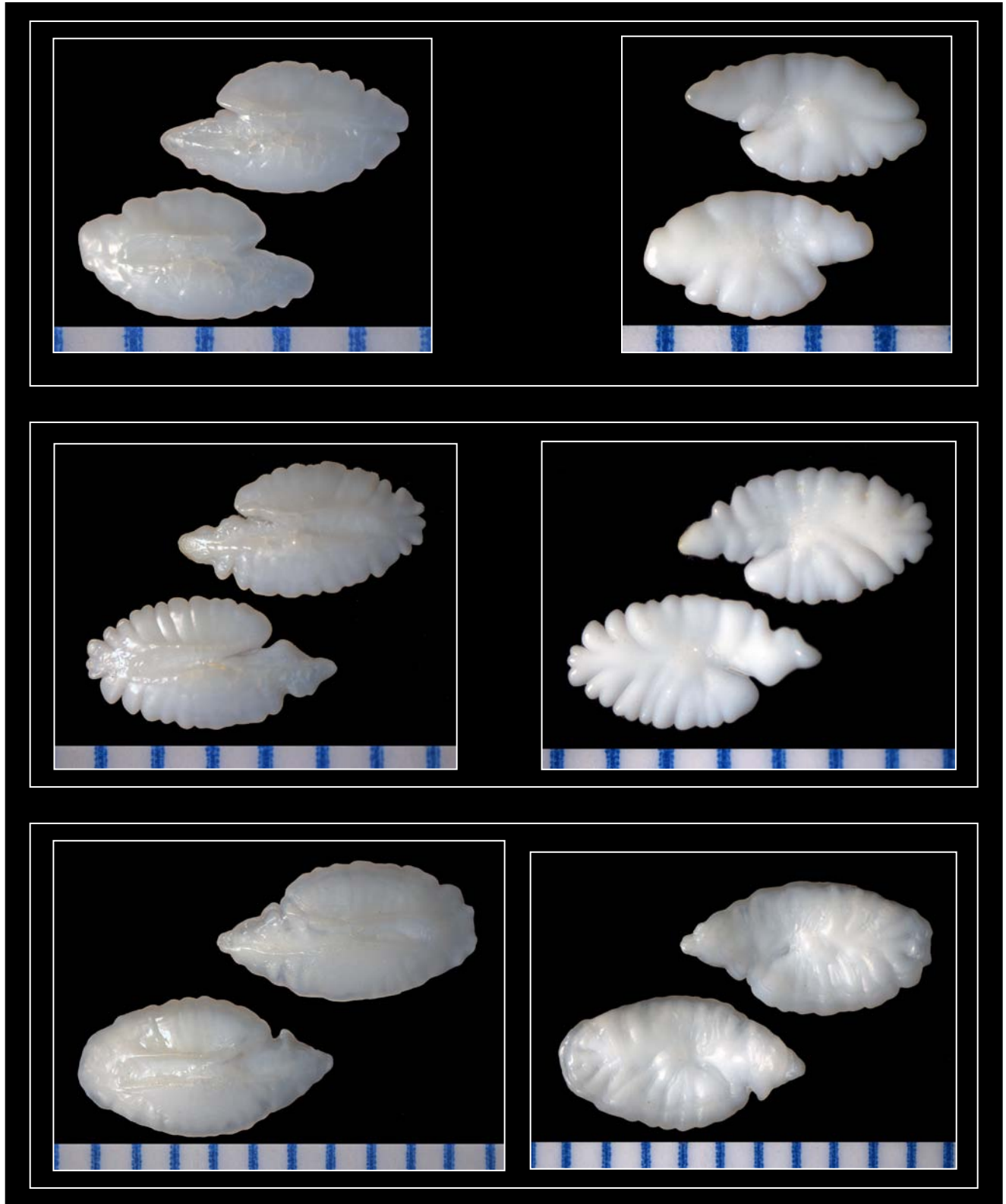
Scorpaenidae

Sebastes entomelas, widow rockfish, LACM 56704-1



Scorpaenidae

Sebastes goodei, chilipeper, LACM 56651-1



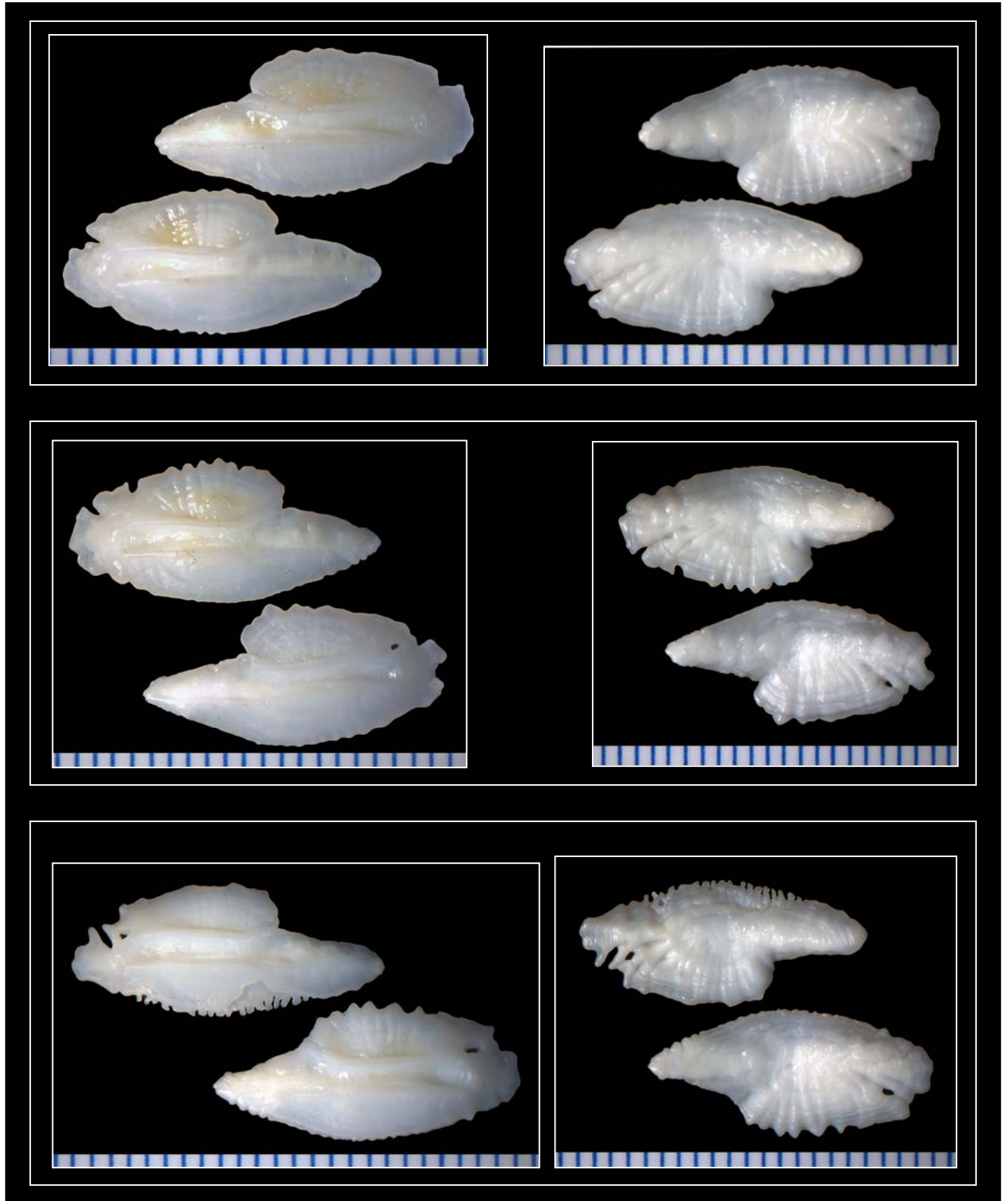
Scorpaenidae

Sebastes goodei, chilipeper, LACM 56651-1



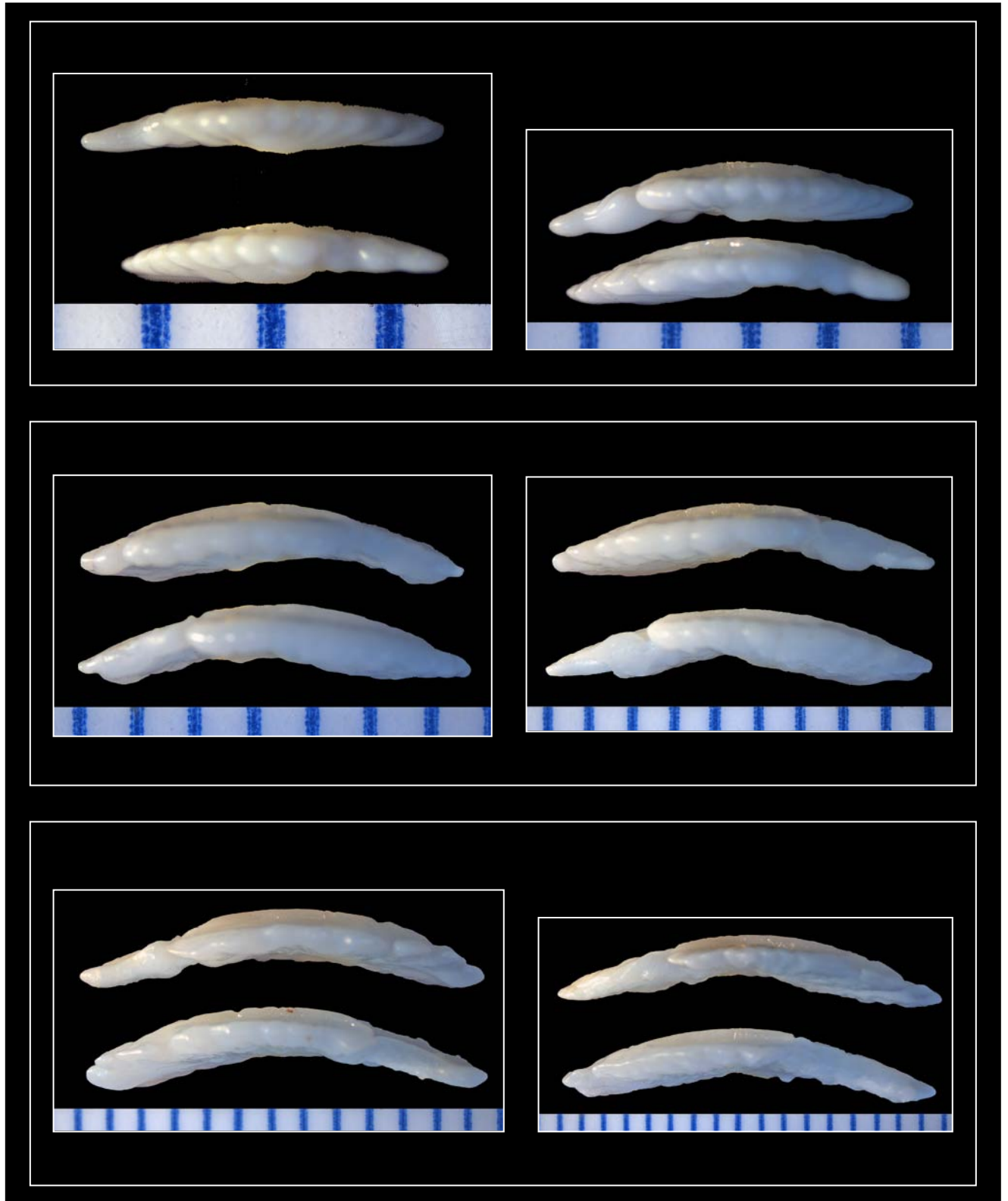
Scorpaenidae

Sebastes goodei, chilipeper, LACM 56651-1



Scorpaenidae

Sebastes goodei, chilipeper, LACM 56651-1



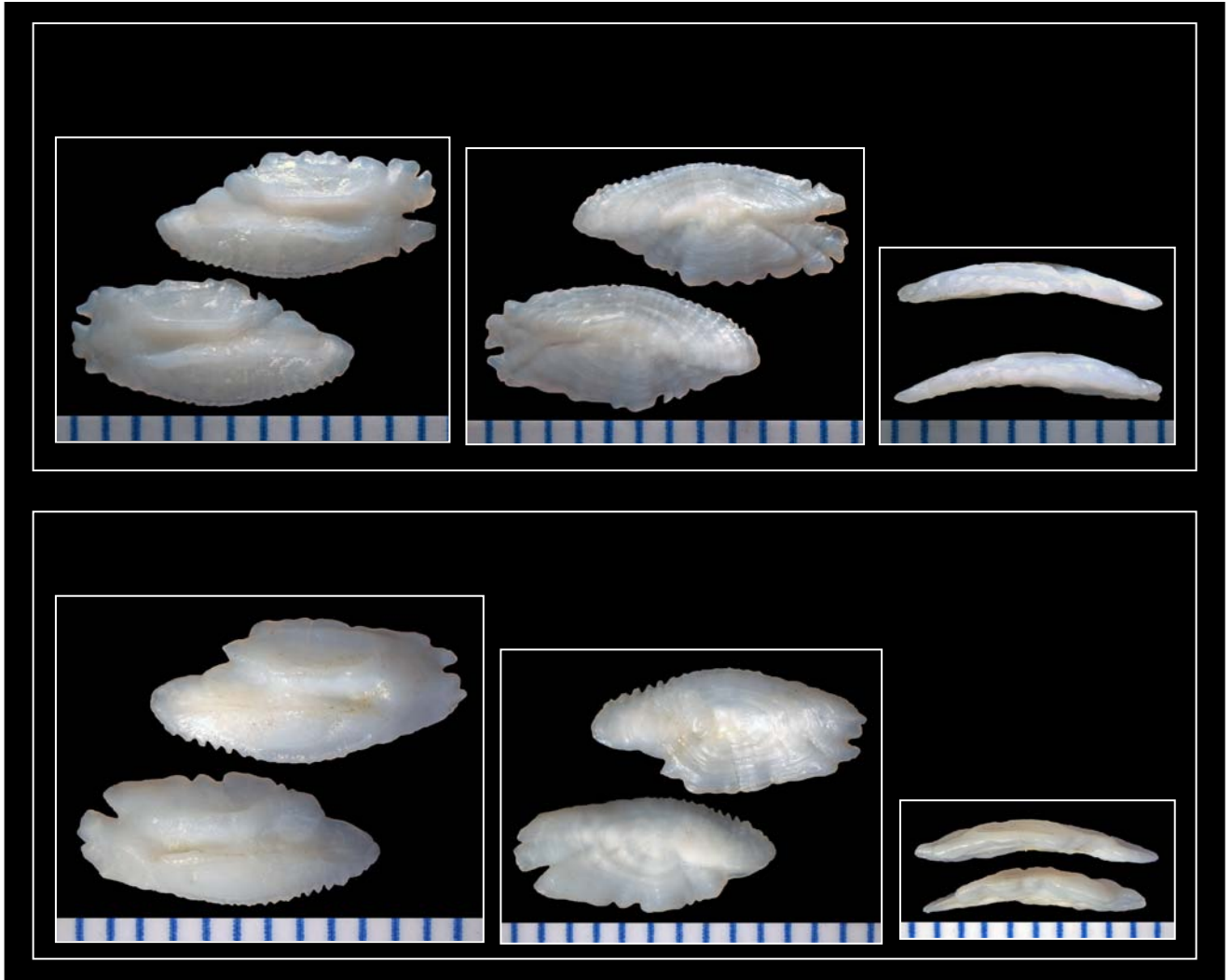
Scorpaenidae

Sebastes hopkinsi, squarespot rockfish, LACM 56671-1



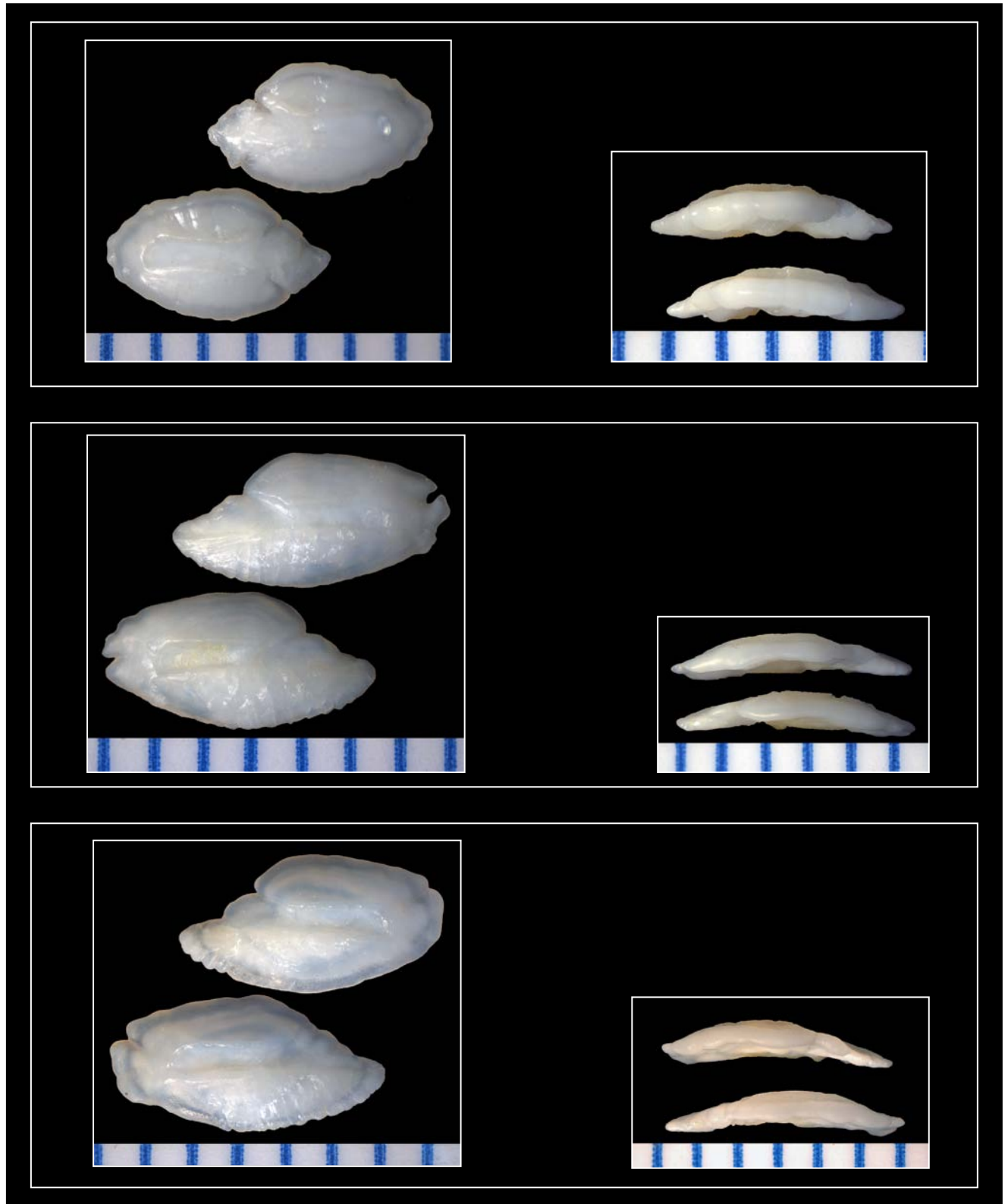
Scorpaenidae

Sebastes hopkinsi, squarespot rockfish, LACM 56671-1



Scorpaenidae

Sebastes hopkinsi, squarespot rockfish, LACM 56671-1



Scorpaenidae

Sebastes hopkinsi, squarespot rockfish, LACM 56671-1



Scorpaenidae

Sebastes jordani, shortbelly rockfish, LACM 56607-1



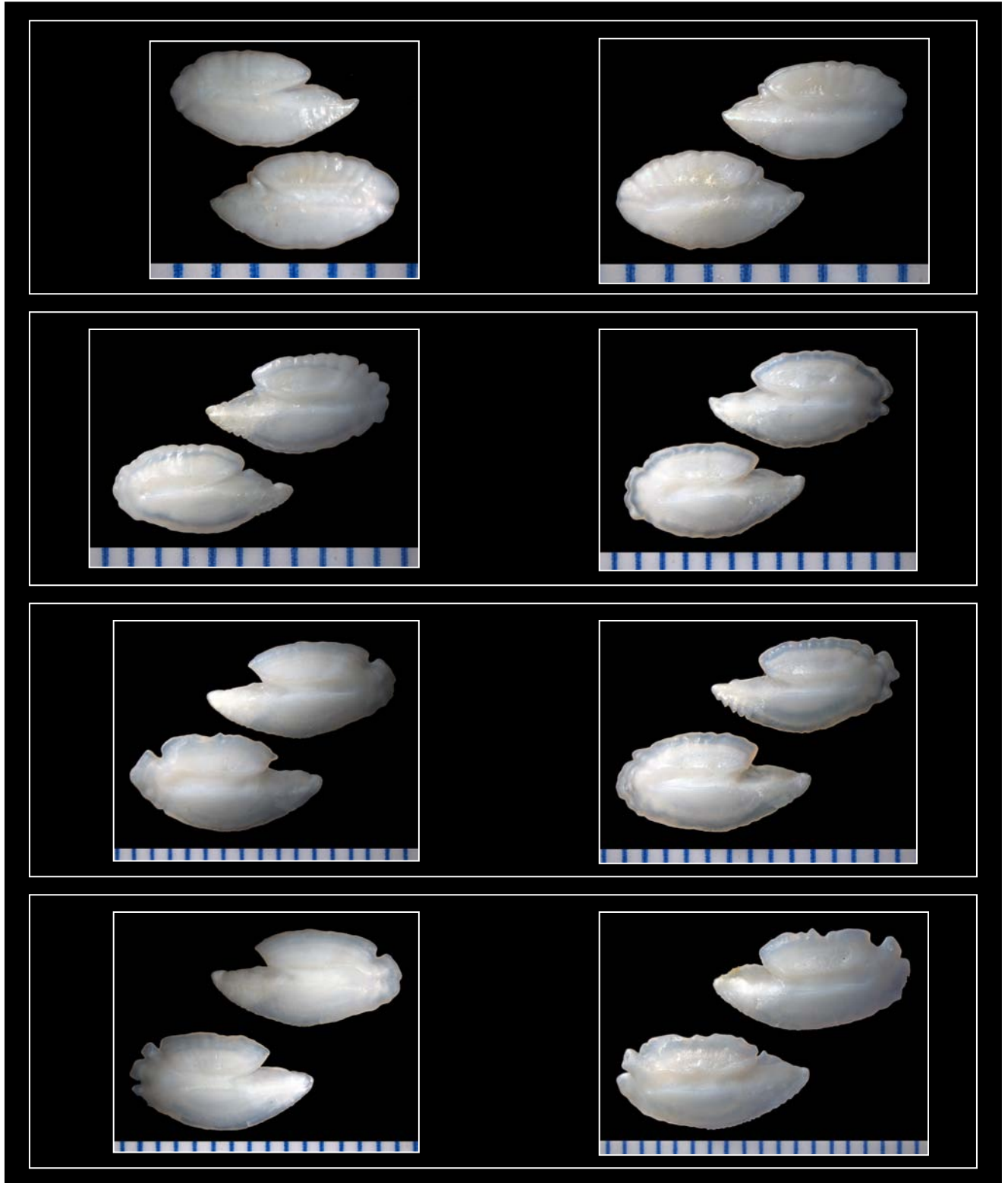
Scorpaenidae

Sebastes jordani, shortbelly rockfish, LACM 56607-1



Scorpaenidae

Sebastes jordani, shortbelly rockfish, LACM 56607-1



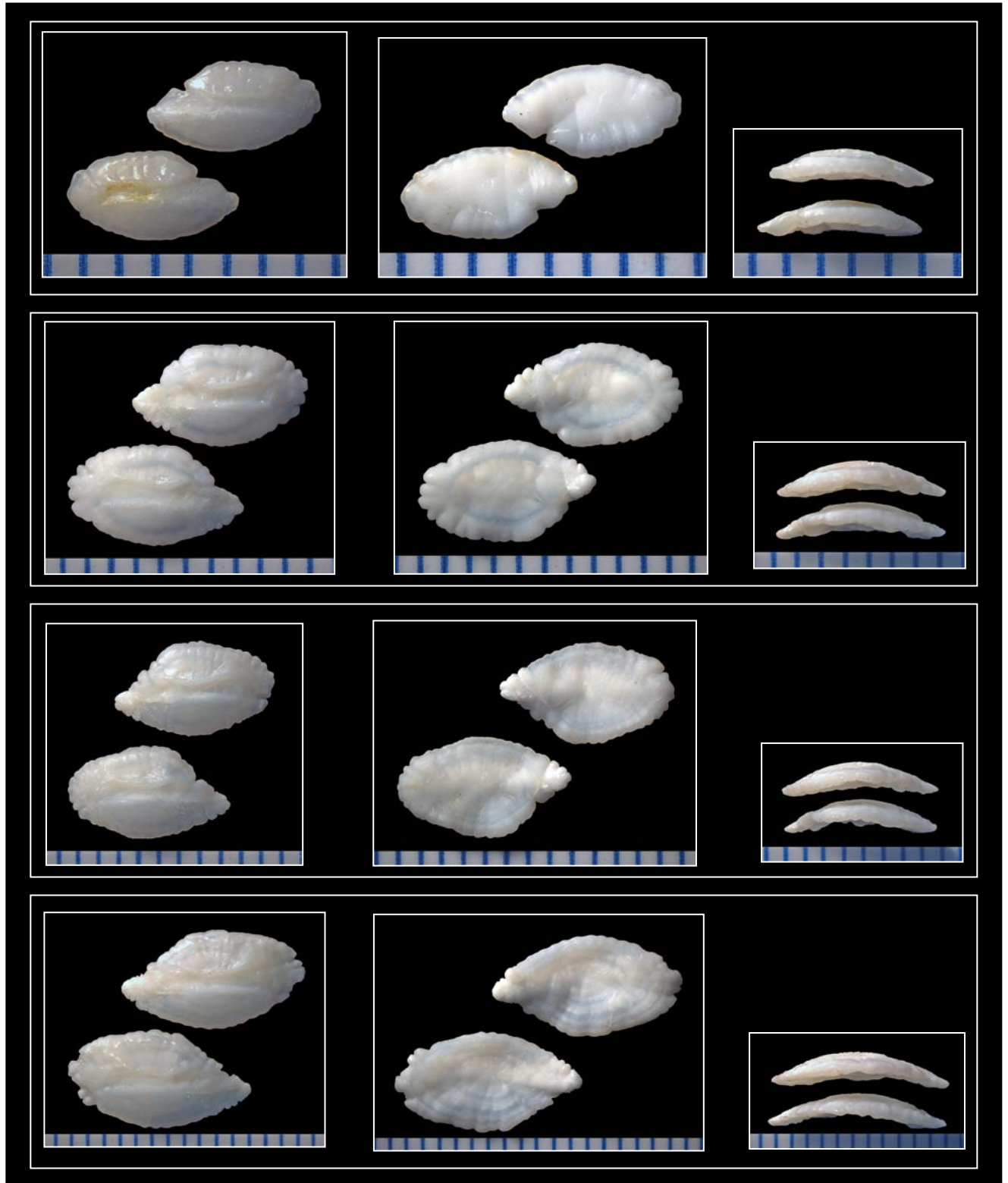
Scorpaenidae

Sebastes lentiginosus, freckled rockfish, LACM 56705-1



Scorpaenidae

Sebastes miniatus, vermilion rockfish, LACM 56707-1



Scorpaenidae

Sebastes miniatus, vermillion rockfish, LACM 56707-1



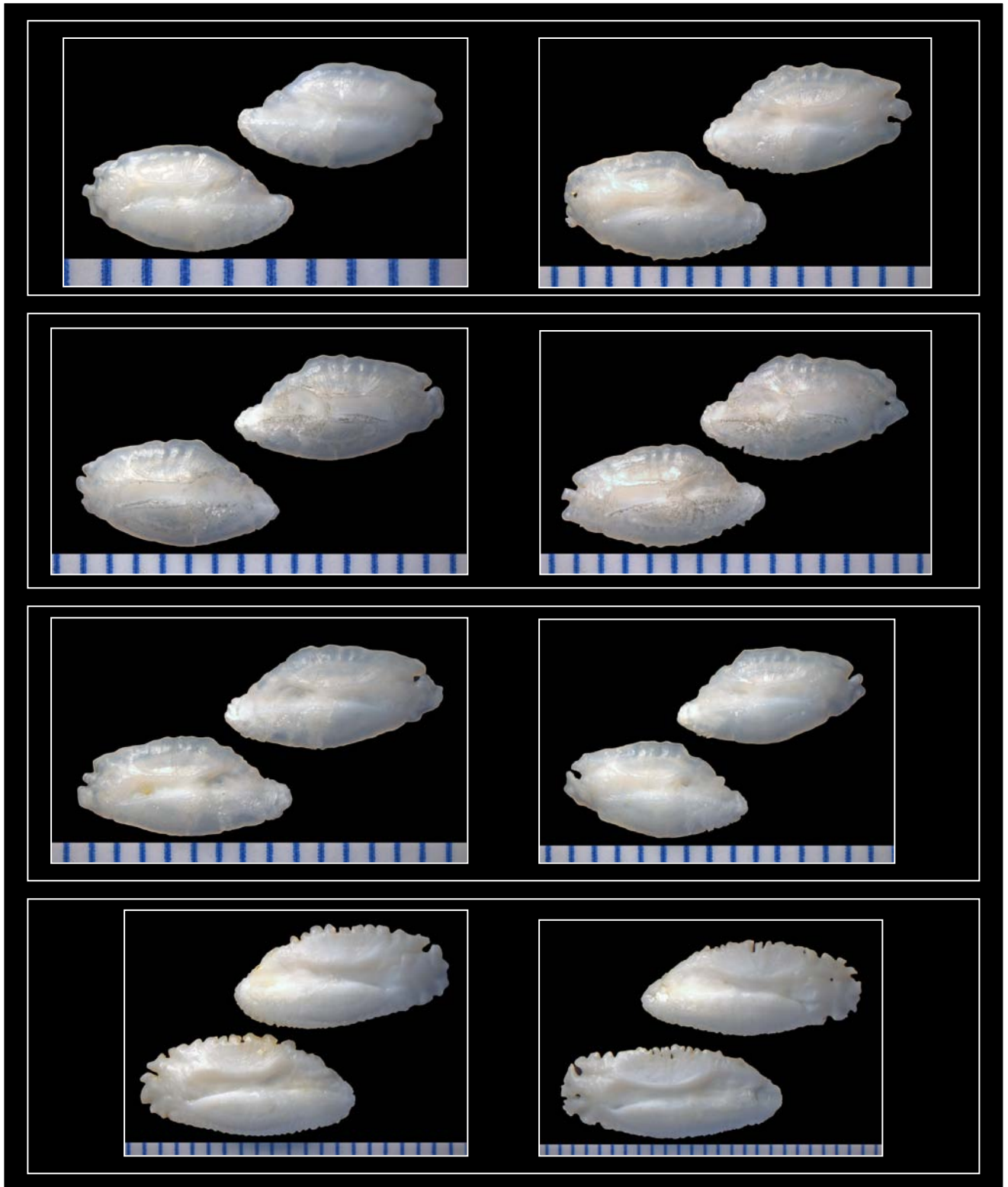
Scorpaenidae

Sebastes mystinus, blue rockfish, LACM 56678-1



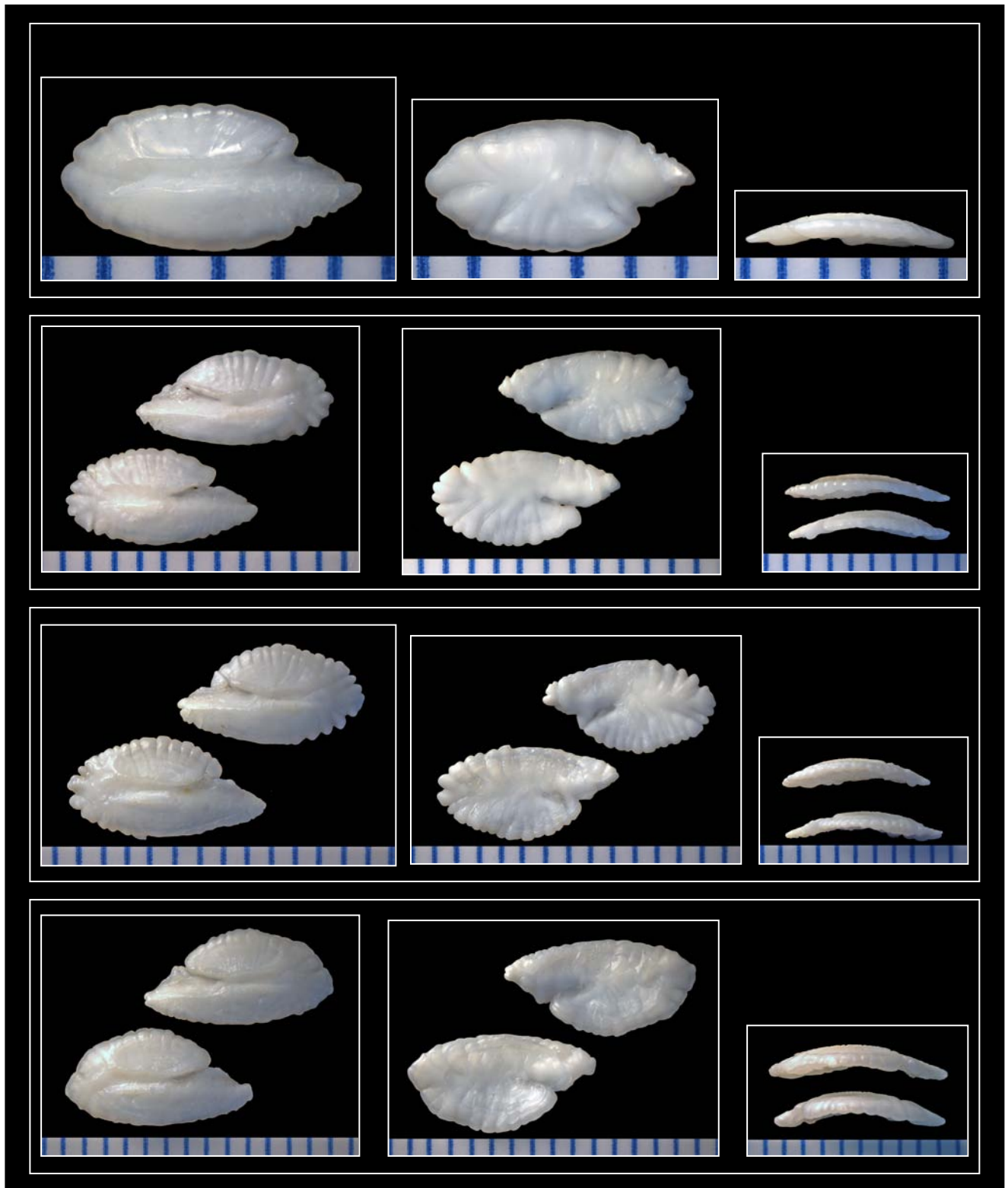
Scorpaenidae

Sebastes mystinus, blue rockfish, LACM 56678-1



Scorpaenidae

Sebastes paucispinis, Bocaccio, LACM 56690-1



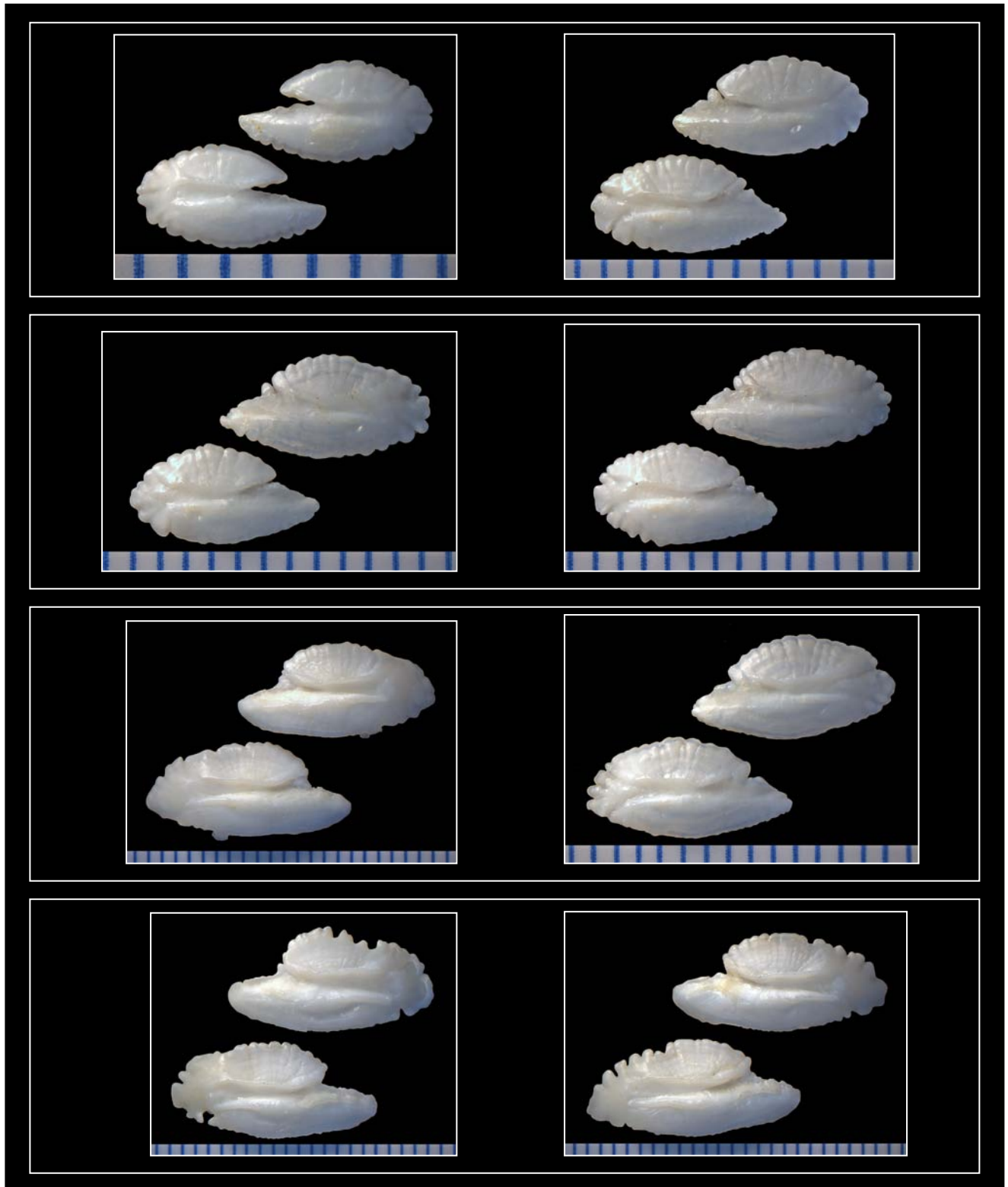
Scorpaenidae

Sebastes paucispinis, Bocaccio, LACM 56690-1



Scorpaenidae

Sebastes paucispinis, Bocaccio, LACM 56690-1



Scorpaenidae

Sebastes proriger, Redstripe rockfish, LACM 56717-1



Scorpaenidae

