Spring 1984

A Molecular Phylogeny of the Grunts (Perciformes: Haemulidae) Inferred from Nuclear RAG1 Gene Sequences

Millicent D. Sanciangco
Old Dominion University

A MOLECULAR PHYLOGENY OF THE GRUNTS (PERCIFORMES: HAEMULIDAE) INFERRED FROM NUCLEAR RAG1 GENE SEQUENCES

by

Millicent D. Sanciangco
B.S. Zoology, 2002, University of the Philippines Los Baños

A Thesis Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirement for the Degree of

MASTER OF SCIENCE

BIOLOGY

OLD DOMINION UNIVERSITY
May 2007

Approved by:

Kent Carpenter (Director)

John Holsinger (Member)

Christopher Osgood (Member)

ABSTRACT

A MOLECULAR PHYLOGENY OF THE GRUNTS (PERCIFORMES: HAEMULIDAE) INFERRED FROM NUCLEAR RAG1 GENE SEQUENCES

Millicent D. Sanciangco
Old Dominion University, 2007
Director: Dr. Kent Carpenter

Species and genera of Haemulidae have undergone various taxonomic revisions, however, there is no study that infers the phylogeny of the haemulid genera using morphological or molecular data. The purpose of this study was to use approximately 1386 base pairs of the nuclear Recombination Activation Gene-1 (RAG1) from 35 haemulid species representing 13 genera, one species of the closely related Inermiidae, and two species of the outgroup Sparidae to infer an intrafamilial phylogeny of Haemulidae. This analysis is corroborated using approximately 650 base pairs of the mitochondrial Cytochrome Oxidase I (COI) gene and RAG1-COI combined gene analyses of 27 haemulids, an inermiid, and two sparids. Results show strong support for a monophyletic Haemulidae. However, the placement of Inermiidae within the proposed superfamily Haemuloidea remains unresolved. The subfamilies Haemulinae and Plectorhinchinae are recovered from both maximum parsimony and maximum likelihood analyses using RAG1, COI, and RAG1-COI genes combined. These analyses also recovered similar clade components within these subfamilies, with some exemptions. The RAG1 gene phylogeny combined with distribution data also revealed a biogeographic pattern that suggests a specific radiation of haemulids. There was strong support for a basal paraphyletic Old World (coastal Eurasia, Africa, Australia, and

western central Pacific) group, a derived monophyletic New World (coastal Americas) group, and an intermediate Old World-New World group, which can be accounted for by the closing Tethys Sea and Atlantic Ocean widening vicariant events. In addition, molecular data using RAG1 and COI genes also highlighted potential problems regarding the validity of several haemulid genera and suggest a re-evaluation of these genera. Finally, this study indicates that the nuclear RAG1 gene is useful for inferring phylogeny at the intrafamilial level for this percoid family of fishes.

This thesis is dedicated to Jonnell and Andre.

ACKNOWLEDGMENTS

I would like to thank Dr. Kent Carpenter for his unending support and guidance throughout the duration of this project and throughout the duration of my Master's degree. I would also like to thank my committee members, Dr. John Holsinger and Dr. Christopher Osgood for their comments and advice. I am grateful to Andrew Mahon for all the help in the lab, constant support, and providing some of the RAG1 sequences. I thank the BSSF staff at ODU for assisting with my sequencing reactions and Dr. Robert Ratzlaff for letting me use the thermal cycler in his lab. I also thank Karin Berling and the Molecular Systematics Laboratory group for help and knowledge. I thank Dr. Thomas Orrell for providing help and suggestions on my analyses. Thanks also to Dr. Yukio Iwatsuki, Dr. Paul Hastings, and H.J. Walker for providing some haemulid tissues and Dr. Guillermo Orti for the two haemulid RAG1 sequences. I am grateful to Dr. Giacomo Bernardi for providing an article and suggestions. I also would like to thank the FishBOL Project for providing us with haemulid COI sequences. I am indebted to my parents, in-laws, Ate Len, and Ate Ivy for unending support and encouragement. My Master's program was funded by the Fulbright Philippine Agriculture Scholarship Program and in part by a graduate research assistantship through an IUCN (World Conservation Union) project at Old Dominion University.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Figure Page

INTRODUCTION

Perciformes is the largest order of vertebrates with over 10,000 species (Nelson, 2006). The classification of this order is tentative and its members thought to be polyphyletic. Perciformes contains 20 suborders, which includes the suborder Percoidei. There are 79 families in this suborder, one of which is Haemulidae. This family is one of the most ecologically and commercially important groups of nearshore fishes. They are typically shallow-water species inhabiting corals reefs, rocky bottoms, seagrass beds, sand flats, and mud-bottoms in coastal and estuarine waters. As one of the most speciose families of percoids, they are circumtropically distributed in the Atlantic, Indian, and the Pacific Oceans (Table 1). Nelson (2006) recognized about 145 haemulid species in 17 to 18 genera. Several species and generic taxonomic revisions have been made of this family, and a number of articles on the systematics and distribution of individual species exist (Konchina, 1976; Courtenay, 1961; Nelson, 1994, 2006; Lindeman and Toxey, 2003; McKay, 1984, 2001). There is no systematic study yet conducted on haemulids employing molecular or morphological techniques to infer a phylogeny of the genera and species within Haemulidae.

There are no hypotheses of outgroups for haemulids based on systematic studies, but some of the suggested outgroups include Inermiidae, Lutjanidae, Nemipteridae, Sciaenidae, and Sparidae (Lindeman and Toxey, 2003). These belong in superfamilies proposed by Johnson (1980): Lutjanoidea, Sparoidea, and Haemuloidea, who found no conclusive evidence to suggest relationships by immediate common ancestry between

---

The guide for tables, figures, and references used in this thesis is Molecular Phylogenetics and Evolution.

Table 1
Distribution and biogeographic (Old World vs New World) designation of species used in this study

Species	Distribution	Old World/ New World
Anisotremus dovii	Eastern Pacific: southern margins of Gulf of California to Peru.	New World
Anisotremus interruptus	Eastern Pacific: Gulf of California to Peru, including the Galapagos Islands.	New World
Anisotremus pacifici	Eastern Pacific: Mexico to Peru.	New World
Anisotremus virginicus	From Bahamas and Florida throughout much of the area, extending southward to Brazil. In Bahamas, recorded primarily from the ventral and northern islands.	New World
Brachydeuterus auritus	Along the West African coast from Mauritania (exceptionally Morocco) to Angola.	Old World
Conodon serrifer	Eastern Pacific: Gulf of California to Peru.	New World
Diagramma pictum	Indo-West Pacific from south Natal to southern Japan and Fiji, excluding northern Australia and most of southern New Guinea. (Includes tropical coasts of Australia).	Old World
Genyatremus luteus	Southern Lesser Antilles and northern coast of South America from eastern Colombia to Brazil.	New World
Haemulon aurolineatum	Western Atlantic from Chesapeake Bay and Bermuda southward throughout much of the area to Brazil.	New World
Haemulon flaviguttatum	From Chesapeake Bay and Gulf of Mexico, southward throughout much of the area to Brazil. Eastern Pacific: Mexico to Ecuador.	New World
Haemulon plumierii	Western Atlantic: Chesapeake Bay, through the Gulf of Mexico and Caribbean southward to Brazil, including Antilles	New World
Haemulon sciurus	Western Atlantic from the lower Gulf of Mexico, South Carolina and the Bahamas southward throughout much of the area to Brazil; also in Bermuda.	New World
Haemulon scudderii	Eastern Pacific: Mexico to Ecuador, including the Galapagos Islands.	New World
Haemulon steindachneri	Juveniles recorded from Guatemala. Adults recorded from Panama along the coast of South America, Brazil. Also recorded from the tropical eastern Pacific from the sea of Cortez to Peru. Western Atlantic: Panama to Rio de Janeiro, Brazil.	New World
Haemulopsis axillaris	Eastern Central Pacific: Mazatlan, Mexico to Ecuador.	New World
Haemulopsis elongatus	Eastern Central Pacific: Mazatlan, Mexico to Panama.	New World
Haemulopsis leuciscus	Eastern Pacific: Gulf of California to Peru.	New World
Haemulopsis nitidus	Eastern Pacific: Gulf of California to Peru.	New World
Inermia vittata	Western Atlantic from Bermuda, Florida to Bahamas, Belize, and northern South America. Also Caribbean, including Antilles	New World
Orthopristis chalceus	Eastern Pacific: Mexico to Panama, including the Galapagos Islands.	New World
Parapristipoma octolineatum	West African coast including islands, from the Straits of Gilbraltar to Angola; northward extending into the Western Mediterranean and along the coasts of Portugal and Spain.	Old World
Parapristipoma trilineatum	Indo-West Pacific: southern Japan, East China Sea and Taiwan.	Old World
Plectorhinchus chaetodonoides	Indo-West Pacific from East Africa to Ryukyu Islands and wide ranging throughout South Pacific eastwards to Rapa. In the area, recorded only from Mauritius. Elsewhere, East Indies to the Western Pacific.	Old World
Plectorhinchus lessonii	Zanzibar, Red Sea to Sri Lanka, Indonesia, Queensland, Polynesia to Philippines, Taiwan Province of China, and southern Japan.	Old World
Plectorhinchus macrolepis	West African coast, from Senegal to Congo.	Old World
Plectorhinchus schotaf	Indo-West Pacific from Port St. Johns, Transkei, East Africa to northern Australia, the Philippines, and southern Japan. Red Sea population differs slightly in coloration.	Old World
Plectorhinchus sordidus	Found in the Red Sea, off Mozambique and the west coast of Madagascar and Mauritius.	Old World
Plectorhinchus vittatus	Indo-West Pacific from East Africa to Indonesia, northern Australia, Thailand, Philippines, and Polynesia.	Old World
Pomadasys argenteus	Found in Red Sea to southern Japan, including northern Australia from Exmouth Gulf of Clarence River, New South Wales. Elsewhere, eastward extending to the Philippines.	Old World

Table 1 (*continued*)

Species	Distribution	Old World/ New World
Pomadasys argyreus	India, Sri Lanka to Papua New Guinea, excluding northern Australia. In the area, found in Pakistan to Sri Lanka. Elsewhere, eastward extending to the Philippines.	Old World
Pomadasys branickii	Eastern Pacific: Mexico to Peru.	New World
Pomadasys kaakan	Indo-West Pacific from Transkei to Red Sea, Persian Gulf, India, Indonesia to China (including Taiwan Province), including northern Australia from Exmouth Gulf to Moreton Bay. In the area, found along the east coast of Africa (including Madagascar, the Seychelles, Farrquhar and Comoro islands).	Old World
Pomadasys maculatus	East coast of Africa, Madagascar, Red Sea, Gulf of Aden, Persian Gulf, Pakistan, India, Sri Lanka to northern half of Australia from Shark Bay to Moreton Bay, New Guinea, Philippines to southern Japan.	Old World
Xenichthys xanti	Eastern Pacific: southern Gulf of California to Peru.	New World
Xenistius californiensis	Eastern Pacific: Monterey Bay in California, USA to Peru; common in southern California but rare north of Point.	New World

any two of the three superfamilies. However, he found that the families Haemulidae and Inermiidae (bonnetmouths) share a unique projection on the lateral side of the metapterygoid and several other osteological features and certain muscle complexes, placing them in a proposed monophyletic superfamily Haemuloidea. He described the family Haemulidae as having an often upturned small to moderate mouth; well-developed ethmo-maxillary and palato-maxillary ligaments; presence of cardiform teeth in jaws with the outer row often enlarged; vertebrae 10 + 16 or 11 + 16; pleural ribs eight to nine; absence of parapophyses on the first two vertebra but beginning on third or fourth; well-developed teeth often bearing hornlike extensions on large upper and lower pharyngeals; a well-developed supraoccipital crest on the neurocranium; frontals without crests; and absence of median trough in the interorbital area. He contended that bonnetmouths are haemulid derivatives due to the presence of haemuloid suspensorium, enlarged chin pores, and procurrent spur, and assigned them familial status (Inermiidae). The major difference between haemulids and inermiids is accounted for by the specialization in the parapophyses, upper jaw structure, and in their lifestyle. Inermiids are midwater planktivore while haemulids are mostly benthic carnivores.

Johnson (1980) further subdivided the haemulids into two subfamilies – Haemulinae and Plectorhinchinae, based on a combination of several external and anatomical characters. Haemulinae is comprised of *Haemulon*, *Haemulopsis*, *Orthopristis*, *Pomadasys*, *Anisotremus*, *Conodon*, *Isacia*, *Genyatremus*, *Boridia*, *Brachydeuterus*, *Xenistius*, *Xenichthys*, *Xenocys* and *Parakuhlia*. *Plectorhinchus*, *Diagramma* and *Parapristipoma* are included in the subfamily Plectorhinchinae. Plectorhinchinae have dorsal rays IX to XIV, 17 to 26; anal rays III, six to eight; vertebrae 11 + 16; pleural ribs nine; epipleural ribs ten to 12; no epibranchial toothplate on the third position; between four to six chin pores; origin of retractor dorsalis on the second vertebrae; absence of parapophyses on the first two vertebrae; absence of fronto-ethmoid trough on the neurocranium; and absence of specialization on the upper jaw. Adult members of Plectorhinchinae often have thick fleshy lips, hence called rubberlips or sweetlips. Haemulinae have dorsal rays XI to XIV, 11 to 18; anal rays III, seven to eight; vertebrae 10 + 16; pleural ribs eight; epipleural ribs seven to eleven; a third epibranchial tooth plate; two enlarged chin pores behind symphysis or a median longitudinal groove or pit, or both; large retractor dorsalis originating on second or second and third vertebrae; the absence of parapophyses on the first two vertebrae; absence of fronto-ethmoid trough on the neurocranium; and absence of specialization on the upper jaw. The last three characters unite the two subfamilies and also distinguish them from inermiids (Nelson, 2006; Johnson, 1980).

The etymology of the term "haemulid" was from the Greek word "haimaleos" which means bloody or blood gums, referring to the red coloration of the interior mouth (Brown, 1956). The family common name "grunt" was derived from the distinctive stridulatory sound they produced by rubbing their pharyngeal or jaw teeth during feeding or deliberately as a fright response or territorial display (Konchina, 1977). Their swim bladder functions as a resonator amplifying the sounds produced by the pharyngeal teeth (Johnson, 1980). Grunting sounds, in combination with "knocks" or "thuds" for some haemulids becomes weak during competitive feeding and louder under duress (netted, handled, or when an electrical stimulation is applied) (Fish and Mowbray, 1970). The sounds produced are also species-specific which also aids in identification during recordings (Fish and Mowbray, 1970). Other common names include sweetlips, rubberlips, hotlips, velvetchins, roncador, pigfish, and burros (Allen and Robertson, 1994; McKay, 2001).

Haemulids are oblong, compressed perch-like fishes averaging to 70 cm in total length (McKay, 2001). Earliest members reported for this family have been dated back to the Eocene epoch of the Tertiary period and hypothesized to exhibit the primitive branchial skeleton among the perciforms (Johnson, 1980; Wainwright, 1989). In most cases, all members possess a typical convex head profile, two anterior pores, and a median groove on chin, except for the genus *Genyatremus*, which do not possess a median groove (Lindeman and Toxey, 2003). Other characteristic features of the grunts include a single dorsal fin with fin rays XI to XIV, 11 to 19; a moderate to long pectoral fin and below its base, a pelvic fin with a single spine and five soft rays; anal rays III, six to 13; small to moderate ctenoid scales, extending onto the head but not on the front of snout, lips, and chin. Grunts have a highly variable coloration, ranging from uniformly colored, striped, banded, blotched, and spotted (Roux et al., 1981). Color patterns are distinctive of adult grunts, while early juveniles of *Anisotremus*, *Orthopristis*, and *Haemulon* ranging from two to five centimeters, exhibit similar dark dorsolateral and midlateral stripes and a caudal spot (Lindeman, 1986). The shape, development of lips, and coloration can be used to discriminate juveniles from adult grunts. McKay (2001) and Courtenay (1961) characterized early juvenile stages of *Haemulon* based on the length of the upper eye stripe in combination with other characters. Although differences in adults can be distinguished by pigmentation, *Haemulon* can easily be distinguished from other haemulid genera by the presence of a serrate opercle, lack of vomerine teeth, association of last dorsal spine with the dorsal rays, and possession of scaly dorsal and anal fins (Hong, 1977). Misidentification of *Plectorhinchus* species is a problem due to diverse coloration in different developmental stages. However, McKay (1984) classified members of the genus *Plectorhinchus* based on a combination of juvenile and adult coloration, dorsal fin counts, and gill raker counts (McKay, 1984). He described *Plectorhinchus* species as having 11 to 14 spines in the dorsal fin and with fewer lateral line scales. The status of the genus *Parakuhlia* is confused because they are variously placed in the Kuhliidae, or in the Haemulidae either as a separate genus or synonymous to *Haemulon* (Johnson, 1980; Nelson, 1994, 2006). Roux et al. (1981) suggested further analysis is needed on several species of West African *Parapristipoma* and *Pomadasys* to establish more clearly their taxonomic status. Moreover, the taxonomic status of the genus *Hapalogenys* within the haemulids remains problematic. Springer and Raasch (1995) established the family name Hapalogeniidae for *Hapalogenys*, a genus of uncertain relationships (Iwatsuki et al., 2000; Lindeman and Toxey, 2003). McKay (2001) described the similarity of *Hapalogenys* to two species of Dinopercidae, but which lacks intrinsic muscles on the posterior end of the swimbladder. Richardson (1844) described *Hapalogenys* as having the following characteristics: a single notched dorsal fin; papillae on the fleshy lower lip; 10 pores on the chin; a procumbent spinelike process (exposed tip of first pterygiophore) at origin of dorsal fin, and seven branchiostegals, and also classified *Hapalogenys* under haemulids. Iwatsuki et al. (2000) and Iwatsuki and Russell (2006) described a total of seven nominal species of *Hapalogenys*, now accepted as valid species names, under the family Haemulidae. Iwatsuki and Nakabo (2005) further described diagnostic characters supporting *Hapalogenys* position within the haemulids, but acknowledged that further evaluation on the genera and species identity of Haemulidae must be conducted. Further, re-description of certain haemulids has resulted in generic re-assignments, such as in the case of *Orthopristis brevipinnis*, which is now placed in the genus *Microlepidotus* (Cooke, 1992).

Haemulids occur worldwide in tropical and warm temperate seas. *Haemulon* and *Anisotremus* are inhabitants of coral reefs or hard-bottom areas and are nocturnal feeders on sand and grass flats (Helfman et al., 1982). Members of *Genyatremus*, *Pomadasys*, and *Conodon* are mud-bottom dwellers, often in turbid brackish water. *Orthopristis* are found on both soft-bottom and hard-bottom habitats. Most grunts are euryhaline fishes, and may enter rivers but seldom enter freshwater (McKay, 2001). Juveniles inhabit more shallow water compared to an adult depth range down to about 115 m. Juveniles may develop a habitat shift during growth and become ecologically and spatially separated for a significant period of time (Helfman et al., 1982; Williams et al., 2004a; Morinière et al., 2003).

Juvenile grunts aggregate in multispecies schools swarming over rocky reefs during the day as a co-evolved predator-defense response. This response can be exacerbated by conditions such as increased water turbidity due to siltation, presence of dense particulate matter suspension, or presence of human observers (McLean and Herrnkind, 1971). Although the schooling behavior diminishes as grunts become older, nocturnal migrations of schooling grunts occur over long distances when they leave the reef to feed at night on sandy bottoms and seagrass beds (McFarland and Wahl, 1996; Ogden and Ehrlich, 1977; Nagelkerken and van der Velde, 2004). Most haemulids are carnivorous, feeding opportunistically on crustaceans, polychaete worms, clams, and echinoids, while smaller species primarily feed on plankton (Konchina, 1977; Ogden and Ehrlich, 1977; Williams et al., 2004a). Stomach content and stable isotope analysis revealed that haemulids undergo dietary changes during ontogeny feeding on increasingly larger prey with increasing trophic level (Morinière et al., 2003). Postrecruitment mortality of grunts was positively correlated with density of predators, including larger conspecifics (Tupper and Juanes, 1999). Grunts are considered gonochoristic, with males and females occurring in all size classes, and display no differences in coloration between sexes (Williams et al., 2004a). The description of unusual male urogenital apparatus of grunts suggests that sexual dimorphisms are probably associated with reproduction (Rasotto and Sadovy, 1995). Purcell et al. (2006) hypothesized that *Haemulon* species spawns throughout the year on a bi-monthly basis. Since haemulids are nonguarders and produce pelagic eggs, the production of mucin, a complex protein usually associated with teleost reproduction, may only indicate a pheromonal role (Rasotto and Sadovy, 1995). Recorded duration of pelagic existence for haemulids is about two weeks, as indicated by the limited period between fertilization and settlement (McFarland et al., 1985). The lack of documented spawning events, however, may suggest that reproduction occurs at dusk (Lindeman and Toxey, 2003; McFarland et al., 1985). Haemulids employ the carangiform mode of swimming and exhibit normal activity level. Haemulids are important reef fish ecologically and economically. They play a significant role in the ecosystem as a nutrient (phosphorus and nitrogen) resource, while also stimulating biological activity in the reef benthic community (Meyer and Schultz, 1985; Ogden and Ehrlich, 1977). They can be used as health indicators of the reef to assess the conditions brought about by anthropogenic effects such as overfishing, dynamite fishing, cyanide fishing, aquarium collection, pollution, and curio collection (Hodgson, 1999; Tupper and Juanes, 1999).

Grunts are an important component in commercial fisheries. The recorded global capture production by continent averaged 74,533 tons from 1950 to 2004 (FAO, 2006). Grunts are caught by hook and line, fish traps, bottom trawls, gillnets, and beach seines, and are marketed fresh, filleted, or salted (Lindeman and Toxey, 2003; McKay, 2001; Roux, 1981). Several grunt species are good recreational gamefish, and others are suitable for aquarium display.

Recombination Activation Gene-1 (RAG1)

Molecular data can help resolve taxonomic uncertainties and answer phylogenetic questions when morphological data is limited. This has proven to be effective in constructing phylogenies consistent with demographic and speciation models done on *Anisotremus* (Bernardi and Lape, 2005) and in identifying population structure and spatial genetic patterns of *Haemulon* species (Williams et al., 2004a; 2004b; Durán-Gonzalez et al., 1990). The nuclear RAG1 marker has many unique properties including: rarity of indels; minimal saturation of transition changes at third positions of codons; little or no GC and codon biases; and highly stationary base composition that are suitable for reconstructing phylogenies of different vertebrate taxa (Groth, 1999). Reduced level of homoplasies in phylogenetic studies can be accounted for by the slow evolution of RAG1 gene, in combination with other properties mentioned above (Groth, 1999). RAG1 is a single copy gene, hence eliminates questions regarding gene duplication and messy allelic variations. RAG1 and RAG2 were presumably acquired by vertebrates through lateral gene transfer from a viral genome when the first vertebrates evolved 450 million years ago (Feng et al., 2005). Both genes evolved adjacent to one another and mediate V(D)J recombination, suggesting their role in generation of antibodies and T-cell receptors (Feng et al., 2005). Studies show that vertebrates use the RAG1 gene only as part of the machinery that creates somatic gene variability for the immune system. Therefore, this would also suggest that the RAG1 gene is not subject to much selective pressures that can produce homoplasy, or lead to adaptive divergence (Feng et al., 2005). However, Holcroft (2004) acknowledged that given the special properties of the RAG1 gene, careful considerations should be made regarding those species that show apparent departure from base stationarity, level of codon bias, and site saturation, which can lead to false classification of taxa under study.

Nuclear genes, such as RAG1, are recognized for their capacity in detecting historical patterns of population structure and reconstructing deep-level phylogenies of vertebrates (Williams et al., 2002; Groth and Barrowclough, 1999; Holcroft, 2004; Springer et al., 2001). However, it has not been used for inferring intrafamilial phylogenies except in one successful case in combination with other genes (Rüber et al., 2004). Mahon (unpublished PhD thesis) was successful in using RAG1 to infer intrafamilial relationships in another percoid family, Sparidae. This prompted the present study to use RAG1 to infer an intrafamilial phylogeny in Haemulidae, which is putatively closely related to Sparidae.

In this study, the nuclear gene RAG1, mitochondrial gene COI, and RAG1-COI combined sequence data were used to: (1) infer the phylogenetic relationship of the haemulids; (2) test the monophyly of the family Haemulidae and the proposed superfamily Haemuloidea; (3) examine if the putative haemulid genera defined by morphological characters are valid; and (4) to test if the RAG1 gene is useful in inferring phylogeny of genera within a percoid family.

MATERIALS AND METHODS

Methodology followed the standard molecular techniques from extraction (DNeasy® Tissue Handbook 03/2004) to sequencing PCR reactions (QIAquick® Spin Handbook 07/2002).

Chemicals

The chemicals listed in Table 2 were used for DNA extraction, electrophoresis, DNA amplification, clean-up, and sequencing reactions.

Table 2
Chemicals used and product information

Chemical	Product information
Agarose GPG/LE (American Bioanalytical)	Ultra pure; CAS 9012-36-6, AB00972-00500; American Bioanalytical, 15 Erie Drive, Natick, MA 01760 (www.americanbio.com)
Boric acid	A74-3; Fisher Scientific, Fair Lawn, New Jersey
Disodium Ethylenediamine Tetraacetate	S311-3; Fisher Scientific, Fair Lawn, New Jersey
Eco130I (StyI) (Buffer Y^{+}/Tango™ with BSA)	MBI Fermentas, #ERO411 (www.fermentas.com)
Ethyl alcohol USP	190 proof and 200 proof%; DSP-KY-417; Aaper Alcohol and Chemical Co., Shelbyville, Kentucky
Hi-Di™ Formamide (Genetic Analysis Grade) (Cycle sequencing mix, pGEM Control Template, 21 M13 Control Primer)	Applied Biosystems, 850 Lincoln Centre Drive, Foster City, California 94404 (www.appliedbiosystems.com)
Isoamyl alcohol	Sigma Chemical Co., St. Louis, Missouri
PCR and SequencingPrimers	IDT, Inc., 1710 Commercial Park, Coralville, IA 52241 (www.idtdna.com)
Phenol chloroform	Sigma Chemical Co., St. Louis, Missouri
Proteinase K	Sigma Chemical Co., St. Louis, Missouri
Qiagen DNeasy® Tissue Kit	Qiagen Inc., 27220 Turnberry Lane, Suite 200, Valencia, California 91355 (www.qiagen.com)
QIAquick Gel Extraction Kit (250)	Qiagen Inc., 27220 Turnberry Lane, Suite 200, Valencia, California 91355 (www.qiagen.com)
Sodium Dodecyl Sulphate (SDS)	Fisher Scientific, Fair Lawn, New Jersey
Sodium Acetate	Sigma Chemical Co., St. Louis, Missouri
TaKaRa ExTaq™ (10X PCR Buffer, dNTP Mixture for PCR)	Takara Bio Inc. Code No. RR001A; Takara Mirus Bio 510 Charmany Drive Madison, Wisconsin 53719 (www.takara-bio.co.jp)
Trizma® base, minimum 99.9% titration	T1503-500g; Sigma-Aldrich Chemical Co., St. Louis, MO (www.sigma-aldrich.com)

Equipment

A thermal cycler (TC-312; Techne Incorporated, 3 Terri Lane, Suite 10 Burlington, NJ 08016, USA) was used for amplification and sequencing programs.

Electrophoresis made use of Wide Mini-Sub Gel GT and Power PAC 300 (BioRad, Hercules, CA). Visualization of agarose gels were performed using UV light (Spectroline® Model TR-302 transilluminator, 302nm UV) following electrophoresis. Sequencing products were sequenced using ABI 3100 capillary sequencer (Applied Biosystems). Other equipment included: Dry bath incubator (Fisher Scientific), Fisher Stirrer (Fisher Scientific), and Eppendorf Centrifuge 5415 C (Brinkman Instruments Inc., Rexdale, Ontario).

Specimen Samples

A total of 35 species of Haemulidae were used in this study (Table 3). These tissues were collected fresh from fish markets, trawl-caught, or speared. Muscle tissue or gill clippings of the fish were dissected and stored in a microcentrifuge tube filled with 95% ethanol or 40 to 70% ethanol, whichever was available during field collection or allowed for air shipping. Tubes were sealed with parafilm and were labeled accordingly by locality, date, and catalogue or field number, and logged in field notebooks. The ethanol was replaced new 95% ethanol solution when the tissues were received at the laboratory. Tissues were stored at -20°C until processed in the laboratory.

DNA Extraction

Genomic DNA was extracted from approximately 25 mg tissue using the DNeasy® Kit (Qiagen) protocol and phenol-chloroform techniques. Phenol-chloroform DNA extraction was adapted from Hillis et al. (1996). Using sterilization technique, 25 mg of tissue, cut into smaller pieces, was taken from each sample specimen and placed in

Table 3
List of species and the accession number of haemulid specimens

Species	Accession Number	Locality
Anisotremus dovii	ODU-305, 9659	Panama
Anisotremus interruptus	ODU-294, 9691	Panama
Anisotremus pacifici	ODU-315, 9618; ODU-317	Panama
Anisotremus virginicus	ODU-653; (577/F12)	Belize; sequence from A. Mahon
Brachydeuterus auritus	ODU-641A	Angola; Sequence from A. Mahon
Conodon serrifer	ODU-591, 9628	Panama
Diagramma pictum	ODU-267, RP-2026; ODU-280, PG30, 10/05/99 KECarpenter	Philippines
Genyatremus luteus	ODU-679, 1	KECarpenter
Haemulon aurolineatum	ODU-290, NMFS030; ODU-299, NMFS028; ODU-300, NMFS027; ODU-301, NMFS026	Sequence from Dr. G. Orti
Haemulon flaviguttatum	ODU-297, 9694	KECarpenter
Haemulon plumierii	ODU-647; ODU-649; (594/101,102)	Sequence from Dr. G. Orti
Haemulon sciurus	ODU-282, NMFS018; ODU-283, NMFS017; ODU-285; ODU-286; ODU-287	KECarpenter
Haemulon scudderii	ODU-307, 9663	Panama
Haemulon steindachneri	ODU-308, 9667; ODU-309, 9671	Panama
Haemulopsis axillaries	ODU-312, 9633	Panama
Haemulopsis elongatus	ODU-298, 9695	Panama
Haemulopsis leuciscus	ODU-318, 9612; ODU-319, 9611	Panama
Haemulopsis nitidus	ODU-320, 9602	Panama
Inermia vittata	T-329	Sequence from A. Mahon
Orthopristis chalceus	ODU-306, 9660; ODU-314, 9619	Panama
Parapristipoma octolineatum	ODU-274, 2A10	Angola
Parapristipoma trilineatum	KECarpenter	KECarpenter
Plectorhinchus chaetodonoides	ODU-275, 153	Manila
Plectorhinchus lessonii	ODU-276, 127; BUS-27; 240	Philippines
Plectorhinchus macrolepis	GG-045	Togo
Plectorhinchus sordidus	ODU-279, PG19, 10/03/99 KECarpenter	Kuwait
Plectorhinchus vittatus	ODU-292, RP01-006	Philippines
Pomadasys argenteus	ODU-335, T-291 BUS03	Philippines
Pomadasys argyreus	ODU-268, 07/27/02 KECarpenter	KECarpenter
Pomadasys branickii	ODU-304, 9655	Panama
Pomadasys kaakan	ODU-269, 07/27/01 KECarpenter; ODU-278, PG8, 10/03/99 KECarpenter	Kuwait
Pomadasys maculatus	ODU-810, RP01-055 (ODU-239)	Philippines
Plectorhinchus shotaf	ODU-95, T-304 BUS03	Philippines
Xenichthys xanti	ODU-264, 09/06/00; ODU-265, 09/06/00; ODU-281, 05/06/00	KECarpenter
Xenistius californiensis	ODU-678; SIO 02-1	KECarpenter

a 0.5 mL microcentrifuge tube. The following were then added to the tube and incubated for a minimum of two hours at 58°C or left overnight at 37°C to accomplish cell lyses: 100 μL of STE buffer (prepared from 0.1 M NaCl, 0.05 M Tris-HCl, and 0.001 M EDTA disodium), 7.5 μL SDS (20% w/v in water), and 7.5 μL proteinase K (10 mg/mL proteinase K in STE buffer). After the tissue dissolves, 100 μL of PCI (phenol:chloroform: isoamyl alcohol, 25:24:1) was added into the tube, vortexed, and left at room temperature for five minutes. The tube was then centrifuged for five minutes at maximum speed (14,000 rpm). It is important to check the color of PCI and to make sure it remains clear, otherwise a new PCI mix would need to be prepared. The aqueous phase (top layer) was then pipetted carefully, placed in a new tube, and 100 µL CI (chloroform: isoamyl alcohol, 24:1) was added. The sample was vortexed and centrifuged for five minutes at maximum speed. The top layer was carefully removed, placed in a new tube, and 10 µL of 3 M sodium acetate (1/10th of original volume) and 250 µL of 100% ethanol (2.5 times of original volume) were added. This tube was placed in the freezer for a minimum of two hours. The samples were centrifuged immediately for five minutes after being removed from the freezer. The liquid was then removed by pipette, making sure the pellet at the bottom is not disturbed. Ethanol (300 µl, 70%) was added to the sample and was vortexed for five minutes. The liquid was removed and samples were placed in a heat-block to dry for approximately one hour at 58°C. Thirty microliters of sterile distilled water was then added to the tube, vortexed, and stored in -20°C until DNA extract was used in the laboratory. DNA extraction following purification of total DNA from animal tissues (DNeasy® Tissue Handbook 03/2004) also required approximately 25 mg tissue sample with addition of 180 µL Buffer ATL and 20 µL proteinase K. The tube was vortexed and incubated at 55°C until completely lysed. It was necessary to vortex the tube occasionally to allow the sample to disperse. The tube was then vortexed (approximately 15 seconds) and 200 µL Buffer AL was added before incubating again for 10 minutes at 70°C. After incubation, 200 µL of 95% ethanol was added to the sample and mixed. The samples were then transferred to DNeasy® Mini spin column (provided in Qiagen Kit) and centrifuged for one minute. Several steps of centrifugation were carried out by adding 500 µL Buffer AW1 for one minute at maximum speed and 500 µL

Buffer AW2 for three minutes at maximum speed to ensure that no residual ethanol was carried over in the eluate. The spin column was then transferred to a new 1.5 mL microcentrifuge tube and the sample was eluted with 200 µL Buffer AE. Sample was incubated at room temperature for one minute and centrifuged for another minute to get the final DNA yield. Successful DNA extractions both from Qiagen DNA extraction protocol and phenol-chloroform techniques were checked using (agarose) gel electrophoresis.

Gel Electrophoresis

Gel electrophoresis was used to check if DNA extraction was carried out successfully and if the desired band during PCR was amplified. It was also necessary to purify the PCR product using this technique followed by gel extraction protocol to eliminate problems with primer dimers during PCR. A 5X Tris-borate EDTA (TBE) buffer was prepared as a stock solution to further make 0.5X TBE buffer for use in gel electrophoresis. The stock (10X TBE) buffer was made by mixing 54 g Trizma® base, 27.5 g boric acid, and 4.65 g sodium EDTA, and adding deionized distilled water to 1 L using a stirrer magnet. The electrophoresis 0.5X TBE buffer was made by measuring 100 mL of 5X TBE buffer and mixing with 900 mL (natural) water. Agarose gels were prepared by measuring 1 g of agarose and adding 100 mL of 0.5X TBE. The agarose solution was microwaved for 1.5 minutes and 10 µL ethidium bromide was added to the agarose solution before pouring into a gel chamber to cool. The solidified gel was then placed on the electrophoresis chamber, making sure the chamber had enough 0.5X TBE buffer (marked on chamber). A tracking dye was added to each sample (2 µL dye: 8 µL sample) before loading the samples on the gel. Ladders were placed at the beginning and at the end of the wells for reference. The ladder was prepared using Eco130I digest of Lambda DNA (www.fermentas.com). Electrophoresis was carried out using PowerPAC 300 (Bio-RAD) running 115 volts of current for 30 minutes. The gel was observed under a UV light using Spectroline® Model TR-302 transilluminator (302nm UV) following electrophoresis. Gel photos were taken using the same transilluminator covered with a photo imaging with ethidium bromide filtering film (Kodak Scientific Imaging Systems EDAS 120 Camera, 1D software (KDS1D) v.3.0.0).

DNA Amplification

Two sets of PCR were employed to successfully amplify approximately 1386 base pairs of RAG1 gene from DNA extracts. The nuclear RAG1 gene of the haemulids was PCR-amplified using Primers 2533F (5'- TGAGCTGCAGTCAGTACCATAAGAT GT -3') and 4078R (5'- TGAGCCTCCATGAACTTCTGAAGRTAYTT -3'). The PCR primers used were separately prepared by adding 90 µL sterile distilled water to 10 µL of each primer to make 10 µM PCR primer. PCR reagents for a 25 µL PCR product included: 14.375 µL sterile distilled water, 2.5 µL 10X Ex Taq™ Buffer, 2 µL dNTPs, 1 µL of each PCR primer, 0.125 µL Takara Ex Taq™ DNA polymerase (Takara Bio Inc.), and 4 µL of DNA extract. The amplification condition was at 95°C for one minute initial denaturation; 15 cycles of 95°C for one minute, 53°C for 45 seconds, and 72°C for 1.5 minutes; 15 more cycles of 95°C for 45 seconds, 51°C for 45 seconds, and 72°C for 1.5 minutes; followed by a seven minute extension at 72°C and incubation at 10°C. PCR products were immediately run on a gel electrophoresis to further prevent problems caused by primer dimers remaining after amplification. PCR products were run on an agarose gel and purified by gel extraction following QIAquick gel extraction protocol from Qiagen. To ensure that enough amount of amplified gene of DNA material can be used for sequencing reactions, the standard protocol of running 25 μL of PCR reaction was carried out first before running another 100 μL PCR reaction (re-PCR). The following cocktail for a 100 μL re-PCR included: 71.5 μL sterile distilled water, 10 μL 10X Ex Taq™ Buffer, 8 μL dNTPs, 4 μL of each primer, 0.5 μL Ex Taq™ DNA polymerase, and 2 μL of the purified PCR product. The same PCR program was used to run this reaction. Re-PCR products were then run on gel and purified using gel extraction following Qiagen protocol.

PCR Purification

To eliminate problems with primer dimers during DNA amplification of RAG1 gene, PCR products were run on a gel electrophoresis and recovery of PCR products from agarose gels was carried out following QIAquick gel extraction kit protocol from Qiagen. After electrophoresis, the desired bands of about 1386 base pairs (marked by RAG1 gene) from PCR products were excised from the gel with a clean sharp blade and each band was placed in a 1.5 mL microcentrifuge tube separately. Samples were weighed and Buffer QG was added to each tube in 3:1 (Buffer QG: weight of excised gel) volume. Samples were incubated at 50°C for 10 minutes or until gels have completely dissolved. To bind the DNA, each sample was transferred to a QIAquick spin column and was centrifuged for one minute at maximum speed. Centrifugation (maximum speed) steps were carried out by adding 0.5 mL Buffer QG (for one minute, to remove traces of agarose), 0.75 mL Buffer PE (one minute), and additional one-minute centrifugations to remove residual ethanol. Each spin column was then transferred to a clean 1.5 mL microcentrifuge tube and eluted with 30 μL sterile distilled water. Samples were incubated at room temperature for one minute and were centrifuged again for one minute. Purified samples were stored in approximately -20°C until used in the laboratory.

Sequencing

The sequencing reaction, for both forward and reverse sequences, was prepared by using 5.4 μL sterile distilled water, 2 μL of 5X BigDye® v3.1 sequencing buffer (included in BigDye® v3.1 Terminator Cycle Sequencing Kit), 2 μL of sequencing primer (either forward or reverse primer), 8 μL of purified re-PCR product, and 2.6 μL BigDye® Terminator (Applied Biosystems). The sequencing reaction was carried with the following program: 25 cycles of 96°C for 30 seconds, 50°C for 15 seconds, and 60°C for four minutes. Unincorporated dyes were removed from sequencing reactions following ethanol and sodium acetate precipitation. The protocol included addition of 50 μL 100% ethanol, 2 μL of EDTA, and 2 μL of 3 M sodium acetate to each tube; 20 minute incubation followed by 20 minute centrifugation (maximum speed). The liquid was removed and 70 μL ethanol was added to each tube. Samples were left at room temperature for five minutes and were centrifuged for another five minutes. The liquid was removed with a pipette and incubated at 90°C for one minute. Dried pellets were stored in the freezer at approximately -20°C until used or re-suspended directly with 15 μL Hi-Di formamide (Applied Biosystems), and incubated at 95°C. The samples were immediately placed on ice after incubation and sequenced using ABI 3100 capillary sequencer (Applied Biosystems) following standard operating methods. Standard precautions such as sterilization techniques and use of positive and negative controls were followed.

Data Analyses

The forward and reverse sequences for each species were run in BLAST (Basic Local Alignment Search Tool) to confirm that sequences matched the RAG1 gene (Altschul et al., 1990). BLAST was also used to determine overlap of the forward and reverse sequences and generate 1386 base pairs of RAG1 gene sequence. Reverse complements of sequences were obtained using BCM Search Launcher (Smith et al., 1996). Fasta files for RAG1 sequences were generated using BioEdit (Hall, 2001). Multiple alignments of sequences were performed using ClustalX (Thompson et al., 1997). Fine-tuning of the aligned sequences was done by comparing the fasta files with peaks from the chromatogram sequence data. Multiple alignment parameters for ClustalX were performed using default settings (Hall, 2004). Samples of haemulid tissues were submitted to the Barcode of Life Project to obtain the COI sequence data, which was used to corroborate the RAG1 dataset. The aligned COI sequences (585 base pairs) were analyzed both independently and combined with the RAG1 sequences.

Data saturation, Maximum Parsimony (MP), and Maximum Likelihood (ML) analyses were performed using PAUP* version 4.0b10 (Swofford, 2002; Hall, 2004). Data saturation is a measurement of the expected number of changes or substitutions depending on the overall genetic distance. Data saturation was performed to examine if the gene used was evolving too quickly for the phylogenetic level examined (Orrell, 2000). Saturation analysis included only the ingroup and was performed for total, first, second, and third codon positions for RAG1, COI, and RAG1-COI combined analyses. To estimate the phylogeny of haemulids, MP was run to search for the best tree with the shortest number of steps, or fewest series of mutations. MrModeltest2.0 (Nylander, 2004) was used to determine the best-fit model for use in ML analysis, which searches for the topology that maximizes the likelihood of observing the data given a model of evolution. Bootstrap analysis was conducted for both MP and ML. The analyses included sequences of an inermiid (*Inermia vittata*) considered in the same superfamily as the Haemulidae, and two sparid fishes, *Diplopodus bermudensis* and *Pagrus pagrus* that are proposed potential outgroups (Johnson, 1980). RAG1 sequences for the two sparids, *A. virginicus*, *B. auritus*, *P. macrolepis*, and *I. vittata* were supplied by Andrew Mahon (unpublished PhD thesis) while sequences for *H. aurolineatum* and *H. plumierii* were obtained from the existing RAG1 mega dataset (University of Nebraska-Lincoln, c/o Dr. Guillermo Orti). Resulting topology for MP and ML analyses were viewed using Treeview (Page, 1996).

