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国家地理科学探索丛书

英文注释

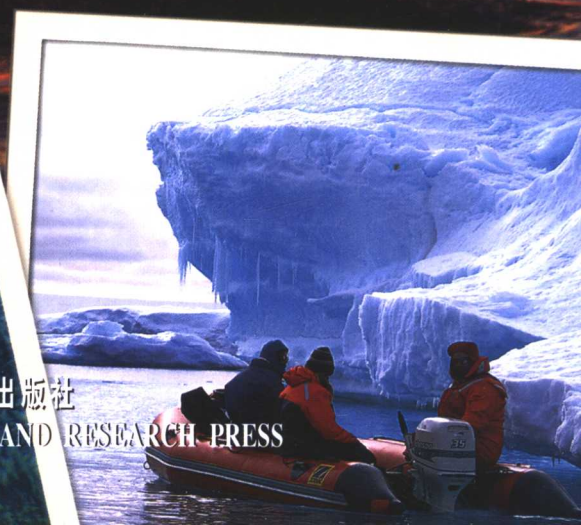
ON ASSIGNMENT

专题研究

Learning about Ocean Animals

了解海洋动物

REBECCA L. JOHNSON （美）著



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致读者

如果你希望在享受英语阅读乐趣的同时又能增长知识、开拓视野，由外语教学与研究出版社与美国国家地理学会合作出版的“国家地理科学探索丛书”（英文注释版）正是你的选择。

“国家地理科学探索丛书”（英文注释版）第二辑分为8个系列，共46本，内容涉及自然科学和社会研究，除对本套丛书第一辑已包含的“生命科学”、“物理科学”、“地球科学”和“文明的进程”4个系列进行了补充外，又推出了4个新的系列——“生活中的科学”、“科学背后的数学”、“专题研究”以及“站在时代前沿的科学家”。

这套丛书秉承《国家地理》杂志图文并茂的特色，在书中配有大量精彩的图片，文字地道易懂、深入浅出，将科学性和趣味性完美结合，称得上是一套精致的小百科全书。特别值得一提的是本套丛书在提高青少年读者英语阅读能力的同时，还注重培养他们的科学探索精神、动手能力、逻辑思维能力和沟通能力。

本套丛书既适合学生自学，又可用于课堂教学。丛书各个系列均配有一本教师用书，内容包括背景知识介绍、技能训练提示、评估测试、多项选择题及答案等详尽的教学指导，是对课堂教学的极好补充。

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北京 BEIJING

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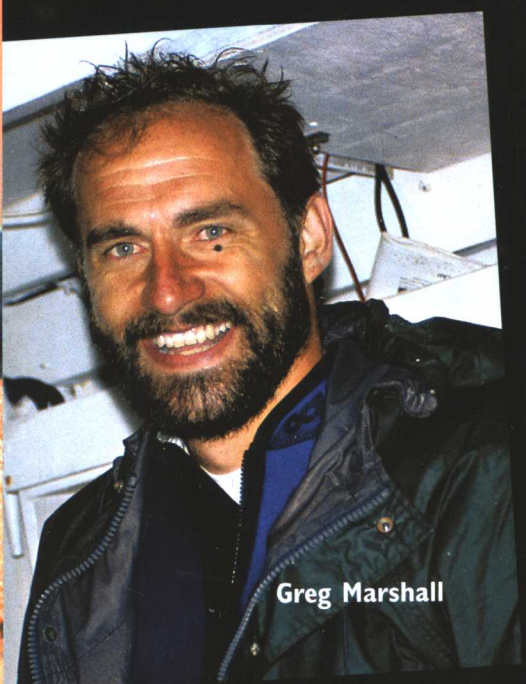


Greg Marshall

Introduction
引言

Hitching a Ride
搭便车

Brightly colored fish swirled[1] around Greg Marshall as he glided[2] over the coral reef[3]. He checked his air supply. It was almost time to end the dive[4]. Then he saw the shark[5]. It was swimming right toward him. The shark came closer, and closer. . . .

Greg held his breath as the shark swam past. That's when he saw the remora[6] on the shark. A remora is a long, skinny[7] fish. With a suction-cup-like[8] structure[9] on its head, it can attach[10] to other fish.

After the dive, Greg could not stop thinking about what he had seen. He wondered if a camera could be stuck to a shark, like a remora. If he could figure out how to do that—and get the camera back—he'd see the ocean from the shark's point of view. The "hitchhiking" camera would go where the shark went. It would record what the shark saw and did.

