**SUPPLEMENTARY MATERIAL**

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# Angels in disguise: Sympatric hybridization in the marine angelfishes is widespread and occurs between deeply divergent lineages

Yi-Kai Tea, Jean-Paul A. Hobbs, Federico Vitelli, Joseph D. DiBattista, Simon Y.W. Ho, and Nathan Lo

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Photographs by H. Senou, Y.K. Tea, and J.T. William

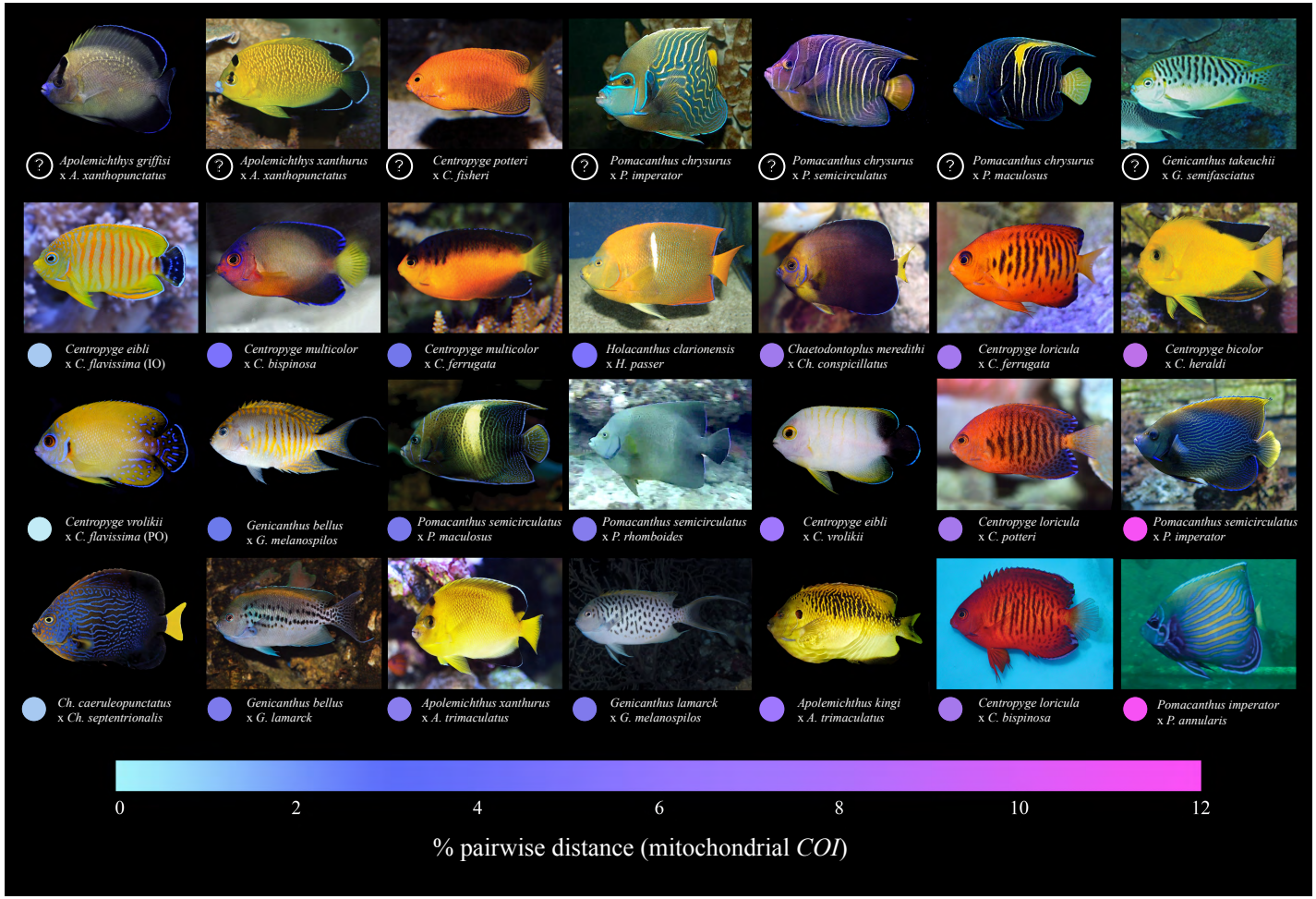


**Figure S1.** Photographic representation of a subset of putative hybrids for species of marine angelfishes in the family Pomacanthidae, inferred by intermediate colouration pattern. Only hybrids of discernible parentage are presented. Colour notation corresponds to mean percentage pairwise genetic distance between parents of the putative hybrids, inferred using mitochondrial *COI*. Parents that are lacking sequences for comparative analyses are labelled with a question mark. For a detailed list of putative hybrids with specific distance values, see Table 1. Photos by J. Coppolino, C. Delbeek, S. Kobayashi, K. Kohen, R. Lanceley, Z. Lin, J. Ma, W.P. Su, P. Supanantananont, and Y.K. Tea.