RESULTS

The RAG1 gene has a total of 1386 characters (Appendix 1), of which 903 are constant, 199 are variable but parsimony uninformative, and 284 are parsimony informative. The COI gene has a total of 585 characters (Appendix 2), of which 372 are constant, 12 are variable but parsimony uninformative, and 201 are parsimony informative. The combined RAG1-COI genes (Appendix 3) exhibited 1308 constant characters, 208 parsimony uninformative, and 455 parsimony informative characters.

Plots of total number of substitutions as a function of sequence divergence (Tamura and Nei, 1993) of pooled transitions and transversions for RAG1, COI, and RAG1-COI gene sequence data are given in Figs. 1 to 6 (plots for first and second codon positions are not shown). Plots of pooled transitions and transversions for RAG1 and combined RAG1 and COI gene sequence data show a positive relationship and appear to increase linearly with sequence divergence. Plots for COI, however, follow a scattered nonlinear relationship, with a large number of substitutions occurring both at low and high genetic distance for third codon position. Therefore, in Figs. 3 and 4, the third codon position data is saturated for both transitions and transversions for COI gene sequence data.

The general, time reversible plus proportion invariant with gamma distribution (GTR+I+G) model of evolution was found to be the best substitution model for each of the RAG1, COI, and RAG1 and CO1 combined data sets using MrModeltest v2.2 (Nylander, 2004). The estimated nucleotide frequencies for RAG1 data were: A=0.26100, C=0.24590, G=0.27480, T=0.21830; for COI A=0.25790, C=0.33100, G=0.13680, T=0.27430; and for RAG1-COI A=0.25280, C=0.27350, G=0.24000, T=0.23370. The proportion of invariable sites was estimated to be 0.33 for RAG1, 0.63 for COI, and 0.46 for RAG1-COI. The shape of gamma parameter was estimated to be 0.76 for RAG1, 1.03 for COI, and 0.40 for RAG1-COI dataset. The model of nucleotide evolution was incorporated in PAUP* using the ML optimality criterion. The resulting topology for MP and ML analyses were tested using 100 bootstrap replicates.

For the RAG1 dataset, both MP and ML cladograms show high node support for a monophyletic Haemuloidea (Figs. 7 and 8). However, in MP, *Inermia* resulted as an outgroup in relation to haemulids, while ML recovered *Inermia* as an ingroup within the haemulids. Both topologies produced are well supported, therefore, no conclusive evidence was found to elucidate the relationship of the inermiid with the haemulids. Also, no COI sequence was available for *Inermia* to corroborate this result. RAG1, COI, and RAG1-COI sequence data all recovered a well-supported monophyletic Haemulidae for all MP and ML analyses conducted (Figs. 7 to 12). Since MP and ML cladograms produced similar components of clades in the case of RAG1 dataset, COI dataset, and RAG1-COI dataset, only the ML cladograms will be used to highlight subclades produced from RAG1, COI, and RAG1-COI dataset.

RAG1 recovered two well-supported clades separating the two subfamilies Haemulinae (Clade A) and Plectorhinchinae (Clade B) (Fig. 8). The Plectorhinchinae clade consists of *Parapristipoma octolineatum*, *P. trilineatum*, *Diagramma pictum*, *Plectorhinchus chaetodonoides*, *P. vittatus*, *P. macrolepis*, and *P. schotaf.* The Haemulinae clade produced six distinct well-supported subclades (Fig. 8). Clade 1 is

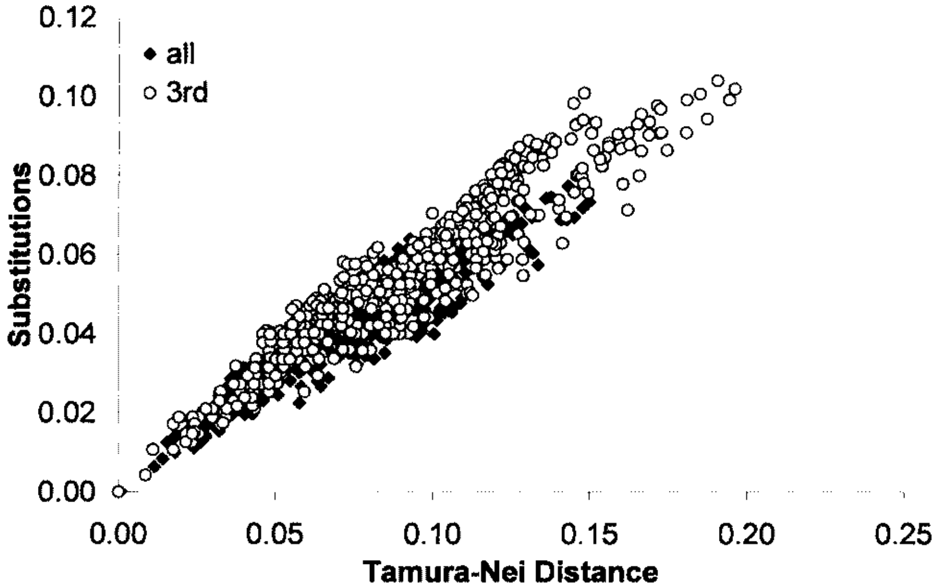

Fig. 1. Total number of substitutions plotted as a function of percent sequence divergence of pooled transitions for RAG1 sequence data. The shaded diamonds represent transitions at all positions, while the non-shaded circles represent transitions at third codon position.

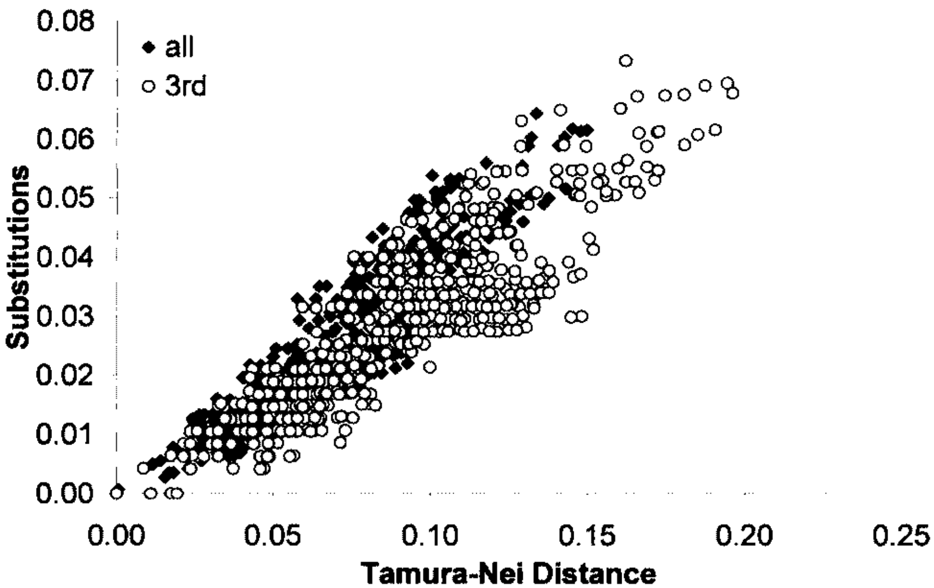

Fig. 2. Total number of substitutions plotted as a function of percent sequence divergence of pooled transversions for RAG1 sequence data. The shaded diamonds represent transversions at all positions, while the non-shaded circles represent transversions at third codon position.

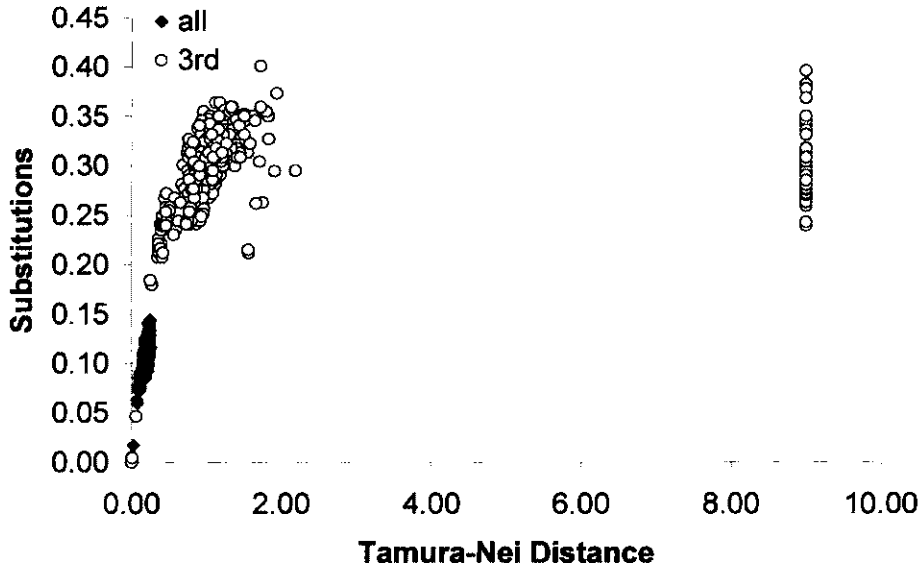

Fig. 3. Total number of substitutions plotted as a function of percent sequence divergence of pooled transitions for COI sequence data. The shaded diamonds represent transitions at all positions, while the non-shaded circles represent transversions at third codon position.

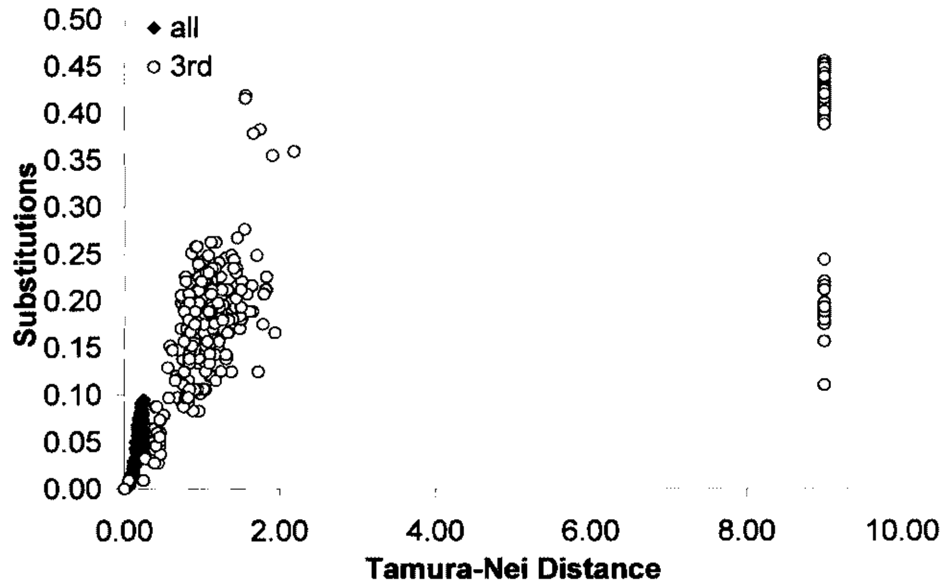

Fig. 4. Total number of substitutions plotted as a function of percent sequence divergence of pooled transversions for COI sequence data. The shaded diamonds represent transversions at all positions, while the non-shaded circles represent transversions at third codon position.

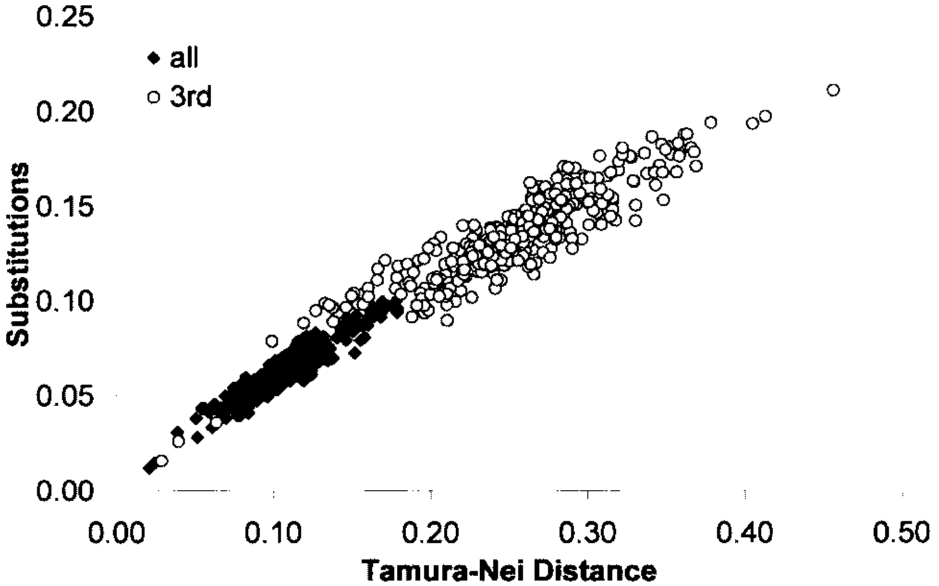

Fig. 5. Total number of substitutions plotted as a function of percent sequence divergence of pooled transitions for RAG1-COI sequence data. The shaded diamonds represent transitions at all positions, while the non-shaded circles represent transversions at third codon position.

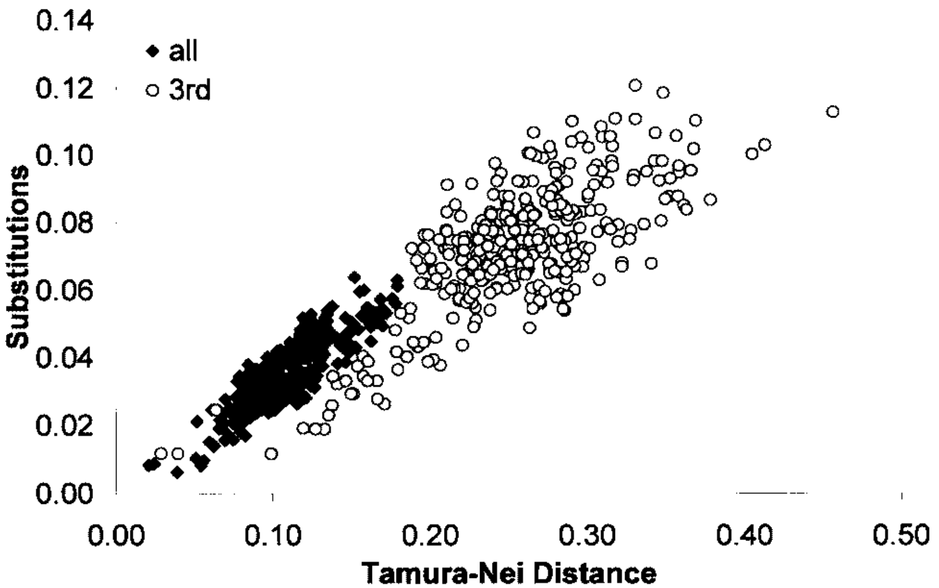

Fig. 6. Total number of substitutions plotted as a function of percent sequence divergence of pooled transversions for RAG1-COI sequence data. The shaded diamonds represent transversions at all positions, while the non-shaded circles represent transversions at third codon position.

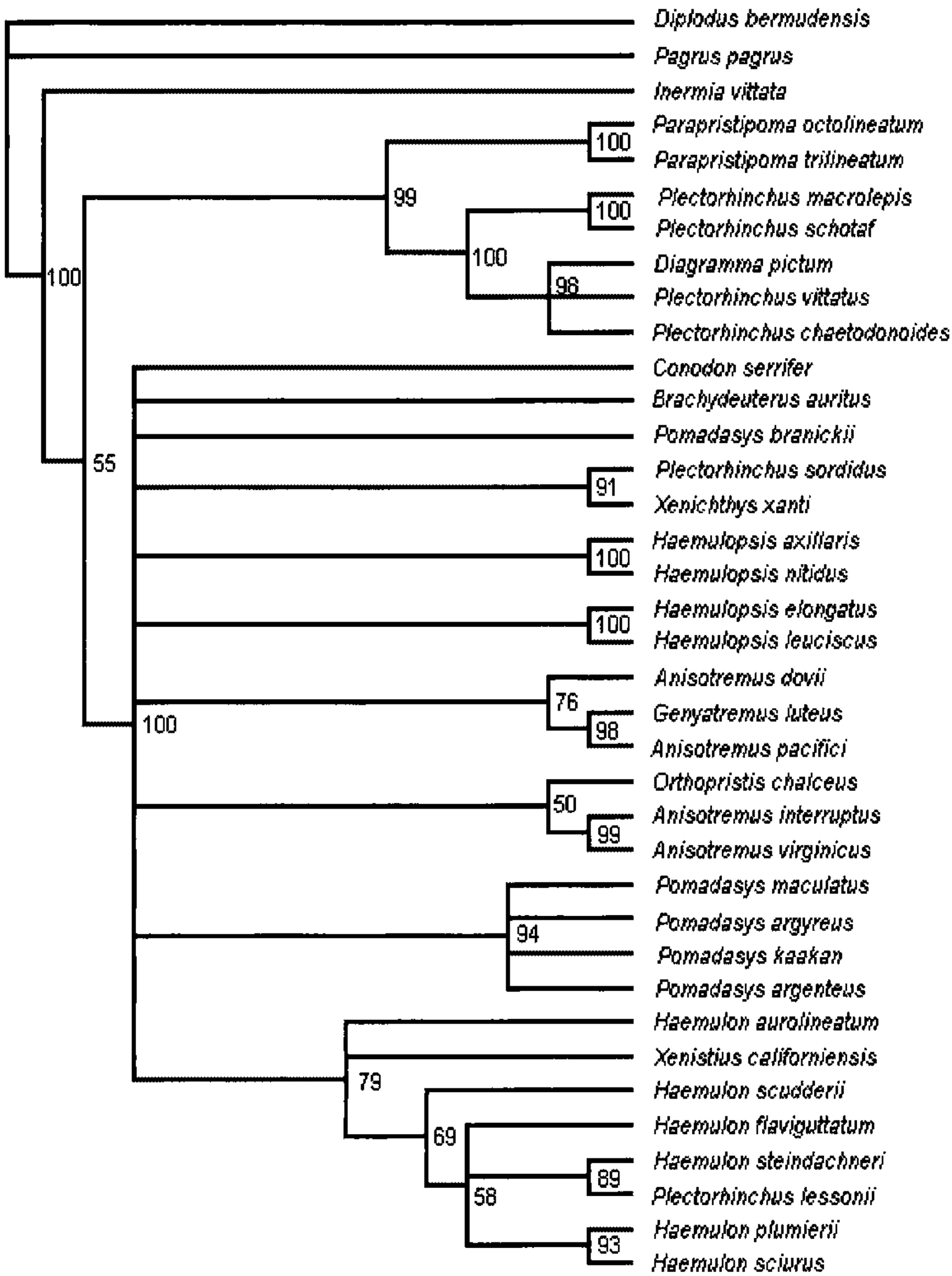

Fig. 7. Maximum Parsimony cladogram with nodes collapsed with less than 50% bootstrap support and bootstrap values of 50 and above indicated at the respective nodes for RAG1 sequence data.

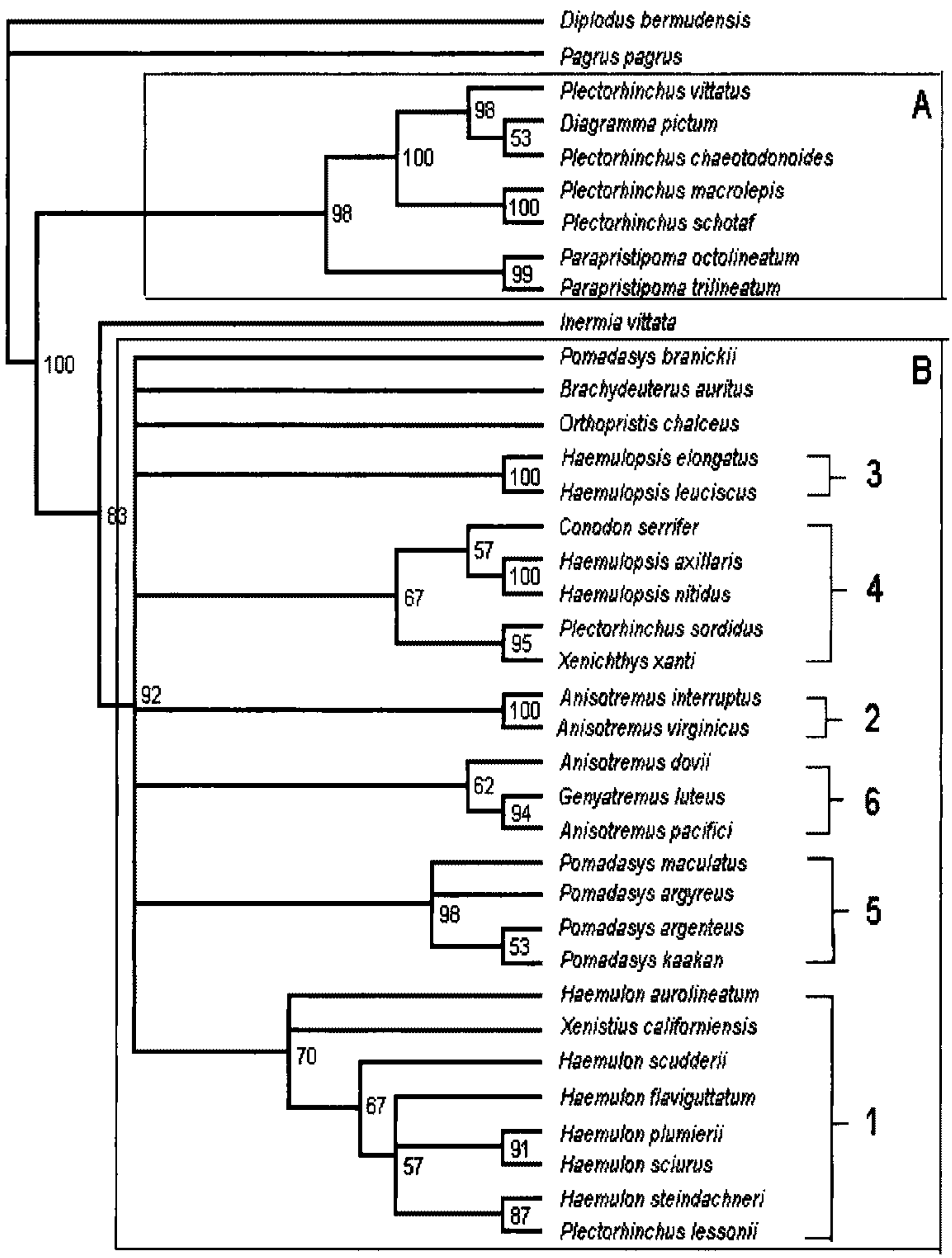

Fig. 8. Maximum Likelihood cladogram with nodes collapsed with less than 50% bootstrap support and bootstrap values of 50 and above indicated at the respective nodes for RAG1 sequence data.

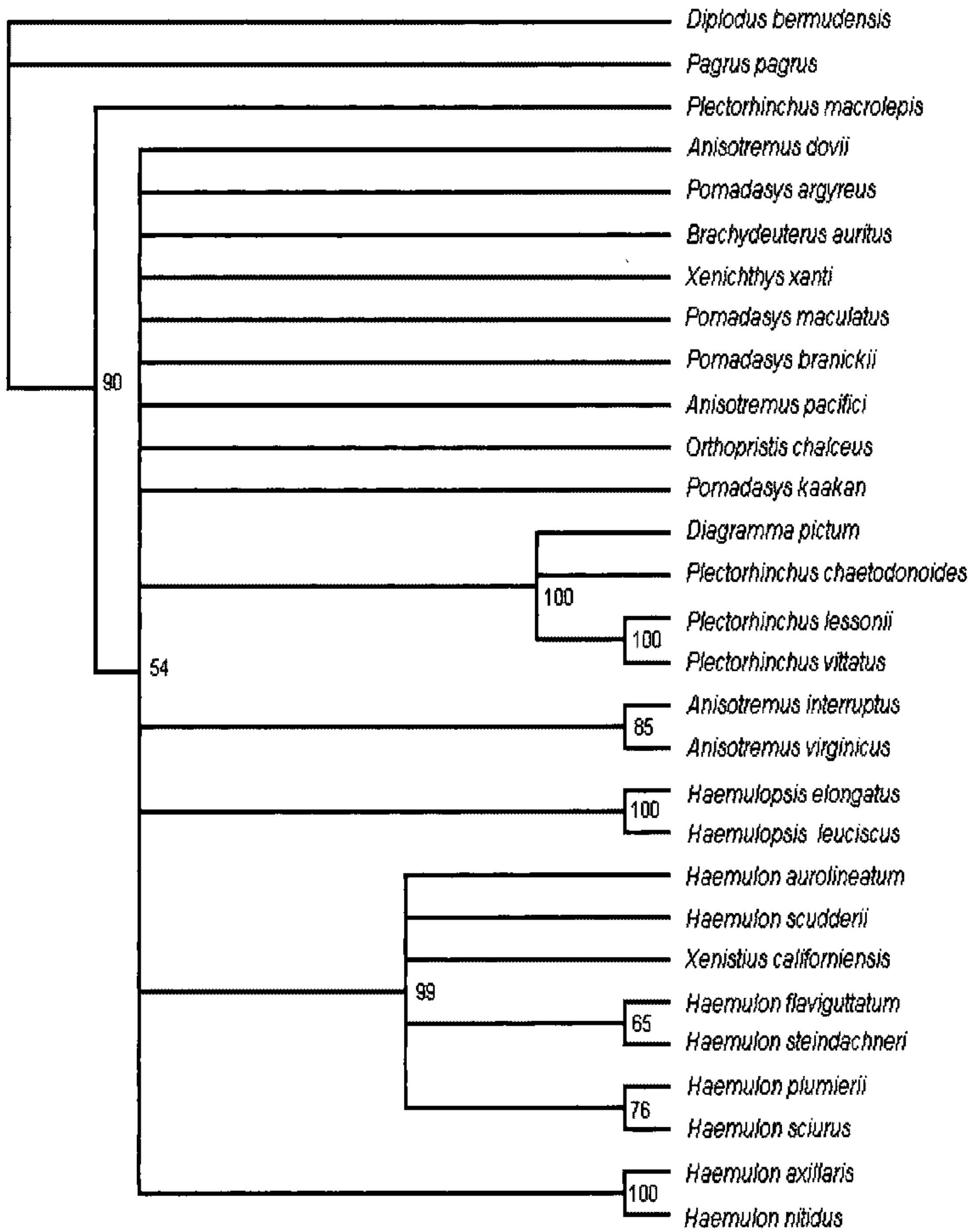

Fig. 9. Maximum Parsimony cladogram with nodes collapsed with less than 50% bootstrap support and bootstrap values of 50 and above indicated at the respective nodes for COI sequence data.

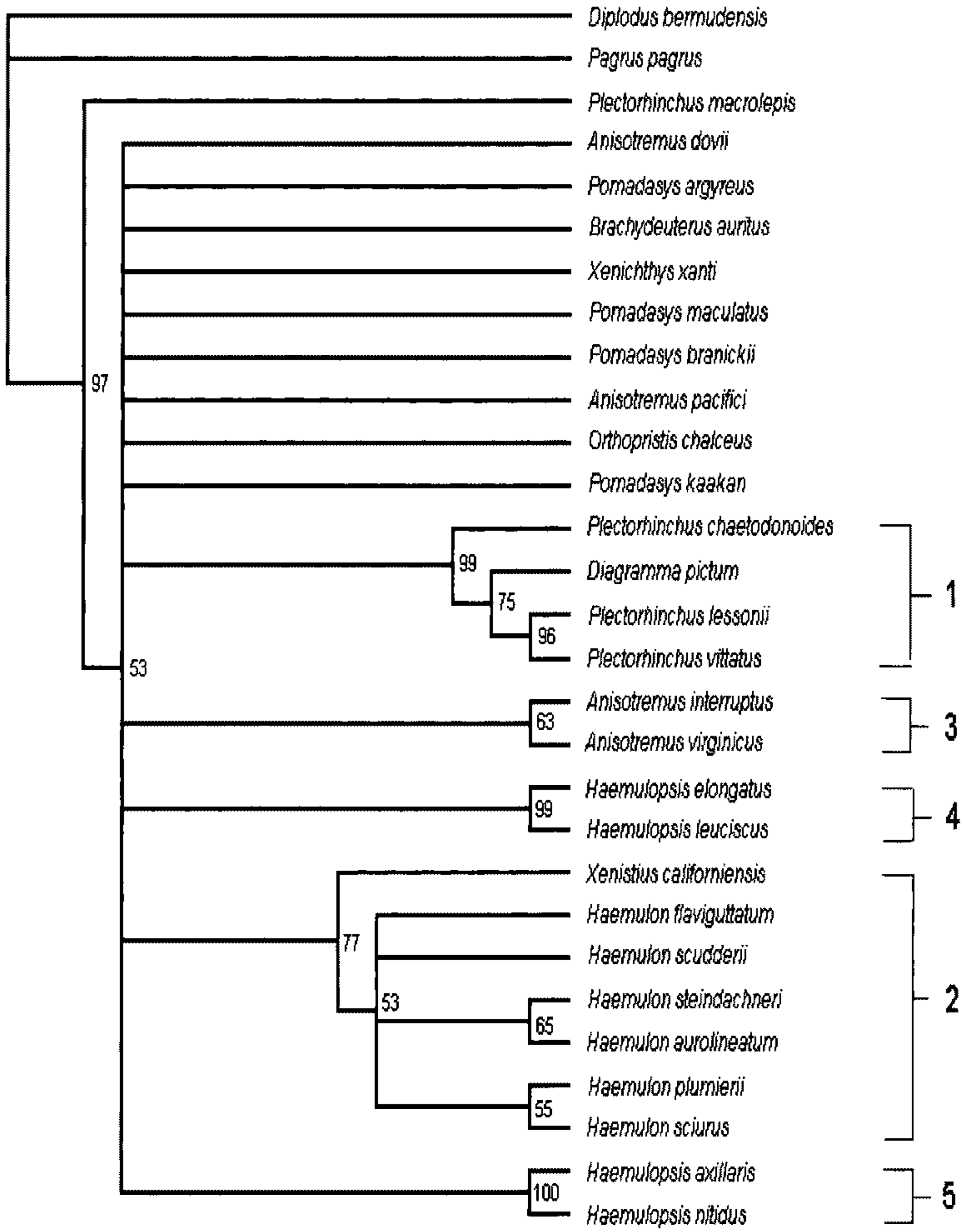

Fig. 10. Maximum Likelihood cladogram with nodes collapsed with less than 50% bootstrap support and bootstrap values of 50 and above indicated at the respective nodes for COI sequence data.

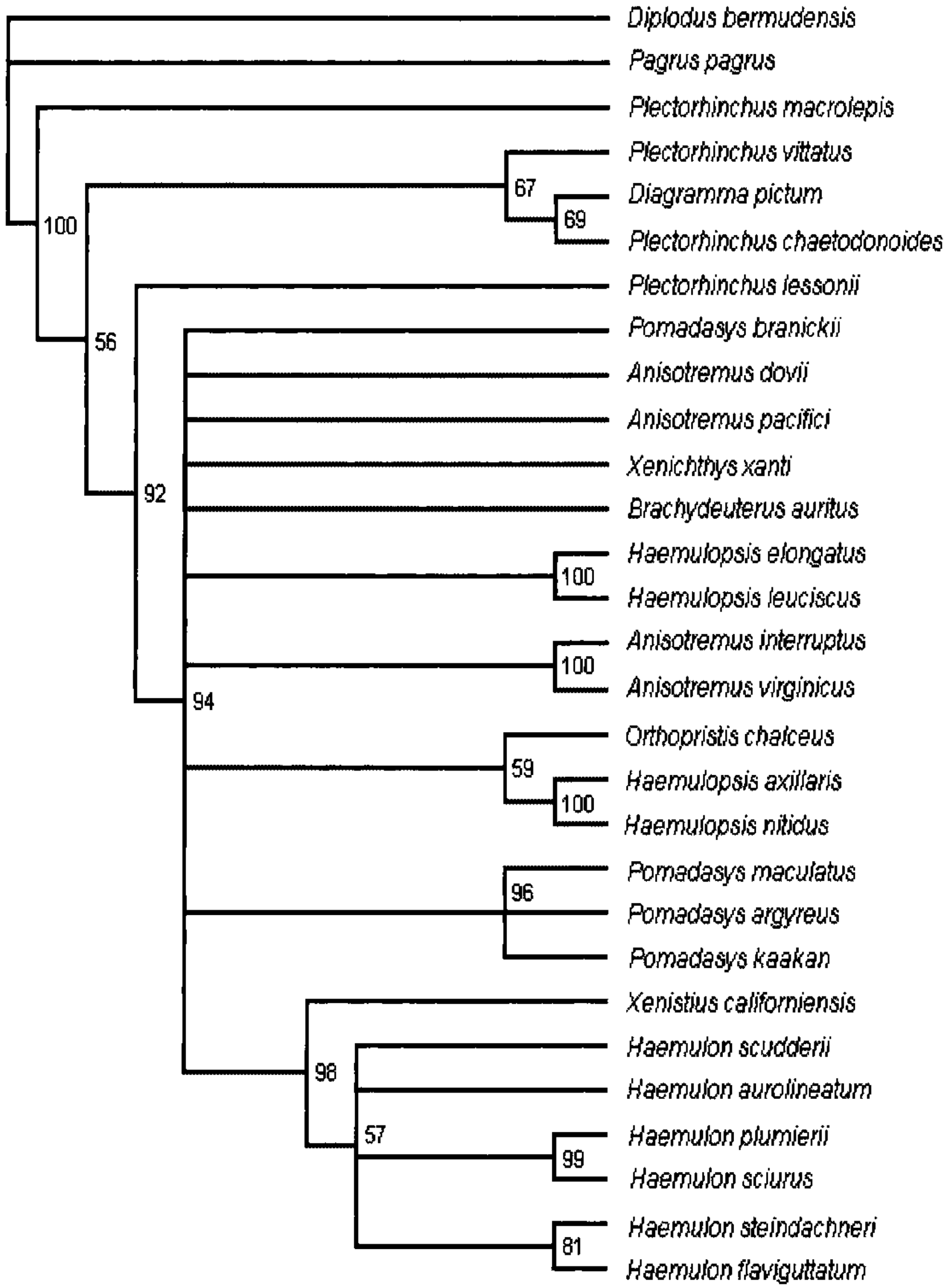

Fig. 11. Maximum Parsimony cladogram with nodes collapsed with less than 50% bootstrap support and bootstrap values of 50 and above indicated at the respective nodes for RAG1-COI sequence data.

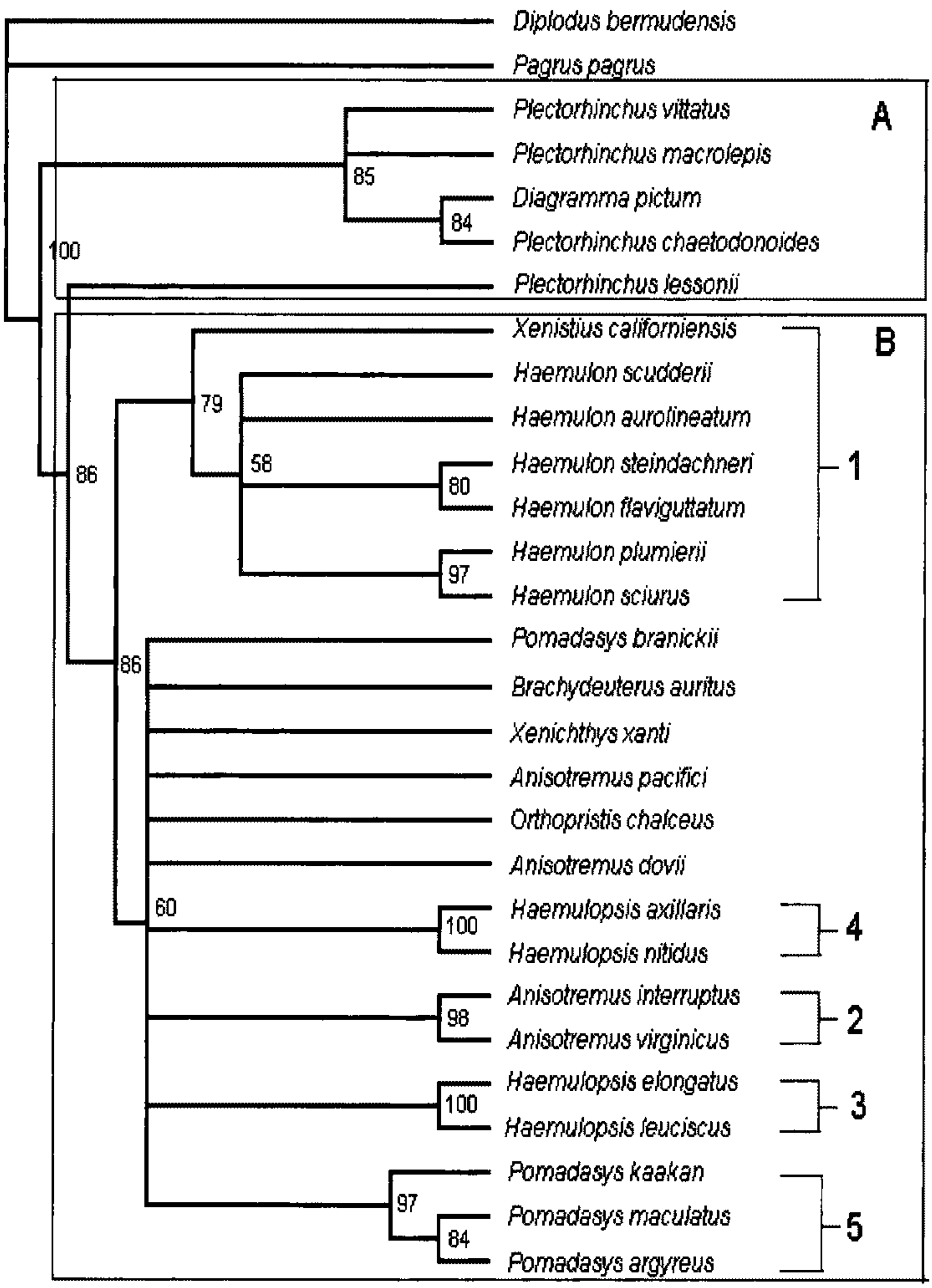

Fig. 12. Maximum Likelihood cladogram with nodes collapsed with less than 50% bootstrap support and bootstrap values of 50 and above indicated at the respective nodes for RAG1-COI sequence data.

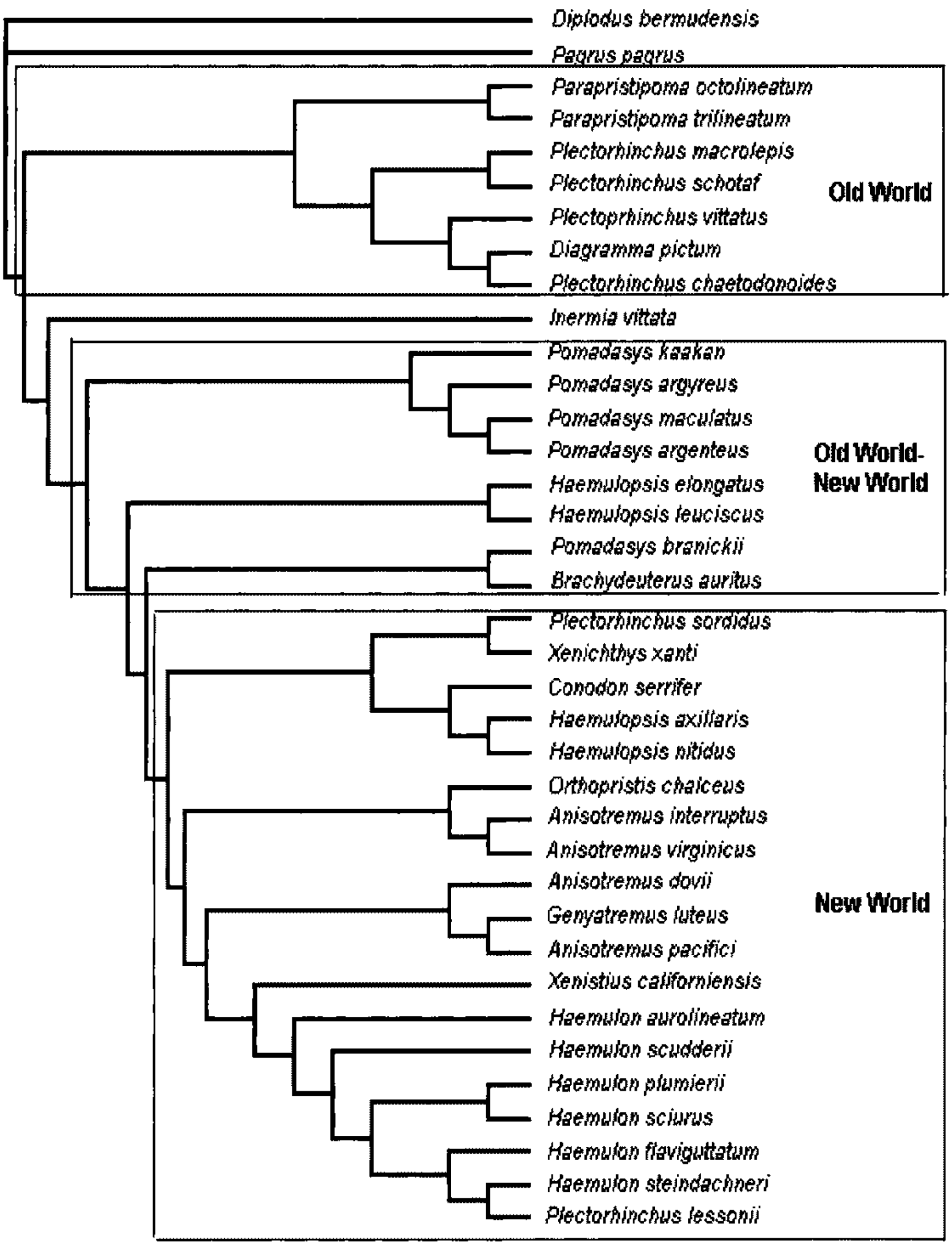

Fig. 13. Proposed radiation of the members of Haemulidae using Maximum Likelihood analysis for RAG1 sequence data. The basal clade is composed of Old World species. The intermediate clade is composed of both Old World and New World species. The more derived clade is composed of New World species.

composed of all the *Haemulon* species (*H. aurolineatum*, *H. scudderii*, *H. flaviguttatum*, and *Genyatremus luteus*. *Orthopristis chalceus, Brachydeuterus auritus*, and *P. branickii* resulted in separate branches within the major Haemulinae clade.

