

# Diva of the Deep

World-renowned aquanaut and shark expert  
Dr. Eugenie Clark bites into some meaty topics



JONATHAN BIRD PHOTOGRAPH (FOREGROUND)  
WILLIAM M. MERCADANTE PHOTOGRAPH (BACKGROUND)

BY HILLARY VIDERS



**Dr.** Eugenie Clark's youthful appearance and exuberance belie the fact that for more than 50 years she's been a leading force in marine science, diving and deep-sea exploration, environmental conservation, and academia. Dr. Clark founded and directed Florida's Cape Haze Marine Laboratory, which was later renamed the Mote Marine Laboratory in Sarasota, Fla. She pioneered important discoveries about the behavior of sharks and tropical marine sand-dwelling fishes of the Caribbean and Red seas.

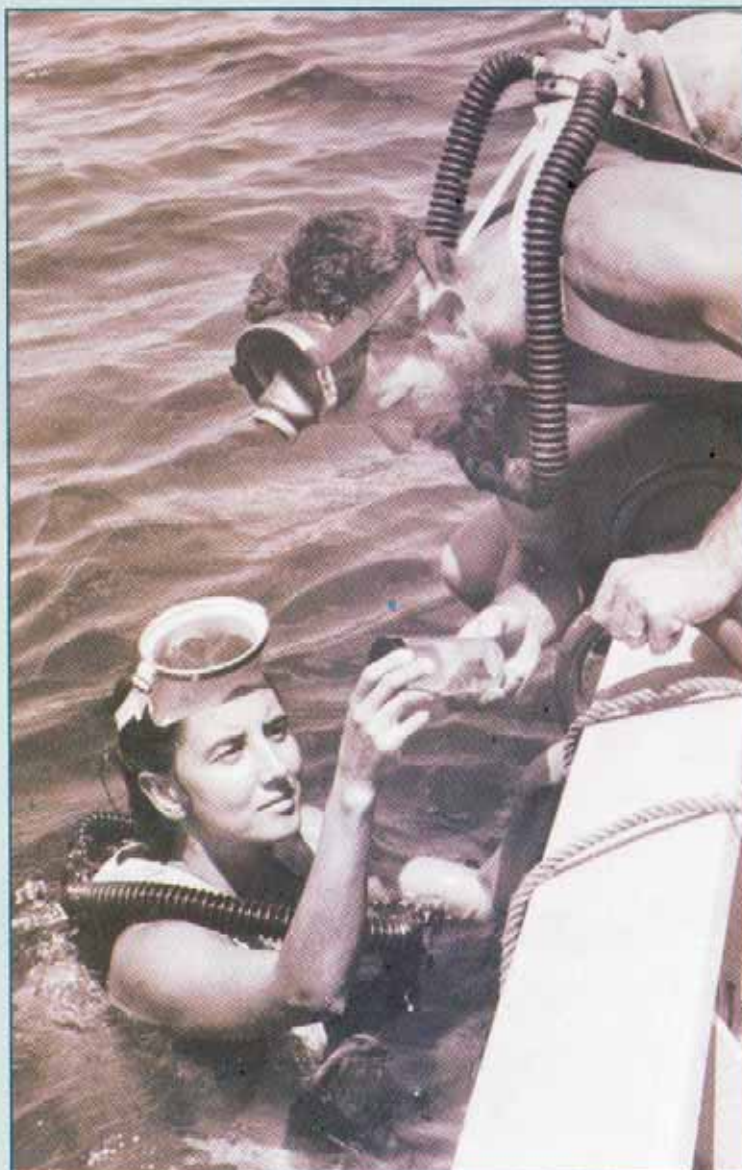
Dr. Clark also enjoyed a distinguished career as a professor of zoology at the University of Maryland. Although she officially retired in 1992, as Professor Emerita, Genie retains her office and secretary at the university and continues to give her courses, and organizes and leads expeditions to the Red Sea, Mexico, Caribbean, Australia, Papua New Guinea, the Solomon Islands, Indonesia, Thailand, Vanuatu and Palau.

