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EARTH SCIENCE

地球科学

# The Oceans Around Us 环绕我们的大洋

KATE BOEHM NYQUIST (美) 著

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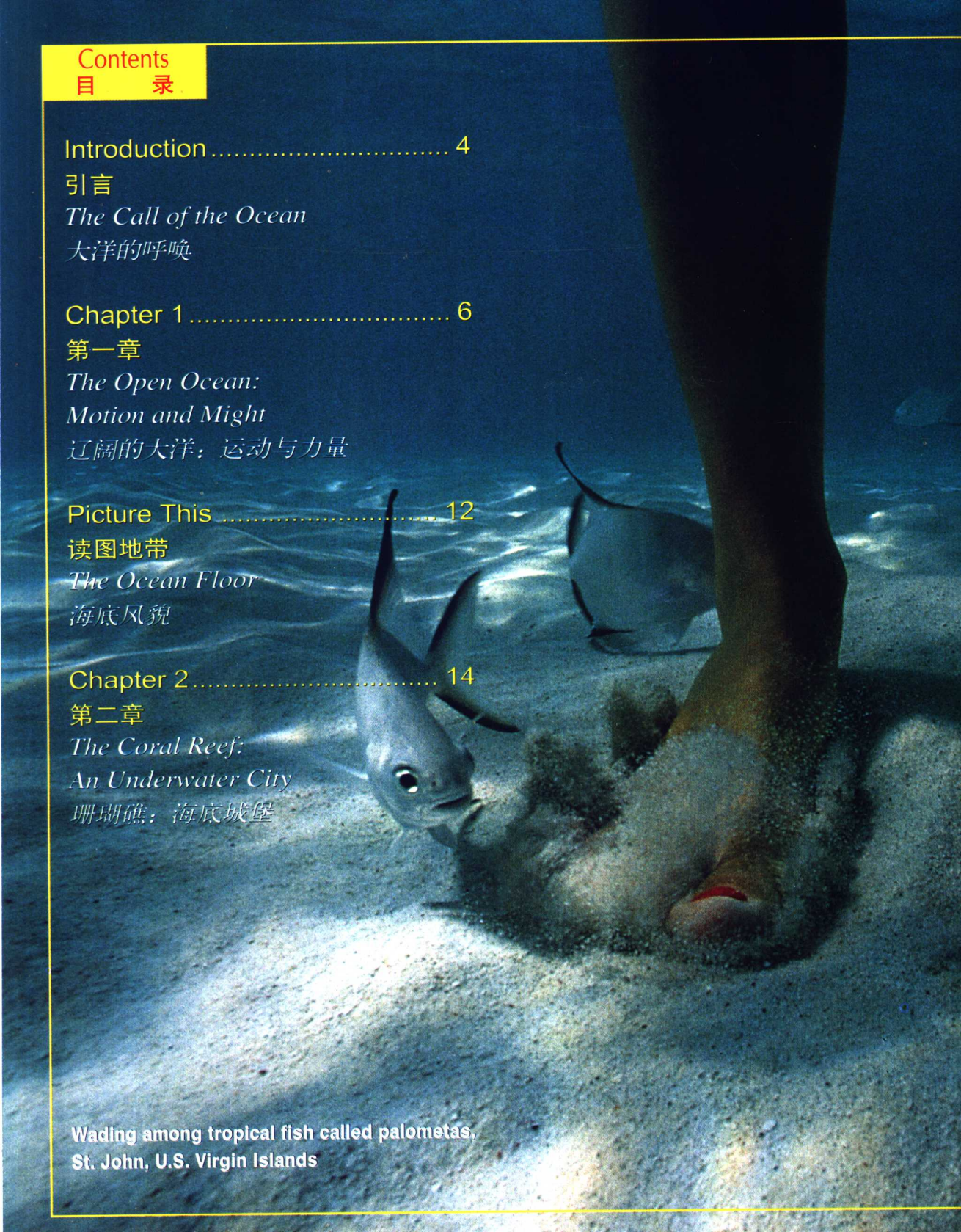
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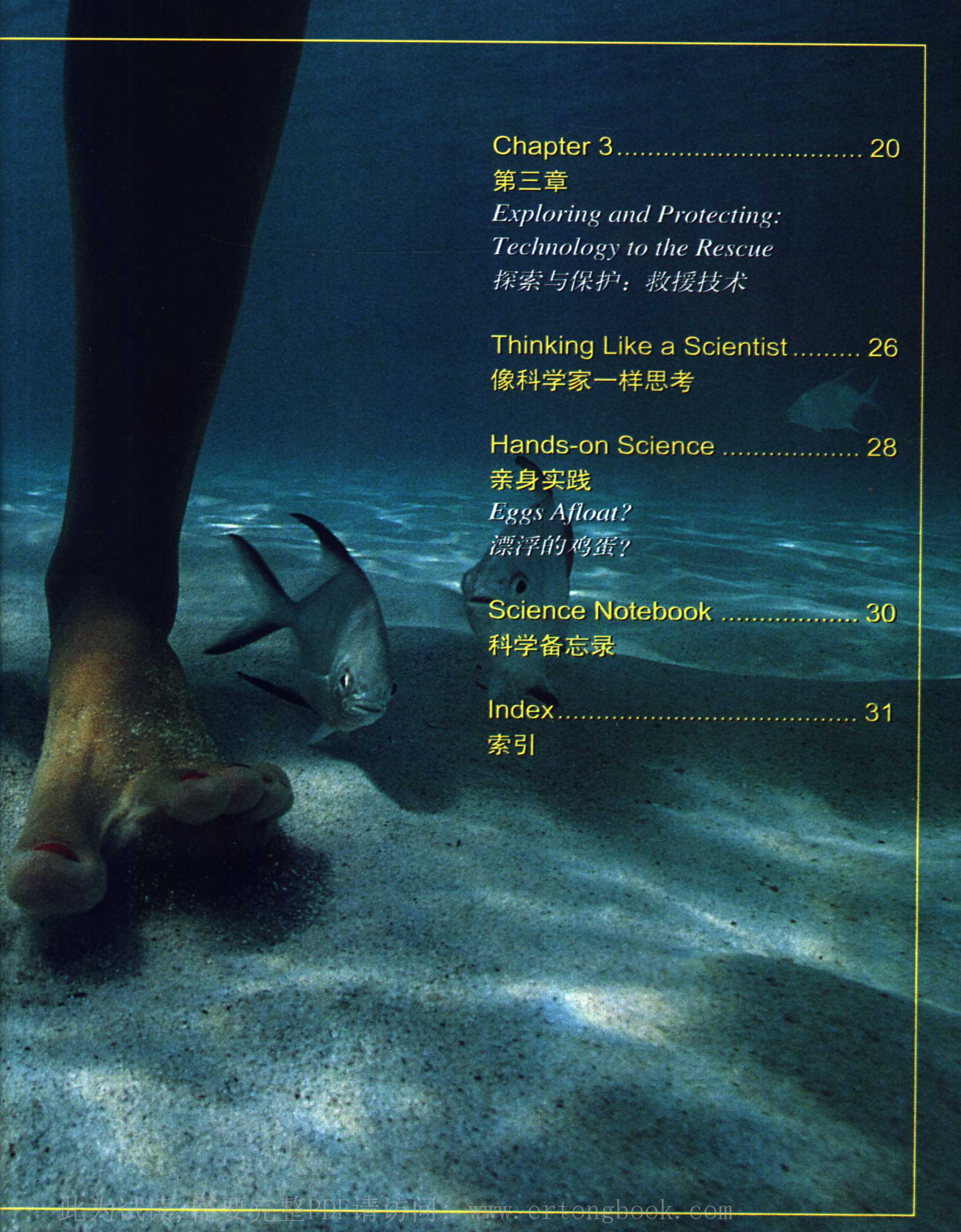
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珊瑚礁：海底城堡

