

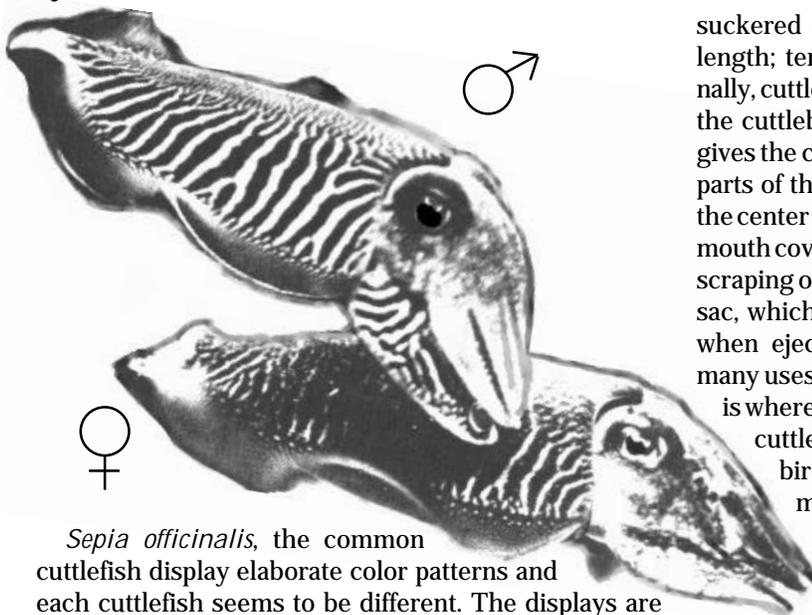
Eye on DOI



For Volunteers of the Department of Invertebrates Vol. II No. 3

Spineless Tales The Common Cuttlefish

by Elaine Lamirande



Sepia officinalis, the common cuttlefish display elaborate color patterns and each cuttlefish seems to be different. The displays are almost a form of sign-language.

Physical Characteristics

Common cuttlefish are slipper-shaped with long, narrow lateral fins along each side of the mantle. They have eight suckered arms and two hidden long tentacles with

sucker-like clubs. (Arms have suckers along the entire length; tentacles have suckers just at the end.) Internally, cuttlefish have a calcareous chambered shell, called the cuttlebone, which serves as a buoyancy organ and gives the cuttlefish its slipper shape. The only other hard parts of the cuttlefish's body are the parrot-like beak in the center of the arms, and the radula (an organ inside the mouth covered with rows of tiny teeth-like structures) for scraping out meat from shells. Cuttlefish also have an ink sac, which contains enough ink to turn the water black when ejected under stress. Cuttlefish products have many uses. Cuttlefish ink has been used as India ink and is where the color sepia (dark brown) comes from. The cuttlebone is used as a diet supplement for caged birds. Cuttlefish meat, used similarly to squid meat, is found in many Mediterranean dishes.

Cuttlefish are predators with binocular vision for use in hunting the fish and crustaceans, such as shrimp and crabs, that make up their diet.

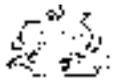
Mating and Reproduction

Cuttlefish have an elaborate courtship ritual. The zebra patterned male will approach another cuttlefish with his lateral arm extended. A male will respond by extending a lateral arm and displaying the zebra pattern. An unreceptive female usually swims away. The male grabs the female from the side and moves them both to a head-to-head position, with arms intertwined. The male then uses the left lateral arm, the hectocotylus, to reach into its mantle to remove spermatophores from the Needhams sac through the penis. The spermatophores are then transferred into a special pouch under the buccal mass (the muscle mass around the beak and mouth) of the female.

