

Nudibranchs

by Mike Bartick and Dr. Terence Gosliner

Seemingly crafted for photographers, nudibranchs are slow-moving, vibrant, and have adapted to curious shapes and sizes. Opisthobranchs, commonly called Nudis or Slugs, can be found worldwide. However, the most incredible variety and abundance are primarily found throughout the Indo-Pacific region, particularly in an area designated as the Coral Triangle. Aside from their cute demeanor, slugs also play an essential role in science and have been the focus of study for many decades. They are helping researchers discover more about the functions of evolution and medical research, and they could even help relate to the health of many ecosystems in our oceans. Yes, slugs might be adorable, but their significance cannot be understated.

Certain “hotspots” for slugs also exist in the area loosely mapped by science that forms the Coral Triangle. This region roughly includes Papua New Guinea, Indonesia, and parts of the Philippines, with Anilao standing out as the premier location on the main island of Luzon in the Philippines, now synonymous with macro diving.

Situated on the southwest tip of Luzon, Anilao is directly adjacent to the Verde Island Passage, the main water corridor that flows through the region separating Luzon from its neighboring island, Mindoro. Since 1992, scientists have partnered with local researchers and dive guides to conduct numerous biodiversity studies in the Anilao area, and their findings are simply staggering.

The leading scientist conducting most of the studies in Anilao is

Dr. Terence Gosliner is the head curator in the Department of Invertebrate Zoology at the California Academy of Sciences. He specializes in adaptive evolution and has devoted much of his life to researching, documenting, and scientifically describing his findings. He spends a significant amount of time in the field, diving and scouring the seabed for new animal life. He is a true modern-day explorer and the author of several ID and natural history books.

For context, around 3,000 nudibranchs have been discovered globally, with just over 1,000 of those found in Anilao alone! Most can be attributed to Dr. Gosliner’s and his teams of experts.



Caloria militaris- A larger slug with lovely orange tipped cerata, orange tipped and smooth rhinophores. This lovely creature has gone undetected for the last 15 years or so, until it recently turned up during our study. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, + EMWL 160° - Backscatter HF-1 with domed diffuser . 1/125th @ F13. ISO 200

The magnitude of this kind of research cannot be conducted alone, so he and other scientists have enlisted groups of divers as citizen scientists to assist in the challenge. This eclectic community of devoted sluggers comprises naturalists, self-taught experts, and, believe it or not, newbies. Groups can include divers of all ages, too, which helps them learn about our planet’s diversity firsthand while working shoulder to shoulder with leading experts.

At a recent Citizen Science Nudibranch Workshop(April 2026, Bi-annual), I sat down with Doc Terry to discuss the importance of the Verde Island Passage and the significance of such projects.

“Having citizen scientists identifying species adds critically important biodiversity data that is used in establishing priority areas for conservation. The collaboration of scientists and knowledgeable public members has proven to be a valuable



Doc Terry

partnership to provide the basis for making science-based decisions that protect biodiversity for future generations. This partnership has demonstrated that Verde Island Passage is one of our planet's most remarkable and iconic marine ecosystems that mandates its protection."

Q- How long have you been studying Nudibranchs

Doc Terry- "I have been studying nudibranchs since I was a high school student growing up on the California coast."

Q- Why Nudibranchs

Doc Terry- "Nudibranchs are not only some of the most beautiful creatures on the planet, but their amazing adaptations tell us much about the process of evolution, and they are also important model organisms for biomedical research."

Q- Why Anilao and the Verde Island Passage

Doc Terry- "For the same reason, scientists who study terrestrial biodiversity go to the Amazon; it is simply the richest marine habitat on the planet. Where else in the ocean



Siphopteron sp. A known genus but an unknown species. Siphopteron are very small and are often called "batwings". When feeling threatened, the batwings flap their mantle like a bat and quickly escape. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, + SMC2. Backscatter Miniflash and snoot. 1/200th @ F29. ISO 125

can you discover new species daily, even after more than 30 years of continuous study?"

Q-Is it important to work with local colleagues to substantiate the findings

Doc Terry- "It is essential to work with local partners such as dive guides, resort owners, members of the fishing community, and local

governments to build a consensus on how to sustain the livelihoods of local people that are going to meet short-term needs and secure the long-term protection of biodiversity hotspots. A bottom-up partnership is always more effective than one that is top-down. Communities must have a stake in their future!