Wading among tropical fish called palometas,  
St. John, U.S. Virgin Islands





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# The Call of the Ocean

大洋的呼唤



Adult green sea turtle<sup>1</sup> in the open sea

*The baby green sea turtle struggles<sup>1</sup> to push her way out of her shell<sup>2</sup>. In time, her tiny<sup>3</sup> body breaks free. But the hard work has just begun. She is still buried<sup>4</sup> deep in the sand. It will take several days of digging to reach the surface<sup>5</sup>. When she crawls<sup>6</sup> out on the beach<sup>7</sup>, the danger will be even greater. Can she make it to the ocean<sup>8</sup>?*

**M**ost baby sea turtles don't survive<sup>9</sup> the trip. Many creatures<sup>10</sup> are waiting to pounce<sup>11</sup> on the little turtles as they struggle toward the water. Sometimes birds gobble<sup>12</sup> them up. Sometimes other animals, including humans, grab<sup>13</sup> them for food. Even if the sea turtles make it to the ocean, they may not be safe. When they are small, sea turtles cannot dive<sup>14</sup> for safety. They bob<sup>15</sup> along, floating<sup>16</sup> wherever the water takes them. Sometimes it takes them straight into the path of a hungry fish.



Green sea turtle  
hatching from egg

But the sea turtle's home is the ocean, and she will risk<sup>17</sup> everything to get to it. This is a book about the great oceans that provide<sup>18</sup> a home to many different creatures. These oceans cover about 70 percent<sup>19</sup> of Earth's surface and are essential<sup>20</sup> to life on this planet<sup>21</sup>. Even if you don't live near an ocean, you are greatly affected<sup>22</sup> by these large bodies of salt water. So get ready, land dweller<sup>23</sup>! A trip through the open ocean awaits<sup>24</sup>.

|              |      |                 |               |      |                 |
|--------------|------|-----------------|---------------|------|-----------------|
| 1. struggle  | v.   | 挣扎; 使劲          | 13. grab      | v.   | 攫取; 抓住          |
| 2. shell     | n.   | (动物的)壳          | 14. dive      | v.   | 潜水              |
| 3. tiny      | adj. | 极小的; 微小的        | 15. bob       | v.   | 上下波动; 摆动        |
| 4. bury      | v.   | 埋; 掩埋           | 16. float     | v.   | 漂浮; 漂流          |
| 5. surface   | n.   | 表面              | 17. risk      | v.   | 冒……的危险          |
| 6. crawl     | v.   | 爬行              | 18. provide   | v.   | 提供              |
| 7. beach     | n.   | 沙滩              | 19. percent   | n.   | 百分之一            |
| 8. ocean     | n.   | 大洋              | 20. essential | adj. | 必不可少的;<br>非常重要的 |
| 9. survive   | v.   | 经历……后继续存在       | 21. planet    | n.   | 行星(此处指地球)       |
| 10. creature | n.   | 生物; 动物          | 22. affect    | v.   | 影响              |
| 11. pounce   | v.   | 猛扑; 突袭          | 23. dweller   | n.   | 居住者; 居民         |
| 12. gobble   | v.   | 贪婪地吃;<br>大口大口地吞 | 24. await     | v.   | 等待              |

The Open Ocean:

# Motion and Might

## 辽阔的大洋：运动与力量

*Waves crash<sup>1</sup> hard on the rocks. Saltwater spray<sup>2</sup> flies high into the air. You can feel the ocean's strength<sup>3</sup> just by standing next to it. Why does it feel so powerful<sup>4</sup>?*

- |               |      |          |
|---------------|------|----------|
| 1. crash      | v.   | 哗啦啦地猛冲直撞 |
| 2. spray      | n.   | 浪花       |
| 3. strength   | n.   | 力量       |
| 4. powerful   | adj. | 强有力的；强大的 |
| 5. lighthouse | n.   | 灯塔       |
| 6. Brittany   |      | 布列塔尼地区   |

Waves crashing on  
La Jument lighthouse<sup>5</sup>,  
Brittany<sup>6</sup> coast, France

Part of the ocean's power comes from its size. All of the oceans are really big. Scientists estimate<sup>1</sup> that there are about 330 million cubic<sup>2</sup> miles<sup>3</sup> of water in the oceans. There are four main oceans—the Atlantic<sup>4</sup>, the Indian, the Arctic, and the Pacific<sup>5</sup>. The largest and deepest is the Pacific Ocean. In fact, the Pacific Ocean is so big that if we could pick up all the land on Earth, we could fit it inside this one ocean.

## Rivers of Water

The movement of ocean water has a great effect<sup>6</sup> on Earth—and the oceans are always in motion. Did you know that there are rivers of water flowing through the oceans? That's right—water flowing through water. These huge rivers of water are called currents<sup>7</sup>. You can't see currents, but as any sailor<sup>8</sup> knows, you can feel them move.

Strong rivers of water that move close to the surface of the ocean are called surface currents. The wind and the rotation<sup>9</sup> of Earth create<sup>10</sup> these currents.

When the baby sea turtle makes it to the water, she will probably head for the safety of a large surface current off the coast where she was born. Here the turtle can find a good food supply<sup>11</sup> while avoiding<sup>12</sup> the many enemies near shore. After floating around in this current for a few years, the turtle will grow big enough to defend<sup>13</sup> herself against most predators<sup>14</sup>. Then she can go back to the waters near the coast.

|             |             |           |              |           |           |
|-------------|-------------|-----------|--------------|-----------|-----------|
| 1. estimate | <i>v.</i>   | 估计        | 8. sailor    | <i>n.</i> | 水手        |
| 2. cubic    | <i>adj.</i> | 立方的       | 9. rotation  | <i>v.</i> | 自转        |
| 3. mile     | <i>n.</i>   | 海里        | 10. create   | <i>v.</i> | 引起; 产生    |
| 4. Atlantic |             | 大西洋       | 11. supply   | <i>n.</i> | 供应; 供给    |
| 5. Pacific  |             | 太平洋       | 12. avoid    | <i>v.</i> | 避开        |
| 6. effect   | <i>n.</i>   | 影响; 作用    | 13. defend   | <i>v.</i> | 保护        |
| 7. current  | <i>n.</i>   | (空气、水等的)流 | 14. predator | <i>n.</i> | 捕食者; 食肉动物 |

*Why do you think Earth is known as the blue planet?*

Surface currents are important because they can help warm or cool land. Surface currents that flow from regions<sup>1</sup> near the Equator<sup>2</sup> carry warm water. Those that flow from the polar<sup>3</sup> regions carry cold water. The map below shows the strong ocean current off the East Coast of the United States, called the Gulf Stream<sup>4</sup>. Do you think the Gulf Stream warms or cools the southeast coast of the United States?