RAG1 recovered two well-supported clades separating the two subfamilies Haemulinae (Clade A) and Plectorhinchinae (Clade B) (Fig. 8). The Plectohinchinae clade consists of *Parapristipoma octolineatum*, *P. trilineatum*, *Diagramma pictum*, *Plectorhinchus chaetodonoides*, *P. vittatus*, *P. macrolepis*, and *P. schotaf*. The Haemulinae clade produced six distinct well-supported subclades (Fig. 8). Clade 1 is composed of all the *Haemulon* species (*H. aurolineatum*, *H. scudderii*, *H. flaviguttatum*, *H. steindachneri*, *H. plumierii*, and *H. sciurus*) and is monophyletic with the inclusion of *Xenistius californiensis*. Clade 2 is a well-supported group composed of *Anisotremus virginicus* and *A. interruptus*. Clade 3 is composed of *Haemulopsis elongatus* and *H. leuciscus*. Clade 4 is composed of *H. axillaris* and *H. nitidus* and clumped together with *Conodon serrifer* and *Xenichthys xanti*. Clade 5 is composed of *Pomadasys maculatus*, *P. argyreus*, *P. argenteus*, and *P. kaakan*. Clade 6 is composed of *A. dovii*, *A. pacifici*, and *Genyatremus luteus*. *Orthopristis chalceus, Brachydeuterus auritus*, and *P. branickii* resulted in separate branches within the major Haemulinae clade.

Only five clades are recovered for COI cladograms (Fig. 10). One of the clades (Clade 1, Figure 10) is composed of members of the subfamily Plectorhinchinae, which are *Plectorhinchus chaetodonoides*, *P. lessonii*, *P. vittatus*, and *Diagramma pictum*. Clade 2 is composed of *Xenistius californiensis*, *Haemulon flaviguttatum*, *H. scudderii*, *H. steindachneri*, *H. aurolineatum*, *H. plumierii*, and H. *sciurus*. Clade 3 is composed of *Anisotremus interruptus* and *A. virginicus*. Clade 4 is composed of *Haemulopsis* *elongatus* and *H. leuciscus*. Clade 5 is composed of *Haemulopsis axillaris* and *H. nitidus*. The RAG1-COI cladogram (Fig. 12) recovered the subfamilies Haemulinae and Plectorhinchinae, and produced five subclades. Clade 1 is composed of all *Haemulon* species and *X. californiensis*. Clade 2 is composed of *A. interruptus* and *A. virginicus*. Clade 3 is composed of *H. elongatus* and *H. leuciscus*. Clade 4 is composed of H. *axillaris* and *H. nitidus*. Clade 5 is composed of *P. maculatus*, *P. argyreus*, and *P. kaakan*.

A discrepancy between RAG1, COI, and RAG1-COI result is the placement of *Plectorhinchus lessonii* and *P. sordidus* in RAG1 cladograms. RAG1 placed *P. lessonii* and *P. sordidus* outside the clade Plectorhinchinae, while corroborated analyses using COI and RAG1-COI positioned *P. lessonii* close to Plectorhinchinae and outside Haemulinae. No COI sequence was available for *P. sordidus*.

Molecular data using RAG1, COI, and RAG1-COI combined genes consistently generated groupings that contradict the monophyly of three haemulid genera: *Anisotremus*, *Haemulopsis*, and *Pomadasys*. For the genus *Anisotremus*, two well-supported clades are produced and are both monophyletic with the inclusion of another genus: one clade includes *A. virginicus*, *A. interruptus*, and *Orthopristis chalceus*; the other clade includes *A. dovii*, *A. pacifici*, and *Genyatremus luteus*. Two clades are also recovered for the genus *Haemulopsis*, one clade is composed of *H. elongatus* and *H. leuciscus*, while the other clade is composed of *H. axillaris*, *H. nitidus*, *Conodon serrifer*, and *Xenichthys xanti*. Two clades are also produced for the genus *Pomadasys*: one group is composed of *Pomadasys kaakan*, *P. argyreus*, *P. maculatus*, and *P. argenteus* and a separate branch for *P. branickii*.

The fully resolved cladogram produced from ML (Fig. 13) recovered groups that are consistent with Old World and New World distributions. The members of the subfamily Plectorhinchinae are primarily Old World species (Clade A, Figs. 8 and 13). Members of the subfamily Haemulinae (Clade B) are composed of both Old World and New World species (Figs. 8 and 13). The ML together (Fig. 13) with these Old World and New World designations may be indicative of radiation of the haemulids: basal Old World group (composed of members of the subfamily Plectorhinchinae); a derived New World group (all *Haemulon* species, all *Anisotremus* species, *Xenistius californiensis*, *G. luteus*, *O. chalceus*, *Conodon serrifer*, *Xenichthys xanti*, *Haemulopsis axillaris*, and *H. nitidus*); and an intermediate Old World-New World group, which is composed of both Old World and New World haemulids (all *Pomadasys* species, *Brachydeuterus auritus*, *Haemulopsis elongatus*, and *H. leuciscus*).

DISCUSSION

Comparison of the number of substitutions with genetic distance at all and each codon position suggested that there is no saturation that has occurred for RAG1 and combined RAG1 and COI dataset. Mutational saturation occurs if there is a deviation from a linear relationship between the number of nucleotide substitutions and the measure of sequence divergence or if data points for substitutions show a leveling off of change as sequence divergence increases (Holcroft, 2004). Figs. 3 and 4 indicate that saturation of third codon substitutions has occurred. Transitional substitutions at third codon position, however, can still be phylogenetically informative even when saturation is indicated (Källersjö etal., 1999; Folmer et al., 1994). COI gene is a mitochondrial gene that evolves very rapidly and contains the most variable sites particularly in third codon positions, which makes it very useful in population genetic studies. Therefore site saturation, especially at third codon positions, is expected for COI dataset at the phylogenetic level being examined in this study. The independent analysis using the COI gene, however, is a suspect using this dataset.

The MP and ML analyses produced mostly similarly distinct clades (Figs. 7 to 12). One exception was *Inermia vittata* that resulted as a haemulid outgroup in MP analysis and as an ingroup in ML analysis for RAG1 dataset. One possible reason for this might be that variation in the RAG1 gene is insufficient to clearly resolve this phylogenetic relationship. Both topologies are well supported by bootstrap values and, therefore, the phylogenetic relationship of inermiids with the haemulids is inconclusive with this dataset. There was no available COI sequence data for *Inermia* that could potentially resolve its position in relation to haemulids.

The two subfamilies Plectorhinchinae and Haemulinae were recovered with high bootstrap support (Figs. 7, 8, 11, and 12) corroborating the previously proposed classification based on morphological data (Johnson, 1980). Although independent analyses using RAG1 gene and COI genes produced a separate clade for members of Plectorhinchinae, only the RAG1 gene recovered both a Plectorhinchinae clade and a Haemulinae clade (Figs. 7 and 8). However, one of the inconsistencies in this study was the placement of *Plectorhinchus lessonii* and *P. sordidus*, which were placed outside the Plectorhinchinae clade in the RAG1 dataset (Figs. 7 and 8). *P. sordidus* was placed in a clade composed of members of *Haemulopsis*, *Conodon*, and *Xenichthys*, while *P. lessonii* was clumped together with members of the genus *Haemulon*. Three potential explanations can account for this anomaly: (1) misidentification of the samples or specimens used, (2) both species may not belong in the genus *Plectorhinchus*, or (3) the RAG1 gene may not have enough variation and that a limited number of mutations made these species look genetically more similar to members outside their true clade. In the latter case, an artifactual phylogenetic grouping could be the result of random convergent or parallel changes in the RAG1 gene. A comparison of RAG1 versus COI results indicates that inherent invariability in the RAG1 gene is the probable cause of misplacement of *P. lessonii* and *P. sordidus*, rather than misidentification or incorrect taxonomic assignment. As a nuclear gene, RAG1 evolves more slowly than the COI mitochondrial gene. The analysis using the COI gene (amplified from the same source of fish tissue) and combined analysis using RAG1 and COI genes, placed *P. lessonii* with other members of the genus *Plectorhinchus*. The added variablility of the mitochondrial gene apparently was better capable of resolving this intrageneric phylogenetic relationship. This refutes the possibility of misidentification or incorrect taxonomy for *P. lessonii*. However, no COI sequence was available for *P. sordidus* to further test the position of this species within the haemulids. Placement of this species needs further evaluation.

One interesting result is a well-supported clade comprised of all *Haemulon* species in all the analyses conducted in this study (Figs. 7 to 12), and includes *Xenistius californiensis* most consistently as sister to *Haemulon*. Morphological examinations and inclusion of both species of *Xenistius* in a molecular analysis may further elucidate this relationship.

Molecular data using RAG1, COI, and RAG-COI combined genes consistently generated clades that question the monophyly of three haemulid genera: *Anisotremus*, *Haemulopsis*, and *Pomadasys* (Figs. 7 to 12). Two well-supported clades are produced for the genus *Anisotremus*: one clade includes *A. virginicus* and *A. interruptus* (and *Orthopristis chalceus* in MP cladogram in Fig. 7); the other clade includes *A. dovii*, *A. pacifici*, and *Genyatremus luteus*. The members of the genus *Anisotremus* has been described based only on various superficial characters. Some obvious morphological characters appear to corroborate the clades in the molecular analyses. For example, the suborbital distance (the distance between the eye and the mouth) of *A. dovii*, *A. pacifici*, and *G. luteus* is significantly shorter than the suborbital distance of *A. virginicus*, *A. interruptus*, and *O. chalceus*. Other morphological characters include the general body and fin configurations that are different between the two clades and similar within clades.

A. virginicus, *A. interruptus*, and *O. chalceus* display a deeper body configuration, with depths typically 30 to 40% of their body length, and are more elongated compared to members of the other clade, which are more ovate than oblong. In addition, *A. virginicus*, *A. interruptus*, and *O. chalceus* possess dorsal rays XII, 14 to 17; anal rays III, 8 to 11. *A. dovii* and *A. pacifici* both have dorsal rays IX, 13 to 16; anal rays III, 9 to 10, while *G. luteus*, has dorsal rays XIII, 12; anal rays III, 11. A complete morphological examination is beyond the scope of this thesis. However, the molecular evidence and superficial morphological evidence indicates that further comprehensive examination of the osteological and other morphological characters of the members of these genera may result in a revision of generic assignments within the Haemulidae.

The molecular evidence in this study indicates two strong sister group relationships within the genus *Haemulopsis*, whose four members are all represented in this study. A clade with *H. axillaris* and *H. nitidus* and a separate clade with *H. elongatus* and *H. leuciscus* are consistently recovered with strong nodal support from bootstrap values (Figs. 7 to 12). However, there is no support for a clade that includes all four species of *Haemulopsis* and further molecular and morphological information are needed to test the monophyly of this genus.

Results of MP and ML analyses using RAG1 question the monophyly of the genus *Pomadasys*. These analyses recovered a separate clade for *P. branickii* and another clade consisting of *P. maculatus*, *P. argenteus*, *P. kaakan*, and *P. argyreus* (Figs. 7 and 8). Superficial morphological differences are evident between *P. branickii* and the larger clade such as the size and length of the anal spine. In addition, *P. branickii* possess dorsal rays XIII, 11 to 12 while the other *Pomadasys* species have dorsal rays XII, 13 to

14. A more comprehensive examination of members of this genus using both molecular and morphological characters may help further resolve the generic limits of *Pomadasys*. There is also a potential biogeographic explanation for these differences that will be discussed later.

The phylogenies inferred from MP and ML analyses of RAG1 gave unexpected insights into the possible biogeographic radiation of haemulid clades of Old World (Indo-Pacific and Eastern Atantic) and New World (both coasts of the Americas) species with respect to tectonic movements. All members of the subfamily Plectorhinchinae are Old World while the most derived members of Haemulinae are New World species (Fig. 13). As stated previously, the presence of two *Plectorhinchus* species in the New World clade is suspected to be an anomaly based on lack of variability in RAG1. An example of an Old World distribution within Plectorhinchinae is the well-supported clade composed of *Parapristipoma trilineatum* and *P. octolineatum*. This is a distinct genus within Plectorhinchinae and both species look very similar but are disjunctly distributed. *Parapristipoma trilineatum* is distributed in the Indo-West Pacific from southern Japan, East China Sea to Taiwan, while *P. octolineatum* occurs in the Eastern Atlantic region ranging from Angola northward and extending into the Western Mediterranean and along the coasts of Portugal and Spain. This genus possibly had a continuous Tethyian distribution prior to the closing of the Tethys Sea when Africa and the Middle East united with Eurasia near the Oligocene-Miocene boundary. Haemulids first evolved during the Cenozoic at a time when the Tethys was circumtropical and later ceased to exist (Hobson, 2006). Haemulids are coastal species and presumably require a more-or-less continuous coastline to become reproductively cohesive. These coastal fishes evolved in continuous distribution during the period of a continuous Tethys Sea. When the Tethys Sea closed and the Atlantic Ocean widened, haemulids would have continued to evolve in allopatry. The Plectorhinchinae (*Plectorhinchus* and *Parapristipoma*) have members both in the Indo-Pacific and eastern Atlantic and presumably evolved prior to the closing of the Tethys but after the Atlantic Ocean widened to an extent that prevented migration across that ocean.

The derived species of Haemulinae are restricted to the New World and presumably evolved after the closing of the Tethys Sea and the widening of Atlantic Ocean (Fig. 13). All species belonging to this clade either occur in the Eastern Pacific or Western Central Atlantic and presumably evolved prior to the relatively recent closing of the Panamanian Isthmus (Bernardi and Lape, 2005). However, other haemulines, including *Haemulopsis elongatus*, *H. leuciscus*, *Brachydeuterus auritus*, *Pomadasys kaakan*, *P. argyreus*, *P. maculatus*, and *P. argenteus* are a paraphyletic group between Old World and New World groups and occur in both the Old and New Worlds. Both *H. elongatus* and *H. leuciscus* occurs in the Eastern Pacific while *B. auritus* occurs in the Eastern Atlantic (from Morocco to Angola). Moreover, members of the genus *Pomadasys* occur in two clades that correspond to New World and Old World distributions. Molecular data suggests a separate clade for *P. branickii* (New World) and another clade consisting of *P. maculatus*, *P. argenteus*, *P. kaakan*, and *P. argyreus* (all Old World). As stated above, there are morphological characters that indicate that *Pomadasys* needs revision with respect to its members. There are two other possibilities for these two separate *Pomadasys* clades. One of them is the inability of RAG1 gene to resolve this relationship and may not have enough variation to resolve the position of *P.*

branickii within the genus *Pomadasys*. The other possibility relates to the separation of the Old World and New World tectonic plates and the widening of the Atlantic Ocean that may have resulted in two separately evolving clades. Further sampling of *Pomadasys* species around the Atlantic is required to test this hypothesis. Alternatively the intermediate paraphyletic group composed of both Old World and New World species could potentially have been evolving as the Atlantic Ocean widened and prior to the closing of the Tethys Sea.

CONCLUSION

The RAG1 gene was found to be useful in inferring phylogeny at the intrafamilial level within the Haemulidae. The RAG1 gene provided evidence for a monophyletic Haemulidae and recovered well-supported clades for the subfamilies Plectorhinchinae and Haemulinae. The placement of *Inermia* in relation to haemulids, however, remains inconclusive using this dataset. Further molecular work and inclusion of another inermiid species may further elucidate this relationship.

The phylogenies inferred from MP and ML analyses of RAG1 gave unexpected insights into the possible biogeographic radiation of haemulid clades of Old World (Indo-Pacific and Eastern Atantic) and New World (both coasts of the Americas) species, which can be accounted for by the closing of the Tethys Sea and the widening of the Atlantic Ocean. In addition, this study also highlighted potential problems regarding the validity of putative genera within the haemulids, including *Anisotremus*, *Haemulopsis*, and *Pomadasys*. Molecular data using RAG1, COI, and combined RAG1 and COI genes consistently generated clades that question the monophyly of three haemulid genera, and indicate that further comprehensive examination of the osteological and other morphological characters of the members of these genera may result in a revision of generic assignments within the Haemulidae. Further molecular phylogenetic studies that include species of *Hapalogenys*, *Microlepidotus*, *Parakuhlia*, *Boridia*, and *Isacia* may further elucidate the phylogeny of members of Haemulidae.

REFERENCES

Allen, G.R., Robertson, D.R., 1994. Fishes of the Tropical Eastern Pacific. University of Hawaii Press, 2840 Kolowalu Street, Honolulu, Hawaii.

Altschul, S.F., Gish, W., Miller, W., Myers, E.W., Lipman, D.J., 1990. Basic local alignment search tool. J. Mol. Biol. 215, 403-410.

Bernardi, G., Lape, J., 2005. Tempo and mode of speciation in the Baja California disjunct fish species *Anisotremus davidsonii*. Mol. Ecol. 14, 4085-4096.

Brown, R.W., 1956. Composition of scientific words: A manual of methods and a lexicon of materials for the practice of logotechnics. Smithsonian Institution Press, Washington, D.C.

Cooke, R., 1992. Prehistoric nearshore and littoral fishing in the Eastern Tropical Pacific: An Ichthyological evaluation. J. World Prehist. 6, 1-49.

Courtenay, W.R. Jr., 1961. Western Atlantic fishes of the genus *Haemulon* (Pomadasyidae): Systematic status and juvenile pigmentation. Bull. Mar. Sci. Gulf & Carib. 11, 66-149.

Durán-Gonzáles, A., García-Rucias, C.E., Laguarda-Figuerras, A., 1990. The karyotype and "G" bands of *Haemulon aurolineatum* Cuvier, 1829 (Pisces: Haemulidae). Anales del Institutio de Ciencias del Mar y Limnología. Evol. 12, 115–123.

FAO., 2006. Capture production 1950-2004. FAO Fishery Information, Data and Statistics Unit: FISHSTAT Plus - Universal software for fishery statistical time series [online or CD-ROM]. Food and Agriculture Organization of the United Nations.

Feng, B., Bulchand, S., Yaksi, E., Friedrich, R.W., Jesuthasan, S., 2005. The recombination activation gene 1 (RAG1) is expressed in a subset of zebrafish olfactory neurons but is not essential for axon targeting or amino acid detection. BMC Neurosci. 6, 46.

Fish, M.P., Mowbray, W.H., 1970. Sounds of Western North Atlantic fishes. A reference file of biological underwater sounds. The John Hopkins Press, Baltimore.

Folmer, O., Black, M., Hoeh, W., Lutz, R., Vrijenhoek, R., 1994. DNA primers for amplification of mitochondrial cytochrome *c* oxidase subunit I from diverse metazoan invertebrates. Mol. Mar. Biol. Biotechnol. 3, 294-299.

Groth, J.G., Barrowclough, G.F., 1999. Basal divergences in birds and the phylogenetic utility of the nuclear RAG-1 gene. Mol. Phylogenet. Evol. 12, 115-123.

Hall, B.G., 2004. Phylogenetic trees made easy: A how-to-manual, Second Edition. Sinauer Associates, Inc.

Hall, T., 2001. BioEdit v7.0.5. North Carolina State University, Department of Microbiology.

Helfman, G.S., Meyer, J.L., McFarland, W.M., 1982. The ontogeny of twilight migration patterns in grunts (Pisces: Haemulidae). Anim. Behav. 30, 317-326.

Hillis, D.M., Moritz, C., Mable, B.K., 1996. Molecular Systematics. Sinauer Associates, Inc. Sunderland, MA. 655 pp.

Hobson, E.S., 2006. Evolution. In: Allen, L.G., Pondella, D.J., Horn, M.H. (Eds.), The Ecology of Marine Fishes: California and Adjacent Waters, p. 55-80. University of California Press, Berkeley, CA.

Hodgson, G., 1999. A global assessment of human effects on coral reefs. Mar. Pollut. Bull. 38, 345-355.

Holcroft, N.I., 2004. A molecular test of alternative hypotheses of tetraodontiform (Acanthomorpha: Tetraodontiformes) sister group relationships using data from the RAG1 gene. Mol. Phylogenet. Evol. 32, 749-760.

Hong, S.L., 1977. Review of Eastern Pacific *Haemulon* with notes on juvenile pigmentation. Copeia 3, 493-501.

Iwatsuki, Y., Nakabo, T., 2005. Redescription of *Hapalogenys nigripinnis* (Schlegel in Temminck and Schlegel, 1843), a senior synonym of *H. nitens* Richardson, 1844, and a new species from Japan. Copeia 4, 854-867.

Iwatsuki, Y., Russell, B.C., 2006. Revision of the genus *Hapalogenys* (Teleostei: Perciformes) with two new species from the Indo-West Pacific. Mem. Mus. Vic. 63, 29-46.

Iwatsuki, Y., Satapoomin, U., Amaoka, K., 2000. New species: *Hapalogenys merguiensis* (Teleostei: Perciformes) from Andaman Sea. Copeia 1, 129-139.

Johnson, G.D., 1980. The limits and relationships of the Lutjanidae and associated families. Bull. Scripps. Inst. Oceanogr. Univ. Calif. 24, 1-114.

Källersjö, M., Albert, V.A., Farris, J.S., 1999. Homoplasy increases phylogenetic structure. Cladistics 15, 91-93.

Konchina, Y.V., 1977. The systematics and distribution of the grunts family (Pomadasyidae). J. Ichthyol. 16, 883-900.

Lindeman, K.C., 1986. Development of larvae of the French grunt, *Haemulon flavolineatum*, and comparative development of twelve western Atlantic species of *Haemulon* (Percoidei, Haemulidae). Bull. Mar. Sci. 39, 673-716.

Lindeman, K.C., Toxey, C., 2003. Haemulidae – Grunts. pp. 1375-2127. In: Carpenter, K.E. (Ed.), The living marine resources of the Western Central Atlantic. Volume 3: Bony fishes part 2 (Opistognathidae to Molidae), sea turtles and marine mammals. FAO species identification guide for fishery purposes and American Society of Ichthyologists and Herpetologists Special Publication No. 5. FAO, Rome, Italy. pp. 1522-1550.

McFarland, W.N., Brothers, E.B., Ogden, J.C., Shulman, M.J., Bermingham, E.L., Kotchian-Prentiss, N.M., 1985. Recruitment patterns in young French grunts, *Haemulon flavolineatum* (Family Haemulidae), at St Croix, Virgin Islands. Fish. Bull. US 83, 413-426.

McFarland, W.N., Wahl, C.M., 1996. Visual constraints on migration behavior of juvenile French grunts. Environ. Biol. Fishes 46, 109-122.

McKay, R.J., 1984. Haemulidae. In: Fischer, W., Bianchi, G. (Eds.), FAO species identification sheets for fishery purposes. Western Indian Ocean (Fishing Area 51). Vol. 2. Bony fishes (Congiopodidae to Lophotidae). FAO, Rome. pag. var.

McKay, R.J., 2001. Haemulidae (= Pomadasyidae). Grunts (also sweetlips, rubberlips, hotlips, and velvetchins). pp. 2961-2976. In: Carpenter, K.E., Niem, V. (Eds.), FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 5. Bony fishes part 3 (Menidae to Pomacentridae). FAO, Rome, Italy.

McLean, R., Herrnkind, W.F., 1971. Compact schooling during a mass movement by grunts. Copeia, 328-330.

Meyer, J.L., Shultz, E.T., 1985. Migrating haemulid fishes as a source of nutrients and organic matter on coral reefs. Limnol. Oceanogr. 30, 146-156.

Morinière, E.C., Pollux, B.J.A., Nagelkerken, I., Veld, G., 2003. Diet shifts of Caribbean grunts (Haemulidae) and snappers (Lutjanidae) and the relation with nursery-to-coral reef migrations. Estuar. Coast. Shelf Sci. 57, 1079-1089.

Nagelkerken, I., van der Velde, G., 2004. Relative importance of interlinked mangroves and seagrass beds as feeding habitats for juvenile reef fish on a Caribbean island. Mar. Ecol. Prog. Ser. 274, 153-159.

Nelson, J.S., 1994. Fishes of the World, 3rd Edition. John Wiley & Sons, Inc., Hoboken, New Jersey. 600 pp.

Nelson, J.S., 2006. Fishes of the World, 4th Edition. John Wiley & Sons, Inc., Hoboken, New Jersey. 624 pp.

Nylander, J.A.A., 2004. MrModeltest v2. Program distributed by the author. Evolutionary Biology Centre, Uppsala University.

Ogden, J.C., Ehrlich, P.R., 1977. The behavior of heterotypic resting schools of juvenile grunts (Pomadasyidae). Mar. Biol. 42, 273-280.

Orrell, T.M., 2000. A molecular phylogeny of the Sparidae (Perciformes: Percoidei). PhD Thesis. Faculty of the School of Marine Science, The College of William and Mary.

Page, R.D.M., 1996. TREEVIEW: An application to display phylogenetic trees on personal computers. CABIOS 12, 357-358.

Purcell, J.F.H., Cowen, R.K., Hughes, C.R., Williams, D.A., 2006. Weak genetic structure indicates strong dispersal limits: a tale of two coral reef fish. Proc. R. Soc. Biol. Sci. Ser. B 273, 1483-1490.

Rasotto, M.B., Sadovy, Y., 1995. Peculiarities of the male urogenital apparatus of two grunt species (Teleostei: Haemulidae). J. Fish Biol. 46, 936-948.

Richardson, J., 1844. Description of a genus of Chinese fish. Ann. Mag. Nat. Hist. (N. S.) 13, 461-462.

Roux, C., 1981. Pomadasyidae. In: Fischer, W., Bianchi, G., Scott, W.B. (Eds.), FAO species identification sheets for fishery purposes. Eastern Central Atlantic; fishing areas 34, 47 (in part). Department of Fisheries and Oceans Canada and FAO. Vol. 3. Bony fishes (Malacanthidae to Scombridae) pag. var.

Rüber, L., Britz, R., Kullander, S.O., Zardoya, R., 2004. Evolutionary and biogeographic patterns of the Badidae (Teleostei: Perciformes) inferred from mitochondrial and nuclear DNA sequence data. Mol. Phylogenet. Evol. 32, 1010-1022.

Smith, R.F., Wiese, B.A., Wojzynski, M.K., Davison, D.B., Worley, K.C., 1996. BCM Search Launcher - An integrated interface to molecular biology data base search and analysis services available on the World Wide Web. Genome Res. 6, 454-62.

Springer, M.S., DeBry, R.W., Douady, C., Amrine, H.M., Madsen, O., de Jong, W.W., Stanhope, M.J., 2001. Mitochondrial versus nuclear gene sequences in deep-level mammalian phylogeny reconstruction. Mol. Biol. Evol. 18, 132-143.

Springer, V.G., Raasch, M.S., 1995. Fishes, angling, and finfish fisheries on stamps of the world. American Topical Association. Handbook 129. Tucson, Arizona. 110 pp.

Swofford, D.L., 2002. PAUP*: Phylogenetic analysis using parsimony (*and other methods), version 4.0B10. Sinauer Associates, Sunderland, MA.

Tamura, T., Nei, M., 1993. Estimation of the number of nucleotide substitutions in the control region of mitochondrial DNA data. Mol. Biol. Evol. 10, 512-526.

Thompson, J.D., Gibson, T.J., Plewniak, F., Jeanmougin, F., Higgins, D.G., 1997. The ClustalX windows interface: flexible strategies for multiple sequence alignment aided by quality analysis tools. Nucleic Acids Res. 24, 4876-4882.

Tupper, M., Juanes, F., 1999. Effects of a marine reserve on recruitment of grunts (Pisces: Haemulidae) at Barbados, West Indies. Environ. Biol. Fishes 55, 53-63.

Wainwright, P.C., 1989. Functional morphology of the pharyngeal jaw apparatus in perciform fishes: An experimental analysis of the Haemulidae. J. Morphol. 200, 231-245.

Williams, A., Begg, G., Garrett, R., Larson, H., Griffiths, S., 2004a. Coastal Fishes. In: National Oceans Office. Description of key species groups in the Northern Planning Area. National Oceans Office, Hobart, Australia.

Williams, D.A., Purcell, J., Cowen, R.K., Hughes, C.R., 2004b. Microsatellite multiplexes for high-throughput genotyping of French grunts (*Haemulon flavolineatum*, Pisces: Haemulidae) and their utility in other grunt species. Mol. Ecol. Notes 4, 46-48.

Williams, S.T., Jara, J., Gomez, E., Knowlton, N., 2002. The marine Indo-West Pacific break: Contrasting the resolving power of mitochondrial and nuclear genes. Integr. Comp. Biol., 42, 941-952.

APPENDIX 1

RAG1 SEQUENCES OF HAEMULIDS, INCLUDING OUTGROUPS

Diagramma pictum	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Plectorhinchus vittatus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Plectorhinchus chaetodonoides	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Plectorhinchus macrolepis	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Plectorhinchus schotaf	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Parapristipoma octolineatum	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Parapristipoma trilineatum	GATTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Haemulopsis elongatus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Haemulopsis leuciscus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Haemulopsis axillaris	ACTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulopsis nitidus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Conodon serrifer	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Plectorhinchus sordidus	GCTTCTCCCCGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Xenichthys xanti	ACTTCCCCCCGGCTTTCGCGGGTTTGAATGGCCGCCAACTCTCACGAAGG
Pomadasys branickii	ACTTCTCGCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Brachydeuterus auritus	GCTGACCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTATAAGAAATG
Anisotremus interruptus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Anisotremus virginicus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Orthopristis chalceus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Genyatremus luteus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Anisotremus pacifici	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Anisotremus dovii	GCTTCTCCCTGGCTTTCACAAATTTGAATGGCAGCCAGCTCTCACGAATG
Pomadasys maculatus	GCTTCTCCCTGGCTTTCACAAATTTGAATGGCAGCCAGCTCTCATGAATG
Pomadasys argenteus	GCTTCTCCCTGGCTTTCACAAATTTGAATGGCAGCCAGCTCTCATGAATG
Pomadasys kaakan	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Pomadasys argyreus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Haemulon plumierii	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulon sciurus	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulon steindachneri	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Plectorhinchus lessonii	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCCGCCAGCTCTCACGAATG
Haemulon scudderii	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulon flaviguttatum	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulon aurolineatum	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCCCTCACNAATG
Xenistius californiensis	GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Inermia vittata	GCTTCTCCCCGGCTTTCACAAGTTTGAGTGGCAGCCAGCTCTCAGGAATG
Diplodus bermudensis	GCTTCTCCCCGGCTTTCACCAGTTTGAATGGCAGCCAGCTCTCAAGAATG
Pagrus pagrus	GCTTCACCCTGGCTTTCACCGGTTTGAGTGGCAGCCTGCTCTCAAGAATG

Diagramma pictum	TGTCGACATCTTGCAATGTTGGCATTATTAATGGACTCGCTGGATGGGCT
Plectorhinchus vittatus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCGCTGGATGGGCT
Plectorhinchus chaetodonoides	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCGCTGGATGGGCT
Plectorhinchus macrolepis	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCGCTGGATGGGCT
Plectorhinchus schotaf	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCGCTGGATGGGCT
Parapristipoma octolineatum	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCGCTGGATGGGCT
Parapristipoma trilineatum	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCGCTGGATGGGCT
Haemulopsis elongatus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulopsis leuciscus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulopsis axillaris	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulopsis nitidus	TGTCGACATCTTGCAATGATGGCATTATTAATGGGCTCTCTGGATGGGCT
Conodon serrifer	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Plectorhinchus sordidus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Xenichthys xanti	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pomadasys branickii	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Brachydeuterus auritus	TGGCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Anisotremus interruptus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Anisotremus virginicus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Orthopristis chalceus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Genyatremus luteus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Anisotremus pacifici	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Anisotremus dovii	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pomadasys maculatus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pomadasys argenteus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT

Pomadasys kaakan	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pomadasys argyreus	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon plumierii	TGTCGACATCTTGCAACGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon sciurus	TGTCGACATCTTGCAACGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon steindachneri	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Plectorhinchus lessonii	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon scudderii	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon flaviguttatum	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon aurolineatum	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Xenistius californiensis	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Inermia vittata	TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Diplodus bermudensis	TGTCGACGTCTTGCGACGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pagrus pagrus	TGTCGACGTCTTGCGACGTCGGCATTATTAATGGGCTCTCTGGATGGGCT

Diagramma pictum	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus vittatus	TCCTCAGTGGACGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus chaetodonoides	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus macrolepis	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus schotaf	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Parapristipoma octolineatum	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Parapristipoma trilineatum	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulopsis elongatus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulopsis leuciscus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulopsis axillaris	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGAGGTTTCGCTA
Haemulopsis nitidus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGAGGTTTCGCTA
Conodon serrifer	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus sordidus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Xenichthys xanti	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Pomadasys branickii	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Brachydeuterus auritus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Anisotremus interruptus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGAGGTTTCGCTA
Anisotremus virginicus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Orthopristis chalceus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Genyatremus luteus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Anisotremus pacifici	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Anisotremus dovii	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Pomadasys maculatus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Pomadasys argenteus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Pomadasys kaakan	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Pomadasys argyreus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon plumierii	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon sciurus	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon steindachneri	TCCTCTGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus lessonii	TCCTCTGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon scudderii	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon flaviguttatum	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon aurolineatum	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Xenistius californiensis	TCCTCGGTGGATGAATCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Inermia vittata	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Diplodus bermudensis	TCCTCAGTGGATGAGACCCCGGCTGACACCATCACTCGGCGCTTTCGCTA
Pagrus pagrus	TCCTCAGTGGATGAGACCCCGGCTGACACCATCACTCGGCGCTTTCGCTA

Diagramma pictum	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus vittatus	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus chaetodonoides	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus macrolepis	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus schotaf	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Parapristipoma octolineatum	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Parapristipoma trilineatum	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulopsis elongatus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulopsis leuciscus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulopsis axillaris	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulopsis nitidus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Conodon serrifer	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus sordidus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Xenichthys xanti	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pomadasys branickii	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Brachydeuterus auritus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Anisotremus interruptus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Anisotremus virginicus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Orthopristis chalceus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACCTCCTGG

Genyatremus luteus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Anisotremus pacifici	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Anisotremus dovii	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pomadasys maculatus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pomadasys argenteus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pomadasys kaakan	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pomadasys argyreus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon plumierii	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon sciurus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon steindachneri	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus lessonii	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon scudderii	TGATGTGGCACTGGTGTCAGCATTAAAGGATTTGGAGGAGGACATCATGG
Haemulon flaviguttatum	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon aurolineatum	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Xenistius californiensis	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Inermia vittata	TGATGTGGCTCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Diplodus bermudensis	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pagrus pagrus	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG

Diagramma pictum	AGGGGCTGAGGGAGATCGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus vittatus	AGGGGCTGAGGGAGATCGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus chaetodonoides	AGGGGCTGAGGGAGATTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus macrolepis	AGGGGCTAAGGGAGATCGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus schotaf	AGGGGCTGAGGGAGATCAGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Parapristipoma octolineatum	AGGGGCTGAGGGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Parapristipoma trilineatum	AGGGGCTGAGGGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulopsis elongatus	AGGGATTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulopsis leuciscus	AGGGATTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulopsis axillaris	AGGGACTGAAAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulopsis nitidus	AGGGACTGAAAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Conodon serrifer	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus sordidus	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Xenichthys xanti	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Pomadasys branickii	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Brachydeuterus auritus	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Anisotremus interruptus	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Anisotremus virginicus	AGGGATTGAGAGAGAGCGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Orthopristis chalceus	AGGGACTGAAAAAGAGTGGGATGGAAAACAGTGCATGTACCTCACGCTTC
Genyatremus luteus	AGGGACTGAGAGGGAGTGGGCTGGAAGACAGTGCTTGTACCTCAGGCTTC
Anisotremus pacifici	AGGGACTGAGAGAGAGTGGGCTGGAAGACAGTGCTTGTACCTCAGGCTTC
Anisotremus dovii	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Pomadasys maculatus	AGGGACTGAGAGAGAGGGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Pomadasys argenteus	AGGGACTGAGAGAGAGGGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Pomadasys kaakan	AGGGACTGAGAGAGAGGGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Pomadasys argyreus	AGGGACTGAGAGAGAGGGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon plumierii	AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon sciurus	AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon steindachneri	AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus lessonii	AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon scudderii	AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon flaviguttatum	AGGGACTGAGAGGGAGTGGGCTGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon aurolineatum	AGGGGCTGCGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Xenistius californiensis	AGGGCCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Inermia vittata	AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGCACCGCAGGCTTC
Diplodus bermudensis	ACGGGCTGAGAGAGAATGGGATGGAAGACAGCGCTTGCACCTCAGGCTTC
Pagrus pagrus	ACGGGCTGAGAGAGAATGGGATGGAAGACAGCGCTTGCACCTCGGGCTTC

Diagramma pictum	AGTGTCATGATCAAGGAATCCTGTGATGGCATGGGTGATGTCAGCGAGAA
Plectorhinchus vittatus	AGTGTCATGATCAAGGAATCCTGTGATGGCATGGGTGATGTCAGCGAGAA
Plectorhinchus chaetodonoides	AGTGTCATGATCAAGGAATCCTGTGATGGCATGGGTGATGTCAGCGAGAA
Plectorhinchus macrolepis	AGTGTCATGATCAAGGAATCGTGTGATGGCATGGGTGATGTCAGCGAGAA
Plectorhinchus schotaf	AGTGTCATGATCAAGGAATCGTGTGATGGCATGGGTGATGTCAGCGAGAA
Parapristipoma octolineatum	AGTGTCATGATCAAGGAATCCTGTGATGGCATGGGTGATGTCAGCGAGAA
Parapristipoma trilineatum	AGTGTCATGATCAAGGAATCCTGTGATGGCATGGGTGATGTCAGCGAGAA
Haemulopsis elongatus	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulopsis leuciscus	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulopsis axillaris	AGTGTCATGATCAAGGAATCGTGTGATGGCATGGGTGATGTCAGTGAGAA
Haemulopsis nitidus	AGTGTCATGATCAAGGAATCGTGTGATGGCATGGGTGATGTCAGTGAGAA
Conodon serrifer	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGTGAGAA
Plectorhinchus sordidus	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGTGAGAA
Xenichthys xanti	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA

Pomadasys branickii	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Brachydeuterus auritus	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGTGAGAA
Anisotremus interruptus	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Anisotremus virginicus	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Orthopristis chalceus	AGTGTTATGATAAAGGAATCTTGCGATGGCATGGGTGACGTCAGCCAGAA
Genyatremus luteus	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGTGATGTCAGCGAGAA
Anisotremus pacifici	AGTGTCATGATCAAAGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Anisotremus dovii	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGTGATGTCAGCGAGAA
Pomadasys maculatus	AGTGTCATGATCAAGGAGTCTTGTGACGGCATGGGTGATGTCAGCGAGAA
Pomadasys argenteus	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Pomadasys kaakan	AATGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Pomadasys argyreus	AGTGTCATGATCAAGGAATCTTGTGACGGCATGGGCGATGTCAGCGAGAA
Haemulon plumierii	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGTGATGTCAGCGAGAA
Haemulon sciurus	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulon steindachneri	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Plectorhinchus lessonii	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulon scudderii	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulon flaviguttatum	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGTGATGTCAGCGAGAA
Haemulon aurolineatum	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Xenistius californiensis	AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Inermia vittata	AGTGTCATGATCAAGGAATCCTGTGATGGCATGGGCGATGTCAGCGAGAA
Diplodus bermudensis	AGAGTCATGATCAAGGAATCCTGTGACGGCATGGGCGATGTCAGCGAGAA
Pagrus pagrus	AGAGTCATGATCAAGGAGTCTTGCGACGGCATGGGCGATGTCAGCGAGAA

Diagramma pictum	GCATGGCGGAGGACCAGCTGTTCCTGAGAAGGCTGTGCGTTTCTCTTTCA
Plectorhinchus vittatus	GCATGGCGGAGGACCAGCTGTTCCTGAGAAGGCTGTGCGTTTCTCTTTCA
Plectorhinchus chaetodonoides	GCATGGCGGAGGACCAGCTGTTCCTGAGAAGGCTGTGCGTTTCTCTTTCA
Plectorhinchus macrolepis	GCACGGCGGAGGACCAGCTGTTCCTGAGAAGGCTGTGCGTTTCTCTTTCA
Plectorhinchus schotaf	GCACGGCGGAGGACCAGCTGTTCCTGAGAAGGCCGTGCGTTTCTCTTTTA
Parapristipoma octolineatum	GCATGGCGGAGGGCCAGCTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Parapristipoma trilineatum	GCACGGTGGAGGACCAGCTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulopsis elongatus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulopsis leuciscus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulopsis axillaris	GCATGGTGGAGGACCACTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulopsis nitidus	GCATGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Conodon serrifer	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Plectorhinchus sordidus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Xenichthys xanti	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Pomadasys branickii	GCACGGTGGAGGACCAGTTGTTCTTGATAAGGCTGTACGTTTCTCTTTCA
Brachydeuterus auritus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Anisotremus interruptus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Anisotremus virginicus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Orthopristis chalceus	GCAAGGTGGAGGACCATTTGTTCCGGAAAAGCCTGTACGTTTCTCTTTCA
Genyatremus luteus	GCACGGTGGAGGACCAGTTGTTCCGGAGAAGGCTGTACGTTTCTCTTTCA
Anisotremus pacifici	GCACGGTGGAGGACCAGTTGTTCCGGAGAAGGCTGTACGTTTCTCTTTCA
Anisotremus dovii	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Pomadasys maculatus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Pomadasys argenteus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Pomadasys kaakan	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Pomadasys argyreus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulon plumierii	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGCTTCTCTTTCA
Haemulon sciurus	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGCTTCTCTTTCA
Haemulon steindachneri	GCATGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Plectorhinchus lessonii	GCACGGTGGAGGACCAGTTGTTCCTGATAAGGCTGTACGTTTCTCTTTCA
Haemulon scudderii	GCATGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulon flaviguttatum	GCACGGTGGAGGACCAGTTGTTCCGGAGAAGGCTGTACGTTTCTCTTTCA
Haemulon aurolineatum	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Xenistius californiensis	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Inermia vittata	GCACGGTGGAGGACCAGCTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Diplodus bermudensis	GCACGGCGGAGGACCAGCTGTTCCCGAGAAGGCTGTACGCTTCTCTTTCA
Pagrus pagrus	GCACGGCGGAGGACCAGCTGTTCCCGAGAAGGCGGTGCGCTTCTCTTTCA