Sebastes rufus, Bank rockfish, LACM 56720-1



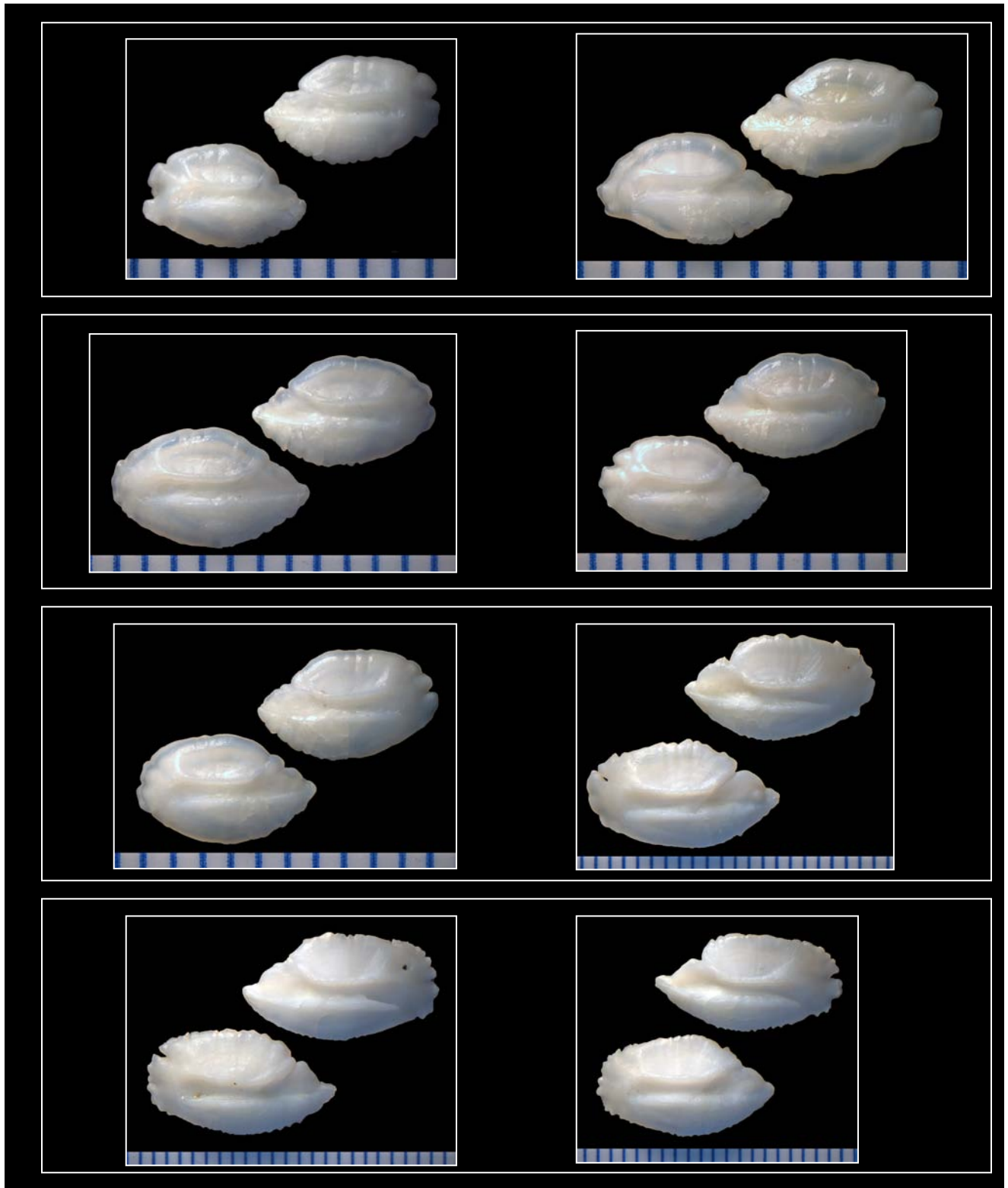
Scorpaenidae

Sebastes saxicola, Stripetail rockfish, LACM 56677-1



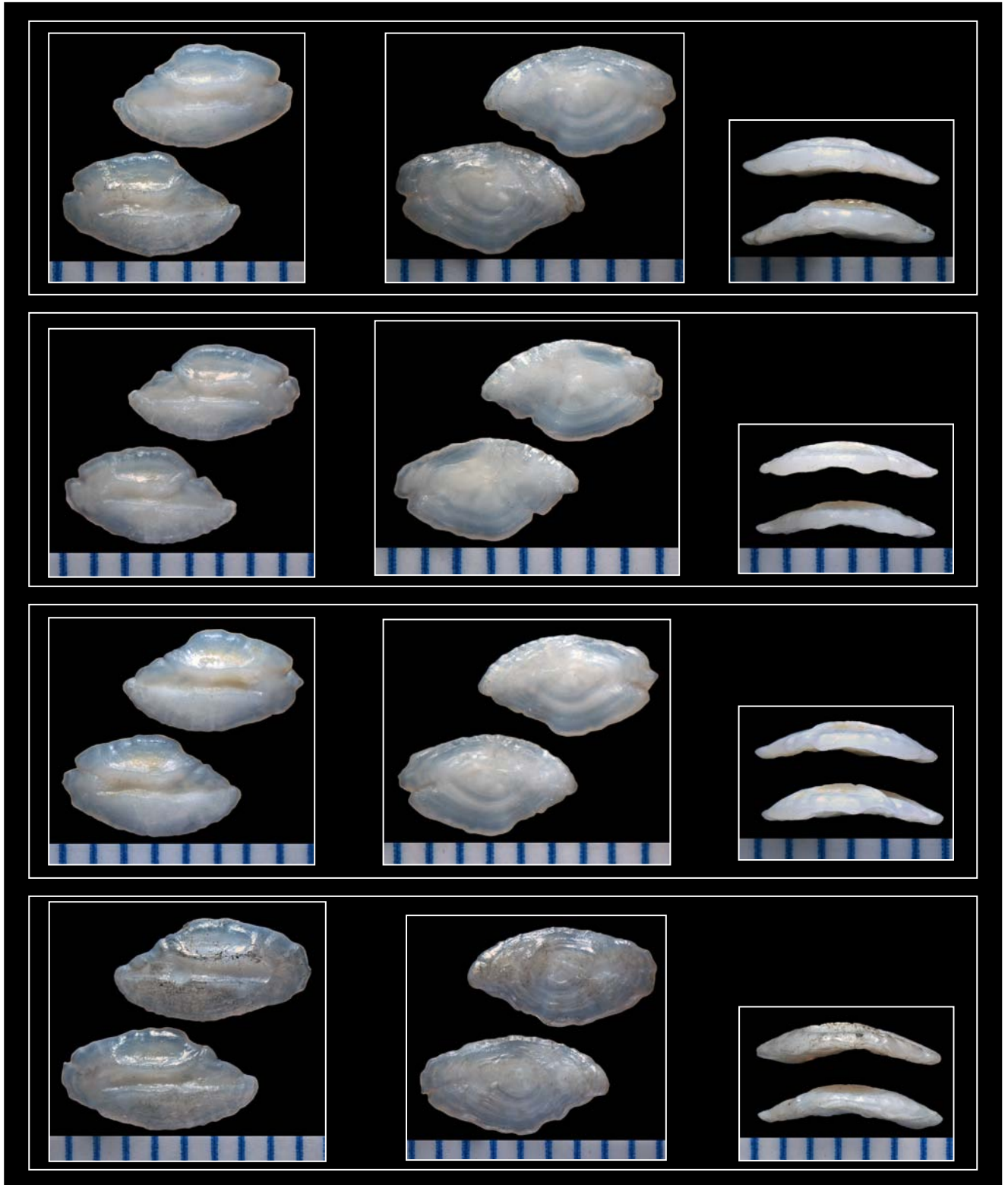
Scorpaenidae

Sebastes saxicola, Stripetail rockfish, LACM 56677-1



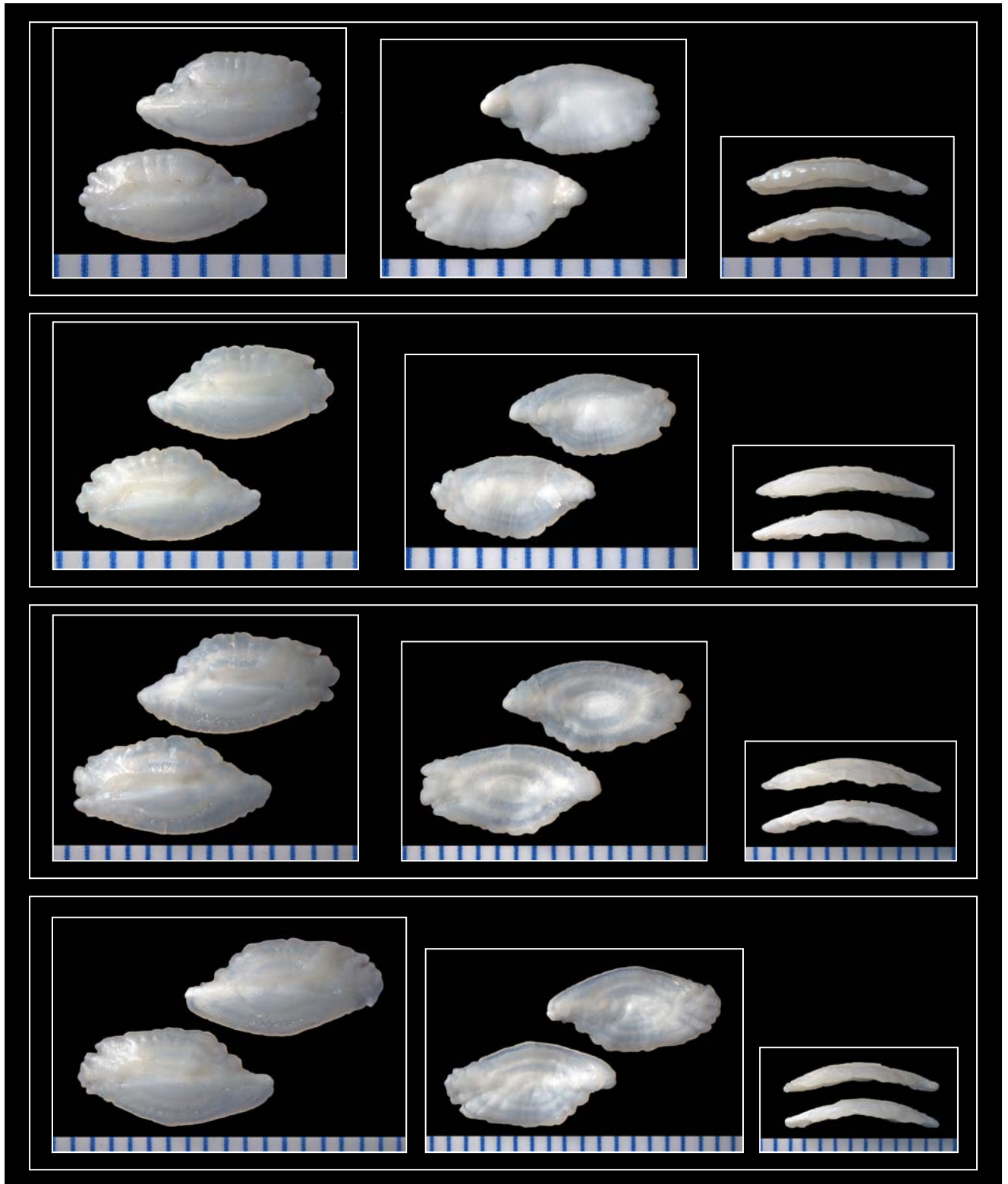
Scorpaenidae

Sebastes semicinctus, halfbanded rockfish, LACM 56606-1



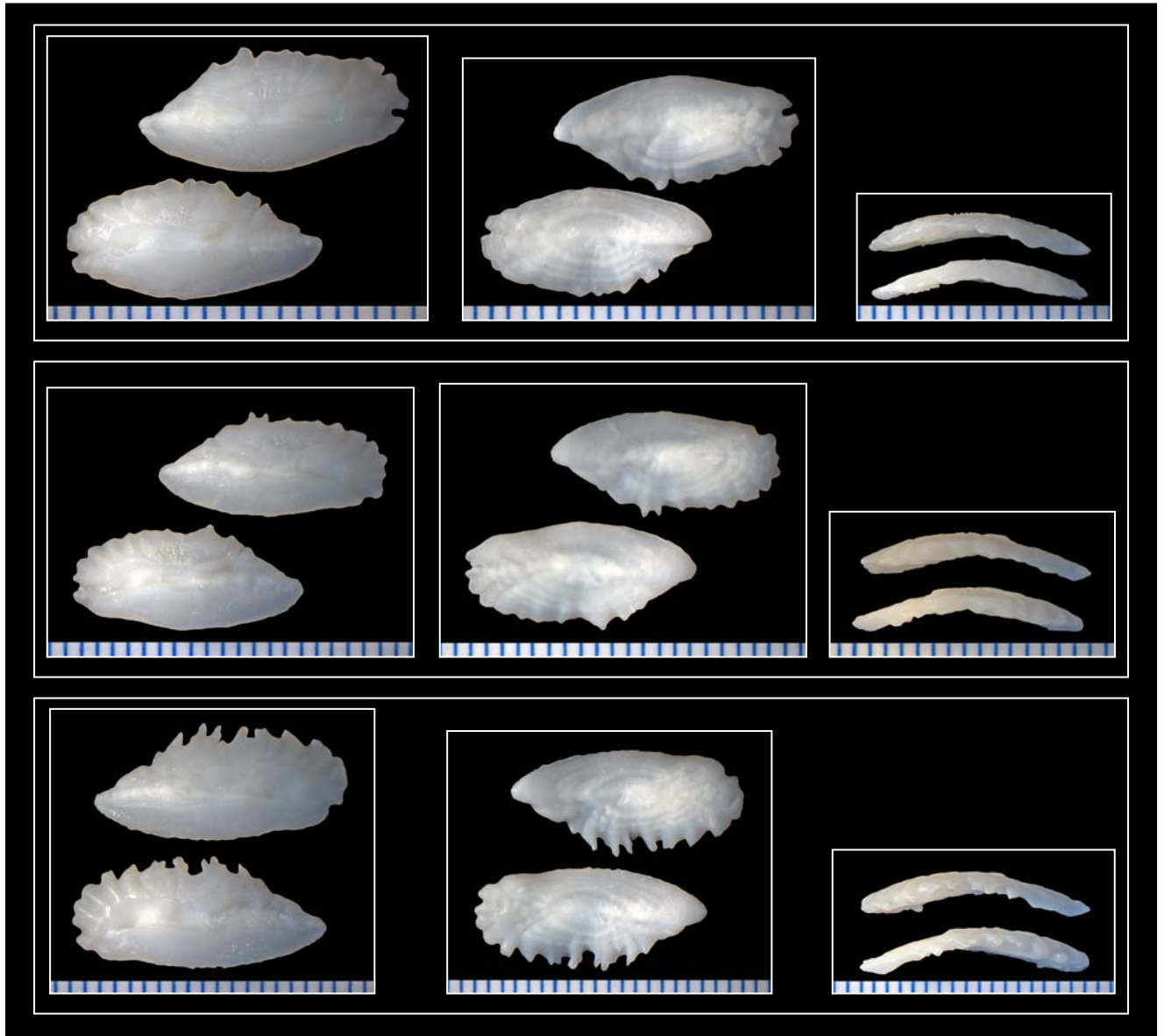
Scorpaenidae

Sebastes serranoides, Olive rockfish, LACM 56708-1



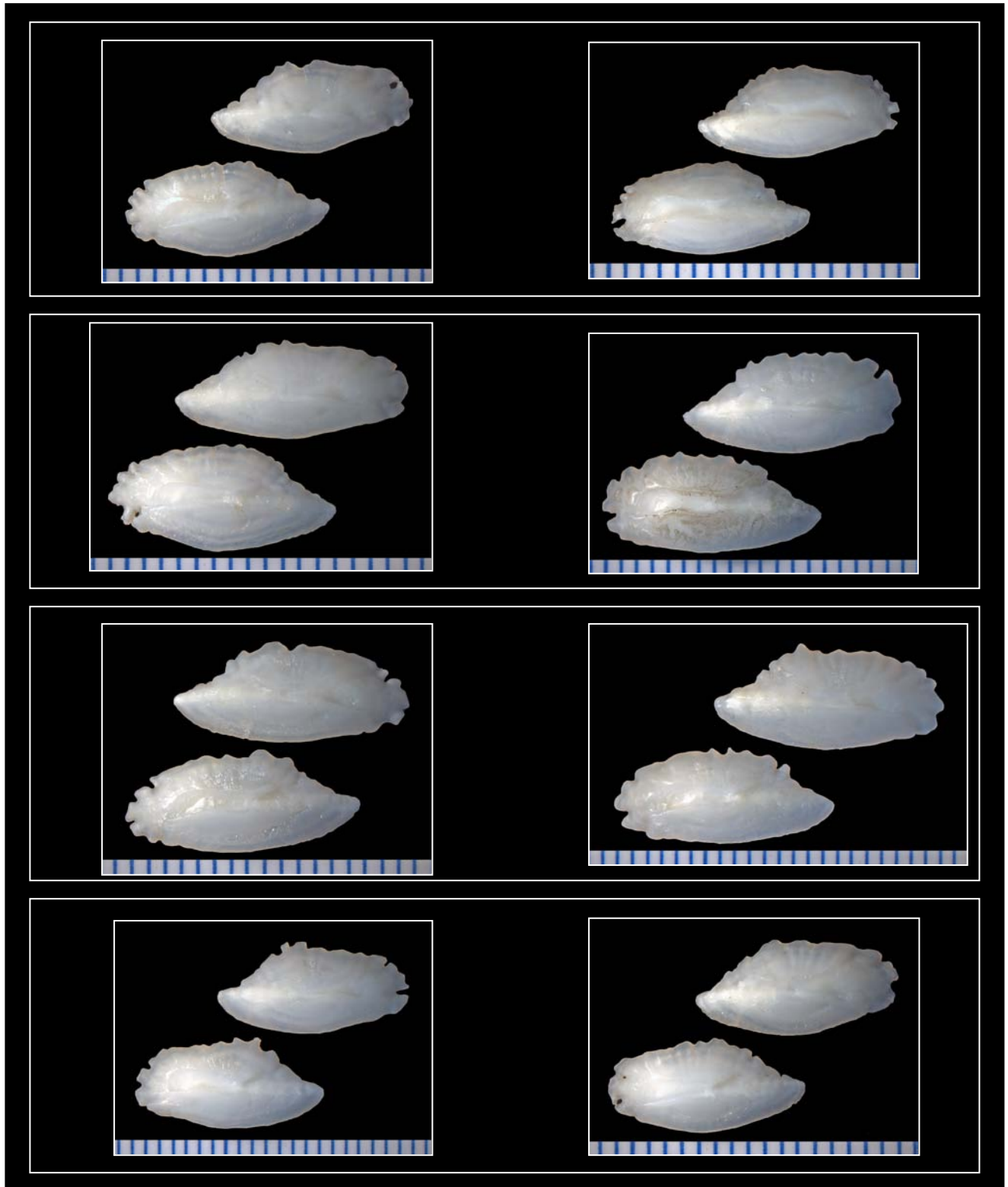
Scorpaenidae

Sebastes serranoides, Olive rockfish, LACM 56708-1



Scorpaenidae

Sebastes serranoides, Olive rockfish, LACM 56708-1



Scorpaenidae

Sebastes umbrosus, Honeycomb rockfish, LACM 56046-1



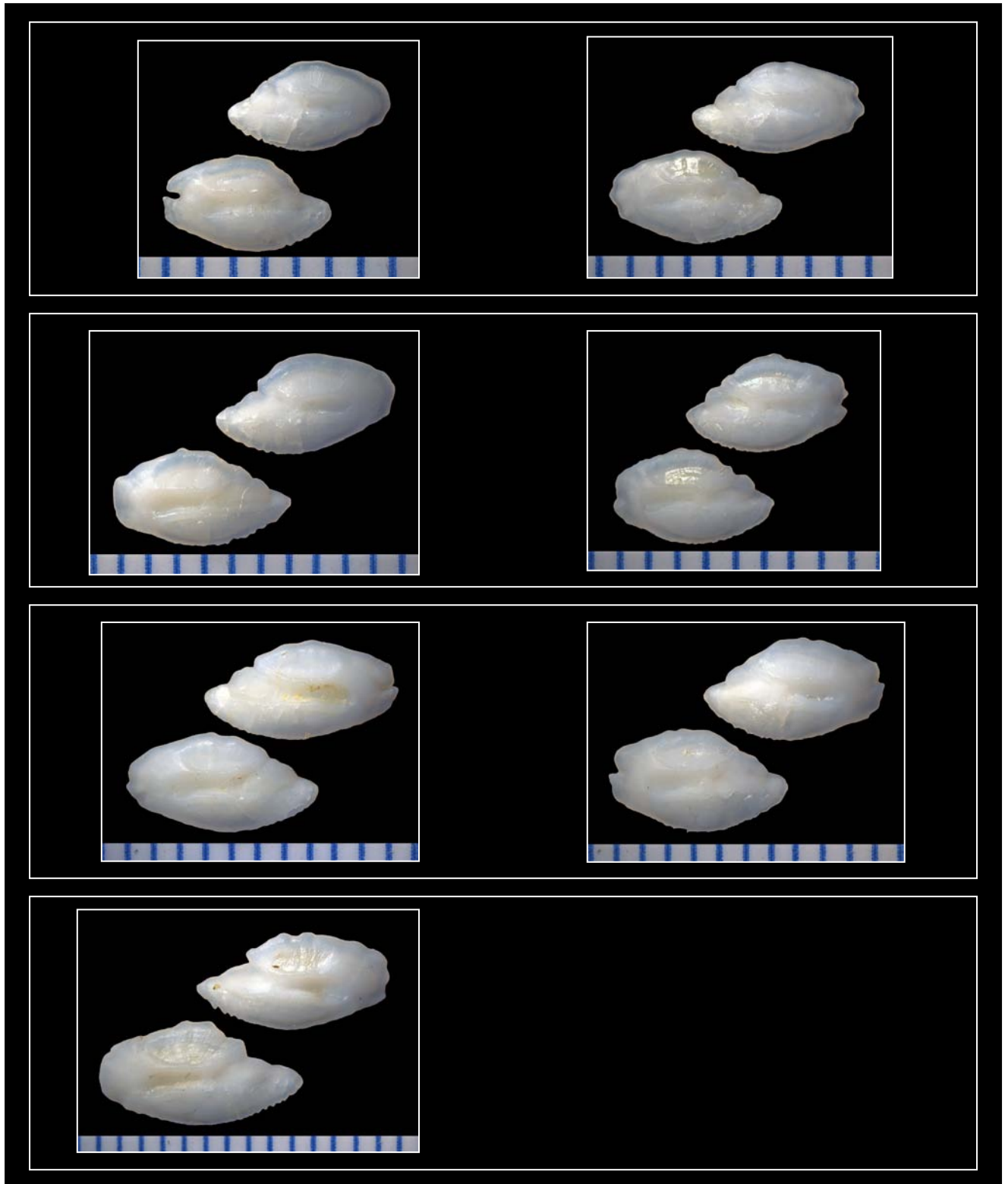
Scorpaenidae

Sebastes wilsoni, Pygmy rockfish, LACM 56692-1



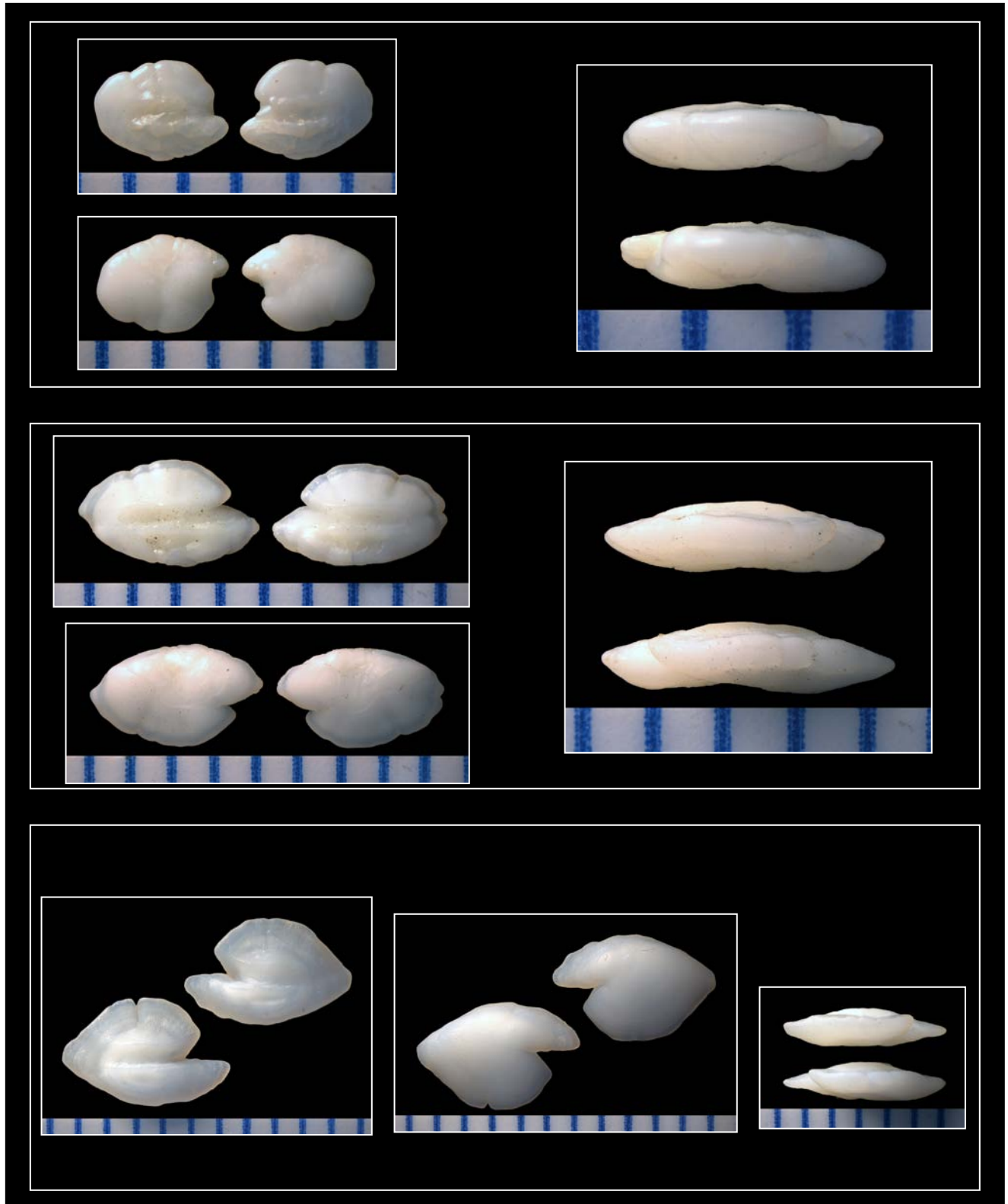
Scorpaenidae

Sebastes wilsoni, Pygmy rockfish, LACM 56692-1



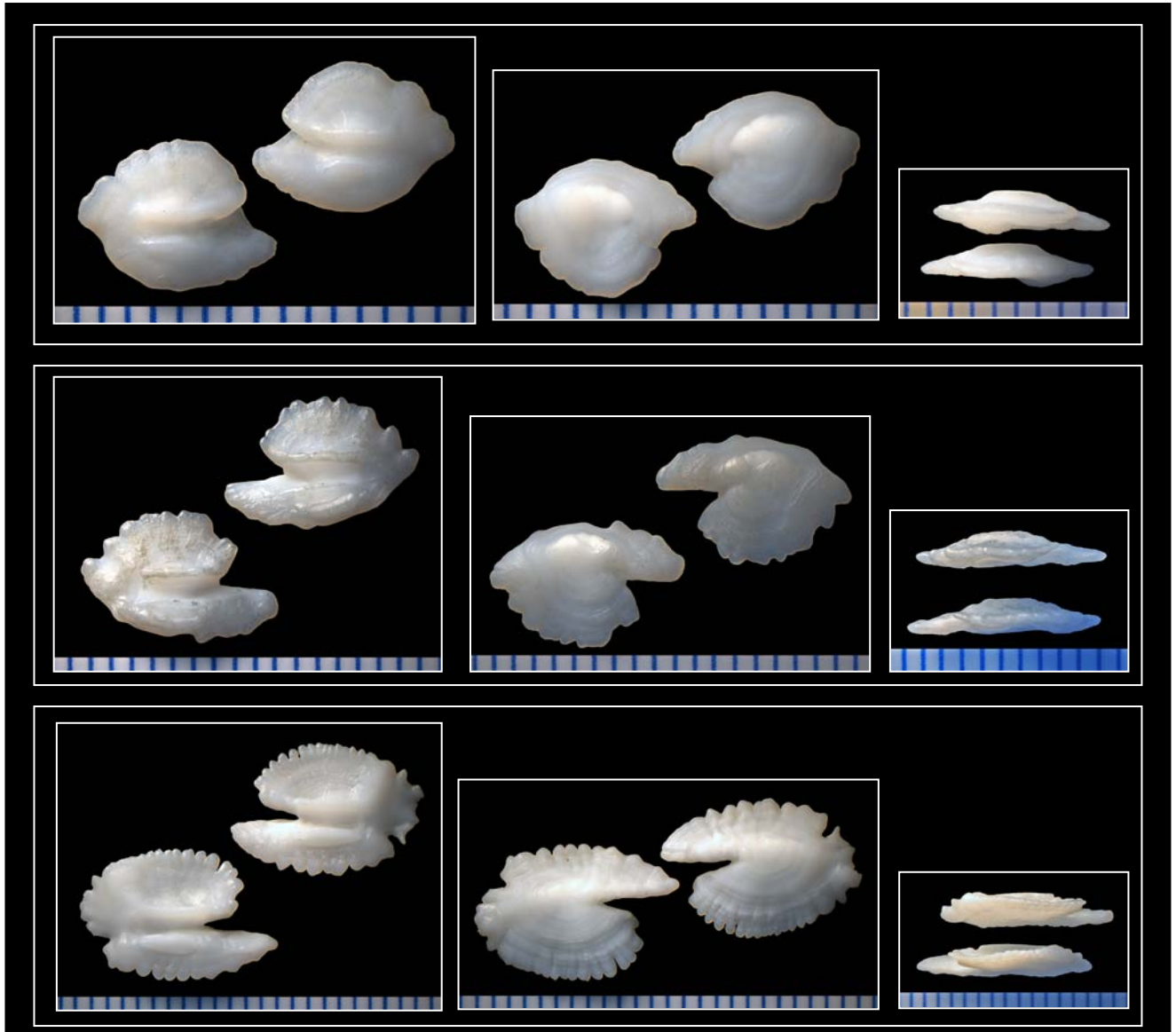
Scorpaenidae

Sebastolobus alascanus, Shortspine thornyhead, LACM 56676-1



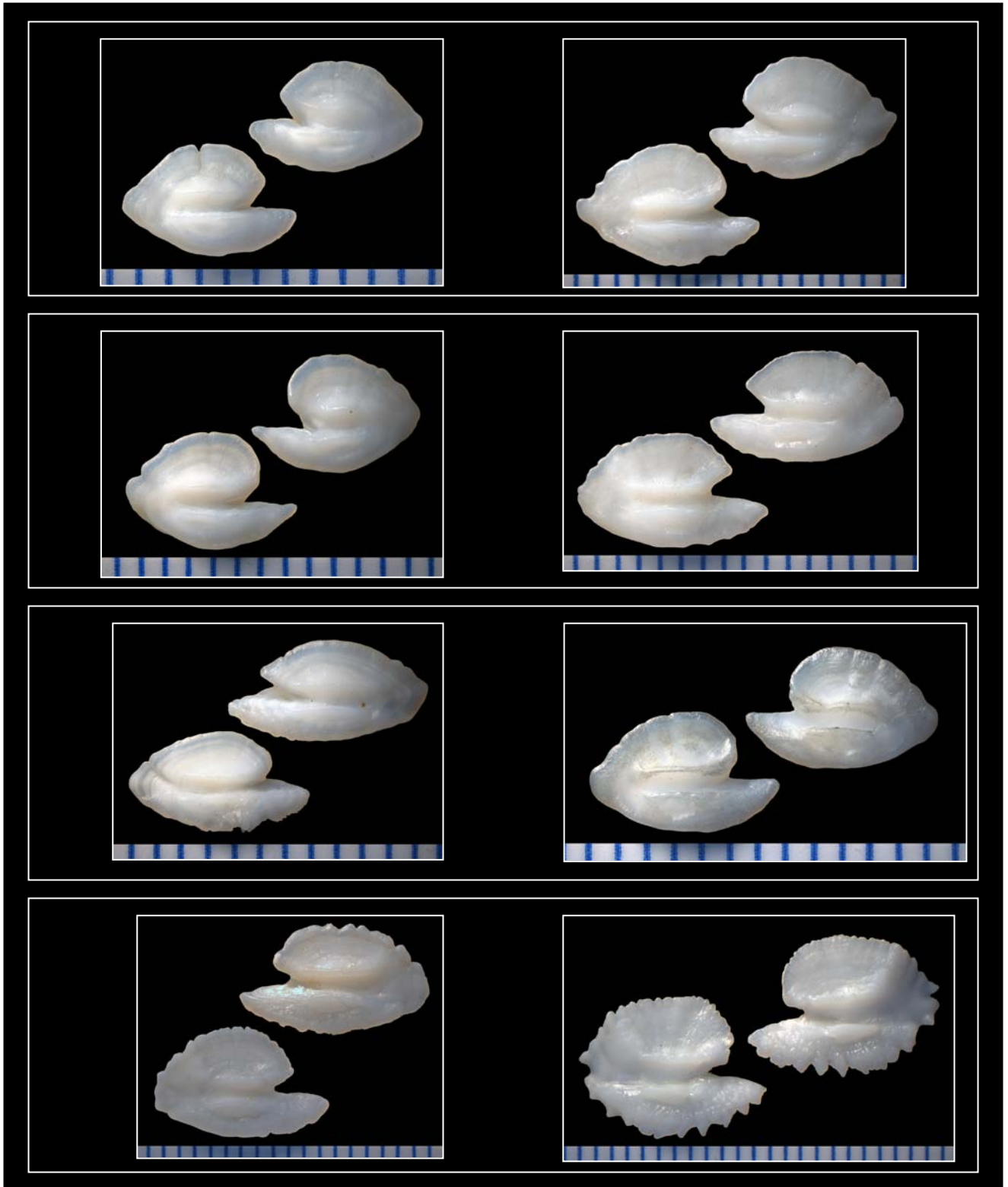
Scorpaenidae

Sebastolobus alascanus, Shortspine thornyhead, LACM 56676-1



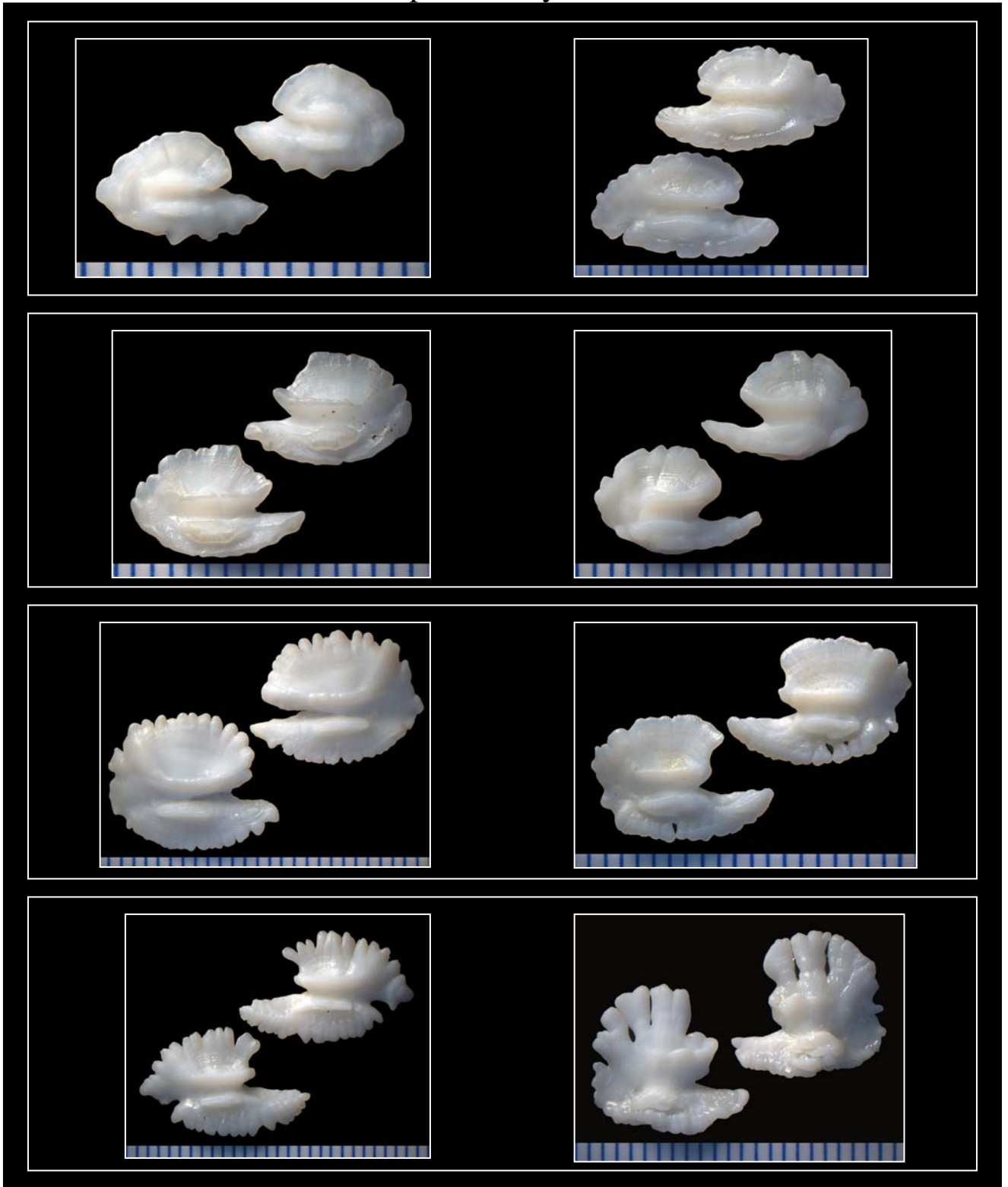
Scorpaenidae

Sebastolobus alascanus, Shortspine thornyhead, LACM 56676-1



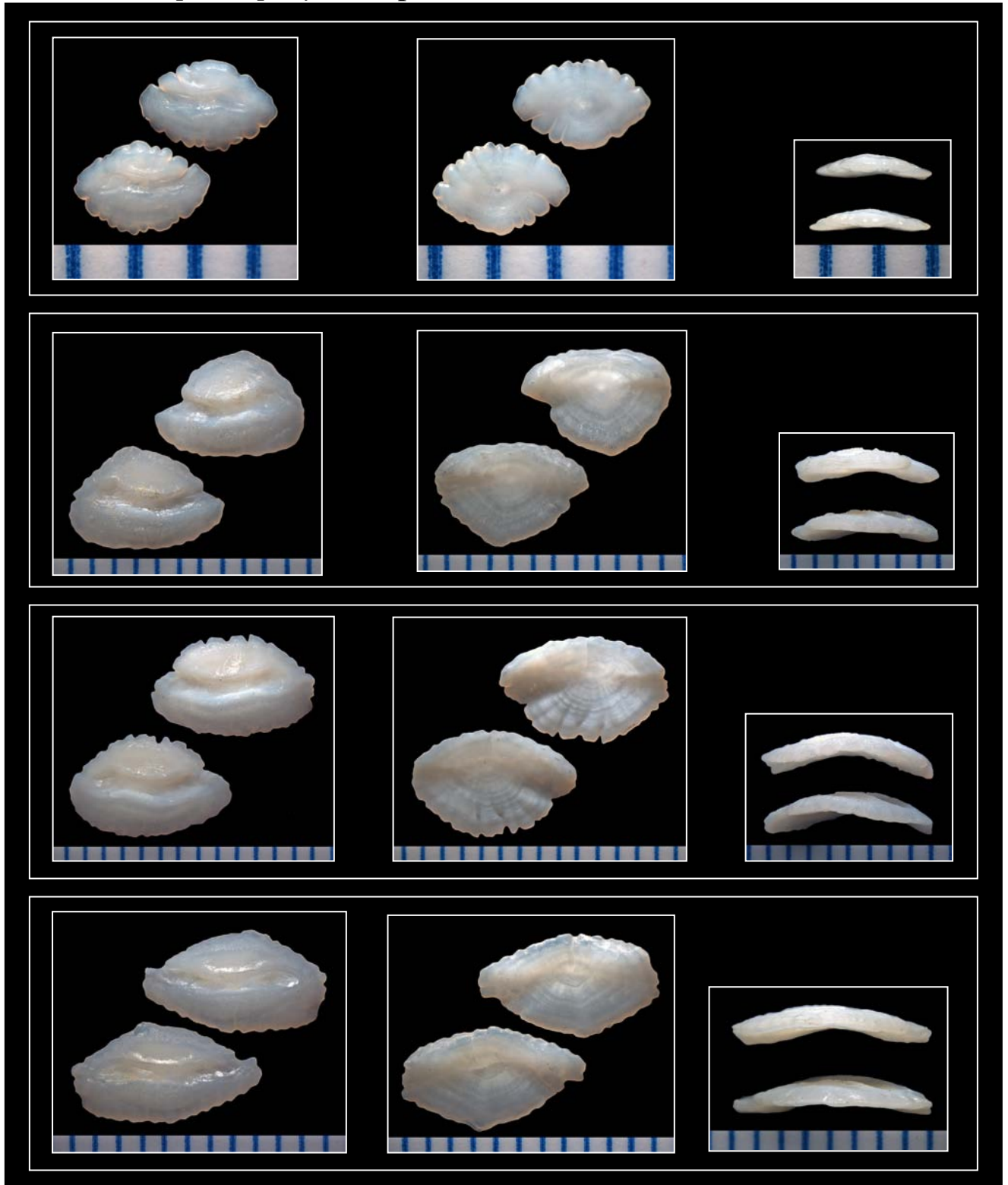
Scorpaenidae

Sebastolobus alascanus, Shortspine thornyhead, LACM 56676-1



Triglidae

Prionotus stephanophrys, lumptail searobin, LACM 56933-1



Triglidae

Prionotus stephanophrys, lumptail searobin, LACM 56933-1



Anoplopomatidae

Anoplopoma fimbria, sablefish, LACM 56713-1



Anoplopomatidae

Anoplopoma fimbria, sablefish, LACM 56713-1



Hexagrammidae

Ophiodon elongatus, lingcod, LACM 57264-1



Hexagrammidae

Ophiodon elongatus, lingcod, LACM 57264-1



