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英文注释
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物理科学
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磁体的奥秘
PAMELA BLISS (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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The Mystery of Magnets

磁体的奥秘

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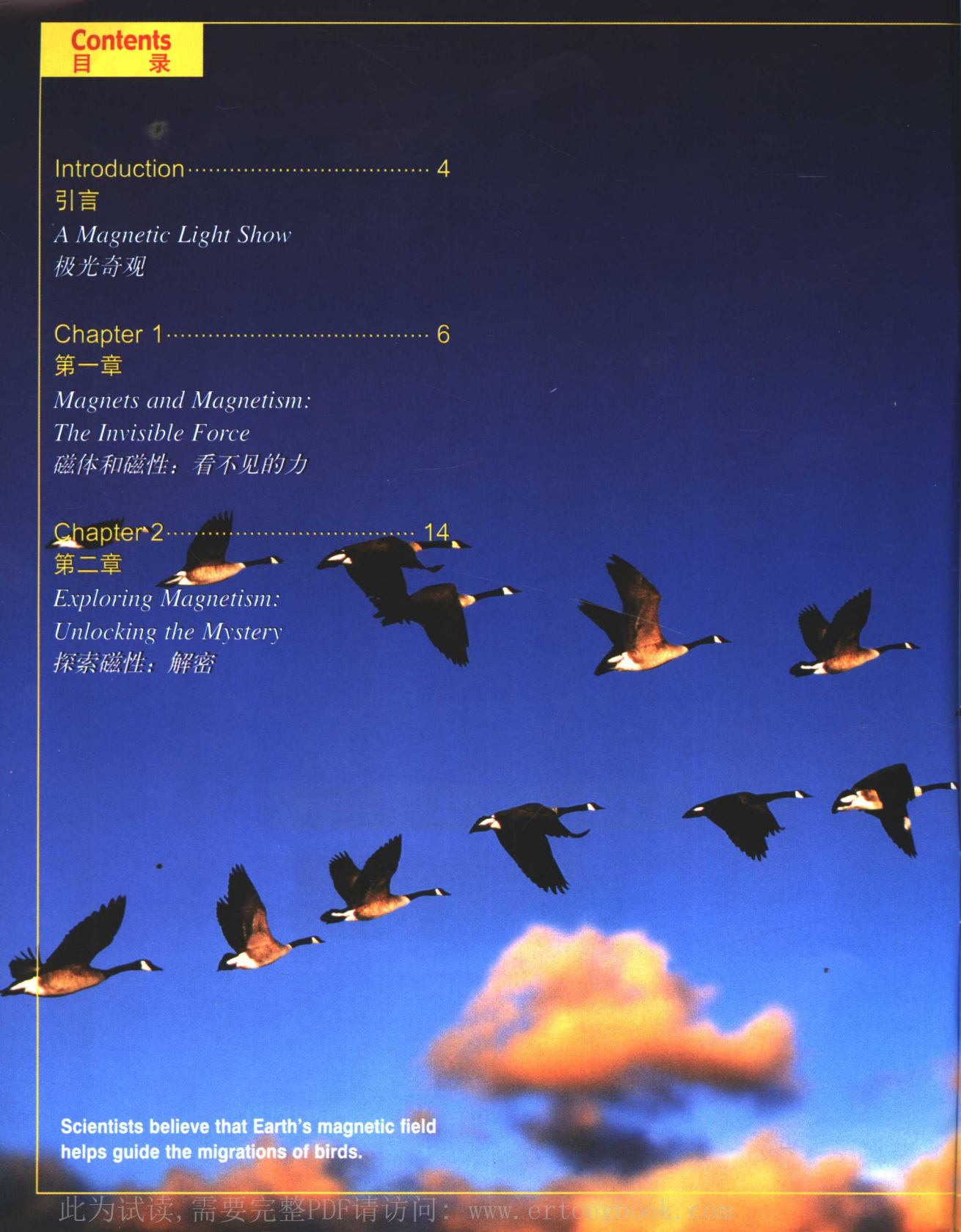
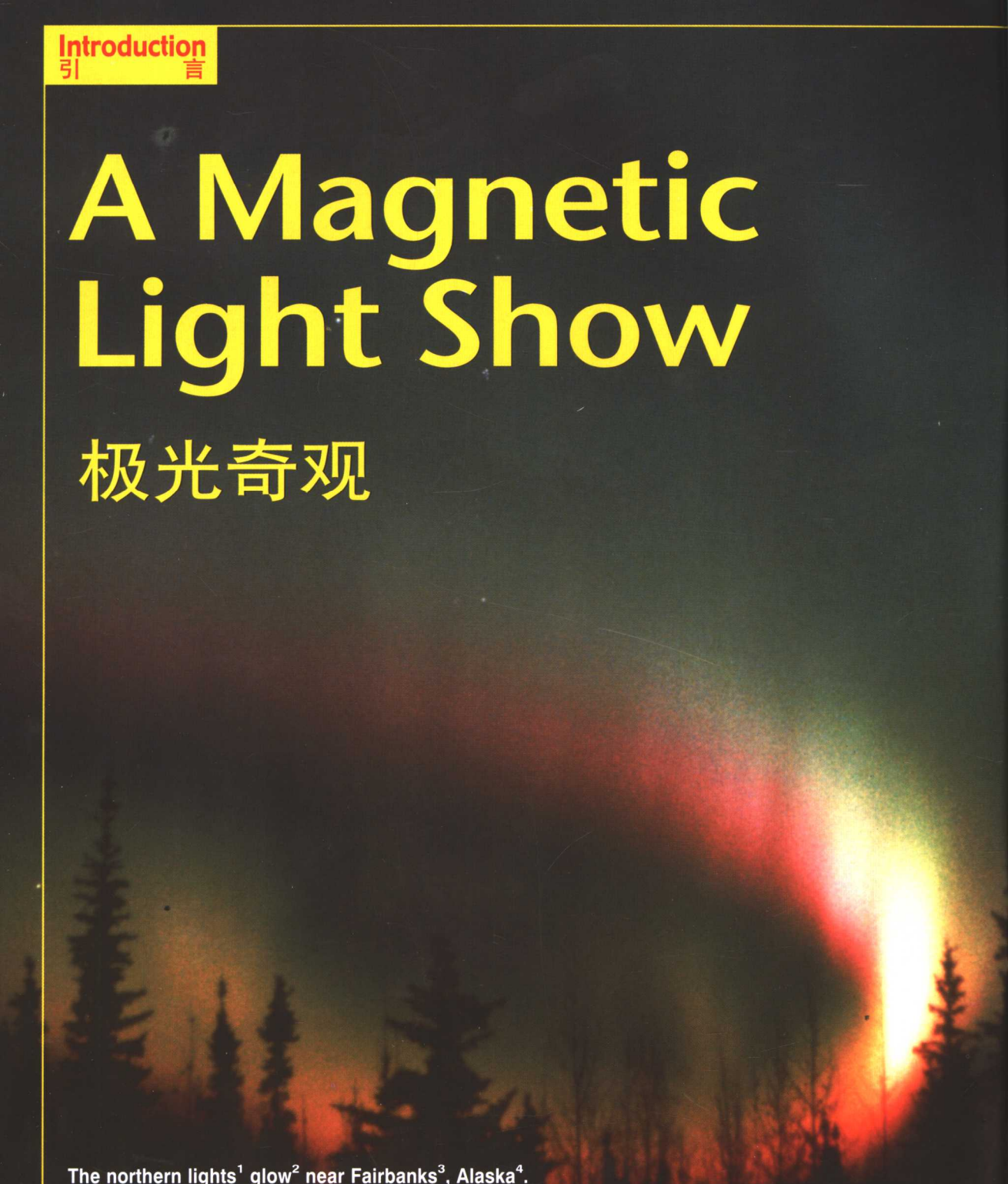