Diagramma pictum	CTGTTATGTCCGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTCACC
Plectorhinchus vittatus	CTGTTATGTCCATCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTCACC
Plectorhinchus chaetodonoides	CTGTTATGTCCATCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTCACC
Plectorhinchus macrolepis	CTGTTATGTCCATCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTCACT
Plectorhinchus schotaf	CTGTTATGTCCATCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTCACC
Parapristipoma octolineatum	CTGTTATGTCTATCTCTGCCCTGGCAGACGAGGAGGAGGAAGAGGTTACC
Parapristipoma trilineatum	CTGTTATGTCTATCTCTGCCCTGGCAGACGAGGAGGAGGAAGAGGTTACC
Haemulopsis elongatus	CTGTTATGTCTGTCTCTGTCTTGGCAGATGAGGAGGGGGAAGAGGTTACG
Haemulopsis leuciscus	CTGTTATGTCTGTCTCTGTCTTGGCAGATGAGGAGGGGGAAGAGGTTACG

```
Haemulopsis axillaris           CTGTTATGTCTATCTCTGTTCTGGCAGACGAGGCGGAGGAGGAGGTTACG
Haemulopsis nitidus             CTGTTATGTCTATCTCTGTTCTGGCAGACGAGGCGGAGGAGGAGGTTACG
Conodon serrifer                CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACG
Plectorhinchus sordidus         CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACG
Xenichthys xanti                CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACG
Pomadasys branickii             CTGTTATGTCTGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTTACG
Brachydeuterus auritus          CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGCAGGAAGAAGAGGTTACG
Anisotremus interruptus         CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAAGAGGAAGAGGTTACG
Anisotremus virginicus          CTGTCATGTCTGTCTCTGTCTTGGCAGACGAGGAGGAGGAAGAGGTTACG
Orthopristis chalceus           CTATTATCTCTGTCTCTGTCCGGGCAAACAAGGAGGTGAAAGAGGTAACT
Genyatremus luteus              CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGAAGCAAGAGGTTACG
Anisotremus pacifici            CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGAAGCAAGAGGTTACG
Anisotremus dovii               CTGTTATGTCTGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTTACA
Pomadasys maculatus             CTATTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACG
Pomadasys argenteus             CTATTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACC
Pomadasys kaakan                CTATTATGTCTGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTTACC
Pomadasys argyreus              CTATTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACG
Haemulon plumierii              CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Haemulon sciurus                CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Haemulon steindachneri          CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Plectorhinchus lessonii         CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Haemulon scudderii              CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Haemulon flaviguttatum          CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGAAGGAAGAGGTTACG
Haemulon aurolineatum           CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAAGAAGAGGTTACA
Xenistius californiensis        CTGTTATGTCTGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTTACG
Inermia vittata                 CTGTTATGTCTGTCTCTGTCCTGGCAGGCGAGGAGGAGGAAGAGGTTACA
Diplodus bermudensis            CCATTATGTCTGTTTCTGTCCTGGCAGACAGCGAGGAGACAGAGGTGACT
Pagrus pagrus                   CCGTTATGTCTGTTTCTGTCCTGGCAGACGGCGAGGAGAAAGAGGTTACC

Diagramma pictum                GTCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTTTG
Plectorhinchus vittatus         ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTTTG
Plectorhinchus chaetodonoides   ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTTTG
Plectorhinchus macrolepis       ATCTTCAGGGAATCAAGGCCAAACTCAGAACTGTCCTGTAAGCCCCTTTG
Plectorhinchus schotaf          ATCTTCAGGGAGTCGAGACCAAATTCAGAACTGTCCTGTAAGCCCCTTTG
Parapristipoma octolineatum     ATCTTCACGGAGTCAAAGCCAAACTCAGAGCTGTCCTGTAAGCCCCTTTG
Parapristipoma trilineatum      ATCTTCACGGAGTCAAAGCCAAACTCAGAGCTGTCCTGTAAGCCCCTTTG
Haemulopsis elongatus           ATCTTCACAGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulopsis leuciscus           ATCTTCACAGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulopsis axillaris           ATCTTCACGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulopsis nitidus             ATCTTCACGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Conodon serrifer                ATCTTCACGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Plectorhinchus sordidus         ATCTTCACTGAGTCAAAGCCAAACTCAGAAATGTCCTGCAAGCCCCTCTG
Xenichthys xanti                ATCTTCACTGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Pomadasys branickii             ATCTTCACGGAGTCGAAGCCAAACTCAGAAATGTCCTGTAAGCCCCTGTG
Brachydeuterus auritus          ATCTTCACAGAGTCAAAGCCCAACTCAGAACTGTCCTGTAAGCCCCTCTG
Anisotremus interruptus         ATCTTCACGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Anisotremus virginicus          ATATTCACGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Orthopristis chalceus           ATCTTCACGGACTCAAAGCCAAACTCAGATATGTCCTGTAAGCCCCTCTG
Genyatremus luteus              ATCTTCACGGAGTCAAAGCCAAATTCAGAACTGTCCTGTAAGCCCCTCTG
Anisotremus pacifici            ATCTTCACAGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Anisotremus dovii               ATCTTCACGGAGTCAAAGCCAAACTCAGAGCTGTCCTGTAAGCCCCTCTG
Pomadasys maculatus             ATCTTCAGGGAGTCAAAGCCAAACTCAGAGCTGTCCTGTAAGCCCCTCTG
Pomadasys argenteus             ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Pomadasys kaakan                ATCTTCAGGGAGCCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Pomadasys argyreus              ATCTTCACGGAGGCAAAGCCAAACTCAGAGCTGTCCTGTAAGCCCCTCTG
Haemulon plumierii              ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon sciurus                ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon steindachneri          ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Plectorhinchus lessonii         ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon scudderii              ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon flaviguttatum          ATCTTCACGGAGTCAAAGCCAAATTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon aurolineatum           ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Xenistius californiensis        ATCTTCAGGGAGCCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Inermia vittata                 ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTTTG
Diplodus bermudensis            ATCTTTACGGAGCCAAAGCCGAGCTCTGAACTGTCCTGTGAGCCCCTTTG
Pagrus pagrus                   ATCTTCACGGAGCCAAAGCCGAACTCAGAAATGTCCTGTAAGCCCCTGTG

Diagramma pictum                CCTGATGTTTGTGGATGAGTCAGACCATGAGACACTCACGGCAGTCCTGT
Plectorhinchus vittatus         CCTGATGTTTGTGGATGAGTCAGACCATGAGACACTCACGGCAGTCCTGT
Plectorhinchus chaetodonoides   CCTGATGTTTGTGGATGAGTCAGACCATGAGACACTCACGGCAGTCCTGT
Plectorhinchus macrolepis       CCTGATGTTTGTGGATGAGTCAGACCATGAGACACTCACGGCCGTCCTAT
```

Plectorhinchus schotaf	CCTGATGTTTGTGGATGAGTCAGACCATGAGACACTCACGGCCGTCCTGT
Parapristipoma octolineatum	CCTGACGTTTGTGGATGAGTCAGACCATGAGACACTCACAGCCGTCCTGT
Parapristipoma trilineatum	CCTGACGTTTGTGGATGAGTCAGACCATGAGACACTCACAGCCGTCCTGT
Haemulopsis elongatus	TCTGATGTTCGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulopsis leuciscus	TCTGATGTTCGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulopsis axillaris	CCTGATGTTTGCGGACGAGTCAGACCATGAGACACTCACAGCCGTCCTGT
Haemulopsis nitidus	CCTGATGTTTGTGGACGAGTCGGACCATGAGACACTCACAGCCGTCCTGT
Conodon serrifer	CCTGATGTTCGTGGACGAGTCGGACCATGAGACACTCACAGCCGTCCTGT
Plectorhinchus sordidus	CCTGATGTTTGTGGACGAGTCGGACCATGAGACACTCACAGCCGTCCTGT
Xenichthys xanti	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Pomadasys branickii	CCTGATGTTTGTGGACGAGTCGGACCATGAGACACTCACAGCCGTCCTGT
Brachydeuterus auritus	CCTGATGTTTGTGGACGAGTCGGACCATGAGACACTCACAGCCGTCCTGT
Anisotremus interruptus	CCTGATGTTTGTGGATGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Anisotremus virginicus	CCTGATGTTTGTGGATGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Orthopristis chalceus	CCTGATGTTTGTAGATGAGTCAGACCATGAAACACTCACAGCCGTCCTGT
Genyatremus luteus	CCTGATGTTTGTGGATGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Anisotremus pacifici	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Anisotremus dovii	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Pomadasys maculatus	CCTCATGTTTGTGGACGAATCAGACCATGAGACACTCACAGCCGTCCTGT
Pomadasys argenteus	CCTCATGTTTGTAGACGAGTCAGACCATGAGACACTCACAGCCGTCCTGT
Pomadasys kaakan	CCTGATGTTTGTAGACGAGTCAGACCATGAGACACTCACAGCCGTCCTGT
Pomadasys argyreus	CCTGATGTTTGTGGACGAGTCAGACCACGAGACCCTCACAGCCGTCCTGT
Haemulon plumierii	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulon sciurus	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulon steindachneri	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Plectorhinchus lessonii	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulon scudderii	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCTGTCCTGT
Haemulon flaviguttatum	CCTGATGTTTGTGGATGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulon aurolineatum	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Xenistius californiensis	CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Inermia vittata	CCTGATGTTTGTGGATGAGTCGGACCACGAAACACTCACAGCCGTCCTGT
Diplodus bermudensis	CCTGATGGTTGTGGAGGAGTCAGACCACCAGACGCTCACAGCCATGCTGG
Pagrus pagrus	CCTGATGTTCGTGGACGAGTCAGACCATGAGACGCTCACGGCCATCCTGT

Diagramma pictum	CGCCTATAGTCGCAGAGCGCGACGCAATGAAAGAGAGCAGGCTCATCCTA
Plectorhinchus vittatus	CGCCTATAGTCGCAGAGCGCGACGCAATGAAAGAGAGCAGGCTCATCCTA
Plectorhinchus chaetodonoides	CGCCTATAGTCGCAGAGCGCAACGCAATGAAAGAGAGCAGGCTCATCCTA
Plectorhinchus macrolepis	CGCCTATAGTCGCAGAGCGCAACGCAATGAAAGAGAGCAGGCTCATCCTA
Plectorhinchus schotaf	CGCCTATAGTCGCAGAGCGCAATGCCATGAAAGAGAGCAGGCTCATCCTA
Parapristipoma octolineatum	CGCCTATAGTTCAAGAGCGCAACGCAATGAAAGAGAGCAGGCTCATCCTA
Parapristipoma trilineatum	CGCCTATAGTTCAAGAGCGCAACGCAATGAAAGAGAGCAGGCTCATCCTA
Haemulopsis elongatus	CACCTATAGTTGCAGAACGCAATGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulopsis leuciscus	CACCTATAGTTGCAGAACGCAATGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulopsis axillaris	CACCTATAGTTGCAGAACGCAATGCCATGAAGGAGAGCAGGCTCATCCTA
Haemulopsis nitidus	CACCTATAGTTGCAGAACGCAATGCCATGAAGGAGAGCAGGCTCATCCTA
Conodon serrifer	CGCCTATAGTTGCAGAACGCAATGCCATGAAAGAGAGCAGGCTCATCCTG
Plectorhinchus sordidus	CGCCTATAGTTGCAGAACGCAATGCCATGAAGGAGAGCAGGCTCATCCTA
Xenichthys xanti	CGCCTATAGTTGCAGAACGCAATGCCATGAAGGAAAGCAGGCTCATCCTA
Pomadasys branickii	CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Brachydeuterus auritus	CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Anisotremus interruptus	CGCCCATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Anisotremus virginicus	CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Orthopristis chalceus	CGCCTATAGTTGCAAAACGCAGTGCAGTGAAGGAGAGCACACTCCTCCTA
Genyatremus luteus	CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCCGGCTCATCCTA
Anisotremus pacifici	CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAAAGCAGGCTCATCCTA
Anisotremus dovii	CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Pomadasys maculatus	CGCCTATCGTTGCAGAACGCAACGCGATGAAGGAGAGCAGGCTCATCCTA
Pomadasys argenteus	CGCCTATTGTTGCAGAACGCAACGCAATGAAGGAAAGCAGGCTCATCCTA
Pomadasys kaakan	CGCCTATCGTTGCAGAACGCAACGCAATGAAGGAAAGCAGGCTCATCCTA
Pomadasys argyreus	CGCCTATCGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulon plumierii	CGCCCATAGTTGCAGAGCGCGACGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulon sciurus	CGCCCATAGTTGCAGAGCGCGACGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulon steindachneri	CGCCCATAGTTGCAGAACGCGACGCAATGAAGGAGAGCAGGCTCATCCTA
Plectorhinchus lessonii	CGCCCATAGTTGCAGAACGCGACGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulon scudderii	CGCCCATAGTTGCAGAGCGCAACGCAATGAAGGAAAGCAGGCTCATCCTA
Haemulon flaviguttatum	CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCCGGCTCATCCTA
Haemulon aurolineatum	CGCCCATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Xenistius californiensis	CGCCCATAGTCGCAGAACGCAACGCAATGAAAGAGAGCAGGCTCATCCTA
Inermia vittata	CGCCCGTAGTTGCAGAGCGCAACGCAATGAAGGAGAGCAGGCTCATCCTG
Diplodus bermudensis	GGCCTGTAGTAGCAGAGCGTATAGCAATGAAAGAGAGCAGGCTGATCCTA
Pagrus pagrus	GGCCTGTAGTTGCAGAGCGCAAGGCAATGAAAGAGAGCAGGCTGATCCTA

```
Diagramma pictum              TCCATCGGTGGACTGCCCCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Plectorhinchus vittatus       TCCATCGGTGGACTGCCCCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Plectorhinchus chaetodonoides TCCATTGGTGGACTGCCCCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Plectorhinchus macrolepis     TCCATTGGCGGACTGCCCCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Plectorhinchus schotaf        TCCATCGGTGGACTGCCCCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Parapristipoma octolineatum   TCCATTGGCGGACTACCTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Parapristipoma trilineatum    TCCATCGGCGGACTACCTCGCTCCTTCCGCTTTCACTTCAGGGGCACGGG
Haemulopsis elongatus         TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulopsis leuciscus         TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulopsis axillaris         TCCATCGGTGGACTACGTCGCTCCTTCCGCTTCCACTTCAGAGGCACGGG
Haemulopsis nitidus           TCCATCGGTGGACTACGTCGCTCCTTCCGCTTCCACTTCAGAGGCACAGG
Conodon serrifer              TCCATCGGTGGACTACGTCGCTCCTTCCGCTTCCACTTCAGAGGCACGGG
Plectorhinchus sordidus       TCCATCGGTGGACTACGTCGCTCCTTCCGCTTCCACTTCAGAGGCACGGG
Xenichthys xanti              TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Pomadasys branickii           TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Brachydeuterus auritus        TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACCGG
Anisotremus interruptus       TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Anisotremus virginicus        CCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGTACGGG
Orthopristis chalceus         TCAATCGGTGGACTGAATCGCTCTTTCCGCTTTCACTTCAGAGGCACAGG
Genyatremus luteus            TCCATTGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Anisotremus pacifici          TCCATCGGTGGATTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Anisotremus dovii             TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCCGAGGCACGGG
Pomadasys maculatus           TCCATCGGCGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Pomadasys argenteus           TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Pomadasys kaakan              TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Pomadasys argyreus            TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon plumierii            TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon sciurus              TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon steindachneri        TCCATCGGTGGACTACCTCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Plectorhinchus lessonii       TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon scudderii            TCTATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon flaviguttatum        TCCATTGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon aurolineatum         TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Xenistius californiensis      TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Inermia vittata               TCCATGGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Diplodus bermudensis          TCTATCGGCGGGCTTGCTCGCTCCTTCCGGTTCCACTTCGCAGTCGTGAG
Pagrus pagrus                 TCCATCGGTGGACTCGCTCGCTCCTTCCGCTTTCACTTCAGAGGCACCGG

Diagramma pictum              ATACGACGAGAAGATGGTGCGCGAGATGGAAGGGCTCGAGGCCTCGGGGT
Plectorhinchus vittatus       ATACGACGAGAAGATGGTGCGCGAAATGGAAGGGCTCGAGGCCTCGGGGT
Plectorhinchus chaetodonoides ATACGACGAGAAGATGGTGCGCGAGATGGAAGGGCTCGAGGCCTCGGGGT
Plectorhinchus macrolepis     ATACGACGAGAAGATGGTGCGCGAGATGGAAGGGCTAGAGGCCTCGGGGT
Plectorhinchus schotaf        ATACGACGAGAAGATGGTGCGCGAGATGGAAGGGCTCGAGGCCTCGGGGT
Parapristipoma octolineatum   ATACGACGAGAAGATGGTGCGTGAGATGGAGGGGCTCGAGGCCTCGGGGT
Parapristipoma trilineatum    ATACGACGAGAAGATGGTGCGTGAGATGGAGGGGCTCGAGGCCTCGGGGT
Haemulopsis elongatus         ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Haemulopsis leuciscus         ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Haemulopsis axillaris         ATACGATGAGAAGATGGTGCGAGAAATGGAGGGGCTCGAGGCCTCGGGCT
Haemulopsis nitidus           ATACGATGAGAAGATGGTGCGAGAAATGGAGGGGCTTGAGGCTTCGAGCT
Conodon serrifer              ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Plectorhinchus sordidus       ATATGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Xenichthys xanti              ATATGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Pomadasys branickii           ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Brachydeuterus auritus        ATATGATGAAAAGATGGTGCGAGAAATGGAGGGGCTTGAGGCCTCGGGGT
Anisotremus interruptus       ATATGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCTTCAGGGT
Anisotremus virginicus        ATATGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCTTCATGGT
Orthopristis chalceus         ATATGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCTTCGGGGT
Genyatremus luteus            ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCAGGGT
Anisotremus pacifici          ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCAGGGT
Anisotremus dovii             ATACGATGAGAAGATGGTGCGAGAGATGGAGGGCTTTGAGGCCTCAGGGT
Pomadasys maculatus           ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAGGCCTCGGGGT
Pomadasys argenteus           ATACGATGAGAAGATGGTGCGAGATATGGAGGGGCTCGAGGCCTCGGGGT
Pomadasys kaakan              ATACGATGAGAAGATGGTGCGAGACATGGAGGGGCTCGAAGCCTCGGGGT
Pomadasys argyreus            ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAGGCCTCGGGGT
Haemulon plumierii            ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAAGCCTCGGGGT
Haemulon sciurus              ATACGATGAAAAGATGGTGCGAGAGATGGAGGGGCTTGAAGCCTCGGGGT
Haemulon steindachneri        ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAAGCCTCGGGGT
Plectorhinchus lessonii       ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAAGCCTCGGGGT
Haemulon scudderii            ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAAGCCTCGGGGT
Haemulon flaviguttatum        ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAAGCCTCGGGGT
```

```
Haemulon aurolineatum           ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAAGCCTCGGGGT
Xenistius californiensis        ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAGGCCTCGGGGT
Inermia vittata                 ATACGATGAGAAGATGGTGCGCGAGGTAGAGGGGCTCGAGGCCTCGGGGT
Diplodus bermudensis            AGGCGATGAGAGAATGATACGTGAGATGGCGGCCCTCGTGGCGTCAGGGT
Pagrus pagrus                   ATACGACGAGAAGATGGTGCGCGAGATGGAGGGCCTCGAGGCCTCGGGGT

Diagramma pictum                CCACCTACATCTGCACTCTGTGTGACTCCAGCCGGGCAGAGGCCTCCGAA
Plectorhinchus vittatus         CCACCTACATCTGCACTCTGTGTGACTCCAGCCGCGCAGAGGCCTCCGAA
Plectorhinchus chaetodonoides   CCACCTACATCTGCACTCTGTGTGACTCCAGCCGCGCAGAGGCCTCCGAA
Plectorhinchus macrolepis       CCACCTACATCTGCACTCTATGTGACTCCAGCCGTGCAGAGGCCTCTGAG
Plectorhinchus schotaf          CCACCTACATCTGCACTCTGTGTGACTCCAGCCGCGCAGAGGCCTCCGAG
Parapristipoma octolineatum     CTTCCTATGTCTGCACCCTGTGTGACTCCAGCCGGGCAGAGGCCTCTCAA
Parapristipoma trilineatum      CCACCTACGTCTGCACCCTGTGTGACTCCAGCCGGGCAGAGGCCTCTCAA
Haemulopsis elongatus           CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCGTCTCAA
Haemulopsis leuciscus           CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCGTCTCAA
Haemulopsis axillaris           CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCACAA
Haemulopsis nitidus             CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Conodon serrifer                CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Plectorhinchus sordidus         CCACCTATGTCTGCACCCTGTGTGACTCCACCCGGGCAGATGCATCTCAA
Xenichthys xanti                CCACCTATGTCTGCACTCCTTGTGACTCCACCCGGGCAGATGCATCTCAA
Pomadasys branickii             CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Brachydeuterus auritus          CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGGAGACTCTCAA
Anisotremus interruptus         CCACCTATGTCTGCACTCTGTGTGACTCCACGCGGGCAGAGGCATCTCAA
Anisotremus virginicus          CCACCTATGTTTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Orthopristis chalceus           CCACCTATGTCTGCACTCTGTGTGACTCCACCCGCGCAGAGGCATCTCAA
Genyatremus luteus              CGACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCAGCTGAA
Anisotremus pacifici            CGACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Anisotremus dovii               CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Pomadasys maculatus             CCACCTATGTTTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTGAA
Pomadasys argenteus             CCACCTATGTTTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTGAA
Pomadasys kaakan                CCACCTATGTTTGCACTCTGTGTGACTCCACCAGGGCAGAGGCATCTGAA
Pomadasys argyreus              CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTGAA
Haemulon plumierii              CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Haemulon sciurus                CCACCTATGTCTGCACTCTGTGTGACTCCACTCGGGCAGAGGCATCTCAA
Haemulon steindachneri          CCACCTATGTCTGCACTCTGAGTGACTCCACCCGGGCAGAGGCATCTCAA
Plectorhinchus lessonii         CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Haemulon scudderii              CCACCTATGTCTGCACTCTGTGTGATTCCACCCGGGCAGAGGCATCTCAA
Haemulon flaviguttatum          CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAG
Haemulon aurolineatum           CCACCTATGTCTGCACTCTGTGTGACTCCACTCGGGCAGAGGCATCTCAA
Xenistius californiensis        CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Inermia vittata                 CCACCTATGTCTGCACTCTTTGTGACTCCACTCGGGCAGAGGCCTCTCAA
Diplodus bermudensis            CCACCTATGCTTGCATTCTATGCGACTCCAGTCGAGCGGACTCGTCTCAA
Pagrus pagrus                   CCACCTACGTCTGCACTCTCTGCGACTCCAGTCGGGCGGAGGCGTCTCAA

Diagramma pictum                AACATGGTGCTCCACTCTGTCACACGCAGCCATGAAGAGAACCTGGACCC
Plectorhinchus vittatus         AACATGGTGCTCCACTCTGTCACACGCAGCCATGAAGAGAACCTGGACCG
Plectorhinchus chaetodonoides   AACATGGTGTTCCACTCTGTTACACGCAGCCATGAAGAGAACCTGGACCG
Plectorhinchus macrolepis       AACATGGTGCTCCACTCTGTCACGCGCAGCCATGAAGAGAACCTGGACCG
Plectorhinchus schotaf          AACATGGTGCTCCACTCTGTCACGCGAAGCCATGAAGAGAACCTGGACCG
Parapristipoma octolineatum     AACATGGTGCTCCACTCCGTCACACGCTGTCATGAAGAGAACCTGGACCG
Parapristipoma trilineatum      AACATGGTGCTCCACTCCGTCACGCGCTGTCATGAAGAGAACCTGGACCG
Haemulopsis elongatus           AACATGGTGCTACACTCCATCACACGCAGCCATGAAGAGAATCTGGACCG
Haemulopsis leuciscus           AACATGGTGCTACACTCCATCACACGCAGCCATGAAGAGAATCTGGACCG
Haemulopsis axillaris           AACATGGTGCTTCACTCTGTCACACGTAGCCACGAAGAGAACCTGGACCG
Haemulopsis nitidus             AACATGGTGCTTCACTCTGTCACACGTAGCCACGAAGAGAAACTGAACTG
Conodon serrifer                AACATGGTGCTGCACTCAGTCACACGCAGCCACGAAGAGAACCTGGACCG
Plectorhinchus sordidus         AACATGGTGCTGCACTCTGTCACACGCAGCCACGAAGAGAACCTGGACCG
Xenichthys xanti                AACATGGTGCTGCACTCTGTCACACGCACCCACGAAGAGAACCTGGACCG
Pomadasys branickii             AACATGGTGCTGCACTCTGTCACACGCAACCACGAAGAGAACCTGGACCG
Brachydeuterus auritus          AACATGGTGCTGCACTCTGTCACACGCAAACACGAAGAGAACCTGGACCG
Anisotremus interruptus         AACATGGTGCTGCACTCTGTCCCACGCACCCACGGAGAGAACCTGGACCG
Anisotremus virginicus          AACATGGTGCTGCACTCTGTCACACGCAGCCACGAAGAGAACCTGGACCG
Orthopristis chalceus           AACATGGTGCTGCACTCTGTCACACGTAACCACGAGGAGAACCTGGACCG
Genyatremus luteus              AACATGGTGCTCCACTCTGTCACACGCAGCCACGAAGAGAACCTGGACCG
Anisotremus pacifici            AACATGGTGCTGCACTCTGTCACACGCAGCCACGAAGAGAACCTGGACCG
Anisotremus dovii               AACATGGTGCTGCATTCTGTCACACGCAGCCACGAAGAGAACGTGGACCG
Pomadasys maculatus             AACATGGTGCTGCACTCCATCTCACGCAGCCAGGAAGAGGACCTGGACCG
Pomadasys argenteus             AACATGGTGCTGCACTCCATCACACGCAGCCACGAAGAGAACCTGGACCG
Pomadasys kaakan                AACATGGTGCTGCACTCCATCACACGCAGCCACGAAGAGAACCTGGACCG
Pomadasys argyreus              AACATGGTGCTGCACTCTATCACACGCAGCCACGAGGAGAACCTGGACCG
Haemulon plumierii              AACATGGTGCTGCACTCCATCACACGCAACCATGAAGAGAACCTGGACCG
```

Haemulon sciurus	AACATGGTGCTGCACTCCATCACACGCAACCACGAGGAGAACCTGGACCG
Haemulon steindachneri	AACATGGTGCTGCACTCCATCACACGCAGCCACGAAGAGAACCTGGACCG
Plectorhinchus lessonii	AACATGGTGCTGCACTCCATCACACGCAGCCACGAAGAGAACCTGGACCG
Haemulon scudderii	AACATGGTGCTGCACTCTATCACACGCAACCACGAAGAGAACCTGGACCG
Haemulon flaviguttatum	AACATGGTGCTGCACTCCATCACACGCAGCCACGAAGAGAACCTGGACCG
Haemulon aurolineatum	AACATGGTGCTGCACTCTGTCACACGCAACCACGAAGAGAACCTGGACCG
Xenistius californiensis	AACATGGTGCTGCACTCTATCACACGCGGCCACGAAGAGAACCTGGACCG
Inermia vittata	AACATGGTGCTGCACTCCATCACACGCAGTCATGAAGAGAACCTAGACCG
Diplodus bermudensis	AACATGGTCCTCCACTCCGTCACCCGCAATCAGGACGAGAACAGGGATCG
Pagrus pagrus	AACATGGTGCTGCACTCCGTCACCCGCAATCACGACGAGAACCTGGAACG

Diagramma pictum	TTACGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGCAGATGAGCTGC
Plectorhinchus vittatus	TTACGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGATGAGCTGC
Plectorhinchus chaetodonoides	TTACGAAATATGGAGGACCAACCCTTTTTCTGAGTCTGTAGATGAGCTGC
Plectorhinchus macrolepis	TTACGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGATGAGCTGC
Plectorhinchus schotaf	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGATGAGCTGC
Parapristipoma octolineatum	TTACGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGATGAGCTGC
Parapristipoma trilineatum	TTACGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGATGAGCTGC
Haemulopsis elongatus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCCGTAGAGGAGCTTA
Haemulopsis leuciscus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCCGTAGAGGAGCTTA
Haemulopsis axillaris	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTGGAGGAGCTGC
Haemulopsis nitidus	TTATAAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTGGAGGAGCTGC
Conodon serrifer	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Plectorhinchus sordidus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Xenichthys xanti	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Pomadasys branickii	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Brachydeuterus auritus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Anisotremus interruptus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAATCTGTAGAGGAGCTAC
Anisotremus virginicus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAATCTGTAGAGGAGCTAC
Orthopristis chalceus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Genyatremus luteus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAATCTGCAGAGGAGCTAC
Anisotremus pacifici	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGCAGAGGAGCTAC
Anisotremus dovii	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTAC
Pomadasys maculatus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Pomadasys argenteus	TTATGAAATATGGAGAACCATCCCCTTTTTGAGTTTGTAGAGGAGCTGC
Pomadasys kaakan	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGCTGC
Pomadasys argyreus	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGCTGC
Haemulon plumierii	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGCTAC
Haemulon sciurus	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCCGTAGAGGAGCTAC
Haemulon steindachneri	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGATGAGCTAC
Plectorhinchus lessonii	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGATGAGCTAC
Haemulon scudderii	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGGTAC
Haemulon flaviguttatum	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGCTAC
Haemulon aurolineatum	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTAC
Xenistius californiensis	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGACGAGCTAC
Inermia vittata	TTACGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGCTGC
Diplodus bermudensis	TTACGAAATCTGGAGCCCCCACCCTTTTTCCGAGTCTGTAGATGAGCTGC
Pagrus pagrus	TTACGAAATCTGGAGGACCAACCCCTTTTCTGAGTCCGCAGATGAGCTGC

Diagramma pictum	GAGACAGAGTCAAAGGGGTCTTTGACAAGCCCTTCCTGGAGACCCATCCC
Plectorhinchus vittatus	GAGACAGAGTCAAAGGGGTCTCTACCAAGCCCTTCCTGGAGACCCATCCC
Plectorhinchus chaetodonoides	GAGACAGAGTCAAAGGGGTCTCTGACAAGCCCTTCCTGGAGACCCATCCC
Plectorhinchus macrolepis	GAGACAGAGTCAAAGGTGTCTCTGCCAAGCCCTTCCTGGAGACCCATCCC
Plectorhinchus schotaf	GAGACAGAGTCAAAGGGGTCTCTGCCAAGCCCTTCCTGGAGACCCATCCC
Parapristipoma octolineatum	GAGACAGAGTCAAAGGGGTCTCTGCCAAGCCCTTCATGGAGACCCATCCC
Parapristipoma trilineatum	GAGACAGAGTCAAAGGGGTCTCTGCCAAGCCCTTCATGGAGACCCATCCC
Haemulopsis elongatus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulopsis leuciscus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulopsis axillaris	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulopsis nitidus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Conodon serrifer	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Plectorhinchus sordidus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Xenichthys xanti	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Pomadasys branickii	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Brachydeuterus auritus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Anisotremus interruptus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Anisotremus virginicus	GAGACAGAGTCAAAGGAGTCTCCGCCAAACCCTTCATGGAGACCCATCCC
Orthopristis chalceus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Genyatremus luteus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCTTGGAGACCCATCCC
Anisotremus pacifici	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Anisotremus dovii	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC

Pomadasys maculatus	GAGACAGAGTCAAAGGAGTCTCTGCCAAGCCCTTCTTGGAGACCCATCCC
Pomadasys argenteus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Pomadasys kaakan	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Pomadasys argyreus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulon plumierii	GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Haemulon sciurus	GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Haemulon steindachneri	GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Plectorhinchus lessonii	GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Haemulon scudderii	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulon flaviguttatum	GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Haemulon aurolineatum	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Xenistius californiensis	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Inermia vittata	GGGACAGAGTCAAAGGGATTTCTGCCAAACCCTTCATGGAGACCCATCCC
Diplodus bermudensis	GAGACAGAGTCAAAGGAGTGTCGAACAAGCCCTTCATGGAGACCCATCAC
Pagrus pagrus	GAGACAGAGTCAAAGGGGTCTCGGCCAAGCCCTTCATCGAGACCCATCCC
Diagramma pictum	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Plectorhinchus vittatus	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Plectorhinchus chaetodonoides	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Plectorhinchus macrolepis	ACGCTGGATGCATTACACTGTGACATAGGGAATGCCACTGAGTTCTACAA
Plectorhinchus schotaf	ACGCTGGATGCATTACACTGTGACATAGGGAATGCCACTGAGTTCTACAA
Parapristipoma octolineatum	ACACTGGATGCCTTGCACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Parapristipoma trilineatum	ACGCTGGATGCATTGCACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulopsis elongatus	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulopsis leuciscus	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulopsis axillaris	ACGCTGGATGCATTACACTGTGACATCGGCAATGCCACTGAGTTCTATAA
Haemulopsis nitidus	TCGCTGGATGCATTACACTGTGACATCGGCAATGCCACTGAGTTCTATAA
Conodon serrifer	ACGCTGGATGCATTACACTGTGACATTGGCAATGCCACCGAGTTCTACAA
Plectorhinchus sordidus	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Xenichthys xanti	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Pomadasys branickii	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Brachydeuterus auritus	ACGCTGGATGCATTGCACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Anisotremus interruptus	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Anisotremus virginicus	ACGCTGGATGCATTACACTGTGACATAGGAAATGCCACTGAGTTCTACAA
Orthopristis chalceus	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Genyatremus luteus	ACGCTAGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Anisotremus pacifici	ACGCTGGATGCATTACACTGTGACATAGGCAATGCTACTGAGTTCTACAA
Anisotremus dovii	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Pomadasys maculatus	ACGCTGGATGCATTGCACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Pomadasys argenteus	ACGCTGGATGCACTACATTGTGACATAGGCAATGCCACTGAGTTCTACAA
Pomadasys kaakan	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Pomadasys argyreus	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon plumierii	ACGCTGGATGCATTRCACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon sciurus	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon steindachneri	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Plectorhinchus lessonii	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon scudderii	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon flaviguttatum	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon aurolineatum	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Xenistius californiensis	ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Inermia vittata	ACGCTGGATGCACTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Diplodus bermudensis	ACGCTGGACGCGCTGCACTGTGACATCGGCAACGCCACCGAGTTCTACAA
Pagrus pagrus	ACGCTGGACGCGCTGCACTGCGACATCGGCAACGCCACCGAGTTCTACAA
Diagramma pictum	AATCTTCCAGGATGAGATCGGGGAGGTGCACCAAAGAGTCAACCCTAGCC
Plectorhinchus vittatus	AATCTTCCAGGATGAGATCGGGGAGGTGCACCAAAAAGTCAACCCTAGCC
Plectorhinchus chaetodonoides	AATCTTCCAGGATGAGATCGGGGAGGTGCACCAAAAAGTCAACCCTAGCC
Plectorhinchus macrolepis	AATCTTCCAGGATGAGATTGGGGAGGTGTACCAAAAAGTGAACCCTAGCC
Plectorhinchus schotaf	AATCTTCCAGGATGAGATTGGGGAGGTGTACCAAAAAGTGAACCCTAGCC
Parapristipoma octolineatum	AATTTTCCAGGATGAGATCGGGGAGGTGTACCAAAAAGTCAACCCTAGCC
Parapristipoma trilineatum	AATCTTCCAGGATGAGATCGGGGAGGTGTACCAAAAAGTCAACCCTAGCC
Haemulopsis elongatus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCAAGCC
Haemulopsis leuciscus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCAAGCC
Haemulopsis axillaris	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAAAACAACCCAAGCC
Haemulopsis nitidus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAAAACAACCCAAGCC
Conodon serrifer	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Plectorhinchus sordidus	AATCTTCCAGGATGAGATCGGAGAAGTGTACCAAAAACCCAACCCAAGCC
Xenichthys xanti	AATCTTCCAGGATGAGATCGGAGAAGTGTACCAAAAACCCAACCCGAGCC
Pomadasys branickii	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Brachydeuterus auritus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAGAAACCCAACCCGAGCC
Anisotremus interruptus	AATCTTCCAGGATGAGATCGGTGAAGTGTACCAAAAACCCAACCCGAGCC

Anisotremus virginicus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAGAACCCAACCCGAGCC
Orthopristis chalceus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Genyatremus luteus	AATTTTCCAGGATGAGATCGGGGAATTGTACCAAAAGCCCAACCCGAGCC
Anisotremus pacifici	AATTTTCCAGGATGAGATCGGGGAATTGTACCAAAAACCCAACCCGAGCC
Anisotremus dovii	AATTTTCCAGGATGAGATCGGGGAATTGTACCAAAAACCCAACCCAGGCC
Pomadasys maculatus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGTC
Pomadasys argenteus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Pomadasys kaakan	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Pomadasys argyreus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon plumierii	AATCTTCCARGACGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon sciurus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon steindachneri	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Plectorhinchus lessonii	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon scudderii	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon flaviguttatum	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon aurolineatum	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Xenistius californiensis	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Inermia vittata	AATCTTCCAGGACGAGATCGGGGAGGTGTACCAAAAACCCAACCCCAGCC
Diplodus bermudensis	AATCTTCCAGGACGAGATCGGGGAGGTGTTCCAGAGGCCCAACCCCAGCC
Pagrus pagrus	AATCTTCCAGGACGAGATCGGGGAGGTGTTCCAGAGGGCCAACCCCAGCC

Diagramma pictum	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Plectorhinchus vittatus	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Plectorhinchus chaetodonoides	GGGAGGAACGGCGCAGCTGGAGGGCGGCCCTAGATAAACAGCTGAGGAAG
Plectorhinchus macrolepis	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Plectorhinchus schotaf	GAGAGGAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Parapristipoma octolineatum	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Parapristipoma trilineatum	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulopsis elongatus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulopsis leuciscus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulopsis axillaris	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulopsis nitidus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Conodon serrifer	GTGAGCAACGACGCAGCTGGAGGGCAGCCCTGGATAAACAGCTGAGGAAG
Plectorhinchus sordidus	GAGAGCAACGACGCAGCTGGAGGGCAGGCCTAGATAAACAGCTGAGGAAG
Xenichthys xanti	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Pomadasys branickii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Brachydeuterus auritus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Anisotremus interruptus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Anisotremus virginicus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Orthopristis chalceus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTCGATAAACAGCTAAGGAAG
Genyatremus luteus	GAGAGCAAAGACGCAGCTGGAGGGCAGGCCTAGATAAACAGCTGAGGAAG
Anisotremus pacifici	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Anisotremus dovii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Pomadasys maculatus	GAGAGAAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Pomadasys argenteus	GAGAGAACCGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Pomadasys kaakan	GAGAGAAAAGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Pomadasys argyreus	GAGAGAAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulon plumierii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulon sciurus	GAGAGCAACGACGCAGCTGGAGGGCAGCCTTAGATAAACAGCTGAGGAAG
Haemulon steindachneri	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Plectorhinchus lessonii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulon scudderii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulon flaviguttatum	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAA
Haemulon aurolineatum	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Xenistius californiensis	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Inermia vittata	GGGAGGAACGACGCAGCTGGAGGGCAGCCCTGGATAAACAGCTGAGGAAG
Diplodus bermudensis	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTCGACAAACAGCTGAGGAAG
Pagrus pagrus	GGGAGGAGCGGCGCAGCTGGAGGGCGGCCCTCGACAAACAGCTGCGGAAG

Diagramma pictum	AACATGAAGCTAAAGCCAGTAATGAGGATGAATGGGAACTATGCCCGCCG
Plectorhinchus vittatus	AAGATGAAGCTAAAGCCAGTAATGAGGATGAATGGGAACTATGCCCGCCG
Plectorhinchus chaetodonoides	AAGATGAAGCTAAAGCCAGTAATGAGGATGAATGGGAACTATGCCCGGCG
Plectorhinchus macrolepis	AAGATGAAGCTAAAGCCAGTAATGAGGATGAATGGGAACTATGCCCGCAG
Plectorhinchus schotaf	AAGATGAAGCTGAAGCCAATAATGAGGATGAATGGGAACTATGCCCGCCG
Parapristipoma octolineatum	AAGATGAAGCTAAAACCTGTAATGAGGATGAATGGGAACTATGCCCGCCG
Parapristipoma trilineatum	AATTTGAAGCTAAAACCAGTAATGAGGATGAATGGGAACTATGCCCGCCG
Haemulopsis elongatus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulopsis leuciscus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulopsis axillaris	AATATGAAGCTTAAGCCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulopsis nitidus	AATATGAAGCTTAAGCCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Conodon serrifer	AACATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG

Plectorhinchus sordidus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Xenichthys xanti	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCACCG
Pomadasys branickii	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Brachydeuterus auritus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTACGCTCGCCG
Anisotremus interruptus	ACGATGAAGCTTAAGCCGGTAATGAGAATGAATGGGAACTATGCTCGCCG
Anisotremus virginicus	ACGATGAAGCTTAAGCCGGTAATGAGAATGAATGGGAACTATGCTCGCCG
Orthopristis chalceus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGACG
Genyatremus luteus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Anisotremus pacifici	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Anisotremus dovii	AAGATGAAGCTTAAACCGATAATGAGGATGAATGGTAACTATGCTCGCCG
Pomadasys maculatus	AACATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTACGCTCGCCG
Pomadasys argenteus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTACGCTCGCCA
Pomadasys kaakan	AATATGAAGCTTAAACCGGTAATGAGGATGAATGGAAACTACGCTCGGCG
Pomadasys argyreus	AACATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTACGCTCGCCG
Haemulon plumierii	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon sciurus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon steindachneri	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Plectorhinchus lessonii	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon scudderii	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon flaviguttatum	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon aurolineatum	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGCAACTATGCTCGCCG
Xenistius californiensis	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Inermia vittata	ACGGTGAAGCTTAAACCGGTAATGAGGATGAACGGGAACTATGCCCGCAG
Diplodus bermudensis	AAAATGAAGCTTAAACCGGTCATGAGGATGAATGGGAACTATGCCCGCAA
Pagrus pagrus	AAAATGAAGCTTAAACCGGTCATGCGGATGAACGGGAACTACGCCCGCAA