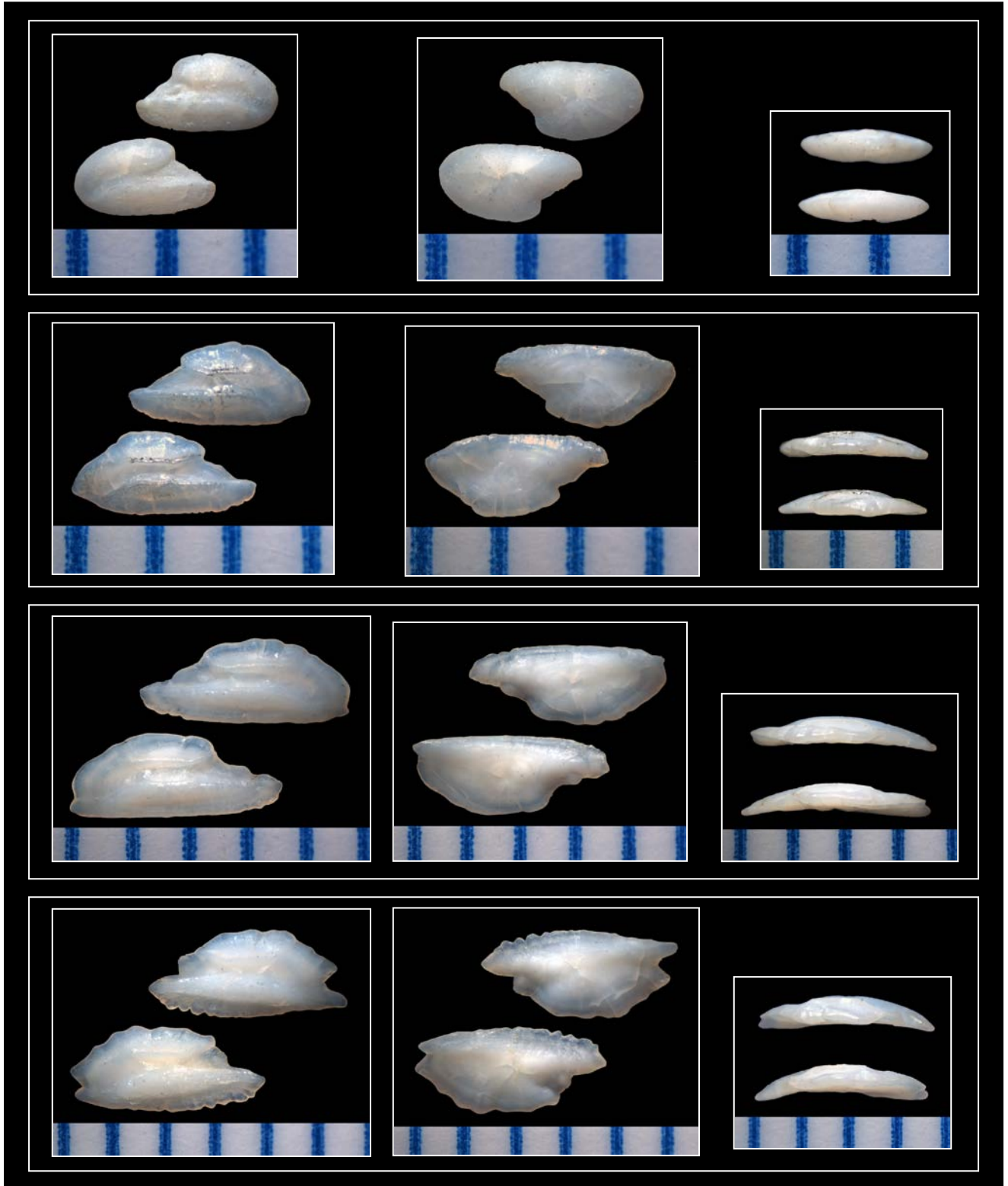
Hexagrammidae

Ophiodon elongatus, lingcod, LACM 57264-1



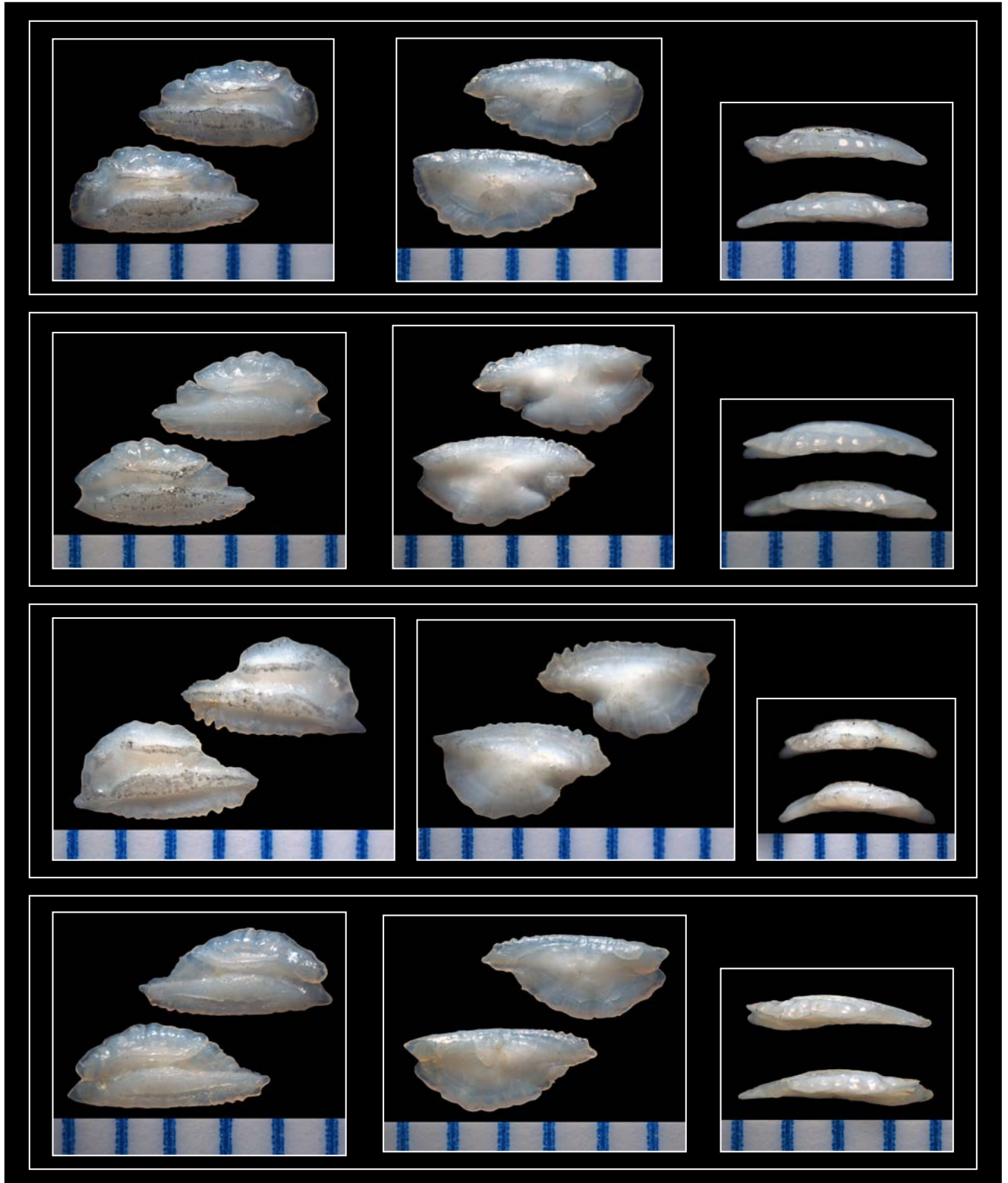
Hexagrammidae

Oxylebius pictus, painted greenling, LACM 56932-1



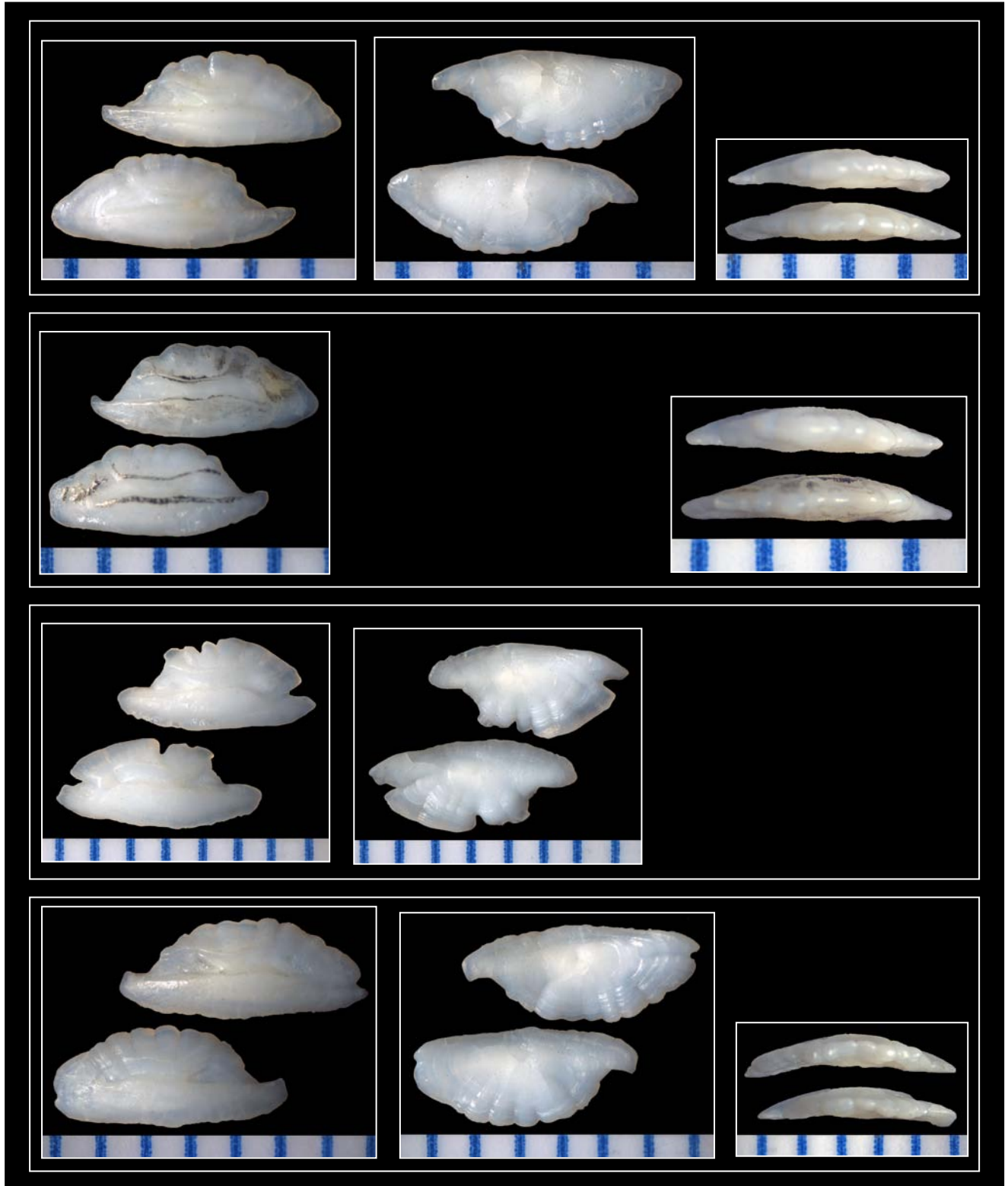
Hexagrammidae

Oxylebius pictus, painted greenling, LACM 56932-1



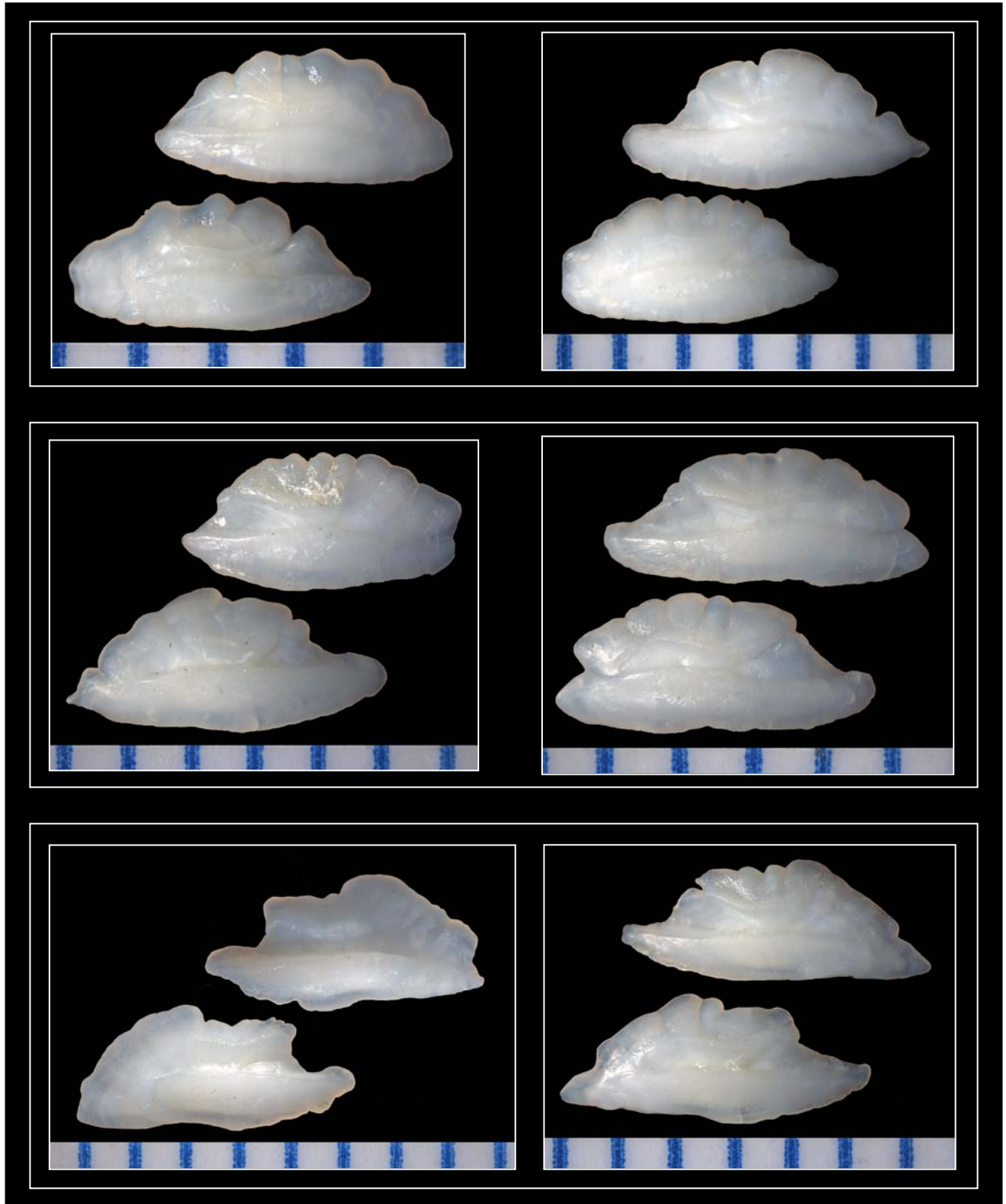
Hexagrammidae

Zaniolepis frenata, shortspine combfish, LACM 56653-1



Hexagrammidae

Zaniolepis frenata, shortspine combfish, LACM 56653-1



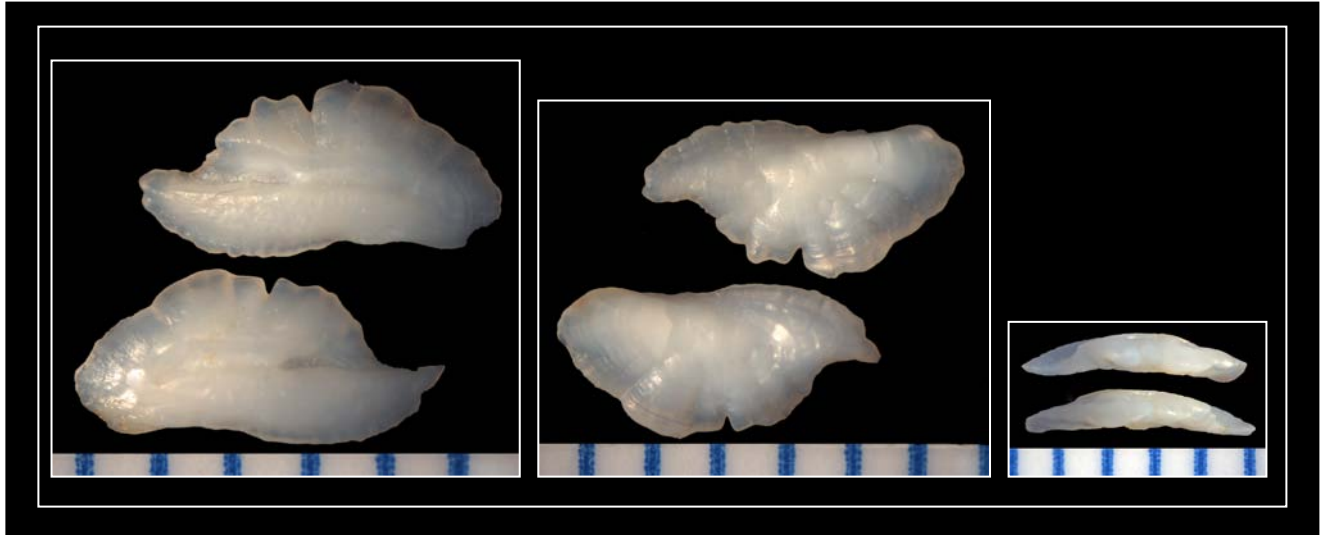
Hexagrammidae

Zaniolepis latipinnis, longspine combfish, LACM 56652-1



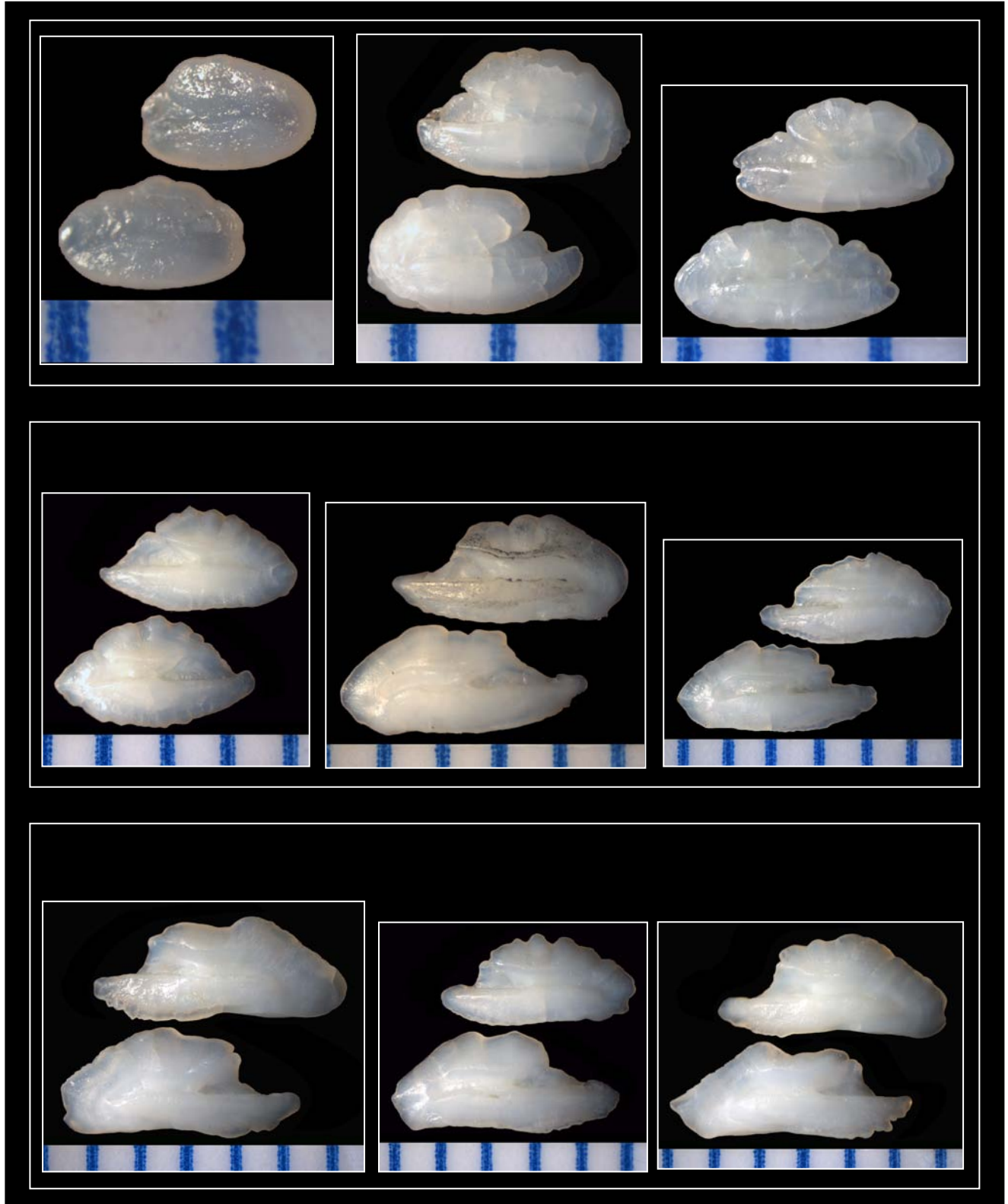
Hexagrammidae

Zaniolepis latipinnis, longspine combfish, LACM 56652-1



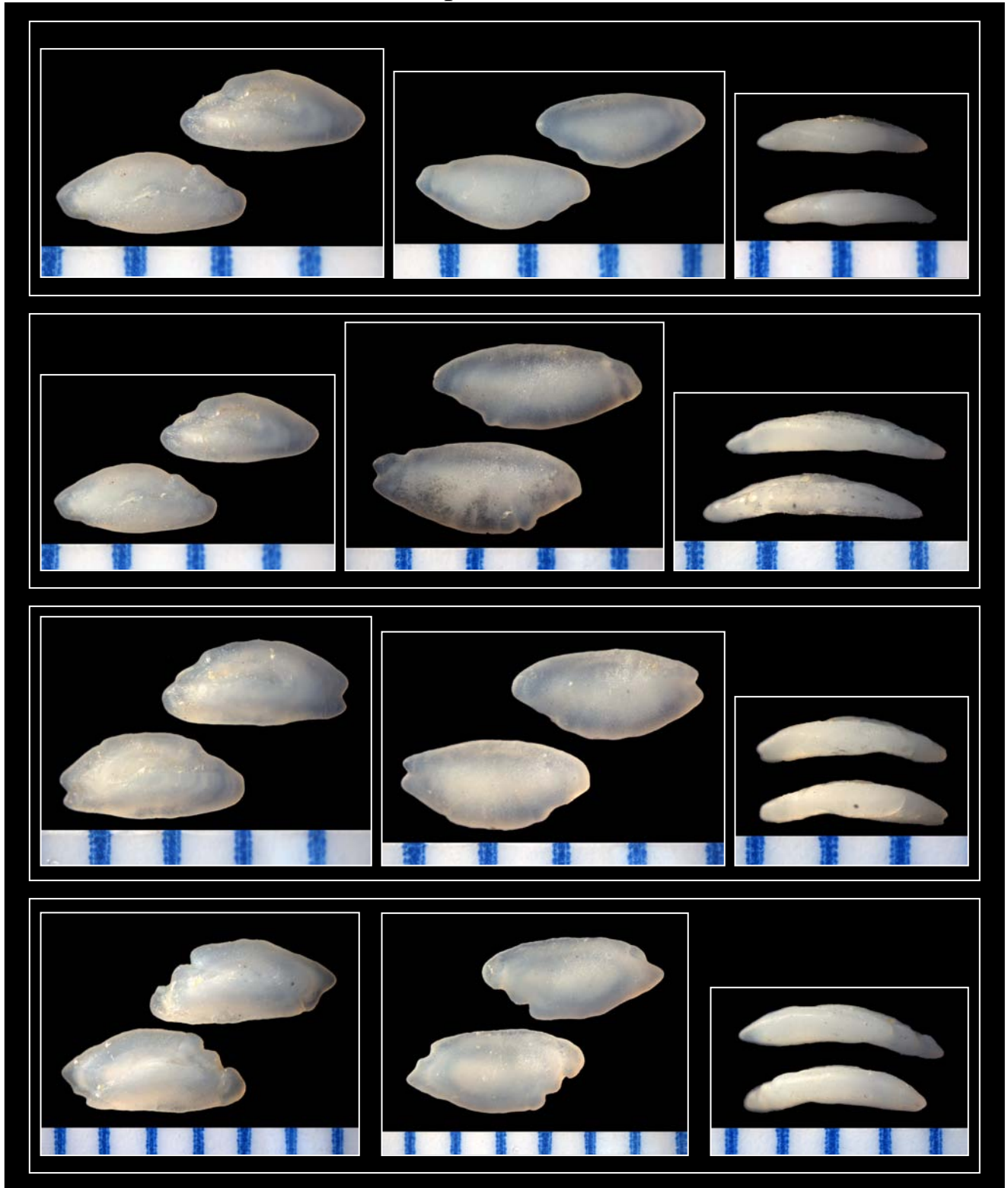
Hexagrammidae

Zaniolepis latipinnis, longspine combfish, LACM 56652-1



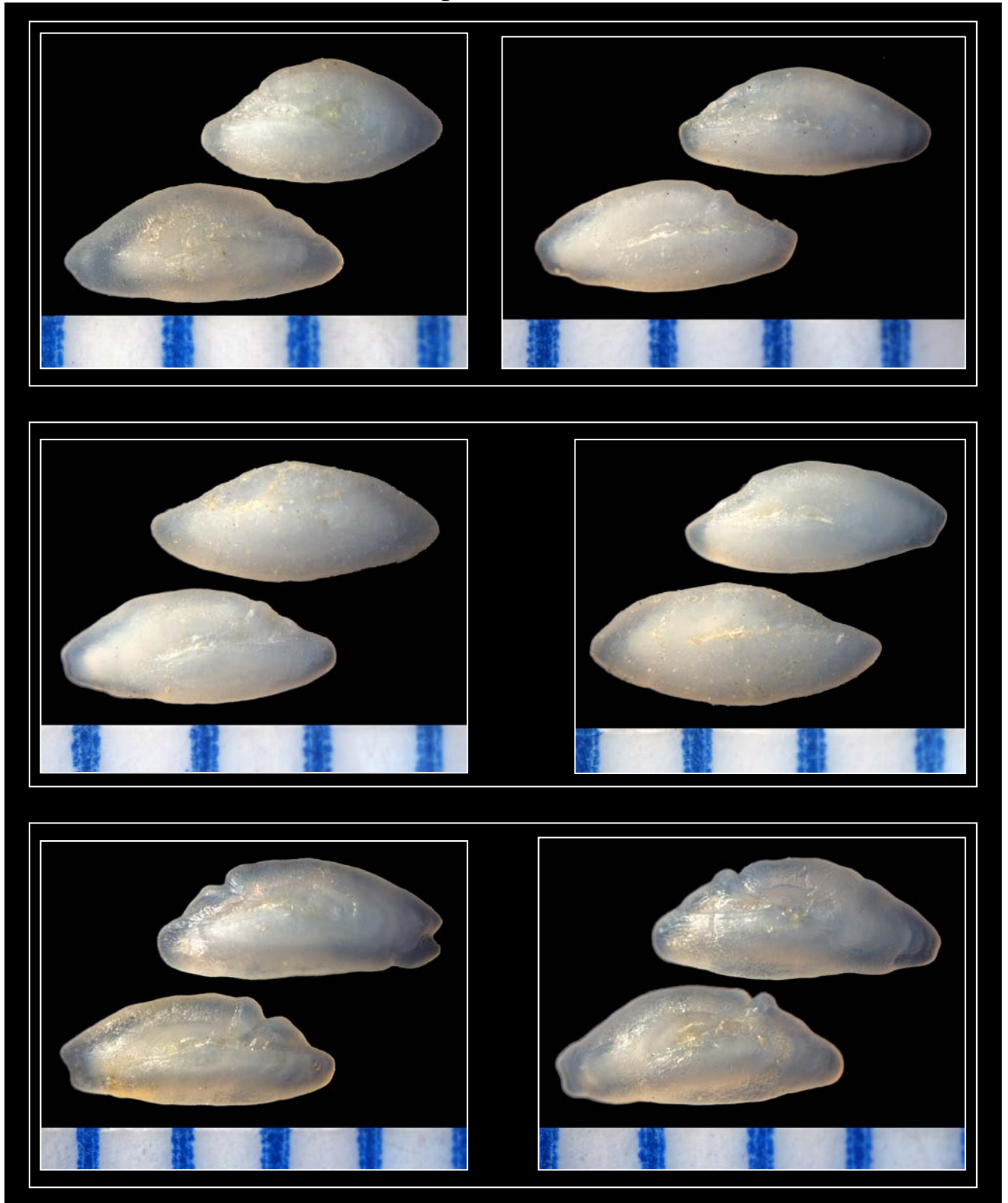
Cottidae

Artedius corallinus, coralline sculpin, LACM 56700-1



Cottidae

Artedius corallinus, coralline sculpin, LACM 56700-1



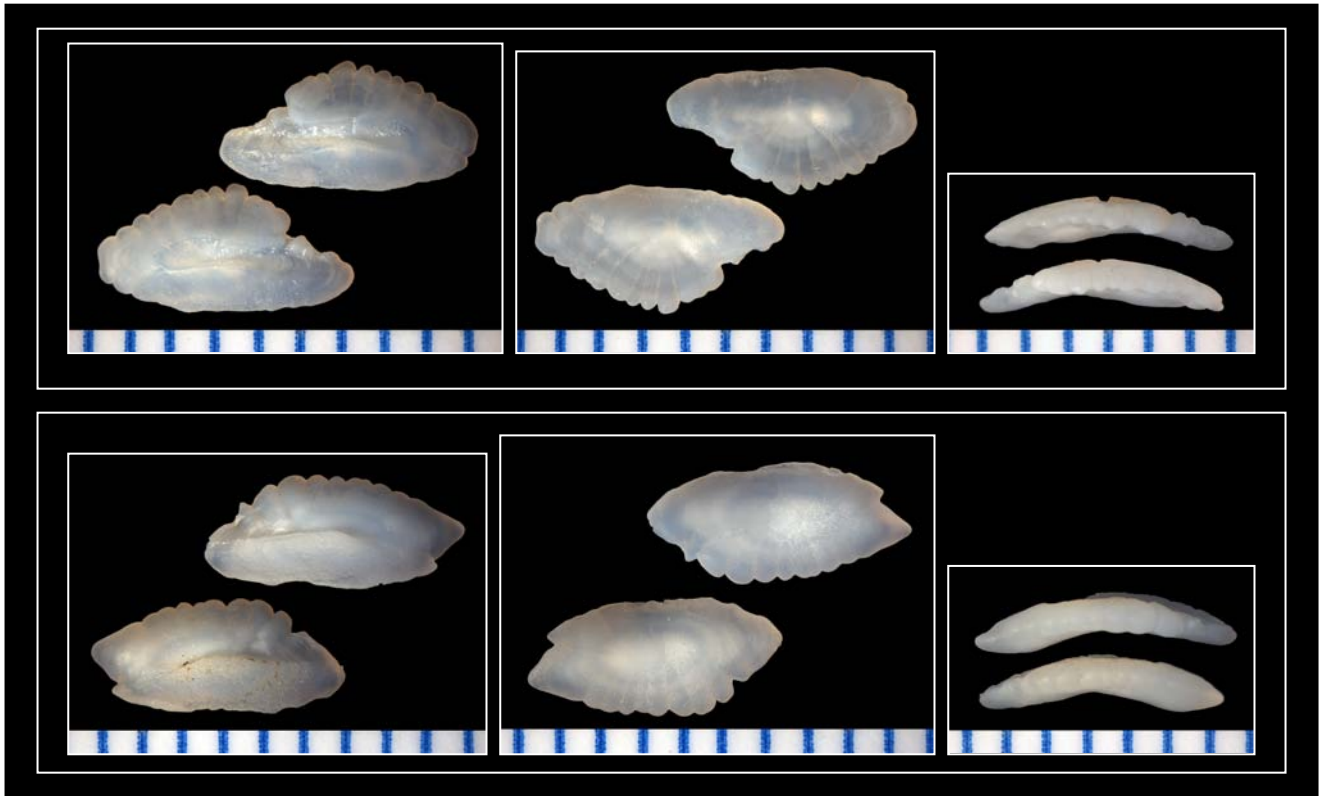
Cottidae

Artedius notospilotus, bonyhead sculpin, LACM 56709-1



Cottidae

Artedius notospilotus, bonyhead sculpin, LACM 56709-1



Cottidae

Artedius notospilotus, bonyhead sculpin, LACM 56709-1



Cottidae

Icelinus filamentosus, threadfin sculpin, LACM 56668-1



Cottidae

Icelinus filamentosus, threadfin sculpin, LACM 56668-1



Cottidae

Icelinus fimbriatus, fringed sculpin, LACM 56674-1



Cottidae

Icelinus fimbriatus, fringed sculpin, LACM 56674-1



Cottidae

Icelinus tenuis, spotfin sculpin, LACM 56669-1



Cottidae

Icelinus tenuis, spotfin sculpin, LACM 56669-1



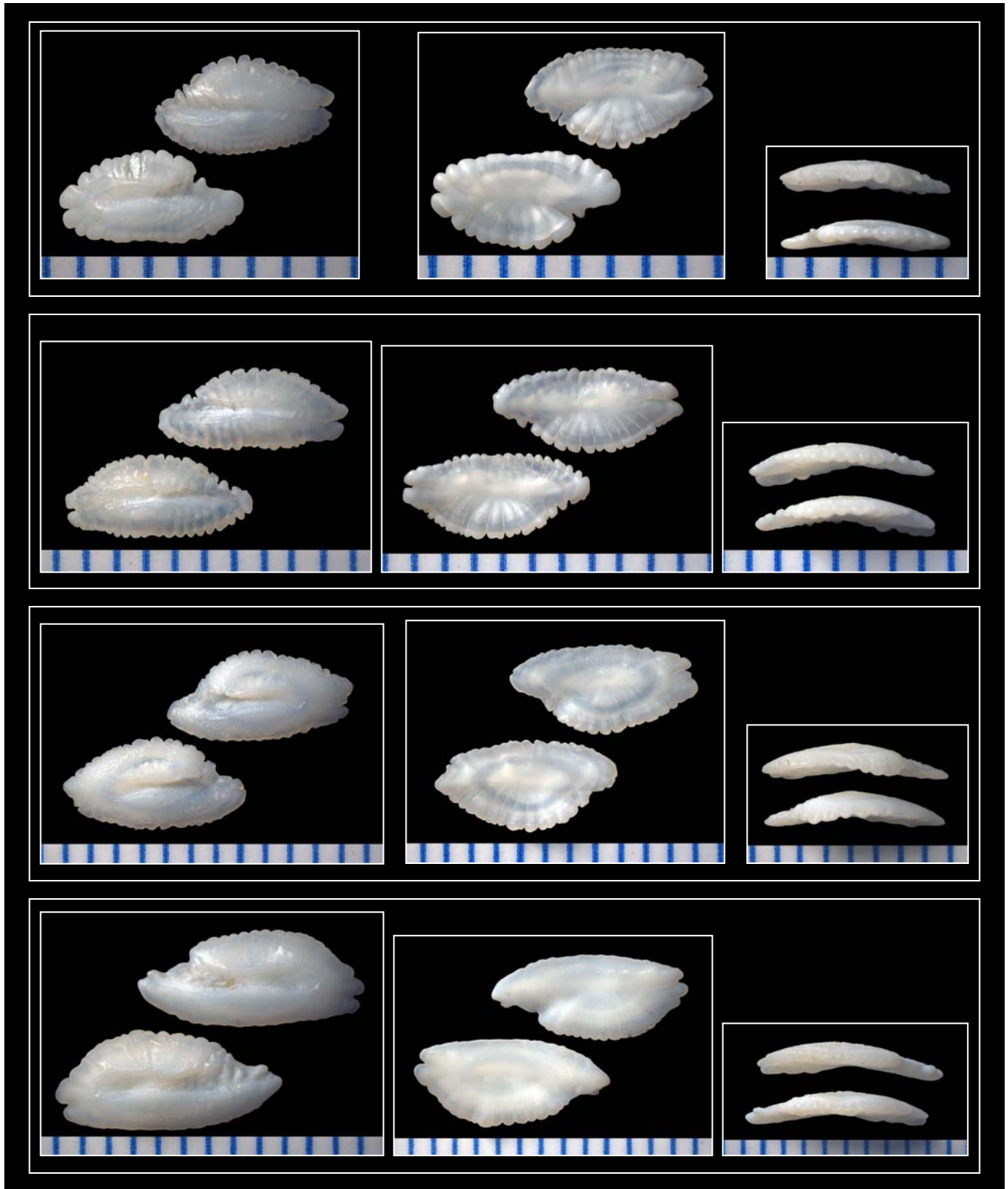
Cottidae

Leptocottus armatus, staghorn sculpin, LACM 56706-1



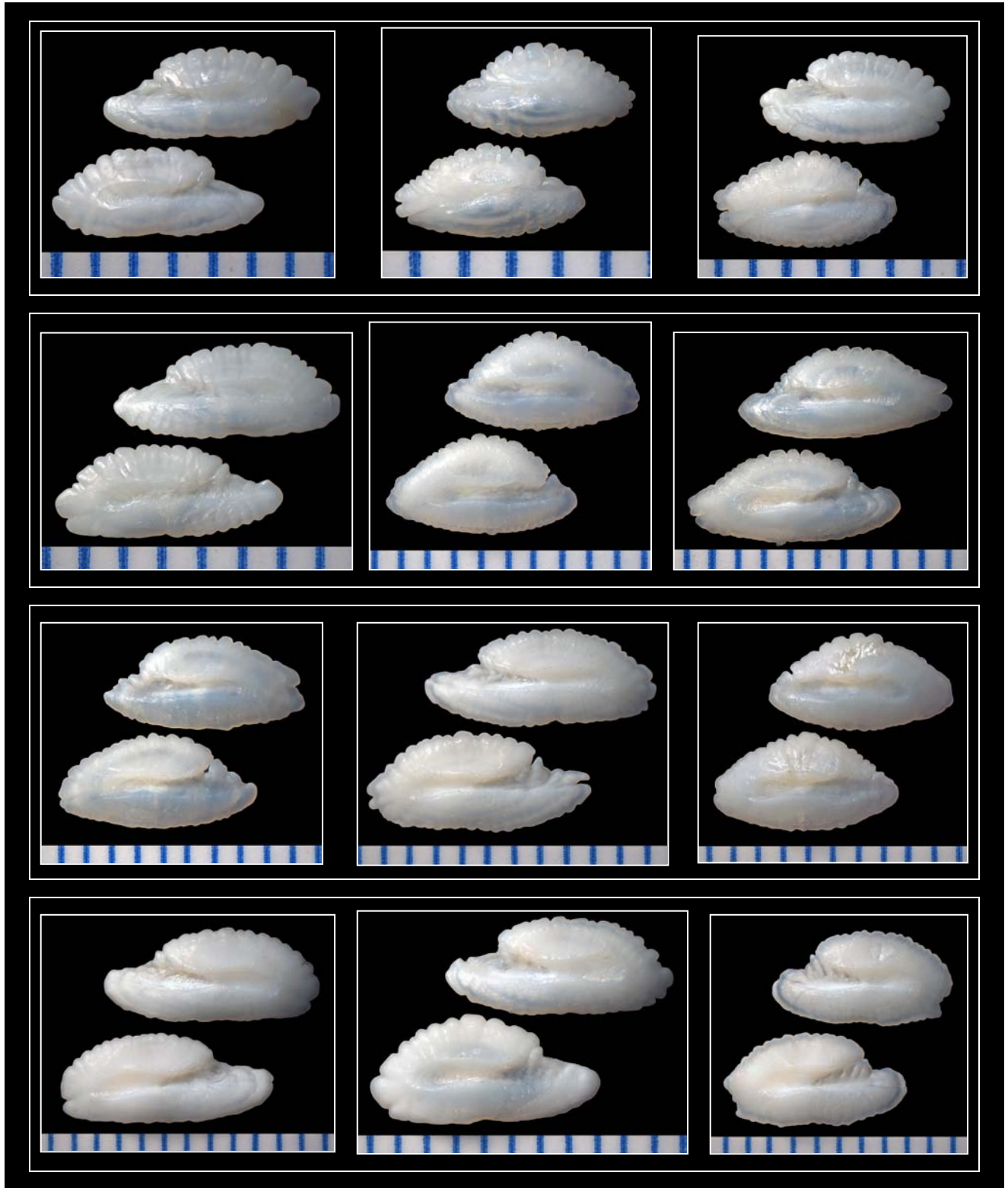