Scientists believe that Earth's magnetic field helps guide the migrations of birds.

A Magnetic Light Show

极光奇观



The northern lights[1] glow[2] near Fairbanks[3], Alaska[4].

（注释见第5页）

What are these colors glowing in the northern sky? This amazing[5] light show is called the aurora borealis[6], or the northern lights.

In the far northern part of Earth, you might see the northern lights. It has to be a dark, clear night. You have to be far away from city lights. Then, if the time is right, the sky may glow with the greens and reds of the northern lights.

You may not be in the right place to see the northern lights. But you have seen the force that causes them—magnetism—in action. Magnetism is a force that pushes or pulls on things.

This is a book about magnets and magnetism. A magnet is an object that has the power to pull things toward it. Did you think that magnets were just holding notes on your refrigerator door? Not so. Read on to see how magnets and magnetism work all around us.

1. northern lights 北极光
2. glow *v.* 发光
3. Fairbanks 费尔班克斯
4. Alaska 阿拉斯加州
5. amazing *adj.* 惊人的
6. aurora borealis 北极光

Chapter 第一章 1

Magnets and Magnetism:

The Invisible Force

磁体和磁性：看不见的力

If you tried balancing[1] like this with your friends, what would happen? You'd fall, of course! Why don't these tiny acrobats[2] fall? They have a special invisible quality[3]—called magnetism.

1. balance *v.* 保持平衡
2. acrobat *n.* 杂技演员
3. quality *n.* 性质

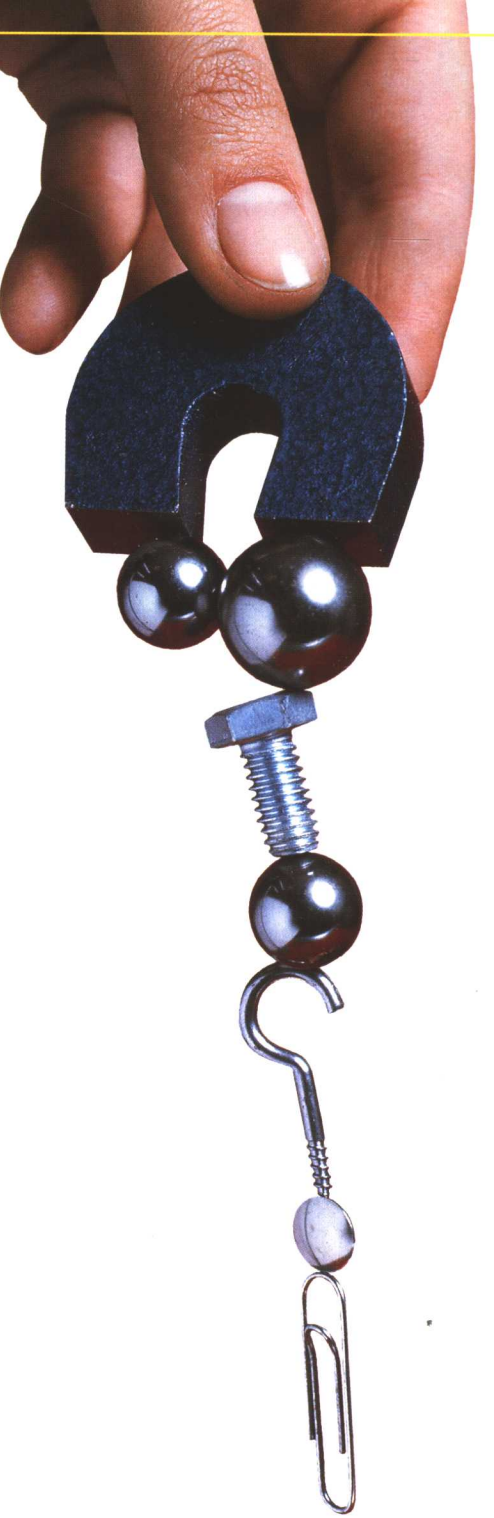
What is special about magnets? Magnets have the power to attract[1], or pull, things made of iron and certain other metals.

The pull of a magnet is an invisible force. You cannot see any strings[2] or wires[3]. You can only observe movement. You see the magnet pull an object toward it. If you hold the magnet or the object, you can also feel the pull. An object that is pulled by a magnet is magnetic.