Diagramma pictum	GCTAATGACAATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTGCCCTCCG
Plectorhinchus vittatus	GCTAATGACAATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTGCCCTCCG
Plectorhinchus chaetodonoides	GCTAATGACAATGAAGGCTGTGGAGGCAGTGTGTGAGCTGGTGCCCTCCG
Plectorhinchus macrolepis	GCTAATGACCATGGAGGCTGTGGAAGTGGTCTGTGATCTGGTGCCCTCTG
Plectorhinchus schotaf	GCTAATGACCATGGAGGCTGTGGAAGTGGTGTGTGATCTGGTGCCCTCTG
Parapristipoma octolineatum	GCTAATGACCATGGAGGCTGTGGAGGTGGTGTGTGATCTGGTGCCCTCAG
Parapristipoma trilineatum	GCTAATGACCATGGAGGCTGTGGAGGTGGTGTGTGATCTGGTGCCCTCAG
Haemulopsis elongatus	GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Haemulopsis leuciscus	GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Haemulopsis axillaris	GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Haemulopsis nitidus	GCTAATGACCATGGAGACCGAGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Conodon serrifer	GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Plectorhinchus sordidus	GCTAATGACCATGGAAGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Xenichthys xanti	AATAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Pomadasys branickii	GCTAATGACCATGGAGGCCATGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Brachydeuterus auritus	GCTAATGACCATGGAGGCCATGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Anisotremus interruptus	GCTAATGACCATGGAGGCCATGGAGGTGGTGTGTGAGCTGGTACCCTCGG
Anisotremus virginicus	GCTAATGACCATGGAAGCCGTGGAGGTGGTGTGTGAGCTGGTACCTTCGG
Orthopristis chalceus	GCTAATGACCATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTACCCTCGG
Genyatremus luteus	GCTAATGACCATGGAGACTGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Anisotremus pacifici	GCTAATGACCATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Anisotremus dovii	GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGTTGGTACCCTCAG
Pomadasys maculatus	GCTAATGACCAAGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Pomadasys argenteus	AATAATAACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Pomadasys kaakan	GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Pomadasys argyreus	GCTAATGACCATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTGCCCTCAG
Haemulon plumierii	GCTAATGACCCTGGAAGCCGTGGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon sciurus	GATAATGACCCTGGAAGCCGTGGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon steindachneri	ACTAATGACCCTGGAAGACATGGAGGTGGTGTGTGAACTGGTACCCTCAG
Plectorhinchus lessonii	ACTAATGACCCTGGAAGCCATGGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon scudderii	GCTAATGACCCTGGAAGCCATGGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon flaviguttatum	GCTAATGACCCTGGAAGACATAGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon aurolineatum	GCTAATGACCCTGGAAGCCGTGGAGGTGGTGTGTGAACTGGTACCCTCAG
Xenistius californiensis	GCTAATGACCCTGGAAACCGTGGAGGTGGTGTGTGAACTGGTACCCTCAG
Inermia vittata	GCTAATGACCCTAGAGGCCGTCGAGGTGGTGTGTGAGCTGGTGCCCTCAG
Diplodus bermudensis	GCTAATGACCGAGGAGGCCGTGGAAGTGGTGTGTGAGCTGGTGCCCTCAG
Pagrus pagrus	GCTAATGACCGAGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTGCCCTCGG

Diagramma pictum	AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTATCTCCAGATG
Plectorhinchus vittatus	AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Plectorhinchus chaetodonoides	AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Plectorhinchus macrolepis	AGGAGAGGAGAGAGGCCCTAAGGGAGCTTGTGAGGCTCTACCTCCAGATG
Plectorhinchus schotaf	AGGAGAGGAGAGAGGCCCTAAGGGAGCTTATGAGGCTCTACCTCCAGATG
Parapristipoma octolineatum	AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Parapristipoma trilineatum	AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG

```
Haemulopsis elongatus           AGGAGAGGAGGGAGGCCCTGAGAGAGCTTATGAGGCTCTACCTCCAGATG
Haemulopsis leuciscus           AGGAGAGGAGGGAGGCCCTGAGAGAGCTTATGAGGCTCTACCTCCAGATG
Haemulopsis axillaris           AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulopsis nitidus             AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Conodon serrifer                AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Plectorhinchus sordidus         AGGAGAGGAGGGAGGCCCTGAAGGAGCTTATGAGGCTCTACCTCCAGATG
Xenichthys xanti                AGGAGAGGAGGGAGGCCCTGAAGGAGCTTATGAGGCTCTACCTCCAGATG
Pomadasys branickii             AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Brachydeuterus auritus          AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Anisotremus interruptus         AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Anisotremus virginicus          AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGCGGCTCTACCTCCAGATG
Orthopristis chalceus           AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATAAGGCTCTACCTCCAGATG
Genyatremus luteus              AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Anisotremus pacifici            AGGAGAGGGGGGAGGCCCTAAGGGAGCTTATGAGGCTCTACCTCCAGATG
Anisotremus dovii               AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Pomadasys maculatus             AGGAGAGGAGGGAGGCCCTGAGGGAGCTCATGAGGCTCTACCTCCAGATG
Pomadasys argenteus             AGGAGAGGAAGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Pomadasys kaakan                AGGAGAGGAAGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Pomadasys argyreus              AGGAGAGGAAGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulon plumierii              AGGAGAGGAGGGAGGCCCTGAGGGAGATTATGAGGCTCTACCTCCAGATG
Haemulon sciurus                AGGAGAGGAGGGAGGCCCTGAGGGAGATTATGAGGCTCTACCTCCAGATG
Haemulon steindachneri          AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Plectorhinchus lessonii         AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulon scudderii              AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulon flaviguttatum          AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulon aurolineatum           AGGAGAGGAGGGAGGCCCTGAGGGAGATTATGAGCCTCTACCTCCAGATG
Xenistius californiensis        AAGAGAGGAGGGAGGCCCTGAGGGAGCTTATCAGGCTCTACATCCAGATG
Inermia vittata                 AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGCCTCTACCTCCAGATG
Diplodus bermudensis            AGGAGAGGAGGGAGGCCCTGAGGGAGCTCATGAGGCTCTACCTCCAGATG
Pagrus pagrus                   AGGAGAGGAGGGAGGCCCTGAGGGAGCTCATGAGGCTCTACCTCCAGATG
```

```
Diagramma pictum                AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Plectorhinchus vittatus         AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Plectorhinchus chaetodonoides   AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCCGACCAGCT
Plectorhinchus macrolepis       AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGATCAGCT
Plectorhinchus schotaf          AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Parapristipoma octolineatum     AAGCCTGTGTGGCGTGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Parapristipoma trilineatum      AAGCCTGTGTGGCGTGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Haemulopsis elongatus           AAACCTGTGTGGCGCGCCACCTGTCCGTCCAAGGAGTGCCCAGACCAGTT
Haemulopsis leuciscus           AAACCTGTGTGGCGCGCCACCTGTCCGTCCAAGGAGTGCCCAGACCAGTT
Haemulopsis axillaris           AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Haemulopsis nitidus             AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Conodon serrifer                AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Plectorhinchus sordidus         AAGCCTGTGTGGCGCGCCTCCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Xenichthys xanti                AAGCCTGTGTGGCGTGCCTCCTGTCCAGCCAAGGAGTGCCCTGACCAGCT
Pomadasys branickii             AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Brachydeuterus auritus          AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGTCCTGACCAGCT
Anisotremus interruptus         AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Anisotremus virginicus          AAACCTGTGTGGCGCGCCACCTGTCCGGCCAAAGAGTGCCCTGACCAGCT
Orthopristis chalceus           AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Genyatremus luteus              AAGCCTGTGTGGCGTGCCACCTGTCCAGCCAAGGAGTGCCCTGACCAGCT
Anisotremus pacifici            AAGCCTGTGTGGCGTGCCACCTGTCCAGCCAAGGAGTGCCCTGACCAGCT
Anisotremus dovii               AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCTGACCAGCT
Pomadasys maculatus             AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Pomadasys argenteus             AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Pomadasys kaakan                AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Pomadasys argyreus              AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Haemulon plumierii              AAGCCTGTGTGGCGCGCCTCCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Haemulon sciurus                AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Haemulon steindachneri          AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Plectorhinchus lessonii         AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Haemulon scudderii              AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCTGACCAGCT
Haemulon flaviguttatum          AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Haemulon aurolineatum           AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Xenistius californiensis        AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAAGAGTGCCCCGACCAGCT
Inermia vittata                 AAGCCTGTGTGGCGAGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Diplodus bermudensis            AAGCCCGTGTGGCGAGCCAGCTGCCCAGCTAAAGAGTGCCCCGACCAGCT
Pagrus pagrus                   AAGCCCGTGTGGCGAGCCAGCTGCCCGGCCAAGGAGTGCCCCGACCAGCT
```

```
Diagramma pictum                GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Plectorhinchus vittatus         GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
```

Plectorhinchus chaetodonoides	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Plectorhinchus macrolepis	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCTGACCTCCTCTCCTCTA
Plectorhinchus schotaf	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Parapristipoma octolineatum	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Parapristipoma trilineatum	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulopsis elongatus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulopsis leuciscus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulopsis axillaris	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulopsis nitidus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Conodon serrifer	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Plectorhinchus sordidus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCAGACCTCCTCTCCTCTA
Xenichthys xanti	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCAGACCTCCTCTCCTCTA
Pomadasys branickii	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Brachydeuterus auritus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Anisotremus interruptus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Anisotremus virginicus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Orthopristis chalceus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Genyatremus luteus	GTGCCGCTACAGCTTTAATTCACAGCGCTTTGCCGACCTCCTCTCCTCTA
Anisotremus pacifici	GTGCCGCTACAGCTTTAATTCGCAGCGCTTTGCTGACCTCCTCTCCTCTA
Anisotremus dovii	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Pomadasys maculatus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Pomadasys argenteus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Pomadasys kaakan	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Pomadasys argyreus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon plumierii	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon sciurus	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCGGACCTCCTCTCCTCTA
Haemulon steindachneri	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Plectorhinchus lessonii	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon scudderii	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon flaviguttatum	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon aurolineatum	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Xenistius californiensis	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCGTCTA
Inermia vittata	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Diplodus bermudensis	GTGCCGCTACAGCTTCAACTCCCAGCGCTTTGCTGACCTCCTCTCCTCCA
Pagrus pagrus	GTGCCGCTACAGCTTCAACTCCCAGCGGTTCGCCGACCTCCTCTCCTCCA

Diagramma pictum	CCTTCAAGTATAGGTACAACGGAAAGATAACCAATTACCTGCACAAGACC
Plectorhinchus vittatus	CCTTCAAATATAGGTACAACGGAAAGATAACCAATTACCTGCACAAGACC
Plectorhinchus chaetodonoides	CCTTCAAATATAGGTACAACGGAAAGATAACCAATTACCTGCACAAGACC
Plectorhinchus macrolepis	CCTTCAAATATAGATACAACGGAAAGATAACCAATTACCTGCACAAGACC
Plectorhinchus schotaf	CCTTCAAATATAGGTACAACGGAAAGATAACCAATTACCTGCACAAGACC
Parapristipoma octolineatum	CCTTCAAATATAGGTACAATGGAAAGATAACCAACTACCTGCACAAGACC
Parapristipoma trilineatum	CCTTCAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Haemulopsis elongatus	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulopsis leuciscus	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulopsis axillaris	CATTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulopsis nitidus	CATTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Conodon serrifer	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTACACAAGACC
Plectorhinchus sordidus	CCTTTAAATATAGATACAATGGGAAGATAACCAATTATCTACACAAGACC
Xenichthys xanti	CCTTTAAATATAGATACAATGGGAAGATAACCAATTATCTGCACAAGACC
Pomadasys branickii	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Brachydeuterus auritus	CCTTTAAATATAGGTACAATGGAAAAATAACCAATTACCTGCACAAGACC
Anisotremus interruptus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Anisotremus virginicus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Orthopristis chalceus	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Genyatremus luteus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Anisotremus pacifici	CCTTTAAATATAGGTACAACGGGAAGATAACCAATTACCTGCACAAGACC
Anisotremus dovii	CCTTTAAATATAGGTACAATGGGAAGATGACCAATTACCTGCACAAGACC
Pomadasys maculatus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAAACC
Pomadasys argenteus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Pomadasys kaakan	CCTTCAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Pomadasys argyreus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Haemulon plumierii	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulon sciurus	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulon steindachneri	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Plectorhinchus lessonii	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulon scudderii	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulon flaviguttatum	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulon aurolineatum	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Xenistius californiensis	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Inermia vittata	CCTTCAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC

Diplodus bermudensis	CCTTCAAATATAGGTACAACGGAAAGATAACCAATTACCTGCACAAGACC
Pagrus pagrus	CCTTCAAGTACAGGTACAACGGAAAGATAACCAACTACCTGCGCAAAACG

Diagramma pictum	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Plectorhinchus vittatus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Plectorhinchus chaetodonoides	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Plectorhinchus macrolepis	CTGGCCCACGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Plectorhinchus schotaf	CTGGCCCACGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Parapristipoma octolineatum	CTGGCCCACGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Parapristipoma trilineatum	CTGGCCCACGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Haemulopsis elongatus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Haemulopsis leuciscus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Haemulopsis axillaris	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Haemulopsis nitidus	CTGGCCCAAGTACCTGAAATCATAGAGAGAGATGGATCCATAGGAGCGTG
Conodon serrifer	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Plectorhinchus sordidus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Xenichthys xanti	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCATG
Pomadasys branickii	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Brachydeuterus auritus	TTGGCTCATGTACCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Anisotremus interruptus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGCTCCATAGGAGCCTG
Anisotremus virginicus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Orthopristis chalceus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCGTG
Genyatremus luteus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Anisotremus pacifici	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCATG
Anisotremus dovii	CTGGCCCAAGTACCTGAAATCATCAAGAAAGATGGATCCATAGGAGCGTG
Pomadasys maculatus	CTGGCCCAAGTACCTGAAATCATAGAGAGAGATGGATGCATAGGAGCGTG
Pomadasys argenteus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Pomadasys kaakan	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Pomadasys argyreus	CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Haemulon plumierii	CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon sciurus	CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon steindachneri	CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Plectorhinchus lessonii	CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon scudderii	CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon flaviguttatum	CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon aurolineatum	CTGGCCCACGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Xenistius californiensis	CTGGCCCATGTGCCTGAAATCATAGAGAGAGACGGATCCATAGGAGCCTG
Inermia vittata	CTGGCCCACGTGCCTGAAATAATAGAGAGAGATGGATCCATAGGAGCCTG
Diplodus bermudensis	CTGGCCCACGTCCCCGAAATCATAGAGAGAGACGGATCCATCGGAGCCTG
Pagrus pagrus	CTGGCCCACGTCCCCGAAATCATAGAGAGAGACGGATCCATCGGCGCCTG

Diagramma pictum	GGCCAGTGAGGGGAACGAGTCGGCAAACAAACTGTT
Plectorhinchus vittatus	GGCCAGTGAGGGGAATGAGTCGGCAAACAAACTGTT
Plectorhinchus chaetodonoides	GGCCAGTGAGGGGAACGAGTCGGCAAACAAACTGTT
Plectorhinchus macrolepis	GGCCAGTGAGGGGAACGAGTCGGCAAACAAACTGTT
Plectorhinchus schotaf	GGCCAGTGAGGGGAACGAGTCGGCAAACAAACTGTT
Parapristipoma octolineatum	GGCCAGCGAGGGGAACGAGTCGGCAAACAAACTGTT
Parapristipoma trilineatum	GGCCAGCGAGGGGAACGAGTCGGCAAACAAACTGTT
Haemulopsis elongatus	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Haemulopsis leuciscus	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Haemulopsis axillaris	GGCCAGCGAGGGGAAGGAGTCAGCAAACAAACTGTT
Haemulopsis nitidus	GACCATTGATGGGAAGGAATCAGCAAACGAAGTATT
Conodon serrifer	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Plectorhinchus sordidus	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Xenichthys xanti	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Pomadasys branickii	GGCCAGCGAGGGGAAGGAGTCAGCAAACAAACTCTT
Brachydeuterus auritus	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Anisotremus interruptus	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Anisotremus virginicus	GGCCAGCGAGGGGAATGAGTCAGCAAACAAACTGTT
Orthopristis chalceus	GGCCAGCGAGGGAAACGAGTCAGCAAACAAACTGTT
Genyatremus luteus	GGCCAGCGAGGGAAACGAGTCAGCAAACAAACTGTT
Anisotremus pacifici	GGCCAGTGAGGGAAACGAGTCAGCAAATAAACTGTT
Anisotremus dovii	GGCCATTGATGGGCAGGCATCAGCAAACGAACTGTT
Pomadasys maculatus	GGCCATTGATGGGAAGGAATCAGCAAACGAAGTCTT
Pomadasys argenteus	GTCCATTGATGGGCAGGAGTCAGCAAACAAACTGTT
Pomadasys kaakan	GGCCAGCGAGGGGAATGAGTCAGCAAACAAACTGTT
Pomadasys argyreus	GGCCTTCGATGGGAAGGAGTCAGCAAACAAACTGTT
Haemulon plumierii	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Haemulon sciurus	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Haemulon steindachneri	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Plectorhinchus lessonii	GGCCAGCGAGGGGAACGAGGAGGCAAACAAAGTGTT

Haemulon scudderii	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Haemulon flaviguttatum	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Haemulon aurolineatum	GGCCAGTGAGGGGAACGAGTCAGCAAACAAACTATT
Xenistius californiensis	GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTT
Inermia vittata	GGCCAGCGAGGGGAACGAGTCGGCAAACAAGCTCTT
Diplodus bermudensis	GGCCAGCGAGGGGAACGAGTCGGCAAACAAGCTGTT
Pagrus pagrus	GGCCAGCGAGGGGAATGAGTCGCCGAACAAACTATT

APPENDIX 2

COI SEQUENCES OF HAEMULIDS, INCLUDING OUTGROUPS

Plectorhinchus lessonii	TATCCGAGCAGAATTAAGCCAACCCGGCGCTCTCCTGGGAGACGACCAGA
Plectorhinchus vittatus	TATCCGAGCAGAATTAAGCCAACCCGGCGCTCTCCTGGGAGACGACCAGA
Diagramma pictum	CATCCGGGCAGAGTTAAGCCAACCCGGCGCGCTCCTAGGAGACGACCAGA
Plectorhinchus chaetodonoides	CATCCGGGCAGAATTAAGCCAACCCGGCGCTCTCCTAGGAGACGACCAGA
Anisotremus dovii	CATCCGAGCAGAGCTCAGCCAACCAGGCGCCCTCCTTGGGGATGACCAAA
Pomadasys argyreus	TATCCGAGCAGAACTTAGCCAGCCAGGCGCCCTCCTGGGAGATGACCAGA
Brachydeuterus auritus	TATCCGAGCAGAACTCAGCCAACCAGGCGCCCTCCTCGGGGATGACCAAA
Xenichthys xanti	TATCCGAGCAGAGCTCAGCCAACCAGGCGCTCTCCTCGGAGACGACCAAA
Pomadasys maculatus	CATCCGAGCAGAACTCAGCCAACCGGGTGCACTCCTCGGGGACGACCAGA
Anisotremus interruptus	CATCCGAGCAGAACTCAGCCAACCGGGCGCCCTCCTCGGAGACGACCAGA
Anisotremus virginicus	TATTCGAGCAGAGCTCAGTCAGCCGGGCGCCCTCCTCGGAGACGACCAGA
Pomadasys branickii	CATCCGGGCAGAGCTTAGCCAACCGGGCGCTCTCCTAGGGGACGACCAGA
Haemulopsis elongatus	CATCCGAGCGGAACTCAGCCAACCGGGCGCTCTCCTCGGGGACGACCAAA
Haemulopsis leuciscus	CATCCGAGCGGAACTCAGCCAACCGGGCGCTCTCCTCGGGGACGACCAAA
Haemulon flaviguttatum	TATCCGGGCAGAACTAAGCCAACCAGGCGCACTCCTTGGGGACGACCAGA
Haemulon steindachneri	TATCCGGGCAGAACTAAGCCAACCGGGTGCACTCCTCGGGGACGATCAAA
Haemulon aurolineatum	TATCCGGGCAGAACTGAGCCAACCAGGCGCACTCCTGGGAGACGACCAGA
Haemulon plumierii	TATCCGGGCAGAACTAAGCCAGCCAGGCGCACTCCTCGGGGACGACCAGA
Haemulon sciurus	CATCCGGGCAGAACTGAGCCAACCAGGCGCACTCCTGGGAGACGACCAGA
Haemulon scudderii	AATCCGAGCAGAACTAAGCCAACCAGGCGCACTCCTAGGGGACGACCAAA
Xenistius californiensis	CATCCGGGCAGAACTTAGCCAACCAGGCGCTCTCCTTGGAGACGACCAAA
Haemulopsis axillaris	TATCCGAGCAGAACTTAGCCAGCCCGGCGCCCTCCTCGGGGACGATCAGA
Haemulopsis nitidus	TATCCGAGCAGAACTTAGCCAGCCCGGCGCCCTCCTCGGGGACGATCAGA
Anisotremus pacifici	GATCCGAGCTGAACTCAGTCAACCCGGCGCTCTCCTTGGGGACGATCAGA
Orthopristis chalceus	AATTCGAGCAGAACTCAGCCAGCCTGGAGCTCTCCTCGGAGACGACCAAA
Pomadasys kaakan	TATCCGAGCCGAACTCAGCCAACCGGGCGCTCTCCTCGGGGACGACCAAA
Diplodus bermudensis	CATTCGAGCCGAACTAAGCCAGCCTGGCGCCCTCCTTGGCGACGACCAGA
Pagrus pagrus	TATTCGAGCTGAGCTTAGCCAGCCCGGGGCTCTCCTAGGCGACGACCAGA
Plectorhinchus macrolepis	TATCCGGGCTGAACTAAGCCAACCTGGCGCTCTTTTAGGGGACGACCAGA

Plectorhinchus lessonii	TTTATAATGTTATTGTTACGGCACATGCATTCGTAATAATCTTTTTTATG
Plectorhinchus vittatus	TTTATAATGTTATTGTTACGGCACATGCATTCGTAATAATCTTTTTTATG
Diagramma pictum	TTTACAATGTTATCGTTACGGCGCATGCGTTCGTAATAATCTTCTTTATA
Plectorhinchus chaetodonoides	TTTACAATGTTATTGTTACGGCGCACGCGTTCGTAATAATCTTCTTTATG
Anisotremus dovii	TTTACAATGTCATCGTTACCGCCCACGCATTCGTAATAATTTTTTTTATA
Pomadasys argyreus	TTTATAATGTAATCGTCACTGCCCATGCTTTCGTAATAATTTTCTTCATA
Brachydeuterus auritus	TCTATAACGTAATCGTTACTGCACATGCATTCGTAATAATTTTCTTTATG
Xenichthys xanti	TTTACAACGTAATCGTTACGGCACATGCATTCGTAATAATCTTCTTTATA
Pomadasys maculatus	TTTATAACGTAATCGTTACTGCACATGCCTTCGTAATAATTTTCTTTATA
Anisotremus interruptus	TTTATAATGTAATTGTTACGGCACACGCGTTCGTAATAATTTTCTTTATA
Anisotremus virginicus	TTTATAATGTAATTGTTACCGCACATGCGTTCGTAATAATTTTCTTTATA
Pomadasys branickii	TTTATAATGTTATTGTTACTGCACATGCGTTTGTAATAATCTTCTTTATA
Haemulopsis elongatus	TTTACAATGTTATTGTTACCGCCCACGCGTTCGTGATAATTTTCTTCATA
Haemulopsis leuciscus	TTTACAATGTTATTGTTACCGCCCACGCGTTCGTGATAATTTTCTTCATA
Haemulon flaviguttatum	TTTATAACGTAATTGTTACTGCGCATGCGTTCGTAATAATTTTCTTTATA
Haemulon steindachneri	TCTATAACGTAATTGTTACTGCGCATGCGTTCGTGATAATTTTCTTTATA
Haemulon aurolineatum	TCTATAACGTAATTGTTACTGCGCATGCGTTCGTGATAATTTTCTTTATA
Haemulon plumierii	TCTATAACGTAATTGTTACTGCGCATGCGTTCGTAATAATTTTCTTTATA
Haemulon sciurus	TCTATAACGTAATTGTTACTGCGCATGCATTCGTAATAATTTTCTTTATA
Haemulon scudderii	TTTATAACGTAATTGTTACTGCGCATGCGTTCGTAATAATTTTCTTTATA
Xenistius californiensis	TCTATAATGTCATTGTTACTGCGCATGCGTTCGTAATAATTTTCTTTATA
Haemulopsis axillaris	TTTACAATGTAATCGTAACCGCACACGCATTCGTAATAATCTTCTTTATA
Haemulopsis nitidus	TTTACAATGTAATCGTAACCGCACACGCATTCGTAATAATCTTCTTTATA
Anisotremus pacifici	TTTACAATGTGATCGTTACCGCCCACGCATTTGTAATAATCTTCTTTATA
Orthopristis chalceus	TTTACAATGTCATTGTAACTGCACATGCATTTGTAATAATCTTTTTTATA
Pomadasys kaakan	TTTATAATGTAATCGTCACTGCACACGCCTTTGTAATAATTTTCTTTATA
Diplodus bermudensis	TTTATAATGTAATTGTTACAGCACATGCGTTTGTAATAATTTTCTTTATA
Pagrus pagrus	TTTATAATGTTATTGTTACAGCACACGCGTTTGTAATAATTTTCTTTATA
Plectorhinchus macrolepis	TCTACAATGTAATCGTTACAGCCCACGCTTTCGTAATAATTTTCTTTATA

Plectorhinchus lessonii	GTTATACCTATCCTAATTGGAGGATTCGGAAACTGACTGGTCCCATTAAT
Plectorhinchus vittatus	GTTATACCTATCCTAATTGGAGGATTCGGAAACTGACTGGTCCCATTAAT

Diagramma pictum	GTTATACCCATCCTAATTGGAGGGTTCGGAAACTGACTAGTCCCGCTAAT
Plectorhinchus chaetodonoides	GTAATACCAATCCTGATCGGAGGGTTCGGAAACTGACTGGTCCCACTAAT
Anisotremus dovii	GTAATACCGATCCTCATCGGAGGGTTTGGGAACTGACTTGTCCCCCTAAT
Pomadasys argyreus	GTTATGCCTATCCTAATTGGGGGTTTTGGTAACTGACTGGTCCCCCTAAT
Brachydeuterus auritus	GTTATACCAATTCTCATCGGGGGTTTCGGCAACTGACTTGTTCCCCTTAT
Xenichthys xanti	GTAATACCAATCCTAATTGGAGGGTTTGGCAACTGACTTGTCCCCCTCAT
Pomadasys maculatus	GTAATACCTATTCTAATTGGTGGTTTCGGAAACTGACTCGTGCCCCTAAT
Anisotremus interruptus	GTAATACCAATCCTAATCGGAGGATTCGGAAACTGACTTGTTCCTCTAAT
Anisotremus virginicus	GTAATACCAATTCTAATCGGAGGGTTCGGAAACTGACTTGTCCCCTTAAT
Pomadasys branickii	GTAATACCAATTTTAATTGGTGGCTTCGGCAACTGACTTGTCCCCCTAAT
Haemulopsis elongatus	GTCATACCAATCCTAATCGGAGGGTTCGGGAACTGACTTGTCCCCCTAAT
Haemulopsis leuciscus	GTCATACCAATCCTAATCGGAGGATTCGGGAACTGACTTGTCCCCCTAAT
Haemulon flaviguttatum	GTAATGCCAATTCTCATTGGAGGATTTGGAAACTGACTTGTTCCCCTAAT
Haemulon steindachneri	GTAATGCCAATTCTCATCGGAGGATTTGGAAACTGACTCGTTCCCCTAAT
Haemulon aurolineatum	GTAATGCCAATTCTCATTGGAGGATTTGGAAACTGACTTGTCCCCCTAAT
Haemulon plumierii	GTAATGCCAATCCTCATTGGAGGATTTGGAAACTGACTCGTTCCCCTAAT
Haemulon sciurus	GTAATGCCAATCCTCATTGGAGGGTTTGGAAACTGACTCGTCCCCCTAAT
Haemulon scudderii	GTAATGCCAATTCTCATTGGAGGATTCGGAAACTGACTCGTCCCCCTAAT
Xenistius californiensis	GTAATGCCAATTCTCATTGGAGGGTTTGGAAACTGACTTATCCCCCTTAT
Haemulopsis axillaris	GTCATGCCAATTCTTATTGGCGGGTTTGGTAACTGACTAGTCCCACTAAT
Haemulopsis nitidus	GTCATGCCAATTCTTATTGGCGGGTTTGGTAACTGACTAGTCCCACTAAT
Anisotremus pacifici	GTTATACCCATTCTCATCGGCGGCTTTGGCAACTGGCTTGTGCCCCTGAT
Orthopristis chalceus	GTTATGCCAATTTTAATTGGCGGATTTGGAAACTGACTTGTCCCCCTGAT
Pomadasys kaakan	GTAATGCCTATTTTAATCGGCGGCTTTGGAAACTGACTCGTGCCCCTAAT
Diplodus bermudensis	GTAATACCAATCATGATTGGAGGCTTTGGAAACTGACTAATCCCACTTAT
Pagrus pagrus	GTTATACCAATTATGATTGGAGGCTTTGGGAACTGATTAATTCCACTTAT
Plectorhinchus macrolepis	GTGATGCCTATCATAATCGGGGGCTTCGGAAACTGACTAGTTCCCTTAAT

Plectorhinchus lessonii	AATCGGGGCACCTGACATGGCATTCCCTCGAATGAACAATATGAGCTTCT
Plectorhinchus vittatus	AATCGGGGCACCTGACATGGCATTCCCTCGAATGAACAATATGAGCTTCT
Diagramma pictum	AATCGGAGCACCTGACATGGCATTCCCCCGAATGAACAATATGAGTTTCT
Plectorhinchus chaetodonoides	AATCGGAGCGCCTGACATGGCATTCCCCCGAATAAACAATATGAGCTTCT
Anisotremus dovii	GATCGGAGCCCCCGACATAGCATTCCCTCGAATGAACAACATGAGTTTCT
Pomadasys argyreus	AATTGGGGCCCCCGACATGGCCTTCCCTCGAATAAATAATATAAGCTTCT
Brachydeuterus auritus	GATTGGGGCCCCTGACATAGCATTCCCTCGAATAAATAATATGAGCTTTT
Xenichthys xanti	GATTGGTGCCCCCGACATGGCATTCCCCCGAATAAATAACATGAGCTTTT
Pomadasys maculatus	GATTGGAGCGCCTGATATGGCATTCCCTCGGATGAACAACATGAGTTTTT
Anisotremus interruptus	GATCGGAGCCCCCGACATGGCATTCCCCCGAATAAACAACATGAGCTTCT
Anisotremus virginicus	GATCGGAGCCCCCGATATGGCATTCCCCCGAATAAACAATATGAGCTTCT
Pomadasys branickii	GATCGGGGCCCCCGACATGGCATTCCCCCGGATAAACAACATGAGCTTCT
Haemulopsis elongatus	GATTGGGGCCCCCGACATGGCATTCCCACGGATAAACAACATGAGTTTCT
Haemulopsis leuciscus	GATTGGGGCCCCCGACATGGCATTCCCACGGATAAACAACATGAGTTTCT
Haemulon flaviguttatum	GATCGGAGCGCCCGACATGGCATTCCCCCGAATGAACAATATGAGCTTTT
Haemulon steindachneri	GATCGGGGCGCCCGATATGGCATTCCCGCGAATGAATAACATGAGCTTTT
Haemulon aurolineatum	GATCGGGGCGCCTGATATGGCATTCCCACGAATGAACAATATGAGCTTTT
Haemulon plumierii	GATTGGGGCGCCCGACATGGCATTCCCCCGAATGAATAACATGAGCTTTT
Haemulon sciurus	GATTGGGGCACCCGATATGGCATTCCCCCGAATGAATAACATGAGCTTTT
Haemulon scudderii	GATTGGAGCGCCCGACATGGCATTCCCCCGGATGAATAACATGAGCTTTT
Xenistius californiensis	GATCGGGGCGCCCGATATGGCATTCCCCCGAATGAACAACATGAGCTTCT
Haemulopsis axillaris	GATTGGGGCCCCTGACATAGCATTCCCTCGGATAAATAATATGAGCTTCT
Haemulopsis nitidus	GATTGGGGCCCCTGACATAGCATTCCCTCGGATAAATAATATGAGCTTCT
Anisotremus pacifici	GATCGGGGCCCCTGACATGGCTTTCCCTCGAATGAACAACATGAGCTTTT
Orthopristis chalceus	GATTGGGGCCCCTGACATAGCATTCCCACGAATGAACAACATGAGCTTCT
Pomadasys kaakan	GATCGGGGCCCCTGACATAGCATTCCCTCGGATGAACAACATGAGCTTCT
Diplodus bermudensis	GATCGGTGCCCCTGACATAGCATTCCCCCGAATAAATAACATGAGCTTCT
Pagrus pagrus	GATTGGTGCCCCTGACATAGCATTCCCCCGAATGAACAACATGAGTTTCT
Plectorhinchus macrolepis	GATTGGGGCACCTGACATAGCATTCCCTCGAATAAACAACATGAGCTTCT

Plectorhinchus lessonii	GACTTCTCCCACCATCCTTCCTCCTCCTCCTTGCCTCCTCAGGCGTAGAA
Plectorhinchus vittatus	GACTTCTCCCACCATCCTTCCTCCTCCTCCTTGCCTCCTCAGGCGTAGAA
Diagramma pictum	GACTTCTCCCTCCGTCCTTCCTTCTCCTCCTTGCCTCCTCAGGCGTAGAA
Plectorhinchus chaetodonoides	GACTTCTCCCACCATCCTTCCTTCTCCTCCTTGCCTCCTCAGGCGTAGAA
Anisotremus dovii	GGCTCCTTCCTCCCTCTTTCCTTCTCCTCCTCGCCTCTTCAGGGGTAGAA
Pomadasys argyreus	GACTCCTTCCACCCTCTTTCCTTCTTCTCCTTGCCTCATCAGGTGTTGAA
Brachydeuterus auritus	GACTTCTACCTCCTTCATTCCTCCTACTTCTTGCCTCATCAGGCGTAGAA
Xenichthys xanti	GGCTGCTTCCGCCTTCTTTCCTCCTGCTCCTCGCCTCTTCGGGCGTTGAA
Pomadasys maculatus	GACTACTTCCCCCCTCTTTCCTCCTTCTACTTGCCTCTTCAGGGGTTGAG
Anisotremus interruptus	GGCTCCTCCCACCTTCCTTCCTCCTCCTCCTTGCCTCCTCAGGCGTAGAA
Anisotremus virginicus	GGCTCCTCCCACCTTCCTTCCTTCTCCTCCTTGCCTCCTCAGGCGTAGAA
Pomadasys branickii	GGCTCCTTCCTCCCTCTTTCCTTCTCCTCCTCGCCTCCTCGGGGGTAGAA
Haemulopsis elongatus	GACTCCTTCCCCCTTCCTTCCTCCTCCTCCTCGCCTCTTCAGGGGTGGAG

Haemulopsis leuciscus	GACTCCTTCCCCCTTCCTTCCTCCTCCTCCTCGCCTCTTCAGGGGTGGAG
Haemulon flaviguttatum	GACTCCTCCCTCCTTCTTTCCTTCTCCTTCTCGCCTCTTCAGGGGTAGAG
Haemulon steindachneri	GACTCCTCCCTCCTTCTTTCCTCCTCCTTCTCGCTTCTTCAGGGGTAGAG
Haemulon aurolineatum	GACTCCTTCCTCCATCTTTCCTTCTCCTTCTTGCCTCTTCAGGCGTAGAA
Haemulon plumierii	GACTCCTCCCTCCTTCTTTCCTTCTCCTTCTCGCTTCTTCAGGTGTAGAA
Haemulon sciurus	GACTCCTCCCTCCCTCTTTCCTTCTCCTTCTCGCCTCTTCAGGCGTAGAG
Haemulon scudderii	GACTCCTCCCCCCTTCTTTCCTTCTCCTTCTCGCCTCTTCAGGAGTAGAG
Xenistius californiensis	GACTCCTTCCCCCTTCTTTCCTTCTCCTTCTCGCCTCCTCAGGAGTAGAG
Haemulopsis axillaris	GACTCCTCCCTCCCTCCTTCCTCCTACTTCTGGCCTCTTCCGGGGTCGAA
Haemulopsis nitidus	GACTCCTCCCTCCCTCCTTCCTCCTACTTCTGGCCTCTTCCGGGGTCGAA
Anisotremus pacifici	GGCTGCTCCCCCCTTCTTTCCTCCTTCTTCTTGCCTCTTCAGGGGTCGAA
Orthopristis chalceus	GACTACTCCCTCCCTCCTTCCTCCTCCTCCTGGCCTCTTCAGGTGTCGAA
Pomadasys kaakan	GACTCCTCCCTCCCTCTTTCCTTCTCCTCCTTGCCTCCTCAGGGGTCGAG
Diplodus bermudensis	GACTTCTGCCTCCCTCATTCCTCCTCCTGCTAGCCTCGTCCGGAGTTGAG
Pagrus pagrus	GACTGCTCCCTCCCTCATTCCTTCTCCTACTTGCCTCCTCAGGAGTTGAA
Plectorhinchus macrolepis	GACTTCTACCCCCCTCATTCCTTCTCCTCCTAGCCTCTTCAGGAGTTGAG

Plectorhinchus lessonii	GCTGGAGCAGGGACTGGTTGAACAGTCTACCCCCCACTAGCCGGCAATTT
Plectorhinchus vittatus	GCTGGAGCAGGGACTGGTTGAACAGTCTACCCCCCACTAGCCGGCAATTT
Diagramma pictum	GCCGGGGCAGGGACTGGTTGAACAGTCTACCCCCCGTTGGCCGGAAATTT
Plectorhinchus chaetodonoides	GCCGGAGCAGGAACTGGTTGAACAGTTTACCCCCCATTGGCCGGTAATCT
Anisotremus dovii	GCAGGGGCTGGTACCGGATGGACAGTCTATCCCCCTCTAGCTGGGAACCT
Pomadasys argyreus	GCTGGGGCAGGGACCGGATGAACAGTCTACCCCCCTCTAGCTGGAAACCT
Brachydeuterus auritus	GCAGGGGCTGGCACCGGATGAACCGTGTACCCCCCTCTTGCCGGCAATCT
Xenichthys xanti	GCCGGGGCAGGAACCGGATGAACAGTTTACCCTCCTCTGGCGGGGAACCT
Pomadasys maculatus	GCTGGGGCCGGAACCGGATGAACAGTTTACCCACCTTTAGCCGGCAACCT
Anisotremus interruptus	GCCGGAGCCGGTACCGGGTGGACAGTCTACCCTCCCTTAGCCGGGAACCT
Anisotremus virginicus	GCTGGGGCCGGCACCGGATGAACAGTTTACCCTCCCTTAGCCGGAAATCT
Pomadasys branickii	GCCGGGGCTGGTACGGGGTGGACAGTTTACCCTCCTTTAGCCGGAAACCT
Haemulopsis elongatus	GCCGGTGCCGGTACTGGGTGGACAGTCTACCCGCCCCTGGCCGGGAACCT
Haemulopsis leuciscus	GCCGGTGCCGGTACTGGGTGGACAGTCTACCCGCCCCTGGCCGGAAACCT
Haemulon flaviguttatum	GCTGGGGCTGGAACGGGGTGAACTGTCTACCCCCCTCTAGCTGGGAATCT
Haemulon steindachneri	GCTGGAGCTGGAACGGGGTGAACTGTCTACCCCCCTCTGGCCGGAAATCT
Haemulon aurolineatum	GCTGGGGCTGGGACTGGATGAACTGTTTATCCCCCTCTAGCTGGGAATCT
Haemulon plumierii	GCTGGGGCCGGAACTGGGTGGACTGTTTACCCCCCTCTAGCCGGAAATCT
Haemulon sciurus	GCTGGGGCCGGGACGGGGTGAACTGTTTACCCCCCTCTAGCGGGTAACCT
Haemulon scudderii	GCCGGGGCTGGGACTGGGTGAACTGTCTACCCTCCCTTAGCTGGTAACCT
Xenistius californiensis	GCCGGGGCCGGAACTGGGTGAACTGTTTACCCCCCTTTAGCCGGGAATCT
Haemulopsis axillaris	GCCGGCGCCGGCACAGGATGAACAGTGTACCCTCCTTTGGCTGGAAACTT
Haemulopsis nitidus	GCCGGCGCCGGCACAGGATGAACAGTGTACCCTCCTTTGGCTGGAAACTT
Anisotremus pacifici	GCAGGAGCTGGGACAGGGTGGACCGTATACCCGCCTTTGGCCGGAAACCT
Orthopristis chalceus	GCCGGAGCTGGTACAGGGTGGACAGTTTACCCCCCTCTGGCCGGAAACTT
Pomadasys kaakan	GCCGGGGCTGGAACTGGGTGGACAGTATACCCCCCTCTGGCCGGAAACCT
Diplodus bermudensis	GCTGGGGCCGGTACTGGATGAACTGTTTACCCGCCCCTGGCAGGTAACCT
Pagrus pagrus	GCCGGAGCTGGCACCGGATGAACGGTTTATCCGCCACTAGCTGGGAATCT
Plectorhinchus macrolepis	GCGGGAGCTGGGACAGGATGAACTGTATATCCACCACTGGCTGGCAACCT

Plectorhinchus lessonii	AGCGCACGCAGGAGCATCTGTTGACCTAACAATCTTCTCTCTTCATCTGG
Plectorhinchus vittatus	AGCGCACGCAGGAGCATCTGTTGACCTAACAATCTTCTCTCTTCATCTGG
Diagramma pictum	AGCGCACGCAGGTGCATCTGTAGACCTCACGATCTTCTCCCTACATCTGG
Plectorhinchus chaetodonoides	GGCGCACGCAGGTGCATCTGTTGACCTAACAATCTTTTCCCTTCATCTGG
Anisotremus dovii	AGCTCATGCCGGGGCATCCGTCGACTTGACAATTTTCTCCCTCCACCTAG
Pomadasys argyreus	AGCCCACGCAGGGGCATCAGTCGACCTGACAATTTTCTCACTTCACCTCG
Brachydeuterus auritus	AGCCCATGCAGGGGCCTCGGTAGACCTGACCATCTTTTCTCTGCATCTAG
Xenichthys xanti	GGCCCACGCAGGTGCATCAGTGGACCTAACAATCTTTTCTCTCCACTTAG
Pomadasys maculatus	CGCCCACGCAGGAGCATCAGTTGACCTAACCATTTTCTCCCTTCACTTGG
Anisotremus interruptus	AGCTCACGCCGGAGCATCTGTCGATCTAACAATTTTCTCCCTTCACCTAG
Anisotremus virginicus	AGCGCATGCCGGGGCATCCGTTGACCTAACAATTTTCTCCCTCCACTTAG
Pomadasys branickii	AGCCCACGCGGGGGCATCCGTTGACCTAACAATTTTCTCCCTTCACTTGG
Haemulopsis elongatus	CGCCCATGCAGGAGCATCTGTCGACCTGACCATCTTCTCCCTCCACTTAG
Haemulopsis leuciscus	CGCCCATGCAGGAGCATCTGTCGACCTGACCATCTTCTCCCTCCACTTAG
Haemulon flaviguttatum	AGCACATGCCGGGGCGTCGGTTGACCTTACAATCTTCTCCCTCCACTTAG
Haemulon steindachneri	GGCACACGCCGGGGCATCGGTTGATCTTACAATCTTCTCCCTTCACTTAG
Haemulon aurolineatum	GGCACACGCCGGGGCATCAGTTGATCTTACAATCTTCTCCCTCCACCTAG
Haemulon plumierii	AGCACATGCTGGGGCATCAGTTGACCTTACAATTTTCTCCCTTCACTTAG
Haemulon sciurus	AGCACACGCTGGGGCATCAGTTGACCTTACAATCTTTTCCCTTCACTTAG
Haemulon scudderii	AGCGCACGCCGGAGCATCAGTTGATCTTACAATTTTCTCCCTCCACCTAG
Xenistius californiensis	GGCACACGCCGGGGCATCAGTTGACCTCACAATTTTCTCTCTCCACCTAG
Haemulopsis axillaris	AGCCCACGCGGGAGCATCTGTTGACCTGACAATCTTTTCACTTCACCTAG
Haemulopsis nitidus	AGCCCACGCGGGAGCATCTGTTGACCTGACAATCTTTTCACTTCACCTAG
Anisotremus pacifici	GGCACACGCCGGAGCTTCCGTTGACTTAACCATCTTCTCCCTTCATCTTG