Another kind of current found far below the surface of the water is called a deep ocean current. These currents form when very cold water meets warm water. The cold water sinks<sup>5</sup> under the warm water, and this movement causes currents.

## Tug-of-War<sup>6</sup> With the Moon

If you've ever been to the ocean shore, you know that water slowly rises and falls along the beach every day. This change in water level is called the tide<sup>7</sup>. The baby sea turtle

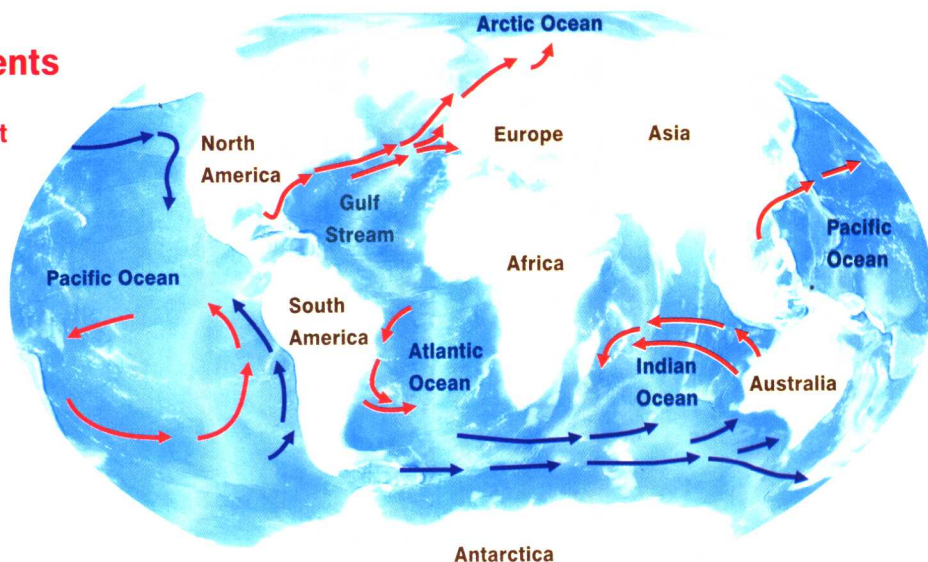
survived her dash<sup>8</sup> across the beach to the ocean partly because of the tide. She made her run at high tide<sup>9</sup>, when the water was highest and closest to her nest<sup>10</sup>. So she had a better chance of making it to the water. What causes the ocean level to rise and fall with the tides? Believe it or not, it's mostly the pull of our moon.

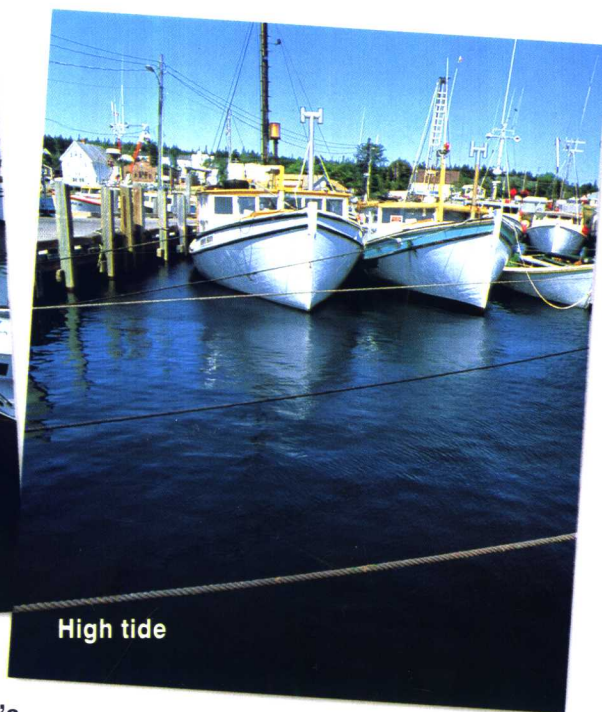
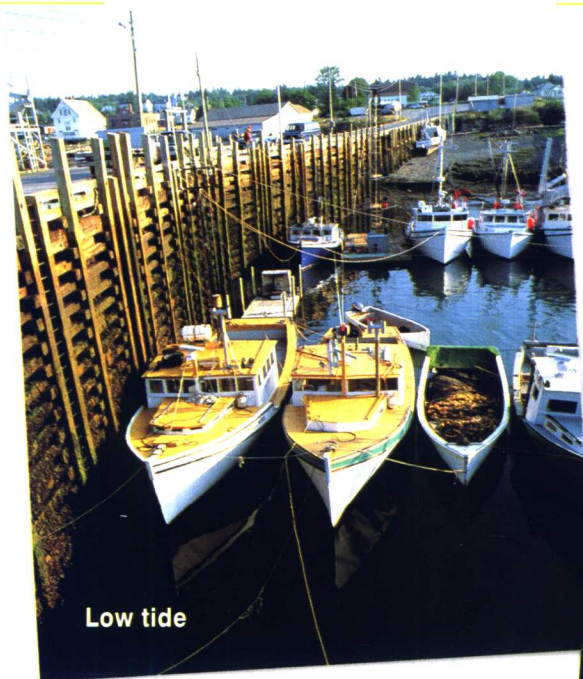
All objects<sup>11</sup> pull on each other. This pull is known as gravity<sup>12</sup>. The side of Earth closest to the moon experiences<sup>13</sup> a stronger pull than