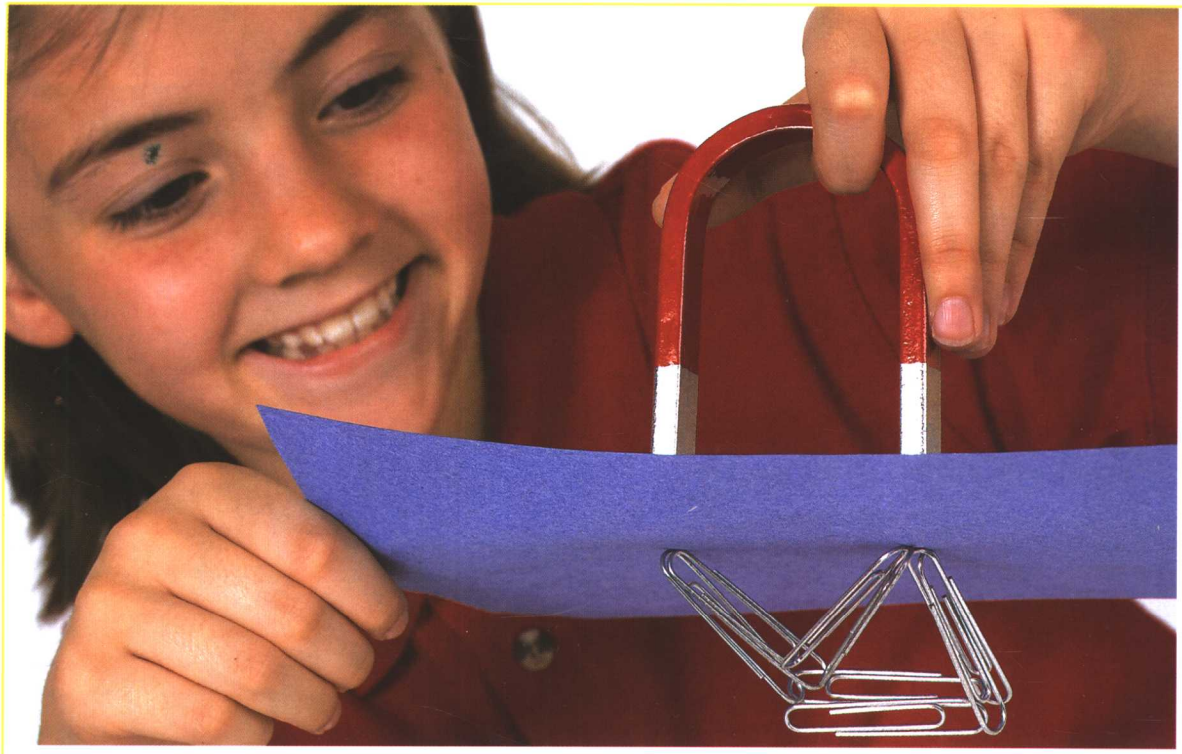
What Is Magnetic?

What kinds of things are magnetic? As you know, iron objects are magnetic. So are objects made of steel. That's because steel is made from iron.

What objects in your home are made of iron or steel? You can probably guess some of them: paper clips[4], the refrigerator door, knives, tools. All of these objects can be pulled by a magnet.



1. attract v. 吸引
2. string n. 细绳
3. wire n. 金属线
4. paper clip 回形针



The magnet's force works through the paper. It attracts the paper clips underneath[4].

What a Magnet Can Do

A very strong magnet can pull an object from far away. When a magnet is weaker, the object must be closer to be pulled by the magnet's force.

What if something lies between the magnet and a magnetic object? Can the force of the magnet be felt then? The answer depends on two things: the strength of the magnet and the material[1] that lies between.

For example, the force of a refrigerator magnet can work through a piece of paper. That's why it's used to hold up paper notes.

But the force may not work through several sheets[2] of paper. That requires a stronger magnet.

Pull and Push

A magnet will attract a magnetic object. But what happens if you place two magnets together? You might feel the magnets attract each other. Or you might feel them repel[3], or push away, each other.

1. material *n.* 材料
2. sheet *n.* 一张（纸）
3. repel *v.* 排斥
4. underneath *adv.* 在下面

When will magnets attract each other? When will they repel each other? The answers depend on the positions of the magnets' poles[1]. A pole is an area of a magnet where its magnetism is strongest. Each magnet has two different poles.

From Pole to Pole

Every magnet has a north pole and a south pole. Like poles repel each other. Unlike poles attract each other.