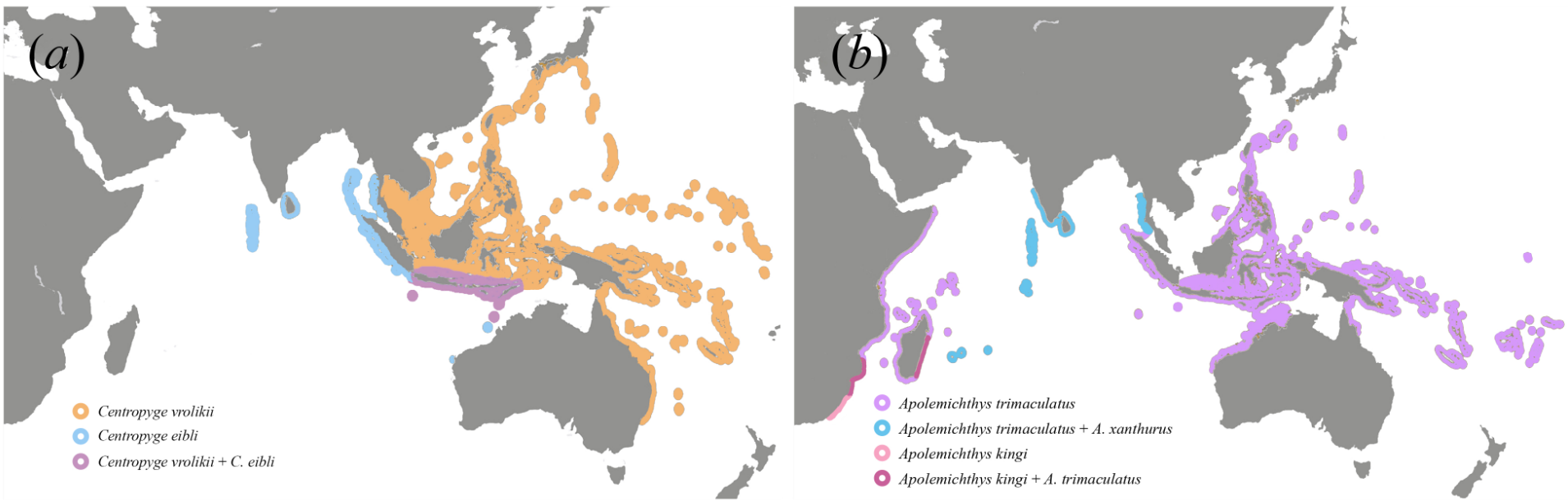


**Figure S2.** Examples of parapatry (*a*) and sympatry (*b*) in marine angelfishes. In (*a*), distributional overlap is narrow and often occurs along a suture zone. In (*b*), sympatry can be complete (in *A. trimaculatus* and *A. xanthurus*), in which the distribution of one species overlaps completely with the other, or partial (in *A. trimaculatus* and *A. kingi*), in which the distribution of one species overlaps incompletely, but largely with the other (>50%).