Since she donned her first set of underwater gear in the 1940s Dr. Clark has dived longer than any woman. She has reputedly dived with more sharks than any other human being; and she has used everything from scuba and snorkeling gear to hardhat diving gear and submersibles to depths of 12,000 feet / 3,600 meters. An avid leader in marine conservation, for more than a decade, she worked with and lobbied the Egyptian government to create the first Egyptian National Marine Park, in Ras Mohammed.

She has received countless honors and awards. She has worked as a consultant, commentator, co-director or principal in 24 television specials, including the current IMAX film on sharks. Four species of fish have been named after her, and she has been profiled in more than 100 magazines and newspapers. She has written more than 200 articles, academic papers and two best-selling books, *Lady with a Spear* and *The Lady and the Sharks*. Dr. Clark's personal life, which includes Japanese ancestry, five husbands and four children, is no less fascinating than her career. In the following interview, conducted after she returned from one of her many field trips to Papua, New Guinea, where she contracted malaria, Dr. Clark discussed some of the highlights of her incredible life.



1959 — Eugenie and her second husband, Ilias Konstantina, with their four children: Aya, Tak, Hera and Nikj on the beach near their home in Sarasota, Fla.



1959 -Eugenie and fellow researcher at the Cape Haze Marine Lab.





1965 — Eugenie receives NOGI Award in Arts Underwater Society of America



1965 — Measuring a tiger shark at Cape Haze Marine Lab

**HV** It's a great relief to hear that you are on the road to recovery from malaria. Did this attack occur even though you were taking anti-malaria medication?

**GC** I used to take malaria pills, but I don't like to be on any medication while I'm diving, so on this trip, I just applied mosquito repellent.

**HV** When did you first realize that you had this deadly disease?

**GC** On my way home from New Guinea, I stopped in Sydney to visit the opera house and I felt very weak. When I arrived in Honolulu, I was getting chills. I ignored these symptoms and continued on to L.A. to visit one of my sons, Niki. I was feeling weak and was experiencing chills again, so I took a hot bath. Suddenly, I passed out, and my son called 911 and had me taken to the hospital.

**HV** What do your doctors feel is the long-term prognosis for your condition?

**GC** I was told that the malaria may recur at any time in my life, but I'm too busy with my work to worry about that. In general, I don't worry much. I'm careful, but if I can't do anything about a situation, I don't worry about it.

**HV** The diving you do is often dangerous — very deep and up close with large, unpredictable creatures. Surely, you must have experienced at least one moment during which you said to yourself, "What the hell am I doing down here?"

**GC** I never did. I only make deep dives — below 200 fsw — because I need to observe something, such as deepwater tilefish. None of my dives are recreational. They are all made with careful scientific protocols and safety backup. So, there is nothing underwater that frightens me. I am, however, terrified of ghosts.

**HV** Ghosts? Come on, you're kidding, right?

**GC** No, I mean it. My Japanese grandmother used to tell me hair-raising, but wonderful, stories about ghosts, which in Japanese, are called "obake." I was so afraid of obake, that until after I started having



children, I couldn't stay alone in the house. Even years later, when I moved into my large house in Bethesda, Md., I was still afraid to go downstairs at night, for fear that obake might be lurking about. It's ironic that I'm not afraid of anything real, only that which doesn't exist. Don't get me wrong, though. I love a good ghost story! (She laughs)

**HV** Other than your fear of ghosts, even as a child, you were quite a courageous and determined individual.

**GC** I'm not sure it was what one would call "courageous." I simply knew what I loved and I held fast to that dream. When I was in elementary school in New York, my American father died when I was a baby, and my Japanese-born mother was working at the cigar and newspaper stand in the lobby of the Downtown Athletic Club. On Saturdays, while she worked, she left me nearby in the old New York Aquarium at Battery Park, where I spent many hours watching the fishes. From the moment I saw my first shark, I was fascinated by these mysterious creatures, and I wanted to swim with them in the ocean.

**HV** Besides your visits to the New York Aquarium, you've mentioned that you also learned a lot about marine life from your stepfather, Masatomo Nobu, who was a restaurant owner and chef.