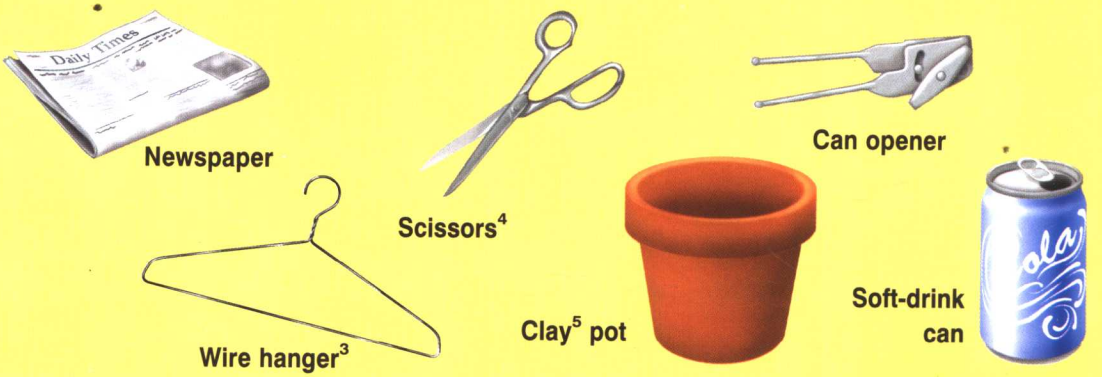
If you hold the *north* pole of one magnet near the *north* pole of another magnet, then the like poles will be next to each other. You will feel the magnets repel, or push away from each other.

If you hold the *north* pole of one magnet near the *south* pole of another magnet, then the unlike poles will be next to each other. You will feel the magnets attract, or pull toward each other.

1. pole	*n.*	磁极
2. infer	*v.*	推断
3. hanger	*n.*	衣架
4. scissors	*n.*	剪刀
5. clay	*n.*	黏土，泥土

Thinking Like a Scientist: Inferring[2]

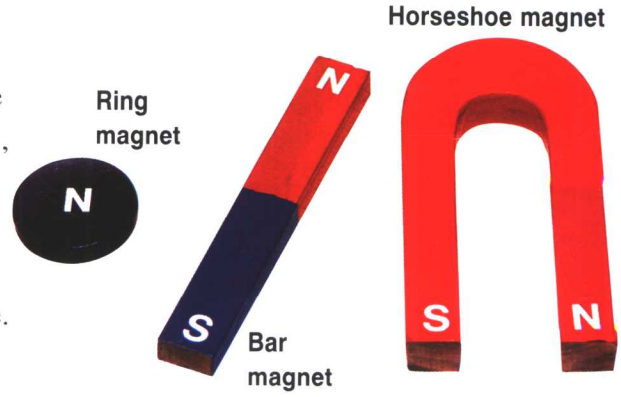
Magnetism is an invisible force. The only way to prove an object is magnetic is to hold a magnet near it. But if you don't have a magnet, you can infer whether or not an object is magnetic. When you infer, you make a decision based on past experience. You have already observed many magnets in your everyday life. Based on what you've seen, can you infer which of these objects are magnetic?



Magnet Shapes

Where are the poles on a magnet? It depends on the shape of the magnet. Three common magnet shapes are the horseshoe[1], bar[2], and ring.

The poles on a horseshoe magnet are at its ends. The magnetism is strongest there. The same is true of a bar magnet. But a ring magnet has no ends. Its poles are on its two flat sides.



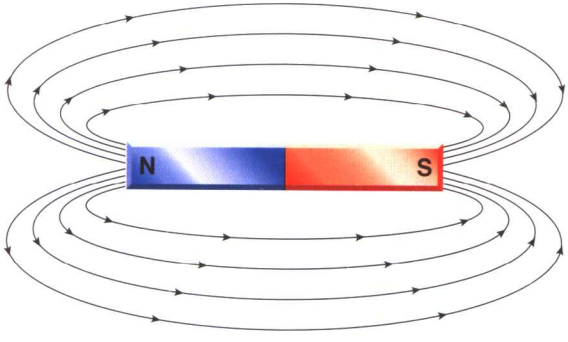
Magnetic Fields[3]

A magnet has an invisible region[4] of force around it. This region is called its magnetic field. That's how a magnet attracts objects that are not touching it. A magnetic object just has to come within a magnet's magnetic field.

The picture below shows the magnetic field of a bar magnet. The lines are drawn flat on the page. But a magnetic field is not flat. It wraps[5] all around a magnet on every side.