Miamira tenue- Symbiotic relationships are somewhat common underwater. This type of slug is often found with a partner shrimp riding along its back and sides. This combination always makes for a great series of images. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, + EMWL 100°, Backscatter miniflash and snoot. 1/40th @ F32. ISO 160

For anything to survive, specific factors must align perfectly. One-off subjects cannot endure in isolation or evolve independently.

A food source, a mate, and a survival strategy are essential for existence. If one of these puzzle pieces doesn't fit properly, that species may cease to exist. However, Mother Nature doesn't easily give up on her creations and will do everything she can to alter designs on the fly through adaptive evolution. The process is

slow from a human perspective, but over generations of environmental pressures, all creatures must develop new survival methods or perish. It is difficult to observe the changes broadly, but they occur right before our eyes; the proof lies in the details.

Examining a specific group of animals over an extended period can reveal a great deal about the subject of your study, as well as provide insights into the health and environment of their habitat. Such



Costasiella kuroshimae AKA-Shaun the sheep, feeds on the algae that live on the *Avrainvillea* seaweed and is not actually a Nudibranch. Shaun the Sheep is a sacaglossan that steals and stores chloroplasts, which are then used to create biological energy. This one is approx. 3mm in size. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, + SMC 2 shot in DX mode-Backscatter Miniflash and snoot. 1/160th @ F29. ISO 160

study subjects, known as indicator species, like nudibranchs, are ideal for these kinds of studies.

The science behind describing any new species is as dynamic as the subjects being described; science is not static. Following each clue to determine the exact genus and species based on systematics has evolved dramatically over the last 50 years. In the past, it was necessary to collect multiple samples of the same

“new species.” Descriptions were often based on scientific comparisons and personal opinions while analyzing similarities or differences to species within a similar genus. Comparative analysis has been and continues to be used frequently before an actual description and is usually denoted by “sp.” behind the name of the genus. For instance, “Siphopteron sp.”, or species.

Today, scientists use DNA



Gymnodorididae are carnivorous predators that stalk their prey by using their scent trail to track them. This Gynmodorid is in the act of consuming another slug. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, + MFO-, Backscatter Miniflash and snoot. 1/200th @ F20. ISO 125

sampling to uncover the truth behind clues, but it doesn't necessarily make their jobs easier. In fact, it can complicate them even more, as the ripple effect can extend to the subjects' closest relatives and descendants. This situation arose with the largest known class of slugs, the Chromodoris. In 2012, Doc Terry and a colleague discovered through new sampling methods that the largest group of slugs (Chromodoris) consisted of three separate and unrelated groups.

In response to this latest finding, they classified them into three new groups: Chromodoris, Goniobranchus, and Felimida. If this seems confusing, consider this instance merely the tip of the iceberg. DNA sampling techniques have advanced rapidly over the last decade, enabling scientists to trace and accurately position the new species within the tree of life and assign their binomial names. Humorously, it is said that the only things that haven't changed are the common names often used by guides



Favorinus sp.2- Preying on the eggs of other slugs, primarily the eggs of Hexabranchs aka Spanish dancers. The Dancers eggs appear as a deep red rose coiled on coral heads. More often than not, Favorinus can be found within the delicate ribbon, consuming the eggs. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, + SMC 2, Backscatter miniflash. 1/160th @ F20. ISO 200

and divers: Cinderella, Pika-Chu, and the Sea Bunny, to name a few.

The discovery of new animal life on our planet evokes a sense of wonder and a litany of questions. How did it get there? Why now? What is it feeding on? How will it survive? Imagine discovering a new type of Homo sapiens. At the rate of new discoveries and the lack of scientists to conduct proper research, a backlog of many types of creatures has yet to be named. Our oceans are teeming

with unknown life forms still waiting to be found and described.

Science and slugs go hand in hand; the more you get to know them, the deeper down the rabbit hole you slide. Nudibranchs are a true gateway drug for marine life.

Slugs, slugs, and more slugs begin to appear as you slowly find and search the substrate. Some are smaller than a grain of rice, and while their tiny size makes them harder to spot, larger slugs can be just as



Thecacera sp.2-The “Pajama pika chu” is a special slug that shows up once a year when the water temperature drops, and the hydroids in which they feed on are abundant. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, + Kraken +6 diopter, Backscatter Miniflash and snoot. 1/200th @ F18. ISO 100

elusive. For instance, many slugs hide under ledges or burrow into sponges while they feed. Some are nocturnal, while others are subterranean or mimic the corals they inhabit. In some cases, slugs even harness photosynthesis to help produce simple sugars for their diet.