Greg's idea became an invention called Crittercam. In this book you'll go on assignment to meet the Crittercam team. You'll learn how Crittercam shows us the secret lives of ocean animals.

1. swirl	*v.*	打旋；旋动	6. remora	*n.*	鲫
2. glide	*v.*	游动	7. skinny	*adj.*	皮包骨头的
3. coral reef		珊瑚礁	8. suction-cup-like	*adj.*	似吸杯的
4. dive	*n.*	潜水	9. structure	*n.*	结构
5. shark	*n.*	鲨	10. attach	*v.*	附着

A remora hitches a ride on a shark.

Chapter 1
第一章

Creating Crittercam
动物摄像机

A whale breaks the water's surface. Then it arches[1] through the air and disappears below. What does it do after it dives out of sight?

Humpback whales

That's a good question, and one scientists have tried to answer for years. Studying animals like whales, sharks, and seals[2] isn't easy. They can dive deeper than divers in scuba gear[3]. They can swim faster than small submarines[4] can travel. Scuba divers and subs can also scare[5] ocean animals and make them act in unnatural ways.

1. arch	*v.*	呈弧形前进
2. seal	*n.*	海豹
3. scuba gear		水下呼吸器装置
4. submarine	*n.*	潜艇
5. scare	*v.*	使惊恐

With a flip[8] of its tail, a whale takes a dive.

That's why Greg liked the idea of attaching cameras to sea creatures[1]. It would be a way to swim with them without scaring them.

In 1987, Greg started building Crittercam. He began by taking apart a video camcorder[2]. Bit by bit, he took out all the parts he didn't need. He got down to the camera's basic parts. He placed those parts in a waterproof[3] metal tube.

The tube was streamlined[4] so that water would flow smoothly around it. The more streamlined Crittercam was, the less drag[5] it would create for the animal wearing it. Imagine how hard it would be to swim wearing a backpack[6]. That's drag!

The tube had to be strong, too. It would probably get bumped[7] as an animal wearing it searched for food.

1. creature	*n.*	生物	5. drag	*n.*	阻力
2. camcorder	*n.*	（可携式）摄像放像机	6. backpack	*n.*	背包
3. waterproof	*adj.*	防水的	7. bump	*v.*	碰，撞
4. streamlined	*adj.*	流线型的	8. flip	*n.*	轻击

Crittercam on a turtle

First Tests

Greg put everything together and made the first prototype[1], or test model, of Crittercam. It looked like a toy rocket[2] with little fins[3] on the sides.

Then Crittercam had to be tested. Some tests were pretty simple. Greg plunged[4] the prototype into a full bathtub to test it for leaks[5]. He made sure that it was buoyant[6]. The camera would have to float. After all, once the camera was done taking pictures, Greg had to get it back.

The camera couldn't be too buoyant. If it was, it would make the animal wearing it rise in the water. Crittercam had to be like a remora—streamlined and nearly weightless underwater.

The next step was to test the prototype on an animal. What kind of animal? Something small and easy to handle . . . probably not a shark! Greg chose a captive[7] turtle[8] in Central America.

1. prototype	*n.*	样本
2. rocket	*n.*	火箭
3. fin	*n.*	尾翼
4. plunge	*v.*	把……投入
5. leak	*n.*	漏洞；裂缝
6. buoyant	*adj.*	能浮起的
7. captive	*adj.*	被关的
8. turtle	*n.*	海龟

Changes in Crittercam design, 1987–2000

1987

1988

Greg carefully strapped[1] Crittercam onto the turtle's shell. As the turtle slid into the water of its tank, Greg watched closely. What would the turtle do?

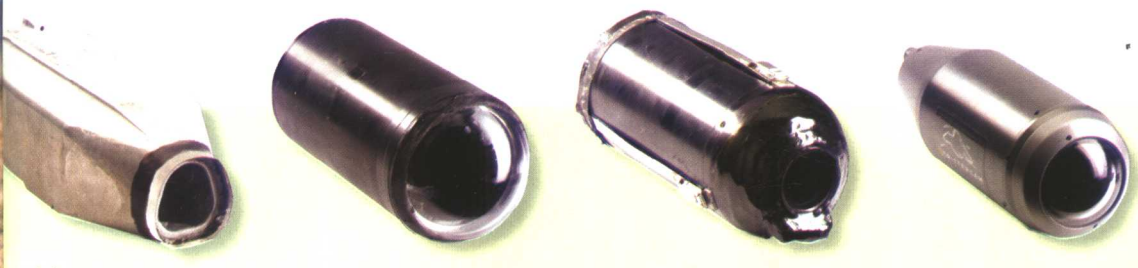
To Greg's relief, the turtle swam around, dived down, and bobbed[2] up to the surface. It didn't pay any attention to the camera on its back. The first big challenge was overcome.