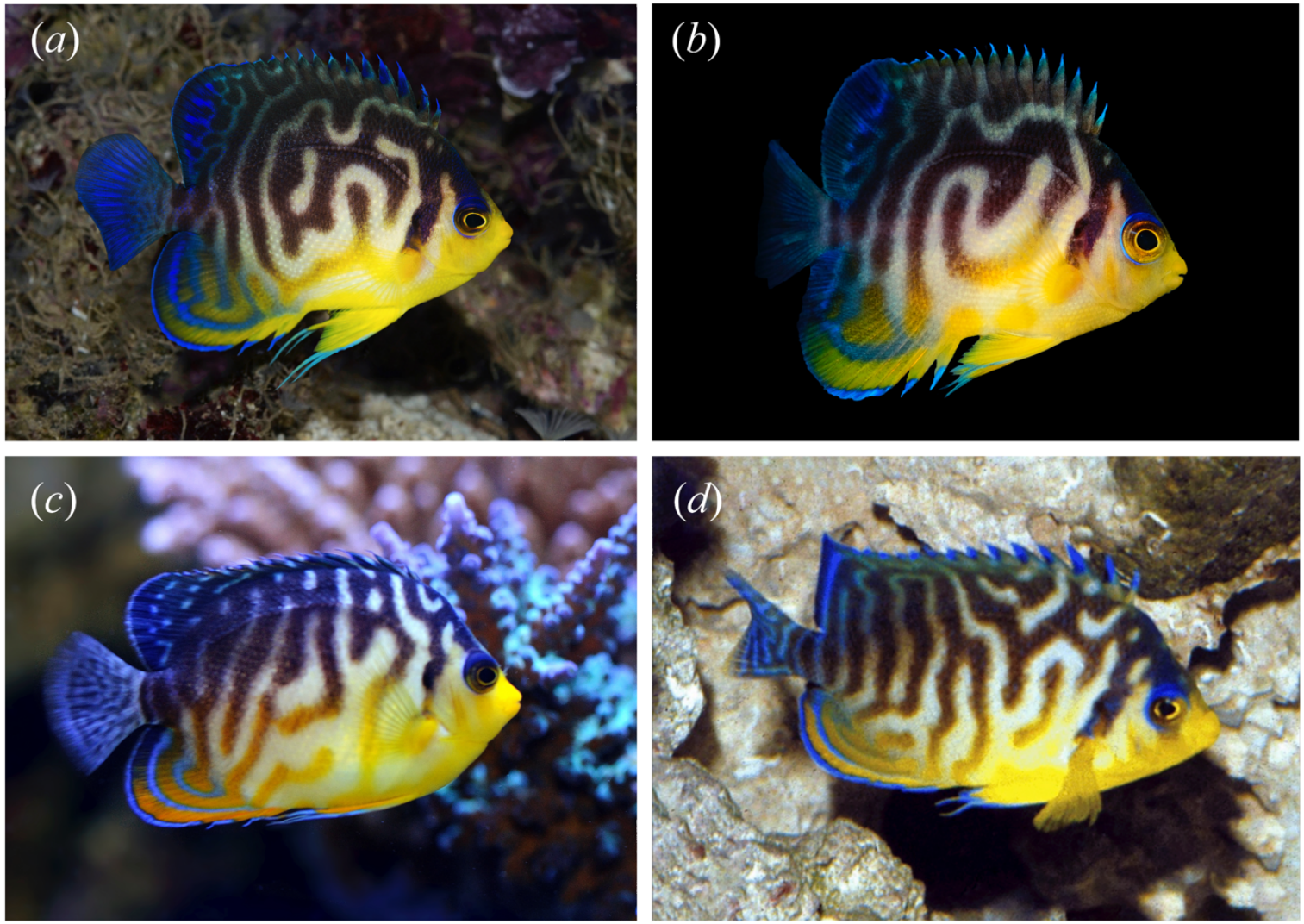


**Figure S3.** *Paracentropyge multifasciata* × *Paracentropyge venusta* hybrids. (*a*) and (*b*): specimens retained in this study, registration numbers AMS I.48937-001 and AMS I.48938-001; (*c*) and (*d*): aquarium specimens, not retained. Photographs by B. Shutman, S.K. Tea, Y.K. Tea, and H. Debelius.