**GC** I knew more about produce from the sea than any of my school mates, and I would entertain and shock them with stories of how my family ate with chopsticks, had rice and seaweed for breakfast, and dined on raw fish, octopus, sea urchin eggs, and cakes made from sharks, called "kamaboku." For lunch, I sometimes came to school with rice wrapped in nori (black seaweed), which prompted the rumor that, "Genie Clark eats rice and carbon paper!" It amused me not to correct my schoolmates.

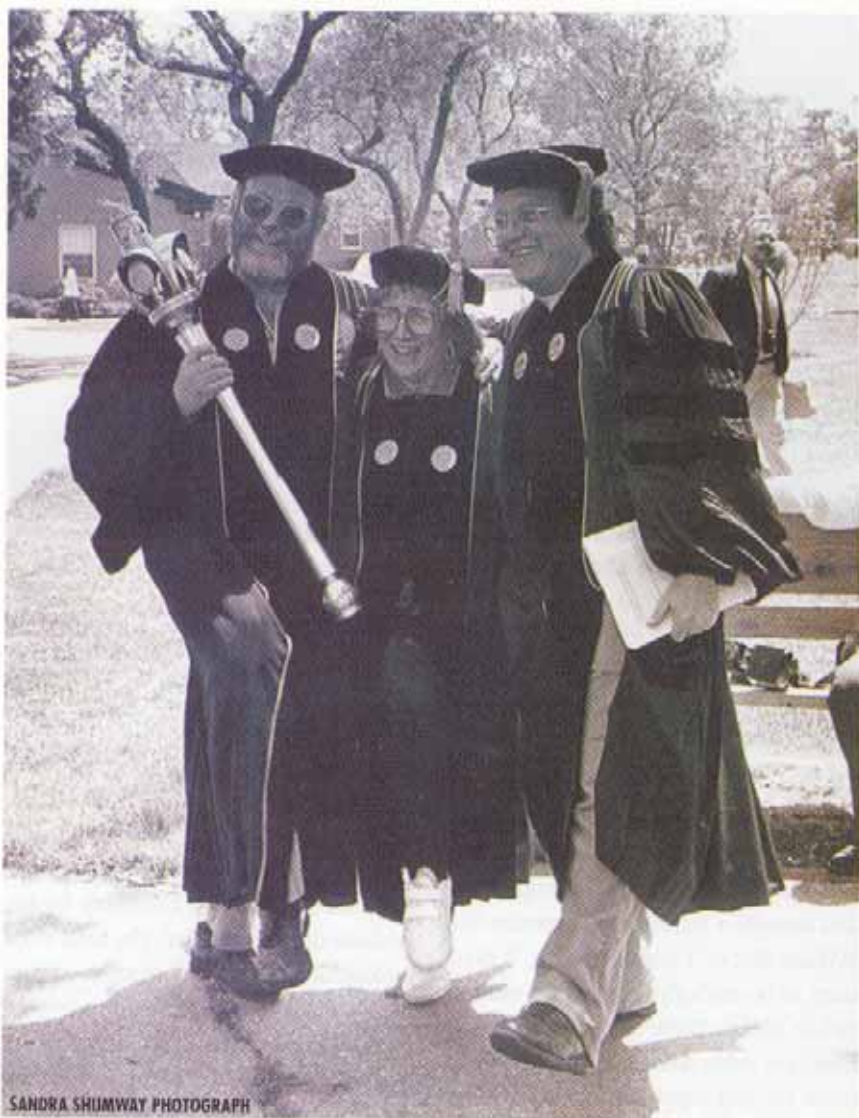
**HV** Did this spark your interest in becoming a marine scientist?

**GC** I'm sure that all this food and my visits to the New York Aquarium had a strong influence on me. But, I was also interested in marine science because of William Beebe,



EMORY KRISTOF PHOTOGRAPH

1986 — With the Deep-Sea Sharks of the National Geographic Society



SANDRA SHUMWAY PHOTOGRAPH

1992 — Receiving honorary D.Sc. degree with famed ice cream makers Ben and Jerry at University of Massachusetts, Dartmouth.





Eugenie with Freddie Aronson and the shark given to Prince Akihito.