With help from Birgit Buhleier, a biologist[3] friend, Greg kept improving Crittercam. In 1989, they tested it on wild turtles in the Caribbean Sea[4].

Greg made harnesses[5], or special straps, to hold Crittercam in place on the turtles' shells. He put the harnesses on when the turtles came ashore to lay eggs. At first, the harnesses didn't work. Underwater, the turtles slipped out of them. Greg lost eight Crittercams before he made a harness that worked.

The first fish to wear Crittercam was a captive nurse shark[6]. Watching the shark swim around its tank, Greg could tell that the camera was causing too much drag. So it was back to the drawing board. Every time it was rebuilt, Crittercam got smaller, sleeker[7], and better.

1. strap	*v.*	用带扣住
2. bob	*v.*	上下快速移动
3. biologist	*adj.*	生物学家
4. Caribbean Sea		加勒比海
5. harness	*n.*	挽具状带子
6. nurse shark		护士鲨
7. sleek	*adj.*	光滑的



1991 1994 1997 2000

The Crittercam team safely harnessed the camera to a hippo[1].

1. hippo	*n.*	河马
2. furry	*adj.*	长有毛皮的
3. sea lion		海狮
4. shed	*v.*	脱落
5. molt	*v.*	脱毛

Greg attached a Crittercam to a furry[2] sea lion[3] with glue. The glue will be shed[4] when the animal molts[5].

What Goes On . . .

A few years later, Greg went to work for National Geographic. Other people joined him to study ocean animals using Crittercam. The Crittercam team experimented with everything from walruses[1] to whales. Each time, the team learned something new.

One goal was to attach Crittercam in ways that are safe for each animal. For example, at first the team attached Crittercam to a shark by poking[2] metal tags[3] into its skin. Later, the team used a clamp[4]. The clamp held the camera on the shark's top fin. No poking was needed.

Walruses dig for food in the sea floor. The team clamped Crittercam to a walrus's tusk[10] to learn more.

. . . Must Come Off

The team has also found creative ways to get the cameras off of animals once the videotaping is over.

Some animals, like penguins, hop onto ice or land to rest. When they do, people unclip[5] their harnesses to get the cameras.

Seals and sea lions often come out of the sea to sun themselves. The Crittercams glued to their fur can be easily removed. What if traces[6] of glue are left behind? They'll disappear when the animals go through a molt. That's when they naturally shed their fur and grow a brand-new coat.

The team has also made a tether[7], or rope, out of a thin strip[8] of metal that dissolves[9]. The tether can tie a camera to an animal. When the tether dissolves, Crittercam pops free.