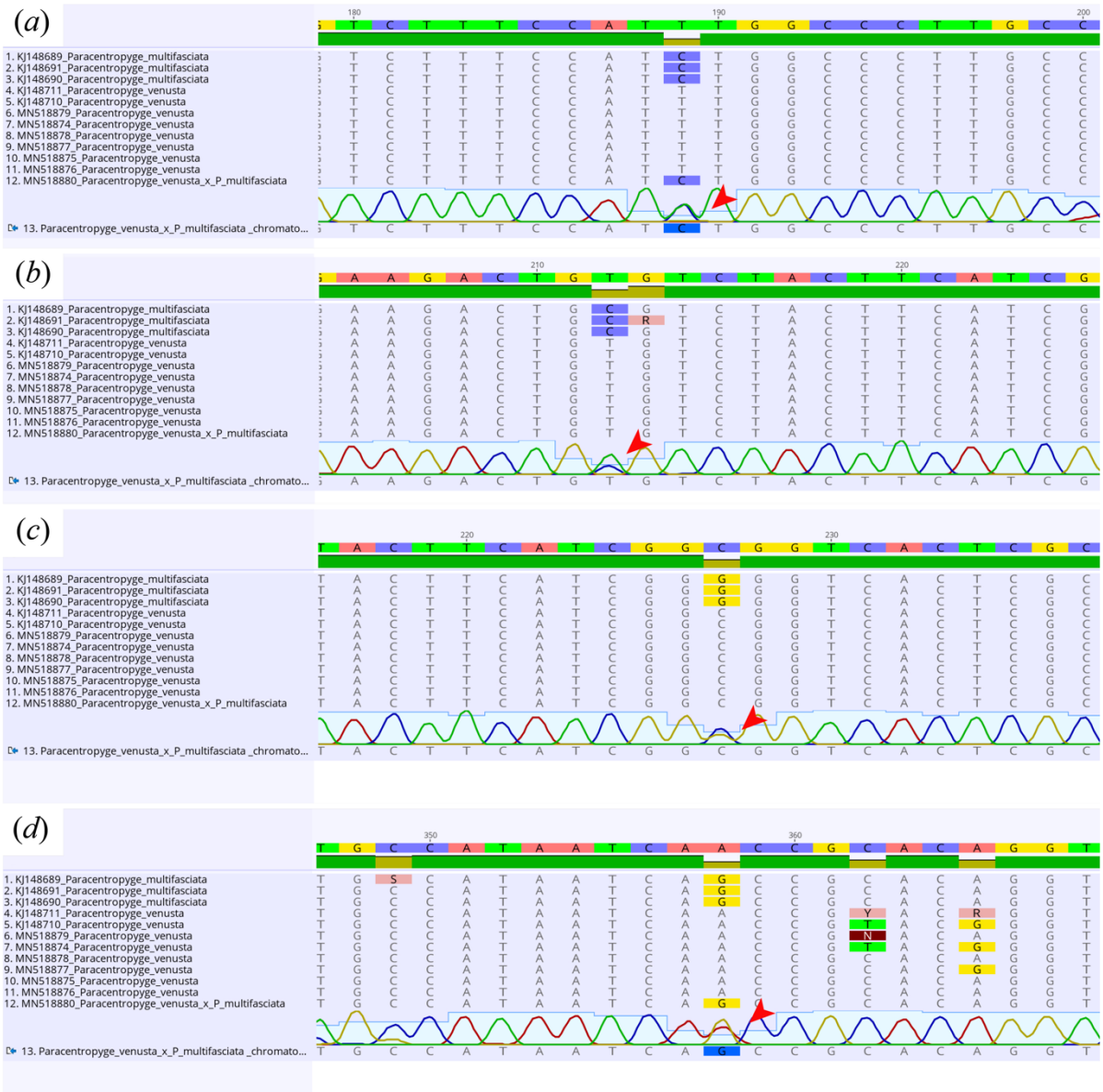


**Figure S4.** Chromatogram for nuclear *RAG2* sequence of the hybrid *Paracentropyge venusta* x *Paracentropyge multifasciata*. Red arrows indicate heterozygous sites: (*a*) site 189; (*b*) site 212; (*c*) site 227; and (*d*) site 358. Length of total *RAG2* alignment is 407 bp. Ambiguous bases (e.g., Y, N, R, W, S, or K) were removed prior to haplotype network construction.

**Figure S5.** A harem of female (dominant male out of frame) *Genicanthus lamarck* in the Philippines. Several genera of pomacanthid angelfishes are haremic, where multiple females are tended to by a single male. In sympatric, haremic species, mixed-species aggregations are not uncommon on adjacent reefs, which may lead to higher incidences of accidental fertilization during synchronous spawning events. Photograph by L.A. Rocha.

**Table S1.** Putative, natural hybrids for species of marine angelfishes in the family Pomacanthidae. Hybrids were inferred from live photographs, the literature, and unpublished personal records by the authors (unless specified, all observations are by YKT and JPAH) outlined on a case-by-case basis in the reference column. Rarity of hybrids was inferred on an arbitrary scale of 1 (common) to 3 (rare), based on the number of reported examples. Field surveys of hybrid abundances are indicated by superscript (^) and follow the categories for parent species. Percentage values denote percentage genetic distance between parents of the putative hybrids, based on mitochondrial *COI*. Abundance for parent species is coded according to the number of individuals observed per dive: fewer than 3 (Rare), 3–10 (Moderately common), and greater than 10 (Common). (–) denotes missing information as a result of unavailable sequence data or inadequate field observations by the authors. IO, Indian Ocean; WPO, Western Pacific Ocean.

| Species pair | General biogeographical overlap | Reported location of hybrids | Rarity of hybrids | Depth overlap by 50% | % distance between parents | Abundance of parent species 1 | Abundance of parent species 2 | Reference |
|---|---|---|---|---|---|---|---|---|
| ***Apolemichthys*** | | | | | | | | |
| [a]*Apolemichthys griffisi* × *A. xanthopunctatus* | Parapatric; Western Micronesia[1,2] | Kiribati | 3 | Yes | – | – | – | Personal observation; electronic supplementary material, figure S1 |
| *Apolemichthys xanthopunctatus* × *A. trimaculatus* | Sympatric; Pacific Ocean | Kiribati | 2 | Yes | – | – | – | Personal observation; electronic supplementary material, figure S1 |
| *Apolemichthys trimaculatus* × *A. kingi* | Sympatric; South Africa and Madagascar | Aliwal Shoals; Madagascar | 3 | Yes | 6.9–7.5 | Rare | Common | Personal observation; electronic supplementary material, figure S1 |
| *Apolemichthys trimaculatus* × *A. xanthurus* | Sympatric; Central and Eastern Indian Ocean | Maldives; Seychelles | 1 | Yes | 5.9–6.5 | Rare in Maldives | Common in Maldives | [1]; electronic supplementary material, figure S1 |
| ***Centropyge*** | | | | | | | | |
| *Centropyge bispinosa* × *C. loricula* | Sympatric; Pacific Ocean | Coral Sea; Vanuatu | 3 | Yes | 8.1–8.4 | Common | Rare | Personal observation; electronic supplementary material, figure S1 |
| *Centropyge bispinosa* × *C. ferrugata* | Sympatric; Western Pacific Ocean | Philippines | 2 | Yes | 2.6–2.9 | Common | Common | [1] |
| *Centropyge bispinosa* × [a]*C. multicolor* | Sympatric; Pacific Ocean[2] | Philippines | 3 | No | 4.5–5.5 | Common | – | Personal observation; electronic supplementary material, figure S1 |
| *Centropyge bispinosa* × *C. shepardi* | Sympatric; Guam | Guam | 2 | Yes | 2.2–2.6 | Rare | Common | [1] |
| *Centropyge eibli* × *C. flavissima* (IO) | Parapatric; Eastern Indian Ocean [1] | Cocos Keeling; Christmas Island (IO Territory) | 2^ | Yes | 1.1 | Rare | Common | [1, 2]; Personal observation; electronic supplementary material, figure S1 |

