

## Preface

In an era in which satellite photographs chart even the most remote land masses in astonishing detail, the vast majority of our planet lies unrevealed beneath the ocean. In this watery wilderness, an environment every bit as inaccessible as space, humans have rarely ventured more than a few hundred meters below the waves. At a time at which most people think of space as the final frontier, we should remind ourselves that a great deal of unfinished business remains here on Earth and as robots crawl on the surface of Mars, we should remember that most of our own planet has never been seen with human eyes.

One of the greatest scientific and technological achievements of the twenty-first century will be to cast a light on the eternal darkness of the deep ocean. Life, say the experts, began in the ocean, and if the way many people spend their vacations is any indication, there are few activities we enjoy more than revisiting our submerged origins. Whether cavorting with dolphins, harassing sharks from the protection of titanium cages, or photographing exotic aquatic species through the portholes of tourist submarines, humans have a natural affinity with what lies beneath the surface of the ocean. But despite having had the technology to establish permanent settlements under the ocean for more than five decades, of the 100 billion humans who have ever lived, not a single one has lived permanently underwater.

*Ocean Outpost* traces the future of man underwater, describing how technology will allow humans to adapt to a permanent life underwater. This book also unveils the challenges that will be faced by twenty-first-century aquatic pioneers and, ultimately, colonists, in what may in due course prove to be one of the greatest human adventures in history.

To realize the goal of a permanent human presence underwater, a wealth of new technologies will need to be developed and qualified, including new manned and unmanned submersibles, advanced propulsion systems, underwater rescue systems, decompression methods, and revolutionary physiological intervention strategies ranging from liquid ventilation to artificial gills. Some of the technology development and medical intervention will require quantum leaps in innovation, while others may be nothing short of radical, appearing to be more science fiction than science. Step by step, *Ocean Outpost* describes how the technology will evolve,

how crews will be selected and trained, and what a typical underwater mission will entail. The book also chronicles the frontiers of underwater technology that will eventually take humans into the midst of a world we could once only guess at.

This book is dedicated to those who accept the dangers and challenges of furthering the human dream to establish a permanent human presence under the ocean and to all those who support them.

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Ocean Outpost

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