EMORY KRISTOF PHOTOGRAPH

1986 — Eugenie aboard the National Geographic Society's submarine *Pisces*, off Bermuda.

who was my hero. I used to read about Beebe going down in the bathysphere and I wanted to do that, too; however, at that time, it was unheard of for a woman to aspire to such a vocation.

I told my family that I wanted to go down to the ocean floor like William Beebe, and they said, "Maybe you can take up typing and become a secretary to a scientist like William Beebe." I answered back, "I don't want to be anybody's secretary. I want to be like William Beebe going down...." And here I am today, doing just that. My family loved me and supported my dream, but they never believed that I would get a job and make money studying fish. As a matter of fact, neither did I. I still marvel at the

course my life has taken and how my dream came true.

**HV** Striving to succeed in a male-dominated field must have been quite a challenge.

**GC** Yes, it was at first. After completing my undergraduate work at Hunter College, I applied to Columbia University for my graduate degree in science. The head of the biology department at Columbia said to me flat out, "Look. We'd have to invest a lot of time and money in you as a graduate student. I can tell by looking at you, that you're going to get married and have a bunch of kids, and you're never going to be a scientist."

**HV** How did you deal with that cold reception?

**GC** I didn't let it discourage me. I enrolled in the master's program at New York University, and I also got my first job, as an assistant chemist, at the Celanese Corporation. I had quite a workload in those days. To attend classes at NYU, I had to commute back and forth into New York City from Newark (up to an hour each way by bus), where I worked at the Celanese Corporation 50 hours a week, and on weekends, I worked as a swimming instructor at an athletic club in Manhattan.

**HV** So, when did you get your first big break?

**GC** My graduate course in ichthyology was given at the American Museum of Natural History in New York City by Charles M. Breder Jr., the curator of the Department of Fishes and former director of the public aquarium at Battery Park. My break came when Dr. Breder became my mentor and supervised my thesis, which dealt with the puffing mechanism of blowfishes. Dr. Breder combined my final master's thesis with a publication of his own studies, and my name appeared as co-author. My pride was as inflated as one of those fishes.

**HV** Did Dr. Breder influence your subsequent work as well?

**GC** Dr. Breder became a lifelong friend and peer. I recently dedicated the newest edition of my second book, *Lady and the Sharks*, to him. In it, I mentioned that I hope to live to a very ripe old age. I watch my cholesterol (not counting ice cream), I do regular aerobic workouts and weight training, I want to be around to celebrate the 70th anniversary of the Mote Marine Laboratory. If not, I don't know if heaven exists, but if it does, I'd certainly like to meet up with Dr. Breder there, so we could continue our fascinating discussions about fish. Speaking of heaven, I can't imagine what it would be like to meet up with five former husbands. How does heaven handle that?

**HV** Did being a woman ever work to your advantage?



**GC** Sure it did. In many instances, when I dove with sharks, people would exclaim, "You're so brave!" even though the men on my expedition were doing exactly the same dives. Or, when I made a scientific discovery, I was given more praise and more media coverage than my male counterparts who were equally, if not more, qualified than me. I was probably given more recognition than I deserved.

**HV** When and where did you make your first dive?

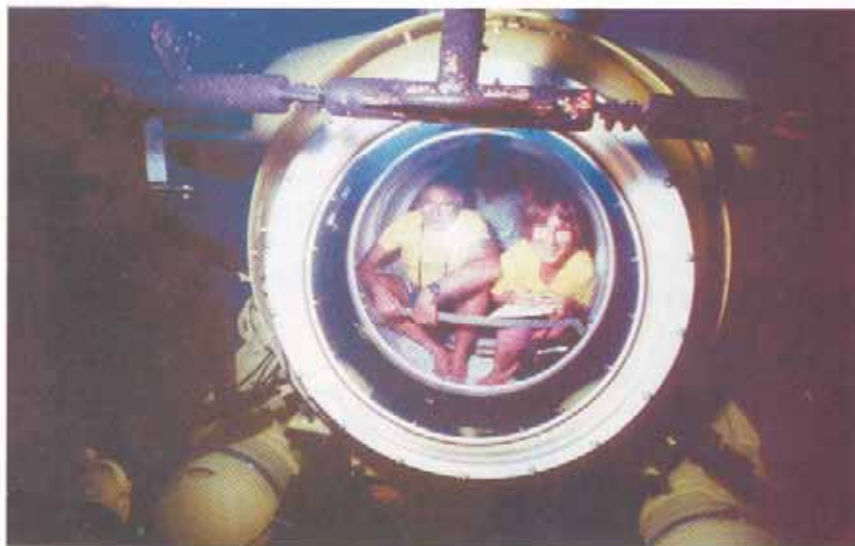
**GC** In 1946, I was invited to Scripps Oceanographic Institution by Carl L. Hubbs to work as his research assistant. Before I learned to scuba dive, I first used a face mask for observing fishes and sharks underwater, and I walked on the bottom of the sea wearing a diving helmet.