Most slugs are specialized feeders that consume specific types of food. One technique for finding these specialized creatures is to locate their

Food source: locate the food and observe the slug. It seems

straightforward, but the rule always comes with a caveat. Certain food types may only appear once every few years, making sightings of the slugs that depend on them rare but thrilling discoveries.

What do plants, solar panels, and a special class of nudis have in common? All use sunlight to create energy.

Phylodesmium is a unique class of slug that demonstrates nature is truly better than art, or, in this case, science fiction. These specialized



Melibe Colemani appear as a bundle of dental floss on the substrate and are considered a “Holy Grail” find for nudibranch enthusiasts. Sometimes called the Ghost Nudi, due to their difficulty to see, even when looking directly at them. The white lines are actually their muscles on an otherwise transparent body structure. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, Backscatter miniflash and snoot x 2, one with color gels. 1/200th @ F20. ISO 160

creatures feed on zooxanthellae algae and retain the living algae within their tissues. Their digestive tracts connect to the algae, utilizing photosynthesis to gain energy from sunlight. This amazing phenomenon also includes Baeolidia and Melibe, but only in the Indo-Pacific regions.

Nudibranch—translated, means naked gill. Most slugs in the Dorid class have an exposed gill structure, which enables respiration. The gill

plume is located at the rear of the slug and typically features a color scheme similar to that of the rhinophores, its main sensory organ.

Aeolidia do not have the standard gill process. Instead, they possess cerata, which appear as a thick, colorful mane along their back, matching the color scheme with the rhinophores. In addition, they have oral tentacles that can be short or long, resembling a handlebar



Miamira allenii uses mimicry as camouflage and appear as coral. Gerry Allen accidentally discovered this special slug when he saw some coral next to his elbow creeping along the substrate, only to discover it had rhinophores and gills! They can get up to 6 inches in length, have a pink coloration, and have well-protected gills. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, + EMWL-160°, Backscatter Atom Flash and Snoot. 1/600th @ F22. ISO 100

mustache.

Rhinophores come in various shapes and designs, helping to identify one species from another. Their primary function as chemoreceptors is to detect the chemical scents or mucus trails of their prey. Many slugs also have visible eye spots that can detect light, but they are not truly capable of vision beyond that.

Like any study, you should

explore as many scenarios as possible during a workshop to gather the most information and compare it with previous studies. Since 2016, our core group has compiled a list of over 400 slugs. During the workshops, “the list” is distributed to each team involved in the study. Each team consists of four divers and one or two guides. Together, the teams explore various dive sites around the Anilao area, taking photos and searching diverse