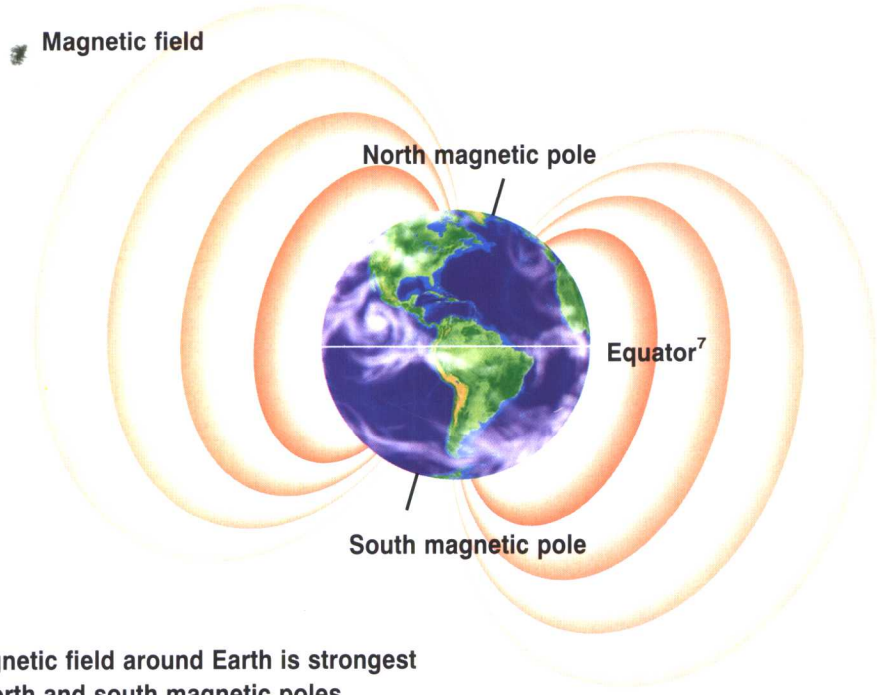
Differently shaped magnets have differently shaped magnetic fields. Look at the horseshoe magnet at the right. Bits of iron are lining up in its magnetic field. They help you see where the magnetic field lies. Most iron bits clump[6] where magnetism is strongest—at the poles.

1. horseshoe *n.* 马蹄形的东西
2. bar *n.* （长方形的）块
3. magnetic field 磁场
4. region *n.* 区域
5. wrap *v.* 包围
6. clump *v.* 形成一丛



The lines show the magnetic field of the bar magnet. Look at where the lines are closest together. That's where the magnetic force is strongest. The arrows show the direction of the force.


Can you see where the magnetic field is strongest on a horseshoe magnet?
N



The magnetic field around Earth is strongest at the north and south magnetic poles.

A Huge Magnet: Earth

Did you know that Earth itself is a magnet? At the center of Earth is a core[1] of hot iron and nickel[2]. These two materials are both magnetic.

Like any magnet, Earth has a north pole and a south pole. (However, these are different from the geographic places we call the North and South Pole.) Earth's magnetism is strongest at the north magnetic and south magnetic poles.

A compass[3] is a tool that uses Earth's magnetism. The needle in a compass is magnetic. So it is pulled along the lines of Earth's magnetic field. The needle of the compass lines up north-south. So whether you're a sailor[4] or a hiker[5], you can use a compass to chart[6] your course.

1. core *n.* 地核
2. nickel *n.* 镍
3. compass *n.* 罗盘
4. sailor *n.* 水手，海员
5. hiker *n.* 远足者
6. chart *v.* 制订……的计划
7. equator *n.* 地球赤道

The Magnetic Light Show

Think back to the northern lights shown on page 4. They happen because of Earth's magnetic field. The sun sends millions[1] of tiny particles[2] out into space. Some particles become trapped[3] in Earth's magnetic field. They are pulled toward the north magnetic or south magnetic pole. As they move, they bump[4] and ram[5] into particles in Earth's air. They collide[6] so hard that they give off light energy[7]. We can see this light energy. The light energy becomes the colors of the northern lights.

1. million *n.* [~s] 许多；无数
2. particle *n.* 微粒；颗粒
3. trap *v.* 使受限制
4. bump *v.* 碰；撞
5. ram *v.* 撞击
6. collide *v.* 碰撞；互撞
7. light energy 光能
8. migrate *v.* 迁徙
9. honeybee *n.* 蜜蜂

Stay Tuned!

Magnetic Mysteries

Humans are not the only ones to use Earth's magnetism to find direction. Animals may use it, too. For example, some birds migrate[8]. This means they fly back and forth from one area to another every year. Scientists think birds may sense Earth's north-south magnetic field. They may use it to help find their way.

Honeybees[9] also use magnetism to find direction. A honeybee will do a "dance." Its movements show other honeybees the direction in which they can find food. This dance is affected by Earth's magnetic field. Scientists continue to study how honeybees and birds use Earth's magnetic field.