|                |             |           |
|----------------|-------------|-----------|
| 1. region      | <i>n.</i>   | 区域; 地方    |
| 2. equator     | <i>n.</i>   | 赤道        |
| 3. polar       | <i>adj.</i> | 极地的       |
| 4. Gulf Stream |             | 墨西哥湾流; 湾流 |
| 5. sink        | <i>v.</i>   | 下沉        |
| 6. tug-of-war  | <i>n.</i>   | 拔河        |
| 7. tide        | <i>n.</i>   | 潮; 潮汐     |
| 8. dash        | <i>n.</i>   | 猛冲; 飞奔    |
| 9. high tide   |             | 满潮        |
| 10. nest       | <i>n.</i>   | 巢; 窝      |
| 11. object     | <i>n.</i>   | 物体        |
| 12. gravity    | <i>n.</i>   | (万有)引力    |
| 13. experience | <i>v.</i>   | 经历        |

## Surface Currents

→ Warm Current  
→ Cold Current



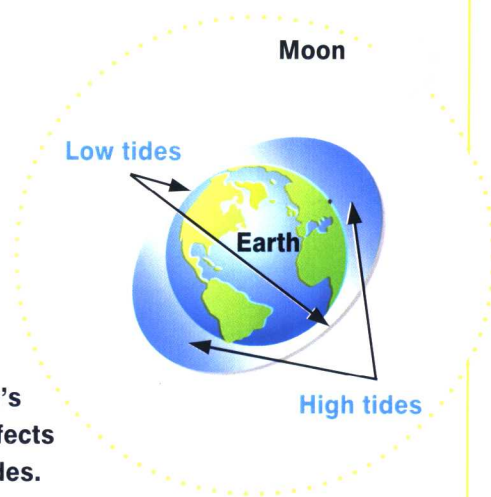


**Boats rise and fall with the tides in Canada's Bay of Fundy<sup>6</sup>.**

the side farthest from the moon. This is because the force of gravity gets weaker as distance<sup>1</sup> gets greater.

High tides occur<sup>2</sup> when ocean water bulges<sup>3</sup> away from Earth. Rising water forms a tidal<sup>4</sup> bulge on the side of the Earth closest to the moon. The moon's gravity pulls Earth's center away from the water on the side farthest from the moon. This causes another ocean bulge. The moon's pull holds the bulges in place while Earth rotates beneath them. A bulge forms a high tide. Where there is no bulge, a low tide<sup>5</sup> occurs.

- |                 |             |             |
|-----------------|-------------|-------------|
| 1. distance     | <i>n.</i>   | 距离          |
| 2. occur        | <i>v.</i>   | 出现          |
| 3. bulge        | <i>v.</i>   | 鼓胀; 凸出      |
| 4. tidal        | <i>adj.</i> | 潮汐的; 受潮汐影响的 |
| 5. low tide     |             | 低潮          |
| 6. Bay of Fundy |             | 芬迪湾         |



**The moon's gravity affects Earth's tides.**

## Surf! 's Up

Currents and tides make the ocean move, but waves breaking on the beach make the ocean fun. When you stand on the edge<sup>2</sup> of the ocean and look at the waves, it seems like the water is rolling in toward you. But the water is not really moving forward. What you see moving is wave energy<sup>3</sup>. And wave energy comes from the wind.

Let's think about how this works. As wave energy passes through the water, the energy makes particles<sup>4</sup> of water move up and down. Look at the illustration<sup>5</sup>, at left, of a wave passing under a beach ball<sup>6</sup>. As the wave passes by, the ball bobs up and then down. But the ball doesn't continue to travel forward with the wave. That's because the wave energy moves the water that is under the ball up and down as it passes underneath.