Orthopristis chalceus	GGCCCATGCGGGAGCATCCGTCGATCTAACAATTTTCTCTCTTCACCTAG
Pomadasys kaakan	GGCTCACGCAGGAGCTTCCGTCGATCTAACAATCTTCTCCCTTCACCTGG
Diplodus bermudensis	CGCTCACGCAGGTGCATCAGTTGACTTAACTATCTTTTCTCTTCACCTGG
Pagrus pagrus	TGCCCACGCAGGAGCATCAGTAGACCTAACCATCTTTTCTCTCCACCTAG
Plectorhinchus macrolepis	AGCCCACGCTGGGGCATCTGTTGACCTCACCATCTTCTCCCTACACCTAG

Plectorhinchus lessonii	CCGGTATCTCCTCAATTCTCGGGGCAATTAATTTCATTACAACAATCATC
Plectorhinchus vittatus	CCGGTATCTCCTCAATTCTCGGGGCAATTAATTTCATTACAACAATCATC
Diagramma pictum	CCGGTATCTCATCAATTCTCGGGGCGATTAATTTTATTACAACAATCATT
Plectorhinchus chaetodonoides	CCGGTATCTCCTCAATTCTTGGAGCAATCAATTTTATTACAACAATTATT
Anisotremus dovii	CAGGGGTCTCTTCTATCCTTGGAGCCATTAATTTTATTACAACAATTATT
Pomadasys argyreus	CAGGTGTTTCCTCAATCCTTGGAGCTATTAACTTTATCACAACAATTATT
Brachydeuterus auritus	CAGGTGTTTCCTCAATTCTTGGGGCAATTAACTTTATTACTACAATTATT
Xenichthys xanti	CAGGGGTCTCCTCAATTTTAGGGGCCATTAACTTCATTACAACAATTATT
Pomadasys maculatus	CGGGTGTTTCCTCAATCCTCGGGGCAATTAACTTCATTACAACAATTATC
Anisotremus interruptus	CAGGTGTTTCCTCAATTCTTGGAGCAATTAACTTCATCACAACAATTATT
Anisotremus virginicus	CAGGTGTTTCCTCAATTCTTGGAGCAATTAACTTCATCACAACAATTATC
Pomadasys branickii	CAGGTGTGTCCTCAATTCTTGGGGCAATTAACTTCATCACCACAATTATT
Haemulopsis elongatus	CTGGTGTCTCCTCAATTCTTGGCGCAATTAACTTCATCACAACAATTATC
Haemulopsis leuciscus	CTGGCGTCTCCTCAATTCTTGGCGCAATTAACTTCATCACAACAATTATC
Haemulon flaviguttatum	CAGGTGTCTCATCGATCCTTGGAGCCATCAACTTCATTACAACAATTATT
Haemulon steindachneri	CAGGTGTCTCATCAATCCTTGGGGCTATCAACTTCATTACAACAATCATT
Haemulon aurolineatum	CAGGTGTTTCATCAATCCTTGGGGCCATCAACTTCATTACAACAATCATT
Haemulon plumierii	CAGGTGTCTCATCAATCCTCGGGGCTATTAACTTCATCACAACAATTATT
Haemulon sciurus	CAGGTGTCTCGTCAATCCTCGGGGCCATCAACTTCATCACAACAATTATT
Haemulon scudderii	CAGGGGTCTCATCCATCCTCGGGGCCATTAACTTCATCACAACGATTATT
Xenistius californiensis	CAGGTGTCTCATCAATCCTCGGGGCGATTAACTTCATCACGACGATTATT
Haemulopsis axillaris	CAGGGGTATCATCTATTCTAGGGGCAATTAATTTTATCACAACCATCATC
Haemulopsis nitidus	CAGGGGTATCATCTATTCTAGGGGCAATTAATTTTATCACAACCATCATC
Anisotremus pacifici	CAGGTGTATCTTCAATTCTTGGGGCCATTAACTTCATTACAACCATCATT
Orthopristis chalceus	CAGGTGTCTCCTCAATTCTTGGAGCAATCAATTTCATTACAACAATTATT
Pomadasys kaakan	CAGGTGTCTCCTCAATCCTCGGAGCAATTAACTTCATCACAACAATTATT
Diplodus bermudensis	CCGGAATTTCATCTATTCTTGGTGCCATTAATTTCATTACCACAATTATT
Pagrus pagrus	CTGGAATCTCATCAATTCTTGGTGCAATCAATTTTATTACTACCATTATC
Plectorhinchus macrolepis	CAGGTGTTTCTTCAATTTTAGGGGCTATTAACTTTATTACAACCATTCTT

Plectorhinchus lessonii	AACATGAAACCCCCTGCAATCTCACAATACCAAACCCCTCTGTTTGTCTG
Plectorhinchus vittatus	AACATGAAACCCCCTGCAATCTCACAATACCAAACCCCTCTGTTTGTCTG
Diagramma pictum	AACATGAAACCCCCTGCAATTTCACAATATCAGACCCCTCTGTTTGTCTG
Plectorhinchus chaetodonoides	AACATGAAGCCCCCTGCAATTTCACAATATCAAACCCCCCTATTCGTCTG
Anisotremus dovii	AACATGAAACCCCCTGCTATTTCCCAATACCAGACCCCCTTGTTCGTGTG
Pomadasys argyreus	AACATAAAACCCCCTGCTATCTCTCAATACCAAACCCCTCTATTCGTTTG
Brachydeuterus auritus	AACATGAAGCCCCCAGCTACCTCCCAGTACCAGACCCCTCTATTTGTTTG
Xenichthys xanti	AACATGAAGCCCCCCGCTATTTCCCAGTACCAGACCCCCTTATTCGTGTG
Pomadasys maculatus	AACATAAAACCCCCTGCAATCTCCCAATACCAGACCCCTCTTTTCGTCTG
Anisotremus interruptus	AACATGAAACCCCCTGCCATTTCCCAGTACCAAACCCCACTATTTGTATG
Anisotremus virginicus	AATATGAAACCTCCTGCCATCTCCCAGTATCAAACCCCCCTATTTGTGTG
Pomadasys branickii	AACATGAAACCTCCCGCAATCTCCCAATACCAAACCCCCCTATTTGTGTG
Haemulopsis elongatus	AACATGAAACCCCCCGCTATCTCACAATATCAAACTCCTCTATTTGTGTG
Haemulopsis leuciscus	AACATGAAACCCCCCGCTATCTCACAATATCAAACTCCTCTATTTGTGTG
Haemulon flaviguttatum	AACATGAAACCTCCTGCCATCTCGCAGTACCAAACTCCCCTATTCGTATG
Haemulon steindachneri	AACATGAAACCTCCTGCCATCTCGCAGTACCAAACTCCGCTATTCGTATG
Haemulon aurolineatum	AATATGAAGCCCCCCGCTATCTCGCAGTACCAAACCCCATTATTTGTATG
Haemulon plumierii	AACATGAAACCTCCCGCTATCTCCCAGTATCAAACCCCCCTATTCGTATG
Haemulon sciurus	AATATGAAGCCTCCCGCTATCTCACAATATCAAACCCCCCTGTTCGTATG
Haemulon scudderii	AACATGAAACCTCCCGCTATCTCGCAGTACCAAACTCCCCTGTTCGTATG
Xenistius californiensis	AACATGAAACCTCCCGCCATCTCCCAATACCAAACCCCTCTGTTCGTATG
Haemulopsis axillaris	AACATGAAGCCCCCAGCCATCTCTCAGTACCAGACCCCTCTGTTTGTATG
Haemulopsis nitidus	AACATGAAGCCCCCAGCCATCTCTCAGTACCAGACCCCTCTGTTTGTATG
Anisotremus pacifici	AACATGAAGCCCCCTGCCATCTCCCAGTACCAAACTCCCCTATTTGTTTG
Orthopristis chalceus	AATATGAAGCCTCCTGCCATTTCCCAATATCAGACTCCCCTGTTTGTATG
Pomadasys kaakan	AACATGAAACCTCCCGCTATTTCCCAATATCAGACCCCCCTATTCGTCTG
Diplodus bermudensis	AATATGAAACCTCCAGCTATTTCACAATATCAGACGCCATTATTTGTATG
Pagrus pagrus	AACATGAAACCCCCTGCTATTTCCCAGTATCAGACCCCACTGTTCGTCTG
Plectorhinchus macrolepis	AACATGAAACCTCCTGCTATCTCGCAGTATCAGACACCTCTCTTTGTTTG

Plectorhinchus lessonii	ATCAGTACTAGTAACTGCTGTCCTCCTTCTCCTTTCCCTCCCAGTCCTTG
Plectorhinchus vittatus	ATCAGTACTAGTAACTGCTGTCCTCCTTCTCCTTTCCCTCCCAGTCCTTG
Diagramma pictum	ATCAGTACTAGTAACCGCTGTTCTCCTACTCCTTTCCCTTCCGGTCCTTG
Plectorhinchus chaetodonoides	ATCAGTCCTAGTGACCGCTGTCCTTCTGCTCCTCTCCCTCCCAGTCCTTG
Anisotremus dovii	GTCCGTCCTGGTAACTGCCGTCCTTCTCCTTCTCTCCCTTCCCGTTCTCG

Pomadasys argyreus	ATCCGTCCTAGTGACCGCCGTCCTCCTCCTGCTTTCCCTCCCAGTTCTGG
Brachydeuterus auritus	ATCAGTACTAGTCACTGCAGTCCTGCTCCTTCTCTCTCTCCCAGTACTTG
Xenichthys xanti	GTCTGTTCTAGTAACCGCAGTGCTCCTCCTTCTCTCGCTCCCAGTCCTTG
Pomadasys maculatus	ATCTGTACTAGTAACTGCCGTCTTACTACTTCTTTCCCTCCCAGTCCTAG
Anisotremus interruptus	ATCAGTCCTGGTTACGGCCGTTCTTCTCCTACTTTCCCTTCCGGTTCTTG
Anisotremus virginicus	GTCCGTTCTGGTTACGGCCGTTCTTCTTCTGCTTTCCCTTCCAGTCCTTG
Pomadasys branickii	GTCCGTTCTGGTAACTGCTGTCCTTCTTTTACTCTCCCTTCCAGTCCTCG
Haemulopsis elongatus	ATCCGTTCTCGTGACTGCTGTCCTTCTTCTACTCTCCCTTCCAGTCCTCG
Haemulopsis leuciscus	ATCCGTTCTCGTGACTGCTGTCCTTCTTCTACTCTCCCTTCCAGTCCTCG
Haemulon flaviguttatum	ATCAGTTCTCGTTACTGCCGTCCTTCTTCTCCTGTCTCTCCCAGTACTCG
Haemulon steindachneri	ATCAGTCCTCGTCACTGCCGTCCTTCTTCTCCTGTCCCTCCCAGTACTCG
Haemulon aurolineatum	ATCAGTCCTCGTCACTGCCGTACTCCTTCTTCTGTCCCTCCCAGTCCTTG
Haemulon plumierii	GTCAGTCCTCGTTACTGCTGTGCTCCTTCTTCTCTCCCTTCCAGTACTCG
Haemulon sciurus	GTCAGTCCTCGTTACTGCCGTACTTCTTCTTCTCTCCCTCCCAGTGCTCG
Haemulon scudderii	ATCGGTCCTCGTAACTGCCGTACTCCTCCTTCTGTCCCTCCCAGTACTCG
Xenistius californiensis	ATCAGTTCTCGTCACTGCCGTCCTTCTTCTTCTATCCCTCCCAGTACTCG
Haemulopsis axillaris	ATCCGTTTTAATTACCGCCGTCCTGCTACTGCTCTCTCTTCCAGTCCTTG
Haemulopsis nitidus	ATCCGTTTTAATTACCGCCGTCCTGCTACTGCTCTCTCTTCCAGTCCTTG
Anisotremus pacifici	ATCCGTCCTAGTAACGGCCGTTCTTCTGCTGCTTTCCCTCCCAGTCCTTG
Orthopristis chalceus	ATCTGTTTTAGTAACCGCCGTCCTACTCCTTCTCTCTCTGCCCGTCCTTG
Pomadasys kaakan	ATCAGTCTTAGTAACCGCCGTTCTCCTCCTACTATCCCTCCCAGTTCTTG
Diplodus bermudensis	AGCCGTCTTAATTACCGCCGTACTTCTTCTCTTATCTCTCCCAGTTCTTG
Pagrus pagrus	AGCTGTTCTTATTACCGCTGTTCTTCTCCTTCTGTCCCTGCCAGTCCTTG
Plectorhinchus macrolepis	GGCCGTTCTAATTACTGCCGTTCTCCTTCTCTTATCTCTCCCAGTTCTAG

Plectorhinchus lessonii	CTGCTGGAATTACAATGCTCCTCACGGATCGAAACCTCAACACTACTTTC
Plectorhinchus vittatus	CTGCTGGAATTACAATGCTCCTCACGGATCGAAACCTCAACACTACTTTC
Diagramma pictum	CTGCTGGGATTACTATGCTCCTCACAGATCGAAACCTCAACACCACTTTC
Plectorhinchus chaetodonoides	CTGCCGGAATTACAATGCTCCTCACAGATCGAAACCTTAACACTACCTTC
Anisotremus dovii	CCGCCGGTATTACAATGCTTCTTACAGACCGAAATCTTAATACCACTTTC
Pomadasys argyreus	CCGCGGGCATTACAATACTGCTTACCGACCGTAATTTAAATACCACCTTC
Brachydeuterus auritus	CCGCCGGCATTACGATGCTCCTTACAGACCGAAATCTCAACACCACTTTC
Xenichthys xanti	CCGCTGGCATCACTATGCTTCTGACGGACCGAAACCTGAACACCACCTTC
Pomadasys maculatus	CCGCTGGCATTACAATGCTTCTGACAGACCGAAACCTAAATACTACCTTC
Anisotremus interruptus	CAGCCGGCATTACAATGCTTCTCACGGACCGAAATCTAAATACCACTTTC
Anisotremus virginicus	CGGCTGGTATTACAATGCTTCTCACAGACCGAAATCTGAATACCACCTTC
Pomadasys branickii	CTGCCGGTATTACAATGCTCCTCACAGACCGGAATTTAAACACCACCTTC
Haemulopsis elongatus	CTGCTGGCATCACAATGCTCCTCACAGACCGAAACCTCAACACCACCTTC
Haemulopsis leuciscus	CTGCTGGCATCACAATGCTCCTCACAGACCGAAACCTCAACACCACCTTC
Haemulon flaviguttatum	CAGCTGGCATTACAATGCTCCTTACAGACCGAAACCTAAATACCACTTTC
Haemulon steindachneri	CGGCTGGTATCACAATGCTCCTCACAGACCGAAACCTGAACACCACTTTC
Haemulon aurolineatum	CGGCTGGCATCACAATGCTCCTCACAGACCGAAACCTAAACACCACATTC
Haemulon plumierii	CGGCAGGCATTACGATGCTCCTTACAGACCGAAACCTAAACACCACCTTC
Haemulon sciurus	CGGCTGGTATTACGATGCTTCTCACAGACCGAAACCTAAATACCACTTTC
Haemulon scudderii	CAGCTGGCATTACGATGCTGCTTACGGACCGAAACCTAAACACCACTTTC
Xenistius californiensis	CAGCTGGCATCACAATGCTCCTAACAGACCGAAATCTAAACACCACTTTC
Haemulopsis axillaris	CGGCCGGCATCACCATGCTCCTCACCGATCGTAACCTAAATACTACCTTC
Haemulopsis nitidus	CGGCCGGCATCACCATGCTCCTCACCGATCGTAACCTAAATACTACCTTC
Anisotremus pacifici	CAGCCGGCATCACAATGCTTCTTACGGACCGCAACCTGAATACTACCTTC
Orthopristis chalceus	CCGCCGGTATTACAATGCTCCTCACAGACCGAAACCTTAACACCACCTTC
Pomadasys kaakan	CCGCCGGCATTACAATGCTTCTTACAGATCGAAACCTAAATACCACCTTC
Diplodus bermudensis	CTGCCGGAATTACAATGCTCCTAACAGATCGAAACCTAAACACCACTTTC
Pagrus pagrus	CCGCAGGAATTACAATGCTCCTCACAGACCGTAATCTAAACACTACTTTC
Plectorhinchus macrolepis	CCGCTGGCATCACTATGCTCCTAACAGACCGAAATTTAAATACTTCCTTC

Plectorhinchus lessonii	TTTGACCCAGCAGGGGGAGGGGATCCAATTCTCTA
Plectorhinchus vittatus	TTTGACCCAGCAGGGGGAGGGGATCCAATTCTCTA
Diagramma pictum	TTTGATCCTGCGGGGGGAGGAGACCCAATTCTTTA
Plectorhinchus chaetodonoides	TTTGATCCTGCAGGAGGAGGAGACCCAATTCTCTA
Anisotremus dovii	TTTGACCCCGCCGGAGGAGGCGACCCCATCCTCTA
Pomadasys argyreus	TTCGACCCTGCCGGAGGGGGCGACCCAATCCTATA
Brachydeuterus auritus	TTTGACCCTGCTGGAGGAGGTGACCCGATTCTTTA
Xenichthys xanti	TTTGACCCTGCCGGAGGAGGGGACCCGATCCTCTA
Pomadasys maculatus	TTTGACCCCGCCGGAGGAGGAGACCCAATCCTGTA
Anisotremus interruptus	TTCGACCCTGCCGGAGGAGGTGATCCCATTCTCTA
Anisotremus virginicus	TTCGACCCCGCTGGAGGAGGGGACCCCATCCTCTA
Pomadasys branickii	TTTGACCCTGCCGGAGGAGGGGATCCCATTCTCTA
Haemulopsis elongatus	TTTGACCCCGCTGGAGGAGGAGACCCTATCCTGTA
Haemulopsis leuciscus	TTTGACCCCGCTGGAGGAGGAGACCCTATCCTGTA
Haemulon flaviguttatum	TTCGACCCCGCCGGAGGAGGTGACCCTATTCTTTA
Haemulon steindachneri	TTCGACCCCGCCGGAGGAGGCGACCCCATTCTTTA

```
Haemulon aurolineatum          TTCGACCCGGCCGGAGGAGGTGACCCCATTCTTTA
Haemulon plumierii             TTTGACCCCGCCGGAGGGGGTGACCCTATTCTTTA
Haemulon sciurus               TTTGACCCCGCCGGAGGGGGCGACCCTATTCTTTA
Haemulon scudderii             TTCGACCCCGCCGGAGGAGGTGATCCCATTCTTTA
Xenistius californiensis       TTCGACCCCGCCGGAGGAGGTGACCCCATTCTCTA
Haemulopsis axillaris          TTTGACCCAGCAGGAGGGGGTGACCCAATTCTGTA
Haemulopsis nitidus            TTTGACCCAGCAGGAGGGGGTGACCCGATTCTGTA
Anisotremus pacifici           TTTGATCCCGCTGGAGGAGGAGACCCTATTCTATA
Orthopristis chalceus          TTTGACCCCGCTGGAGGAGGTGACCCCATTCTTTA
Pomadasys kaakan               TTCGACCCCGCTGGAGGGGGTGACCCAATCCTGTA
Diplodus bermudensis           TTCGACCCTGCAGGGGGAGGAGACCCGATTCTTTA
Pagrus pagrus                  TTCGACCCGGCAGGAGGAGGGGACCCAATTCTCTA
Plectorhinchus macrolepis      TTTGACCCTGCAGGAGGAGGGGACCCAATTCTGTA
```

APPENDIX 3

RAG1-COI CONCATENATED SEQUENCES OF HAEMULIDS, INCLUDING OUTGROUPS

```
Diagramma pictum                 GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Plectorhinchus vittatus          GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Plectorhinchus chaetodonoides    GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Plectorhinchus macrolepis        GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCAAGAATG
Haemulopsis elongatus            GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Haemulopsis leuciscus            GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Anisotremus interruptus          GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Anisotremus virginicus           GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Pomadasys branickii              ACTTCTCGCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Anisotremus dovii                GCTTCTCCCTGGCTTTCACAAATTTGAATGGCAGCCAGCTCTCACGAATG
Haemulopsis axillaris            ACTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulopsis nitidus              GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Orthopristis chalceus            GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Anisotremus pacifici             GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Xenichthys xanti                 ACTTCCCCCCGGCTTTCGCGGGTTTGAATGGCCGCCAACTCTCACGAAGG
Brachydeuterus auritus           GCTGACCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTATAAGAAATG
Pomadasys maculatus              GCTTCTCCCTGGCTTTCACAAATTTGAATGGCAGCCAGCTCTCATGAATG
Pomadasys argyreus               GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Pomadasys kaakan                 GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCATGAATG
Haemulon plumierii               GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulon sciurus                 GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulon steindachneri           GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulon flaviguttatum           GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulon scudderii               GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Haemulon aurolineatum            GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCCCTCACNAATG
Xenistius californiensis         GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCAGCCAGCTCTCACGAATG
Plectorhinchus lessonii          GCTTCTCCCTGGCTTTCACAAATTTGAGTGGCCGCCAGCTCTCACGAATG
Diplodus bermudensis             GCTTCTCCCCGGCTTTCACCAGTTTGAATGGCAGCCAGCTCTCAAGAATG
Pagrus pagrus                    GCTTCACCCTGGCTTTCACCGGTTTGAGTGGCAGCCTGCTCTCAAGAATG

Diagramma pictum                 TGTCGACATCTTGCAATGTTGGCATTATTAATGGACTCGCTGGATGGGCT
Plectorhinchus vittatus          TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCGCTGGATGGGCT
Plectorhinchus chaetodonoides    TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCGCTGGATGGGCT
Plectorhinchus macrolepis        TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCGCTGGATGGGCT
Haemulopsis elongatus            TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulopsis leuciscus            TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Anisotremus interruptus          TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Anisotremus virginicus           TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pomadasys branickii              TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Anisotremus dovii                TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulopsis axillaris            TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulopsis nitidus              TGTCGACATCTTGCAATGATGGCATTATTAATGGGCTCTCTGGATGGGCT
Orthopristis chalceus            TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Anisotremus pacifici             TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Xenichthys xanti                 TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Brachydeuterus auritus           TGGCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pomadasys maculatus              TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pomadasys argyreus               TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pomadasys kaakan                 TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon plumierii               TGTCGACATCTTGCAACGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon sciurus                 TGTCGACATCTTGCAACGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon steindachneri           TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon flaviguttatum           TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon scudderii               TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Haemulon aurolineatum            TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Xenistius californiensis         TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Plectorhinchus lessonii          TGTCGACATCTTGCAATGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Diplodus bermudensis             TGTCGACGTCTTGCGACGTTGGCATTATTAATGGGCTCTCTGGATGGGCT
Pagrus pagrus                    TGTCGACGTCTTGCGACGTCGGCATTATTAATGGGCTCTCTGGATGGGCT
```

Diagramma pictum	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus vittatus	TCCTCAGTGGACGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus chaetodonoides	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus macrolepis	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulopsis elongatus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulopsis leuciscus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Anisotremus interruptus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGAGGTTTCGCTA
Anisotremus virginicus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Pomadasys branickii	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Anisotremus dovii	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulopsis axillaris	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGAGGTTTCGCTA
Haemulopsis nitidus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGAGGTTTCGCTA
Orthopristis chalceus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Anisotremus pacifici	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Xenichthys xanti	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Brachydeuterus auritus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Pomadasys maculatus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Pomadasys argyreus	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Pomadasys kaakan	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon plumierii	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon sciurus	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon steindachneri	TCCTCTGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon flaviguttatum	TCCTCAGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon scudderii	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Haemulon aurolineatum	TCCTCGGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Xenistius californiensis	TCCTCGGTGGATGAATCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Plectorhinchus lessonii	TCCTCTGTGGATGACTCCCCAGCTGACACCATCACTCGGCGGTTTCGCTA
Diplodus bermudensis	TCCTCAGTGGATGAGACCCCGGCTGACACCATCACTCGGCGCTTTCGCTA
Pagrus pagrus	TCCTCAGTGGATGAGACCCCGGCTGACACCATCACTCGGCGCTTTCGCTA

Diagramma pictum	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus vittatus	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus chaetodonoides	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus macrolepis	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulopsis elongatus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulopsis leuciscus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Anisotremus interruptus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Anisotremus virginicus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pomadasys branickii	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Anisotremus dovii	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulopsis axillaris	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulopsis nitidus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Orthopristis chalceus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACCTCCTGG
Anisotremus pacifici	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Xenichthys xanti	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Brachydeuterus auritus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pomadasys maculatus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pomadasys argyreus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pomadasys kaakan	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon plumierii	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon sciurus	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon steindachneri	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon flaviguttatum	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Haemulon scudderii	TGATGTGGCACTGGTGTCAGCATTAAAGGATTTGGAGGAGGACATCATGG
Haemulon aurolineatum	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Xenistius californiensis	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Plectorhinchus lessonii	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Diplodus bermudensis	TGATGTGGCACTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG
Pagrus pagrus	TGATGTGGCGCTGGTGTCAGCATTAAAGGATCTGGAGGAGGACATCATGG

Diagramma pictum	AGGGGCTGAGGGAGATCGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus vittatus	AGGGGCTGAGGGAGATCGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus chaetodonoides	AGGGGCTGAGGGAGATTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus macrolepis	AGGGGCTAAGGGAGATCGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulopsis elongatus	AGGGATTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulopsis leuciscus	AGGGATTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Anisotremus interruptus	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Anisotremus virginicus	AGGGATTGAGAGAGAGCGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Pomadasys branickii	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Anisotremus dovii	AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulopsis axillaris	AGGGACTGAAAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC

```
Haemulopsis nitidus             AGGGACTGAAAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Orthopristis chalceus           AGGGACTGAAAAAGAGTGGGATGGAAAACAGTGCATGTACCTCACGCTTC
Anisotremus pacifici            AGGGACTGAGAGAGAGTGGGCTGGAAGACAGTGCTTGTACCTCAGGCTTC
Xenichthys xanti                AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Brachydeuterus auritus          AGGGACTGAGAGAGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Pomadasys maculatus             AGGGACTGAGAGAGAGGGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Pomadasys argyreus              AGGGACTGAGAGAGAGGGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Pomadasys kaakan                AGGGACTGAGAGAGAGGGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon plumierii              AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon sciurus                AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon steindachneri          AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon flaviguttatum          AGGGACTGAGAGGGAGTGGGCTGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon scudderii              AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Haemulon aurolineatum           AGGGGCTGCGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Xenistius californiensis        AGGGCCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Plectorhinchus lessonii         AGGGGCTGAGAGGGAGTGGGATGGAAGACAGTGCTTGTACCTCAGGCTTC
Diplodus bermudensis            ACGGGCTGAGAGAGAATGGGATGGAAGACAGCGCTTGCACCTCAGGCTTC
Pagrus pagrus                   ACGGGCTGAGAGAGAATGGGATGGAAGACAGCGCTTGCACCTCGGGCTTC

Diagramma pictum                AGTGTCATGATCAAGGAATCCTGTGATGGCATGGGTGATGTCAGCGAGAA
Plectorhinchus vittatus         AGTGTCATGATCAAGGAATCCTGTGATGGCATGGGTGATGTCAGCGAGAA
Plectorhinchus chaetodonoides   AGTGTCATGATCAAGGAATCCTGTGATGGCATGGGTGATGTCAGCGAGAA
Plectorhinchus macrolepis       AGTGTCATGATCAAGGAATCGTGTGATGGCATGGGTGATGTCAGCGAGAA
Haemulopsis elongatus           AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulopsis leuciscus           AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Anisotremus interruptus         AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Anisotremus virginicus          AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Pomadasys branickii             AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Anisotremus dovii               AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGTGATGTCAGCGAGAA
Haemulopsis axillaris           AGTGTCATGATCAAGGAATCGTGTGATGGCATGGGTGATGTCAGTGAGAA
Haemulopsis nitidus             AGTGTCATGATCAAGGAATCGTGTGATGGCATGGGTGATGTCAGTGAGAA
Orthopristis chalceus           AGTGTTATGATAAAGGAATCTTGCGATGGCATGGGTGACGTCAGCCAGAA
Anisotremus pacifici            AGTGTCATGATCAAAGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Xenichthys xanti                AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Brachydeuterus auritus          AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGTGAGAA
Pomadasys maculatus             AGTGTCATGATCAAGGAGTCTTGTGACGGCATGGGTGATGTCAGCGAGAA
Pomadasys argyreus              AGTGTCATGATCAAGGAATCTTGTGACGGCATGGGCGATGTCAGCGAGAA
Pomadasys kaakan                AATGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulon plumierii              AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGTGATGTCAGCGAGAA
Haemulon sciurus                AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulon steindachneri          AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulon flaviguttatum          AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGTGATGTCAGCGAGAA
Haemulon scudderii              AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Haemulon aurolineatum           AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Xenistius californiensis        AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Plectorhinchus lessonii         AGTGTCATGATCAAGGAATCTTGTGATGGCATGGGCGATGTCAGCGAGAA
Diplodus bermudensis            AGAGTCATGATCAAGGAATCCTGTGACGGCATGGGCGATGTCAGCGAGAA
Pagrus pagrus                   AGAGTCATGATCAAGGAGTCTTGCGACGGCATGGGCGATGTCAGCGAGAA

Diagramma pictum                GCATGGCGGAGGACCAGCTGTTCCTGAGAAGGCTGTGCGTTTCTCTTTCA
Plectorhinchus vittatus         GCATGGCGGAGGACCAGCTGTTCCTGAGAAGGCTGTGCGTTTCTCTTTCA
Plectorhinchus chaetodonoides   GCATGGCGGAGGACCAGCTGTTCCTGAGAAGGCTGTGCGTTTCTCTTTCA
Plectorhinchus macrolepis       GCACGGCGGAGGACCAGCTGTTCCTGAGAAGGCTGTGCGTTTCTCTTTCA
Haemulopsis elongatus           GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulopsis leuciscus           GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Anisotremus interruptus         GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Anisotremus virginicus          GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Pomadasys branickii             GCACGGTGGAGGACCAGTTGTTCTTGATAAGGCTGTACGTTTCTCTTTCA
Anisotremus dovii               GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulopsis axillaris           GCATGGTGGAGGACCACTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulopsis nitidus             GCATGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Orthopristis chalceus           GCAAGGTGGAGGACCATTTGTTCCGGAAAAGCCTGTACGTTTCTCTTTCA
Anisotremus pacifici            GCACGGTGGAGGACCAGTTGTTCCGGAGAAGGCTGTACGTTTCTCTTTCA
Xenichthys xanti                GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Brachydeuterus auritus          GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Pomadasys maculatus             GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Pomadasys argyreus              GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Pomadasys kaakan                GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulon plumierii              GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGCTTCTCTTTCA
Haemulon sciurus                GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGCTTCTCTTTCA
Haemulon steindachneri          GCATGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
```

Haemulon flaviguttatum	GCACGGTGGAGGACCAGTTGTTCCGGAGAAGGCTGTACGTTTCTCTTTCA
Haemulon scudderii	GCATGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Haemulon aurolineatum	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Xenistius californiensis	GCACGGTGGAGGACCAGTTGTTCCTGAGAAGGCTGTACGTTTCTCTTTCA
Plectorhinchus lessonii	GCACGGTGGAGGACCAGTTGTTCCTGATAAGGCTGTACGTTTCTCTTTCA
Diplodus bermudensis	GCACGGCGGAGGACCAGCTGTTCCCGAGAAGGCTGTACGCTTCTCTTTCA
Pagrus pagrus	GCACGGCGGAGGACCAGCTGTTCCCGAGAAGGCGGTGCGCTTCTCTTTCA

Diagramma pictum	CTGTTATGTCCGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTCACC
Plectorhinchus vittatus	CTGTTATGTCCATCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTCACC
Plectorhinchus chaetodonoides	CTGTTATGTCCATCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTCACC
Plectorhinchus macrolepis	CTGTTATGTCCATCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTCACT
Haemulopsis elongatus	CTGTTATGTCTGTCTCTGTCTTGGCAGATGAGGAGGGGGAAGAGGTTACG
Haemulopsis leuciscus	CTGTTATGTCTGTCTCTGTCTTGGCAGATGAGGAGGGGGAAGAGGTTACG
Anisotremus interruptus	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAAGAGGAAGAGGTTACG
Anisotremus virginicus	CTGTCATGTCTGTCTCTGTCTTGGCAGACGAGGAGGAGGAAGAGGTTACG
Pomadasys branickii	CTGTTATGTCTGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTTACG
Anisotremus dovii	CTGTTATGTCTGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTTACA
Haemulopsis axillaris	CTGTTATGTCTATCTCTGTTCTGGCAGACGAGGCGGAGGAGGAGGTTACG
Haemulopsis nitidus	CTGTTATGTCTATCTCTGTTCTGGCAGACGAGGCGGAGGAGGAGGTTACG
Orthopristis chalceus	CTATTATCTCTGTCTCTGTCCGGGCAAACAAGGAGGTGAAAGAGGTAACT
Anisotremus pacifici	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGAAGCAAGAGGTTACG
Xenichthys xanti	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACG
Brachydeuterus auritus	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGCAGGAAGAAGAGGTTACG
Pomadasys maculatus	CTATTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACG
Pomadasys argyreus	CTATTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACG
Pomadasys kaakan	CTATTATGTCTGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTTACC
Haemulon plumierii	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Haemulon sciurus	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Haemulon steindachneri	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Haemulon flaviguttatum	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGAAGGAAGAGGTTACG
Haemulon scudderii	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Haemulon aurolineatum	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAAGAAGAGGTTACA
Xenistius californiensis	CTGTTATGTCTGTCTCTGTCCTGGCAGATGAGGAGGAGGAAGAGGTTACG
Plectorhinchus lessonii	CTGTTATGTCTGTCTCTGTCCTGGCAGACGAGGAGGAGGAAGAGGTTACA
Diplodus bermudensis	CCATTATGTCTGTTTCTGTCCTGGCAGACAGCGAGGAGACAGAGGTGACT
Pagrus pagrus	CCGTTATGTCTGTTTCTGTCCTGGCAGACGGCGAGGAGAAAGAGGTTACC

Diagramma pictum	GTCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTTTG
Plectorhinchus vittatus	ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTTTG
Plectorhinchus chaetodonoides	ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTTTG
Plectorhinchus macrolepis	ATCTTCAGGGAATCAAGGCCAAACTCAGAACTGTCCTGTAAGCCCCTTTG
Haemulopsis elongatus	ATCTTCACAGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulopsis leuciscus	ATCTTCACAGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Anisotremus interruptus	ATCTTCACGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Anisotremus virginicus	ATATTCACGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Pomadasys branickii	ATCTTCACGGAGTCGAAGCCAAACTCAGAAATGTCCTGTAAGCCCCTGTG
Anisotremus dovii	ATCTTCACGGAGTCAAAGCCAAACTCAGAGCTGTCCTGTAAGCCCCTCTG
Haemulopsis axillaris	ATCTTCACGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulopsis nitidus	ATCTTCACGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Orthopristis chalceus	ATCTTCACGGACTCAAAGCCAAACTCAGATATGTCCTGTAAGCCCCTCTG
Anisotremus pacifici	ATCTTCACAGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Xenichthys xanti	ATCTTCACTGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Brachydeuterus auritus	ATCTTCACAGAGTCAAAGCCCAACTCAGAACTGTCCTGTAAGCCCCTCTG
Pomadasys maculatus	ATCTTCAGGGAGTCAAAGCCAAACTCAGAGCTGTCCTGTAAGCCCCTCTG
Pomadasys argyreus	ATCTTCACGGAGGCAAAGCCAAACTCAGAGCTGTCCTGTAAGCCCCTCTG
Pomadasys kaakan	ATCTTCAGGGAGCCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon plumierii	ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon sciurus	ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon steindachneri	ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon flaviguttatum	ATCTTCACGGAGTCAAAGCCAAATTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon scudderii	ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Haemulon aurolineatum	ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Xenistius californiensis	ATCTTCAGGGAGCCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Plectorhinchus lessonii	ATCTTCAGGGAGTCAAAGCCAAACTCAGAACTGTCCTGTAAGCCCCTCTG
Diplodus bermudensis	ATCTTTACGGAGCCAAAGCCGAGCTCTGAACTGTCCTGTGAGCCCCTTTG
Pagrus pagrus	ATCTTCACGGAGCCAAAGCCGAACTCAGAAATGTCCTGTAAGCCCCTGTG