Honeybee

Chapter 第二章 2

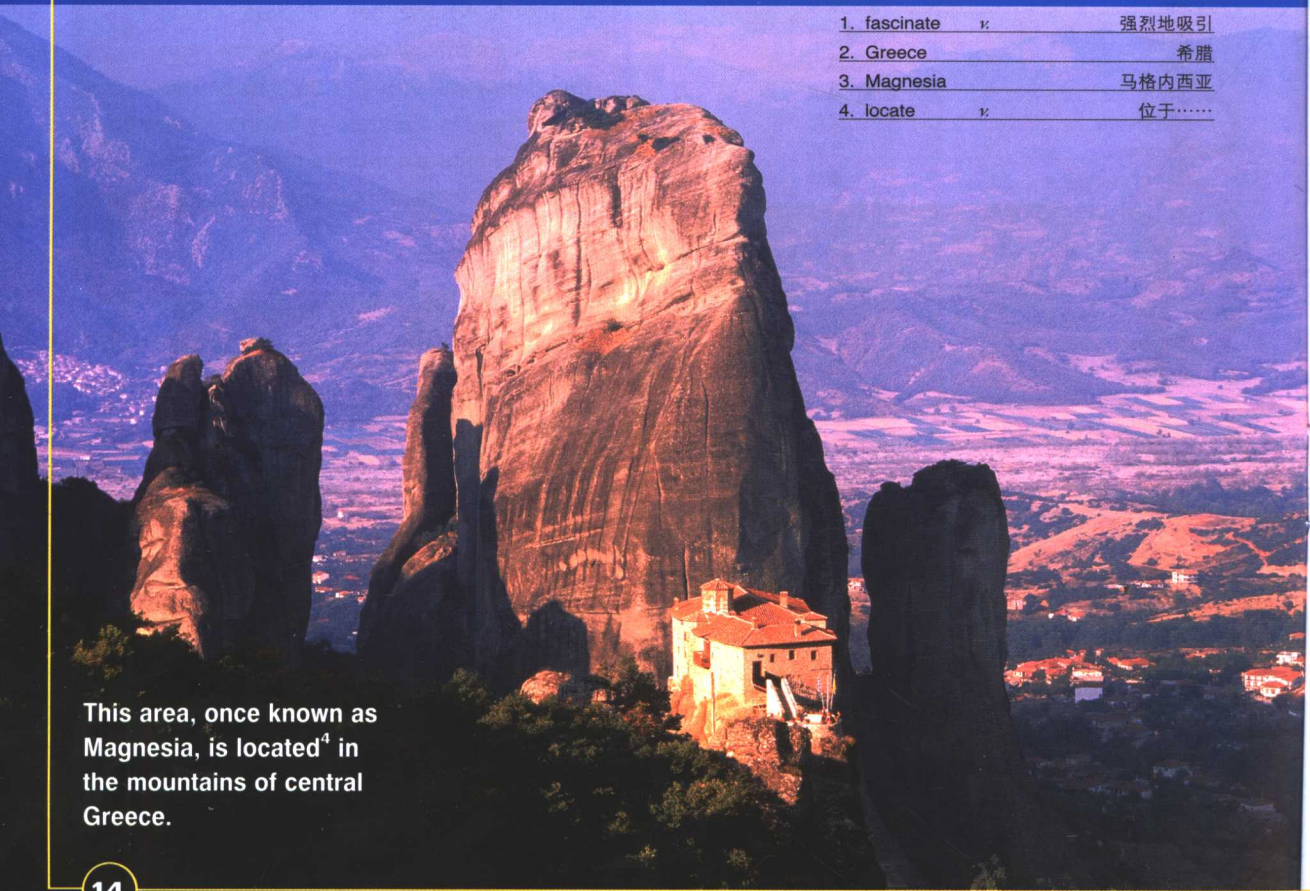
Exploring Magnetism:

Unlocking the Mystery

探索磁性：解密

The mystery of magnets fascinated[1] the people living in an area of ancient Greece[2] called Magnesia[3]. Why did some metals stick to certain rocks? Was it magic?

1. fascinate v. 强烈地吸引
2. Greece 希腊
3. Magnesia 马格内西亚
4. locate v. 位于……



This area, once known as Magnesia, is located[4] in the mountains of central Greece.