So why can a wave knock you down at the water's edge? When a wave moves toward shore, the bottom of the wave, or the trough<sup>7</sup>, slows down because it meets the ocean floor. But the top of the wave, or the crest<sup>8</sup>, keeps moving. This difference in motion causes the wave to fall over, or break, onto the shore. If a wave is very large, it carries a lot of energy when it crashes onto land. Over time, waves can break up and carry away the rocks and sand that line the shore. Shorelines<sup>9</sup> are constantly changing because of wave action.

(注释见第 11 页)



1. Wave approaches<sup>10</sup>.



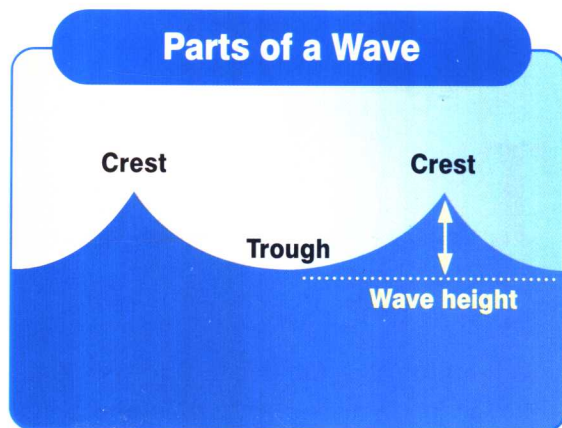
2. Ball rises as wave passes underneath .



3. Ball remains as wave continues.

The distance between the crest and the trough of a wave is the wave's height<sup>11</sup>. What's the biggest wave you've ever seen? Five feet? Ten feet? The sailors on the Navy<sup>12</sup> ship U.S.S. *Ramapo*<sup>13</sup> once saw a wave taller than a ten-story building.

- |                          |             |          |
|--------------------------|-------------|----------|
| 1. surf                  | <i>n.</i>   | 激浪       |
| 2. edge                  | <i>n.</i>   | 边缘       |
| 3. energy                | <i>n.</i>   | 能量       |
| 4. particle              | <i>n.</i>   | 粒子       |
| 5. illustration          | <i>n.</i>   | 插图       |
| 6. beach ball            |             | 浮水气球     |
| 7. trough                | <i>n.</i>   | 波谷       |
| 8. crest                 | <i>n.</i>   | 波峰       |
| 9. constantly            | <i>adv.</i> | 不断地, 不停地 |
| 10. approach             | <i>v.</i>   | 接近; 靠近   |
| 11. height               | <i>n.</i>   | 高度       |
| 12. navy                 | <i>n.</i>   | 海军       |
| 13. U.S.S. <i>Ramapo</i> |             | 美国军舰瑞曼波号 |



*What if the oceans didn't have currents, waves, and tides? How would that affect you?*