**HV** I read somewhere that you made your first hardhat dive after eating hamburger and onions. I'm almost afraid to ask what happened.

**GC** It wasn't pretty! The surface team was supposed to supply air to my helmet via a garden hose, but the hose turned out to be faulty. After diving a few minutes at 30 feet seawater (fsw) in this closed system with no fresh air circulating, the stench of onions and hamburger, not to mention the lack of oxygen, became unbearable. I tried to signal the surface team to abort the dive, but I was so faint that I could only manage to give one pull on the tender's line (the agreed-upon distress signal was five pulls; one pull meant everything was OK). Fortunately, before passing out, I managed to yank off the helmet, and the rush of seawater over my face revived me enough to make an emergency swimming ascent to the surface.

**HV** Much of your work has focused on sharks, which are the most feared creatures on earth.

**GC** The shark's reputation as a vicious man-killer is undeserved. Sharks are very efficient predators, and their diet does not include humans. Nor are sharks "unpredictable," as many people erroneously believe. Actually, sharks are as predictable as people, cats or dogs. But, we need to respect these



1987 — Eugenie and Dr. Sol Klotz begin a dive to 1,000 feet in Grand Cayman.



NIKOLAS KONSTANTINOV PHOTOGRAPH

#### Diving with a reef shark.

amazing animals and understand them more.

**HV** Have you ever been bitten by a shark?

**GC** I've never been bitten, but I've had two close encounters with aggressive sharks. In my first autobiographical book, *Lady with A Spear*, I described an incident which occurred while I was diving with the Cousteau team. Along with the other divers, I was given what I thought was a pretty silly prop, a "bang stick." Well, soon after I was underwater, a large shark started coming toward me. Since my back was pinned against a wall, I reached out and touched the shark with the bang stick, and it took off immediately. To this day, I still do not know what the shark would have done had I not struck

it, but I think it would probably have just swam away.

**HV** You've shown that sharks have much greater intelligence than people realize.

**GC** Sharks definitely have measurable intelligence. For example, they can tell the difference between vertical stripes and horizontal stripes in order to get food.