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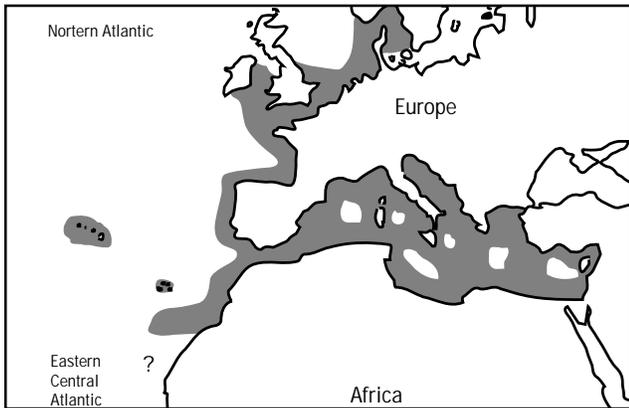


Cuttlefish *(continued from page 1)*

The female can lay more than 1000 eggs several months after copulation and laying can last weeks. Females in the Invertebrate Exhibit have been known to lay fewer eggs over several months. Cuttlefish lay the eggs individually in shallow water, at depths of no more than 30 or 40 meters. Each egg is attached to a relatively thin object such as plants, tube worms, and structures such as cables, netting, and wood. Eggs are stained black with ink and look like dark wine grapes or Hershey's kisses. The length of development depends on the temperature and varies from 40-45 days at 20°C to 80-90 days at 15°C. Hatchlings have a mantle length of 6-9 mm and eat small crustaceans.

Where Cuttlefish are Found

Common cuttlefish are abundant in the eastern Atlantic ocean to the Mediterranean Sea in coastal waters and on the continental shelf at depths of no more than 150 meters. No *Sepia* are found around North or South America. There is a squid, *Sepioteuthis* (Reef Squid) that looks similar but more narrow-bodied.



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The cuttlefish life span varies from 18 months to 2 years. *Sepia officinalis* is the first cephalopod species to be raised through several generations in an inland aquarium, and because of this scientists have been able to study it extensively. They have determined that life span and growth rate of cuttlefish is temperature dependent. Cuttlefish kept at lower temperatures tend to live longer, while cuttlefish kept at higher temperatures tend to grow faster. In aquariums, cuttlefish are usually kept at temperatures between 10°C and 25°C.

Color-changing Ability

One of the more interesting features of the cuttlefish is its ability to change color. Cuttlefish change the color and texture of skin using chromatophores, iridophores, leucophores and skin muscles. Chromatophores are muscular organs that are supplied with nerves leading directly to the brain. The pattern-controlling areas of the cuttlefish brain are well developed at hatching, and young cuttlefish can display patterns as complex as the adults. Cuttlefish display different behaviors and patterns at different ages. Young animals appear to use patterns mainly for camouflage. Adult's patterns are similar but more elaborate and seem to function as communication with other cuttlefish, distracting prey, and frightening away predators.

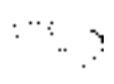
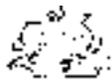
Cuttlefish communication continues to be studied. Specific patterns and colors have been associated with behaviors and situations. Though loosely called language, they are merely indications of the animal's neural activity displayed on the skin. The vast combinations of color and pattern are far too complicated for us to find a direct translation at this point.

Invert Alert

- The honey bees are doing well – no more swarming! They should be in the new hive by the end of September.
- The first group of butterflies – Zebra Long-wing (*Heliconius charitonia*) and Orange Julia (*Dryas julia*) – have emerged and are flying around the greenhouse with a pair of male Ana's hummingbirds.
- The cuttlefish in the big tank are doing well, they were still hatching until the end of July and seem robust. We shipped three to Cleveland Zoo and two to Baltimore Aquarium. Although we had some mortality, a large group remains in S80 for another generation of breeding.
- We recently received a new shipment of Pacific Reef Squid. Unfortunately, all of them died within two weeks from unknown causes. The spiny lobster is in

Tank #15 and replaces the American lobster which is now in the service area.

