

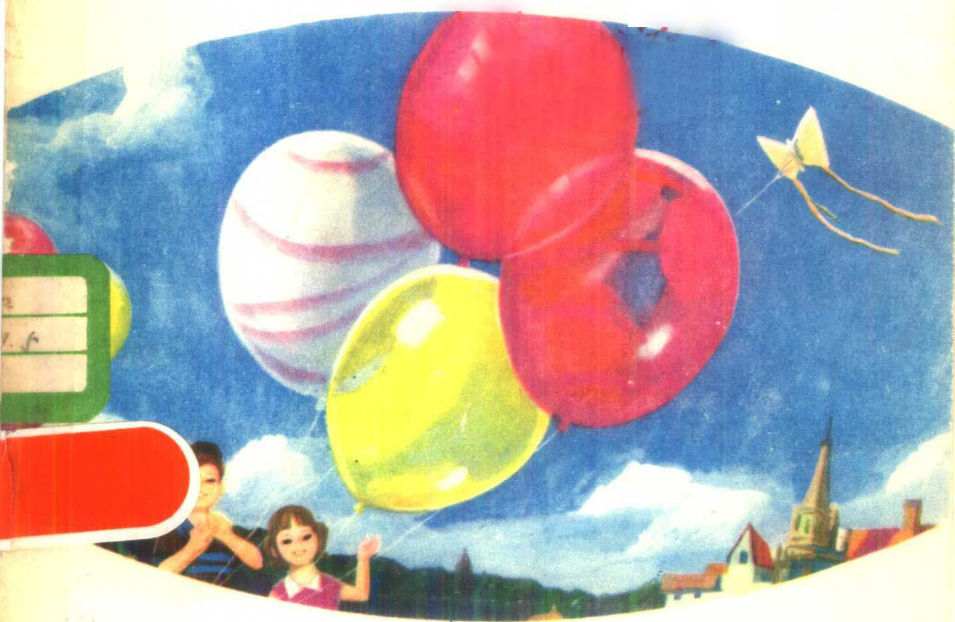
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BASIC SCIENCE SERIES
自然科学初级读物



AIR 空气

徐烈成 译



科学普及出版社

BASIC SCIENCE SERIES

自然科学初级读物

AIR

空气

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出 版 说 明

当前，在实现四个现代化的新长征途中，广大青少年正在努力学习现代科学文化知识，为祖国的社会主义建设事业，增长才干，积蓄力量。编译出版《自然科学初级读物》的目的，就是为初学自然科学和英语的读者，提供一套浅近而有趣的参考书籍。

全套读物共有16个选题，细目见各书封底。英语部分采自 FEP INTERNATIONAL PRIVATE LIMITED 出版的 BASIC SCIENCE SERIES (修订版)。

为了便于阅读，对全书重新作了编排，绘制了插图，并附了参考译文。书中还配有相当数量的简单实验，使读者通过实验，加深理解有关科学内容。

由于编者水平所限，错误不当之处在所难免，请批评指正。

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BASIC SCIENCE SERIES — BOOK 1

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THE ATMOSPHERE

Our Earth is surrounded by a layer of air called the **atmosphere**. The atmosphere surrounds the Earth completely and is about 900 kilometres thick. Without the atmosphere, we would not be able to live on the Earth. There would be no air for us to breathe. The Earth would be very, very hot in the day and very, very cold at night.

大 气 层

我们的地球被一层叫做大气层的空气包围着。大气层团团围住地球，约有九百公里厚。要是没有大气层，我们会无法在地球上生存，也不会有空气供我们呼吸，白天地球会很热很热，而夜晚则很冷很冷。



Things to Do

- (i) Stretch out your hand in line with your shoulders. Swing it quickly round. What can you feel?

What you felt is the air. We cannot see the air but we can feel it. We feel it when it is moving. We can also feel it when we move in it.

动 手 做

一、将手伸至齐肩平，快速地旋转挥动，你能感觉到什么东西？

你所感觉到的是空气。我们看不见空气，但能感觉到空气。空气流动时，我们感觉到它；我们在空气中运动时，也能感觉到它。



- (ii) Now take a piece of paper in your hand. Swing your hand round again. You can see that the piece of paper is bent when your hand is moving.

The air pushes against things when they move in it. It pushed against the paper when it moved. That is why the paper became bent when you moved it. You can feel the air pushing against you when you are in a moving car. You can also feel it when you cycle or run.

When air moves, it is called a **wind** or **breeze**. Sometimes the air moves very fast and causes



Air is all around us.

我们周围全是空气

a very strong wind. A strong wind can destroy things. It can blow down trees and houses.