**HV** So, sharks can be trained?

**GC** Yes. We can train sharks, and they are quick learners.

**HV** How would you compare a shark's intelligence to that of terrestrial creatures?

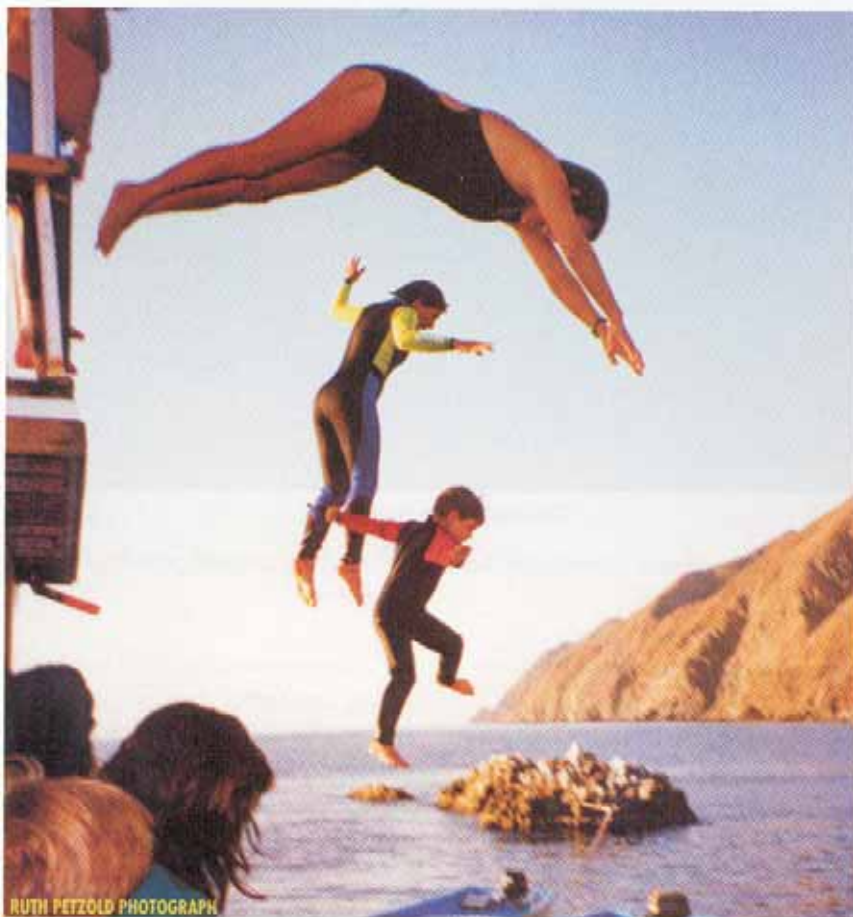
**GC** Sharks aren't as "intelligent" as mammals, such as dogs, gorillas or dolphins. In some problem-solving tests, you can





NIKOLAS KONSTATIDOU PHOTOGRAPH

1995 — Diving with the sharks in Yemen.



RUTH PETZOLD PHOTOGRAPH

1996 — Eugenie takes the plunge into the Sea of Cortez, along with daughter Aya and grandson Eli.

train a shark as quickly as you train a white rat, but that doesn't mean that sharks have comparable intelligence. However, sharks have senses which even human don't have, such as electromagnetic sensory perception. They can sense an extremely weak electrical field (up close), or detect the irregular

vibrations of an injured fish a hundred yards away.

**HV** What is the most unusual and / or fascinating fish behavior you've seen in the sea?

**GC** There are many examples of fascinating

fish behavior. One of my favorites, however, is the mating ritual of the cross-fertilizing hermaphroditic grouper, *Serranus subligarius*. This grouper spawns in pairs, during which it can undergo a rapid change in sex and can even fertilize its own eggs. The mating ritual of hermaphroditic groupers begins when two pregnant groupers, which are swollen with eggs, decide who will play female first. Usually the bigger fish will chase the smaller one into a corner, whereupon it takes on the coloration of a male and fertilizes the eggs of the other fish. Then the two groupers switch sex roles.

**HV** Beginning in 1987, as chief scientist on the National Geographic Society's Beebe Project, you made some 71 dives in seven different submersibles, diving as deep as 12,000 fsw. What is there is sex at so great a depth?

**GC** Through an international effort, we made dives up to 12,000 fsw in the Alvin (the Woods Hole Oceanographic Institution's manned robot which explored the Titanic), the Soviet Mir I, the French Nautile, and the Canadian-made subs, Pisces II and Pisces VI.

Below 2,000 fsw, one usually sees only bony fishes, skates, and chimeras and, rarely, small sharks. But, on Sept. 13, 1989, all that changed. I was doing a deep-sea study in Suruga Bay, Japan (the deepest bay in Japan), with the French deep diving submersible, Nautile, along with Emory Kristof, Ralph White and David Doubilet. At 4,000 fsw, our sub came eyeball to eyeball with the largest creature ever seen in the deep sea, the Pacific sleeper shark, *Somniosus pacificus*. This 7 meter / 21-foot fish rammed its body against our bait cage and pushed the cage into the mud. Then, we saw a chimera bump into a wall, and the wall moved. As the enormous creature moved on, all we could think was, "Holy mackerel!"

**HV** You continued to scuba dive through all four of your pregnancies, in one instance, right up until the day you went into labor. Were you ever afraid that diving could harm your unborn child?

