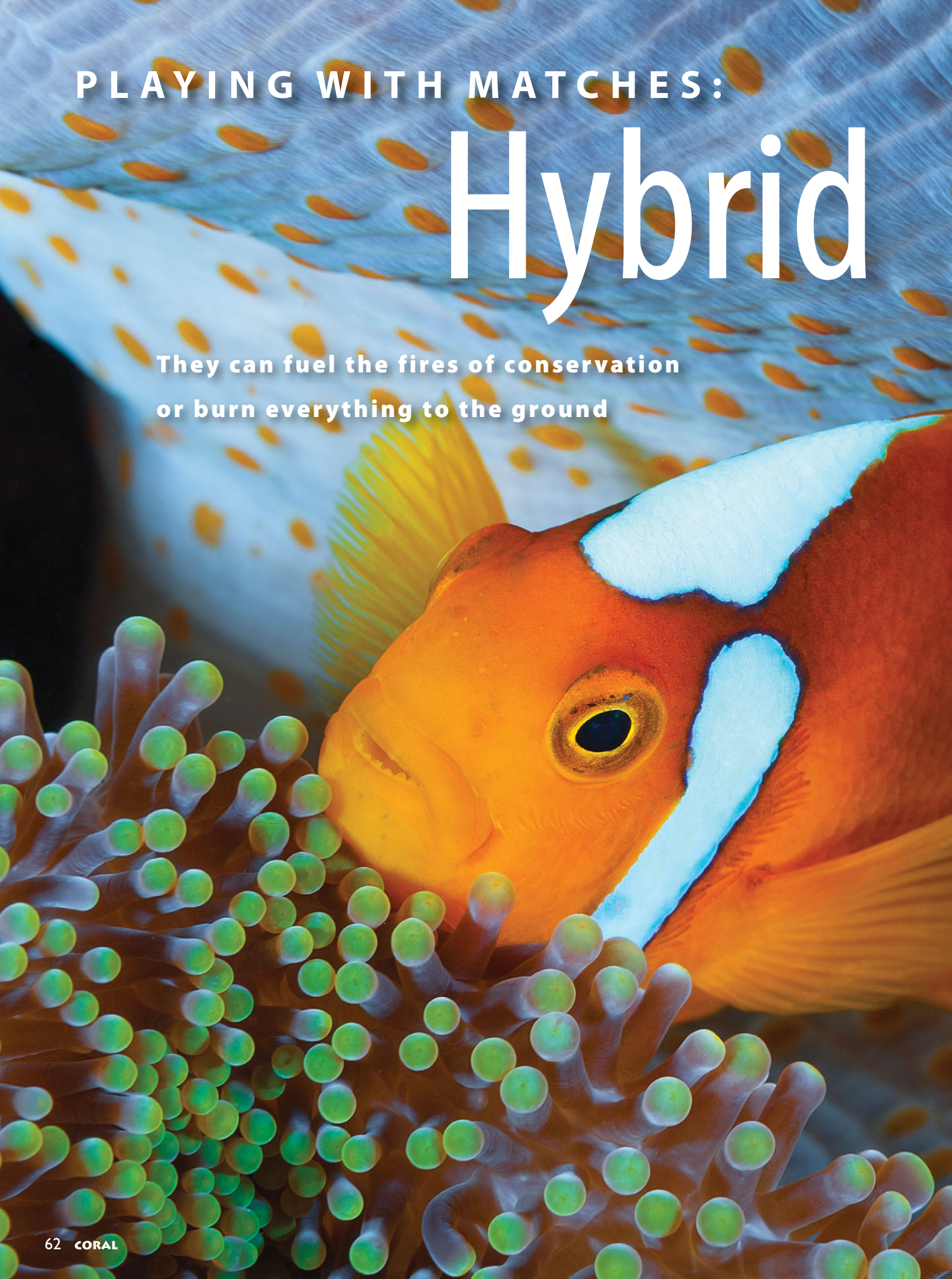
PLAYING WITH MATCHES:

Hybrid

They can fuel the fires of conservation or burn everything to the ground



Clownfishes

by Matt Pedersen

Riley couldn't understand it: her mated pair of "Tomato Clownfish" kept spitting out a strange mix of offspring, some with black ventral and anal fins, others with white tails, but otherwise looking like their red parents. Meanwhile, Brennon struggled to identify the clownfishes he had picked up from a distant aquarium shop on a road trip; the label said "Onyx Percula," but the fish lacked the bright orange eye that *Amphiprion percula* should have. Melanie was disappointed when her "True Sebae" clownfish never grew their full vertical bars and always seemed to have black tails with a hint of a yellow tail bar instead of the all-yellow tail she had come to expect.

Although Riley, Brennon, and Melanie are not their real names (I am trying to protect the innocent here), these dramatizations are all too real. Hobbyists (and, to be honest, some people in the marine livestock trade) have often

White-Bonnet Anemonefish (*Amphiprion leucokranos*) in Milne Bay, Papua New Guinea. This a suspected hybrid of *A. chrysopterus* and *A. sandaracinos*.