二、现在，手里拿一张纸。再次旋转挥动。你会看到，手挥动时，纸就卷曲。

物体在空气中运动时，空气就进行阻挡。刚才纸运动时，空气就阻挡纸片，这就是你挥动纸片时，纸片卷曲的原因。你呆在行驶着的汽车里，会感觉到空气迎面吹来。骑自行车或奔跑时，你也能感觉到空气。

空气流动时，就叫做风或微风。有时空气流动很快，会刮起一阵狂风。狂风能毁坏东西，它能刮倒树木和房屋。



Air pushes against things.
空气阻挡物体

DO LIVING THINGS NEED AIR ?

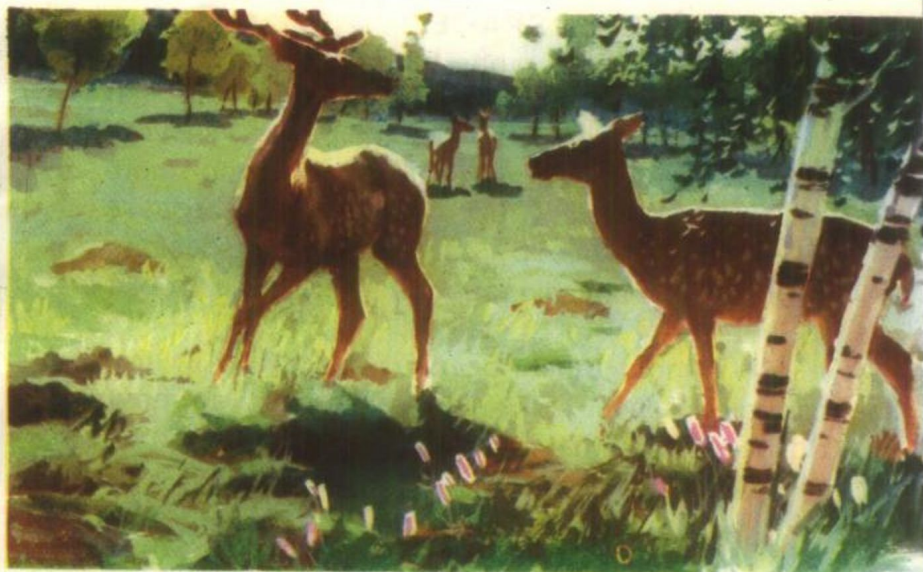
Air is all around us. It is around us as we walk and play. From the moment we are born, we are surrounded by air. When we sit down, it is around us. When we go to bed, air is also around us. Wherever we are on Earth, we are surrounded by air. We live in air.

生物需要空气吗

我们周围到处都是空气。我们散步或游戏时，周围有空气。我们从诞生的时刻起，就处在空气的包围之中。我们坐着，周围有空气。睡觉，周围也有空气。不管我们处在地球上什么地方，我们总被空气包围着。我们生活在空气之中。

Plants need air to live. 植物需要空气才能生存





Animals also need air to live. 动物也需要空气才能生存

All living things need air. Living things cannot live without air. We can go without food or water for a few days, but we cannot live for more than a few minutes without air. We breathe in air. When we are working or running, we need more air. So we breathe faster than usual. When we are asleep, we need less air.

所有生物都需要空气。没有空气，生物就没法生存。我们可以几天不吃饭、不喝水，但是没有空气，我们就活不上几分钟。我们吸进空气。我们干活或者奔跑时，需要较多的空气，所以比平时呼吸得快。我们睡着的时候，需要的空气较少。

AIR OCCUPIES SPACE

When you pack your bag with books, your books occupy some **space** in your bag. If you ask your friends to put their books in your bag, there will come a time when no more books will enter your bag. This is because all the books occupy space and the space in your bag is not big enough for all the books to enter.

All things must occupy space. Air too occupies space. We cannot see air, so how do we know that it occupies space?

空气占据空间

当你把书装进你的书包时，书在书包里占据一些空间。假如你请朋友们把他们的书都装进你的书包，总会出现书再也装不进书包的时候。这是因为，所有的书都占据空间，而你书包里的空间不够大，装不下所有的书。

所有东西都要占据空间。空气也占据空间。我们看不见空气，那么我们又怎么知道它占据空间呢？



Things to Do

Let's find out if air occupies space. Crumple a piece of paper, and put it in a jar such that when you overturn the jar, the paper will not fall out.

Fill a bucket with water and slowly push the jar upside down into the bucket of water. Make sure the jar is upright all the time it is being pushed down. Do not tilt it. Do you see water entering the jar?