**GC** In the 1950s, there was no data on



diving during pregnancy. Over the last few decades, however, I've read several anecdotal studies which reported fetal deformities attributed to diving during pregnancy. So I would advise women divers today against it.

**HV** Do all four of your children scuba dive?

**GC** Yes. Hera, Aya, Tak and Niki are great scuba divers, and they have all accompanied me on diving field trips as part of our team of underwater observers. Even my grandson, Eli, has been on some of these expeditions and is a proficient snorkeler. At age 5, using a camera for the first time, Eli took some remarkable photos of large whale sharks. Two of Eli's photos were published in *National Geographic* magazine (he was paid \$640 for three of his photos), and he became the youngest photographer ever featured in *National Geographic*.

**HV** What mystery of the ocean would you love to solve in your lifetime?

**GC** I'd like to learn more about a very strange fish, which is commonly called the "convict blenny," because of its stripes. Young convict blennies are often mistaken for poisonous catfish, and the adults look like moray eels. Although these fish are quite prolific, they are only found in a limited area of the southwestern Pacific. We have studied them in New Guinea and the Solomon Islands. No one really knows how to classify these fish: they are placed in a family entirely by themselves, nor has anyone discovered why they developed the habit of living inside coral reefs. There, they remove enormous amounts of sand — up to 31 tons from a stretch of 100 meters of reef per year.

Convict blennies actually build tunnels within the structure of the reef and the adults never come out of their burrows, not even to eat. Every morning, the babies, which range from about a half inch to several inches long, come out of the burrows and stuff themselves with plankton, then return with swollen bellies into the tunnels. The parents are approximately 53 cm long. We don't know how they feed. Their behavior is totally unlike anything we've ever seen;



1996 — Eugenie in her office at the University of Maryland.

we have to wonder whether the adults are eating something in the sand. Are the babies acting like birds, i.e., bringing food into the tunnels and regurgitating it for the parents to eat, or do the parents actually eat their

### *The most rewarding aspect of teaching was being able to mentor and motivate many bright young people who, in turn, became scientists themselves.*

young? All we know is that the larger the babies get, the fewer there were. It is a fascinating mystery. We hope to look into these tunnels with a modified endoscope and learn what is going on.

**HV** During your tenure as professor of zoology at the University of Maryland, you were one of the most popular teachers on campus. Your array of courses included: ichthyology, marine vertebrate zoology, life in the oceans, ecology of the oceans, and an honors course, Sea Monsters and Deep Sea Sharks. Which was your favorite course and why?

**GC** That's a tough question. I loved every course I ever taught, and I enjoyed all my students. The most rewarding aspect of teaching was being able to mentor and

motivate many bright young people who, in turn, became scientists themselves. Many students have come on our underwater research expeditions and will participate again this year. As a professor, I like to believe that I opened the door so that many, especially women, could follow.

**HV** You've certainly done that! Had you not become a marine scientist, what other career might you have pursued?

**GC** It would have to have been something that involved water. Water is the primal soup that keeps me energized and impassioned. Even though science is my primary vocation, in my heart, I've always felt like I was a diver first and then a scientist. I want to dive and be in the water to see fishes in their natural habitat, even when I'm 100 years old.

#### ABOUT THE AUTHOR



Hillary Vidars, Ph.D., is a journalist, EMT, author, dive research enthusiast and environmental educator. She has served on the NAUI environmental board, is a member of the Explorers Club and is the 1999 recipient of the distinguished DAN/Rolex Diver of the Year Award.





STAN WATERMAN PHOTOGRAPH

(Left) 1983 — Eugenie hitches a ride with a whale shark. (Right) 1958 — Eugenie, Dr. Lester Aronson and his son Freddie study sharks at the Cape Haze Marine Lab.



## NO TO PREGNANCY; YES TO ANTIMALARIALS

DAN is privileged to have notable dive personalities like Dr. Eugenie Clark share her life experiences with DAN Members. Like the majority of articles in *Alert Diver*, such articles contain the seeds of information that grow into larger bases of knowledge. Once again, divers can not only read about the life of one of diving's greatest icons, but learn from her history.

