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SCIENTISTS IN THE FIELD

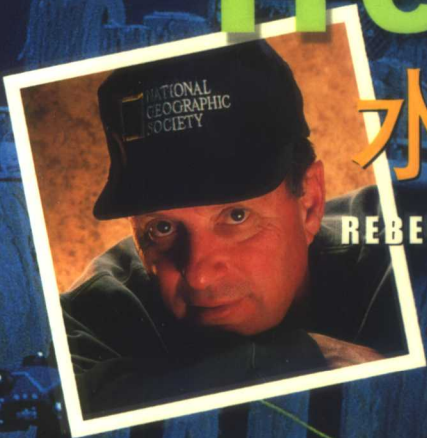
实地科学探索

ROBERT BALLARD

Discovering Underwater Treasures

水下探宝

REBECCA L. JOHNSON (美) 著



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Secrets of the Deep

深海的秘密

Time was running out for Robert Ballard. For weeks his team had searched¹ and found nothing. Now it was past midnight on September 1, 1985. Cameras, more than two miles beneath the ship, were sending back pictures of the ocean floor. Suddenly, dark shapes appeared on the video screens in the ship's control room. "Wreckage²!" someone shouted. BINGO! The hunt³ was over. They had found the Titanic⁴.



Robert Ballard, explorer

She was the largest ship the world had ever seen. And—ask anyone—she was unsinkable⁵! That's what people thought when the *Titanic* set sail from England in 1912. It was the ship's first voyage⁶, and she was bound for⁷ New York City.

As you probably know, the *Titanic* never made it to America. After hitting an iceberg⁸ in the middle of the Atlantic Ocean⁹, the great ship sank—taking more than 1,500 passengers¹⁰ with her. Many people looked for the sunken ship. However, until 1985, her exact¹¹ whereabouts¹² had remained¹³ a mystery¹⁴.

Finding the *Titanic* was something Robert Ballard had dreamed about for a long time. But he didn't just find it. He explored¹⁵ the wreck¹⁶ firsthand¹⁷ in a tiny¹⁸ submarine¹⁹—and answered questions that people had been asking for 73 years.

This is a book about underwater explorer Robert Ballard, who's got a knack²⁰ for discovering things in the ocean's darkest depths. Ready for adventure beneath the waves? The mysteries of the deep await!

1. search	<i>v.</i>	搜索
2. wreckage	<i>n.</i>	沉船残骸
3. hunt	<i>n.</i>	搜索
4. Titanic		"泰坦尼克"号
5. unsinkable	<i>adj.</i>	不会下沉的
6. voyage	<i>n.</i>	航行
7. be bound for		驶往……的
8. iceberg	<i>n.</i>	冰山
9. Atlantic Ocean		大西洋
10. passenger	<i>n.</i>	乘客
11. exact	<i>adj.</i>	确切的

12. whereabouts	<i>n.</i>	所在; 下落
13. remain	<i>v.</i>	保持
14. mystery	<i>n.</i>	谜
15. explore	<i>v.</i>	探测
16. wreck	<i>n.</i>	失事船
17. firsthand	<i>adv.</i>	直接地
18. tiny	<i>adj.</i>	极小的
19. submarine	<i>n.</i>	潜艇
20. knack	<i>n.</i>	技巧; 技能
21. submersible	<i>n.</i>	潜水器; 深潜器
22. ROV		遥控运载器

◀ As the submersible²¹ *Alvin*'s lights glow from above, ROV²² *Jason Jr.* explores the *Titanic*.

Robert Ballard: The Call of the Sea

罗伯特·巴拉德：海洋的呼唤

Have you ever wondered what lies beneath the ocean's surface¹? For as long as he can remember, Robert Ballard has.

As a boy growing up in San Diego², California³, Robert never tired of walking along the beach. He watched small sea creatures⁴ trapped⁵ in tide pools⁶. He collected things that washed up on the shore. He listened to the pounding⁷ waves and wondered what lay beneath them.

Robert's hero was Captain Nemo, the main character⁸ in *20,000 Leagues Under the Sea*, by Jules Verne⁹. Robert read the book again and again. Captain Nemo had a fantastic¹⁰ submarine called the *Nautilus*, in which he explored the deep sea. Could there be any thing more exciting, Robert wondered. He knew without a doubt that he wanted to be an undersea explorer when he grew up.