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|---|---|---|---|---|---|---|---|---|
| *Centropyge eibli* × *C. vrolikii* | Parapatric; Eastern Indian Ocean[1] | Indonesia; Christmas Island (IO Territory) | 3^ | Yes | 6.5 | Rare | Rare | [2, 3]; Personal observation; electronic supplementary material, figure S1 |
| *Centropyge flavissima* (IO) × *C. vrolikii* | Parapatric; Eastern Indian Ocean[1] | Christmas Island (IO Territory) | 3^ | Yes | 6.5 | Rare | Rare | [2, 3]; Personal observation; electronic supplementary material, figure S1 |
| *Centropyge flavissima* (WPO) × *C. vrolikii* | Parapatric; Western Pacific Ocean[1] | Marianas Archipelago; Marshall Islands; Vanuatu; Pohnpei; Guam; Kosrae, Micronesia; | 2-3^ | Yes | 0–0.2 (complete introgression) | Varies across hybrid locations, but one species usually rare | Varies across hybrid locations, but one species usually rare | [2, 3]; Personal observation; electronic supplementary material, figure S1 |
| *Centropyge loricula* × *C. ferrugata* | Parapatric; Western Pacific Ocean | Philippines | 2 | Yes | 8.4–8.9 | Rare | Common | Personal observation; electronic supplementary material, figure S1 |
| *Centropyge loricula* × [a]*C. potteri* | Sympatric; Hawaii[1,2] | Hawaii | 3 | No | 8.2–8.7 | Rare | Common | [1]; Personal observation; electronic supplementary material, figure S1 |
| *Centropyge loricula* × *C. shepardi* | Sympatric; Guam | Guam | 3 | Yes | 8.6–8.8 | Rare | Common | [4] |
| *Centropyge ferrugata* × [a]*C. multicolor* | Sympatric; Western Pacific Ocean[2] | Philippines | 3 | No | 4.4–4.9 | Common | – | Personal observation; electronic supplementary material, figure S1 |
| *Centropyge bicolor* × *C. heraldi* | Sympatric; Pacific Ocean | Philippines | 3 | Yes | 10.4–10.9 | Common | Moderately common | Personal observation; electronic supplementary material, figure S1 |
| [a]*Centropyge potteri* × *C. fisheri* | Sympatric; Hawaii[1] | Hawaii | 3 | Yes | – | Common | Moderately common | Personal observation; electronic supplementary material, figure S1 |
| ***Paracentropyge*** | | | | | | | | |
| *Paracentropyge venusta* × *Pa. multifasciata* | Parapatric; Western Pacific Ocean[1] | Cagayan; Luzon, northern Philippines | 3 | Yes | 7.7–8.4 | – | – | [5]; Personal observation; electronic supplementary material, figure S1 |
| ***Chaetodontoplus*** | | | | | | | | |
| *Chaetodontoplus conspicillatus* × *Ch. meredithi* | Parapatric; Northeastern Australia | Southern Queensland; Lord Howe Island | 3 | Yes | 8.3 | Rare | Rare | Personal observation; electronic supplementary material, figure S1 |

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|---|---|---|---|---|---|---|---|---|
| *Chaetodontoplus septentrionalis* × *Ch. caeruleopunctatus* | Parapatric; South China Sea[1] | Taiwan; Southern Japan | 1 | Yes | 1.6–3.3 | – | – | [1]; Personal observation; electronic supplementary material, figure S1 |
| ***Genicanthus*** | | | | | | | | |
| [a]*Genicanthus bellus* × *G. lamarck* | Sympatric; Western Pacific Ocean[2] | Philippines | 3 | No | 5.1–5.2 | – | – | Personal observation; electronic supplementary material, figure S1 |
| [a]*Genicanthus bellus* × *G. melanospilos* | Sympatric; Western Pacific Ocean[2] | Philippines | 3 | Yes | 2.8–3.1 | – | – | Personal observation; electronic supplementary material, figure S1 |
| *Genicanthus melanospilos* × *G. lamarck* | Sympatric; Western Pacific Ocean | Philippines | 3 | Yes | 5.2–5.6 | – | – | Personal observation; electronic supplementary material, figure S1 |
| *Genicanthus melanospilos* × *G. semifasciatus*[a] | Sympatric;Western Pacific Ocean[1,2] | Southern Japan; Northern Philippines | 3 | Yes | 0.3–0.9 | – | – | Personal observation; aquarium specimen |
| [a]*Genicanthus semifasciatus* × *G. takeuchii* | Sympatric; Western Pacific Ocean[2] | Ogasawara Islands | 3 | Yes | – | – | – | Field photograph (S. Kobayashi); electronic supplementary material, figure S1 |
| ***Holacanthus*** | | | | | | | | |
| *Holacanthus bermudensis* × *H. ciliaris* | Sympatric; Western Atlantic Ocean | Bermuda; Florida Keys; South Carolina; Bimini | 1 | Yes | 0.3–0.5 | Varies across hybrid locations, but one species usually rare | Varies across hybrid locations, but one species usually rare | [1] |
| *Holacanthus passer* × *H. clarionensis* | Parapatric; Eastern Pacific Ocean | Baja California; Mexico | 2 | Yes | 4.7 | Common | Rare | Personal observation; electronic supplementary material, figure S1 |
| ***Pomacanthus*** | | | | | | | | |
| *Pomacanthus chrysurus* × *Po. semicirculatus* | Sympatric; East African coast | Kenya | 3 | Yes | – | – | – | Aquarium specimen; electronic supplementary material, figure S1 |
| *Pomacanthus chrysurus* × *Po. maculosus* | Parapatric; East African coast | Kenya | 3 | Yes | – | – | – | Personal observation; electronic supplementary material, figure S1 |
| *Pomacanthus chrysurus* × *Po. imperator* | Sympatric; East African coast | Kenya | 3 | Yes | – | – | – | Aquarium specimen; electronic supplementary material, figure S1 |

