FIGURE 1

FIGURE 2

FIGURE 3

THE COMPLEX WORLD *of*

If siphonophores are so special, why have many people never heard of them? Unlike the Portuguese Man O' War—a non-representative species which has come to represent the group in most textbooks — most types are found below the surface, and away from the coast. They are extremely frangible, breaking apart in nets or when merely illuminated, and they require special means of collection, such as blue-water SCUBA diving or submersibles.

If you think of a dominant predator in the sea, you probably imagine a shark, killer whale, or perhaps a giant squid. Unless you are a marine biologist (or a species of zooplankton), you probably would not think of—or perhaps even know of—the siphonophores. These planktonic cnidarians, however, have a much greater ecological effect than their better-known counterparts. There are no movies featuring siphonophores, but they are among the most abundant and effective carnivores in the sea.

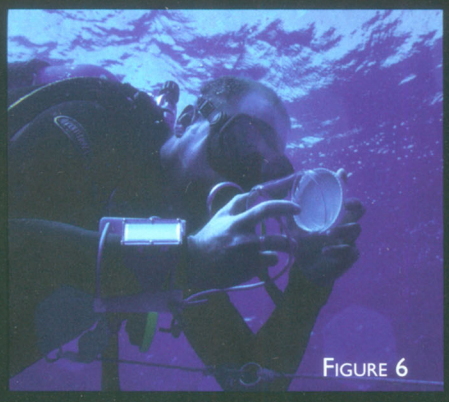

FIGURE 6

Siphonophores are hydrozoans, related to jellyfish and corals, but they aren't radially symmetrical as you might expect a cnidarian to be. They are elongate and in many ways bilaterally symmetrical, taking on complex forms that look strange even among other marine invertebrates. The most similar animal might be a hydroid, growing along a rock and sprouting polyps, but which takes to the water column. Each siphonophore is a colony consisting of a few basic types of zooids attached in many repeating series along a central stem. Zooids have specialized functions and are arranged like a train, usually with propulsion at one end, and feeding, protective, and reproductive units trailing behind. Through the central stem, food can be conveyed from the feeding 'carriages' (gastrozooids) along the length of the train and distributed to the rest of zooids. Most species grow by adding 'carriages' just behind the train engine (nectophores). This allows them to reach great lengths, they range in scale from about a centimetre to more than 10 metres. In fact, they may be the longest organisms on earth, while only as wide as a broomstick.

Siphonophores are unique in many ways. Typically, each gastrozooid has its own tentacle and can catch and process prey independently. Therefore as the length and number of tentacles increase, the predatory impact of an individual is multiplied by the area of this long curtain of continuously fishing tentacles. Some species even use a variety of tricks to lure prey directly to their stinging cells. Even humans would do well to avoid the species with black, purple, or

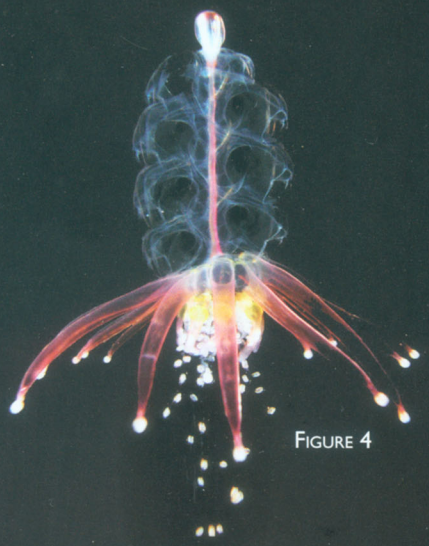

FIGURE 4

FIGURE 5

Siphonophores

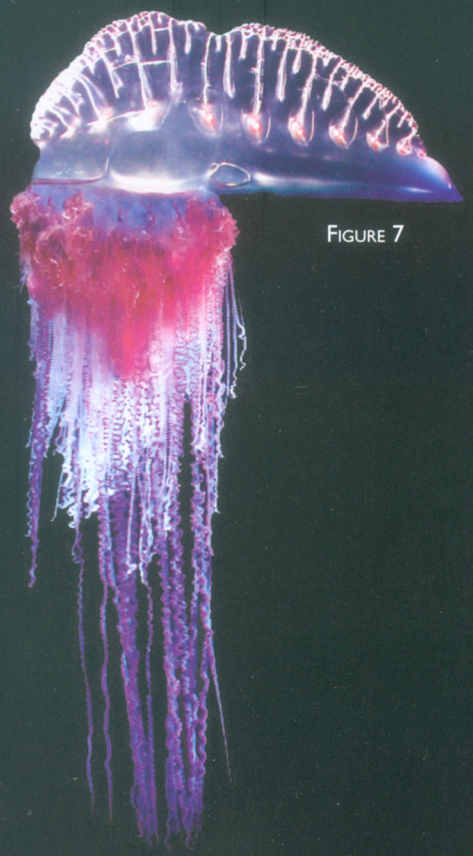

FIGURE 7

green coloration—these are usually fish-eaters, and while they won't kill you, their sting is powerful enough to penetrate through latex gloves. On the other hand, you would be lucky to see one because these are typically found deeper than 500 metres. Most siphonophores are bioluminescent, and they can produce dramatic light shows when disturbed. Some, including many newly discovered deep-sea species, are fluorescent, iridescent, or capable of blanching to a milky white (or all of the above!). Siphonophores have not always been so esoteric; the most famous biologists of the 19th century pondered and debated their structures and origins. Later marine biologists directed their efforts toward large-scale and rapid trawling, methods which are poorly suited to returning intact specimens of gelatinous taxa. Our knowledge of siphonophore taxonomy would have stagnated in the last 70 years if not for the work of two British scientists. A.K. Totton described numerous species during the 1940s and 1950s, but even more importantly, he synthesized, summarized, and organized what was known about the group in his monograph of 1965. Since the 1980s, Phil Pugh has incorporated his numerous species descriptions into influential papers which examine and clarify entire siphonophore families and is perhaps the most prolific siphonophore taxonomist ever. With the application of molecular genetics and greater access to the deep sea, we head to a future filled with insight into the evolution, relationships, and development of these unique superorganisms.

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FIGURES
FIGURE 1—*Ceratocymba.*
FIGURE 2—*Erenna richardii.*
FIGURE 3—*Hippodius.*
FIGURE 4—*Physophora.*
FIGURE 5—*Diphyes.*
FIGURE 6—Blue water SCUBA diving to collect siphonophores.
FIGURE 7—*Physalia*
FIGURE 8—Fluorescent siphosome.

Adapted from GME 2, 2005

OTHER *JMBA* PUBLICATIONS:

Pugh, P.R. & Haddock, S.H.D., 2009, Three new species of remosiid siphonophore (Siphonophora: Physonectae). *JMBA*, doi: 10.1017/S0025315409990543, *published online by Cambridge University Press 14 Aug 2009.*

Haddock, S.H.D., Dunn, C.W. & Pugh, P.R., 2005, A reexamination of siphonophore terminology and morphology applied to the description of two new prayine species with remarkable bio-optical properties. *JMBA*, **85(3)**, 695–707

FIGURE 8