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Julian Sprung's pair of wild-collected hybrid *Amphiprion frenatus* X *Premnas biaculeautus;* this hybrid is occasionally found in the Philippines.

struggled with the identification of many anemonefishes at the basic species level. And now, at a time when it can still be difficult for the casual hobbyist to differentiate between a Tomato and a Cinnamon Clownfish, we are starting to have to contend with hybrid fishes. Some hybrids are clearly labeled and sold as such, but things can get hopelessly complicated by small-scale breeders who inadvertently create hybrid pairings and sell the offspring as whatever pure species they resemble. Hybrids blur subtle differences between the parental forms, and in the end it can be very easy to mistake them for actual pure species.

Even more sinister are those breeders who intentionally create hybrids and sell them as pure species because they believe the hybrids have an advantage in appearance over the true species. An overseas breeder some years ago openly admitted to selling Percula X Ocellaris as a straight-up "Mango" Ocellaris or some other fanciful strain name. He bragged to other breeders that he got higher prices and brisker sales on these "Percularis" than his competitors got for pure Ocellaris.

2014 HYBRID CLOWNFISH REVIEW

If the world of clownfish breeding and marketing seems more than bit frenzied at the moment, it helps to know that hybrid anemonefishes can be sorted into four groups.

"Natural" Hybrids

Once again, as with "designer" morphs that turn up in natural wild populations of *Amphiprion* and *Premnas* spp. fishes, we find that Mother Nature is not the straight-laced, stern headmistress she is often made out to be—hybrid fishes are far from rare within reef communities.

We define "natural" or "wild" hybrids as those found in nature without any direct human intervention. Certain hybrids are definitely part of the natural biodiversity in the reef. Some of the "pure species" today may have well been the result of two wild species merging through hybridization countless generations in the past.

Amphiprion leucokranos There has been a lot of debate over the years as to whether this is a species or a hybrid; those proclaiming it to be a natural hybrid seem to be heading toward victory. The most recent research claims to firmly demonstrate that *A. leucokranos*, which occurs in the Solomon Islands and Papua New Guinea, is a cross between *A. chrysopterus* and *A. sandaracinos*. Technically, this doesn't eliminate the taxonomic name applied to this animal in the wild, but future publications may use a variation of the taxonomic style guide to denote this "species" as a naturally occurring hybrid; depending on which rules you want to follow, the proper formatting of the name may be either *A.* X *leucokranos* or *A.* × *leucokranos*. (The latter, considered more proper among marine biologists, uses a multiplication × sign.)

Amphiprion thiellei Many suspect that *A. thiellei*, so far found mainly around Cebu in the Philippines, is another naturally occurring hybrid. *A.* (*ocellaris* X *sandaracinos)* seems to make the most sense from a visual standpoint, but also because certain other potential pairings from this region are known, and most are not remotely close to *A. thiellei*. If this is in fact a hybrid, then any place where the parental species occur could yield examples of it. Ichthyologist Warren Burgess defends the position that it is a valid species.

Amphiprion (frenatus* X *ocellaris) The hybrid of the Tomato Clownfish and the common Ocellaris has been recorded in the wild from the Philippines. From the single well-documented specimen, we can say that the fish showed a deeper body type more reminiscent of *A. frenatus*, with a white head stripe and mid-stripe over a rusty

JULIAN SPRUNG / TWO LITTLE FISHIES

orange base coloration. The ventral fins were particularly noteworthy, as they were a brighter red-orange with a thick black border and trailing edge.

***Amphiprion* (*frenatus* X *clarkii*)** This stunning fish is an example of what might be called a benign hybrid; no one is going to mistake this fish for either parental species or any other natural clownfish species. It is unique. Multiple examples of this hybrid have been collected in the Philippines, and their appearance is consistent. I am so enamored with this hybrid that I am trying to replicate it in my fishroom. (Yes, I have been known to vilify all hybrids and now I am trying to make one—with a clear conscience, as I am keeping pure lines of the parents as part of the process.)

