

# Beauty of the Beast

kid  
space

BIZARRE AND COLORFUL,  
SEA SLUGS FASCINATE  
DIVERS AND RESEARCHERS

SLITHERING RAINBOWS? Tie-dyed gummy worms? If you can imagine those, you can imagine nudibranchs (NU-dee-branks). And not just their colors are eye-popping. Nudibranchs (also called sea slugs) have some of the weirdest lifestyles and most bizarre weapons in all nature.

The underwater cavern off Kauai, in the Hawaiian Islands, is a perfect slug spot. I'm 40 feet underwater when I spot it: a black, thumb-sized blob with rows of blue-white bumps topped with bright yellow. It's Hawaii's fried-egg nudibranch, sunny-side up. I touch it gently. It feels like an old wad of gum.

Nearby, a delicate burgundy rosette gently flutters on a rock. These are the eggs of a Spanish dancer (*Hexabranchus sanguineus*). Spanish dancers look like the ruffle on a Flamenco dancer's dress. They are the largest of the nudibranchs, growing up to 16 inches long. That's a lot of slug!

Nudibranchs are mollusks. All mollusks have soft bodies. Some, like snails and clams, have shells. Others, like octopuses and nudibranchs, do not. Nudibranch means "naked gills." Gills



PHOTOS BY JEFF JEFFORDS

**BRILLIANT, YES - BUT SLUGGISH:** This nudibranch (*Chromodoris annae*), photographed off Luzon in the Philippines, can retract its feathery yellow gills into its body. Its bright colors proclaim to predators: 'Don't eat me - I'm poisonous!'

take oxygen from the water, just as lungs take oxygen from the air. Many nudibranchs have feathery gills on the outside of their bodies.

There are about 3,000 kinds of sea slugs. Most live on coral reefs, but some live in the Arctic and Antarctica. Some nudibranchs live in shallow tide pools, and others live deeper than 3,000 feet (1,000 meters).

What they eat varies widely, too. Researchers have identified at least 100 species of sea-slug food sources, including algae, seagrass, worms, other mollusks, crustaceans, soft corals, sea squirts, and sponges. Many feed on a single species - a particular sponge, for instance.

Sea slugs aren't

speedy, but they do get around. When the Spanish dancer's eggs hatch, the larvae will float on ocean currents until they find a good spot. They may travel for hundreds of miles before landing on a suitable coral reef.

#### Eating poison - and recycling it

Nudibranchs may look soft and helpless, but few animals snack on slugs. Nudibranchs manufacture poisonous and nasty-tasting slime. Fish that nibble a nudibranch spit it out quickly. A sea slug's wild colors help keep predators away, too. They are a warning and a reminder to hungry fish: "Don't eat me, you'll regret it!"

Nudibranchs are the ultimate recyclers. Many of their poisons and bad-tasting chemicals come from the sponges, anemones, and stinging corals they eat. Nudibranchs can slurp up these chemicals and make them part of their own body without harming themselves.

Some nudibranchs eat the stinging cells of anemones and fire corals. How can a sea slug eat stinging cells without getting stung? They eat "baby" cells that are not yet ready to sting. The baby stinging cells pass through special tubes in the nudibranch's body and are stored on the nudibranch's back.

When the stinging cells mature, the slug becomes a crawling weapon, bristling with missiles ready to fire. It's as if you could swallow a slingshot and then shoot stones from your back!

Some are solar-powered  
Among land animals,

carnivores like lions eat meat, and grazers like zebras eat grass. Humans eat meat, but they also farm. Nudibranchs are carnivorous grazers that sometimes "farm," as well!

Sea slugs don't have eyes, only simple sensors that detect light and dark. They also have small organs (rhinophores) that "smell" the water and help them find prey.

Sponges, anemones, and stinging corals look like plants, but they are really animals that stay in one place. When a nudibranch finds a sponge, anemone, or coral, it scrapes off bits with its rough radula (tongue).

Some nudibranchs farm by eating tiny plants (algae). Instead of digesting the algae, the nudibranch keeps them alive under its skin. These "solar-powered" sea slugs can absorb energy from their own portable greenhouses.

#### Why aren't they in aquariums?

Diving in the cavern off Kauai, I come across two small nudibranchs huddled on a ledge. The pale, inch-long slugs are crisscrossed with gold lines and seem to glow from within.

It's not easy to find a tiny mate on a big reef - especially if you are slow and only see light and dark. Most nudibranchs increase their chances of finding a mate by not having an opposite sex. Because every nudibranch is both male and female, a nudibranch has only to find another slug of the same species. (On land, worms follow this pattern as well.)