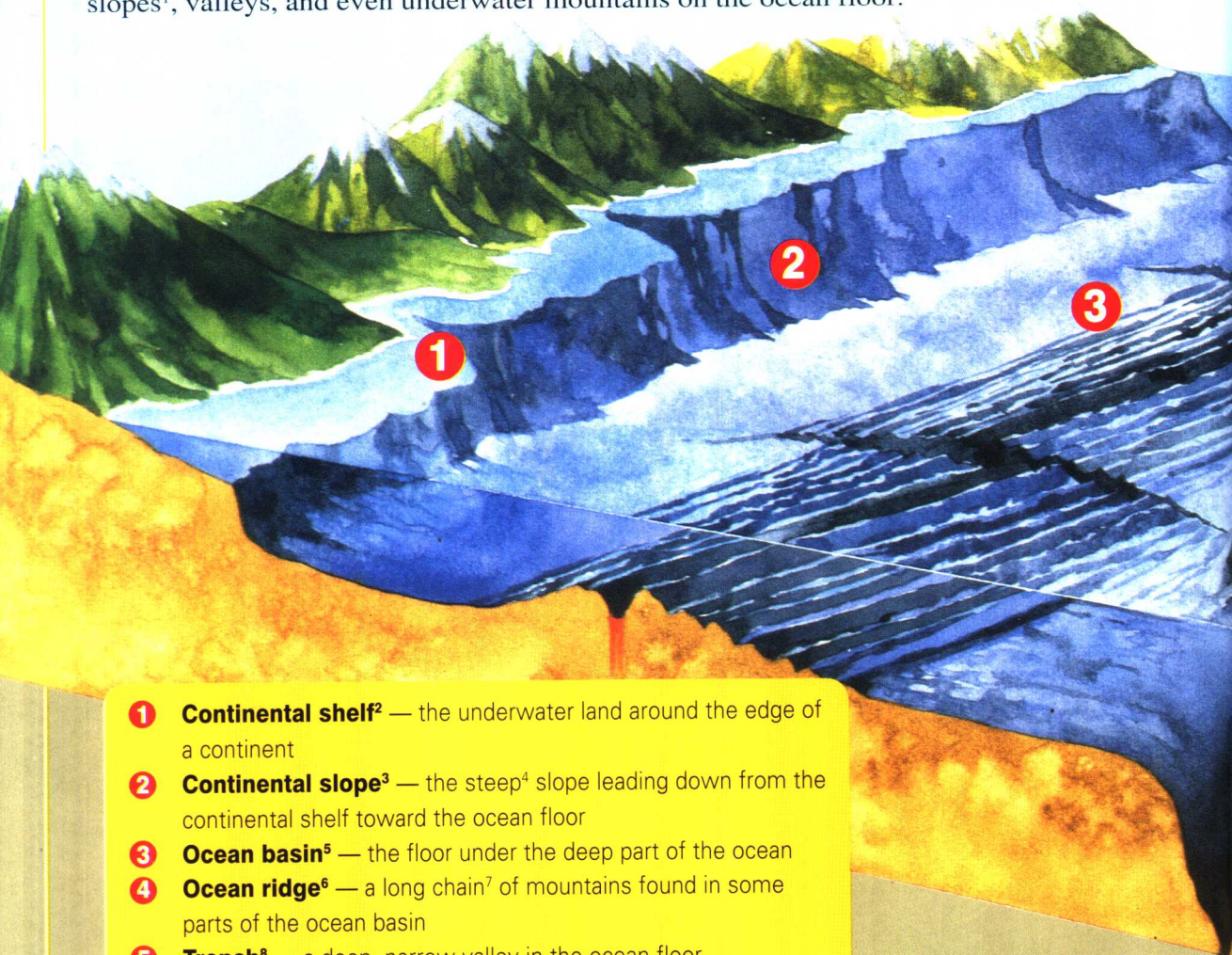
**Surfers riding a big wave**



# The Ocean Floor

## 海底风貌

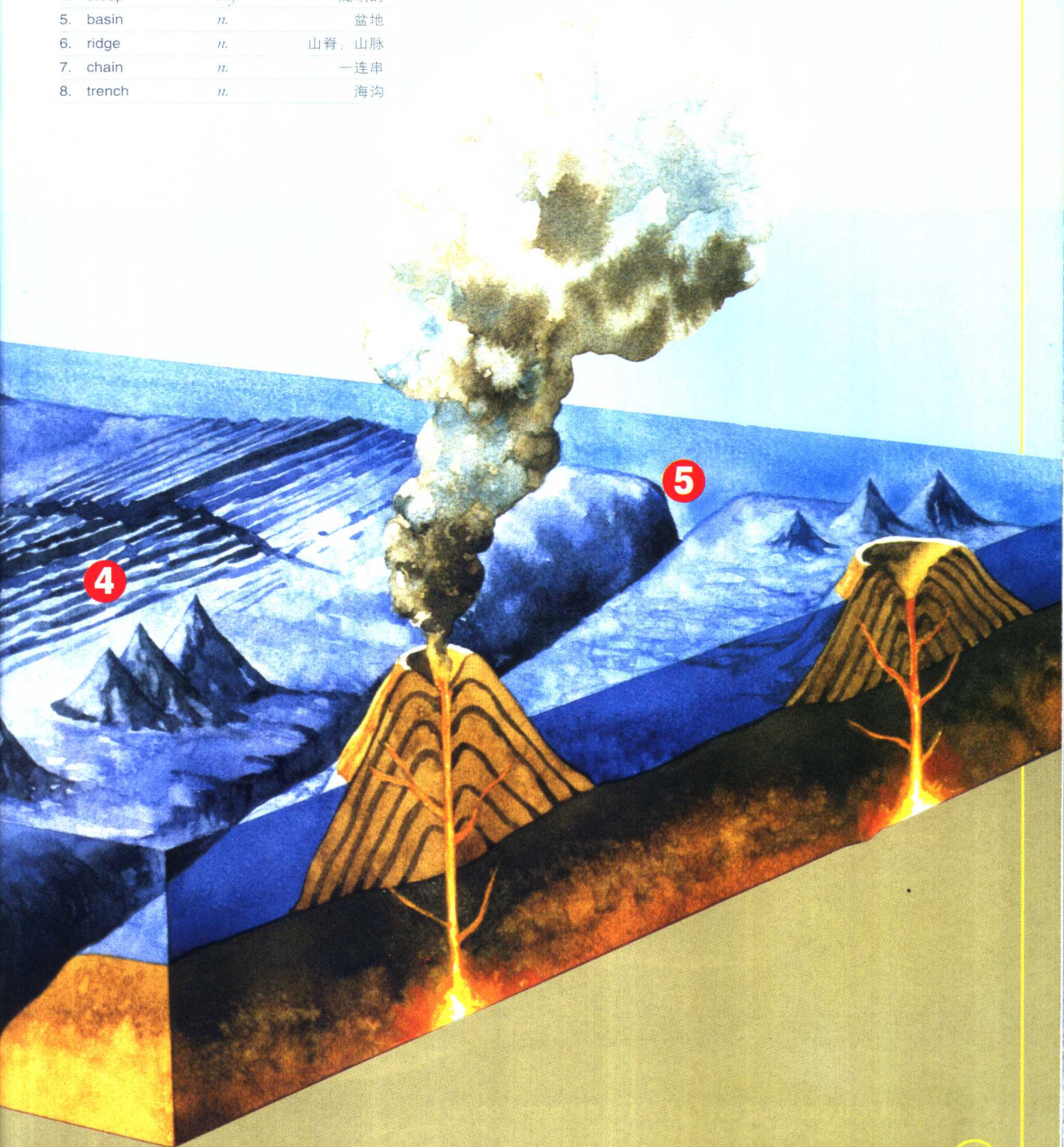
You might think the ocean floor is a flat surface. But it's really a lot like the land you see on Earth above water. Believe it or not, there are slopes<sup>1</sup>, valleys, and even underwater mountains on the ocean floor.