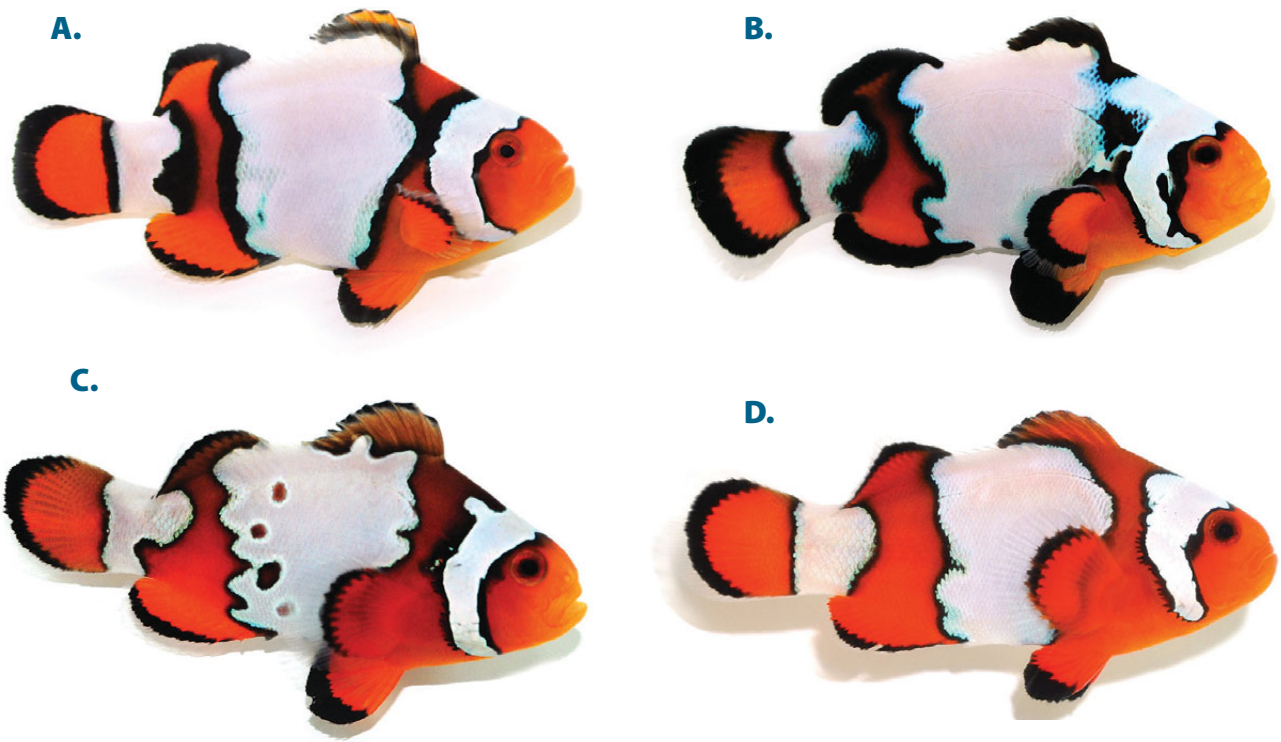
Amphiprion frenatus* X *Premnas biaculeatus Amazingly, there is even a wild example of an intergeneric hybrid (a cross between two species from different genera). This wild hybrid, found repeatedly in the Philippines, probably represents a near-perfect blending of the traits of the two parental species. It is vibrant red to deep burgundy and black, with a full whitish-blue head stripe and potential for second and third stripes. The body shape is a perfect compromise between those of the parental species.

Intraspecific Hybrids

This group represents a gray area where contested taxonomic definitions cause aquarists to disagree about whether these pairings represent matings between two different species or one unified species. Thus, an intraspecific hybrid would be defined as a cross between different phenotypes or geographic forms of taxonomically same-species clownfishes. The mating between Yellowtail and Whitetail geographic races of the Bluestripe Clownfish, *A. chrysopterus*, is one such example.

***Premnas biaculeatus* ("White Stripe" X "Gold Stripe")** This hybrid has reportedly been accomplished, but finding any documentation is beyond difficult. What little is written seems to suggest that it matures with washed-out, faintly yellow stripes. This is one of the best examples of what I'd call a really bad hybrid; it does not improve on what is offered by either parental type, and it muddies what makes each of them unique. It is likely that the fish could be passed off to an unsuspecting individual as a pure White Stripe or Gold Stripe form, and it could pollute someone's breeding efforts down the line. Hybrids like this have no upside and should be avoided.

***Amphirion ocellaris* Mocha** (*A. ocellaris* X *A. ocellaris* "Darwin/Black") This is a 50 percent Orange/Common Ocellaris X 50 percent Black Ocellaris. Other names have been applied in the past, but Mocha seems to be the most enduring. Wolfgang Mai was the first to write about this hybrid pairing in the October/November 2005 issue of *CORAL* Magazine, saying: "Crossbreeding