Cottidae

Leptocottus armatus, staghorn sculpin, LACM 56706-1



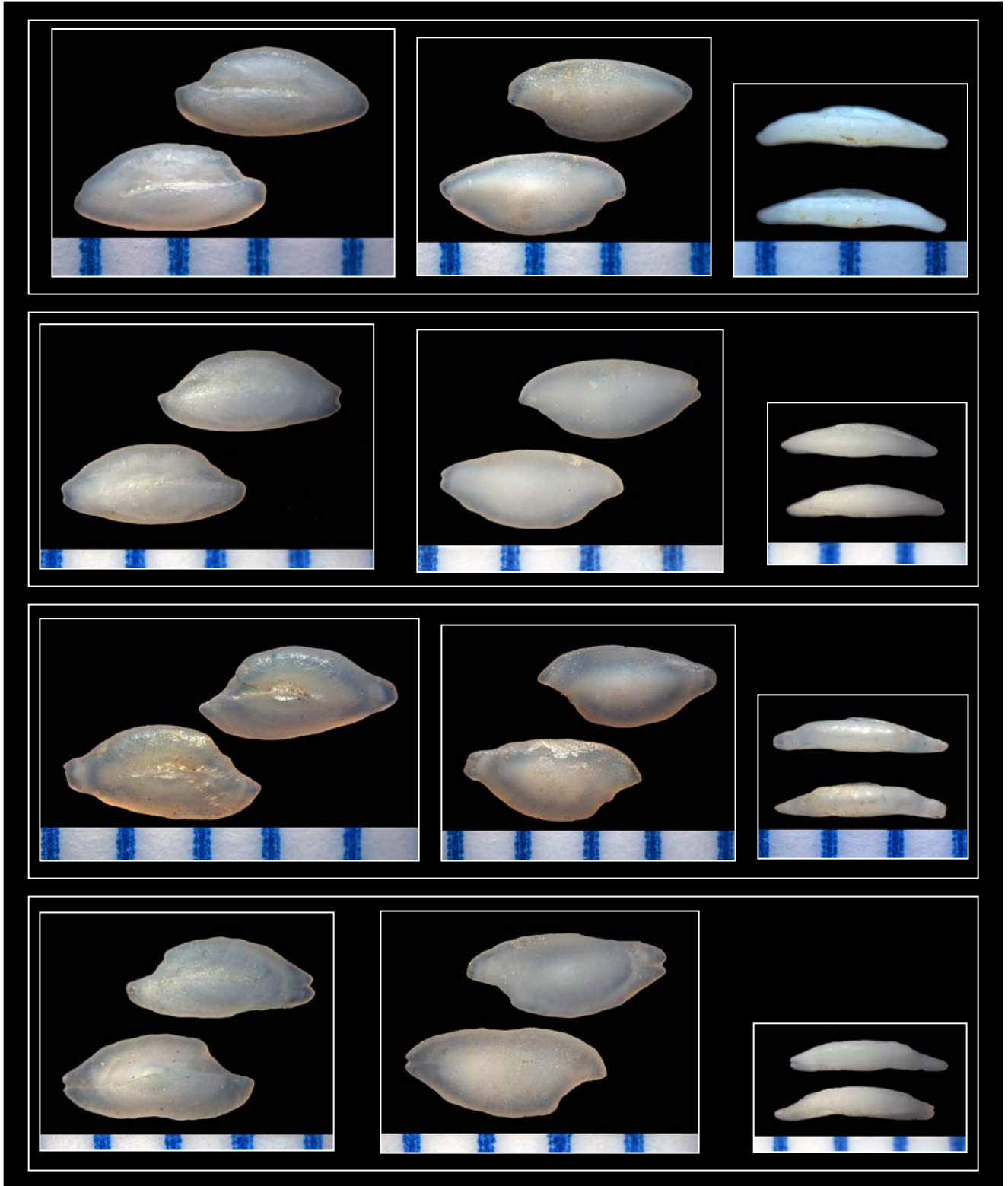
Cottidae

Leptocottus armatus, staghorn sculpin, LACM 56706-1



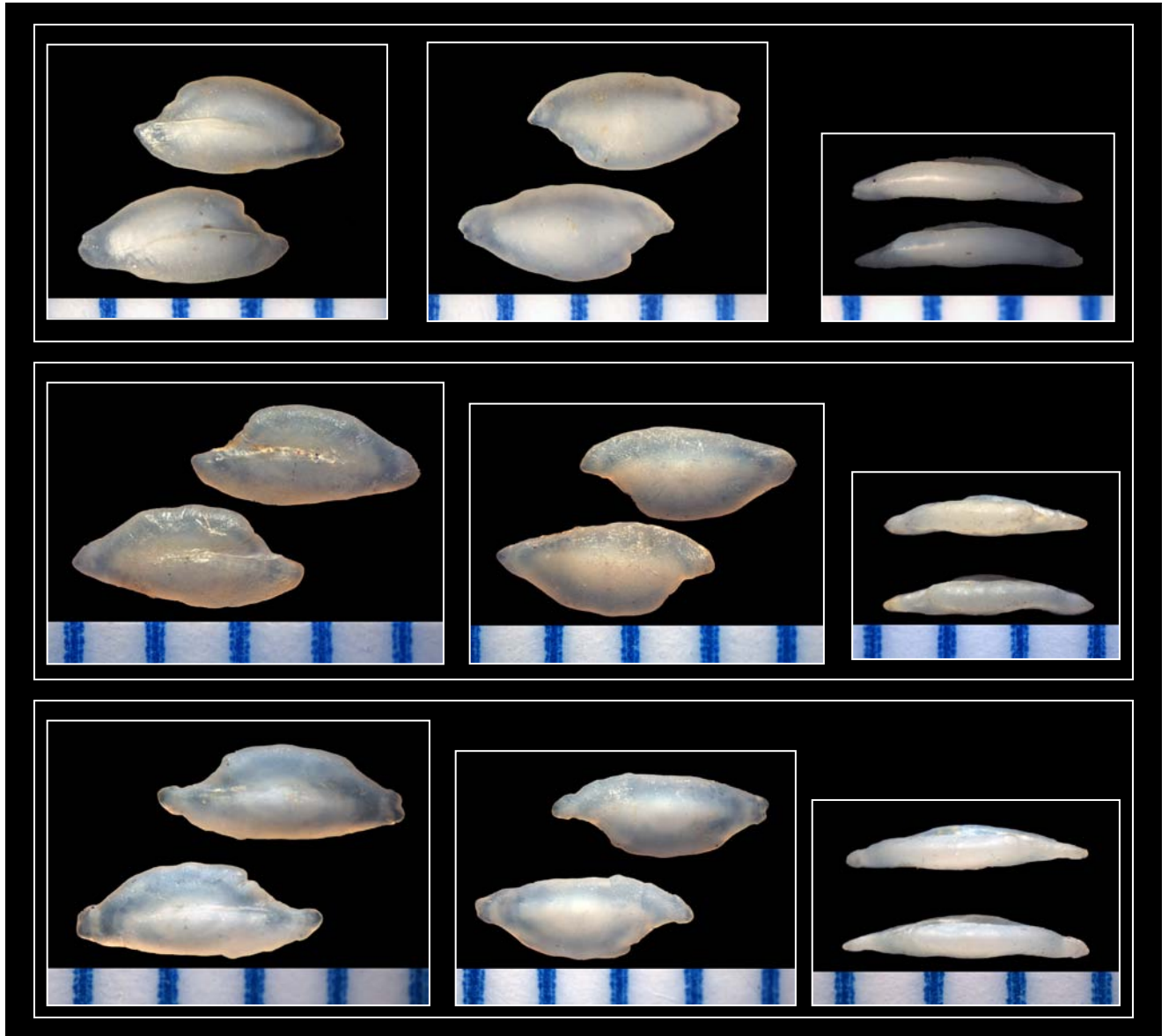
Cottidae

Orthonopias triacis, snubnose sculpin, LACM 56701-1



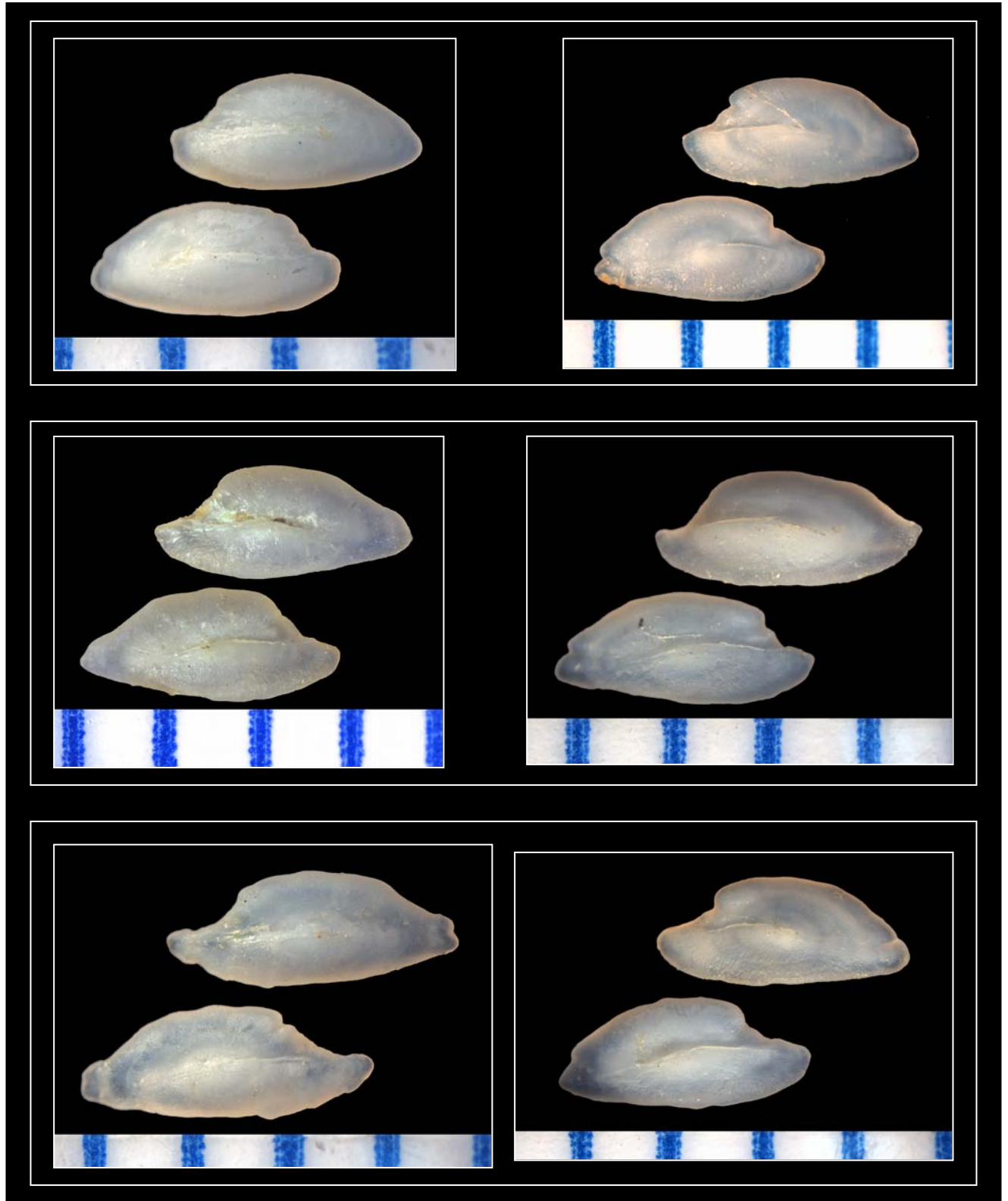
Cottidae

Orthonopias triacis, snubnose sculpin, LACM 56701-1



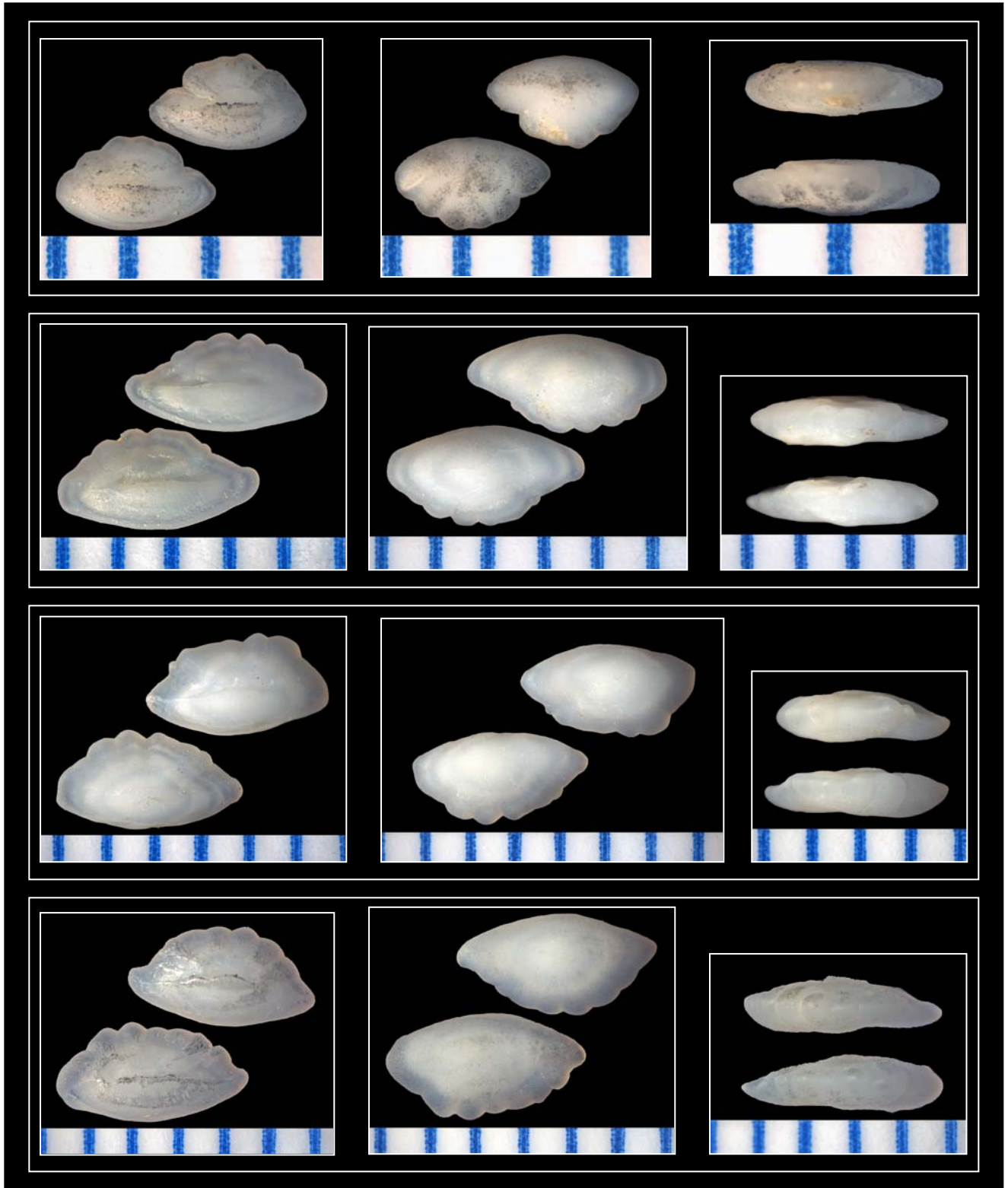
Cottidae

Orthonopias triacis, snubnose sculpin, LACM 56701-1



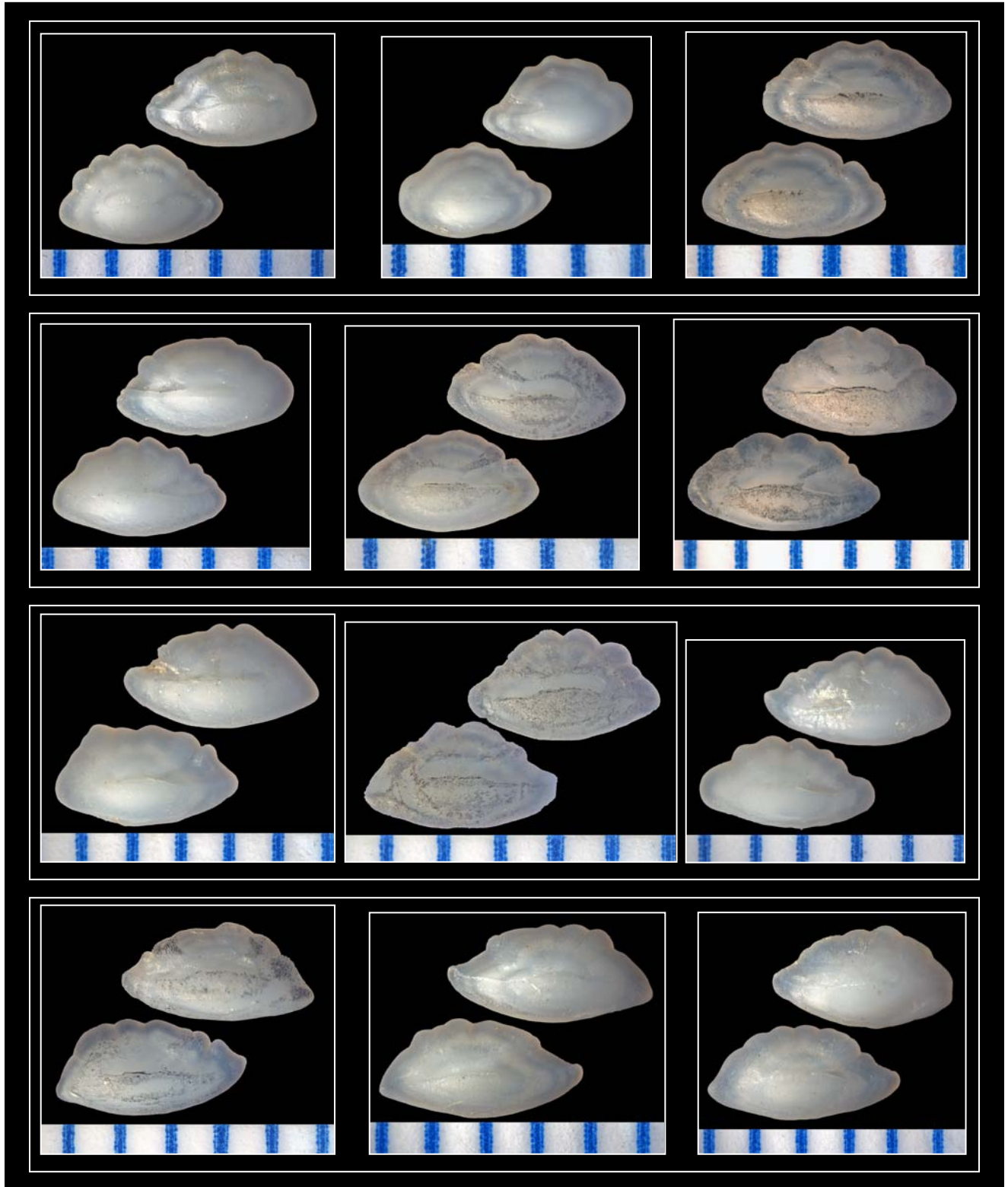
Cottidae

Radulinus asprellus, slim sculpin, LACM 56703-1



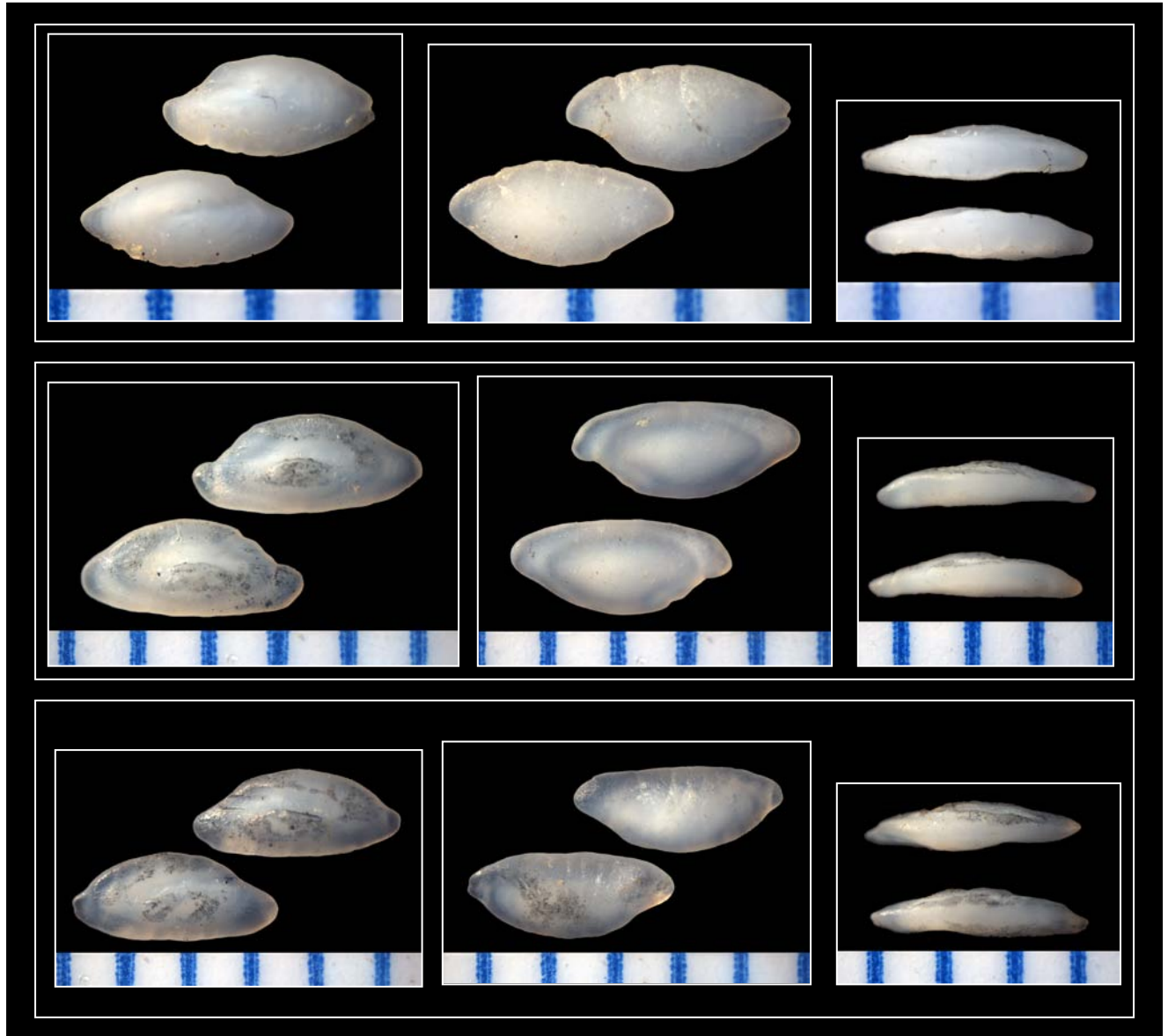
Cottidae

Radulinus asprellus, slim sculpin, LACM 56703-1



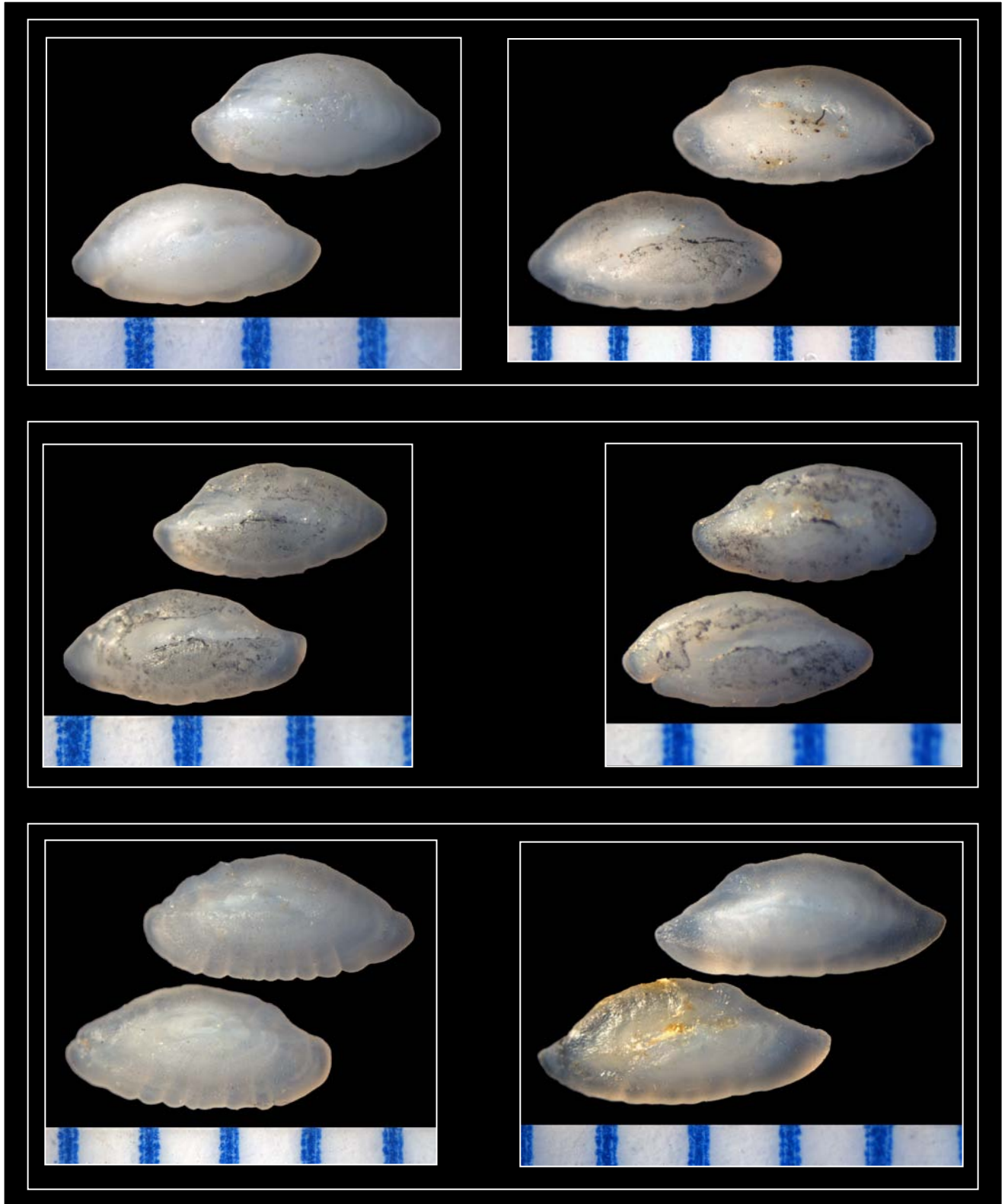
Cottidae

Ruscarius creaseri, roughcheek sculpin, LACM 56702-1



Cottidae

Ruscarius creaseri, roughcheek sculpin, LACM 56702-1



Agonidae

Xeneretmus ritteri, stripefin poacher, LACM 56682-1



Agonidae

Xeneretmus ritteri, stripefin poacher, LACM 56682-1



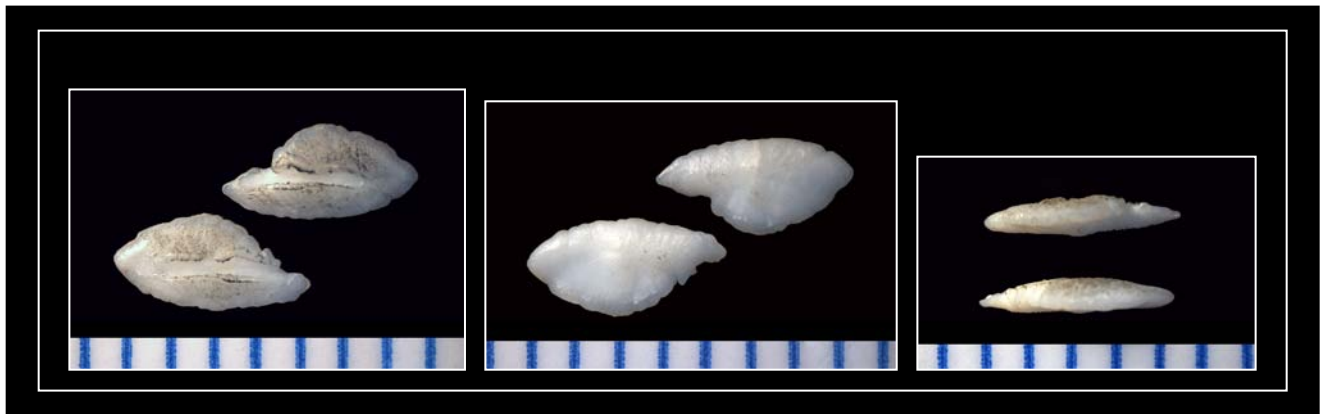
Agonidae

Xeneretmus triacanthus, bluespotted poacher, LACM 56679-1



Agonidae

Xeneretmus triacanthus, bluespotted poacher, LACM 56679-1



Agonidae

Xeneretmus triacanthus, bluespotted poacher, LACM 56679-1



Liparidae

Careproctus melanurus, blacktail snailfish, LACM 56719-1



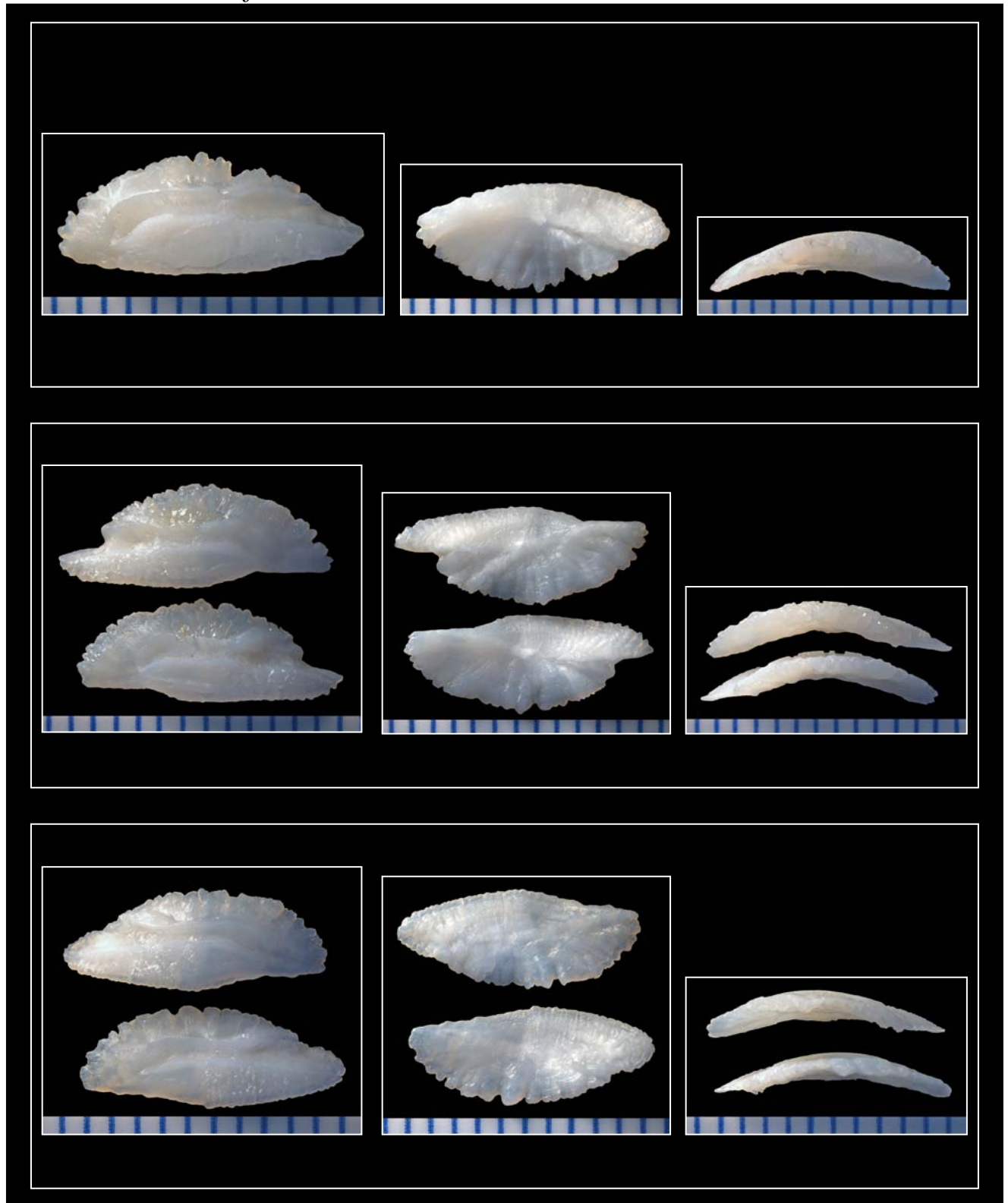
Serranidae

Paralabrax clathratus, kelp bass



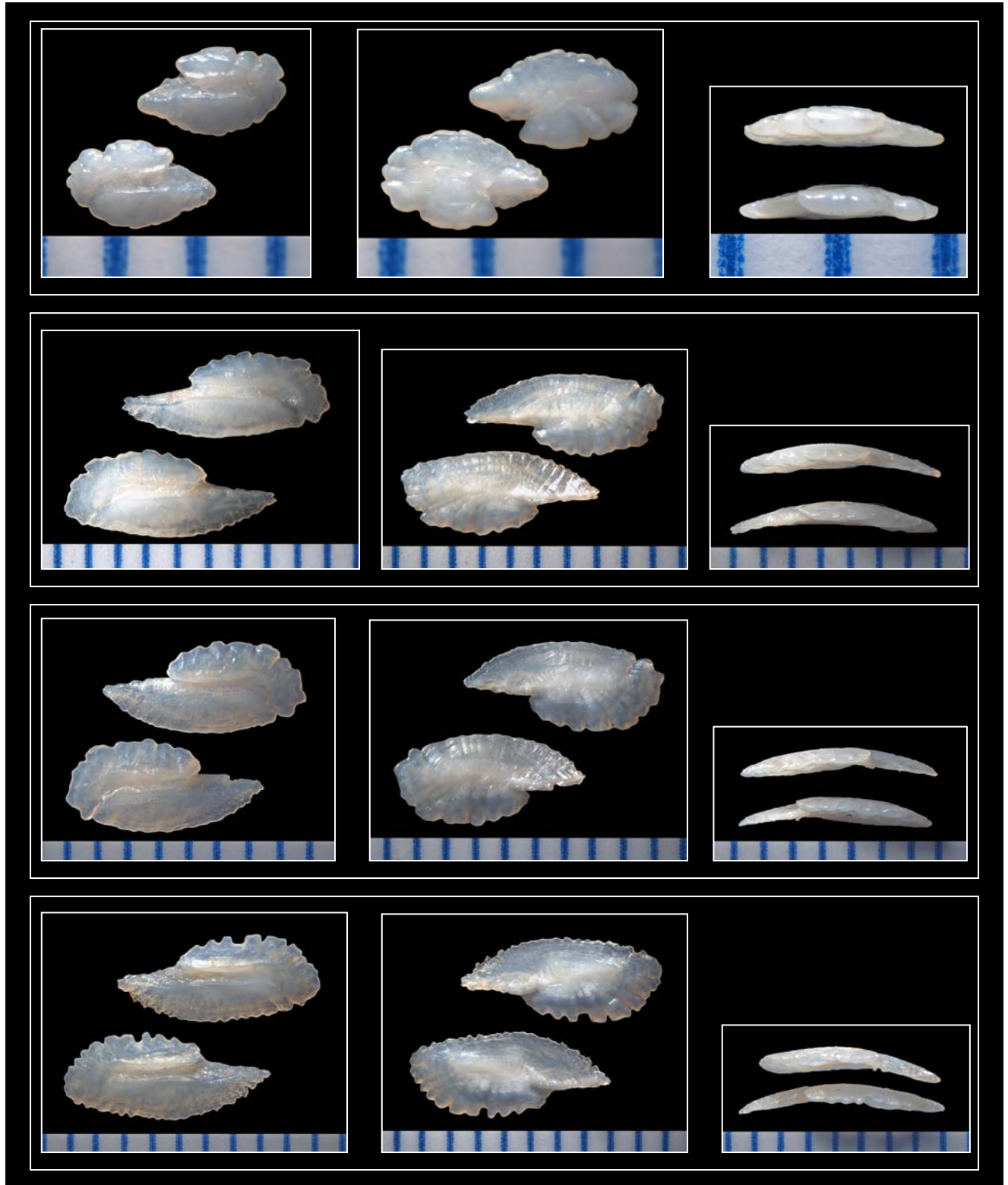
Serranidae

Paralabrax nebulifer, barred sand bass



Carangidae

Trachurus symmetricus, jack mackerel, LACM 56598-1



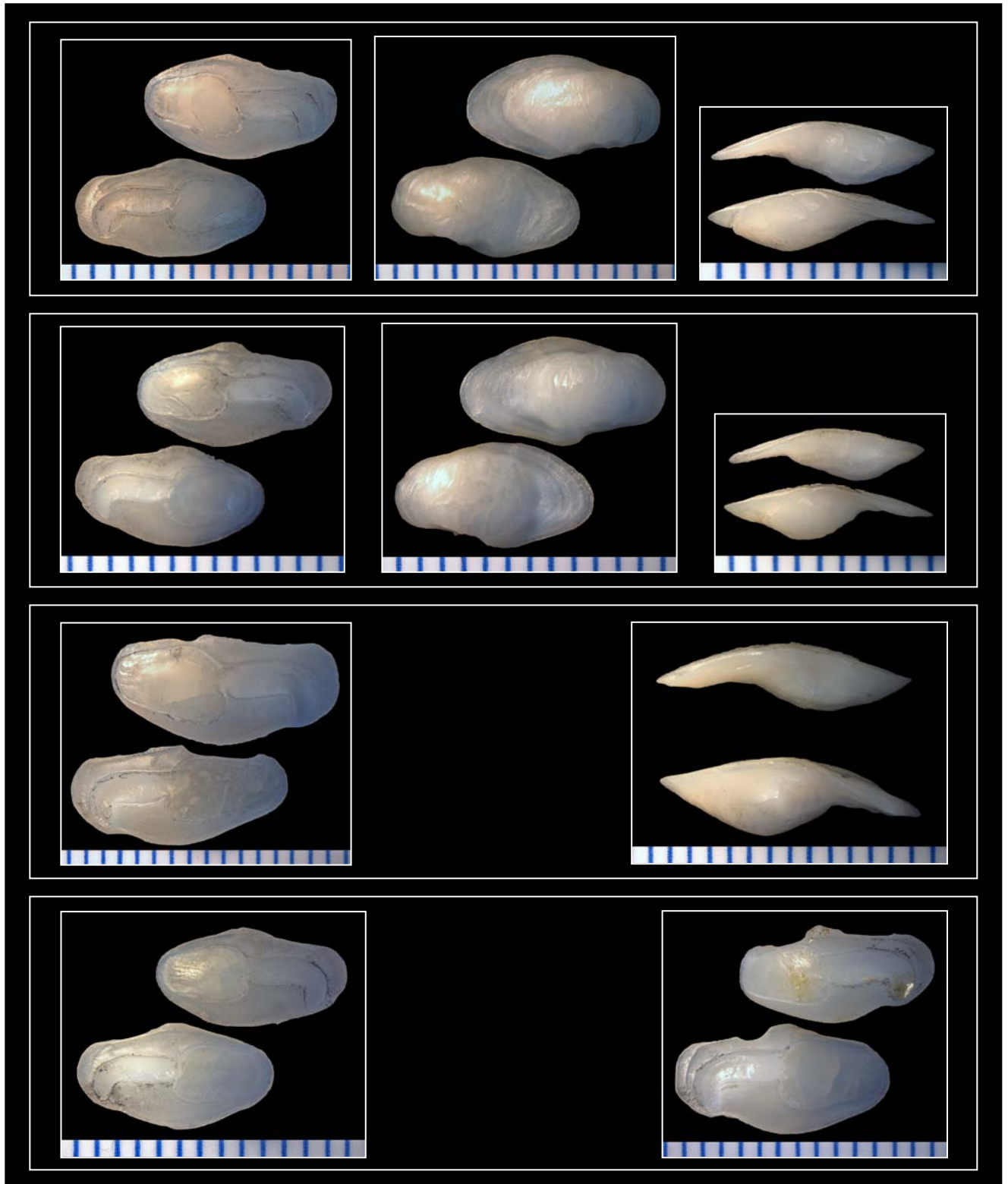
Carangidae

Trachurus symmetricus, jack mackerel, LACM 56598-1



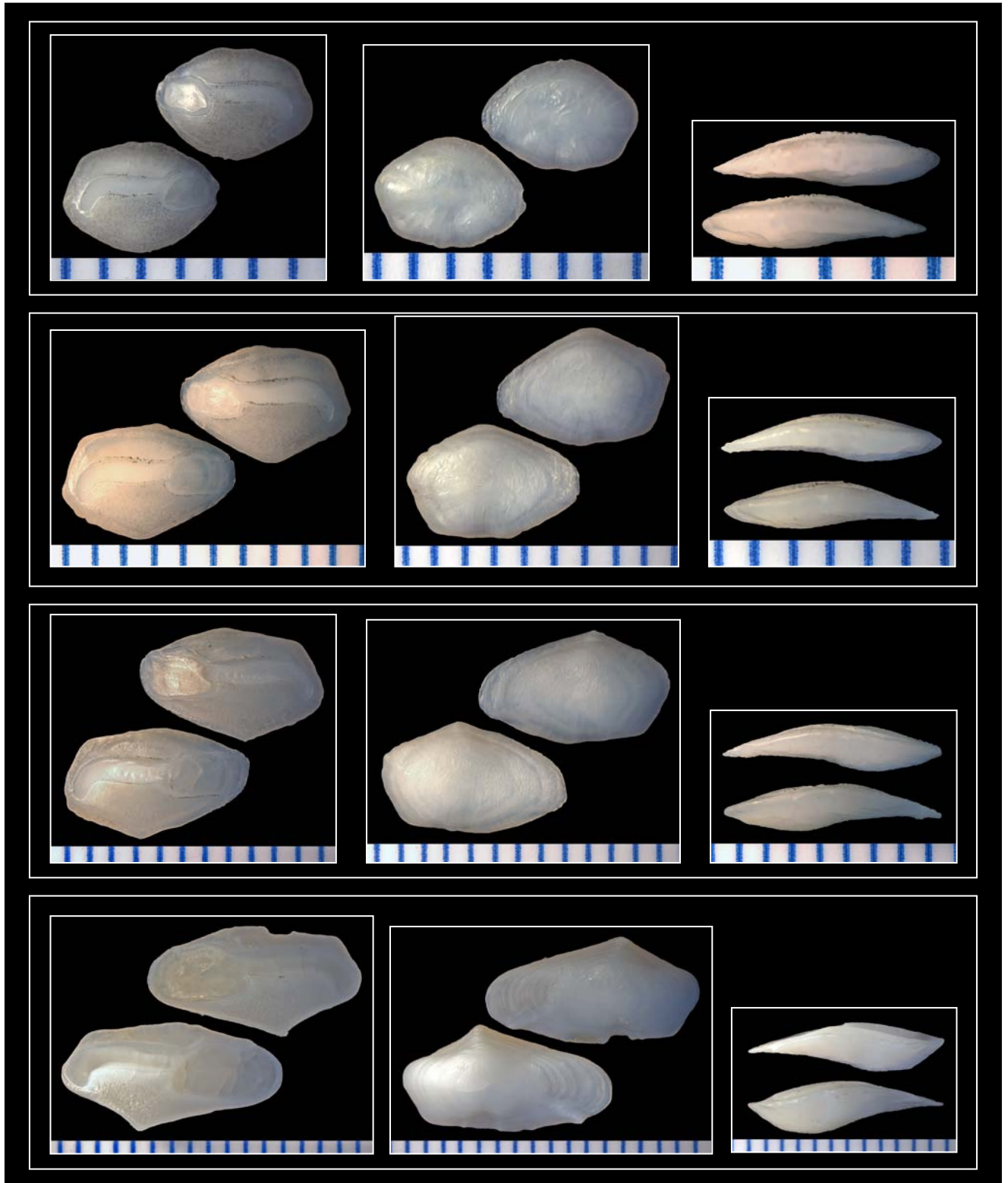
Sciaenidae

Genyonemus lineatus, white croaker, LACM 56673-1



Sciaenidae