The story brings out two important issues in the dive community that the DAN Medical Information Line answers daily: "Should women dive when they're pregnant?" and "Do we really need to take anti-malarial drugs while in malarious areas?"

The difference between success and failure is often luck. By having all of the information we need to evaluate the risk to ourselves and others, we can make the best decision, and in essence make our own luck good luck.

On review of this fascinating look at Dr. Clark, DAN physicians have strongly emphasized that Dr. Clark is correct in her assessment that diving while pregnant is not advisable. As dive physician Dr. Maida Beth Taylor notes: "Though not addressed in any of the literature, maternal third-space fluid might offer a reservoir for nitrogen retention. The potential sites for nitrogen sequestration include the increased deposits of body fat found during pregnancy. Combining third-space and fat stores as harbors for nitrogen, offgassing time for pregnant women may not correspond to the limits established in the standard repetitive dive tables."

Some older studies suggested a higher incidence of fetal abnormalities and miscarriages in pregnant divers, notes DAN Associate Medical Director Dr. Guy Dear.

Fluid retention during pregnancy also causes nasopharyngeal swelling, with nose and ear stuffiness in women with no history of allergies. This adds risk of ear and sinus squeeze, notes

Taylor. And approximately two-thirds of pregnant women experience some degree of gastrointestinal dysfunction in the early months of gestation, including increased nausea and vomiting, increased gastric acidity, and gastric reflux. This can result in a definite danger of regurgitation underwater, with inherent dangers of swallowing water, breath-holding and subsequent embolism. For a more complete discussion of diving and pregnancy, look to a future issue of *Alert Diver*, in which dive physician Dr. Maida Beth Taylor revisits the topic.

On the issue of malaria, DAN encourages you to take a careful look at your travel destination and, with the help of your physician, decide on the best preventative measures for you.

Fact #1: Malaria is a serious disease that can easily kill the first-world traveler / diver if it is left untreated.

Fact #2: Effective prophylaxis is available in the form of mefloquine (Lariam™) and doxycycline and, to a lesser extent, azithromycin and chloroquine-proguanil.

In the November/December 1999 issue, DAN referral physician David DuBois, M.D., M.S., FACEP, noted that malaria in Australia and areas of the South Pacific — including Papua New Guinea, the Solomon Islands and Vanuatu — are high-risk areas for malaria that is resistant to the drug chloroquine.

Your travel physician may recommend some personal precautions, along with the following medications:

- mefloquine (Lariam™)
- doxycycline
- chloroquine (Aralen™), and
- proguanil (not available in the United States).

Dosages will depend on weight in some cases. Often the medications are taken one week before you enter a malarious area and continued for four

weeks after you leave. Beginning pre-treatment may help you identify whether you'll have side effects that you can't tolerate. You then have time to find an alternative medication.

For malarial prevention, G. Ralph Corey, M.D., suggests these measures:

1. Use anti-malarial prophylaxis when the destination is one where reliable diagnostic and treatment facilities are not readily available. Unfortunately, this includes a great deal of the Third World.
2. When using mefloquine, it is prudent to time the weekly dosing so no diving is done that morning; always take medication on a full stomach.
3. Accompany the use of mefloquine with measures to prevent mosquito bites, such as wearing light clothing with long pants and sleeves, using topical repellants containing DEET™ and spraying clothes and bed nets with a repellant containing permethrin.
4. Doxycycline is a very good malaria preventative medication. The downside includes daily instead of weekly dosing, a 5 percent incidence of sun-related rash and occasional stomach upset.
5. The efficiency of the chloroquine-proguanil combination is high enough that the British recommend it to their travelers. Unfortunately, definitive studies are still waiting to be done.

Careful planning and good judgment are important before and during every diving adventure. This is especially true for a safe and healthy trip to a developing third-world country.

Finally, always check with the Centers for Disease Control (CDC) for the latest information about antimalarial prophylaxis for the country you intend to visit. See [www.cdc.gov/travel/malinfo.htm](http://www.cdc.gov/travel/malinfo.htm) or to request fax information, call 1-888-232-3299 and listen to the instructions.