- 1 Continental shelf<sup>2</sup>** — the underwater land around the edge of a continent
- 2 Continental slope<sup>3</sup>** — the steep<sup>4</sup> slope leading down from the continental shelf toward the ocean floor
- 3 Ocean basin<sup>5</sup>** — the floor under the deep part of the ocean
- 4 Ocean ridge<sup>6</sup>** — a long chain<sup>7</sup> of mountains found in some parts of the ocean basin
- 5 Trench<sup>8</sup>** — a deep, narrow valley in the ocean floor

(注释见第 13 页)

- |                      |             |        |
|----------------------|-------------|--------|
| 1. slope             | <i>n.</i>   | 斜坡     |
| 2. continental shelf |             | 大陆架    |
| 3. continental slope |             | 陆坡     |
| 4. steep             | <i>adj.</i> | 陡峭的    |
| 5. basin             | <i>n.</i>   | 盆地     |
| 6. ridge             | <i>n.</i>   | 山脊; 山脉 |
| 7. chain             | <i>n.</i>   | 一连串    |
| 8. trench            | <i>n.</i>   | 海沟     |



Underwater Reef

# An Underwater City

珊瑚礁：海底城堡

|            |           |        |
|------------|-----------|--------|
| 1. school  | <i>n.</i> | 鱼群     |
| 2. stream  | <i>v.</i> | 流；涌    |
| 3. cabbage | <i>n.</i> | 卷心菜叶形状 |
| 4. coral   | <i>n.</i> | 珊瑚     |

A school<sup>1</sup> of fish streams<sup>2</sup> over a field of cabbage<sup>3</sup> coral<sup>4</sup>.

*Imagine what it might be like to live underwater all the time. Would there be enough food? Where would you sleep? What other creatures might you meet?*

**M**any plants and animals live in the ocean, but coral reefs are home to the greatest variety<sup>1</sup> of creatures. The sea turtle is a frequent<sup>2</sup> visitor to the reef. The coral provides lots of places for the sea turtle to rest and find food.

Coral reefs are made of the limestone<sup>3</sup> skeletons<sup>4</sup> of tiny animals called coral polyps<sup>5</sup>. The tiny coral polyps feed on<sup>6</sup> organisms<sup>7</sup> that need sunlight to grow. So coral reefs are found only in warm, shallow ocean water.

Coral reefs are amazing<sup>8</sup> structures<sup>9</sup>. When corals die, new corals build on the remains<sup>10</sup> of the dead ones. Over time, millions and millions of limestone skeletons build up to form huge underwater reefs. In fact, coral reefs are the largest natural structures ever built by living creatures in the wild.

- |                |             |            |
|----------------|-------------|------------|
| 1. variety     | <i>n.</i>   | 种类; 品种     |
| 2. frequent    | <i>adj.</i> | 经常的; 频繁的   |
| 3. limestone   | <i>n.</i>   | 石灰岩        |
| 4. skeleton    | <i>n.</i>   | 骨骼         |
| 5. coral polyp |             | 珊瑚虫        |
| 6. feed on     |             | 以……为食      |
| 7. organism    | <i>n.</i>   | 生物体; 有机体   |
| 8. amazing     | <i>adj.</i> | 惊人的; 令人惊异的 |
| 9. structure   | <i>n.</i>   | 结构; 构造     |
| 10. remains    | <i>n.</i>   | 遗骸; 残留物    |