Diagramma pictum	CCTGATGTTTGTGGATGAGTCAGACCATGAGACACTCACGGCAGTCCTGT
Plectorhinchus vittatus	CCTGATGTTTGTGGATGAGTCAGACCATGAGACACTCACGGCAGTCCTGT
Plectorhinchus chaetodonoides	CCTGATGTTTGTGGATGAGTCAGACCATGAGACACTCACGGCAGTCCTGT

```
Plectorhinchus macrolepis      CCTGATGTTTGTGGATGAGTCAGACCATGAGACACTCACGGCCGTCCTAT
Haemulopsis elongatus          TCTGATGTTCGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulopsis leuciscus          TCTGATGTTCGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Anisotremus interruptus        CCTGATGTTTGTGGATGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Anisotremus virginicus         CCTGATGTTTGTGGATGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Pomadasys branickii            CCTGATGTTTGTGGACGAGTCGGACCATGAGACACTCACAGCCGTCCTGT
Anisotremus dovii              CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulopsis axillaris          CCTGATGTTTGCGGACGAGTCAGACCATGAGACACTCACAGCCGTCCTGT
Haemulopsis nitidus            CCTGATGTTTGTGGACGAGTCGGACCATGAGACACTCACAGCCGTCCTGT
Orthopristis chalceus          CCTGATGTTTGTAGATGAGTCAGACCATGAAACACTCACAGCCGTCCTGT
Anisotremus pacifici           CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Xenichthys xanti               CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Brachydeuterus auritus         CCTGATGTTTGTGGACGAGTCGGACCATGAGACACTCACAGCCGTCCTGT
Pomadasys maculatus            CCTCATGTTTGTGGACGAATCAGACCATGAGACACTCACAGCCGTCCTGT
Pomadasys argyreus             CCTGATGTTTGTGGACGAGTCAGACCACGAGACCCTCACAGCCGTCCTGT
Pomadasys kaakan               CCTGATGTTTGTAGACGAGTCAGACCATGAGACACTCACAGCCGTCCTGT
Haemulon plumierii             CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulon sciurus               CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulon steindachneri         CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulon flaviguttatum         CCTGATGTTTGTGGATGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Haemulon scudderii             CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCTGTCCTGT
Haemulon aurolineatum          CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Xenistius californiensis       CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Plectorhinchus lessonii        CCTGATGTTTGTGGACGAGTCGGACCATGAAACACTCACAGCCGTCCTGT
Diplodus bermudensis           CCTGATGGTTGTGGAGGAGTCAGACCACCAGACGCTCACAGCCATGCTGG
Pagrus pagrus                  CCTGATGTTCGTGGACGAGTCAGACCATGAGACGCTCACGGCCATCCTGT

Diagramma pictum               CGCCTATAGTCGCAGAGCGCGACGCAATGAAAGAGAGCAGGCTCATCCTA
Plectorhinchus vittatus        CGCCTATAGTCGCAGAGCGCGACGCAATGAAAGAGAGCAGGCTCATCCTA
Plectorhinchus chaetodonoides  CGCCTATAGTCGCAGAGCGCAACGCAATGAAAGAGAGCAGGCTCATCCTA
Plectorhinchus macrolepis      CGCCTATAGTCGCAGAGCGCAACGCAATGAAAGAGAGCAGGCTCATCCTA
Haemulopsis elongatus          CACCTATAGTTGCAGAACGCAATGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulopsis leuciscus          CACCTATAGTTGCAGAACGCAATGCAATGAAGGAGAGCAGGCTCATCCTA
Anisotremus interruptus        CGCCCATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Anisotremus virginicus         CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Pomadasys branickii            CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Anisotremus dovii              CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulopsis axillaris          CACCTATAGTTGCAGAACGCAATGCCATGAAGGAGAGCAGGCTCATCCTA
Haemulopsis nitidus            CACCTATAGTTGCAGAACGCAATGCCATGAAGGAGAGCAGGCTCATCCTA
Orthopristis chalceus          CGCCTATAGTTGCAAAACGCAGTGCAGTGAAGGAGAGCACACTCCTCCTA
Anisotremus pacifici           CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAAAGCAGGCTCATCCTA
Xenichthys xanti               CGCCTATAGTTGCAGAACGCAATGCCATGAAGGAAAGCAGGCTCATCCTA
Brachydeuterus auritus         CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Pomadasys maculatus            CGCCTATCGTTGCAGAACGCAACGCGATGAAGGAGAGCAGGCTCATCCTA
Pomadasys argyreus             CGCCTATCGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Pomadasys kaakan               CGCCTATCGTTGCAGAACGCAACGCAATGAAGGAAAGCAGGCTCATCCTA
Haemulon plumierii             CGCCCATAGTTGCAGAGCGCGACGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulon sciurus               CGCCCATAGTTGCAGAGCGCGACGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulon steindachneri         CGCCCATAGTTGCAGAACGCGACGCAATGAAGGAGAGCAGGCTCATCCTA
Haemulon flaviguttatum         CGCCTATAGTTGCAGAACGCAACGCAATGAAGGAGAGCCGGCTCATCCTA
Haemulon scudderii             CGCCCATAGTTGCAGAGCGCAACGCAATGAAGGAAAGCAGGCTCATCCTA
Haemulon aurolineatum          CGCCCATAGTTGCAGAACGCAACGCAATGAAGGAGAGCAGGCTCATCCTA
Xenistius californiensis       CGCCCATAGTCGCAGAACGCAACGCAATGAAAGAGAGCAGGCTCATCCTA
Plectorhinchus lessonii        CGCCCATAGTTGCAGAACGCGACGCAATGAAGGAGAGCAGGCTCATCCTA
Diplodus bermudensis           GGCCTGTAGTAGCAGAGCGTATAGCAATGAAAGAGAGCAGGCTGATCCTA
Pagrus pagrus                  GGCCTGTAGTTGCAGAGCGCAAGGCAATGAAAGAGAGCAGGCTGATCCTA

Diagramma pictum               TCCATCGGTGGACTGCCCCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Plectorhinchus vittatus        TCCATCGGTGGACTGCCCCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Plectorhinchus chaetodonoides  TCCATTGGTGGACTGCCCCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Plectorhinchus macrolepis      TCCATTGGCGGACTGCCCCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulopsis elongatus          TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulopsis leuciscus          TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Anisotremus interruptus        TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Anisotremus virginicus         CCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGTACGGG
Pomadasys branickii            TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Anisotremus dovii              TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCCGAGGCACGGG
Haemulopsis axillaris          TCCATCGGTGGACTACGTCGCTCCTTCCGCTTCCACTTCAGAGGCACGGG
Haemulopsis nitidus            TCCATCGGTGGACTACGTCGCTCCTTCCGCTTCCACTTCAGAGGCACAGG
Orthopristis chalceus          TCAATCGGTGGACTGAATCGCTCTTTCCGCTTTCACTTCAGAGGCACAGG
Anisotremus pacifici           TCCATCGGTGGATTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
```

```
Xenichthys xanti                 TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Brachydeuterus auritus           TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACCGG
Pomadasys maculatus              TCCATCGGCGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Pomadasys argyreus               TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Pomadasys kaakan                 TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon plumierii               TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon sciurus                 TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon steindachneri           TCCATCGGTGGACTACCTCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Haemulon flaviguttatum           TCCATTGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon scudderii               TCTATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Haemulon aurolineatum            TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACAGG
Xenistius californiensis         TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Plectorhinchus lessonii          TCCATCGGTGGACTACGTCGCTCCTTCCGCTTTCACTTCAGAGGCACGGG
Diplodus bermudensis             TCTATCGGCGGGCTTGCTCGCTCCTTCCGGTTCCACTTCGCAGTCGTGAG
Pagrus pagrus                    TCCATCGGTGGACTCGCTCGCTCCTTCCGCTTTCACTTCAGAGGCACCGG

Diagramma pictum                 ATACGACGAGAAGATGGTGCGCGAGATGGAAGGGCTCGAGGCCTCGGGGT
Plectorhinchus vittatus          ATACGACGAGAAGATGGTGCGCGAAATGGAAGGGCTCGAGGCCTCGGGGT
Plectorhinchus chaetodonoides    ATACGACGAGAAGATGGTGCGCGAGATGGAAGGGCTCGAGGCCTCGGGGT
Plectorhinchus macrolepis        ATACGACGAGAAGATGGTGCGCGAGATGGAAGGGCTAGAGGCCTCGGGGT
Haemulopsis elongatus            ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Haemulopsis leuciscus            ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Anisotremus interruptus          ATATGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCTTCAGGGT
Anisotremus virginicus           ATATGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCTTCATGGT
Pomadasys branickii              ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Anisotremus dovii                ATACGATGAGAAGATGGTGCGAGAGATGGAGGGCTTTGAGGCCTCAGGGT
Haemulopsis axillaris            ATACGATGAGAAGATGGTGCGAGAAATGGAGGGGCTCGAGGCCTCGGGCT
Haemulopsis nitidus              ATACGATGAGAAGATGGTGCGAGAAATGGAGGGGCTTGAGGCTTCGAGCT
Orthopristis chalceus            ATATGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCTTCGGGGT
Anisotremus pacifici             ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCAGGGT
Xenichthys xanti                 ATATGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAGGCCTCGGGGT
Brachydeuterus auritus           ATATGATGAAAAGATGGTGCGAGAAATGGAGGGGCTTGAGGCCTCGGGGT
Pomadasys maculatus              ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAGGCCTCGGGGT
Pomadasys argyreus               ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAGGCCTCGGGGT
Pomadasys kaakan                 ATACGATGAGAAGATGGTGCGAGACATGGAGGGGCTCGAAGCCTCGGGGT
Haemulon plumierii               ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAAGCCTCGGGGT
Haemulon sciurus                 ATACGATGAAAAGATGGTGCGAGAGATGGAGGGGCTTGAAGCCTCGGGGT
Haemulon steindachneri           ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAAGCCTCGGGGT
Haemulon flaviguttatum           ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAAGCCTCGGGGT
Haemulon scudderii               ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAAGCCTCGGGGT
Haemulon aurolineatum            ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAAGCCTCGGGGT
Xenistius californiensis         ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTCGAGGCCTCGGGGT
Plectorhinchus lessonii          ATACGATGAGAAGATGGTGCGAGAGATGGAGGGGCTTGAAGCCTCGGGGT
Diplodus bermudensis             AGGCGATGAGAGAATGATACGTGAGATGGCGGCCCTCGTGGCGTCAGGGT
Pagrus pagrus                    ATACGACGAGAAGATGGTGCGCGAGATGGAGGGCCTCGAGGCCTCGGGGT

Diagramma pictum                 CCACCTACATCTGCACTCTGTGTGACTCCAGCCGGGCAGAGGCCTCCGAA
Plectorhinchus vittatus          CCACCTACATCTGCACTCTGTGTGACTCCAGCCGCGCAGAGGCCTCCGAA
Plectorhinchus chaetodonoides    CCACCTACATCTGCACTCTGTGTGACTCCAGCCGCGCAGAGGCCTCCGAA
Plectorhinchus macrolepis        CCACCTACATCTGCACTCTATGTGACTCCAGCCGTGCAGAGGCCTCTGAG
Haemulopsis elongatus            CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCGTCTCAA
Haemulopsis leuciscus            CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCGTCTCAA
Anisotremus interruptus          CCACCTATGTCTGCACTCTGTGTGACTCCACGCGGGCAGAGGCATCTCAA
Anisotremus virginicus           CCACCTATGTTTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Pomadasys branickii              CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Anisotremus dovii                CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Haemulopsis axillaris            CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCACAA
Haemulopsis nitidus              CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Orthopristis chalceus            CCACCTATGTCTGCACTCTGTGTGACTCCACCCGCGCAGAGGCATCTCAA
Anisotremus pacifici             CGACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Xenichthys xanti                 CCACCTATGTCTGCACTCCTTGTGACTCCACCCGGGCAGATGCATCTCAA
Brachydeuterus auritus           CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGGAGACTCTCAA
Pomadasys maculatus              CCACCTATGTTTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTGAA
Pomadasys argyreus               CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTGAA
Pomadasys kaakan                 CCACCTATGTTTGCACTCTGTGTGACTCCACCAGGGCAGAGGCATCTGAA
Haemulon plumierii               CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Haemulon sciurus                 CCACCTATGTCTGCACTCTGTGTGACTCCACTCGGGCAGAGGCATCTCAA
Haemulon steindachneri           CCACCTATGTCTGCACTCTGAGTGACTCCACCCGGGCAGAGGCATCTCAA
Haemulon flaviguttatum           CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAG
Haemulon scudderii               CCACCTATGTCTGCACTCTGTGTGATTCCACCCGGGCAGAGGCATCTCAA
Haemulon aurolineatum            CCACCTATGTCTGCACTCTGTGTGACTCCACTCGGGCAGAGGCATCTCAA
```

Xenistius californiensis	CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Plectorhinchus lessonii	CCACCTATGTCTGCACTCTGTGTGACTCCACCCGGGCAGAGGCATCTCAA
Diplodus bermudensis	CCACCTATGCTTGCATTCTATGCGACTCCAGTCGAGCGGACTCGTCTCAA
Pagrus pagrus	CCACCTACGTCTGCACTCTCTGCGACTCCAGTCGGGCGGAGGCGTCTCAA

Diagramma pictum	AACATGGTGCTCCACTCTGTCACACGCAGCCATGAAGAGAACCTGGACCC
Plectorhinchus vittatus	AACATGGTGCTCCACTCTGTCACACGCAGCCATGAAGAGAACCTGGACCG
Plectorhinchus chaetodonoides	AACATGGTGTTCCACTCTGTTACACGCAGCCATGAAGAGAACCTGGACCG
Plectorhinchus macrolepis	AACATGGTGCTCCACTCTGTCACGCGCAGCCATGAAGAGAACCTGGACCG
Haemulopsis elongatus	AACATGGTGCTACACTCCATCACACGCAGCCATGAAGAGAATCTGGACCG
Haemulopsis leuciscus	AACATGGTGCTACACTCCATCACACGCAGCCATGAAGAGAATCTGGACCG
Anisotremus interruptus	AACATGGTGCTGCACTCTGTCCCACGCACCCACGGAGAGAACCTGGACCG
Anisotremus virginicus	AACATGGTGCTGCACTCTGTCACACGCAGCCACGAAGAGAACCTGGACCG
Pomadasys branickii	AACATGGTGCTGCACTCTGTCACACGCAACCACGAAGAGAACCTGGACCG
Anisotremus dovii	AACATGGTGCTGCATTCTGTCACACGCAGCCACGAAGAGAACGTGGACCG
Haemulopsis axillaris	AACATGGTGCTTCACTCTGTCACACGTAGCCACGAAGAGAACCTGGACCG
Haemulopsis nitidus	AACATGGTGCTTCACTCTGTCACACGTAGCCACGAAGAGAAACTGAACTG
Orthopristis chalceus	AACATGGTGCTGCACTCTGTCACACGTAACCACGAGGAGAACCTGGACCG
Anisotremus pacifici	AACATGGTGCTGCACTCTGTCACACGCAGCCACGAAGAGAACCTGGACCG
Xenichthys xanti	AACATGGTGCTGCACTCTGTCACACGCACCCACGAAGAGAACCTGGACCG
Brachydeuterus auritus	AACATGGTGCTGCACTCTGTCACACGCAAACACGAAGAGAACCTGGACCG
Pomadasys maculatus	AACATGGTGCTGCACTCCATCTCACGCAGCCAGGAAGAGGACCTGGACCG
Pomadasys argyreus	AACATGGTGCTGCACTCTATCACACGCAGCCACGAGGAGAACCTGGACCG
Pomadasys kaakan	AACATGGTGCTGCACTCCATCACACGCAGCCACGAAGAGAACCTGGACCG
Haemulon plumierii	AACATGGTGCTGCACTCCATCACACGCAACCATGAAGAGAACCTGGACCG
Haemulon sciurus	AACATGGTGCTGCACTCCATCACACGCAACCACGAGGAGAACCTGGACCG
Haemulon steindachneri	AACATGGTGCTGCACTCCATCACACGCAGCCACGAAGAGAACCTGGACCG
Haemulon flaviguttatum	AACATGGTGCTGCACTCCATCACACGCAGCCACGAAGAGAACCTGGACCG
Haemulon scudderii	AACATGGTGCTGCACTCTATCACACGCAACCACGAAGAGAACCTGGACCG
Haemulon aurolineatum	AACATGGTGCTGCACTCTGTCACACGCAACCACGAAGAGAACCTGGACCG
Xenistius californiensis	AACATGGTGCTGCACTCTATCACACGCGGCCACGAAGAGAACCTGGACCG
Plectorhinchus lessonii	AACATGGTGCTGCACTCCATCACACGCAGCCACGAAGAGAACCTGGACCG
Diplodus bermudensis	AACATGGTCCTCCACTCCGTCACCCGCAATCAGGACGAGAACAGGGATCG
Pagrus pagrus	AACATGGTGCTGCACTCCGTCACCCGCAATCACGACGAGAACCTGGAACG

Diagramma pictum	TTACGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGCAGATGAGCTGC
Plectorhinchus vittatus	TTACGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGATGAGCTGC
Plectorhinchus chaetodonoides	TTACGAAATATGGAGGACCAACCCTTTTTCTGAGTCTGTAGATGAGCTGC
Plectorhinchus macrolepis	TTACGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGATGAGCTGC
Haemulopsis elongatus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCCGTAGAGGAGCTTA
Haemulopsis leuciscus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCCGTAGAGGAGCTTA
Anisotremus interruptus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAATCTGTAGAGGAGCTAC
Anisotremus virginicus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAATCTGTAGAGGAGCTAC
Pomadasys branickii	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Anisotremus dovii	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTAC
Haemulopsis axillaris	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTGGAGGAGCTGC
Haemulopsis nitidus	TTATAAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTGGAGGAGCTGC
Orthopristis chalceus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Anisotremus pacifici	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGCAGAGGAGCTAC
Xenichthys xanti	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Brachydeuterus auritus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Pomadasys maculatus	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTGC
Pomadasys argyreus	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGCTGC
Pomadasys kaakan	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGCTGC
Haemulon plumierii	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGCTAC
Haemulon sciurus	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCCGTAGAGGAGCTAC
Haemulon steindachneri	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGATGAGCTAC
Haemulon flaviguttatum	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGCTAC
Haemulon scudderii	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGAGGAGGTAC
Haemulon aurolineatum	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGAGGAGCTAC
Xenistius californiensis	TTATGAAATATGGAGAACCAACCCCTTTTCTGAGTCTGTAGACGAGCTAC
Plectorhinchus lessonii	TTATGAAATATGGAGAACCAACCCTTTTTCTGAGTCTGTAGATGAGCTAC
Diplodus bermudensis	TTACGAAATCTGGAGCCCCCACCCTTTTTCCGAGTCTGTAGATGAGCTGC
Pagrus pagrus	TTACGAAATCTGGAGGACCAACCCCTTTTCTGAGTCCGCAGATGAGCTGC

Diagramma pictum	GAGACAGAGTCAAAGGGGTCTTTGACAAGCCCTTCCTGGAGACCCATCCC
Plectorhinchus vittatus	GAGACAGAGTCAAAGGGGTCTCTACCAAGCCCTTCCTGGAGACCCATCCC
Plectorhinchus chaetodonoides	GAGACAGAGTCAAAGGGGTCTCTGACAAGCCCTTCCTGGAGACCCATCCC
Plectorhinchus macrolepis	GAGACAGAGTCAAAGGTGTCTCTGCCAAGCCCTTCCTGGAGACCCATCCC
Haemulopsis elongatus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulopsis leuciscus	GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC

```
Anisotremus interruptus          GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Anisotremus virginicus           GAGACAGAGTCAAAGGAGTCTCCGCCAAACCCTTCATGGAGACCCATCCC
Pomadasys branickii              GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Anisotremus dovii                GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulopsis axillaris            GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulopsis nitidus              GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Orthopristis chalceus            GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Anisotremus pacifici             GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Xenichthys xanti                 GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Brachydeuterus auritus           GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Pomadasys maculatus              GAGACAGAGTCAAAGGAGTCTCTGCCAAGCCCTTCTTGGAGACCCATCCC
Pomadasys argyreus               GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Pomadasys kaakan                 GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulon plumierii               GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Haemulon sciurus                 GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Haemulon steindachneri           GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Haemulon flaviguttatum           GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Haemulon scudderii               GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Haemulon aurolineatum            GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Xenistius californiensis         GAGACAGAGTCAAAGGAGTCTCTGCCAAACCCTTCATGGAGACCCATCCC
Plectorhinchus lessonii          GAGACAGAGTCAAAGGAGTTTCTGCCAAACCCTTCATGGAGACTCATCCC
Diplodus bermudensis             GAGACAGAGTCAAAGGAGTGTCGAACAAGCCCTTCATGGAGACCCATCAC
Pagrus pagrus                    GAGACAGAGTCAAAGGGGTCTCGGCCAAGCCCTTCATCGAGACCCATCCC

Diagramma pictum                 ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Plectorhinchus vittatus          ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Plectorhinchus chaetodonoides    ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Plectorhinchus macrolepis        ACGCTGGATGCATTACACTGTGACATAGGGAATGCCACTGAGTTCTACAA
Haemulopsis elongatus            ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulopsis leuciscus            ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Anisotremus interruptus          ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Anisotremus virginicus           ACGCTGGATGCATTACACTGTGACATAGGAAATGCCACTGAGTTCTACAA
Pomadasys branickii              ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Anisotremus dovii                ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulopsis axillaris            ACGCTGGATGCATTACACTGTGACATCGGCAATGCCACTGAGTTCTATAA
Haemulopsis nitidus              TCGCTGGATGCATTACACTGTGACATCGGCAATGCCACTGAGTTCTATAA
Orthopristis chalceus            ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Anisotremus pacifici             ACGCTGGATGCATTACACTGTGACATAGGCAATGCTACTGAGTTCTACAA
Xenichthys xanti                 ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Brachydeuterus auritus           ACGCTGGATGCATTGCACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Pomadasys maculatus              ACGCTGGATGCATTGCACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Pomadasys argyreus               ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Pomadasys kaakan                 ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon plumierii               ACGCTGGATGCATTRCACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon sciurus                 ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon steindachneri           ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon flaviguttatum           ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon scudderii               ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Haemulon aurolineatum            ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Xenistius californiensis         ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Plectorhinchus lessonii          ACGCTGGATGCATTACACTGTGACATAGGCAATGCCACTGAGTTCTACAA
Diplodus bermudensis             ACGCTGGACGCGCTGCACTGTGACATCGGCAACGCCACCGAGTTCTACAA
Pagrus pagrus                    ACGCTGGACGCGCTGCACTGCGACATCGGCAACGCCACCGAGTTCTACAA

Diagramma pictum                 AATCTTCCAGGATGAGATCGGGGAGGTGCACCAAAGAGTCAACCCTAGCC
Plectorhinchus vittatus          AATCTTCCAGGATGAGATCGGGGAGGTGCACCAAAAAGTCAACCCTAGCC
Plectorhinchus chaetodonoides    AATCTTCCAGGATGAGATCGGGGAGGTGCACCAAAAAGTCAACCCTAGCC
Plectorhinchus macrolepis        AATCTTCCAGGATGAGATTGGGGAGGTGTACCAAAAAGTGAACCCTAGCC
Haemulopsis elongatus            AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCAAGCC
Haemulopsis leuciscus            AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCAAGCC
Anisotremus interruptus          AATCTTCCAGGATGAGATCGGTGAAGTGTACCAAAAACCCAACCCGAGCC
Anisotremus virginicus           AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAGAACCCAACCCGAGCC
Pomadasys branickii              AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Anisotremus dovii                AATTTTCCAGGATGAGATCGGGGAATTGTACCAAAAACCCAACCCAGGCC
Haemulopsis axillaris            AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAAAACAACCCAAGCC
Haemulopsis nitidus              AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAAAACAACCCAAGCC
Orthopristis chalceus            AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Anisotremus pacifici             AATTTTCCAGGATGAGATCGGGGAATTGTACCAAAAACCCAACCCGAGCC
Xenichthys xanti                 AATCTTCCAGGATGAGATCGGAGAAGTGTACCAAAAACCCAACCCGAGCC
Brachydeuterus auritus           AATCTTCCAGGATGAGATCGGGGAAGTGTACCAGAAACCCAACCCGAGCC
Pomadasys maculatus              AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGTC
```

Pomadasys argyreus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Pomadasys kaakan	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon plumierii	AATCTTCCARGACGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon sciurus	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon steindachneri	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon flaviguttatum	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon scudderii	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Haemulon aurolineatum	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Xenistius californiensis	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Plectorhinchus lessonii	AATCTTCCAGGATGAGATCGGGGAAGTGTACCAAAAACCCAACCCGAGCC
Diplodus bermudensis	AATCTTCCAGGACGAGATCGGGGAGGTGTTCCAGAGGCCCAACCCCAGCC
Pagrus pagrus	AATCTTCCAGGACGAGATCGGGGAGGTGTTCCAGAGGGCCAACCCCAGCC

Diagramma pictum	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Plectorhinchus vittatus	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Plectorhinchus chaetodonoides	GGGAGGAACGGCGCAGCTGGAGGGCGGCCCTAGATAAACAGCTGAGGAAG
Plectorhinchus macrolepis	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulopsis elongatus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulopsis leuciscus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Anisotremus interruptus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Anisotremus virginicus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Pomadasys branickii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Anisotremus dovii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulopsis axillaris	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulopsis nitidus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Orthopristis chalceus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTCGATAAACAGCTAAGGAAG
Anisotremus pacifici	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Xenichthys xanti	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Brachydeuterus auritus	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Pomadasys maculatus	GAGAGAAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Pomadasys argyreus	GAGAGAAACGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Pomadasys kaakan	GAGAGAAAAGGCGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulon plumierii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulon sciurus	GAGAGCAACGACGCAGCTGGAGGGCAGCCTTAGATAAACAGCTGAGGAAG
Haemulon steindachneri	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulon flaviguttatum	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAA
Haemulon scudderii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Haemulon aurolineatum	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Xenistius californiensis	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Plectorhinchus lessonii	GAGAGCAACGACGCAGCTGGAGGGCAGCCCTAGATAAACAGCTGAGGAAG
Diplodus bermudensis	GGGAGGAACGGCGCAGCTGGAGGGCAGCCCTCGACAAACAGCTGAGGAAG
Pagrus pagrus	GGGAGGAGCGGCGCAGCTGGAGGGCGGCCCTCGACAAACAGCTGCGGAAG

Diagramma pictum	AACATGAAGCTAAAGCCAGTAATGAGGATGAATGGGAACTATGCCCGCCG
Plectorhinchus vittatus	AAGATGAAGCTAAAGCCAGTAATGAGGATGAATGGGAACTATGCCCGCCG
Plectorhinchus chaetodonoides	AAGATGAAGCTAAAGCCAGTAATGAGGATGAATGGGAACTATGCCCGGCG
Plectorhinchus macrolepis	AAGATGAAGCTAAAGCCAGTAATGAGGATGAATGGGAACTATGCCCGCAG
Haemulopsis elongatus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulopsis leuciscus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Anisotremus interruptus	ACGATGAAGCTTAAGCCGGTAATGAGAATGAATGGGAACTATGCTCGCCG
Anisotremus virginicus	ACGATGAAGCTTAAGCCGGTAATGAGAATGAATGGGAACTATGCTCGCCG
Pomadasys branickii	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Anisotremus dovii	AAGATGAAGCTTAAACCGATAATGAGGATGAATGGTAACTATGCTCGCCG
Haemulopsis axillaris	AATATGAAGCTTAAGCCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulopsis nitidus	AATATGAAGCTTAAGCCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Orthopristis chalceus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGACG
Anisotremus pacifici	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Xenichthys xanti	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCACCG
Brachydeuterus auritus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTACGCTCGCCG
Pomadasys maculatus	AACATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTACGCTCGCCG
Pomadasys argyreus	AACATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTACGCTCGCCG
Pomadasys kaakan	AATATGAAGCTTAAACCGGTAATGAGGATGAATGGAAACTACGCTCGGCG
Haemulon plumierii	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon sciurus	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon steindachneri	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon flaviguttatum	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon scudderii	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Haemulon aurolineatum	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGCAACTATGCTCGCCG
Xenistius californiensis	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Plectorhinchus lessonii	AAGATGAAGCTTAAACCGGTAATGAGGATGAATGGGAACTATGCTCGCCG
Diplodus bermudensis	AAAATGAAGCTTAAACCGGTCATGAGGATGAATGGGAACTATGCCCGCAA

Pagrus pagrus AAAATGAAGCTTAAACCGGTCATGCGGATGAACGGGAACTACGCCCGCAA

Diagramma pictum GCTAATGACAATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTGCCCTCCG
Plectorhinchus vittatus GCTAATGACAATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTGCCCTCCG
Plectorhinchus chaetodonoides GCTAATGACAATGAAGGCTGTGGAGGCAGTGTGTGAGCTGGTGCCCTCCG
Plectorhinchus macrolepis GCTAATGACCATGGAGGCTGTGGAAGTGGTCTGTGATCTGGTGCCCTCTG
Haemulopsis elongatus GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Haemulopsis leuciscus GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Anisotremus interruptus GCTAATGACCATGGAGGCCATGGAGGTGGTGTGTGAGCTGGTACCCTCGG
Anisotremus virginicus GCTAATGACCATGGAAGCCGTGGAGGTGGTGTGTGAGCTGGTACCTTCGG
Pomadasys branickii GCTAATGACCATGGAGGCCATGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Anisotremus dovii GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGTTGGTACCCTCAG
Haemulopsis axillaris GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Haemulopsis nitidus GCTAATGACCATGGAGACCGAGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Orthopristis chalceus GCTAATGACCATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTACCCTCGG
Anisotremus pacifici GCTAATGACCATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Xenichthys xanti AATAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Brachydeuterus auritus GCTAATGACCATGGAGGCCATGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Pomadasys maculatus GCTAATGACCAAGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Pomadasys argyreus GCTAATGACCATGGAGGCTGTGGAGGTGGTGTGTGAGCTGGTGCCCTCAG
Pomadasys kaakan GCTAATGACCATGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTACCCTCAG
Haemulon plumierii GCTAATGACCCTGGAAGCCGTGGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon sciurus GATAATGACCCTGGAAGCCGTGGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon steindachneri ACTAATGACCCTGGAAGACATGGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon flaviguttatum GCTAATGACCCTGGAAGACATAGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon scudderii GCTAATGACCCTGGAAGCCATGGAGGTGGTGTGTGAACTGGTACCCTCAG
Haemulon aurolineatum GCTAATGACCCTGGAAGCCGTGGAGGTGGTGTGTGAACTGGTACCCTCAG
Xenistius californiensis GCTAATGACCCTGGAAACCGTGGAGGTGGTGTGTGAACTGGTACCCTCAG
Plectorhinchus lessonii ACTAATGACCCTGGAAGCCATGGAGGTGGTGTGTGAACTGGTACCCTCAG
Diplodus bermudensis GCTAATGACCGAGGAGGCCGTGGAAGTGGTGTGTGAGCTGGTGCCCTCAG
Pagrus pagrus GCTAATGACCGAGGAGGCCGTGGAGGTGGTGTGTGAGCTGGTGCCCTCGG

Diagramma pictum AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTATCTCCAGATG
Plectorhinchus vittatus AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Plectorhinchus chaetodonoides AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Plectorhinchus macrolepis AGGAGAGGAGAGAGGCCCTAAGGGAGCTTGTGAGGCTCTACCTCCAGATG
Haemulopsis elongatus AGGAGAGGAGGGAGGCCCTGAGAGAGCTTATGAGGCTCTACCTCCAGATG
Haemulopsis leuciscus AGGAGAGGAGGGAGGCCCTGAGAGAGCTTATGAGGCTCTACCTCCAGATG
Anisotremus interruptus AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Anisotremus virginicus AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGCGGCTCTACCTCCAGATG
Pomadasys branickii AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Anisotremus dovii AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulopsis axillaris AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulopsis nitidus AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Orthopristis chalceus AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATAAGGCTCTACCTCCAGATG
Anisotremus pacifici AGGAGAGGGGGGAGGCCCTAAGGGAGCTTATGAGGCTCTACCTCCAGATG
Xenichthys xanti AGGAGAGGAGGGAGGCCCTGAAGGAGCTTATGAGGCTCTACCTCCAGATG
Brachydeuterus auritus AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Pomadasys maculatus AGGAGAGGAGGGAGGCCCTGAGGGAGCTCATGAGGCTCTACCTCCAGATG
Pomadasys argyreus AGGAGAGGAAGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Pomadasys kaakan AGGAGAGGAAGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulon plumierii AGGAGAGGAGGGAGGCCCTGAGGGAGATTATGAGGCTCTACCTCCAGATG
Haemulon sciurus AGGAGAGGAGGGAGGCCCTGAGGGAGATTATGAGGCTCTACCTCCAGATG
Haemulon steindachneri AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulon flaviguttatum AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulon scudderii AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Haemulon aurolineatum AGGAGAGGAGGGAGGCCCTGAGGGAGATTATGAGCCTCTACCTCCAGATG
Xenistius californiensis AAGAGAGGAGGGAGGCCCTGAGGGAGCTTATCAGGCTCTACATCCAGATG
Plectorhinchus lessonii AGGAGAGGAGGGAGGCCCTGAGGGAGCTTATGAGGCTCTACCTCCAGATG
Diplodus bermudensis AGGAGAGGAGGGAGGCCCTGAGGGAGCTCATGAGGCTCTACCTCCAGATG
Pagrus pagrus AGGAGAGGAGGGAGGCCCTGAGGGAGCTCATGAGGCTCTACCTCCAGATG

Diagramma pictum AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Plectorhinchus vittatus AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Plectorhinchus chaetodonoides AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCCGACCAGCT
Plectorhinchus macrolepis AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGATCAGCT
Haemulopsis elongatus AAACCTGTGTGGCGCGCCACCTGTCCGTCCAAGGAGTGCCCAGACCAGTT
Haemulopsis leuciscus AAACCTGTGTGGCGCGCCACCTGTCCGTCCAAGGAGTGCCCAGACCAGTT
Anisotremus interruptus AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Anisotremus virginicus AAACCTGTGTGGCGCGCCACCTGTCCGGCCAAAGAGTGCCCTGACCAGCT
Pomadasys branickii AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT

Anisotremus dovii	AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCTGACCAGCT
Haemulopsis axillaris	AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Haemulopsis nitidus	AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Orthopristis chalceus	AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Anisotremus pacifici	AAGCCTGTGTGGCGTGCCACCTGTCCAGCCAAGGAGTGCCCTGACCAGCT
Xenichthys xanti	AAGCCTGTGTGGCGTGCCTCCTGTCCAGCCAAGGAGTGCCCTGACCAGCT
Brachydeuterus auritus	AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGTCCTGACCAGCT
Pomadasys maculatus	AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Pomadasys argyreus	AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Pomadasys kaakan	AAGCCTGTGTGGCGCGCCACCTGTCCGGCCAAGGAGTGCCCTGACCAGCT
Haemulon plumierii	AAGCCTGTGTGGCGCGCCTCCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Haemulon sciurus	AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Haemulon steindachneri	AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Haemulon flaviguttatum	AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Haemulon scudderii	AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCTGACCAGCT
Haemulon aurolineatum	AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Xenistius californiensis	AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAAGAGTGCCCCGACCAGCT
Plectorhinchus lessonii	AAGCCTGTGTGGCGCGCCACCTGTCCAGCCAAGGAGTGCCCCGACCAGCT
Diplodus bermudensis	AAGCCCGTGTGGCGAGCCAGCTGCCCAGCTAAAGAGTGCCCCGACCAGCT
Pagrus pagrus	AAGCCCGTGTGGCGAGCCAGCTGCCCGGCCAAGGAGTGCCCCGACCAGCT

Diagramma pictum	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Plectorhinchus vittatus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Plectorhinchus chaetodonoides	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Plectorhinchus macrolepis	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCTGACCTCCTCTCCTCTA
Haemulopsis elongatus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulopsis leuciscus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Anisotremus interruptus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Anisotremus virginicus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Pomadasys branickii	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Anisotremus dovii	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulopsis axillaris	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulopsis nitidus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Orthopristis chalceus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Anisotremus pacifici	GTGCCGCTACAGCTTTAATTCGCAGCGCTTTGCTGACCTCCTCTCCTCTA
Xenichthys xanti	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCAGACCTCCTCTCCTCTA
Brachydeuterus auritus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Pomadasys maculatus	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Pomadasys argyreus	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Pomadasys kaakan	GTGCCGCTACAGCTTTAACTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon plumierii	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon sciurus	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCGGACCTCCTCTCCTCTA
Haemulon steindachneri	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon flaviguttatum	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon scudderii	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Haemulon aurolineatum	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Xenistius californiensis	GTGCCGCTACAGCTTTAATTCCCAGCGCTTTGCCGACCTCCTCTCGTCTA
Plectorhinchus lessonii	GTGCCGCTACAGCTTCAATTCCCAGCGCTTTGCCGACCTCCTCTCCTCTA
Diplodus bermudensis	GTGCCGCTACAGCTTCAACTCCCAGCGCTTTGCTGACCTCCTCTCCTCCA
Pagrus pagrus	GTGCCGCTACAGCTTCAACTCCCAGCGGTTCGCCGACCTCCTCTCCTCCA

Diagramma pictum	CCTTCAAGTATAGGTACAACGGAAAGATAACCAATTACCTGCACAAGACC
Plectorhinchus vittatus	CCTTCAAATATAGGTACAACGGAAAGATAACCAATTACCTGCACAAGACC
Plectorhinchus chaetodonoides	CCTTCAAATATAGGTACAACGGAAAGATAACCAATTACCTGCACAAGACC
Plectorhinchus macrolepis	CCTTCAAATATAGATACAACGGAAAGATAACCAATTACCTGCACAAGACC
Haemulopsis elongatus	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulopsis leuciscus	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Anisotremus interruptus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Anisotremus virginicus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Pomadasys branickii	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Anisotremus dovii	CCTTTAAATATAGGTACAATGGGAAGATGACCAATTACCTGCACAAGACC
Haemulopsis axillaris	CATTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulopsis nitidus	CATTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Orthopristis chalceus	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Anisotremus pacifici	CCTTTAAATATAGGTACAACGGGAAGATAACCAATTACCTGCACAAGACC
Xenichthys xanti	CCTTTAAATATAGATACAATGGGAAGATAACCAATTATCTGCACAAGACC
Brachydeuterus auritus	CCTTTAAATATAGGTACAATGGAAAAATAACCAATTACCTGCACAAGACC
Pomadasys maculatus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAAACC
Pomadasys argyreus	CCTTTAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Pomadasys kaakan	CCTTCAAATATAGGTACAATGGAAAGATAACCAATTACCTGCACAAGACC
Haemulon plumierii	CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC

```
Haemulon sciurus                  CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulon steindachneri            CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulon flaviguttatum            CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulon scudderii                CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Haemulon aurolineatum             CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Xenistius californiensis          CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Plectorhinchus lessonii           CCTTTAAATATAGGTACAATGGGAAGATAACCAATTACCTGCACAAGACC
Diplodus bermudensis              CCTTCAAATATAGGTACAACGGAAAGATAACCAATTACCTGCACAAGACC
Pagrus pagrus                     CCTTCAAGTACAGGTACAACGGAAAGATAACCAACTACCTGCGCAAAACG

Diagramma pictum                  CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Plectorhinchus vittatus           CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Plectorhinchus chaetodonoides     CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Plectorhinchus macrolepis         CTGGCCCACGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Haemulopsis elongatus             CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Haemulopsis leuciscus             CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Anisotremus interruptus           CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGCTCCATAGGAGCCTG
Anisotremus virginicus            CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Pomadasys branickii               CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Anisotremus dovii                 CTGGCCCAAGTACCTGAAATCATCAAGAAAGATGGATCCATAGGAGCGTG
Haemulopsis axillaris             CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Haemulopsis nitidus               CTGGCCCAAGTACCTGAAATCATAGAGAGAGATGGATCCATAGGAGCGTG
Orthopristis chalceus             CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCGTG
Anisotremus pacifici              CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCATG
Xenichthys xanti                  CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCATG
Brachydeuterus auritus            TTGGCTCATGTACCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Pomadasys maculatus               CTGGCCCAAGTACCTGAAATCATAGAGAGAGATGGATGCATAGGAGCGTG
Pomadasys argyreus                CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Pomadasys kaakan                  CTGGCCCATGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Haemulon plumierii                CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon sciurus                  CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon steindachneri            CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon flaviguttatum            CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon scudderii                CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Haemulon aurolineatum             CTGGCCCACGTGCCTGAAATCATAGAGAGAGATGGATCCATAGGAGCCTG
Xenistius californiensis          CTGGCCCATGTGCCTGAAATCATAGAGAGAGACGGATCCATAGGAGCCTG
Plectorhinchus lessonii           CTGGCCCACGTGCCTGAAATAATAGAGAGAGACGGATCCATAGGAGCCTG
Diplodus bermudensis              CTGGCCCACGTCCCCGAAATCATAGAGAGAGACGGATCCATCGGAGCCTG
Pagrus pagrus                     CTGGCCCACGTCCCCGAAATCATAGAGAGAGACGGATCCATCGGCGCCTG

Diagramma pictum                  GGCCAGTGAGGGGAACGAGTCGGCAAACAAACTGTTCATCCGGGCAGAGT
Plectorhinchus vittatus           GGCCAGTGAGGGGAATGAGTCGGCAAACAAACTGTTTATCCGAGCAGAAT
Plectorhinchus chaetodonoides     GGCCAGTGAGGGGAACGAGTCGGCAAACAAACTGTTCATCCGGGCAGAAT
Plectorhinchus macrolepis         GGCCAGTGAGGGGAACGAGTCGGCAAACAAACTGTTTATCCGGGCTGAAC
Haemulopsis elongatus             GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTCATCCGAGCGGAAC
Haemulopsis leuciscus             GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTCATCCGAGCGGAAC
Anisotremus interruptus           GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTCATCCGAGCAGAAC
Anisotremus virginicus            GGCCAGCGAGGGGAATGAGTCAGCAAACAAACTGTTTATTCGAGCAGAGC
Pomadasys branickii               GGCCAGCGAGGGGAAGGAGTCAGCAAACAAACTCTTCATCCGGGCAGAGC
Anisotremus dovii                 GGCCATTGATGGGCAGGCATCAGCAAACGAACTGTTCATCCGAGCAGAGC
Haemulopsis axillaris             GGCCAGCGAGGGGAAGGAGTCAGCAAACAAACTGTTTATCCGAGCAGAAC
Haemulopsis nitidus               GACCATTGATGGGAAGGAATCAGCAAACGAAGTATTTATCCGAGCAGAAC
Orthopristis chalceus             GGCCAGCGAGGGAAACGAGTCAGCAAACAAACTGTTAATTCGAGCAGAAC
Anisotremus pacifici              GGCCAGTGAGGGAAACGAGTCAGCAAATAAACTGTTGATCCGAGCTGAAC
Xenichthys xanti                  GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTTATCCGAGCAGAGC
Brachydeuterus auritus            GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTTATCCGAGCAGAAC
Pomadasys maculatus               GGCCATTGATGGGAAGGAATCAGCAAACGAAGTCTTCATCCGAGCAGAAC
Pomadasys argyreus                GGCCTTCGATGGGAAGGAGTCAGCAAACAAACTGTTTATCCGAGCAGAAC
Pomadasys kaakan                  GGCCAGCGAGGGGAATGAGTCAGCAAACAAACTGTTTATCCGAGCCGAAC
Haemulon plumierii                GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTTATCCGGGCAGAAC
Haemulon sciurus                  GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTCATCCGGGCAGAAC
Haemulon steindachneri            GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTTATCCGGGCAGAAC
Haemulon flaviguttatum            GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTTATCCGGGCAGAAC
Haemulon scudderii                GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTAATCCGAGCAGAAC
Haemulon aurolineatum             GGCCAGTGAGGGGAACGAGTCAGCAAACAAACTATTTATCCGGGCAGAAC
Xenistius californiensis          GGCCAGCGAGGGGAACGAGTCAGCAAACAAACTGTTCATCCGGGCAGAAC
Plectorhinchus lessonii           GGCCAGCGAGGGGAACGAGGAGGCAAACAAAGTGTTTATCCGAGCAGAAT
Diplodus bermudensis              GGCCAGCGAGGGGAACGAGTCGGCAAACAAGCTGTTCATTCGAGCCGAAC
Pagrus pagrus                     GGCCAGCGAGGGGAATGAGTCGCCGAACAAACTATTTATTCGAGCTGAGC

Diagramma pictum                  TAAGCCAACCCGGCGCGCTCCTAGGAGACGACCAGATTTACAATGTTATC
```

Plectorhinchus vittatus	TAAGCCAACCCGGCGCTCTCCTGGGAGACGACCAGATTTATAATGTTATT
Plectorhinchus chaetodonoides	TAAGCCAACCCGGCGCTCTCCTAGGAGACGACCAGATTTACAATGTTATT
Plectorhinchus macrolepis	TAAGCCAACCTGGCGCTCTTTTAGGGGACGACCAGATCTACAATGTAATC
Haemulopsis elongatus	TCAGCCAACCGGGCGCTCTCCTCGGGGACGACCAAATTTACAATGTTATT
Haemulopsis leuciscus	TCAGCCAACCGGGCGCTCTCCTCGGGGACGACCAAATTTACAATGTTATT
Anisotremus interruptus	TCAGCCAACCGGGCGCCCTCCTCGGAGACGACCAGATTTATAATGTAATT
Anisotremus virginicus	TCAGTCAGCCGGGCGCCCTCCTCGGAGACGACCAGATTTATAATGTAATT
Pomadasys branickii	TTAGCCAACCGGGCGCTCTCCTAGGGGACGACCAGATTTATAATGTTATT
Anisotremus dovii	TCAGCCAACCAGGCGCCCTCCTTGGGGATGACCAAATTTACAATGTCATC
Haemulopsis axillaris	TTAGCCAGCCCGGCGCCCTCCTCGGGGACGATCAGATTTACAATGTAATC
Haemulopsis nitidus	TTAGCCAGCCCGGCGCCCTCCTCGGGGACGATCAGATTTACAATGTAATC
Orthopristis chalceus	TCAGCCAGCCTGGAGCTCTCCTCGGAGACGACCAAATTTACAATGTCATT
Anisotremus pacifici	TCAGTCAACCCGGCGCTCTCCTTGGGGACGATCAGATTTACAATGTGATC
Xenichthys xanti	TCAGCCAACCAGGCGCTCTCCTCGGAGACGACCAAATTTACAACGTAATC
Brachydeuterus auritus	TCAGCCAACCAGGCGCCCTCCTCGGGGATGACCAAATCTATAACGTAATC
Pomadasys maculatus	TCAGCCAACCGGGTGCACTCCTCGGGGACGACCAGATTTATAACGTAATC
Pomadasys argyreus	TTAGCCAGCCAGGCGCCCTCCTGGGAGATGACCAGATTTATAATGTAATC
Pomadasys kaakan	TCAGCCAACCGGGCGCTCTCCTCGGGGACGACCAAATTTATAATGTAATC
Haemulon plumierii	TAAGCCAGCCAGGCGCACTCCTCGGGGACGACCAGATCTATAACGTAATT
Haemulon sciurus	TGAGCCAACCAGGCGCACTCCTGGGAGACGACCAGATCTATAACGTAATT
Haemulon steindachneri	TAAGCCAACCGGGTGCACTCCTCGGGGACGATCAAATCTATAACGTAATT
Haemulon flaviguttatum	TAAGCCAACCAGGCGCACTCCTTGGGGACGACCAGATTTATAACGTAATT
Haemulon scudderii	TAAGCCAACCAGGCGCACTCCTAGGGGACGACCAAATTTATAACGTAATT
Haemulon aurolineatum	TGAGCCAACCAGGCGCACTCCTGGGAGACGACCAGATCTATAACGTAATT
Xenistius californiensis	TTAGCCAACCAGGCGCTCTCCTTGGAGACGACCAAATCTATAATGTCATT
Plectorhinchus lessonii	TAAGCCAACCCGGCGCTCTCCTGGGAGACGACCAGATTTATAATGTTATT
Diplodus bermudensis	TAAGCCAGCCTGGCGCCCTCCTTGGCGACGACCAGATTTATAATGTAATT
Pagrus pagrus	TTAGCCAGCCCGGGGCTCTCCTAGGCGACGACCAGATTTATAATGTTATT