- | | | |
|----------------|-------------|---------------------------------|
| 1. surface | <i>n.</i> | 表面 |
| 2. San Diego | | 圣迭戈 |
| 3. California | | 加利福尼亚州 |
| 4. creature | <i>n.</i> | 生物；动物 |
| 5. trap | <i>v.</i> | 困于；陷入 |
| 6. tide pool | | 潮间带水坑 |
| 7. pound | <i>v.</i> | 连续重击 |
| 8. character | <i>n.</i> | 人物 |
| 9. Jules Verne | | 儒勒·凡尔纳(法国科幻小说家，文中提及其作品为《海底两万里》) |
| 10. fantastic | <i>adj.</i> | 奇异的 |

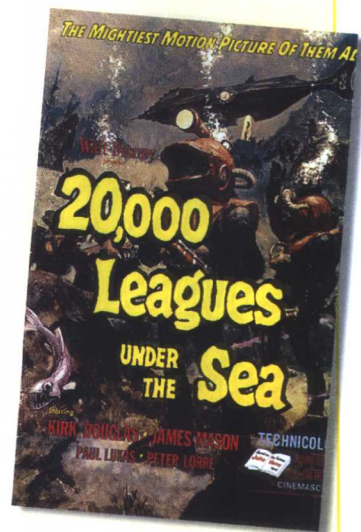
As a boy, Robert loved to explore outdoors.



As Robert grew older, his love of the sea grew stronger. He learned to snorkel¹ and then to scuba dive². As a diver, he started to explore the world beneath the waves. But the great depths—the part of the ocean Robert really wanted to see—were still out of reach.

The deep sea is a world of darkness, cold, and crushing pressure³. When Robert was a boy, there was almost no way to explore it. A few submarines could dive deep, but they weren't designed⁴ for exploration⁵. Ships could drag⁶ nets through the water or scoop up⁷ chunks⁸ of the seafloor⁹. What they brought to the surface, however, gave few clues¹⁰ about what lay below. For the most part, the oceans remained a mystery.

Photograph and movie poster¹¹ from *20,000 Leagues Under the Sea*



1. snorkel	v.	使用水下呼吸 管潜游
2. scuba dive		戴水肺潜水
3. crushing pressure		令人窒息的压力
4. design	v.	设计
5. exploration	n.	探险

6. drag	v.	拖
7. scoop up		铲起
8. chunk	n.	大块
9. seafloor	n.	海底
10. clue	n.	线索
11. movie poster		电影海报

Becoming an Underwater Explorer

When Robert was in high school, he spent a summer working on a scientific research vessel¹ off the California coast. The experience² left him determined³ to become an ocean explorer. Standing on deck⁴, he wondered about many things. What creatures that no one had ever seen swam below the ship? Was the seafloor beneath him flat and empty or full of mountains and valleys?

What about all the missing ships that had sailed the Pacific⁵ and other oceans? Storms and other disasters⁶ had sent many to the bottom⁷. Were they lying there still, these traces⁸ of the past? What could they tell us about people and their way of life long ago? Robert was fascinated⁹ by stories of shipwrecks¹⁰. There was one story in particular¹¹ that captured¹² his imagination¹³—the sinking of the *Titanic*.

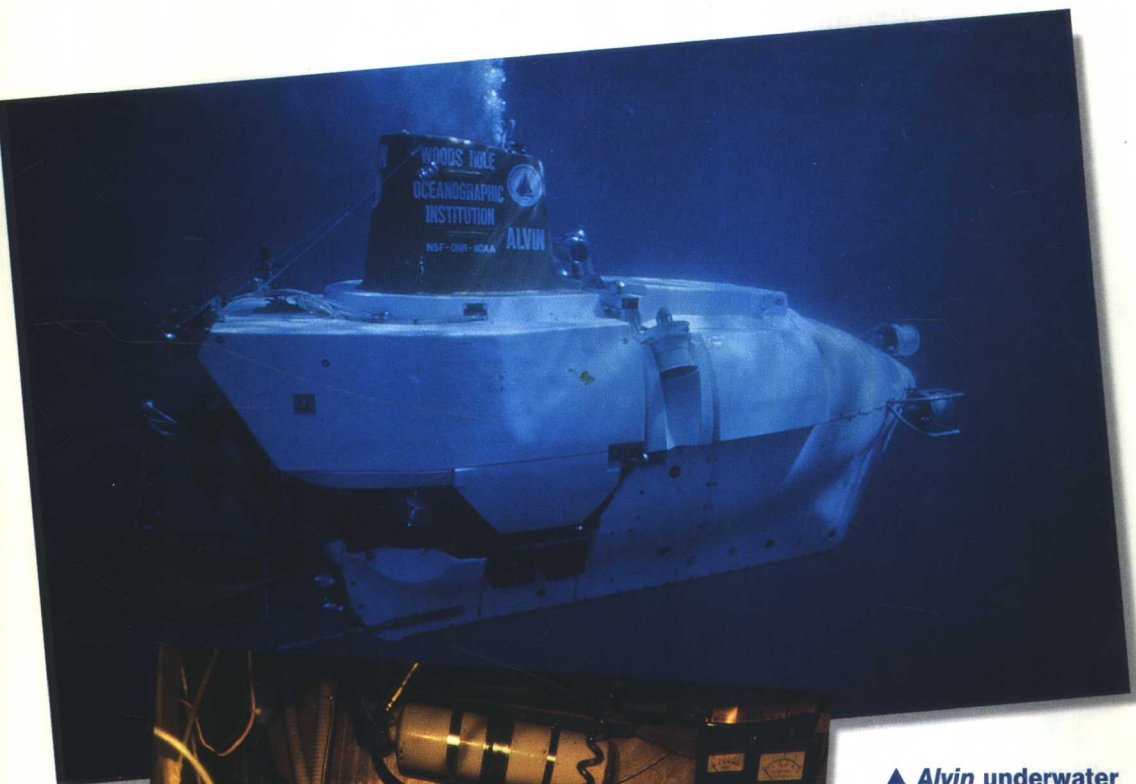
In college Robert took every course that would help him understand the oceans. In graduate school¹⁴ he was called to serve¹⁵ in the U.S. Navy¹⁶ during the Vietnam War¹⁷. He was assigned¹⁸ to Woods Hole Oceanographic Institution¹⁹ in Massachusetts²⁰. At Woods Hole, Robert came face to face with *Alvin*. No, *Alvin* isn't a person. It's a submersible, a small submarine. Tiny but nimble²¹, *Alvin* can carry a pilot²² and two scientists down to a depth of 4,500 meters (about 14,800 feet).