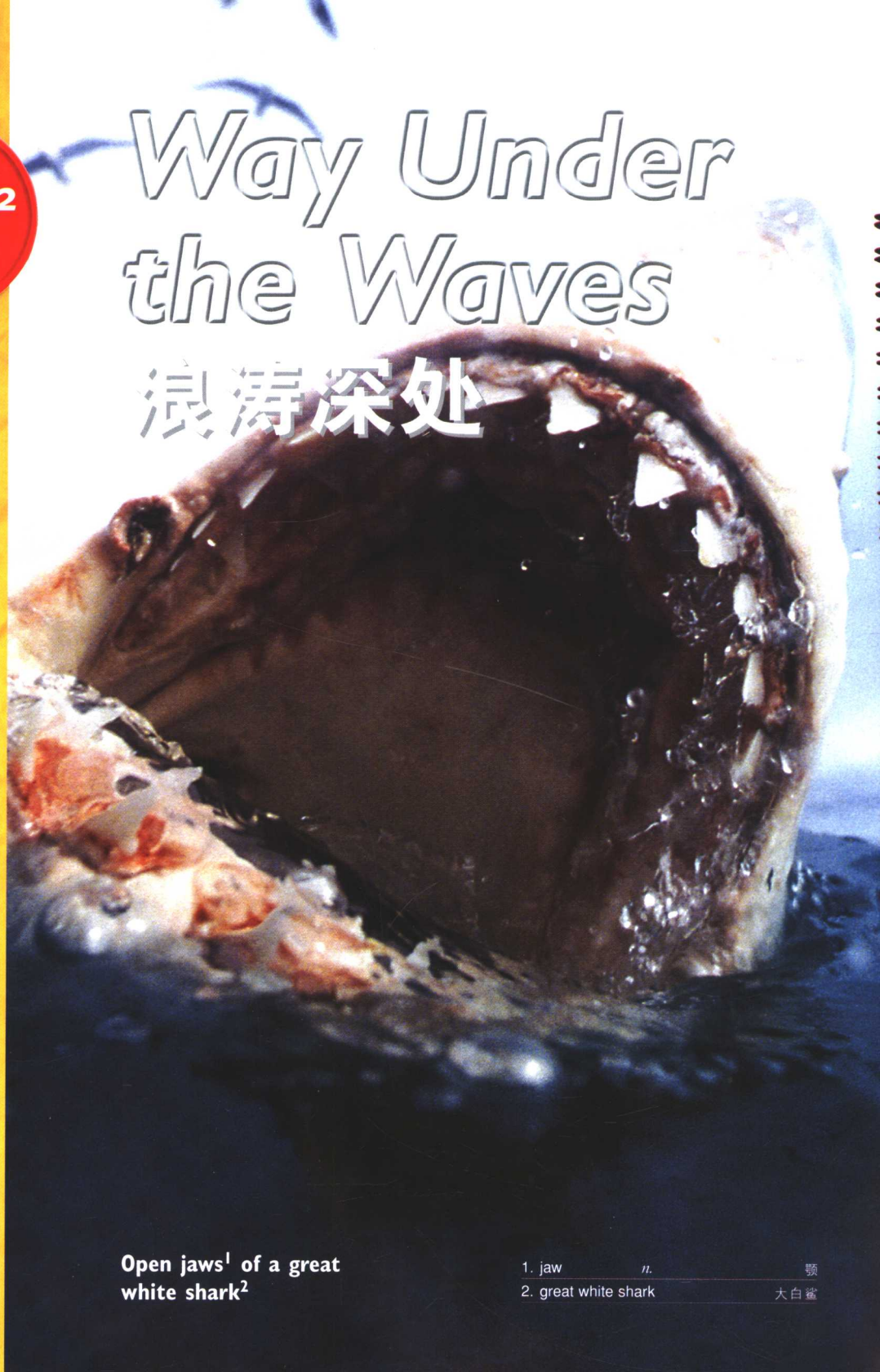
From the very beginning, Greg Marshall hoped Crittercam would help scientists learn about ocean animals in a new way. And it certainly has!

1. walrus	*n.*	海象
2. poke	*v.*	把……戳向
3. tag	*n.*	附加物
4. clamp	*n.*	夹具
5. unclip	*v.*	松开
6. trace	*n.*	痕迹
7. tether	*n.*	拴链
8. strip	*n.*	（金属）条
9. dissolve	*v.*	分解
10. tusk	*n.*	（海象的）长牙

Chapter 2
第二章

Way Under the Waves

浪涛深处



Open jaws[1] of a great white shark[2]

1. jaw *n.* 颚
2. great white shark 大白鲨

Imagine for a moment that you want to study the underwater habits of a great white shark. There's a problem. The shark is five times longer than you are tall. And it's got a mouth packed full of some very scary teeth.

Crittercam is tethered to the shark's top, or dorsal[12], fin.

How would you get Crittercam on—and off—that shark? That's what the Crittercam team had to figure out. Off the coast of South Africa[1], they used bait[2] to attract[3] great white sharks to the boat. When a shark came close enough, a team member used a long pole[4] to attach a metal tag into its fin. Attached to the tag by a tether was Crittercam. The shark hardly seemed to notice. With a flick[5] of its tail, it swam away. As the shark disappeared, the camera inside Crittercam went to work.