Seriphus politus, queenfish, LACM 56696-1



Kyphosidae

Girella nigricans, opaleye, LACM 56686-1



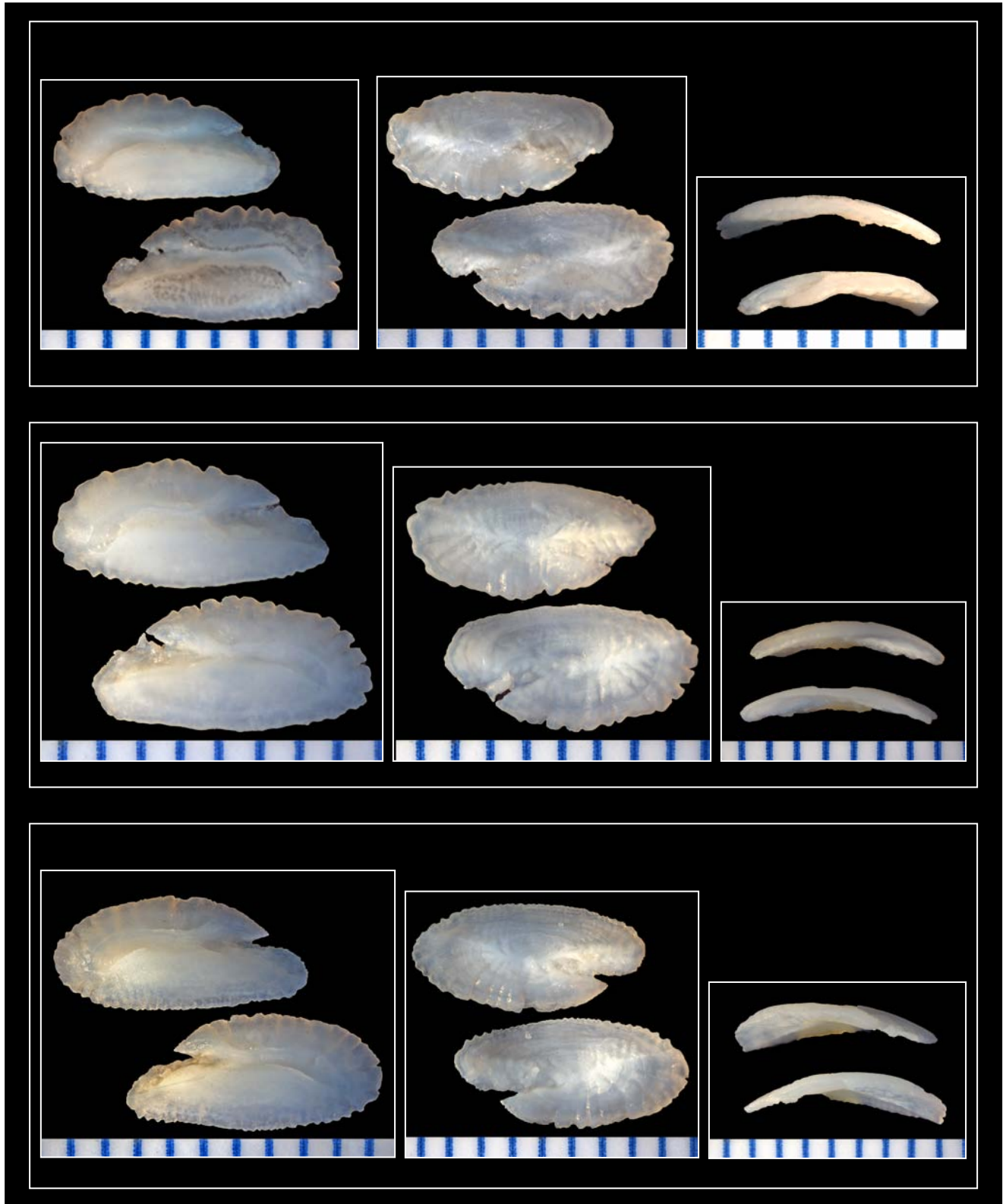
Kyphosidae

Girella nigricans, opaleye, LACM 56686-1



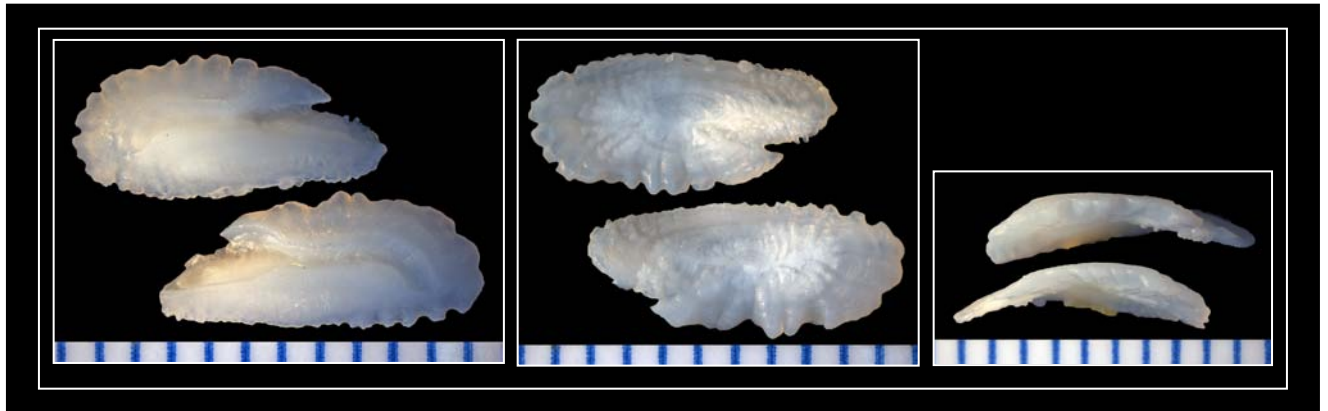
Kyphosidae

Medialuna californiensis, halfmoon, LACM 56660-1



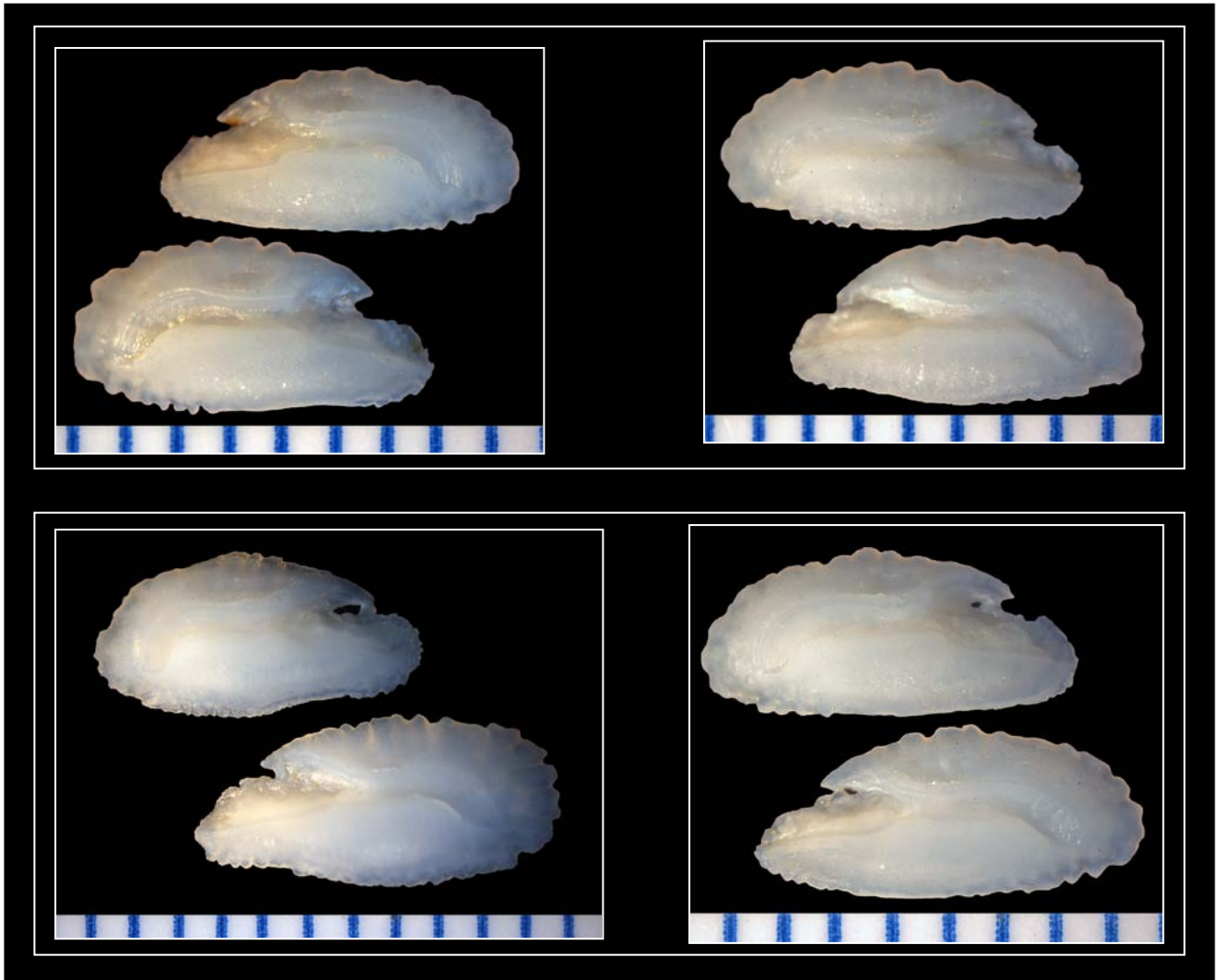
Kyphosidae

Medialuna californiensis, halfmoon, LACM 56660-1



Kyphosidae

Medialuna californiensis, halfmoon, LACM 56660-1



Embiotocidae

Cymatogaster aggregata, shiner surfperch, LACM 56662-1



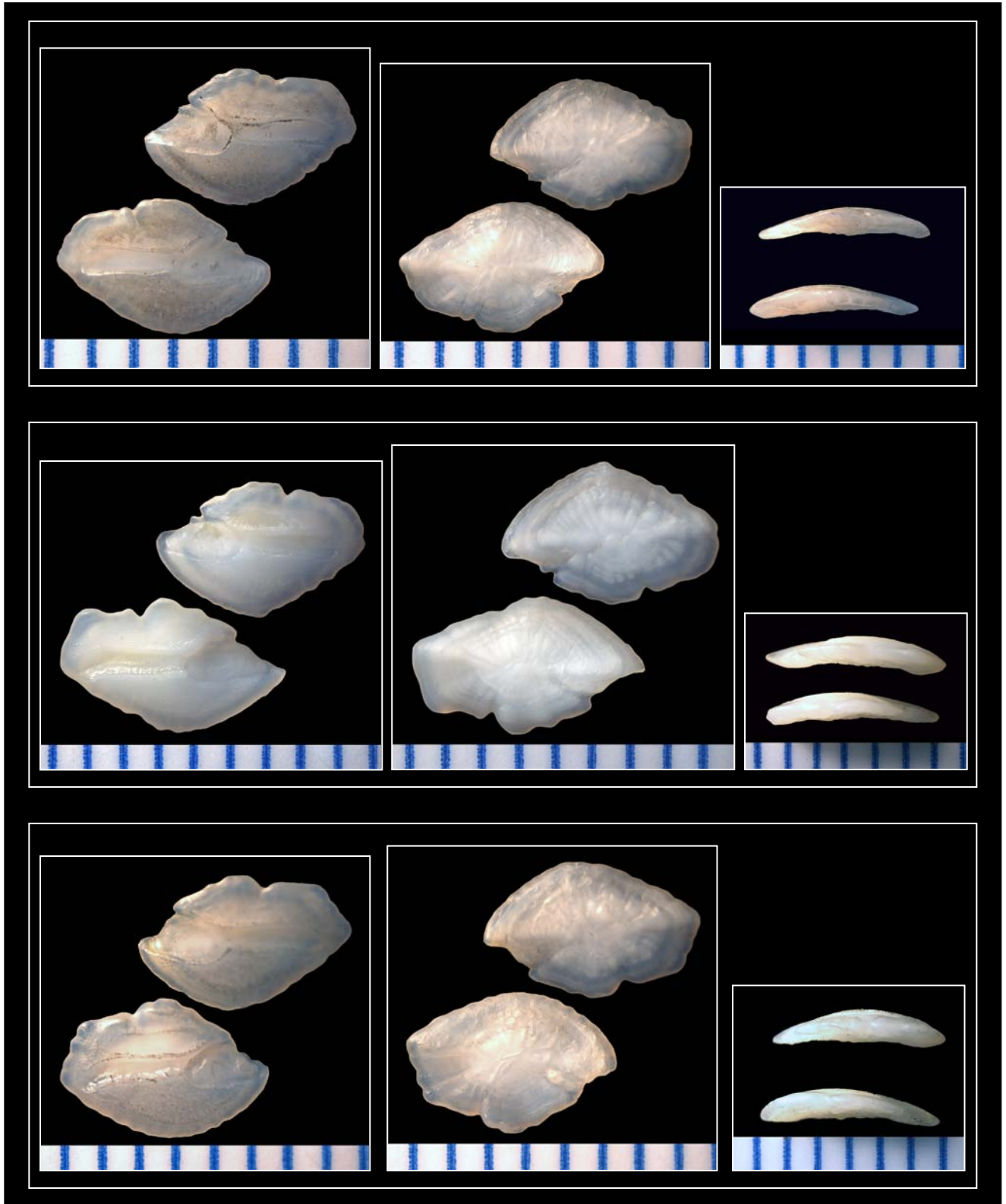
Embiotocidae

Cymatogaster aggregata, shiner surfperch, LACM 56662-1



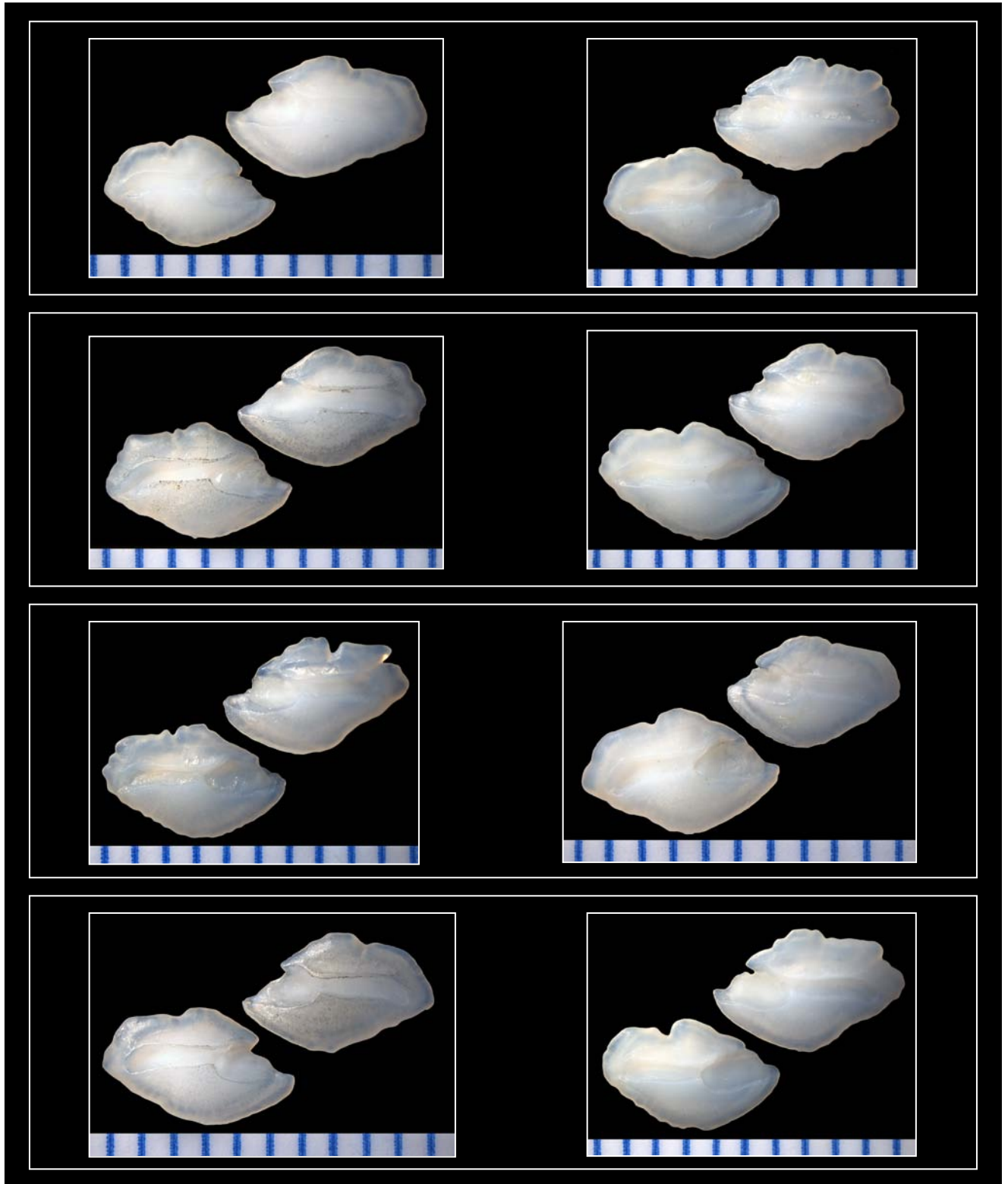
Embiotocidae

Cymatogaster aggregata gracilis, island surfperch, LACM 56663-1



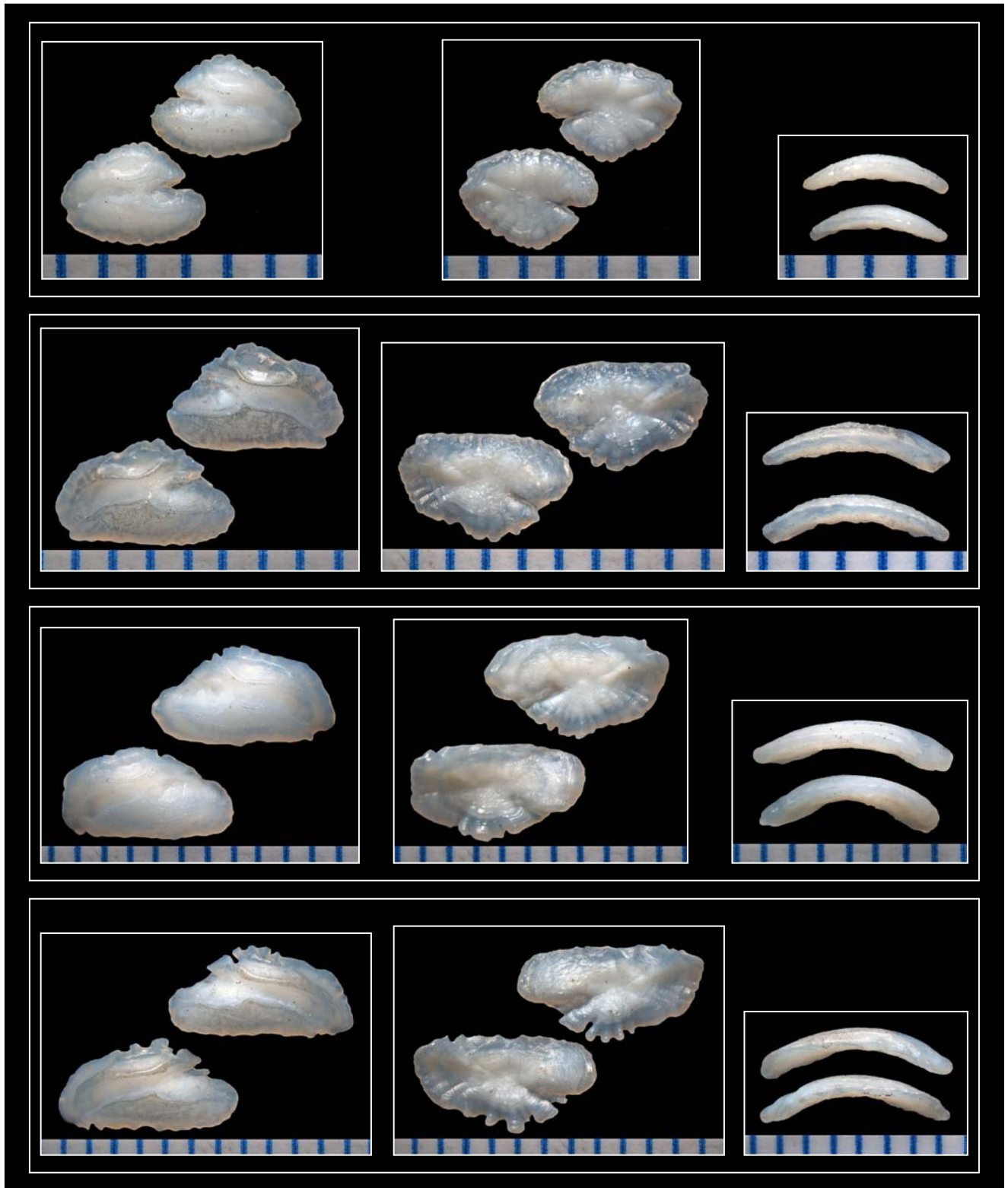
Embiotocidae

Cymatogaster aggregata gracilis, island surfperch, LACM 56663-1



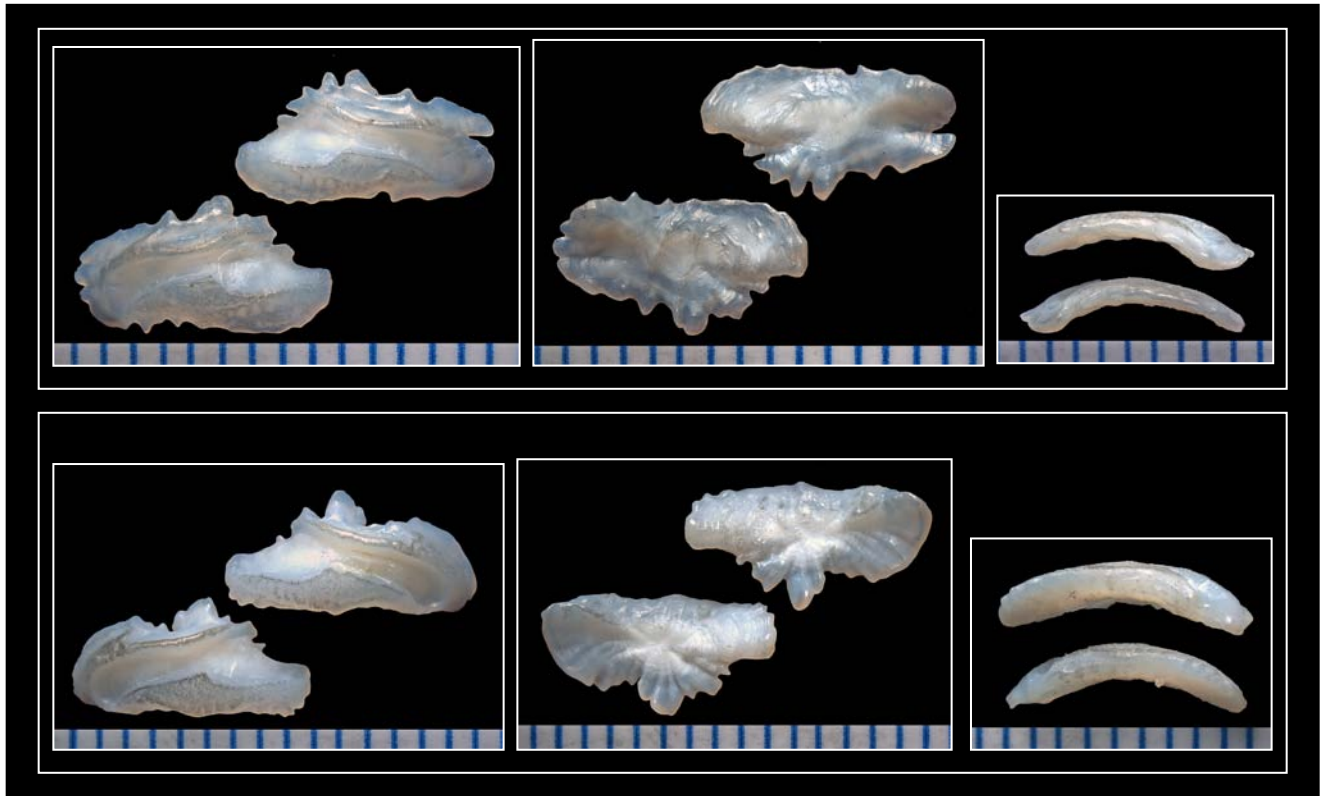
Embiotocidae

Embiotoca jacksoni, black surfperch, LACM 56721-1



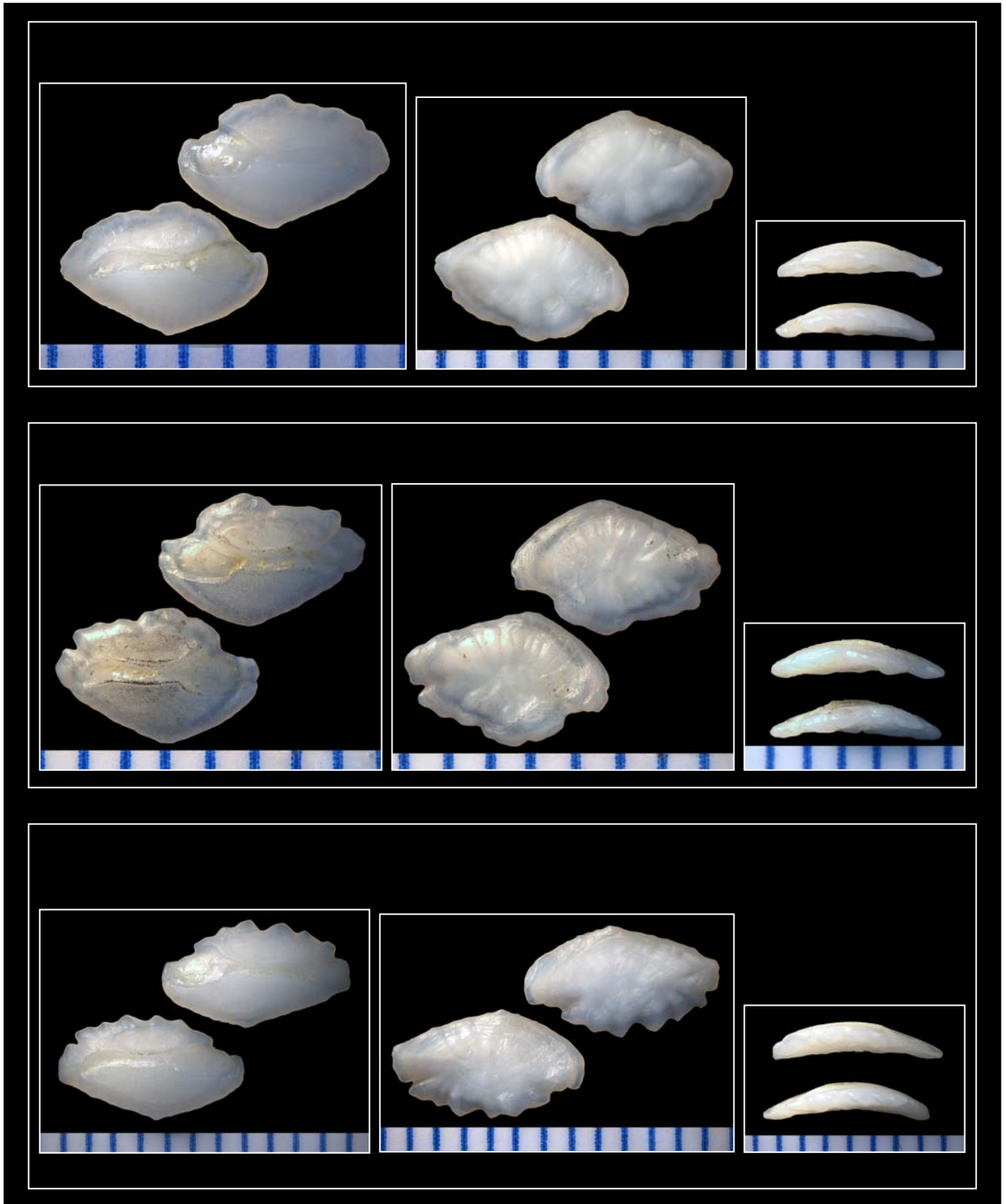
Embiotocidae

Embiotoca jacksoni, black surfperch, LACM 56721-1



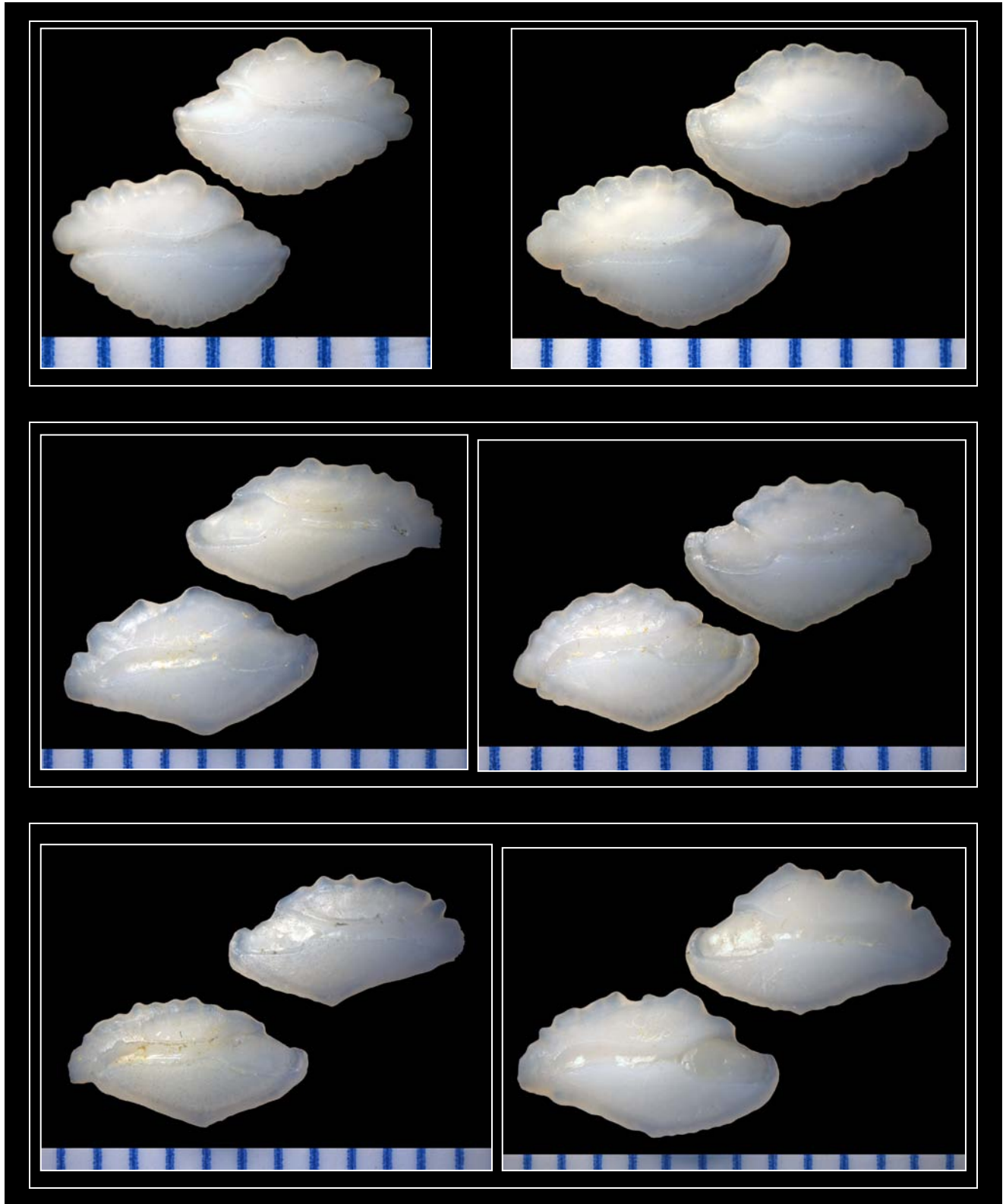
Embiotocidae

Hyperprosopon anale, spotfin surfperch, LACM 56664-1



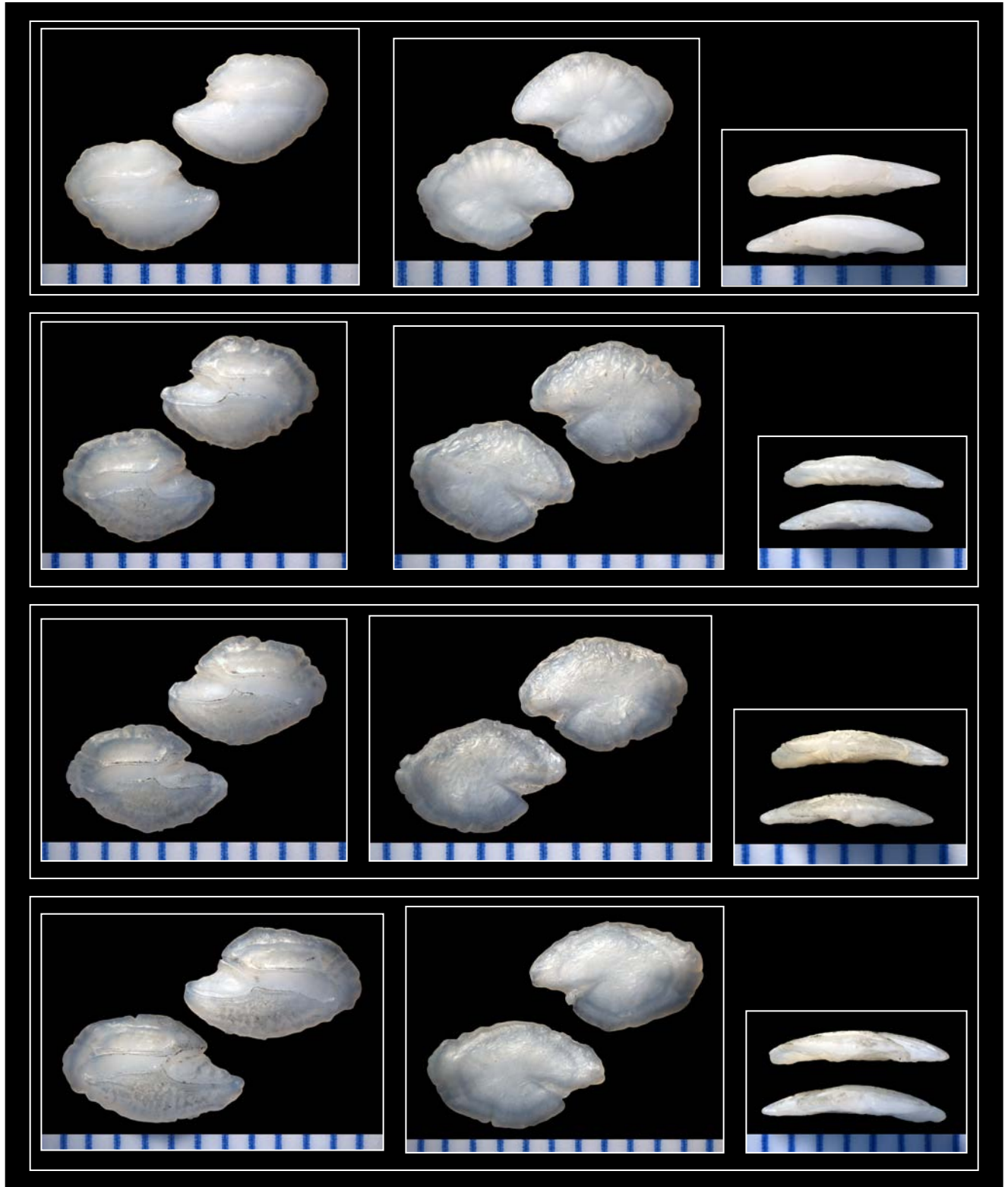
Embiotocidae

Hyperprosopon anale, spotfin surfperch, LACM 56664-1



Embiotocidae

Phanerodon furcatus, white surfperch, LACM 56694-1



Embiotocidae

Phanerodon furcatus, white surfperch, LACM 56694-1



Embiotocidae

Phanerodon furcatus, white surfperch, LACM 56694-1



Embiotocidae

Zalemnius rosaceus, pink surfperch, LACM 56661-1



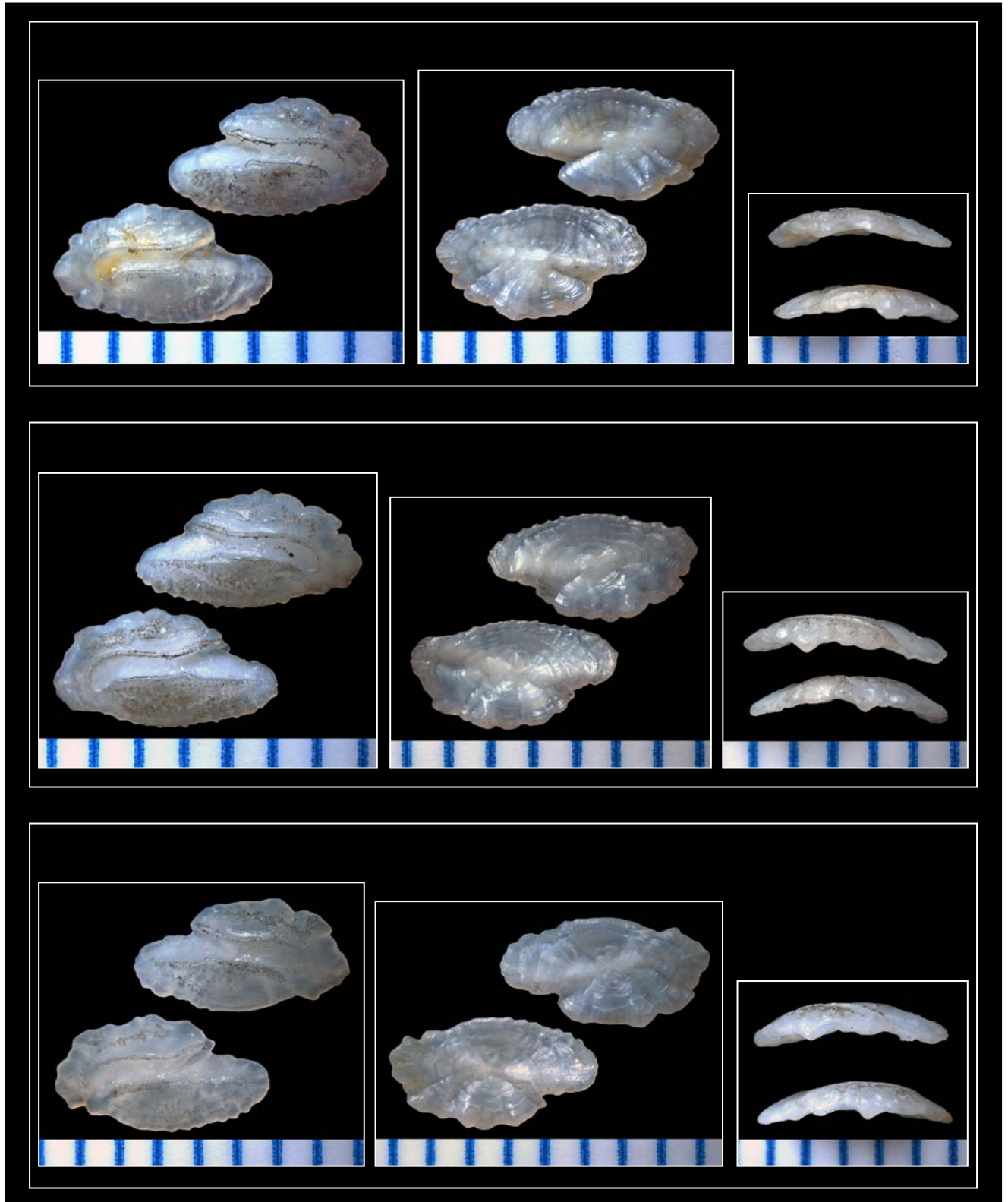
Embiotocidae

Zalemnius rosaceus, pink surfperch, LACM 56661-1



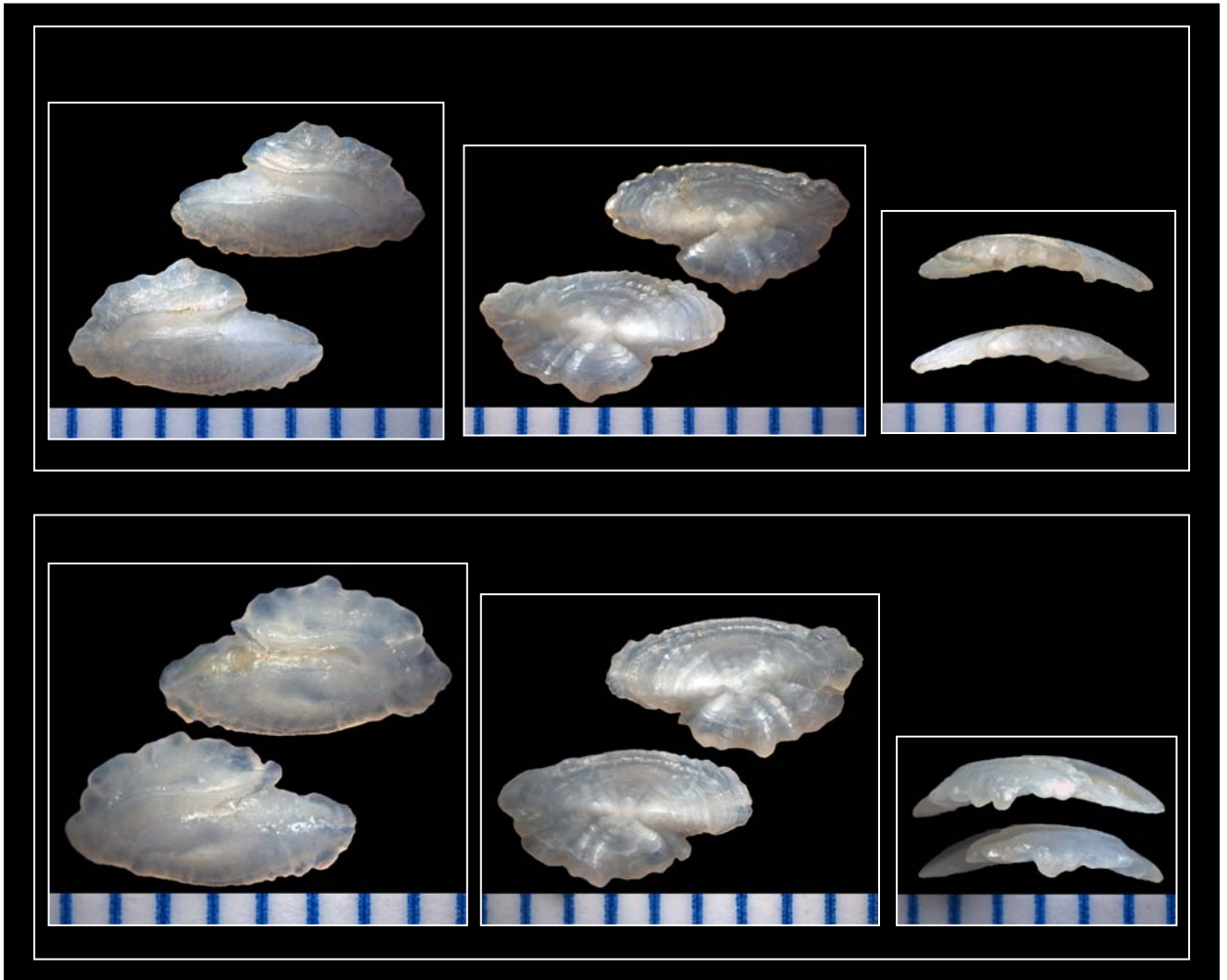
Pomacentridae

Chromis punctipinnis, blacksmith, LACM 56610-1