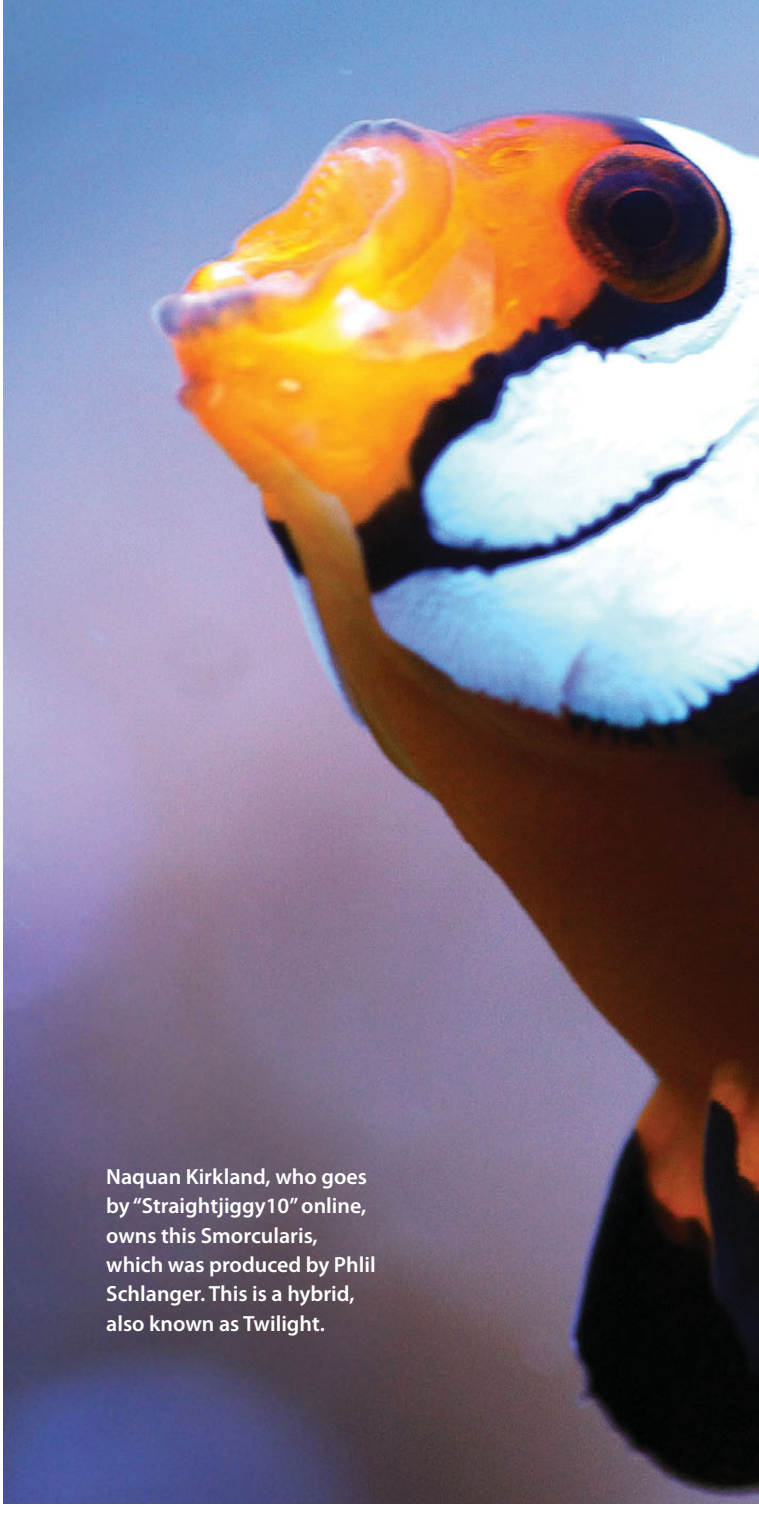
Pop Quiz! Can you tell which fishes are hybrids and which are pure species? Can you tell what each one is named just by looking? See answers on the next page.

of regular and black morphs of *A. ocellaris* is no problem at all; it won't work, however, between any of the *A. ocellaris* color variants and *A. percula*. Crossbreeding these two variants can actually lead to very interesting color combinations. When selling them, they should always be labeled as such, because they will never attain a flawless black coloration." Mai was correct about labeling this cross, and now we know we should always call it Mocha. That part about not being able to breed *A. ocellaris* and *A percula*...well, read on.

***Amphiprion ocellaris* Black Ice** (*A. ocellaris* "Snowflake" X *A. ocellaris* "Darwin/Black") The name first published for this hybrid by Fisheye Aquaculture was S'more. A very short time later a larger commercial producer introduced the same hybrid and called it Black Ice, and that's the name that stuck. Basically, this hybrid is a Mocha with one difference—it brings in the Snowflake genetic mutation from the standard orange *A. ocellaris* form, where the mutation originated. Because of the way Snowflake genes work, in the hybrid parentage listed, only 50 percent of the fish inherit the Snowflake gene. These are the Black Ice, and all the normally barred fish, lacking the gene, are genetically Mochas. This is perhaps one of the most interesting and unique phenomena in designer clownfish breeding; most breeders in other fields deal with either hybrids or genetics, but rarely both. You will see this scenario of "genetics" on top of "hybrids" recur several more times in this article; this is why I say you can't be a really good designer-breeder if you don't understand the genetics.

Why would anyone create a Black Ice? Here's the secret: the Snowflake gene doesn't exist in pure Black Ocellaris. Wouldn't a Black Snowflake be a really beautiful fish? Some folks thought so, but the only way to achieve it is to get the gene from Ocellaris and put it into Black Ocellaris. The Black Ice represents the first step in that project. The rest of the intraspecific hybrids mentioned here represent the steps that completed the project.

***Amphiprion ocellaris* Blacker Ice** (*A. ocellaris* Black Ice X *A. ocellaris* "Darwin/Black") This is the next generation backcross of the Black Ice (a Mocha with a Snowflake gene) to the Black Ocellaris parent. All that is being accomplished here is the first step in "breeding out" the orange. This fish is now 75 percent Black Ocellaris and only 25 percent Orange Ocellaris.