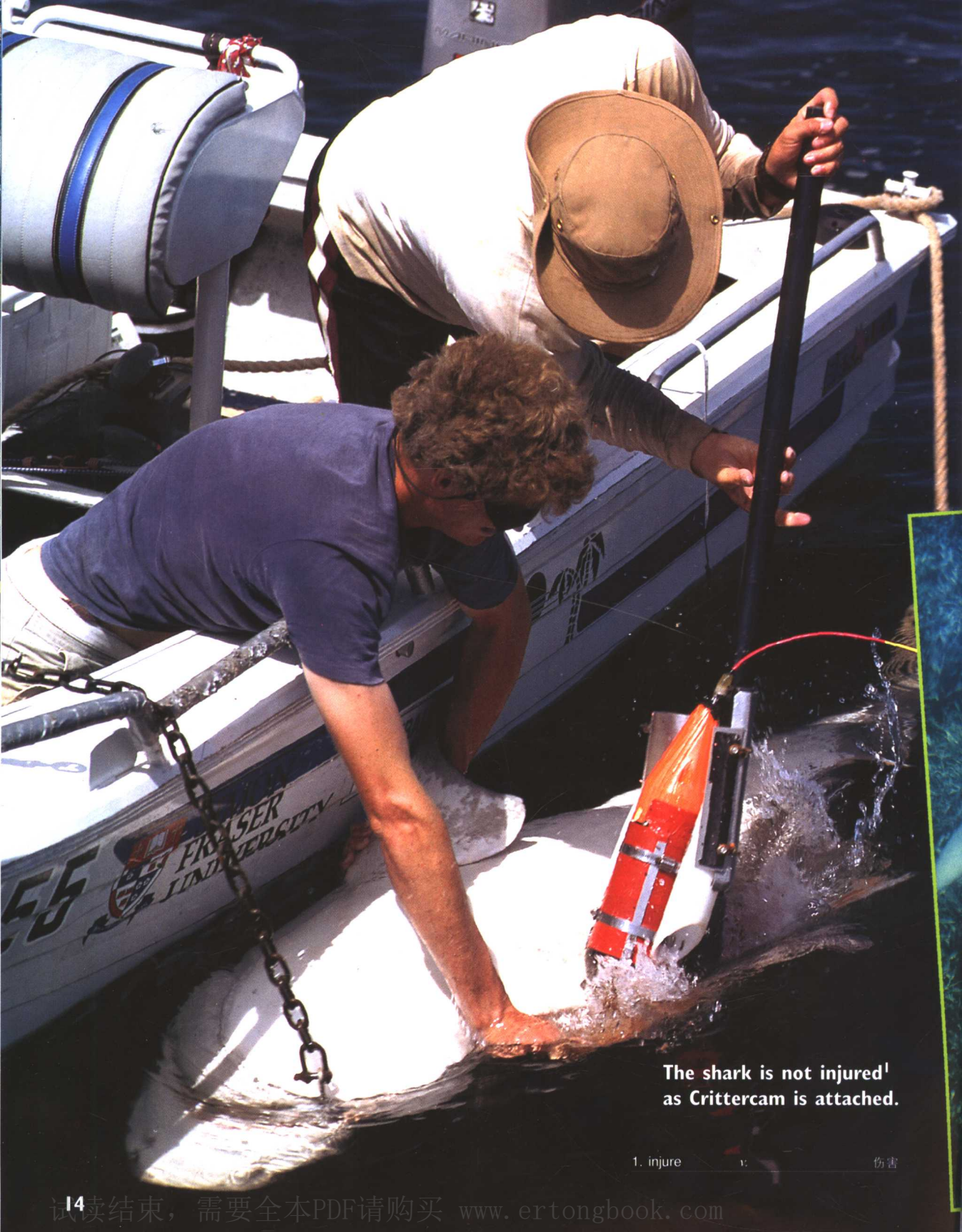
About the time the camera ran out of tape, the tether dissolved. Crittercam floated to the surface, where it sent out a radio signal[6]. The team followed the signal to its source[7]. Soon Crittercam was back on board.

The videotape was worth all the effort. As the tape rolled, the shark's world came into view. The shark's head moved slowly from side to side. Back and forth, back and forth. . . . It took a while for everyone to realize what the shark was doing. It was hunting.

Exactly *how* the shark was hunting was an important discovery. It was looking for silhouettes[8], or outlines, on the surface of the ocean.

Silhouettes of what, you ask? They could be of a seal, a big fish, or even a person—anything swimming near the surface. When a great white shark spots[9] a shape, it streaks[10] up to attack[11].

1. South Africa		南非
2. bait	*n.*	饵
3. attract	*v.*	诱惑
4. pole	*n.*	杆
5. flick	*n.*	（突然的）轻快动作
6. signal	*n.*	信号
7. source	*n.*	来源
8. silhouette	*n.*	轮廓
9. spot	*v.*	发现
10. streak	*v.*	疾驰
11. attack	*v.*	攻击
12. dorsal	*adj.*	背部的



The shark is not injured[1] as Crittercam is attached.

1. injure v. 伤害