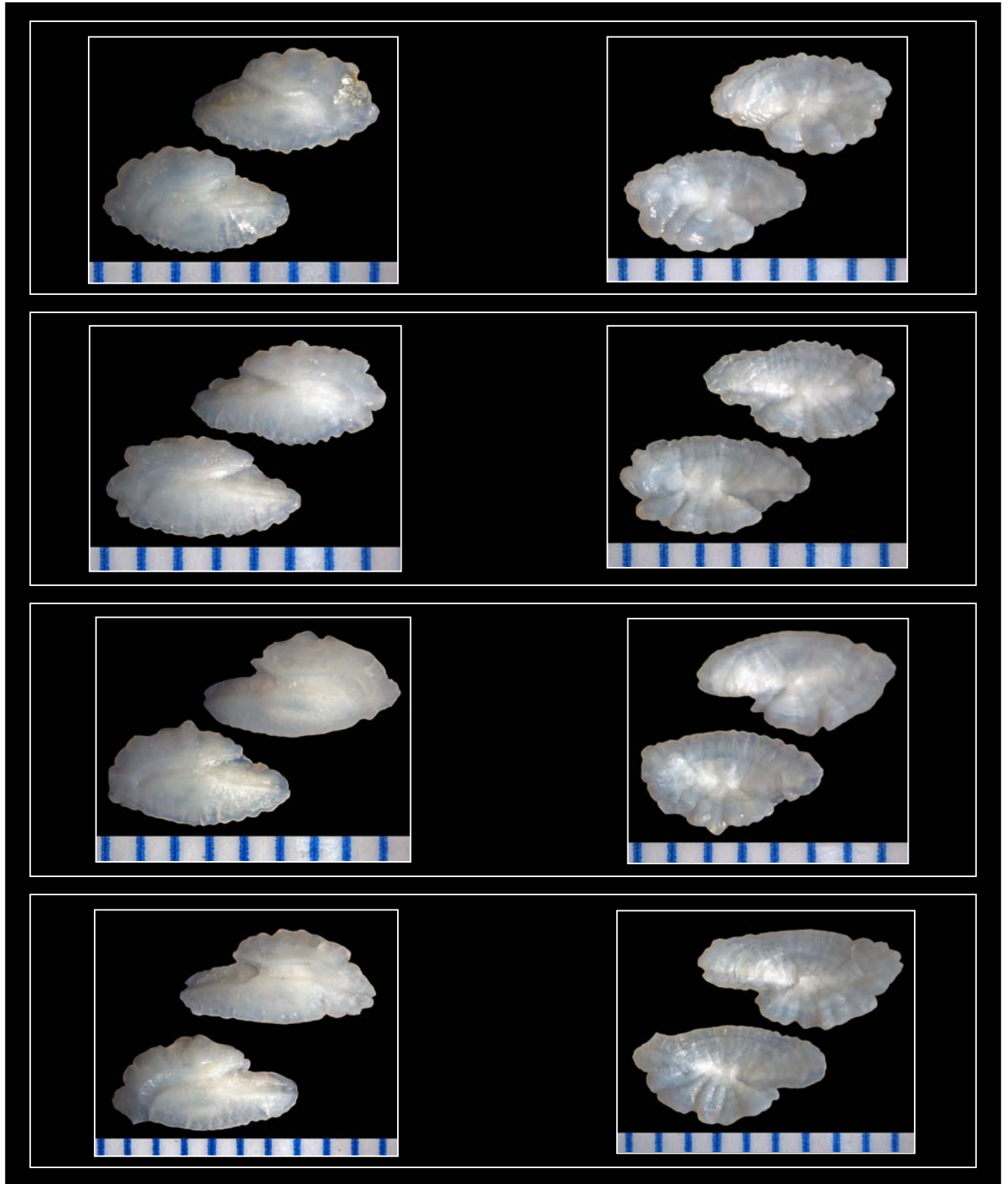
Pomacentridae

Chromis punctipinnis, blacksmith, LACM 56610-1



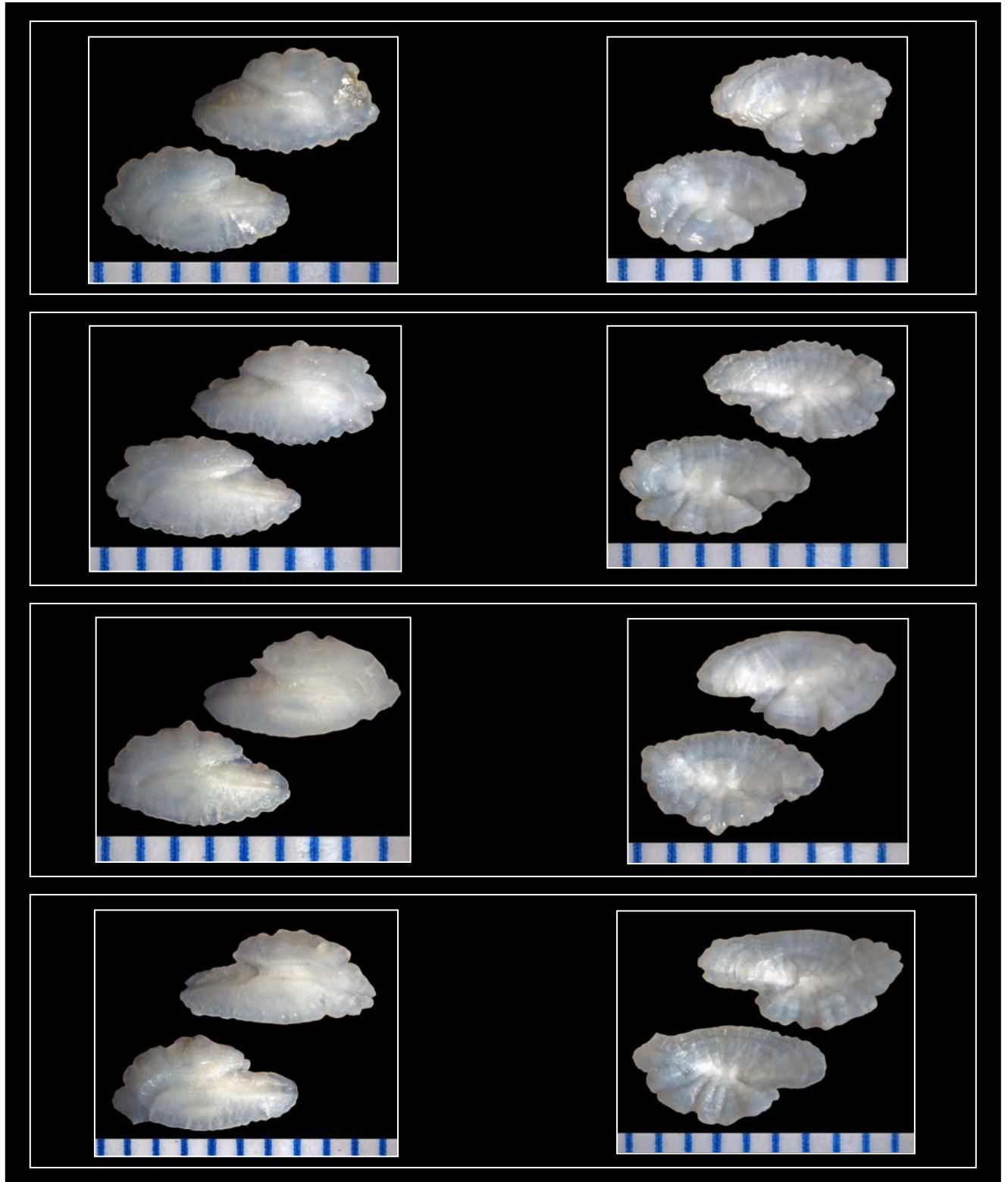
Pomacentridae

Chromis punctipinnis, blacksmith, LACM 56610-1



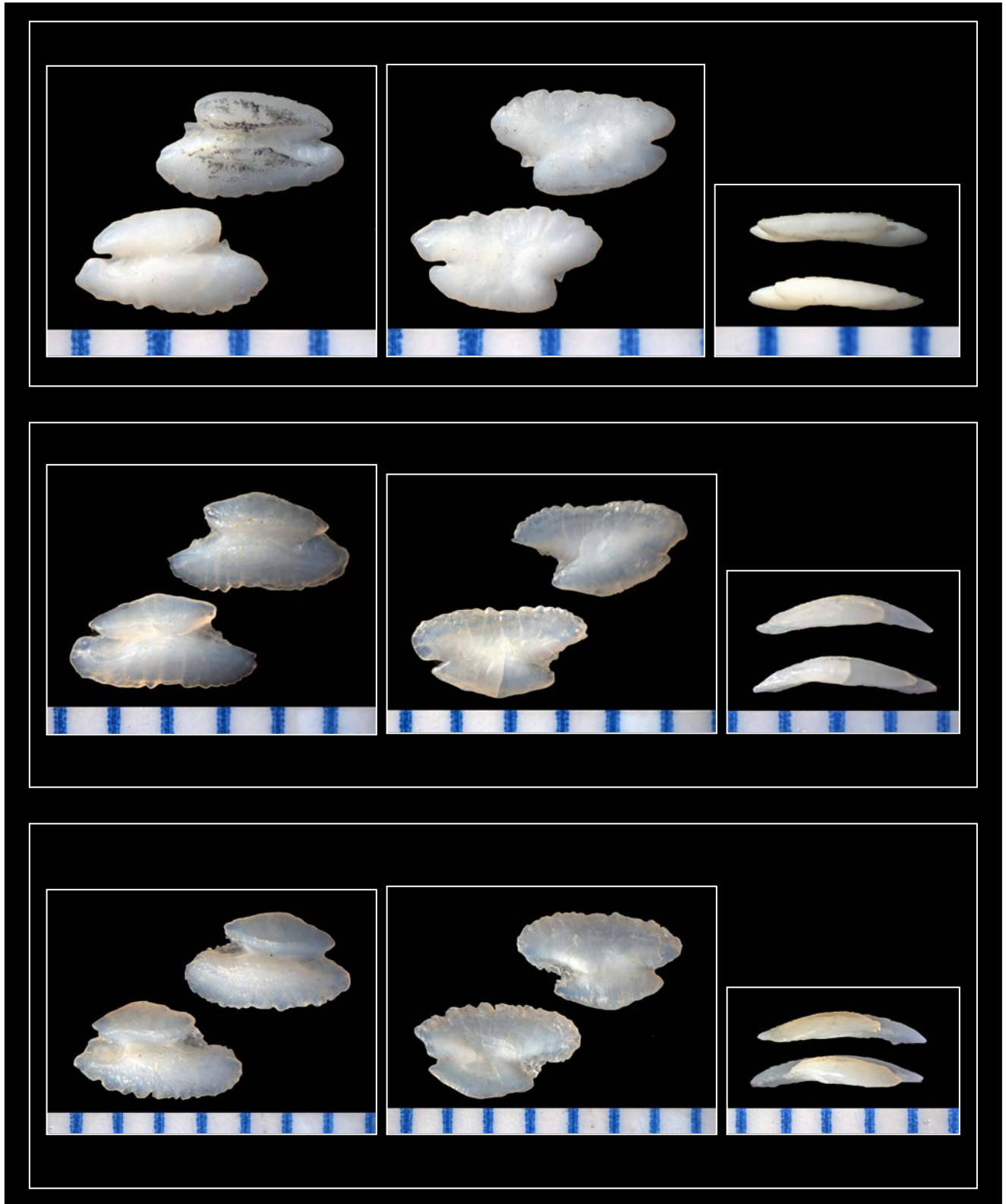
Pomacentridae

Chromis punctipinnis, blacksmith, LACM 56610-1



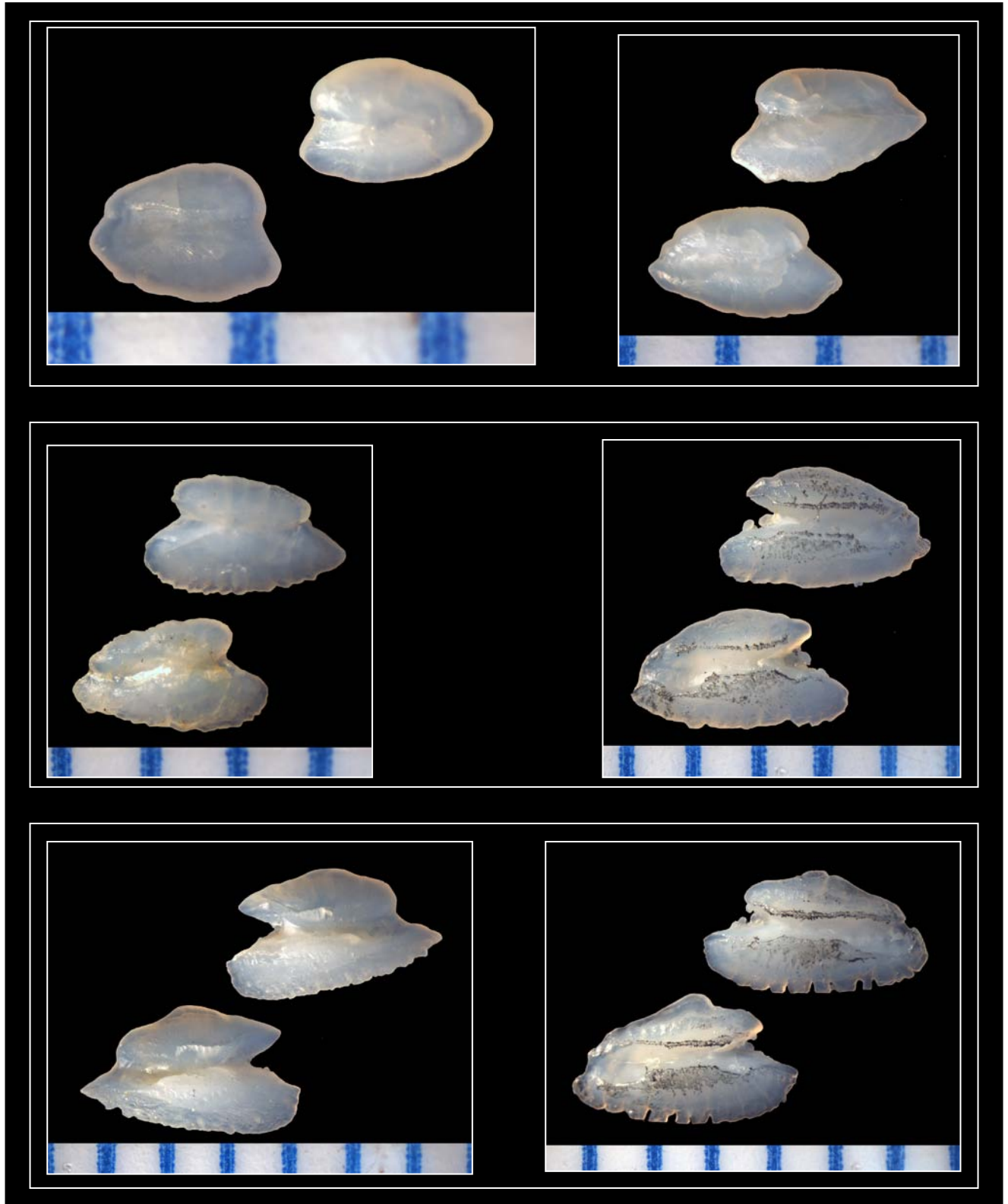
Labridae

Oxyjulis californica, señorita, LACM 56611-1



Labridae

Oxyjulis californica, señorita, LACM 56611-1



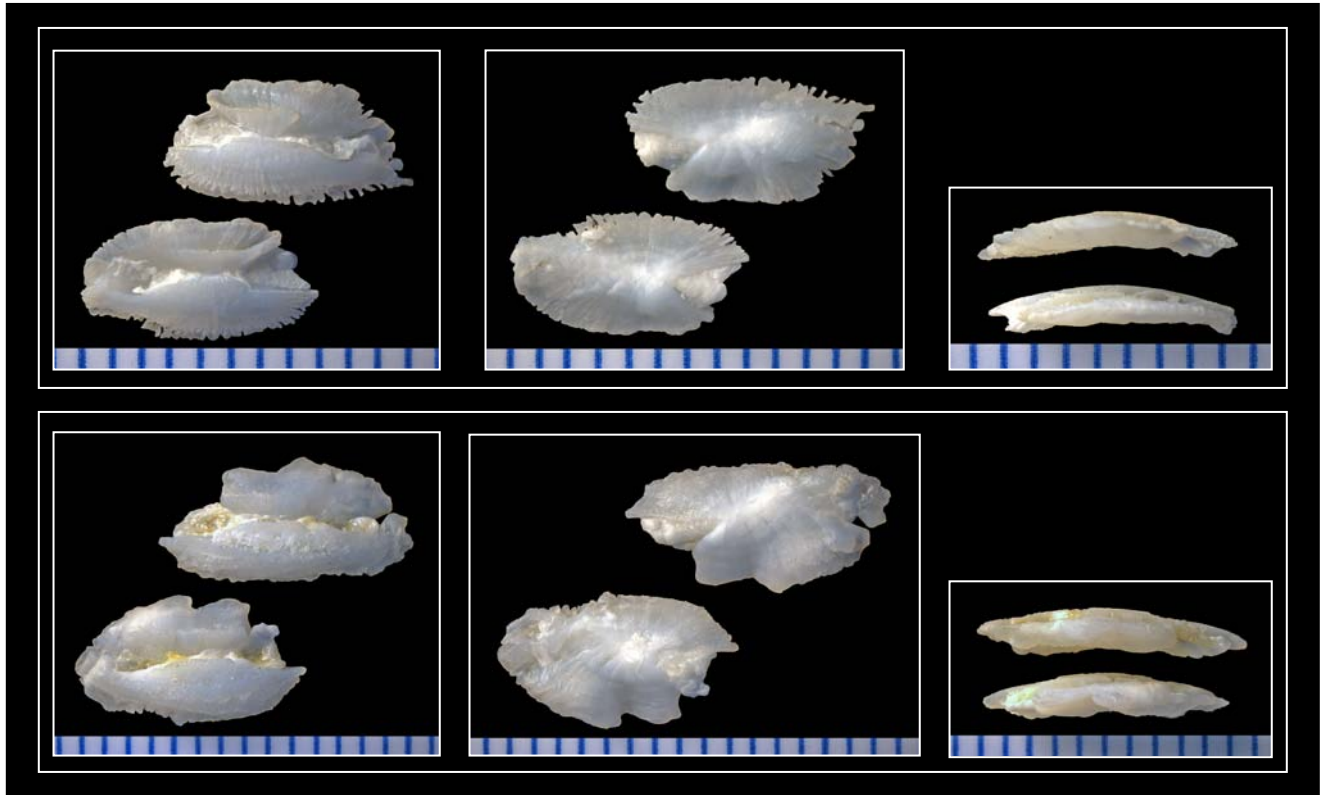
Labridae

Semicossyphus pulcher, California sheephead, LACM 56695-1



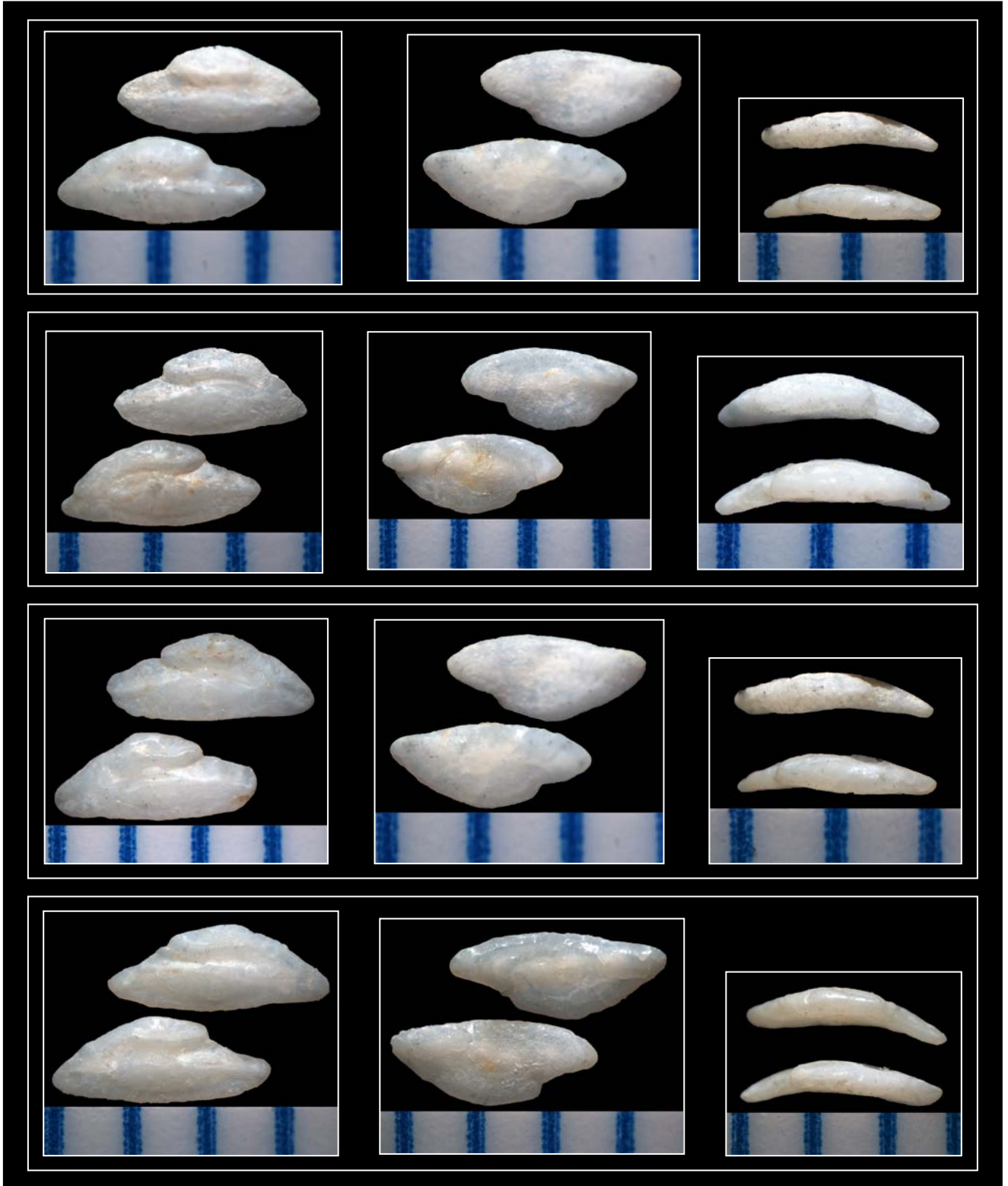
Labridae

Semicossyphus pulcher, California sheephead, LACM 56695-1



Bathymasteridae

Rathbunella hypoplecta, bluebanded ronquil, LACM 57267-1



Bathymasteridae

Rathbunella hypoplecta, bluebanded ronquil, LACM 57267-1



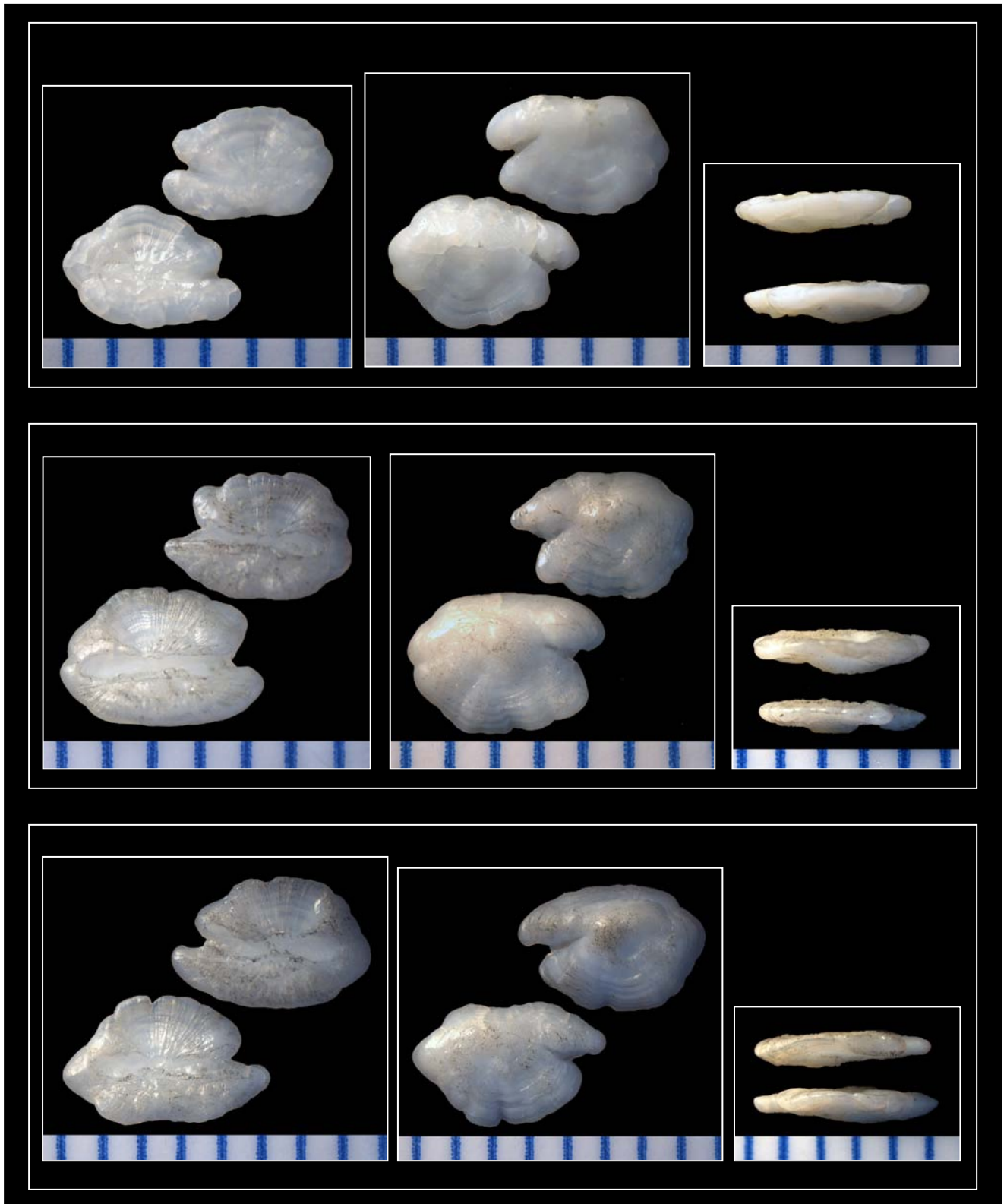
Bathymasteridae

Rathbunella hypoplecta, bluebanded ronquil, LACM 57267-1



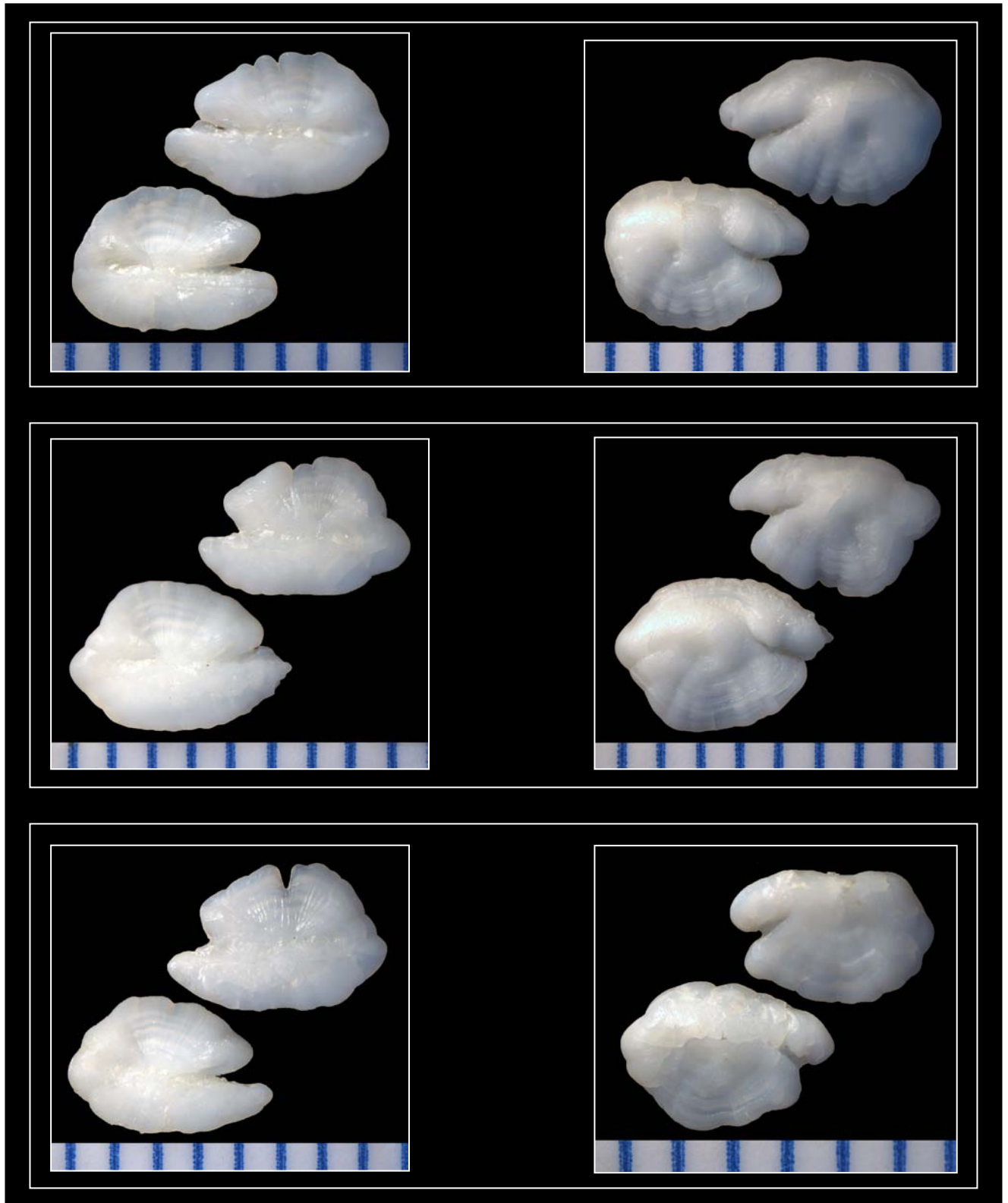
Zoarcidae

Lycodes cortezianus, Bigfin eelpout, LACM 56665-1



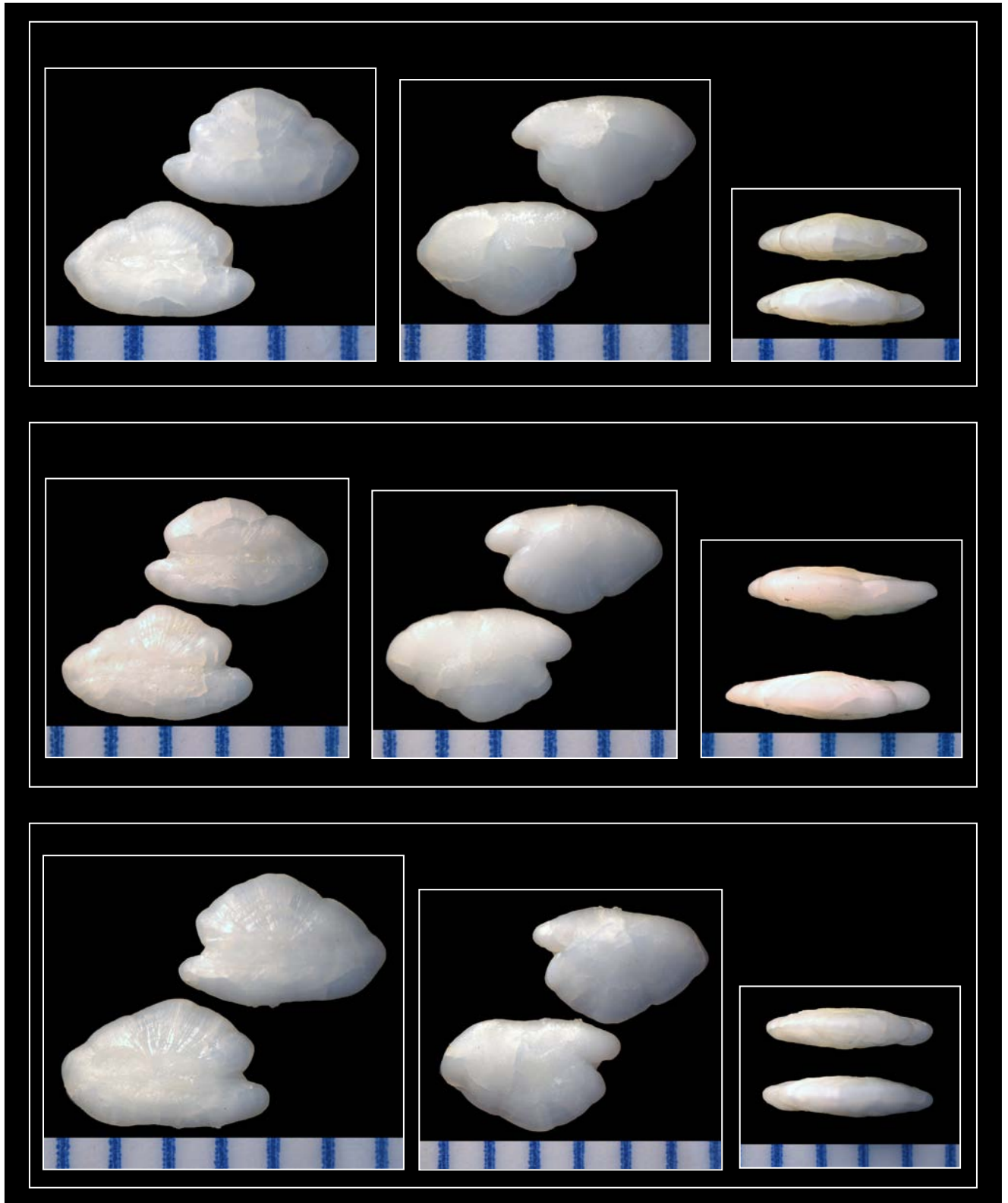
Zoarcidae

Lycodes cortezianus, Bigfin eelpout, LACM 56665-1



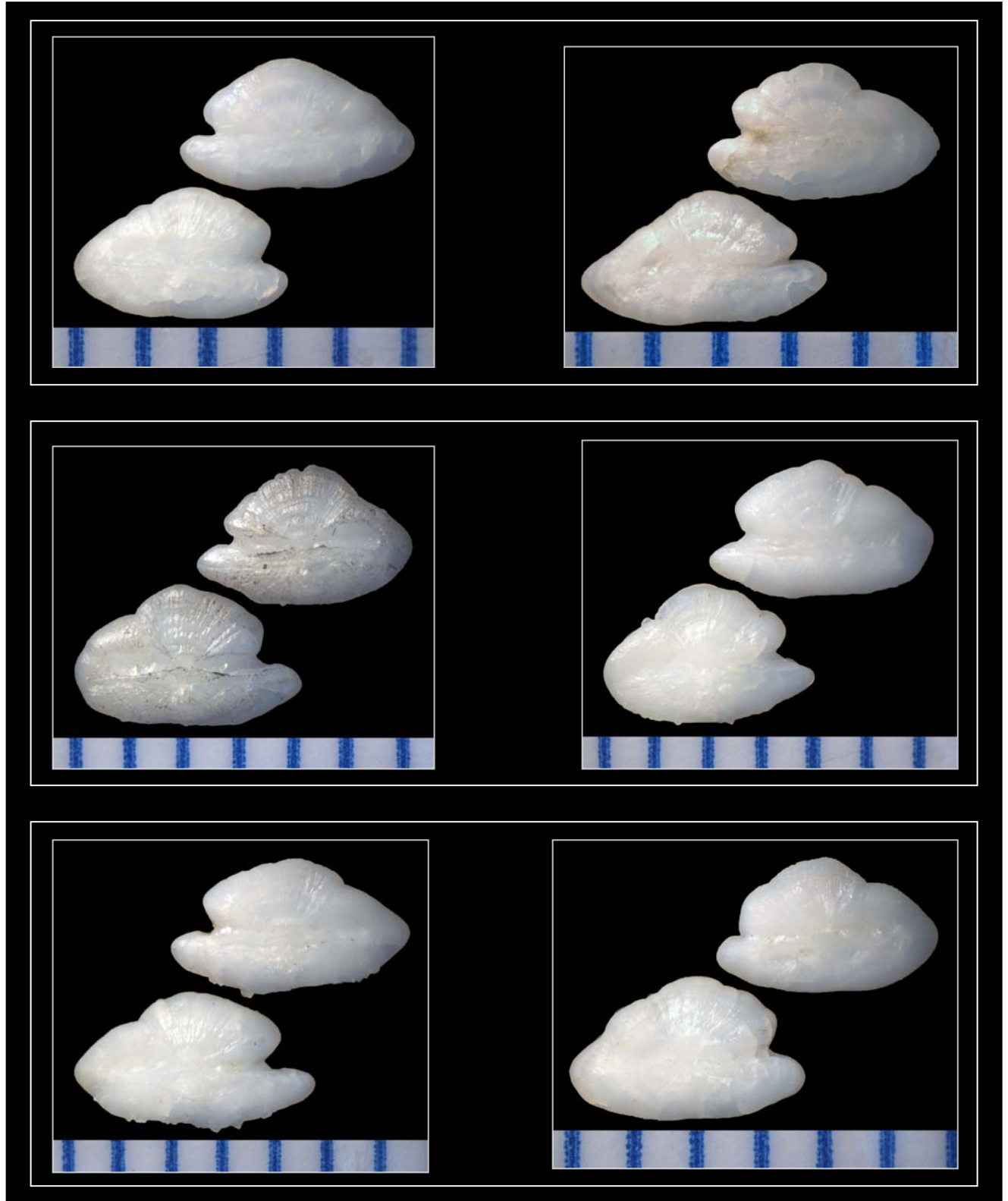
Zoarcidae

Lycodes pacificus, Blackbelly eelpout, LACM 56665-1



Zoarcidae

Lycodes pacificus, Blackbelly eelpout, LACM 56665-1



Zoarcidae

Lyconema barbatum, bearded eelpout, LACM 57265-1



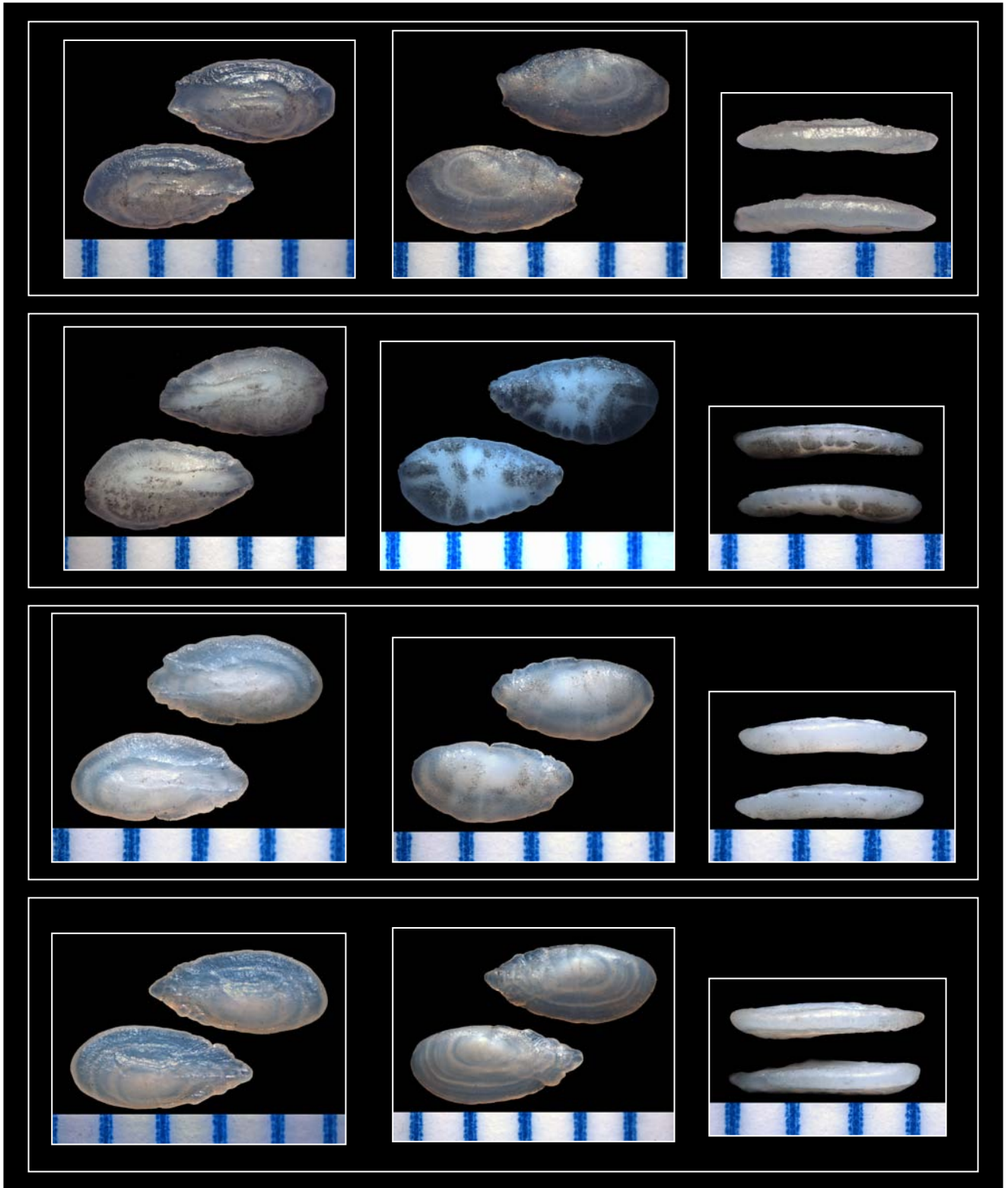
Zoarcidae

Lyconema barbatum, bearded eelpout, LACM 57265-1



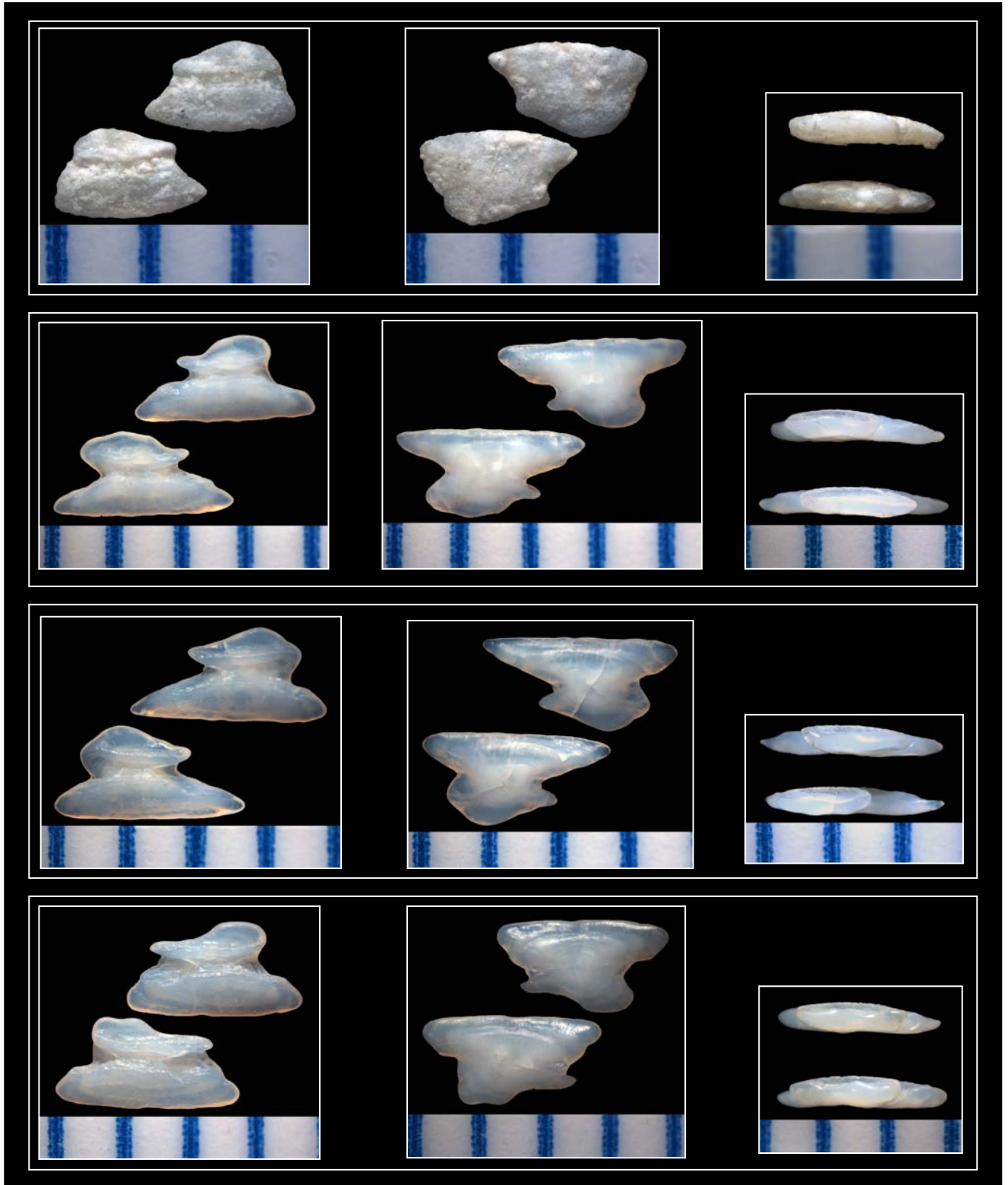
Ammodytidae

Ammodytes hexapterus, Pacific sandlance, LACM 56930-1



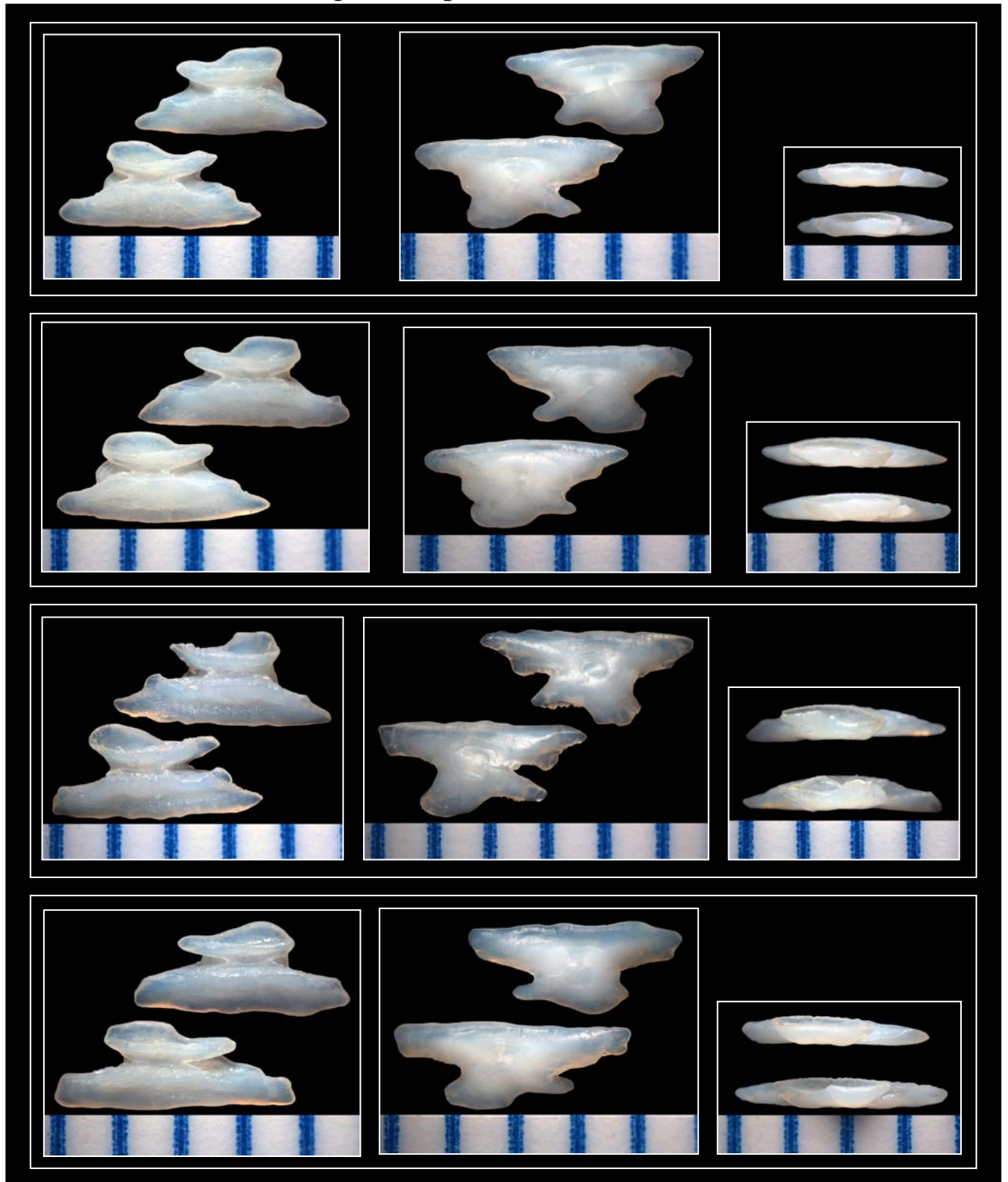
Clinidae

Heterostichus rostratus, giant kelpfish, LACM 57266-1



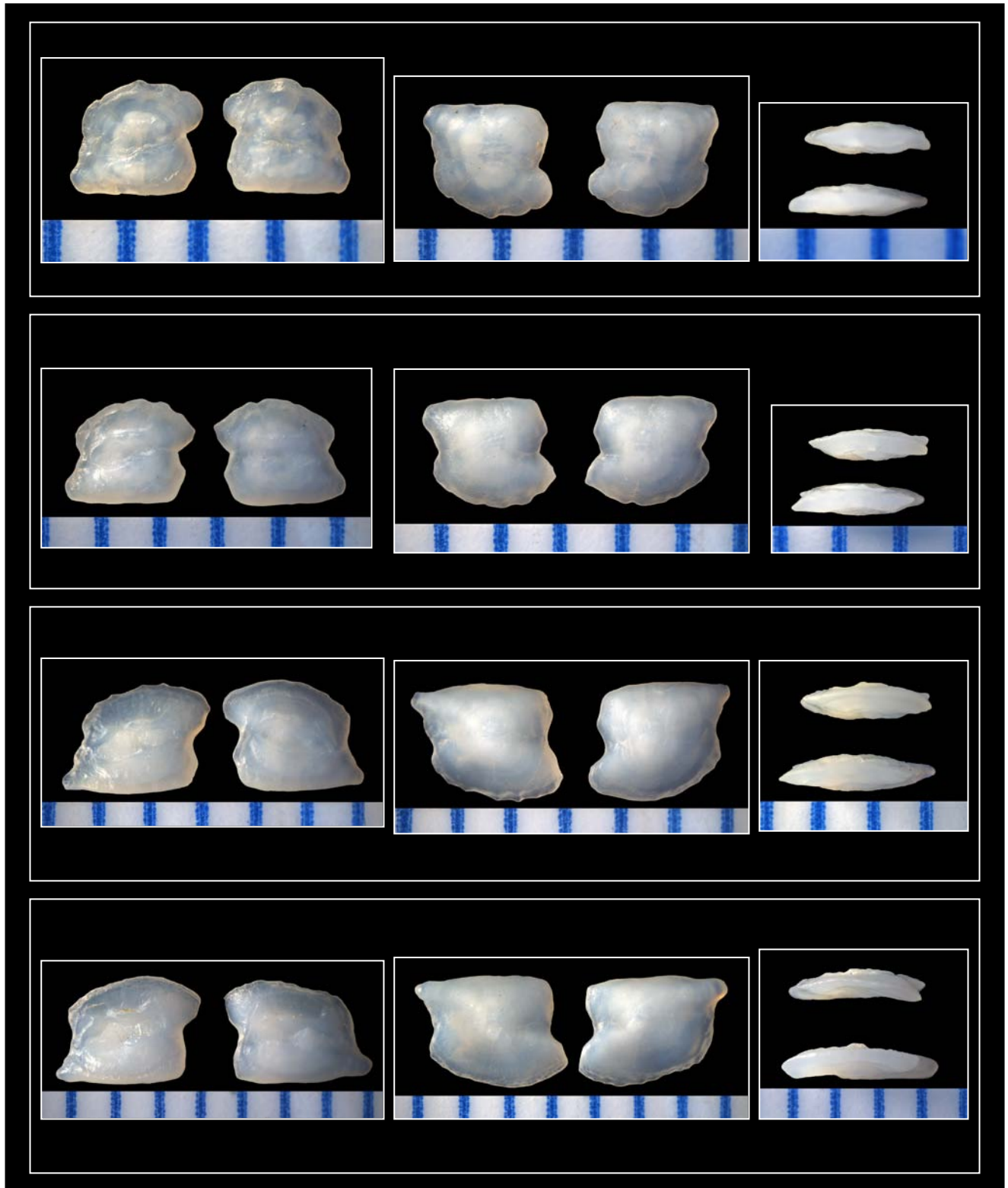
Clinidae