Naquan Kirkland, who goes by "Straightjiggy10" online, owns this Smorcularis, which was produced by Phlil Schlanger. This is a hybrid, also known as Twilight.

***Amphiprion ocellaris* Chocolate Mocha** (*A. ocellaris* Mocha X *A. ocellaris* "Darwin/Black") There are two ways to make Chocolate Mocha Clownfish. The parentage listed here will produce 100 percent Chocolate Mocha, because it is just the backcross of a Mocha to the Black Ocellaris parent: 75 percent Black Ocellaris, 25 percent Orange Ocellaris. Meanwhile, Blacker Ice breeding will also create 50 percent Chocolate Mochas, because only 50 percent of those offspring receive the Snowflake gene. Those that don't inherit the Snowflake gene, the normally barred siblings, are still the same backcross as in mat-

ANSWERS to POP QUIZ on PREVIOUS PAGE:

A: Snow Onyx, interspecies hybrid, *Amphiprion percula* X *A. ocellaris* Snowflake

B: Black Ice, currently an intraspecies hybrid, *A. ocellaris* Snowflake X *A. ocellaris* Darwin/Black

C: Fancy Snowflake, a Snowflake gene on Fancy Strain, pure *Amphipiron ocellaris*

D: Snowflake Ocellaris, pure *A. ocellaris* Snowflake

NAQUAN KIRKLAND

ings where no Snowflake gene was present to start with.

***Amphprion ocellaris* Black Snowflake/Phantom** Here we don't necessarily know the parentage involved, as it varies from breeder to breeder and the producer assigns a brand name. As with Black Ice and Blacker Ice, each backcrossing to the Black Ocellaris parent reduces the influence of the regular orange Ocellaris parent on the overall phenotype of the fish; we don't know how many backcrosses it took to get to the desired visual goal. We might assume that the first apparent Black Snowflakes were seen in the third generation of breeding; if true, that would make Black Snowflakes at least 87.5 percent Black Ocellaris.

This brings us to a question with a very troubling answer. We know that in the production of Black Snowflakes, 50 percent of the fish will fail to express a Snowflake gene and will be normal three-barred black and white fish. They may outwardly look identical to a pure Black Ocellaris from Darwin, Australia. And what are breeders selling these normally barred black and white fish calling them? Care to wager a guess?

This group of fish is truly representative of the guppification of clownfishes. The loss of lineage is bad enough, but the fact that the cast-offs from this line of breeding

A sampling of hybrid clownfishes produced by Sustainable Aquatics


Snow Onyx


Snow Onyx—"Extreme" Grade


Snow Onyx—"Extreme" Grade


Percularis


Mocha


Ice Mocha


Ice Mocha—"Extreme" Grade


Black Ice—"Extreme" Grade


Chocolate Mocha


Blacker Ice


Black Snowflake


Mai Tai

A sampling of hybrid clownfishes produced by Sea & Reef Aquaculture


Mocha— "Misbar" Grade


Black Ice


Black Ice—"Ultra" Grade


Phantom


Snow Onyx


Black Photon

COURTESY OF, TOP: SUSTAINABLE AQUATICS; BOTTOM: SEA & REEF AQUACULTURE

may be sold off as "pure" is extremely problematic. If hybrid Black Ocellaris are entering the market unlabeled as hybrids (which I suspect they are), it could undermine other breeders who are trying to maintain pure lines of Black Ocellaris. This is why the ethics of clownfish breeding should start with "Do no harm: if you are making hybrids, accept a responsibility to label your fish honestly." In the absence of a truth in labeling law for clownfishes, we should embrace a communal ethic of transparency and live by it. The sale of mixed-lineage fishes can create problems for other breeders.

Interspecific Hybrids

Interspecific hybrids are offspring resulting from the mating of different species (primary hybrids), a species and a hybrid, or even two hybrids (secondary or complex), all within the same genus.