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|---|---|---|---|---|---|---|---|---|
| *Pomacanthus maculosus* × *Po. semicirculatus* | Sympatric; East African coast; Red Sea | Kenya; Oman | 3 | Yes | 4.9–5.1 | – | – | Personal observation; electronic supplementary material, figure S1 |
| *Pomacanthus semicirculatus* × *Po. imperator* | Sympatric; Indian and Pacific Oceans | Kenya | 3 | Yes | 11.2–11.7 | – | – | Aquarium specimen; electronic supplementary material, figure S1 |
| *Pomacanthus imperator* × *Po. annularis* | Sympatric; Indian and Pacific Oceans | Indonesia | 3 | Yes | 11.1–11.3 | Rare | Rare | Personal observation; electronic supplementary material, figure S1 |
| *Pomacanthus navarchus* × *Po. xanthometopon* | Sympatric; Western Pacific Ocean | Indonesia | 3 | Yes | 8.0–8.3 | Rare | Rare | [6] |
| *Pomacanthus xanthometopon* × *Po. sextriatus* | Sympatric; Western Pacific Ocean | Japan | 3 | Yes | 4.1–4.5 | Rare | Rare | Personal observation |
| *Pomacanthus rhomboides* × *Po. semicirculatus* | Sympatric; South African coast | South Africa | 2 | Yes | 5.4–6 | – | – | Personal observation; electronic supplementary material, figure S1 |

[a]Species occurring more frequently in deep reefs (greater than 50 m). [1]Biogeographical suture zones defined by Hobbs et al. [15]. [2]Species that are sympatric but are otherwise partitioned by habitat (depth).


1. Pyle RL, Randall JE. 1994 A review of hybridization in marine angelfishes (Perciformes, Pomacanthidae). *Environ. Biol. Fish.* **41**, 127–145.
2. DiBattista JD, Gaither MR, Hobbs JPA, Rocha LA, Bowen BW. 2016 Angelfishes, paper tigers, and the devilish taxonomy of the *Centropyge flavissima* complex. *J. Hered.* **107**, 647–653.
3. DiBattista JD, Waldrop E, Bowen BW, Schultz JK, Gaither MR, Pyle RL, Rocha LA. 2012 Twisted sister species of pygmy angelfishes: discordance between taxonomy, colouration, and phylogenetics. Coral Reefs **31**, 839–851.
4. Lieske E, Myers R. 1994. *Collins pocket guide. Coral reef fishes. Indo-Pacific & Caribbean including the Red Sea*. New York, NY: HarperCollins.
5. Debelius H, Tanaka H, Kuiter RH. 2003 *Angelfishes*. A comprehensive guide to Pomacanthidae. Chorleywood, UK: TMC Publishing.
6. Myers RF. 1989 *Micronesian reef fishes*. Hicksville, NY: Coral Graphics.

**Table S1.** GenBank and BOLD accession numbers for *COI* sequences of all angelfishes used in calculating pairwise distances.

| Species | Location | Accession number |
|---|---|---|
| *Apolemichthys trimaculatus* | Kwazulu-Natal, South Africa | JF492864 |
| *Apolemichthys trimaculatus* | Réunion Island | JQ349770 |
| *Apolemichthys trimaculatus* | Nosy Be, Madagascar | JQ349771 |
| *Apolemichthys trimaculatus* | Nosy Be, Madagascar | JQ349772 |
| *Apolemichthys trimaculatus* | Nosy Be, Madagascar | JQ349773 |
| *Apolemichthys trimaculatus* | Philippines | KJ148890 |
| *Apolemichthys kingi* | Kwazulu-Natal, South Africa | JF492862 |
| *Apolemichthys kingi* | Kwazulu-Natal, South Africa | KU176326 |
| *Apolemichthys xanthurus* | Sri Lanka | KJ148892 |
| *Apolemichthys xanthurus* | Sri Lanka | KJ148893 |
| *Apolemichthys xanthurus* | Sri Lanka | FJ582873 |
| *Apolemichthys xanthurus* | Sri Lanka | FJ582874 |
| *Centropyge bispinosa* | Philippines | FJ582956 |
| *Centropyge bispinosa* | Moorea, French Polynesia | JQ431554 |
| *Centropyge bispinosa* | Moorea, French Polynesia | MK658181 |
| *Centropyge bispinosa* | Leeward Islands, French Polynesia | MK658265 |
| *Centropyge loricula* | Leeward Islands, French Polynesia | MK657848 |
| *Centropyge loricula* | Austral Islands, French Polynesia | MK658688 |
| *Centropyge loricula* | Hawaiian Islands, USA | FJ582974 |
| *Centropyge loricula* | Hawaiian Islands, USA | FJ582975 |
| *Centropyge loricula* | Hawaiian Islands, USA | FJ582976 |
| *Centropyge ferrugata* | Okinawa, Japan | KJ148921 |
| *Centropyge ferrugata* | Okinawa, Japan | KJ148922 |
| *Centropyge ferrugata* | Okinawa, Japan | FJ582961 |
| *Centropyge ferrugata* | Okinawa, Japan | FJ582962 |