- The ant's feeding tubes were cleaned, and they are back to cutting normally. The giant prawn molted a few times. Justin collected aquatic insects and spiders for our exhibit, and Chris James found a spotted pelidnota beetle, which "followed him home..." The pink-toed tarantula on Paul's desk molted, as did a slipper lobster and a rose-hair tarantula. The service area and Microtheater are now starring two more colonies of leaf-cutter ants, one which will be moved into the Think-Tank, and one for future foraging and pheromone research. They are doing incredibly well! The aquatic insect tank had a fishing spider hatching. We're not sure who and where the father is!



VertAlert

Jesse Babonis has left for Maine, where she starts college this fall. Jesse spent the summer working at the Chesapeake Wildlife Sanctuary. We'll miss you, Jesse! Joyce Bailey went reef diving in the Caribbean this summer. Sam Bernet has taken a leave of absence, and won't be around for a while. Hurry back, Sam.

Kathy Bine has a new job at ICF Kaiser. Congratulations! Lara Chapman is back in school to get a degree in patent law at Georgetown. Justin Graves is back in school for his Junior year!! He has a new car, and will be moving into a place of his own soon. Good luck to the students!

Beth Ebersole went to Maine for a course on freshwater mollusks. Grace Ham just got back from a trip to Honduras and other places in Central and South America. She says she got to do lots of scuba diving. Congratulations to Bobbie Jellinek, who's daughter was just accepted into a graduate school program at Harvard. Way to go!

Thanks to Daniel Lebbin for the drawings and to Sharon Lee for the photographs that they have done for the Pollinarium! Ask Marianne Lester about her work in the Insect Zoo at the National Museum of Natural History where she has also been volunteering.

Patsy Lozupone just got back from a cross-country trip in which she saw a lot of the United States. Connie Binder and Sean Murphy also just got back from family road-trip vacations.

Jenny Phillips has finished her internship. Jenny was with Invertebrates through the 1994-95 school year. Elizabeth Kunz starts as this year's Roosevelt scholar. Our thanks to Jenny for all her help, and welcome, Elizabeth! Elizabeth will be working on a project with the bees.

Sara Riffe has left for school in Delaware. That's close enough to come visit us, Sara! Alex Siess is back from New York -- we'll see her around the exhibit soon. Stacy Stevenson has moved to Albuquerque and sent back a really cool newsletter about the move. Good luck to her and her husband!

Bill Walton went on a two-week sailing trip, and is taking scuba diving lessons. Don't forget to breathe!! Jenn Welham is planning another tee-shirt order. Look

Birthdays



SEPTEMBER

4 Joshua Gruenspecht
8 Tom Evers
15 Michelle Linscott
21 Grace Ham
24 Mildred Edlowitz

OCTOBER

16 Carmen Revenga
21 Suzanne Hough

NOVEMBER

9 Beth Ebersole
15 Carol Halden

DECEMBER

2 Elaine Lamirande
6 Randee Chafkin
9 Dottie Bunch
15 Paul Hawkes
16 Nancy Pratt
21 Jennifer Welham
Sara Riffe
26 Ted Lukacs
31 Allison Dean

for order forms posted at the exhibit or call Jenn for more details.

Congratulations to Robert Hamilton, who won a grant from the National Science Foundation to research plants and ecological systems. Roberta Seymour and Steve Kreisler were recently for visits. Steve's been in Guatemala and Costa Rica, he loved it, and he's planning to go back to stay for a couple of years. Roberta was transferred to Florida by her company, and has been back a couple of times since then.

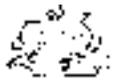
Diane Meyers has a new puppy! The puppy's name is "Piper." Although Maryann Robinson and her husband were originally planning to leave for his overseas tour this summer, the plans have been changed, and she'll be staying around until December. We're glad you can stay! Maryann is pregnant! Congratulations!

Some Keepers and Volunteers from the Department of Invertebrates will be participating in a course on American Sign Language. There still may be time to sign up -- check the bulletin board for more details.

Consider This...

The mission of The Smithsonian Institution calls us to be devoted to "the increase and diffusion of knowledge." What does this mean to you? The next issue will address NZP's, Biological Programs (animal health, and nutrition departments), and DOI's interpretation of this mission.