***Amphiprion* White Tipped** (*A. polymnus* X *A. sebae*)

A sampling of hybrid clownfishes produced and marketed by Proaquatix

Black Photon

Mocha

Black Ice

Blacker Ice

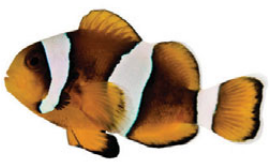
Blacker Ice—"Premium" Grade

Black Snowflake

Black Snowflake—"Premium" Grade

Black Snowflake—"Extreme" Grade

A sampling of hybrid clownfishes produced by ORA



A. (*ocellaris* X *clarkii*) 1

A. (*ocellaris* Darwin / Black X *clarkii*) 2

A. (*tricinctus* X *clarkii*)

A. (*ocellaris* X *frenatus*)

Blood Orange

Blood Orange—"Misbar" Grade

Blood Orange—"Misbar" Grade

Black Ice

Black Snowflake

Black Snowflake

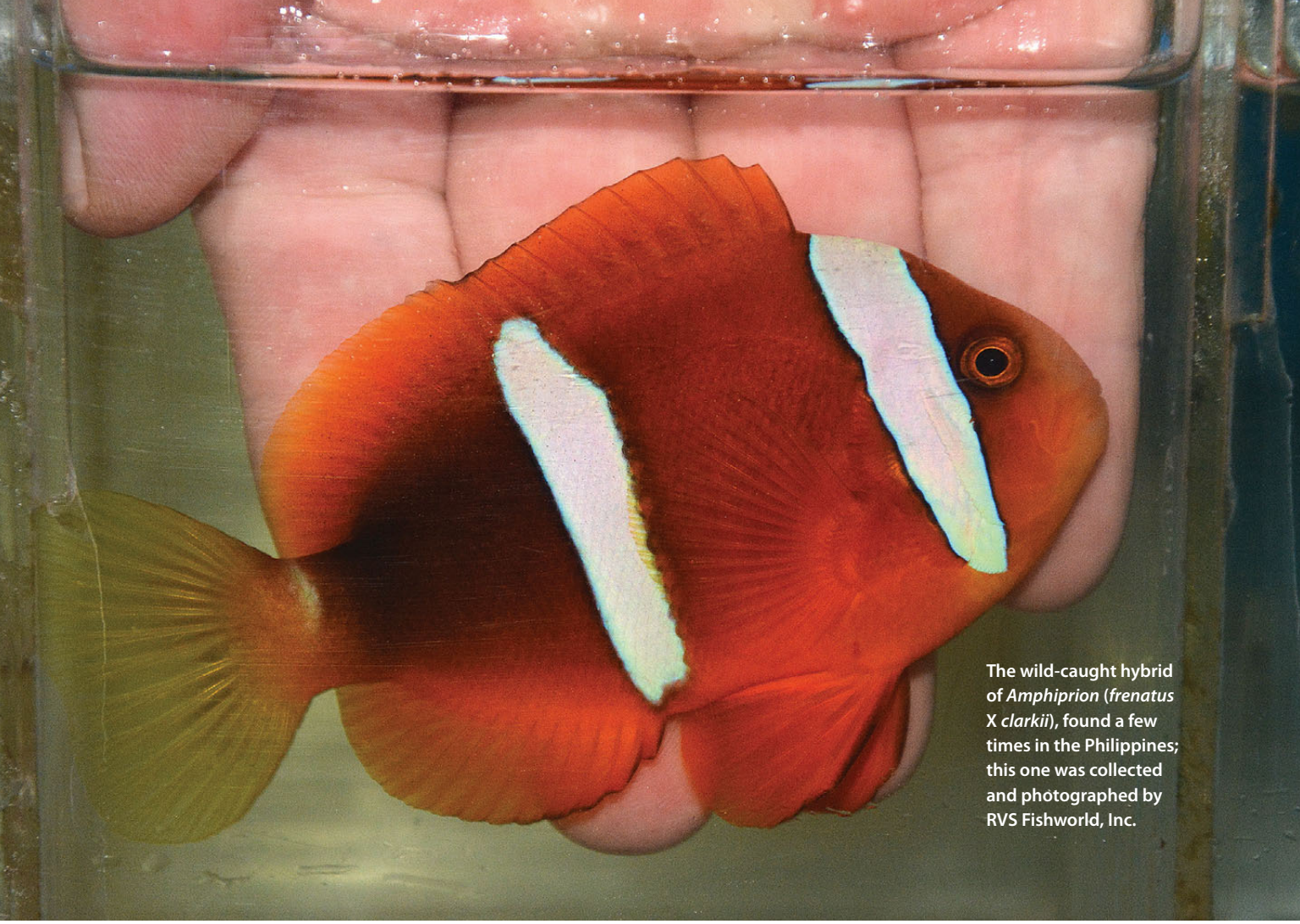
Black Snowflake

Black Snowflake

COURTESY OF; TOP: PROAQUATIX; BOTTOM: ORA

Both C-Quest and Proaquatix have offered this creation in the past. I am unsure which form of *A. polymnus* was used in making this hybrid, but based on the timeline it was most likely the brown, Philippine form of the Saddleback Clownfish. Joe Lichtenbert of Reef Propagations succeeded in creating second generation (F2) offspring from first generation (F1) White Tipped hybrids. This may be one of the first documented cases showing that interspecific clownfish hybrids can be fertile. There is a general notion that interspecific hybrids are always sterile, but the orchid world has disproved that, and it seems clownfish hybrids are more likely to be fertile than not.

***Amphiprion* Percularis** (*A. ocellaris* X *A. percula*) This hybrid probably beats out the White Tipped as being the first hybrid clownfish created in captivity. For those who fear the loss of species characteristics and purity, this is arguably the best example of a bad hybrid. Percularis are completely intermediate between their two parents,



The wild-caught hybrid of *Amphiprion* (*frenatus* X *clarkii*), found a few times in the Philippines; this one was collected and photographed by RVS Fishworld, Inc.

burying the small differences that help us differentiate between the parental species. Many of the newer designer clownfishes are Percularis at the core, with genetic variations thrown on top to make something "new."

