

Living and Working in the Sea

James W. Miller

Ian G. Koblick

SECOND EDITION

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William Boggess



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Dedication

In appreciation for their assistance and perseverance, this book is dedicated to our wives, Ardeth and Tonya, who through the years have supported and aided our efforts to enhance human capability to live and work in the sea. They have waited patiently on the surface while we carried out experimental programs on the seafloor and have offered encouragement continually throughout the preparation of this book.

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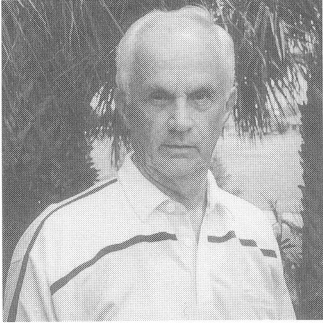
Appreciation is expressed to Lee H. Boylan for his valuable assistance in the compilation of information on European habitats he gathered and cataloged over the years. Thanks also are offered to Betty Estes who conscientiously typed the entire manuscript.

In particular, our gratitude and appreciation are extended to William Boggess, who not only illustrated this book but who reviewed and edited each chapter in the early stages of preparation.

Explanation of Frontispiece

The Frontispiece shows the remarkable water spider *Argyroneta Aquatica*. Found in the lakes and ponds of the temperate regions of Europe and Asia, *Argyroneta* spends its life underwater in and around a thimble-shaped diving bell constructed of carefully woven silk suspended among water plants. This unique spider, ranging in size from 0.35 to 1.1 inches, supplies itself with air periodically by swimming to the surface, capturing an air bubble, and maneuvering so that the body becomes cloaked in air. Although living underwater, the body must be kept dry at all times which is achieved probably through the emission of a waterproofing fluid, a kind of wet suit. When encapsulated with air, *Argyroneta* dives to her underwater habitat and releases the bubble inside allowing her to remain there for hours before returning to the surface for another air bubble, the time dependent upon the amount of activity and oxygen content of the water. As winter approaches, *Argyroneta* builds a stronger habitat that is sealed with silk and converted into a closed cell. Sometimes snail shells are used by males who line them with silk, fill them with air, and seal themselves in. While in a state of hibernation, this amazing animal can survive on a single large bubble of air for as long as three to four months, clearly establishing itself as the world's record-holding aquanaut. (Data from Bristowe, W.S., 1958, *The World of Spiders*, Collins, St. James Place, London.)

ABOUT the AUTHORS



JAMES W. MILLER received the B.A. (1949), M.A. (1950) and Ph.D. (1956) in physiological psychology from Michigan State University. After twelve years of research in physiological optics and visual display systems at the Kresge Eye Institute and Hughes Aircraft Company, he joined the Office of Naval Research in 1963 as director of engineering psychology. In 1964, he became responsible for the diver performance studies in the U.S. Navy's Sealab-II and later Sealab-III programs. Dr. Miller served as deputy program manager of Tektite-I in 1969 and as program manager of Tektite-II in 1970. From 1971 to 1980, he was the deputy director of the NOAA Manned Undersea Science and Technology Office. He participated as an aquanaut team leader in a two-week saturation diving mission in 1973 and again in 1974, both in the La Chalupa habitat. In addition to authoring and co-authoring over 100 scientific and technical publications, Dr. Miller was the writer and editor of the first two editions of the NOAA Diving Manual and a consulting editor for the third edition. The recipient of numerous professional awards, Dr. Miller served from 1980 to 1985 as Associate Director, and from 1985 to 1990 as the Florida Keys Coordinator of the Florida Institute of Oceanography. From 1982 to 1992, he was a consultant and President of Woodell Enterprises. Since 1991, he has served as Vice Chairman and member of the Federal Florida Keys National Marine Sanctuary Advisory Council.



IAN G. KOBICK, president of Marine Resources Development Foundation since 1970, is an international authority in undersea living. He received a B.A. in biology from California State University at Chico in 1964. He has served as special assistant to the Governor of the Virgin Islands for undersea programs and as special advisor for the development of marine resources under two governors of Puerto Rico. Mr. Koblick was an alternate aquanaut on Tektite-I, an aquanaut on Tektite-II, and served as Tektite-II program manager for the Virgin Islands' Government. He is responsible for twenty articles on ocean management and resource development and was a consulting editor of the second edition of the NOAA Diving Manual. Mr. Koblick designed and managed the La Chalupa undersea habitat program and has spent more than two months saturated in undersea habitats. Since 1984 he has operated and managed the Classroom in the Sea-MarineLab Habitat in Key Largo, Florida and was co-owner and developer of the Jules' Undersea Lodge, the world's first underwater hotel. In 1995, he developed the Scott Carpenter Man in The Sea Program, a hands-on experience using high-tech diving systems and equipment.