U.S. Navy Lt. Ballard

1. scientific research vessel		科学研究船	12. capture	v.	引起(注意)
2. experience	n.	经历	13. imagination	n.	想像
3. determined	adj.	决意的; 已下决心的	14. graduate school		研究生院
4. deck	n.	甲板	15. serve	v.	服役
5. the Pacific		太平洋	16. U.S. Navy		美国海军
6. disaster	n.	灾难	17. Vietnam War		越南战争
7. bottom	n.	水底	18. assign	v.	指派; 分配
8. trace	n.	痕迹	19. Woods Hole Oceanographic Institution		伍兹霍尔海洋科学学院
9. fascinate	v.	使着迷	20. Massachusetts		马萨诸塞州
10. shipwreck	n.	船舶失事; 海难	21. nimble	adj.	灵活的
11. in particular		特别地	22. pilot	n.	领航员

Robert knew that in *Alvin* he could explore parts of the ocean floor that couldn't be reached any other way. He also knew that, in this little white sub¹, it might be possible to look for something that had been on his mind² for a long time—the *Titanic*.



▲ *Alvin* underwater



◀ Robert inside *Alvin*

- | | | |
|------------------|-----|------------------|
| 1. sub | 11. | 〈口〉潜艇 |
| 2. on one's mind | | 压在某人心头
而致牵肠挂肚 |

From Tube Worms¹ to Underwater Tools

It's a tight squeeze² inside *Alvin*. Between 1973 and 1979, Robert was scrunched up³ inside the tiny sub many times. He was on the first manned⁴ exploration of the Mid-Atlantic Ridge⁵, a huge underwater mountain range⁶—the largest on Earth—that runs down the middle of the Atlantic Ocean. He was part of a team that discovered giant tube worms in the Pacific Ocean. These worms—some more than 2.5 meters (8 feet) long—live in total darkness around deep-sea hot springs⁷ called hydrothermal vents⁸.

Giant tube worms



Inside *Alvin*, Robert felt like he was cruising⁹ through a strange new world. Yet the sub covered only a small area on each dive. Robert wondered if vehicles¹⁰ with no people on board, controlled from a ship or sub, would be better for deep-sea exploration. Researchers could use these remotely operated vehicles (ROVs) to explore farther, faster, and more safely than a submersible like *Alvin* ever could.

Over the next few years, Robert worked with other scientists to create these new kinds of underwater tools. Attached¹¹ by a cable¹² to a ship or a sub, ROVs carry lights, cameras, and sometimes sonar¹³. A sonar system uses sound waves to find objects underwater.

1. tube worm		管虫
2. tight squeeze		极度拥挤
3. scrunched up		缩成一团
4. manned	adj.	载人的
5. Mid-Atlantic Ridge		中大西洋海岭
6. mountain range		山脉
7. hot spring		温泉
8. hydrothermal vent		热液喷口
9. cruise	v.	巡游; 巡航
10. vehicle	n.	运载器
11. attach	v.	缚上; 系上
12. cable	n.	电缆
13. sonar	n.	声纳(声波或 超声波水下探测系统)



Jason Jr. peers into the *Titanic*.