***Amphiprion* Black Photon** (*A. ocellaris* "Darwin" X *A. percula* "Onyx") Dr. Sanjay Joshi originated this hybrid and was the first to show how Ocellaris striping genetics can beat out the ordinarly slow Percula striping genetics. It can be very hard to differentiate an Onyx Percula from a Black Photon; having the label firmly attached to the fish (staples help) is the only way we can realistically know what we're looking at. Sanjay succeeded in creating "Gen 2" (F2) Black Photons from his F1 generation; visually they appear to be the same and the fertility of the hybrid is proven. He has gone on to use this initial hybrid success as the basis for several more creations along similar lines.

***Amphiprion* Smorcularis/Twilight** (*A. ocellaris* "Darwin" X *A. percula* "Picasso") Phil Schlanger produced the Smorcularis using a high-grade Picasso Percula strain; this means that the fish was likely an Onyx Picasso, so a Smorcularis is probably exactly the same as a Black Photon, but with the Picasso gene added. Schlanger credits the company Just Clowning Around with producing this hybrid first and naming it Twilight.

***Amphiprion* Midnight Black Photon** (*A. ocellaris* "Darwin Midnight" X *A. percula* "Onyx") Created by Sanjay Joshi, this is basically the same as the Black Photon, but it uses the Midnight form of the Darwin/Black Ocellaris; Midnight is the equivalent of the Naked (no bars) phenotype in Ocellaris, and, not surprisingly, the only real visual difference in a Midnight Black Photon is heavily reduced barring. It's unclear how many offspring wind up reduced/naked versus normally striped, but it's probably safe to say that any normally patterned siblings are just Black Photons. Other variations on Sanjay's theme are ***Amphiprion* Double Black Photon** (*Amphiprion* Black Photon X *ocellaris* "Darwin"); ***Amphiprion* Half-Black Photon** (*Amphiprion* Black Photon X *A. percula* "Onyx"); and ***Amphiprion* Snowflake Black Photon** (*Amphiprion* Black Snowflake X *A. percula* "Onyx").

***Amphiprion* Snow Onyx** (*A. ocellaris* "Snowflake" X *A. percula* "Onyx") This is a 50/50 mix of *A. ocellaris* and *A. percula*, but with the Snowflake and Onyx genes added into the mix. The originator is unknown. It also isn't known what those offspring that don't get the Snowflake gene are called. Are they just Percularis, or do we need to draw a distinction based on the presence of Onyx genetics from the Percula parent?

***Amphiprion* Picassnow** (*A. ocellaris* "Snowflake" X *A.*

RVS FISHWORLD INC.

percula "Picasso") Breeder Doni Marie trademarked the name Snowcasso® to apply to her best grade of Picasso Percula. (Someone else claims to have been the original breeder and to have coined the name, but did not protect it legally.) Now the hybrid has been re-created by Bali Aquarich, and the breeding community came up with the name Picassnow. Genetically, the parentage of Picassnow yields 100 percent hybrid offspring, but only 25 percent receive the Picasso and Snowflake genes and earn the name Picassnow. Twenty-five percent will get only the Snowflake gene, and might be considered Snow Onyx or need a new name. Twenty-five percent will only get the Picasso gene, representing a form that currently lacks a name. The remaining 25 percent will get no mutant genes, and could be called Percularis.

***Amphiprion* White Knight** (*A.* Snow Onyx X *A. percula* "Picasso") Brian Williams's hybrid appears to get the Snowflake gene from the Snow Onyx parent and the Picasso gene from the Percula. Like Picassnow, White Knight suggests four unique genotype combinations on fish that are 75 percent Percula, 25 percent Ocellaris; there should be four distinct phenotypes in the offspring.

***Amphiprion* (*frenatus* X *melanopus*)** This is an unnamed hybrid likely created by accident, probably more than once.

***Amphiprion* (*frenatus* X *ocellaris*)** While this hybrid has been seen in the wild, it has also been made in captivity. This, and the next three hybrids, were created accidentally at ORA when sperm from one species managed to reach and fertilize eggs in a different tank connected via central filtration. Julian Sprung documented this in his article "Accidental Selection" in the July/August 2011 issue of *CORAL* Magazine.

***Amphiprion* (*clarkii* X *ocellaris*)** This hybrid eliminates a parentage candidate when thinking about *A. thiellei*'s potential hybrid nature. Clarkii and Ocellaris are both present in the Philippines, but their outcome is very unlike *A. theillei*.

***Amphiprion* (*clarkii* X *ocellaris* "Darwin/Black")** This ORA accident is almost the same as the previous one, but the Black Ocellaris parent changes everything about the appearance of the offspring.

***Amphiprion* (*clarkii* X *trincinctus*)** This is the last of the ORA accidental hybrids and is not worth re-creating.