Diagramma pictum	GTTACGGCGCATGCGTTCGTAATAATCTTCTTTATAGTTATACCCATCCT
Plectorhinchus vittatus	GTTACGGCACATGCATTCGTAATAATCTTTTTTATGGTTATACCTATCCT
Plectorhinchus chaetodonoides	GTTACGGCGCACGCGTTCGTAATAATCTTCTTTATGGTAATACCAATCCT
Plectorhinchus macrolepis	GTTACAGCCCACGCTTTCGTAATAATTTTCTTTATAGTGATGCCTATCAT
Haemulopsis elongatus	GTTACCGCCCACGCGTTCGTGATAATTTTCTTCATAGTCATACCAATCCT
Haemulopsis leuciscus	GTTACCGCCCACGCGTTCGTGATAATTTTCTTCATAGTCATACCAATCCT
Anisotremus interruptus	GTTACGGCACACGCGTTCGTAATAATTTTCTTTATAGTAATACCAATCCT
Anisotremus virginicus	GTTACCGCACATGCGTTCGTAATAATTTTCTTTATAGTAATACCAATTCT
Pomadasys branickii	GTTACTGCACATGCGTTTGTAATAATCTTCTTTATAGTAATACCAATTTT
Anisotremus dovii	GTTACCGCCCACGCATTCGTAATAATTTTTTTTATAGTAATACCGATCCT
Haemulopsis axillaris	GTAACCGCACACGCATTCGTAATAATCTTCTTTATAGTCATGCCAATTCT
Haemulopsis nitidus	GTAACCGCACACGCATTCGTAATAATCTTCTTTATAGTCATGCCAATTCT
Orthopristis chalceus	GTAACTGCACATGCATTTGTAATAATCTTTTTTATAGTTATGCCAATTTT
Anisotremus pacifici	GTTACCGCCCACGCATTTGTAATAATCTTCTTTATAGTTATACCCATTCT
Xenichthys xanti	GTTACGGCACATGCATTCGTAATAATCTTCTTTATAGTAATACCAATCCT
Brachydeuterus auritus	GTTACTGCACATGCATTCGTAATAATTTTCTTTATGGTTATACCAATTCT
Pomadasys maculatus	GTTACTGCACATGCCTTCGTAATAATTTTCTTTATAGTAATACCTATTCT
Pomadasys argyreus	GTCACTGCCCATGCTTTCGTAATAATTTTCTTCATAGTTATGCCTATCCT
Pomadasys kaakan	GTCACTGCACACGCCTTTGTAATAATTTTCTTTATAGTAATGCCTATTTT
Haemulon plumierii	GTTACTGCGCATGCGTTCGTAATAATTTTCTTTATAGTAATGCCAATCCT
Haemulon sciurus	GTTACTGCGCATGCATTCGTAATAATTTTCTTTATAGTAATGCCAATCCT
Haemulon steindachneri	GTTACTGCGCATGCGTTCGTGATAATTTTCTTTATAGTAATGCCAATTCT
Haemulon flaviguttatum	GTTACTGCGCATGCGTTCGTAATAATTTTCTTTATAGTAATGCCAATTCT
Haemulon scudderii	GTTACTGCGCATGCGTTCGTAATAATTTTCTTTATAGTAATGCCAATTCT
Haemulon aurolineatum	GTTACTGCGCATGCGTTCGTGATAATTTTCTTTATAGTAATGCCAATTCT
Xenistius californiensis	GTTACTGCGCATGCGTTCGTAATAATTTTCTTTATAGTAATGCCAATTCT
Plectorhinchus lessonii	GTTACGGCACATGCATTCGTAATAATCTTTTTTATGGTTATACCTATCCT
Diplodus bermudensis	GTTACAGCACATGCGTTTGTAATAATTTTCTTTATAGTAATACCAATCAT
Pagrus pagrus	GTTACAGCACACGCGTTTGTAATAATTTTCTTTATAGTTATACCAATTAT

Diagramma pictum	AATTGGAGGGTTCGGAAACTGACTAGTCCCGCTAATAATCGGAGCACCTG
Plectorhinchus vittatus	AATTGGAGGATTCGGAAACTGACTGGTCCCATTAATAATCGGGGCACCTG
Plectorhinchus chaetodonoides	GATCGGAGGGTTCGGAAACTGACTGGTCCCACTAATAATCGGAGCGCCTG
Plectorhinchus macrolepis	AATCGGGGGCTTCGGAAACTGACTAGTTCCCTTAATGATTGGGGCACCTG
Haemulopsis elongatus	AATCGGAGGGTTCGGGAACTGACTTGTCCCCCTAATGATTGGGGCCCCCG
Haemulopsis leuciscus	AATCGGAGGATTCGGGAACTGACTTGTCCCCCTAATGATTGGGGCCCCCG
Anisotremus interruptus	AATCGGAGGATTCGGAAACTGACTTGTTCCTCTAATGATCGGAGCCCCCG
Anisotremus virginicus	AATCGGAGGGTTCGGAAACTGACTTGTCCCCTTAATGATCGGAGCCCCCG
Pomadasys branickii	AATTGGTGGCTTCGGCAACTGACTTGTCCCCCTAATGATCGGGGCCCCCG
Anisotremus dovii	CATCGGAGGGTTTGGGAACTGACTTGTCCCCCTAATGATCGGAGCCCCCG
Haemulopsis axillaris	TATTGGCGGGTTTGGTAACTGACTAGTCCCACTAATGATTGGGGCCCCTG
Haemulopsis nitidus	TATTGGCGGGTTTGGTAACTGACTAGTCCCACTAATGATTGGGGCCCCTG

Orthopristis chalceus	AATTGGCGGATTTGGAAACTGACTTGTCCCCCTGATGATTGGGGCCCCTG
Anisotremus pacifici	CATCGGCGGCTTTGGCAACTGGCTTGTGCCCCTGATGATCGGGGCCCCTG
Xenichthys xanti	AATTGGAGGGTTTGGCAACTGACTTGTCCCCCTCATGATTGGTGCCCCCG
Brachydeuterus auritus	CATCGGGGGTTTCGGCAACTGACTTGTTCCCCTTATGATTGGGGCCCCTG
Pomadasys maculatus	AATTGGTGGTTTCGGAAACTGACTCGTGCCCCTAATGATTGGAGCGCCTG
Pomadasys argyreus	AATTGGGGGTTTTGGTAACTGACTGGTCCCCCTAATAATTGGGGCCCCCG
Pomadasys kaakan	AATCGGCGGCTTTGGAAACTGACTCGTGCCCCTAATGATCGGGGCCCCTG
Haemulon plumierii	CATTGGAGGATTTGGAAACTGACTCGTTCCCCTAATGATTGGGGCGCCCG
Haemulon sciurus	CATTGGAGGGTTTGGAAACTGACTCGTCCCCCTAATGATTGGGGCACCCG
Haemulon steindachneri	CATCGGAGGATTTGGAAACTGACTCGTTCCCCTAATGATCGGGGCGCCCG
Haemulon flaviguttatum	CATTGGAGGATTTGGAAACTGACTTGTTCCCCTAATGATCGGAGCGCCCG
Haemulon scudderii	CATTGGAGGATTCGGAAACTGACTCGTCCCCCTAATGATTGGAGCGCCCG
Haemulon aurolineatum	CATTGGAGGATTTGGAAACTGACTTGTCCCCCTAATGATCGGGGCGCCTG
Xenistius californiensis	CATTGGAGGGTTTGGAAACTGACTTATCCCCCTTATGATCGGGGCGCCCG
Plectorhinchus lessonii	AATTGGAGGATTCGGAAACTGACTGGTCCCATTAATAATCGGGGCACCTG
Diplodus bermudensis	GATTGGAGGCTTTGGAAACTGACTAATCCCACTTATGATCGGTGCCCCTG
Pagrus pagrus	GATTGGAGGCTTTGGGAACTGATTAATTCCACTTATGATTGGTGCCCCTG

Diagramma pictum	ACATGGCATTCCCCCGAATGAACAATATGAGTTTCTGACTTCTCCCTCCG
Plectorhinchus vittatus	ACATGGCATTCCCTCGAATGAACAATATGAGCTTCTGACTTCTCCCACCA
Plectorhinchus chaetodonoides	ACATGGCATTCCCCCGAATAAACAATATGAGCTTCTGACTTCTCCCACCA
Plectorhinchus macrolepis	ACATAGCATTCCCTCGAATAAACAACATGAGCTTCTGACTTCTACCCCCC
Haemulopsis elongatus	ACATGGCATTCCCACGGATAAACAACATGAGTTTCTGACTCCTTCCCCCT
Haemulopsis leuciscus	ACATGGCATTCCCACGGATAAACAACATGAGTTTCTGACTCCTTCCCCCT
Anisotremus interruptus	ACATGGCATTCCCCCGAATAAACAACATGAGCTTCTGGCTCCTCCCACCT
Anisotremus virginicus	ATATGGCATTCCCCCGAATAAACAATATGAGCTTCTGGCTCCTCCCACCT
Pomadasys branickii	ACATGGCATTCCCCCGGATAAACAACATGAGCTTCTGGCTCCTTCCTCCC
Anisotremus dovii	ACATAGCATTCCCTCGAATGAACAACATGAGTTTCTGGCTCCTTCCTCCC
Haemulopsis axillaris	ACATAGCATTCCCTCGGATAAATAATATGAGCTTCTGACTCCTCCCTCCC
Haemulopsis nitidus	ACATAGCATTCCCTCGGATAAATAATATGAGCTTCTGACTCCTCCCTCCC
Orthopristis chalceus	ACATAGCATTCCCACGAATGAACAACATGAGCTTCTGACTACTCCCTCCC
Anisotremus pacifici	ACATGGCTTTCCCTCGAATGAACAACATGAGCTTTTGGCTGCTCCCCCCT
Xenichthys xanti	ACATGGCATTCCCCCGAATAAATAACATGAGCTTTTGGCTGCTTCCGCCT
Brachydeuterus auritus	ACATAGCATTCCCTCGAATAAATAATATGAGCTTTTGACTTCTACCTCCT
Pomadasys maculatus	ATATGGCATTCCCTCGGATGAACAACATGAGTTTTTGACTACTTCCCCCC
Pomadasys argyreus	ACATGGCCTTCCCTCGAATAAATAATATAAGCTTCTGACTCCTTCCACCC
Pomadasys kaakan	ACATAGCATTCCCTCGGATGAACAACATGAGCTTCTGACTCCTCCCTCCC
Haemulon plumierii	ACATGGCATTCCCCCGAATGAATAACATGAGCTTTTGACTCCTCCCTCCT
Haemulon sciurus	ATATGGCATTCCCCCGAATGAATAACATGAGCTTTTGACTCCTCCCTCCC
Haemulon steindachneri	ATATGGCATTCCCGCGAATGAATAACATGAGCTTTTGACTCCTCCCTCCT
Haemulon flaviguttatum	ACATGGCATTCCCCCGAATGAACAATATGAGCTTTTGACTCCTCCCTCCT
Haemulon scudderii	ACATGGCATTCCCCCGGATGAATAACATGAGCTTTTGACTCCTCCCCCCT
Haemulon aurolineatum	ATATGGCATTCCCACGAATGAACAATATGAGCTTTTGACTCCTTCCTCCA
Xenistius californiensis	ATATGGCATTCCCCCGAATGAACAACATGAGCTTCTGACTCCTTCCCCCT
Plectorhinchus lessonii	ACATGGCATTCCCTCGAATGAACAATATGAGCTTCTGACTTCTCCCACCA
Diplodus bermudensis	ACATAGCATTCCCCCGAATAAATAACATGAGCTTCTGACTTCTGCCTCCC
Pagrus pagrus	ACATAGCATTCCCCCGAATGAACAACATGAGTTTCTGACTGCTCCCTCCC

Diagramma pictum	TCCTTCCTTCTCCTCCTTGCCTCCTCAGGCGTAGAAGCCGGGGCAGGGAC
Plectorhinchus vittatus	TCCTTCCTCCTCCTCCTTGCCTCCTCAGGCGTAGAAGCTGGAGCAGGGAC
Plectorhinchus chaetodonoides	TCCTTCCTTCTCCTCCTTGCCTCCTCAGGCGTAGAAGCCGGAGCAGGAAC
Plectorhinchus macrolepis	TCATTCCTTCTCCTCCTAGCCTCTTCAGGAGTTGAGGCGGGAGCTGGGAC
Haemulopsis elongatus	TCCTTCCTCCTCCTCCTCGCCTCTTCAGGGGTGGAGGCCGGTGCCGGTAC
Haemulopsis leuciscus	TCCTTCCTCCTCCTCCTCGCCTCTTCAGGGGTGGAGGCCGGTGCCGGTAC
Anisotremus interruptus	TCCTTCCTCCTCCTCCTTGCCTCCTCAGGCGTAGAAGCCGGAGCCGGTAC
Anisotremus virginicus	TCCTTCCTTCTCCTCCTTGCCTCCTCAGGCGTAGAAGCTGGGGCCGGCAC
Pomadasys branickii	TCTTTCCTTCTCCTCCTCGCCTCCTCGGGGGTAGAAGCCGGGGCTGGTAC
Anisotremus dovii	TCTTTCCTTCTCCTCCTCGCCTCTTCAGGGGTAGAAGCAGGGGCTGGTAC
Haemulopsis axillaris	TCCTTCCTCCTACTTCTGGCCTCTTCCGGGGTCGAAGCCGGCGCCGGCAC
Haemulopsis nitidus	TCCTTCCTCCTACTTCTGGCCTCTTCCGGGGTCGAAGCCGGCGCCGGCAC
Orthopristis chalceus	TCCTTCCTCCTCCTCCTGGCCTCTTCAGGTGTCGAAGCCGGAGCTGGTAC
Anisotremus pacifici	TCTTTCCTCCTTCTTCTTGCCTCTTCAGGGGTCGAAGCAGGAGCTGGGAC
Xenichthys xanti	TCTTTCCTCCTGCTCCTCGCCTCTTCGGGCGTTGAAGCCGGGGCAGGAAC
Brachydeuterus auritus	TCATTCCTCCTACTTCTTGCCTCATCAGGCGTAGAAGCAGGGGCTGGCAC
Pomadasys maculatus	TCTTTCCTCCTTCTACTTGCCTCTTCAGGGGTTGAGGCTGGGGCCGGAAC
Pomadasys argyreus	TCTTTCCTTCTTCTCCTTGCCTCATCAGGTGTTGAAGCTGGGGCAGGGAC
Pomadasys kaakan	TCTTTCCTTCTCCTCCTTGCCTCCTCAGGGGTCGAGGCCGGGGCTGGAAC
Haemulon plumierii	TCTTTCCTTCTCCTTCTCGCTTCTTCAGGTGTAGAAGCTGGGGCCGGAAC
Haemulon sciurus	TCTTTCCTTCTCCTTCTCGCCTCTTCAGGCGTAGAGGCTGGGGCCGGGAC
Haemulon steindachneri	TCTTTCCTCCTCCTTCTCGCTTCTTCAGGGGTAGAGGCTGGAGCTGGAAC
Haemulon flaviguttatum	TCTTTCCTTCTCCTTCTCGCCTCTTCAGGGGTAGAGGCTGGGGCTGGAAC

```
Haemulon scudderii              TCTTTCCTTCTCCTTCTCGCCTCTTCAGGAGTAGAGGCCGGGGCTGGGAC
Haemulon aurolineatum           TCTTTCCTTCTCCTTCTTGCCTCTTCAGGCGTAGAAGCTGGGGCTGGGAC
Xenistius californiensis        TCTTTCCTTCTCCTTCTCGCCTCCTCAGGAGTAGAGGCCGGGGCCGGAAC
Plectorhinchus lessonii         TCCTTCCTCCTCCTCCTTGCCTCCTCAGGCGTAGAAGCTGGAGCAGGGAC
Diplodus bermudensis            TCATTCCTCCTCCTGCTAGCCTCGTCCGGAGTTGAGGCTGGGGCCGGTAC
Pagrus pagrus                   TCATTCCTTCTCCTACTTGCCTCCTCAGGAGTTGAAGCCGGAGCTGGCAC

Diagramma pictum                TGGTTGAACAGTCTACCCCCCGTTGGCCGGAAATTTAGCGCACGCAGGTG
Plectorhinchus vittatus         TGGTTGAACAGTCTACCCCCCACTAGCCGGCAATTTAGCGCACGCAGGAG
Plectorhinchus chaetodonoides   TGGTTGAACAGTTTACCCCCCATTGGCCGGTAATCTGGCGCACGCAGGTG
Plectorhinchus macrolepis       AGGATGAACTGTATATCCACCACTGGCTGGCAACCTAGCCCACGCTGGGG
Haemulopsis elongatus           TGGGTGGACAGTCTACCCGCCCCTGGCCGGGAACCTCGCCCATGCAGGAG
Haemulopsis leuciscus           TGGGTGGACAGTCTACCCGCCCCTGGCCGGAAACCTCGCCCATGCAGGAG
Anisotremus interruptus         CGGGTGGACAGTCTACCCTCCCTTAGCCGGGAACCTAGCTCACGCCGGAG
Anisotremus virginicus          CGGATGAACAGTTTACCCTCCCTTAGCCGGAAATCTAGCGCATGCCGGGG
Pomadasys branickii             GGGGTGGACAGTTTACCCTCCTTTAGCCGGAAACCTAGCCCACGCGGGGG
Anisotremus dovii               CGGATGGACAGTCTATCCCCCTCTAGCTGGGAACCTAGCTCATGCCGGGG
Haemulopsis axillaris           AGGATGAACAGTGTACCCTCCTTTGGCTGGAAACTTAGCCCACGCGGGAG
Haemulopsis nitidus             AGGATGAACAGTGTACCCTCCTTTGGCTGGAAACTTAGCCCACGCGGGAG
Orthopristis chalceus           AGGGTGGACAGTTTACCCCCCTCTGGCCGGAAACTTGGCCCATGCGGGAG
Anisotremus pacifici            AGGGTGGACCGTATACCCGCCTTTGGCCGGAAACCTGGCACACGCCGGAG
Xenichthys xanti                CGGATGAACAGTTTACCCTCCTCTGGCGGGGAACCTGGCCCACGCAGGTG
Brachydeuterus auritus          CGGATGAACCGTGTACCCCCCTCTTGCCGGCAATCTAGCCCATGCAGGGG
Pomadasys maculatus             CGGATGAACAGTTTACCCACCTTTAGCCGGCAACCTCGCCCACGCAGGAG
Pomadasys argyreus              CGGATGAACAGTCTACCCCCCTCTAGCTGGAAACCTAGCCCACGCAGGGG
Pomadasys kaakan                TGGGTGGACAGTATACCCCCCTCTGGCCGGAAACCTGGCTCACGCAGGAG
Haemulon plumierii              TGGGTGGACTGTTTACCCCCCTCTAGCCGGAAATCTAGCACATGCTGGGG
Haemulon sciurus                GGGGTGAACTGTTTACCCCCCTCTAGCGGGTAACCTAGCACACGCTGGGG
Haemulon steindachneri          GGGGTGAACTGTCTACCCCCCTCTGGCCGGAAATCTGGCACACGCCGGGG
Haemulon flaviguttatum          GGGGTGAACTGTCTACCCCCCTCTAGCTGGGAATCTAGCACATGCCGGGG
Haemulon scudderii              TGGGTGAACTGTCTACCCTCCCTTAGCTGGTAACCTAGCGCACGCCGGAG
Haemulon aurolineatum           TGGATGAACTGTTTATCCCCCTCTAGCTGGGAATCTGGCACACGCCGGGG
Xenistius californiensis        TGGGTGAACTGTTTACCCCCCTTTAGCCGGGAATCTGGCACACGCCGGGG
Plectorhinchus lessonii         TGGTTGAACAGTCTACCCCCCACTAGCCGGCAATTTAGCGCACGCAGGAG
Diplodus bermudensis            TGGATGAACTGTTTACCCGCCCCTGGCAGGTAACCTCGCTCACGCAGGTG
Pagrus pagrus                   CGGATGAACGGTTTATCCGCCACTAGCTGGGAATCTTGCCCACGCAGGAG

Diagramma pictum                CATCTGTAGACCTCACGATCTTCTCCCTACATCTGGCCGGTATCTCATCA
Plectorhinchus vittatus         CATCTGTTGACCTAACAATCTTCTCTCTTCATCTGGCCGGTATCTCCTCA
Plectorhinchus chaetodonoides   CATCTGTTGACCTAACAATCTTTTCCCTTCATCTGGCCGGTATCTCCTCA
Plectorhinchus macrolepis       CATCTGTTGACCTCACCATCTTCTCCCTACACCTAGCAGGTGTTTCTTCA
Haemulopsis elongatus           CATCTGTCGACCTGACCATCTTCTCCCTCCACTTAGCTGGTGTCTCCTCA
Haemulopsis leuciscus           CATCTGTCGACCTGACCATCTTCTCCCTCCACTTAGCTGGCGTCTCCTCA
Anisotremus interruptus         CATCTGTCGATCTAACAATTTTCTCCCTTCACCTAGCAGGTGTTTCCTCA
Anisotremus virginicus          CATCCGTTGACCTAACAATTTTCTCCCTCCACTTAGCAGGTGTTTCCTCA
Pomadasys branickii             CATCCGTTGACCTAACAATTTTCTCCCTTCACTTGGCAGGTGTGTCCTCA
Anisotremus dovii               CATCCGTCGACTTGACAATTTTCTCCCTCCACCTAGCAGGGGTCTCTTCT
Haemulopsis axillaris           CATCTGTTGACCTGACAATCTTTTCACTTCACCTAGCAGGGGTATCATCT
Haemulopsis nitidus             CATCTGTTGACCTGACAATCTTTTCACTTCACCTAGCAGGGGTATCATCT
Orthopristis chalceus           CATCCGTCGATCTAACAATTTTCTCTCTTCACCTAGCAGGTGTCTCCTCA
Anisotremus pacifici            CTTCCGTTGACTTAACCATCTTCTCCCTTCATCTTGCAGGTGTATCTTCA
Xenichthys xanti                CATCAGTGGACCTAACAATCTTTTCTCTCCACTTAGCAGGGGTCTCCTCA
Brachydeuterus auritus          CCTCGGTAGACCTGACCATCTTTTCTCTGCATCTAGCAGGTGTTTCCTCA
Pomadasys maculatus             CATCAGTTGACCTAACCATTTTCTCCCTTCACTTGGCGGGTGTTTCCTCA
Pomadasys argyreus              CATCAGTCGACCTGACAATTTTCTCACTTCACCTCGCAGGTGTTTCCTCA
Pomadasys kaakan                CTTCCGTCGATCTAACAATCTTCTCCCTTCACCTGGCAGGTGTCTCCTCA
Haemulon plumierii              CATCAGTTGACCTTACAATTTTCTCCCTTCACTTAGCAGGTGTCTCATCA
Haemulon sciurus                CATCAGTTGACCTTACAATCTTTTCCCTTCACTTAGCAGGTGTCTCGTCA
Haemulon steindachneri          CATCGGTTGATCTTACAATCTTCTCCCTTCACTTAGCAGGTGTCTCATCA
Haemulon flaviguttatum          CGTCGGTTGACCTTACAATCTTCTCCCTCCACTTAGCAGGTGTCTCATCG
Haemulon scudderii              CATCAGTTGATCTTACAATTTTCTCCCTCCACCTAGCAGGGGTCTCATCC
Haemulon aurolineatum           CATCAGTTGATCTTACAATCTTCTCCCTCCACCTAGCAGGTGTTTCATCA
Xenistius californiensis        CATCAGTTGACCTCACAATTTTCTCTCTCCACCTAGCAGGTGTCTCATCA
Plectorhinchus lessonii         CATCTGTTGACCTAACAATCTTCTCTCTTCATCTGGCCGGTATCTCCTCA
Diplodus bermudensis            CATCAGTTGACTTAACTATCTTTTCTCTTCACCTGGCCGGAATTTCATCT
Pagrus pagrus                   CATCAGTAGACCTAACCATCTTTTCTCTCCACCTAGCTGGAATCTCATCA

Diagramma pictum                ATTCTCGGGGCGATTAATTTTATTACAACAATCATTAACATGAAACCCCC
Plectorhinchus vittatus         ATTCTCGGGGCAATTAATTTCATTACAACAATCATCAACATGAAACCCCC
Plectorhinchus chaetodonoides   ATTCTTGGAGCAATCAATTTTATTACAACAATTATTAACATGAAGCCCCC
Plectorhinchus macrolepis       ATTTTAGGGGCTATTAACTTTATTACAACCATTCTTAACATGAAACCTCC
```

Haemulopsis elongatus	ATTCTTGGCGCAATTAACTTCATCACAACAATTATCAACATGAAACCCCC
Haemulopsis leuciscus	ATTCTTGGCGCAATTAACTTCATCACAACAATTATCAACATGAAACCCCC
Anisotremus interruptus	ATTCTTGGAGCAATTAACTTCATCACAACAATTATTAACATGAAACCCCC
Anisotremus virginicus	ATTCTTGGAGCAATTAACTTCATCACAACAATTATCAATATGAAACCTCC
Pomadasys branickii	ATTCTTGGGGCAATTAACTTCATCACCACAATTATTAACATGAAACCTCC
Anisotremus dovii	ATCCTTGGAGCCATTAATTTTATTACAACAATTATTAACATGAAACCCCC
Haemulopsis axillaris	ATTCTAGGGGCAATTAATTTTATCACAACCATCATCAACATGAAGCCCCC
Haemulopsis nitidus	ATTCTAGGGGCAATTAATTTTATCACAACCATCATCAACATGAAGCCCCC
Orthopristis chalceus	ATTCTTGGAGCAATCAATTTCATTACAACAATTATTAATATGAAGCCTCC
Anisotremus pacifici	ATTCTTGGGGCCATTAACTTCATTACAACCATCATTAACATGAAGCCCCC
Xenichthys xanti	ATTTTAGGGGCCATTAACTTCATTACAACAATTATTAACATGAAGCCCCC
Brachydeuterus auritus	ATTCTTGGGGCAATTAACTTTATTACTACAATTATTAACATGAAGCCCCC
Pomadasys maculatus	ATCCTCGGGGCAATTAACTTCATTACAACAATTATCAACATAAAACCCCC
Pomadasys argyreus	ATCCTTGGAGCTATTAACTTTATCACAACAATTATTAACATAAAACCCCC
Pomadasys kaakan	ATCCTCGGAGCAATTAACTTCATCACAACAATTATTAACATGAAACCTCC
Haemulon plumierii	ATCCTCGGGGCTATTAACTTCATCACAACAATTATTAACATGAAACCTCC
Haemulon sciurus	ATCCTCGGGGCCATCAACTTCATCACAACAATTATTAATATGAAGCCTCC
Haemulon steindachneri	ATCCTTGGGGCTATCAACTTCATTACAACAATCATTAACATGAAACCTCC
Haemulon flaviguttatum	ATCCTTGGAGCCATCAACTTCATTACAACAATTATTAACATGAAACCTCC
Haemulon scudderii	ATCCTCGGGGCCATTAACTTCATCACAACGATTATTAACATGAAACCTCC
Haemulon aurolineatum	ATCCTTGGGGCCATCAACTTCATTACAACAATCATTAATATGAAGCCCCC
Xenistius californiensis	ATCCTCGGGGCGATTAACTTCATCACGACGATTATTAACATGAAACCTCC
Plectorhinchus lessonii	ATTCTCGGGGCAATTAATTTCATTACAACAATCATCAACATGAAACCCCC
Diplodus bermudensis	ATTCTTGGTGCCATTAATTTCATTACCACAATTATTAATATGAAACCTCC
Pagrus pagrus	ATTCTTGGTGCAATCAATTTTATTACTACCATTATCAACATGAAACCCCC
Diagramma pictum	TGCAATTTCACAATATCAGACCCCTCTGTTTGTCTGATCAGTACTAGTAA
Plectorhinchus vittatus	TGCAATCTCACAATACCAAACCCCTCTGTTTGTCTGATCAGTACTAGTAA
Plectorhinchus chaetodonoides	TGCAATTTCACAATATCAAACCCCCCTATTCGTCTGATCAGTCCTAGTGA
Plectorhinchus macrolepis	TGCTATCTCGCAGTATCAGACACCTCTCTTTGTTTGGGCCGTTCTAATTA
Haemulopsis elongatus	CGCTATCTCACAATATCAAACTCCTCTATTTGTGTGATCCGTTCTCGTGA
Haemulopsis leuciscus	CGCTATCTCACAATATCAAACTCCTCTATTTGTGTGATCCGTTCTCGTGA
Anisotremus interruptus	TGCCATTTCCCAGTACCAAACCCCACTATTTGTATGATCAGTCCTGGTTA
Anisotremus virginicus	TGCCATCTCCCAGTATCAAACCCCCCTATTTGTGTGGTCCGTTCTGGTTA
Pomadasys branickii	CGCAATCTCCCAATACCAAACCCCCCTATTTGTGTGGTCCGTTCTGGTAA
Anisotremus dovii	TGCTATTTCCCAATACCAGACCCCCTTGTTCGTGTGGTCCGTCCTGGTAA
Haemulopsis axillaris	AGCCATCTCTCAGTACCAGACCCCTCTGTTTGTATGATCCGTTTTAATTA
Haemulopsis nitidus	AGCCATCTCTCAGTACCAGACCCCTCTGTTTGTATGATCCGTTTTAATTA
Orthopristis chalceus	TGCCATTTCCCAATATCAGACTCCCCTGTTTGTATGATCTGTTTTAGTAA
Anisotremus pacifici	TGCCATCTCCCAGTACCAAACTCCCCTATTTGTTTGATCCGTCCTAGTAA
Xenichthys xanti	CGCTATTTCCCAGTACCAGACCCCCTTATTCGTGTGGTCTGTTCTAGTAA
Brachydeuterus auritus	AGCTACCTCCCAGTACCAGACCCCTCTATTTGTTTGATCAGTACTAGTCA
Pomadasys maculatus	TGCAATCTCCCAATACCAGACCCCTCTTTTCGTCTGATCTGTACTAGTAA
Pomadasys argyreus	TGCTATCTCTCAATACCAAACCCCTCTATTCGTTTGATCCGTCCTAGTGA
Pomadasys kaakan	CGCTATTTCCCAATATCAGACCCCCCTATTCGTCTGATCAGTCTTAGTAA
Haemulon plumierii	CGCTATCTCCCAGTATCAAACCCCCCTATTCGTATGGTCAGTCCTCGTTA
Haemulon sciurus	CGCTATCTCACAATATCAAACCCCCCTGTTCGTATGGTCAGTCCTCGTTA
Haemulon steindachneri	TGCCATCTCGCAGTACCAAACTCCGCTATTCGTATGATCAGTCCTCGTCA
Haemulon flaviguttatum	TGCCATCTCGCAGTACCAAACTCCCCTATTCGTATGATCAGTTCTCGTTA
Haemulon scudderii	CGCTATCTCGCAGTACCAAACTCCCCTGTTCGTATGATCGGTCCTCGTAA
Haemulon aurolineatum	CGCTATCTCGCAGTACCAAACCCCATTATTTGTATGATCAGTCCTCGTCA
Xenistius californiensis	CGCCATCTCCCAATACCAAACCCCTCTGTTCGTATGATCAGTTCTCGTCA
Plectorhinchus lessonii	TGCAATCTCACAATACCAAACCCCTCTGTTTGTCTGATCAGTACTAGTAA
Diplodus bermudensis	AGCTATTTCACAATATCAGACGCCATTATTTGTATGAGCCGTCTTAATTA
Pagrus pagrus	TGCTATTTCCCAGTATCAGACCCCACTGTTCGTCTGAGCTGTTCTTATTA
Diagramma pictum	CCGCTGTTCTCCTACTCCTTTCCCTTCCGGTCCTTGCTGCTGGGATTACT
Plectorhinchus vittatus	CTGCTGTCCTCCTTCTCCTTTCCCTCCCAGTCCTTGCTGCTGGAATTACA
Plectorhinchus chaetodonoides	CCGCTGTCCTTCTGCTCCTCTCCCTCCCAGTCCTTGCTGCCGGAATTACA
Plectorhinchus macrolepis	CTGCCGTTCTCCTTCTCTTATCTCTCCCAGTTCTAGCCGCTGGCATCACT
Haemulopsis elongatus	CTGCTGTCCTTCTTCTACTCTCCCTTCCAGTCCTCGCTGCTGGCATCACA
Haemulopsis leuciscus	CTGCTGTCCTTCTTCTACTCTCCCTTCCAGTCCTCGCTGCTGGCATCACA
Anisotremus interruptus	CGGCCGTTCTTCTCCTACTTTCCCTTCCGGTTCTTGCAGCCGGCATTACA
Anisotremus virginicus	CGGCCGTTCTTCTTCTGCTTTCCCTTCCAGTCCTTGCGGCTGGTATTACA
Pomadasys branickii	CTGCTGTCCTTCTTTTACTCTCCCTTCCAGTCCTCGCTGCCGGTATTACA
Anisotremus dovii	CTGCCGTCCTTCTCCTTCTCTCCCTTCCCGTTCTCGCCGCCGGTATTACA
Haemulopsis axillaris	CCGCCGTCCTGCTACTGCTCTCTCTTCCAGTCCTTGCGGCCGGCATCACC
Haemulopsis nitidus	CCGCCGTCCTGCTACTGCTCTCTCTTCCAGTCCTTGCGGCCGGCATCACC
Orthopristis chalceus	CCGCCGTCCTACTCCTTCTCTCTCTGCCCGTCCTTGCCGCCGGTATTACA
Anisotremus pacifici	CGGCCGTTCTTCTGCTGCTTTCCCTCCCAGTCCTTGCAGCCGGCATCACA
Xenichthys xanti	CCGCAGTGCTCCTCCTTCTCTCGCTCCCAGTCCTTGCCGCTGGCATCACT

Brachydeuterus auritus	CTGCAGTCCTGCTCCTTCTCTCTCTCCCAGTACTTGCCGCCGGCATTACG
Pomadasys maculatus	CTGCCGTCTTACTACTTCTTTCCCTCCCAGTCCTAGCCGCTGGCATTACA
Pomadasys argyreus	CCGCCGTCCTCCTCCTGCTTTCCCTCCCAGTTCTGGCCGCGGGCATTACA
Pomadasys kaakan	CCGCCGTTCTCCTCCTACTATCCCTCCCAGTTCTTGCCGCCGGCATTACA
Haemulon plumierii	CTGCTGTGCTCCTTCTTCTCTCCCTTCCAGTACTCGCGGCAGGCATTACG
Haemulon sciurus	CTGCCGTACTTCTTCTTCTCTCCCTCCCAGTGCTCGCGGCTGGTATTACG
Haemulon steindachneri	CTGCCGTCCTTCTTCTCCTGTCCCTCCCAGTACTCGCGGCTGGTATCACA
Haemulon flaviguttatum	CTGCCGTCCTTCTTCTCCTGTCTCTCCCAGTACTCGCAGCTGGCATTACA
Haemulon scudderii	CTGCCGTACTCCTCCTTCTGTCCCTCCCAGTACTCGCAGCTGGCATTACG
Haemulon aurolineatum	CTGCCGTACTCCTTCTTCTGTCCCTCCCAGTCCTTGCGGCTGGCATCACA
Xenistius californiensis	CTGCCGTCCTTCTTCTTCTATCCCTCCCAGTACTCGCAGCTGGCATCACA
Plectorhinchus lessonii	CTGCTGTCCTCCTTCTCCTTTCCCTCCCAGTCCTTGCTGCTGGAATTACA
Diplodus bermudensis	CCGCCGTACTTCTTCTCTTATCTCTCCCAGTTCTTGCTGCCGGAATTACA
Pagrus pagrus	CCGCTGTTCTTCTCCTTCTGTCCCTGCCAGTCCTTGCCGCAGGAATTACA
Diagramma pictum	ATGCTCCTCACAGATCGAAACCTCAACACCACTTTCTTTGATCCTGCGGG
Plectorhinchus vittatus	ATGCTCCTCACGGATCGAAACCTCAACACTACTTTCTTTGACCCAGCAGG
Plectorhinchus chaetodonoides	ATGCTCCTCACAGATCGAAACCTTAACACTACCTTCTTTGATCCTGCAGG
Plectorhinchus macrolepis	ATGCTCCTAACAGACCGAAATTTAAATACTTCCTTCTTTGACCCTGCAGG
Haemulopsis elongatus	ATGCTCCTCACAGACCGAAACCTCAACACCACCTTCTTTGACCCCGCTGG
Haemulopsis leuciscus	ATGCTCCTCACAGACCGAAACCTCAACACCACCTTCTTTGACCCCGCTGG
Anisotremus interruptus	ATGCTTCTCACGGACCGAAATCTAAATACCACTTTCTTCGACCCTGCCGG
Anisotremus virginicus	ATGCTTCTCACAGACCGAAATCTGAATACCACCTTCTTCGACCCCGCTGG
Pomadasys branickii	ATGCTCCTCACAGACCGGAATTTAAACACCACCTTCTTTGACCCTGCCGG
Anisotremus dovii	ATGCTTCTTACAGACCGAAATCTTAATACCACTTTCTTTGACCCCGCCGG
Haemulopsis axillaris	ATGCTCCTCACCGATCGTAACCTAAATACTACCTTCTTTGACCCAGCAGG
Haemulopsis nitidus	ATGCTCCTCACCGATCGTAACCTAAATACTACCTTCTTTGACCCAGCAGG
Orthopristis chalceus	ATGCTCCTCACAGACCGAAACCTTAACACCACCTTCTTTGACCCCGCTGG
Anisotremus pacifici	ATGCTTCTTACGGACCGCAACCTGAATACTACCTTCTTTGATCCCGCTGG
Xenichthys xanti	ATGCTTCTGACGGACCGAAACCTGAACACCACCTTCTTTGACCCTGCCGG
Brachydeuterus auritus	ATGCTCCTTACAGACCGAAATCTCAACACCACTTTCTTTGACCCTGCTGG
Pomadasys maculatus	ATGCTTCTGACAGACCGAAACCTAAATACTACCTTCTTTGACCCCGCCGG
Pomadasys argyreus	ATACTGCTTACCGACCGTAATTTAAATACCACCTTCTTCGACCCTGCCGG
Pomadasys kaakan	ATGCTTCTTACAGATCGAAACCTAAATACCACCTTCTTCGACCCCGCTGG
Haemulon plumierii	ATGCTCCTTACAGACCGAAACCTAAACACCACCTTCTTTGACCCCGCCGG
Haemulon sciurus	ATGCTTCTCACAGACCGAAACCTAAATACCACTTTCTTTGACCCCGCCGG
Haemulon steindachneri	ATGCTCCTCACAGACCGAAACCTGAACACCACTTTCTTCGACCCCGCCGG
Haemulon flaviguttatum	ATGCTCCTTACAGACCGAAACCTAAATACCACTTTCTTCGACCCCGCCGG
Haemulon scudderii	ATGCTGCTTACGGACCGAAACCTAAACACCACTTTCTTCGACCCCGCCGG
Haemulon aurolineatum	ATGCTCCTCACAGACCGAAACCTAAACACCACATTCTTCGACCCGGCCGG
Xenistius californiensis	ATGCTCCTAACAGACCGAAATCTAAACACCACTTTCTTCGACCCCGCCGG
Plectorhinchus lessonii	ATGCTCCTCACGGATCGAAACCTCAACACTACTTTCTTTGACCCAGCAGG
Diplodus bermudensis	ATGCTCCTAACAGATCGAAACCTAAACACCACTTTCTTCGACCCTGCAGG
Pagrus pagrus	ATGCTCCTCACAGACCGTAATCTAAACACTACTTTCTTCGACCCGGCAGG
Diagramma pictum	GGGAGGAGACCCAATTCTTTA
Plectorhinchus vittatus	GGGAGGGGATCCAATTCTCTA
Plectorhinchus chaetodonoides	AGGAGGAGACCCAATTCTCTA
Plectorhinchus macrolepis	AGGAGGGGACCCAATTCTGTA
Haemulopsis elongatus	AGGAGGAGACCCTATCCTGTA
Haemulopsis leuciscus	AGGAGGAGACCCTATCCTGTA
Anisotremus interruptus	AGGAGGTGATCCCATTCTCTA
Anisotremus virginicus	AGGAGGGGACCCCATCCTCTA
Pomadasys branickii	AGGAGGGGATCCCATTCTCTA
Anisotremus dovii	AGGAGGCGACCCCATCCTCTA
Haemulopsis axillaris	AGGGGGTGACCCAATTCTGTA
Haemulopsis nitidus	AGGGGGTGACCCGATTCTGTA
Orthopristis chalceus	AGGAGGTGACCCCATTCTTTA
Anisotremus pacifici	AGGAGGAGACCCTATTCTATA
Xenichthys xanti	AGGAGGGGACCCGATCCTCTA
Brachydeuterus auritus	AGGAGGTGACCCGATTCTTTA
Pomadasys maculatus	AGGAGGAGACCCAATCCTGTA
Pomadasys argyreus	AGGGGGCGACCCAATCCTATA
Pomadasys kaakan	AGGGGGTGACCCAATCCTGTA
Haemulon plumierii	AGGGGGTGACCCTATTCTTTA
Haemulon sciurus	AGGGGGCGACCCTATTCTTTA
Haemulon steindachneri	AGGAGGCGACCCCATTCTTTA
Haemulon flaviguttatum	AGGAGGTGACCCTATTCTTTA
Haemulon scudderii	AGGAGGTGATCCCATTCTTTA
Haemulon aurolineatum	AGGAGGTGACCCCATTCTTTA
Xenistius californiensis	AGGAGGTGACCCCATTCTCTA

Plectorhinchus lessonii	GGGAGGGGATCCAATTCTCTA
Diplodus bermudensis	GGGAGGAGACCCGATTCTTTA
Pagrus pagrus	AGGAGGGGACCCAATTCTCTA