Alan



New in the Reading Room *by Connie Binder*

With the development of the Pollinarium, we've received a number of books to help answer any questions you may have. Remember to check the files in the cabinet for more Pollinarium information. There are files on Bees, Butterflies, Caterpillars, Moths, and Pollination.

The Bee, text by Dr. Beth B. Norden, illustrations by Biruta Akerbergs Hansen, 1991. This pop-up book of bees is great! It provides basic bee information, anatomy, life-cycle, etc. with easy to read text and clear illustrations (and fun pop-up stuff!).

Sweetened with Honey: The Natural Way, National Honey Board, 1994. 92 pages of recipes using honey, lots of color photos.

Empezando Correctamente con Abejas (Starting Right with Bees), 1984, 111 p.

Enjoying Hummingbirds More, 1992, 32 p. Good, practical advice about attracting and feeding hummingbirds. Includes plant lists for a hummingbird garden. Donated by Pat Jaffray.

Hummingbirds: Jewels in the Sky by Esther Quesafa Tyrell. Written for kids, this book provides all of the basic hummingbird information you'll need to answer pollinarium questions. It has beautiful photographs, too. Donated by Pat Jaffray.

We've also received a number of non-Pollinarium books recently.

Field Guide to the Slug by David George Gordon, 1994, 48 p. This book begins with "The Slug Family Tree" (mollusk stuff), and proceeds to tell the reader all the basic slug stuff, with brief descriptions of slugs found in the Pacific Northwest. Don't miss "The Seven Wonders of Slugdom" chapter. Donated by Pat Jaffray (where does she find these things? They're great!).

National Zoological Park Status of the Collection, 12/31/94

Life at the Seashore, written by Helen Mason, illustrated by Martin J. Magee, 1990, 31 p. A really nice kids book about exploring the seashore. Lots of information, with easy but revealing experiments. Thank you, Andy Keech for this donation!

E Pluribus Unum: This Divine Paradox, 1995, 36 p. Report of the Commission on the Future of the Smithsonian Institution. A really good synopsis of what SI does, and plans to do.

Ecological Knowledge and Environmental Problem-Solving, Natural Research Council, 1986, 388p. Donated by Kathy Bine. Note especially chapter 14, "Biological Control of California Red Scale."

Alternative Agriculture, Natural Research Council, 1989, 448 p. Donated by Kathy Bine. Lots on pest management; also look up "Insects" in the index.

Alternatives for Ground Water Cleanup, Natural Research Council, 1994, 315 p. Donated by Kathy Bine.

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Careen's Corner

- On October 2, from 6:30 to 8:30 pm there will be a special preview and reception in the Pollinarium for all FONZ volunteers. This will be a great opportunity to share not only the Pollinarium, but the entire Invertebrate exhibit with our fellow volunteers. We hope you can attend to help us host the exhibit.
- The Audubon Naturalist Society is offering a wide variety of courses this fall and winter. Insects on Ice will be held on Saturday, January 27. This course will focus on the winter ecology of insects.
- Macroinvertebrate Identification 1 will be offered on three dates: Saturday, October 21, Thursday, November 16, and Wednesday, January 17. In this class participants will learn how to identify the major groups of these organisms, including aquatic insects and crustaceans.
- Aquatic Macroinvertebrate Adaptations will be held on Saturday, November 4 and will take a look at macroinvertebrate structures and strategies. For more information about the above programs please

contact the Audubon Naturalist Society at (301) 652-9188 x3006.

- National Geographic Society Sale October 6, 12-8pm members only. Open to public October 7 and 8, 9-5 pm 30%-80% off. Directions: 11555 Darnestown Road I-270 to Exit 6B. Follow Rt. 28 West/Darnestown Road 5 miles. Bring your own bags!

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Smithsonian Institution, National Zoological Park, Department of Invertebrates and Friends of the National Zoo, Department of Education and Volunteer Services.