Heterostichus rostratus, giant kelpfish, LACM 57266-1



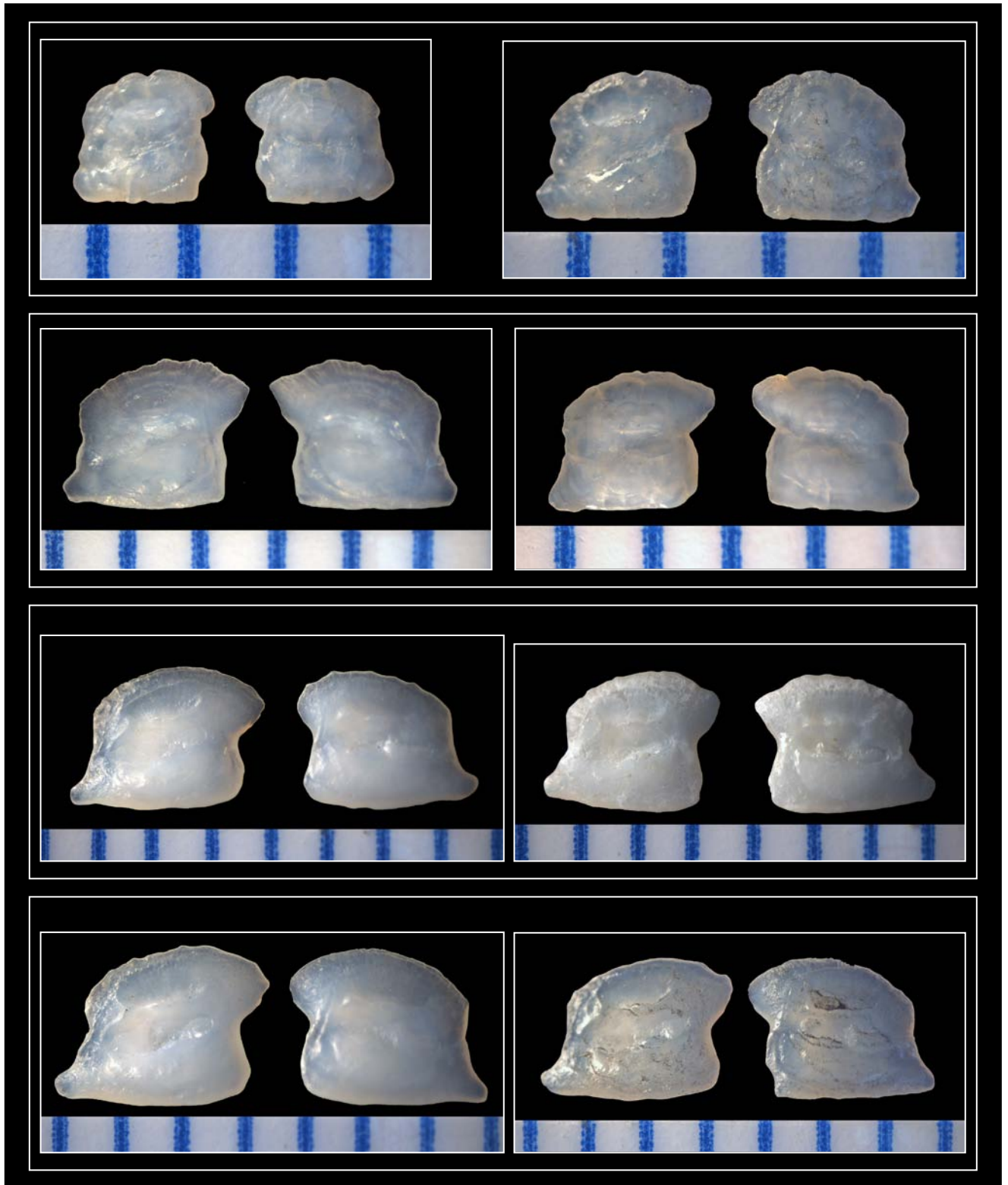
Gobiidae

Rhinogobiops nicholsii, blackeye goby, LACM 56681-1



Gobiidae

Rhinogobiops nicholsii, blackeye goby, LACM 56681-1



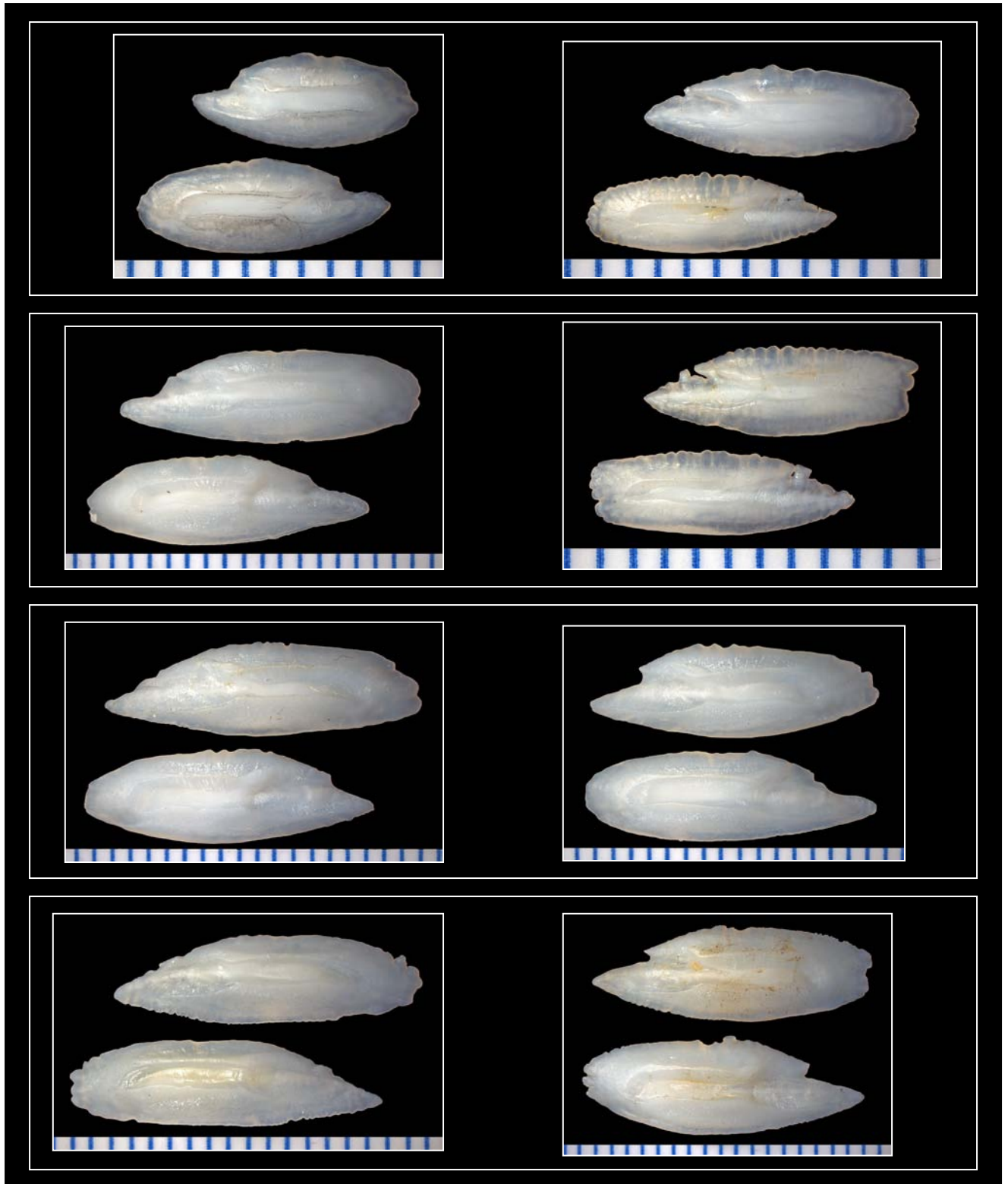
Sphyraenidae

Sphyraena argentea, California barracuda, LACM 56687-1



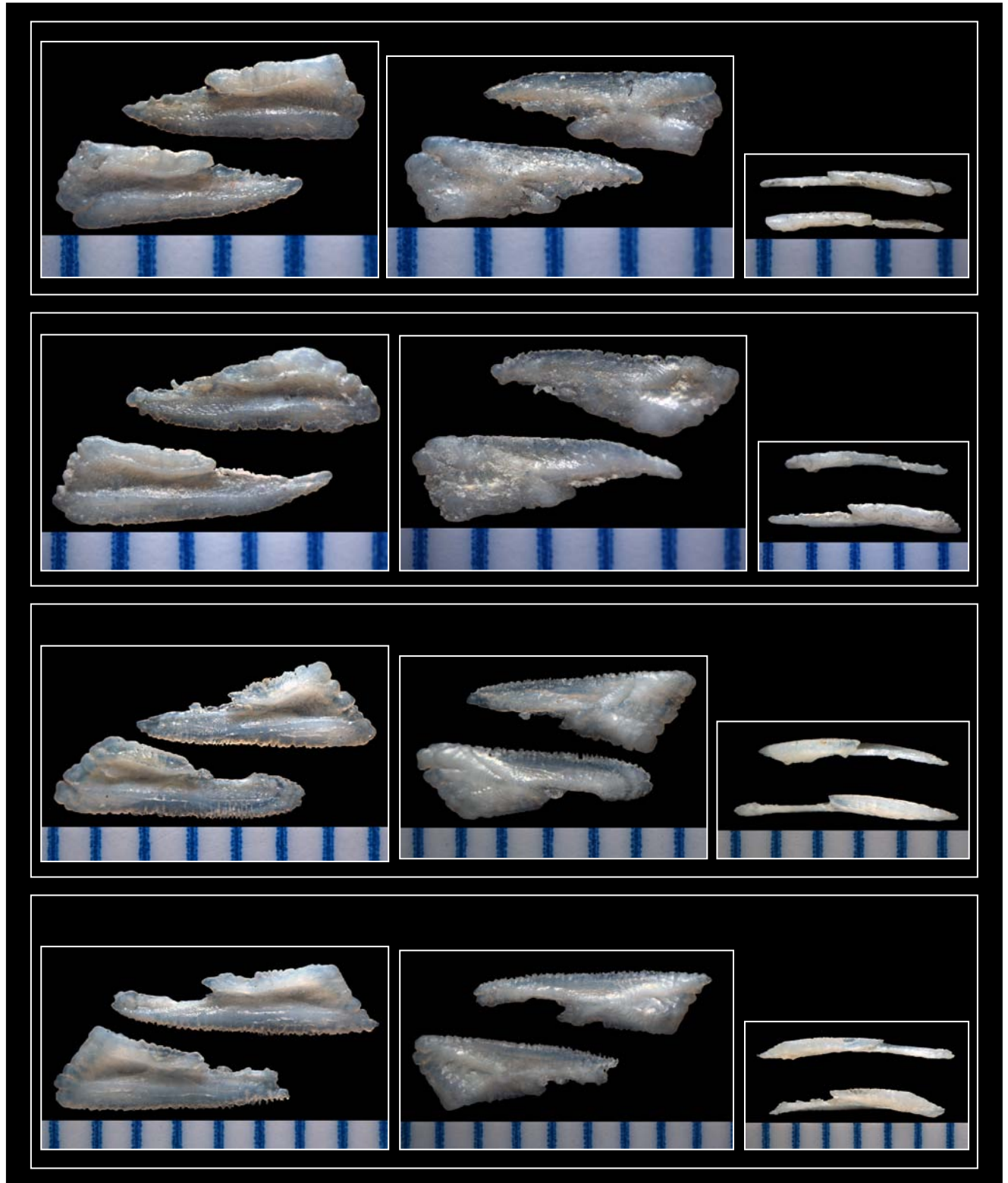
Sphyraenidae

Sphyraena argentea, California barracuda, LACM 56687-1



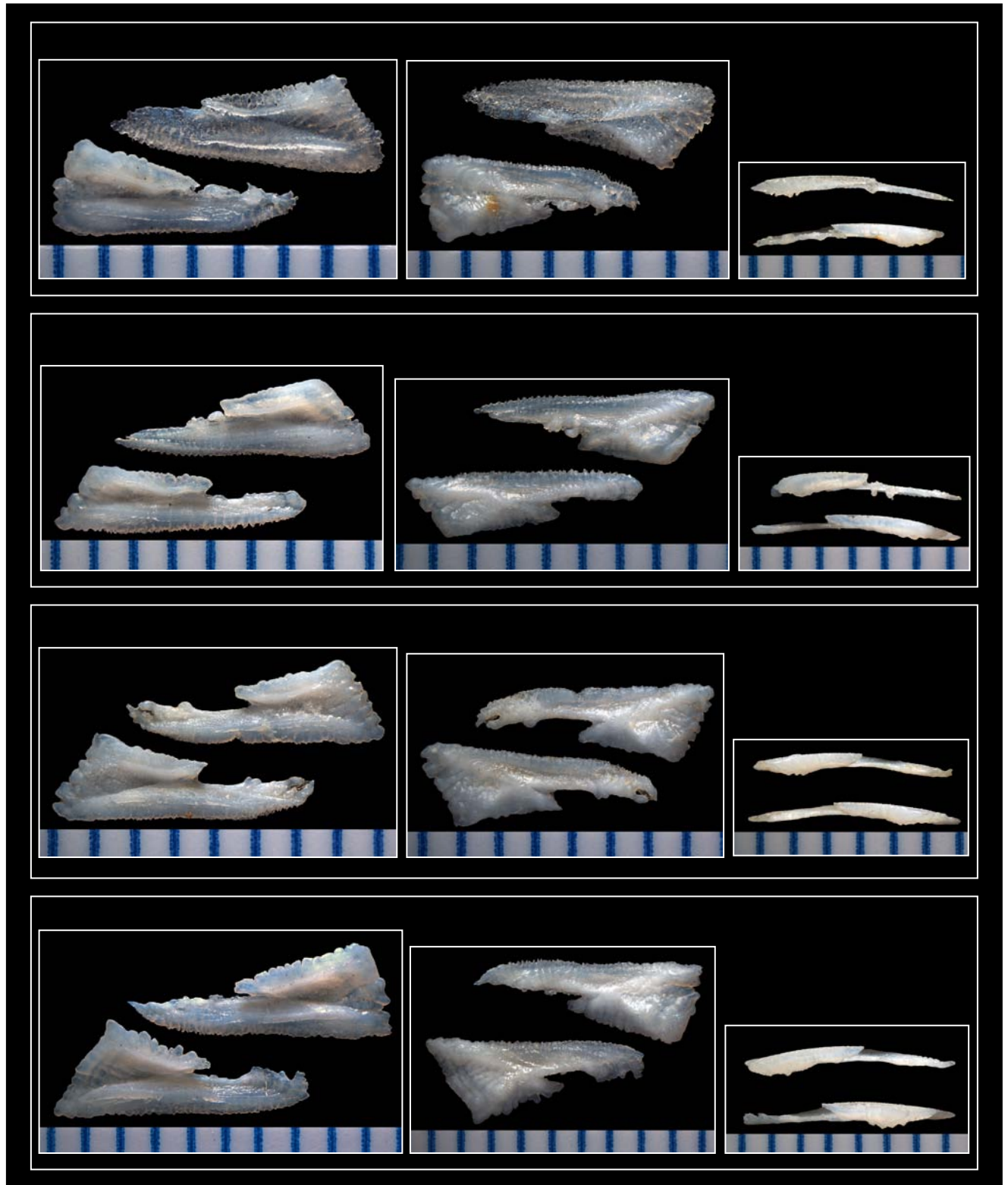
Scombridae

Sarda chiliensis, Pacific bonito, LACM 57268-1



Scombridae

Sarda chiliensis, Pacific bonito, LACM 57268-1



Scombridae

Sarda chiliensis, Pacific bonito, LACM 57268-1



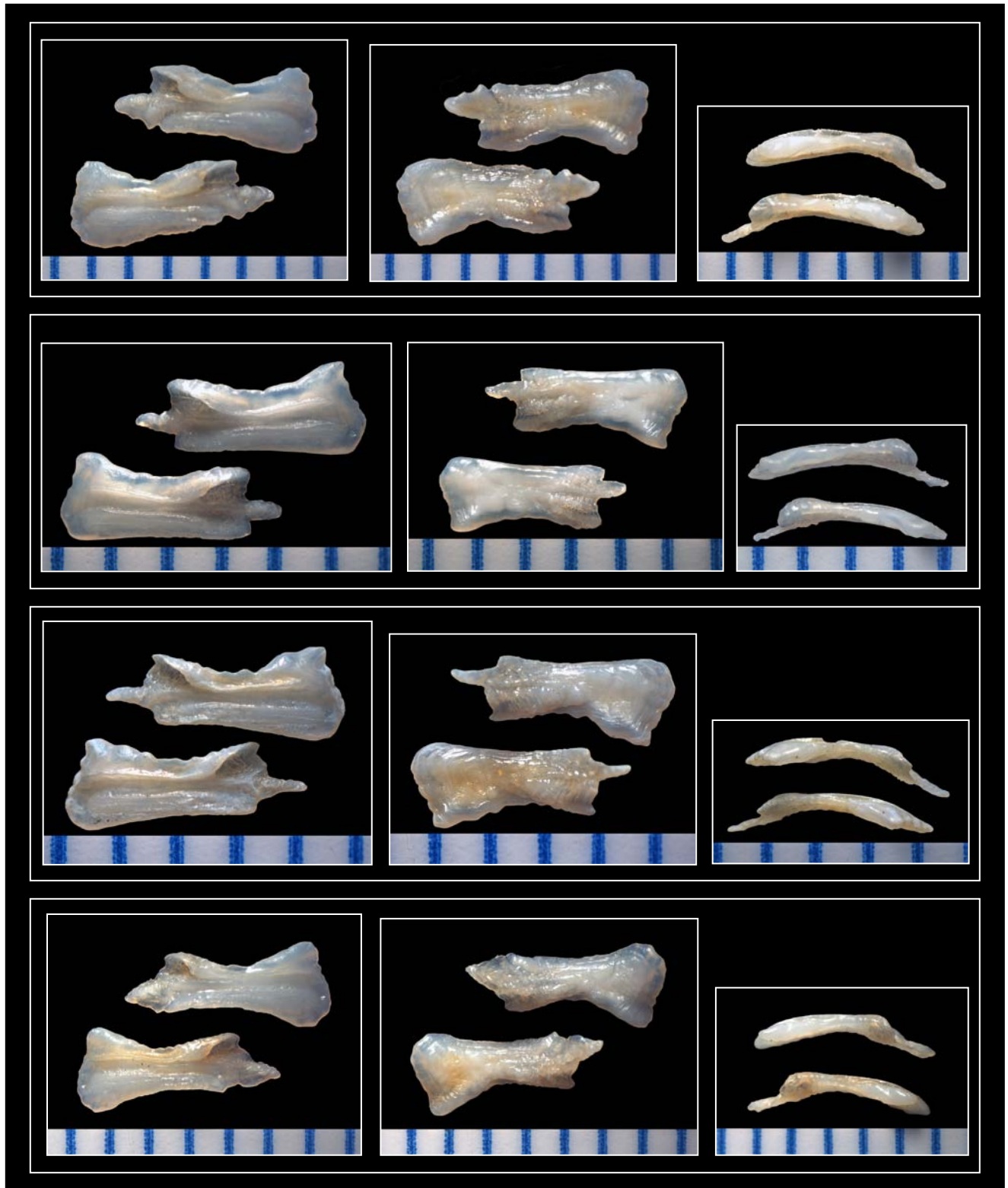
Scombridae

Scomber japonicus, Pacific mackerel, LACM 56604-1



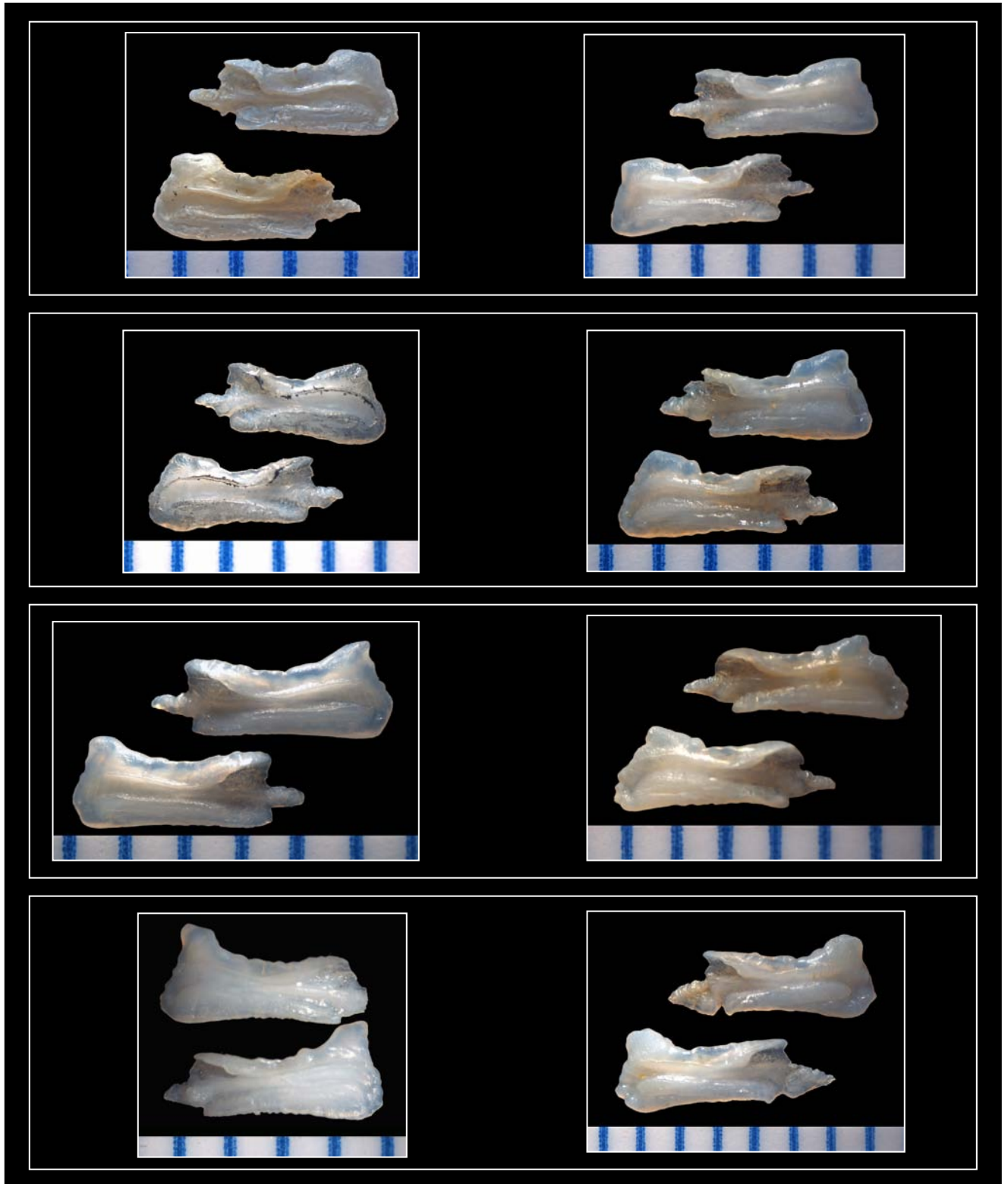
Scombridae

Scomber japonicus, Pacific mackerel, LACM 56604-1



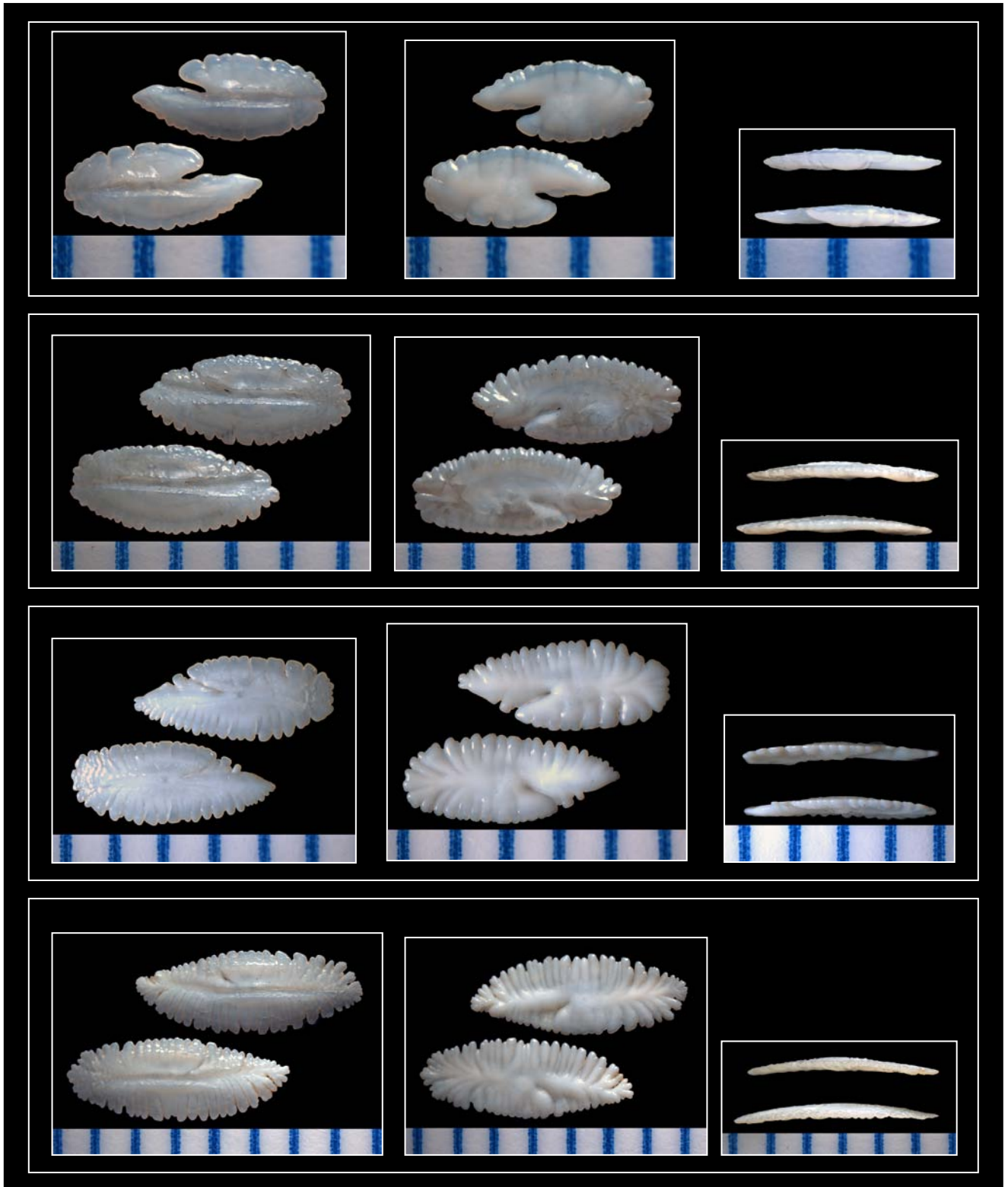
Scombridae

Scomber japonicus, Pacific mackerel, LACM 56604-1



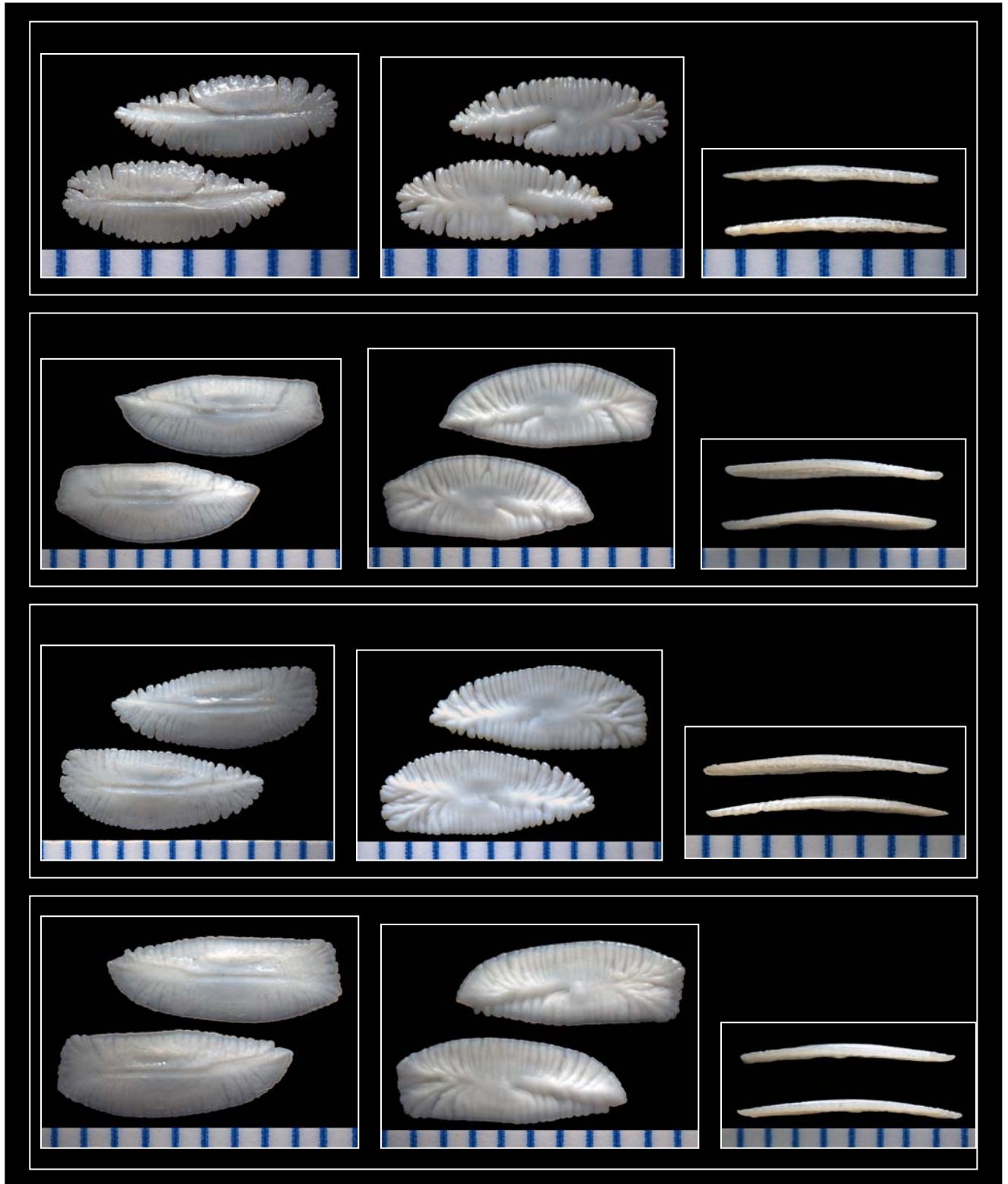
Centrolophidae

Icichthys lockingtoni, medusafish, LACM 56602-1



Centrolophidae

Icichthys lockingtoni, medusafish, LACM 56602-1



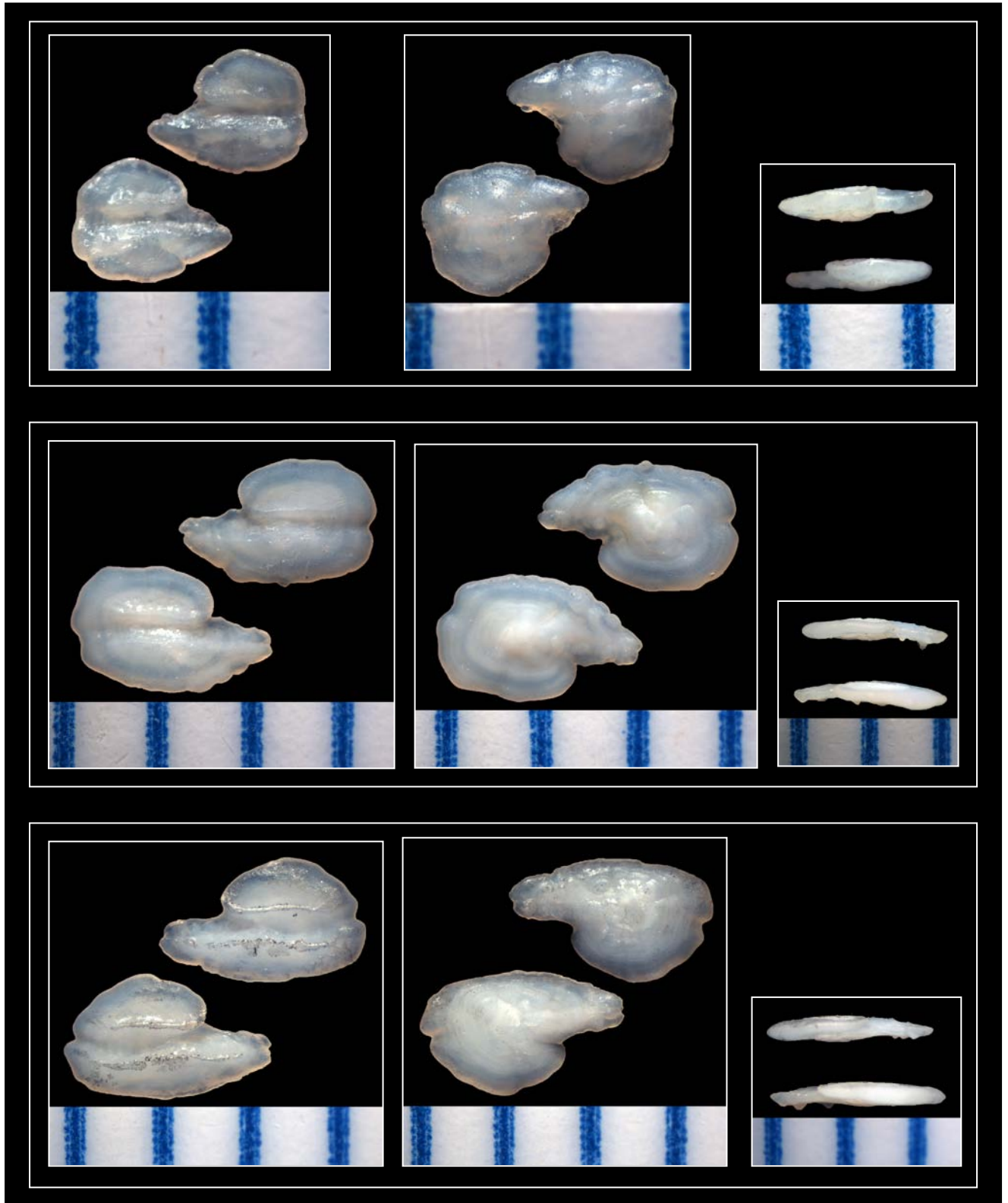
Centrolophidae

Icichthys lockingtoni, medusafish, LACM 56602-1



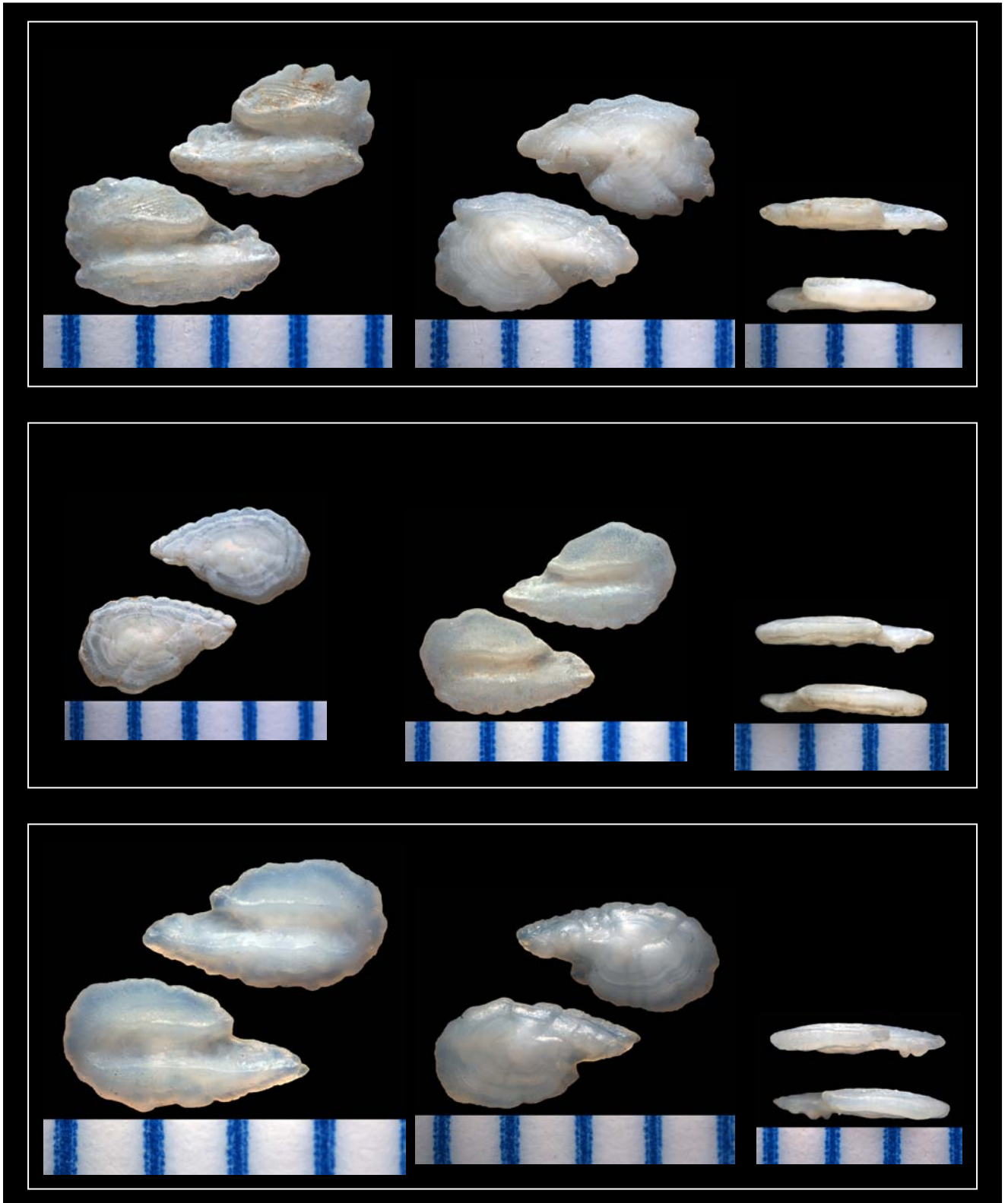
Tetragonuridae

Tetragonurus cuvieri, smalleye squaretail, LACM 57269-1



Tetragonuridae

Tetragonurus cuvieri, smalleye squaretail, LACM 57269-1



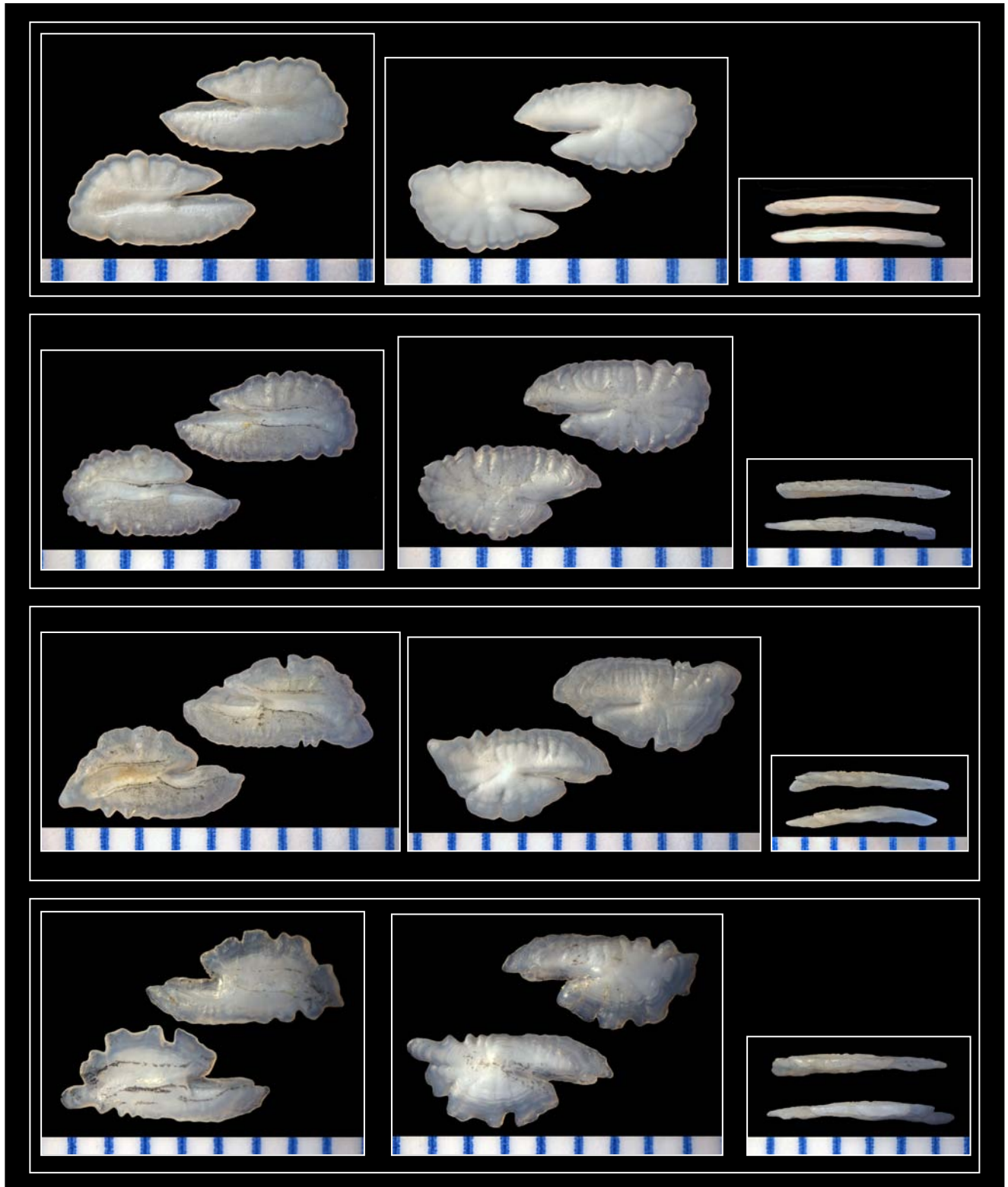
Tetragonuridae

Tetragonurus cuvieri, smalleye squaretail, LACM 57269-1



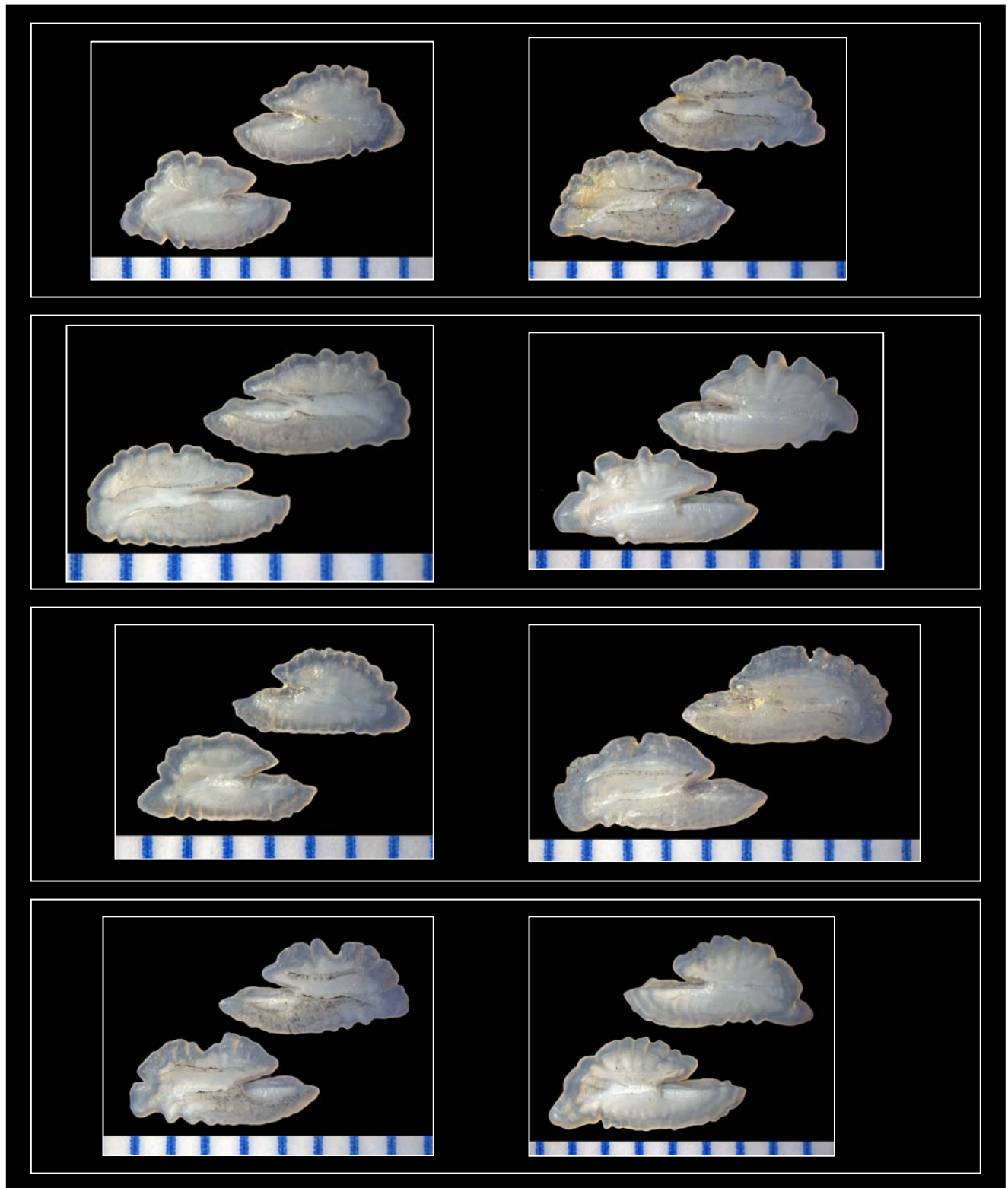
Stromateidae

Peprilus simillimus, Pacific pompano, LACM 56689-1



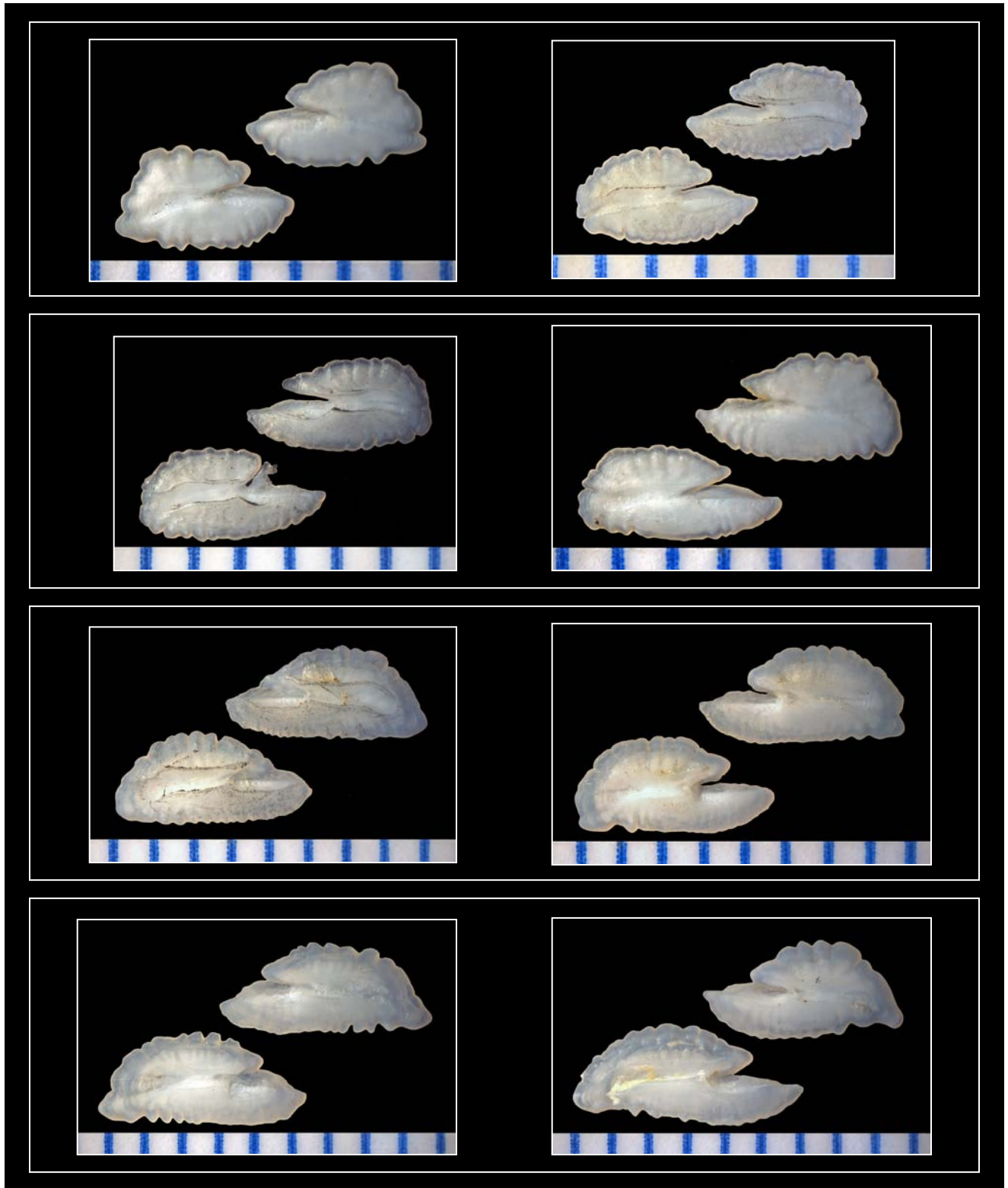
Stromateidae

Peprilus simillimus, Pacific pompano, LACM 56689-1