Nudibranchs are a favorite of underwater photographers. They are colorful and fascinating - and they can't sprint away from a camera. Mary Jane Adams, a physician from California, spends her free time diving and photographing nudibranchs. "There is still

Continued on next page

## More on nudibranchs

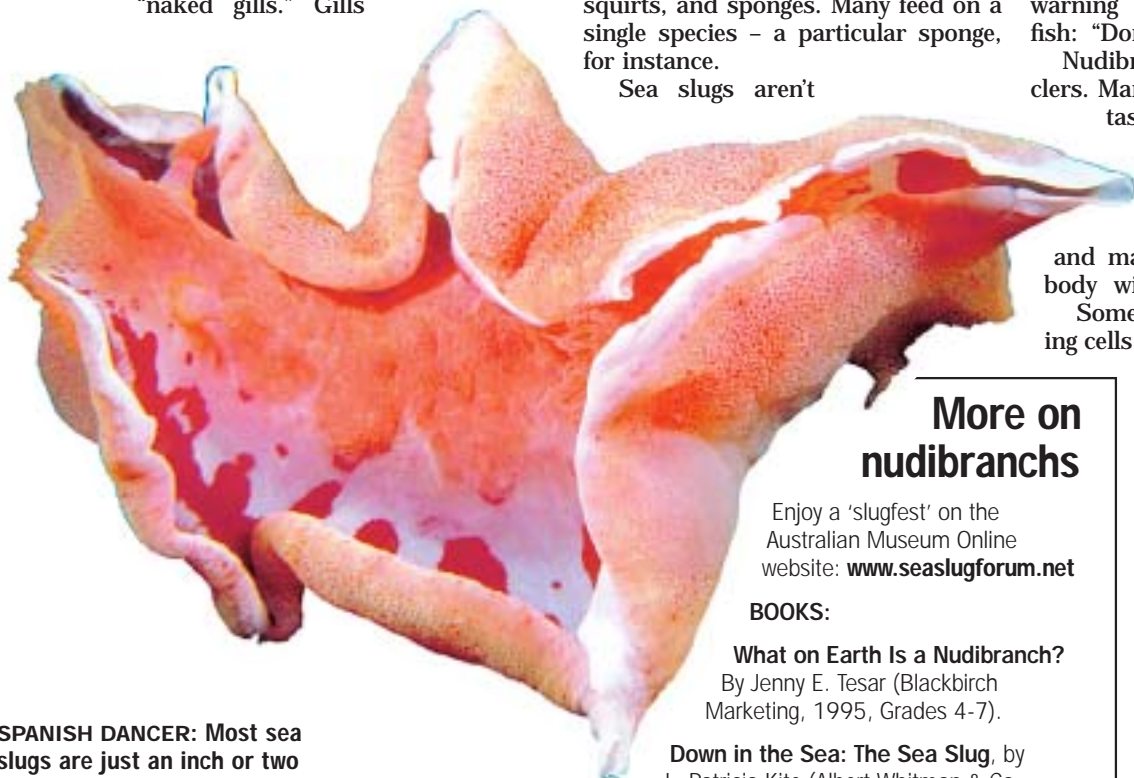
Enjoy a 'slugfest' on the Australian Museum Online website: [www.seaslugforum.net](http://www.seaslugforum.net)

#### BOOKS:

**What on Earth Is a Nudibranch?**  
By Jenny E. Tesar (Blackbirch Marketing, 1995, Grades 4-7).

**Down in the Sea: The Sea Slug**, by L. Patricia Kite (Albert Whitman & Co., 1994, Grades K-3).

P.S.T.



**SPANISH DANCER:** Most sea slugs are just an inch or two long. The one shown here is a foot long, but it can grow to 16 inches. It is shown swimming.

Continued from previous page

so little known about them, even the common ones," Ms. Adams says. "My favorite is one I call 'The Alien.'"

Adams was diving at night off Papua New Guinea in the South Pacific. Her flashlight caught a small, silvery nudibranch with strange red feelers creeping over the sand. She was the first to photograph a live *Kalinga ornata*. "It really does look like a creature from outer space!" she says.

You might expect to find colorful nudibranchs in an aquarium. However, sea slugs don't live long in captivity. If you want to see a living "alien," you'll need to explore tide pools, or put on a face mask and flippers. Come on in - the water's fine!

**How one diver said 'I love you'**

And if you're a diver and a nudibranch fan, how do you say "I love you" on Valentine's Day? If you're biologist Dave Behrens, you "say it with slugs."

Mr. Behrens writes books about nudibranchs. He's discovered more than 40 new species of them. When a scientist finds a new plant or animal, he or she can give it a unique name to go with its group (genus) name.