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|---|---|---|
| *Centropyge ferrugata* | Okinawa, Japan | FJ582963 |
| *Centropyge multicolor* | Hawaiian Islands, USA | FJ582977 |
| *Centropyge multicolor* | Hawaiian Islands, USA | FJ582978 |
| *Centropyge multicolor* | Marshall Islands, Micronesia | KJ148949 |
| *Centropyge multicolor* | Marshall Islands, Micronesia | KJ148949 |
| *Centropyge multicolor* | Leeward Islands, French Polynesia | MK658007 |
| *Centropyge shepardi* | Guam | KJ148970 |
| *Centropyge shepardi* | Guam | KJ148971 |
| *Centropyge shepardi* | Guam | KJ148972 |
| *Centropyge eibli* | Bali, Indonesia | KJ534322 |
| *Centropyge flavissima* | Cocos-Keeling Islands, Australia (Indian Ocean Territory) | KJ534314 |
| *Centropyge flavissima* | Fiji | KJ534355 |
| *Centropyge flavissima* | New Caledonia | KJ542561 |
| *Centropyge vrolikii* | Philippines | KJ542549 |
| *Centropyge vrolikii* | Bali, Indonesia | MH049313 |
| *Centropyge potteri* | Hawaiian Islands, USA | FJ582884 |
| *Centropyge potteri* | Hawaiian Islands, USA | FJ582985 |
| *Centropyge potteri* | Hawaiian Islands, USA | KF929696 |
| *Centropyge potteri* | Hawaiian Islands, USA | KJ148964 |
| *Centropyge potteri* | Hawaiian Islands, USA | KJ148965 |
| *Centropyge potteri* | Hawaiian Islands, USA | MG816666 |
| *Centropyge bicolor* | Philippines | FJ582944 |
| *Centropyge bicolor* | Tonga | FJ582946 |
| *Centropyge bicolor* | Tonga | FJ582947 |
| *Centropyge bicolor* | Great Barrier Reef, Australia | KJ148906 |
| *Centropyge bicolor* | Lizard Island, Australia | KP194839 |
| *Centropyge heraldi* | Tonga | FJ582970 |

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|---|---|---|
| *Chaetodontoplus conspicillatus* | New Caledonia | NC_026883 |
| *Chaetodontoplus conspicillatus* | New Caledonia | KP033452 |
| *Chaetodontoplus meredithi* | Queensland, Australia | HQ956576 |
| *Chaetodontoplus septentrionalis* | Yokosuka, Japan | JF952699 |
| *Chaetodontoplus septentrionalis* | Taiwan | KU944249 |
| *Chaetodontoplus septentrionalis* | Korea | HM180496 |
| *Chaetodontoplus caeruleopunctatus* | Philippines | FJ583090 |
| *Chaetodontoplus caeruleopunctatus* | Philippines | FJ583091 |
| *Chaetodontoplus caeruleopunctatus* | Philippines | FJ583092 |
| *Genicanthus bellus* | Moorea, French Polynesia | JQ431750 |
| *Genicanthus bellus* | Moorea, French Polynesia | JQ431751 |
| *Genicanthus bellus* | Leeward Islands, French Polynesia | MK657904 |
| *Genicanthus lamarck* | Indonesia | KJ148986 |
| *Genicanthus lamarck* | Indonesia | KJ148987 |
| *Genicanthus lamarck* | Taiwan | KU944256 |
| *Genicanthus melanospilos* | Tonga | FJ583424 |
| *Genicanthus melanospilos* | Tonga | FJ583425 |
| *Genicanthus melanospilos* | Tonga | FJ583426 |
| *Genicanthus melanospilos* | Great Barrier Reef, Australia | KJ148988 |
| *Genicanthus melanospilos* | Indonesia | KJ148989 |
| *Genicanthus semifasciatus* | Taiwan | NC_027596 |
| *Genicanthus semifasciatus* | Taiwan | KU944257 |
| *Holacanthus clarionensis* | Baja California, Mexico | KP218260 |
| *Holacanthus passer* | Mexico | KT883583 |
| *Holacanthus bermudensis* | Bermuda | UKFBJ532-08 |
| *Holacanthus ciliaris* | Yucatan Peninsula, Mexico | JN313799 |
| *Holacanthus ciliaris* | Belize | JQ841231 |
| *Holacanthus ciliaris* | Belize | JQ841232 |