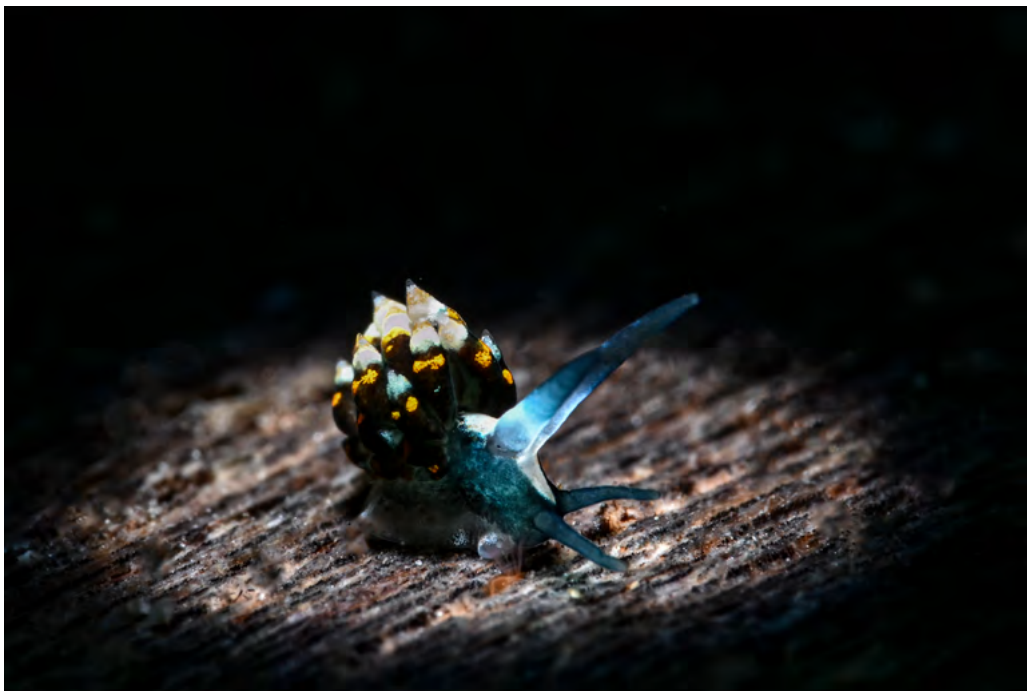


Placida sp. The discovery of a slug that lives within a bubble found on the substrate opened a Pandora’s box of questions for slug hunters and scientists alike. How did it get there, how does it mate, how do they feed, can it get out, do they create the bubble and many more. Nikon Z8, 105mm F2.8 Nikkor, Nauticam housing, + SMC2- This image is cropped, Backscatter miniflash. 1/200th @ F32. ISO 80

habitats. Each site yields different slugs, with minor overlaps usually comprising those less finicky about their diet. All information is recorded and submitted to the group’s data master, who then transfers the data onto a graph. This allows the teams to measure our real-time progress during our sometimes heated morning discussions.

One of the notable characteristics of slugs is their color and shape.

Due to evolutionary processes, opisthobranchs lost their gastropod shells, which forced them to adopt new strategies for protection. Over generations, shell-less slugs developed several new methods for camouflage and self-defense. Color variations within a species can often confuse enthusiasts into thinking they are seeing a new nudibranch, as described in Dave Behrens’ book, “Nudibranch Behavior.” He goes on



Stiliger SP-F - This is a new and undescribed slug. Nikon Z8, 105mm F2.8 Nikkor + SMC2 shot in DX mode, Nauticam housing, Backscatter miniflash. 1/160th @ F32. ISO 250

to detail the form and function of the flamboyant color schemes that occur across many other species of slugs.

For self-defense, slow-moving, vulnerable slugs need a solid plan to fend off predators. Part of this involves a behavior scientists refer to as aposematic coloration. These bright colors serve as a warning because once bitten, the slug will unleash its secret weapon, injuring and possibly killing its potential predator. Many slugs presumably acquire an unpalatable flavor from their diet, while others have stinging

cells. Like other marine organisms, nematocysts are the preferred weapon for inflicting damage during an attack. The nematocysts are ingested as a byproduct of consuming hydroids. The immature cells are then transported to the cerata or glands, where they eventually mature within the slug. Each nematocyst cell, when magnified, appears as a tightly coiled spring with a sharp barb on one end, ready to discharge with the slightest disturbance. When bitten by a fish, this self-defense mechanism involuntarily discharges, delivering fatal wounds in

the fish's mouth.

Photographing slugs can be accomplished in various ways. For a scientific study, capturing an identification photo from above or laterally is essential, ensuring that as much of the slug is in focus as possible. It is also important to photograph the slug undisturbed and in its natural habitat. Using a ring flash or front lighting is ideal for this type of photography. Additionally, when discovering a new slug, it is crucial to take that identification photo first so it can be adequately identified before getting creative.

A completely different composition style is necessary for a more expressive rendition. The true challenge lies in merging the two styles to artistically depict the slug while ensuring it can be properly identified. To achieve this, ensure the rhinophores or eye spots are sharp. Additionally, leverage the available colors and patterns. Macro lenses, diopters, and even wide-angle lenses can be utilized effectively, provided the slug occupies a significant portion of the frame. Employing negative space is also crucial for creating a portrait. Taking a slightly upward angle enhances perspective, and getting close ensures clarity, contrast, and minimal backscatter. Lighting, of course, is everything when shooting this way. Using a

snoot, a single strobe, strobes at varying power settings, backlighting, or combinations of these techniques helps create striking photos. Slugs can be photogenic even when sitting still.

From ID to art, and nestled between sci-fi and true science, opisthobranchs, nudibranchs, or slugs—whichever name you prefer—are among the most dynamic subjects you could encounter on any dive. Like hunting for colorful needles in a haystack on steroids, continue searching for self and science, and who knows, you might accidentally stumble across a new and undiscovered life form right here on planet earth.

Our next Citizen Science Workshop is April 1-10, 2027. All are welcomed to attend as long as you bring a sense of adventure, your sense of humor and your sense of curiosity.

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