One Valentine's Day, Behrens surprised his wife, Diana, by naming a sea

slug after her. *Chromodoris diana* (which means "colorful sea goddess Diana" in Latin) is a lovely bluish-purple nudibranch with black racing stripes and stylish yellow highlights.

"I thought I was doing a great thing," Behrens says, laughing. "But she said she would have preferred diamonds!"

**Mystery of the black sea slug**

The oddest Odd Couple of the ocean may be the snapping shrimp and the shrimp goby. The nearsighted shrimp is the builder and housekeeper. It digs a place for the pair to hide. The sharp-eyed goby provides food, hunting and watching for danger. The two stay together for life.

Enter a black nudibranch whose name (*Gymnodoris nigricolor*) is longer than it is. This pesky nudibranch is sometimes found hanging onto the shrimp goby's fins.

"This little nudibranch is dragged around on the back of a bucking bronco, as the goby goes in and out of its hole," Behrens says.

Is the slug a Freddie freeloader? Or a budding buddy? "Nobody knows," the scientist says.

Pamela S. Turner

**SOME NUDIBRANCHS 'FARM' ALGAE UNDER THEIR SKIN; OTHERS RECYCLE POISON FROM THEIR PREY.**

**A BORROWED DEFENSE:** The Aeolid sea slug (right) has long fingerlike digestive glands, called cerata, on its back. The cerata store poisons collected from animals the slug has eaten. It uses the poison to defend itself. The unidentified nudibranch below was found on a coral reef in the Fiji Islands. Note its feathery gills.



JEFF JEFFORDS



MELANIE STETSON FREEMAN - STAFF

TODAY'S ARTICLE ON CHRISTIAN SCIENCE

For kids

**Do you know who you are?**

TRY TO PICTURE this scene: It's rainy and cold and there's a big fire burning. A man named Paul and a group of men are wet and huddled around the fire. Their ship was wrecked in a storm, and they swam ashore to this island. The island people built a fire to welcome the men and help them get warm and dry (see Acts, chapters 27 and 28).

At one point, Paul gathered up a bundle of brushwood and was adding it to the fire. He didn't know it, but there was a viper (a poisonous snake) in the wood, and it crawled out and bit Paul on the hand.

The island people who saw this immediately said, "This man must be a murderer." They thought the viper bit Paul to punish him for terrible things he had done. They expected him to drop down dead. But Paul threw off the viper into the fire. And he wasn't hurt.

How could this be? We need to go back some years earlier in Paul's life in order to understand how this could happen.

When Paul was younger, he was a leader of a group of men who were persecuting Christians, the people who were following the teachings of Jesus. And he was doing terrible things. He went looking for those who were Christians and then he had them sent to prison. He didn't even try to stop anyone from killing them.

But one day when he was traveling along the road, intending to do more harm to people, he was blinded by a light from heaven. He heard a message saying that Christ Jesus had a purpose for him (see Acts 26:16, 17). He was supposed to help others see the power of God so they could have their sins forgiven. Paul immediately obeyed this message and began traveling and telling everyone about Jesus and what he taught about God. Paul healed people too, just as Jesus did.

Paul was changed. He became a new man. He knew who he was. God was his Father. He was God's son, made in God's own image. So Paul put off the old, hateful things about himself and became what God intended for him to be. He stopped doing wrong and started doing great things to help people know about God.

So years later around that big fire when someone said about Paul, "He

must be a murderer," Paul knew that wasn't who he was. And he immediately threw off the viper (and the bad things the people said about him), and he was safe.

Paul was protected because he knew who he was. Knowing who you are can protect you, too. What Jesus taught is true about you, too. God is your Father. That means you are God's child, made in God's own image. That might seem impossible, but it's true.

If God is good, you must be good. If God is intelligent, you must be smart. If God is powerful, you must be strong. Maybe you know other good things about God that will tell you something more about who you are. Of course, you can always ask God to show you how you're like Him.

So if you ever hear those voices in your head saying things like, "You're ugly." Or, "You're dumb." Or maybe the voices come from other kids saying, "You're no good. You can't be on the team." No matter where the voices come from, you can always stop and think about how God made you in His own image. And you can't turn into something else. So those put-down voices can't possibly be right. Shake them off.

**Those put-down voices can't possibly be right. Shake them off.**

Remember how Paul changed? You might change too. Finding out how wonderful God made you changes how you think about yourself, and then you might find that you're acting more like God made you to be. Then you'll be "new," too.

When you're sure about who you are, you can't be tricked into believing something about yourself that's not true. When you know who you are, then you can be as God made you.

*Put on the new man, which after God is created in righteousness and true holiness.*

Ephesians 4:24

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