In 1985 Robert Ballard used an ROV to find the *Titanic*. The ship lay under 3,795 meters (12,450 feet) of water. A year later he returned with *Alvin* and a small ROV, *Jason Jr.*, to take detailed¹ pictures and video of the ship. Those pictures showed how an iceberg had damaged² the *Titanic* so that the “unsinkable” ship flooded³ and sank. For Robert Ballard, discovering the great ship and answering questions about her was like finding a lost page in a history book.

1. detailed	<i>adʒ</i>	详细的
2. damage	<i>v</i>	损害
3. flood	<i>v</i>	为水所淹

Some of Robert Ballard's Major Underwater Explorations

Isis—a 1,600-year-old Roman ship found in the Mediterranean Sea⁷

Bismarck—a huge German warship that sank in the North Atlantic during World War II

Lusitania—a British ocean liner torpedoed⁸ by a German submarine in 1915 off the Irish⁹ coast

Yorktown—an aircraft carrier¹⁰ sunk near Midway Island¹¹ in the Pacific Ocean during World War II



Sunken Museums

The *Titanic* is like a museum—filled with information about the past. Scientists who study the past, especially the objects that people leave behind, are called archaeologists¹. Just as archaeologists on land are digging up traces of the past, underwater archaeologists discover the past on the ocean floor.

Every sunken ship can give us clues about the past. Robert Ballard is skilled at finding these treasures. He's found and explored dozens of shipwrecks in oceans around the world. Some shipwrecks were many centuries old. Some sank to the bottom more recently, during World War II.

How does Robert decide where to look for these “sunken museums”? He looks for clues by reading about great sea battles. He researches the travels of early explorers and ocean adventurers. He reads legends² about ancient sailors and the routes³ that they sailed.

Recently, Robert's research has taken him to the Black Sea, sandwiched⁴ between Turkey⁵ and Ukraine⁶. It's a sea like no other. Below about 180 meters (600 feet), there is nothing alive. The

1. archaeologist	<i>n.</i>	考古学家
2. legend	<i>n.</i>	传说
3. route	<i>n.</i>	航线
4. sandwich	<i>v.</i>	夹在中间
5. Turkey		土耳其
6. Ukraine		乌克兰
7. Mediterranean Sea		地中海
8. torpedo	<i>v.</i>	用鱼雷袭击
9. Irish	<i>adj.</i>	爱尔兰的
10. aircraft carrier		航空母舰
11. Midway Island		中途岛
12. illustration	<i>n.</i>	插图

◀ Illustration¹² of the *Isis* at sea and coins similar to the ones found with *Isis*



deep water contains no oxygen¹, which living things need to survive². That means there are no little creatures around to chew³ and burrow⁴ their way through wood or canvas⁵. On the bottom of the Black Sea, sunken ships may be preserved⁶ for thousands of years.

Would you like to make an underwater discovery? Well, pack⁷ your gear⁸ because you're about to join Robert Ballard on an expedition in the Black Sea.

Robert holds model of *Lusitania* while viewing⁹ a wreck of the ship on screen¹⁰ with his team.

1. oxygen	<i>n.</i>	氧气
2. survive	<i>v.</i>	活下来
3. chew	<i>v.</i>	咬; 咀嚼
4. burrow	<i>v.</i>	掘洞; 挖掘
5. canvas	<i>n.</i>	帆布
6. preserve	<i>v.</i>	保存
7. pack	<i>v.</i>	整理
8. gear	<i>n.</i>	衣服
9. view	<i>v.</i>	观看
10. screen	<i>n.</i>	屏幕

In the Field: A Black Sea Adventure

实地作业：黑海探险

Is the water in the Black Sea really black? No, but it looks that way from the deck of a ship.



DSL-120 gets lowered over the side of the research ship.

The research ship rides¹ the waves, moving up and down, up and down. After three weeks sailing the Black Sea with Robert Ballard's team, you've gotten so used to the motion², you hardly notice.

The ship's deck is crowded with ROVs. These are the tools that make it possible to explore the dark waters below. Just now, an ROV called the *DSL-120* is going over the side. The DSL uses sonar to find "hard targets"³—solid⁴ things—on the seafloor.

A hard target might be just a rock. It also could be part of a sunken ship. On this expedition the remains⁵ of two ancient ships already have been found. When it comes to finding shipwrecks, Robert has a talent⁶ for knowing where to look.

- | | | |
|------------|------|----------|
| 1. ride | v. | (在……上)航进 |
| 2. motion | n. | 动；移动 |
| 3. target | n. | 目标 |
| 4. solid | adj. | 坚实的；固体的 |
| 5. remains | n. | 剩余物；残骸 |
| 6. talent | n. | 才能 |
| 7. sunset | n. | 日落 |

The Black Sea at sunset⁷ ►