Intergeneric Hybrids

In the world of clownfishes, there are only two genera: *Premnas* and *Amphiprion*. In order to create an intergeneric hybrid—one that crosses genus lines—you have to incorporate some sort of Maroon Clownfish. Intergeneric orchid hybrids are given made-up botanical genus names that combine the genera of the parental species; whether or not we need to do that in clownfish breeding is unclear, but if we did, some group of breeders would have to get together and decide between the endless possibilities: *Pramphiprion*, *Premprion*, *Premphiprion*, *Premnion*, *Premnasion*, *Premnamphiprion?* For now, I'll use the abbreviation *Pram.* to represent the intergeneric "hybrid genus" in the following descriptions.

***Pram.* "Cocoa"** (*Premnas biaculeatus* "White Stripe"

THE DANGERS OF HYBRIDS

The fact that hybridization cannot be undone sits at the core of generally negative sentiments toward hybrids. For conservation biologists, "hybridization" is generally a dirty word, inasmuch as hybrids can lead to the loss of distinctive species. For those of us in the aquarium world, and especially breeders, it is their potential to be passed off as pure species, and thus their ability undermine the work of maintaining wild-type strains of fish, that raises concerns about hybrids.

Conservation aside, hybridization at low, ongoing levels can severely impact the aesthetics of a pure species. A striking example of this was recently documented in Lake Victoria. Researchers discovered two sympatric cichlid species sharing a common range, normally quite distinct and vibrant, in a location where the mate selection processes broke down and allowed hybridization to occur. The now impure populations appear muddled, muted, and simply less attractive.

WHY DO WE CREATE HYBRIDS?

Hybridization often appeals to breeders, particularly those who have yet to understand the need for a conservation ethic, for a few reasons. First: vanity. We're all guilty of wanting to "do something new," and the instinct runs especially strong among breeders of aquarium fishes. In fact, it's relatively easy to create a new hybrid. By comparison, it can take two to ten years and thousands of dollars to investigate an aberrant form once it is discovered and obtained, and in the end, the aberration might not even be genetic and heritable.

At a commercial level, hybridization can be very appealing. Hybridization, particularly creating primary hybrids between species, offers instant and replicable results. There is the added benefit that there isn't a wild fishery to compete with.

Hybrids between disparate species are generally very unique; the *Amphiprion* (*clarkii* X *frenatus*) hybrid won't be confused with any pure species, so it's somewhat benign. However, you can't make this hybrid without the species. When I set out to recreate this hybrid, I need to breed (or find) purebred Tomato and Clarkii clownfishes too, which I never would have done otherwise. A hybrid like this may well be beneficial, creating a need to preserve the parental species, even if only so we can remake the hybrid!

—Matt Pedersen

X *A. ocellaris* "Darwin) This was the first of the documented Maroon X Ocellaris type hybrids originated by Proaquatix. The adult Cocoa Clownfish actually appears to be a deep red wine color, near black, with white bars.

***Pram.* Blood Orange** (*P. biaculeatus* "Gold Stripe" X *A. ocellaris*) This is a second Maroon X Ocellaris hybrid; this one was created by ORA.

***Pram.* Mai Tai** (*P. biaculeatus* "White Stripe" X *A. ocellaris*) This was the third of similar hybrids, and as near as I can tell the first recorded success with this species was by a breeder from Thailand who goes by the alias Vekin online. Vekin didn't name the hybrid, but another breeder who created the same cross (and perhaps didn't know of Vekin's work) dubbed the hybrid Mai Tai. It is now being offered by Sustainable Aquatics.

***Pram.* (Your Name Here)** (*P. biaculeatus* "Gold Stripe" X *A. ocellaris* "Darwin") Here is the missing fourth hybrid, just waiting for someone to report doing it. We already have the other three primary hybrids between the Ocellaris "twin species" and Maroon "twin species." Someone now needs to breed a Gold Stripe Maroon with a Black Ocellaris. Whoever documents success first gets to name it.

HYBRIDIZATION FUELS THE FIRES OF IMAGINATION

But why stop there? Has anyone bred *Amphiprion percula* with either of the Maroon forms? Why not throw in some Snowflake, Picasso, or Fancy White genes? How about mating a Gold Nugget Maroon with a Black Snowflake Ocellaris? Is anyone else's head spinning yet?

This is likely how ornamental breeding started for many domestic freshwater fishes—Guppies, Goldfish, Bettas, and Koi. Every new gene, and every clownfish species and variant, becomes the raw material for seemingly limitless new forms that no one has ever seen, other than in their dreams.

Being a clownfish breeder myself, I happen to think we are like children playing with matches. We strike a match and watch it flare up. We marvel at the awesome power and potential of the fire. But do we hold onto that match? Do we watch the flame travel closer, until it burns our fingers? Do we react without thinking, dropping that lit match and igniting the blaze that burns our house down? Or, recognizing the destructive potential, do we blow out the match and think about it? Do we talk with others who've already seen the consequences? Do we learn from their experiences?

At this point, we are still children playing with fire.

Special Thanks: *The author and* CORAL *Magazine offer sincere thanks for all the time and effort invested in preparing this and the prior article by those who supplied information and images, especially Bali Aquarich, ORA, Proaquatix, Sea & Reef Aquaculture, RSV Fishworld, and Sustainable Aquatics.*