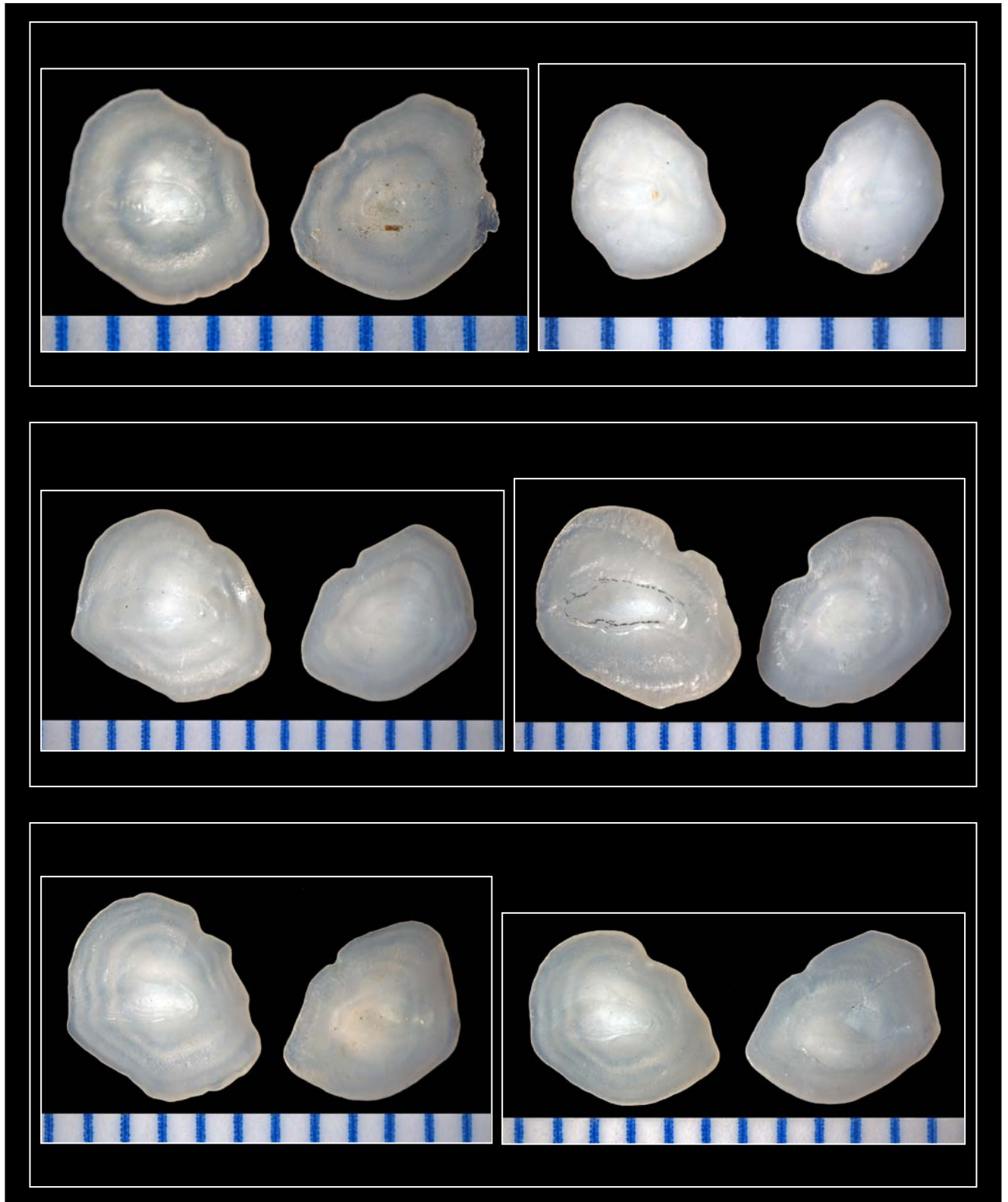
Stromateidae

Peprilus simillimus, Pacific pompano, LACM 56689-1



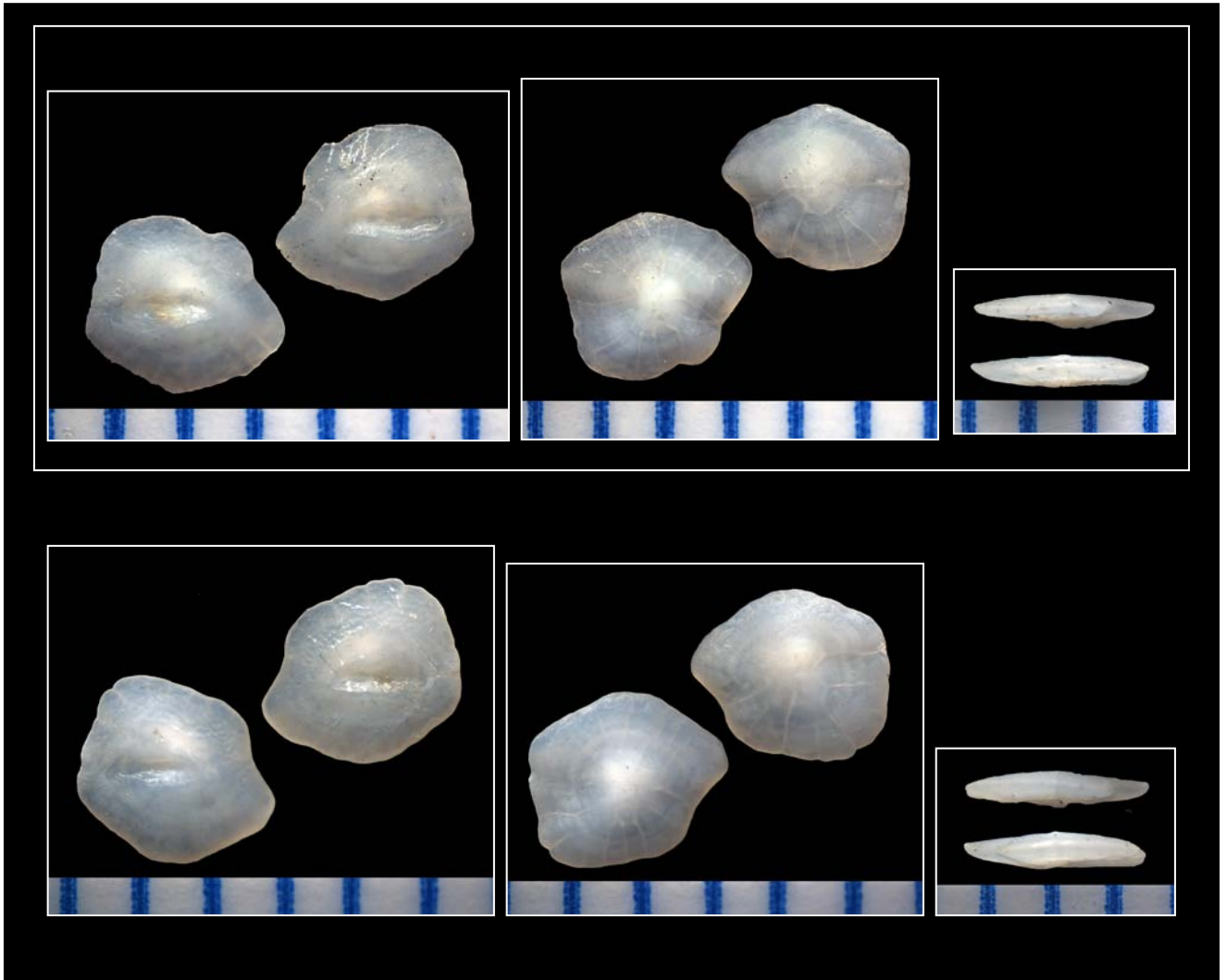
Paralichthyidae

Citharichthys sordidus, Pacific sanddab, LACM 56637-1



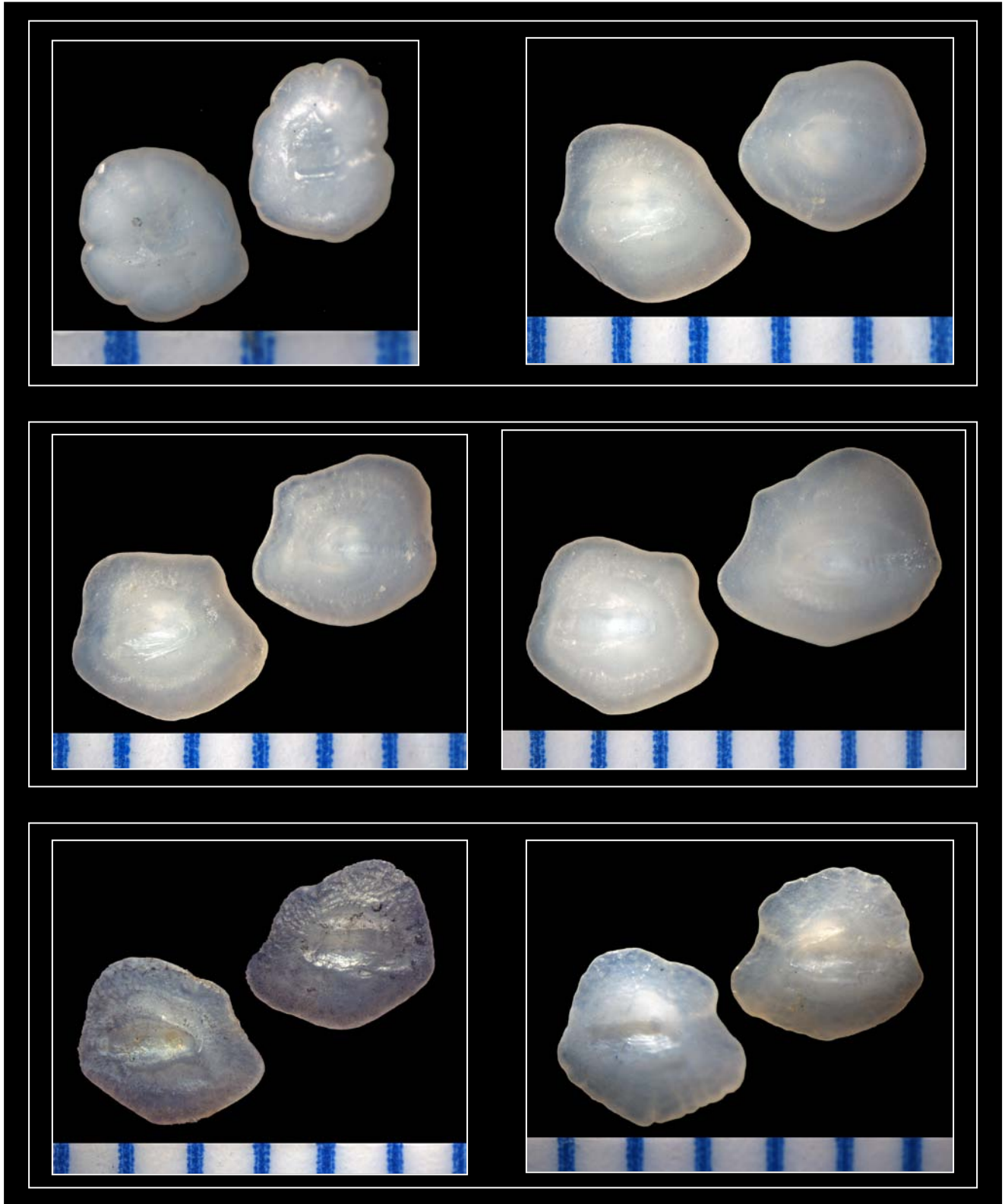
Paralichthyidae

Citharichthys stigmaeus, speckled sanddab, LACM 56638-1



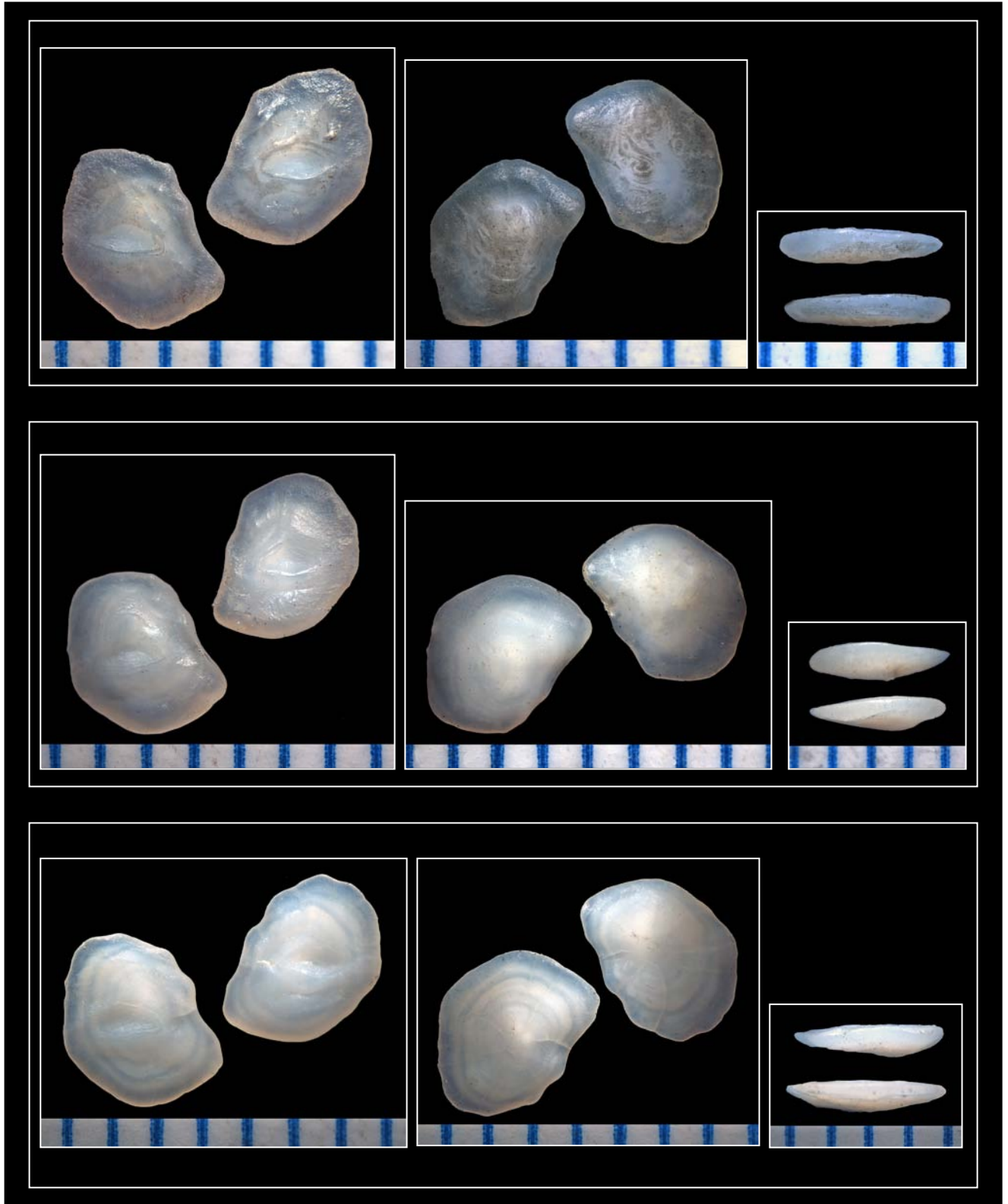
Paralichthyidae

Citharichthys stigmaeus, speckled sanddab, LACM 56638-1



Paralichthyidae

Citharichthys xanthostigma, longfin sanddab, LACM 56718-1



Paralichthyidae

Citharichthys xanthostigma, longfin sanddab, LACM 56718-1



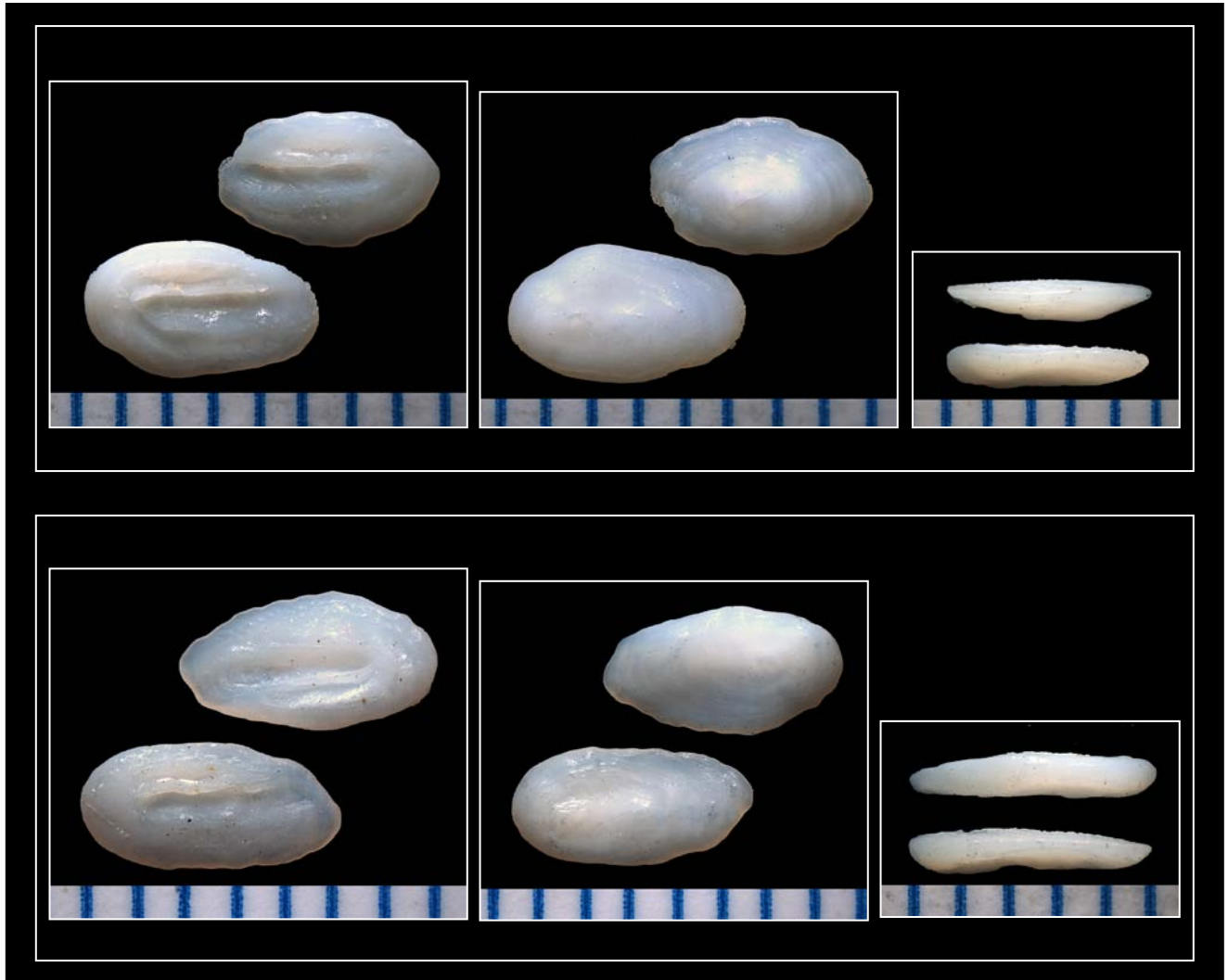
Paralichthyidae

Hippoglossina stomata, bigmouth sole, LACM 56715-1



Paralichthyidae

Hippoglossina stomata, bigmouth sole, LACM 56715-1



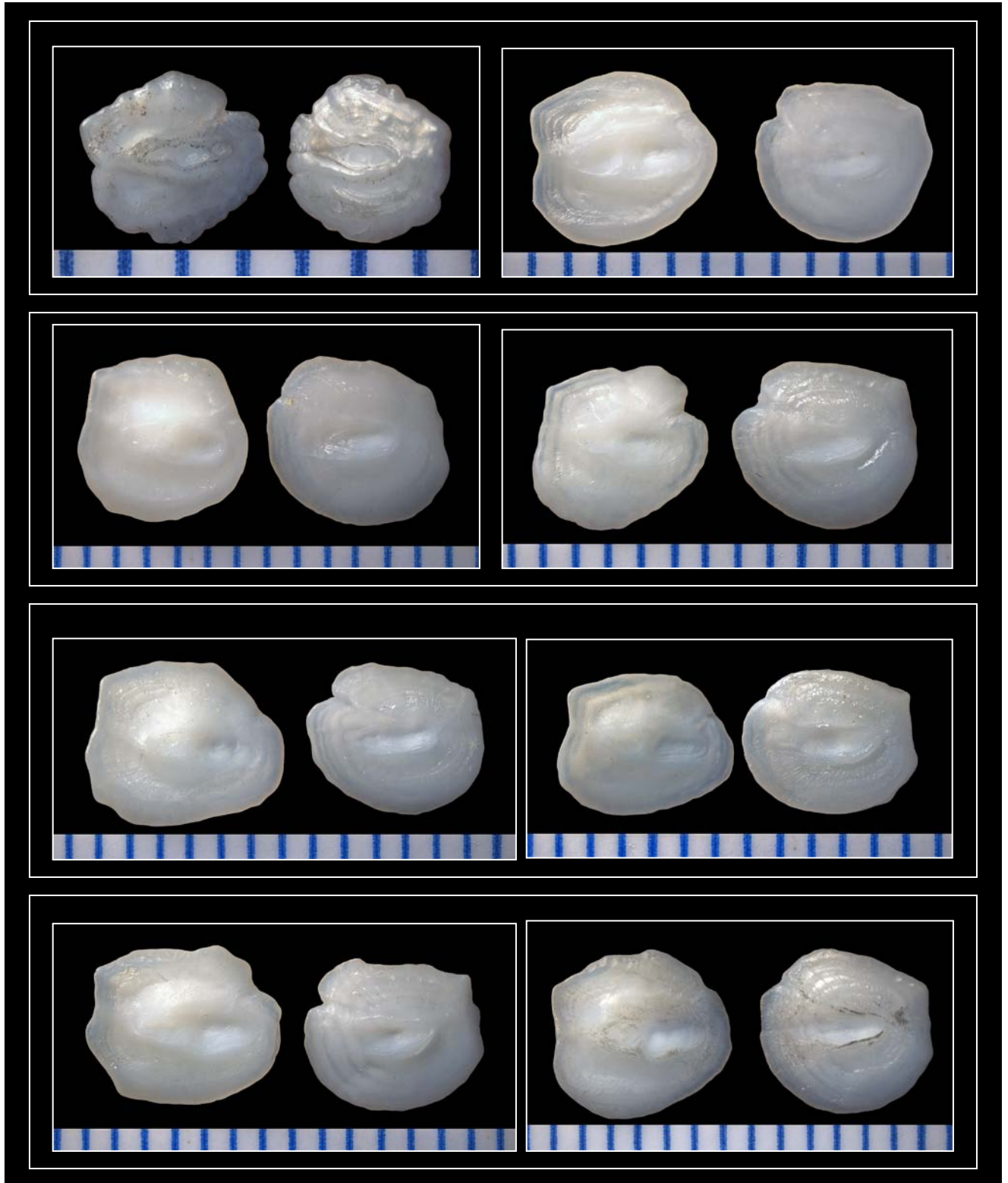
Pleuronectidae

Glyptocephalus zachirus, rex sole, LACM 56672-1



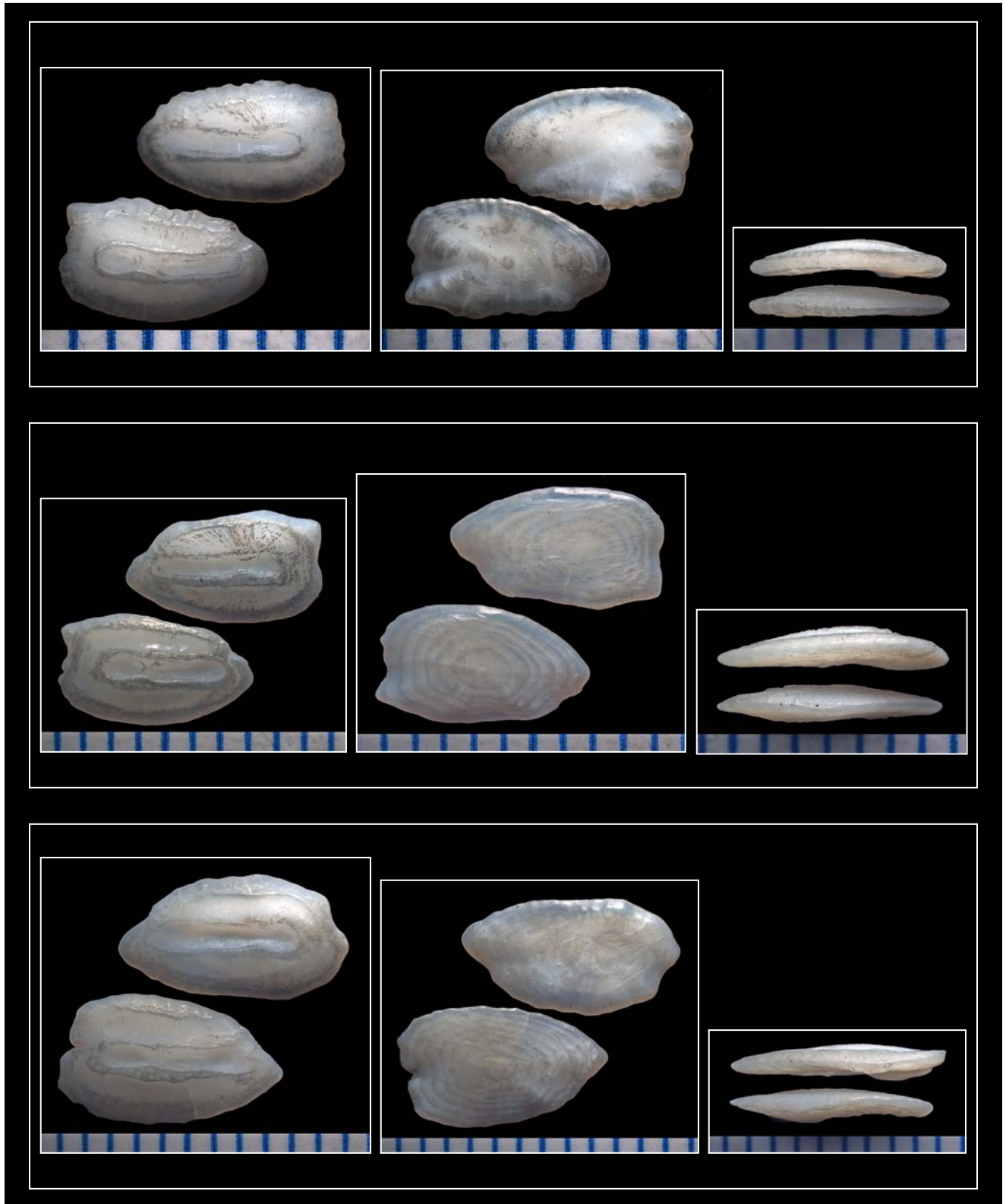
Pleuronectidae

Glyptocephalus zachirus, rex sole, LACM 56672-1



Pleuronectidae

Lepidopsetta bilineata, rock sole, LACM 56716-1



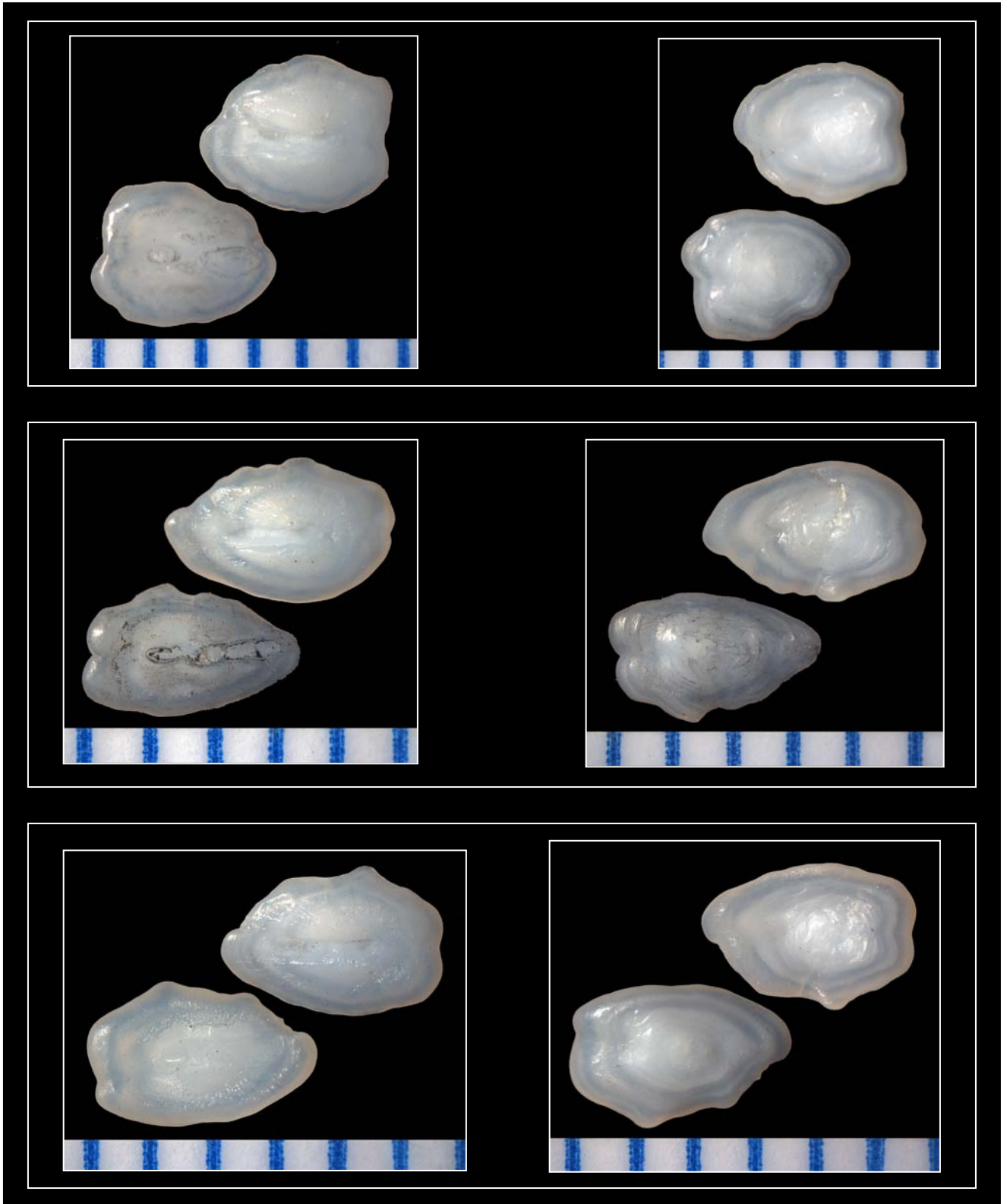
Pleuronectidae

Lyopsetta exilis, slender sole, LACM 56639-1



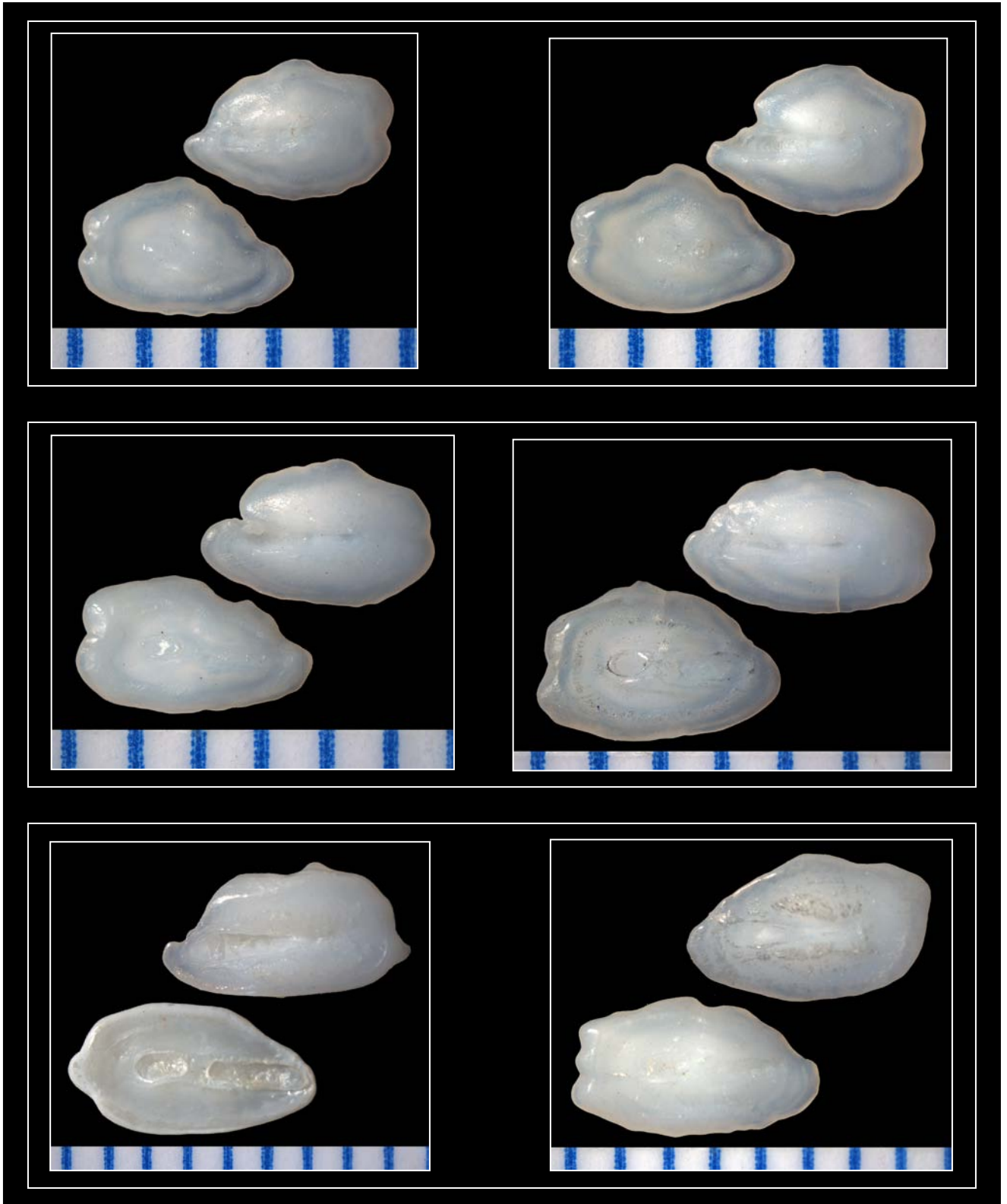
Pleuronectidae

Microstomus pacificus, dover sole, LACM 56640-1



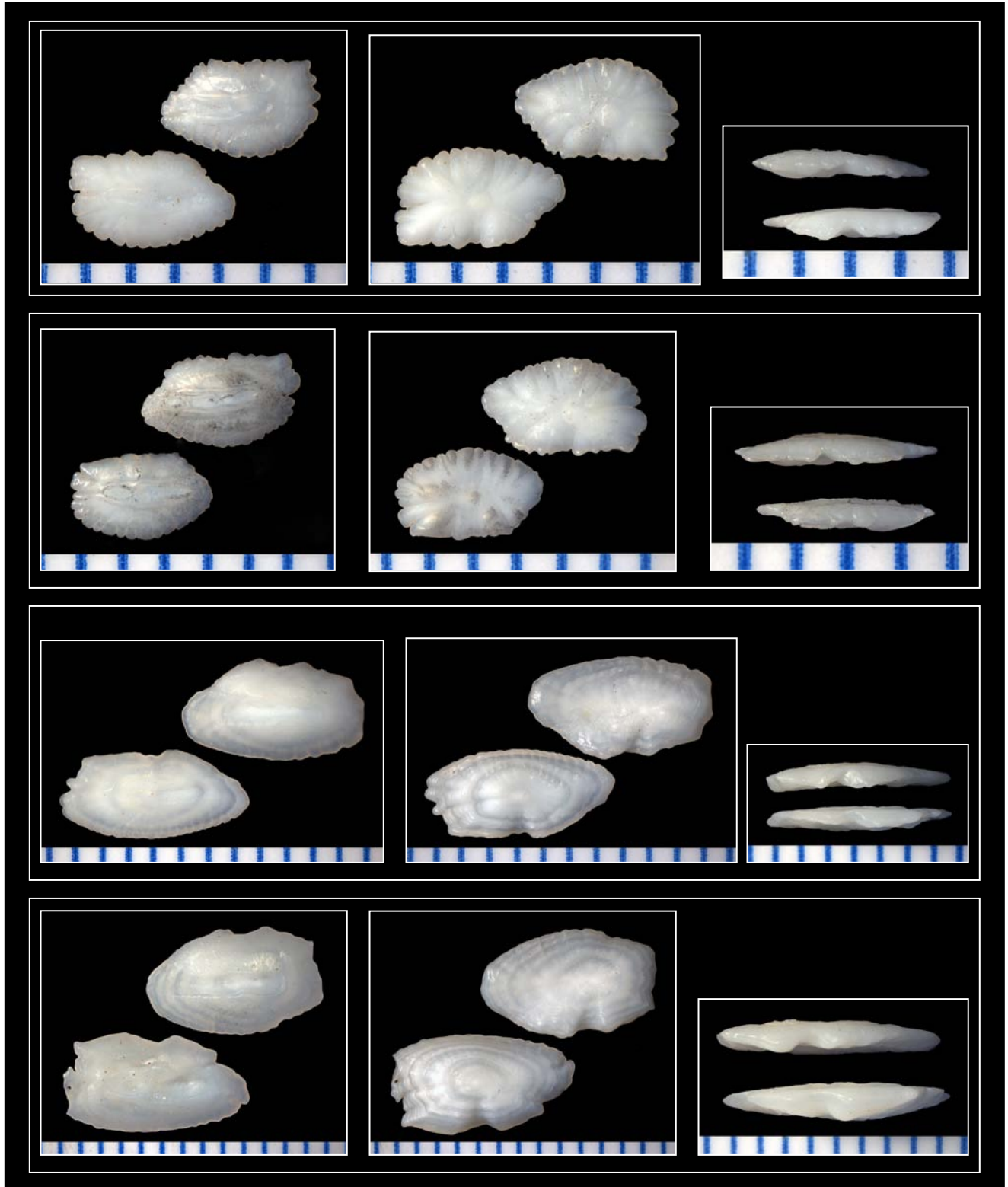
Pleuronectidae

Microstomus pacificus, dover sole, LACM 56640-1



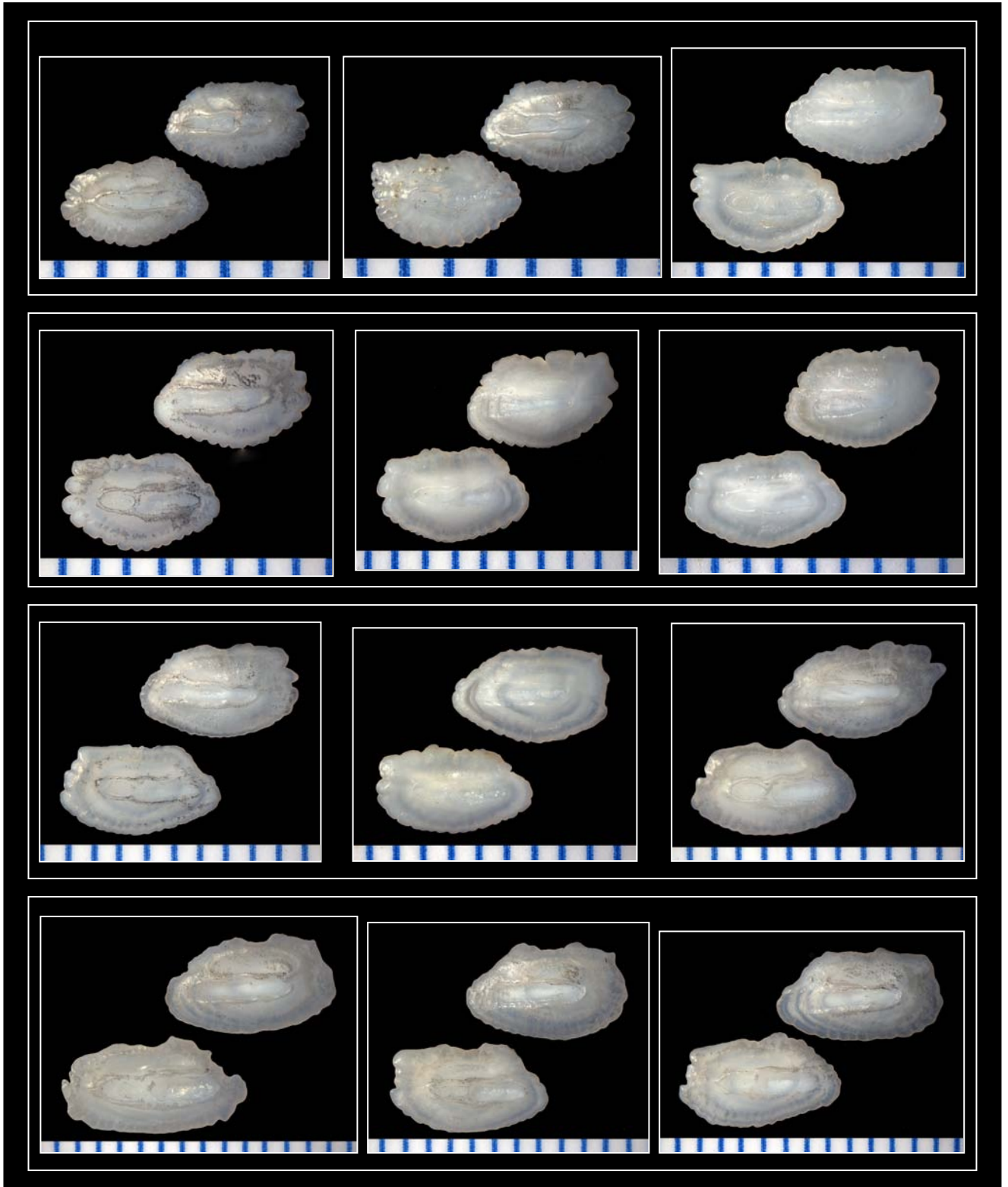
Pleuronectidae

Parophrys vetulus, English sole, LACM 56691-1



Pleuronectidae

Parophrys vetulus, English sole, LACM 56691-1



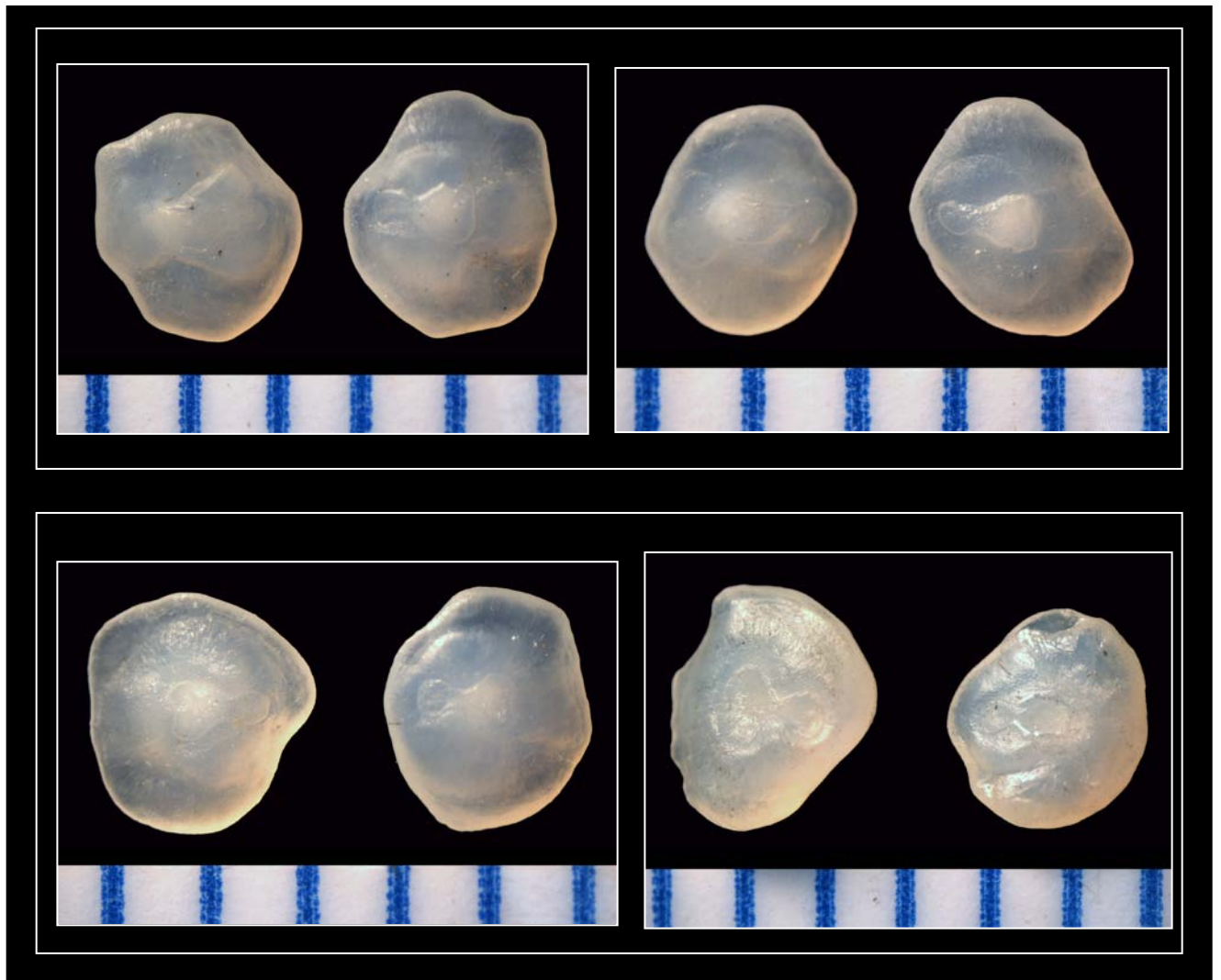
Cynoglossidae

Symphurus atricauda, California tonguefish, LACM 56688-1



Cynoglossidae

Symphurus atricauda, California tonguefish, LACM 56688-1



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