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|---|---|---|
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148911 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148912 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148913 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148914 |
| *Paracentropyge multifasciata* | Taiwan | GBMNA15030 |
| *Paracentropyge multifasciata* | Taiwan | GBMTG027 |
| *Paracentropyge multifasciata* | Vanuatu | KJ148951 |
| *Paracentropyge multifasciata* | Vanuatu | KJ148952 |
| *Paracentropyge multifasciata* | Vanuatu | KJ148953 |
| *Paracentropyge multifasciata* | Philippines | FJ582979 |
| *Paracentropyge venusta* | Philippines | FJ582994 |
| *Paracentropyge venusta* | Philippines | FJ582995 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518866 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518867 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518868 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518869 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518870 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518871 |
| *Paracentropyge venusta* | Okinawa, Japan | KJ148975 |
| *Paracentropyge venusta* | Okinawa, Japan | KJ148976 |
| *Paracentropyge venusta* | Okinawa, Japan | KU944244 |
| *Pomacanthus maculosus* | Persian Gulf, Iran | HQ149905 |
| *Pomacanthus maculosus* | Red Sea, Iran | HQ149906 |
| *Pomacanthus maculosus* | Red Sea, Saudi Arabia | KU499606 |
| *Pomacanthus maculosus* | Red Sea, Saudi Arabia | KU499607 |
| *Pomacanthus semicirculatus* | Nosy Be, Madagascar | JQ350236 |
| *Pomacanthus semicirculatus* | Nosy Be, Madagascar | JQ350238 |
| *Pomacanthus imperator* | Philippines | FJ583882 |

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|---|---|---|
| *Pomacanthus imperator* | Nosy Be, Madagascar | JQ350234 |
| *Pomacanthus imperator* | Nosy Be, Madagascar | JQ350235 |
| *Pomacanthus imperator* | South Africa | KF489706 |
| *Pomacanthus annularis* | Taiwan | KU944248 |
| *Pomacanthus annularis* | Bali, Indonesia | MH085785 |
| *Pomacanthus annularis* | Myanmar | MH235689 |
| *Pomacanthus annularis* | Taiwan | KU944248 |
| *Pomacanthus navarchus* | Vietnam | FJ583883 |
| *Pomacanthus xanthometopon* | Indonesia | KJ534356 |
| *Pomacanthus xanthometopon* | Indonesia | KJ534357 |
| *Pomacanthus xanthometopon* | Queensland, Australia | KJ534358 |
| *Pomacanthus sexstriatus* | Lizard Island, Australia | KP194521 |
| *Pomacanthus rhomboides* | South Africa | HQ945884 |
| *Pomacanthus rhomboides* | South Africa | JF494235 |

**Table S2.** GenBank accession numbers for *RAG2* sequences of all *Paracentropyge* angelfishes used in haplotype networks.

| Species | Location | Accession number |
|---|---|---|
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148656 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148657 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148658 |
| *Paracentropyge multifasciata* | Vanuatu | KJ148689 |
| *Paracentropyge multifasciata* | Vanuatu | KJ148690 |
| *Paracentropyge multifasciata* | Vanuatu | KJ148691 |
| *Paracentropyge venusta* | Okinawa, Japan | KJ148710 |
| *Paracentropyge venusta* | Okinawa, Japan | KJ148711 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518874 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518875 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518876 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518877 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518878 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518879 |
| *Paracentropyge multifasciata* × *Paracentropyge venusta* | Cagayan, Philippines | MN518880 |

**Table S3.** GenBank accession numbers for *S7* sequences of all *Paracentropyge* angelfishes used in haplotype networks.

| Species | Location | Accession number |
|---|---|---|
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148743 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148744 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ148745 |
| *Paracentropyge multifasciata* | Vanuatu | KJ148773 |
| *Paracentropyge multifasciata* | Vanuatu | KJ148774 |
| *Paracentropyge multifasciata* | Vanuatu | KJ148775 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518881 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518882 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518883 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518884 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518885 |
| *Paracentropyge multifasciata* × *Paracentropyge venusta* | Cagayan, Philippines | MN518886 |

**Table S4.** GenBank accession numbers for *TMO-4C4* sequences of all *Paracentropyge* angelfishes used in haplotype networks.

| Species | Location | Accession number |
|---|---|---|
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ149019 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ149020 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ149021 |
| *Paracentropyge boylei* | Cook Islands, French Polynesia | KJ149022 |
| *Paracentropyge multifasciata* | Vanuatu | KJ149059 |
| *Paracentropyge multifasciata* | Vanuatu | KJ149060 |
| *Paracentropyge multifasciata* | Vanuatu | KJ149061 |
| *Paracentropyge venusta* | Okinawa, Japan | KJ149084 |
| *Paracentropyge venusta* | Okinawa, Japan | KJ149085 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518887 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518888 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518889 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518890 |
| *Paracentropyge venusta* | Kagoshima, Japan | MN518891 |
| *Paracentropyge multifasciata* × *Paracentropyge venusta* | Cagayan, Philippines | MN518892 |