Now remove the jar from the bucket of water and examine the piece of paper. Is it wet? The paper remains dry because water did not enter the whole jar. Air was in the jar and it prevented the water from entering the whole jar. This shows that air occupies space.

动手做

让我们查明空气是否占据空间。把一张纸揉成团，放进杯子，使杯子倒过来时纸团掉不出来。

将一水桶装上水，把杯子倒过来，慢慢地按进这桶水里。杯子往下按时，务须始终保持竖直，不要倾斜。你看到水进入杯子了吗？

现在把杯子从这桶水里拿出来，检查那张纸。纸湿了吗？那张纸仍旧是干的。因为刚才水并没有进入整个杯子；杯子里有空气，空气阻止水进入整个杯子。这证明：空气占据空间。

AIR CAN TAKE THE PLACE OF LIQUIDS

If you fill a bottle with water and turn it upside down quickly you will see that, as the water comes out of the mouth of the bottle, large bubbles of air rush in to take the place of the water. Does this happen with other liquids?



**Can air take the place
of water ?**

空气能取代水的位置吗？

空气能够取代液体占有的空间

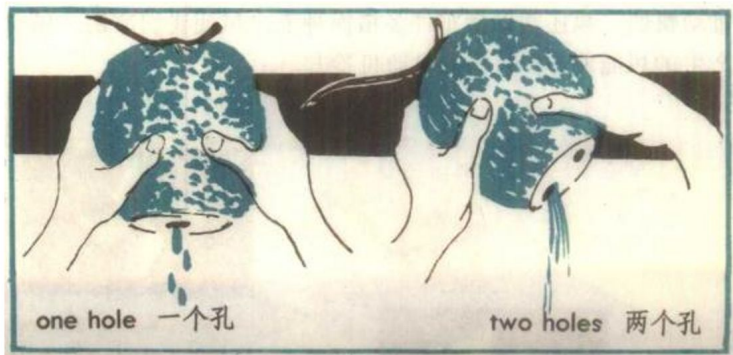
如果你灌满一瓶水，把瓶子迅速地倒过来，你会看到，水从瓶口往外流时，大气泡冲进瓶子去取代水。使用别的液体时，会出现这种现象吗？

Things to Do

Take a coconut. Make a hole in it. Try to pour the 'water' out of the coconut. Can you do it? Now make another hole not too close to the first. Pour the 'water' out of the coconut. Are two holes better than one for pouring 'water' out of a coconut? Yes. As the 'water' comes out of one hole of the coconut, air rushes in through the other hole to take the place of the 'water'.

动 手 做

取一个椰子。在椰子上挖一个孔。试试看，把“水”从椰子里倒出来，行吗？现在再挖一个孔，不要同第一个孔挨的太近。把“水”从椰子里倒出来。是不是两个孔比一个孔更容易把“水”从椰子里倒出来？是的。“水”从椰子的一个孔流出来时，空气就从另一个孔冲进去取代“水”。



MOVING AIR

Moving air is called wind or breeze. How can you make air move? Here is one way. Hold an open book in your hands so that it faces you. Close it quickly. Do you feel the wind?

Sometimes the air moves very fast and causes a very strong wind. A strong wind can blow down trees and damage houses. The wind can do many useful things too. It works windmills and moves sailing boats. It helps to scatter the seeds of many plants. The wind helps to keep us cool. The wind produced by fans cools the engines of many machines.

流 动 的 空 气

流动的空气叫做风或微风。你怎么能使空气流动呢？这里有一个办法。两手捧着一本打开的书，放在脸前。很快地合上书本。你感到有风吗？

有时，空气流动得非常快，刮起一阵狂风。狂风能刮倒大树，毁坏房屋。但是风也能做很多有益的事情。风能转动风车，推动帆船。风还帮助撒布许多植物种子。风使我们凉快。风扇产生的风能使许多机器的发动机冷却。





Things to Do

Make a pinwheel by marking a piece of paper as shown above. Then cut along each line. Bend over the corners. Push a pin through the centre. Push the pin into a pencil. Can you make the pinwheel turn? In how many different ways can you make it turn? One way is to blow air from your mouth. Another way is to fan it. A third way is to hold it in your hand and move your hand very quickly around you.

动手做

做一个风车。按照上图所示，在一张纸上划好线，然后沿着每条线剪开。将四角折起，中心插一根大头针，把大头针插在铅笔上。你能使这个风车转动吗？你能用多少种方法使它转动？一种方法是用嘴吹气。另一种方法是用扇子扇。第三种方法是把它拿在手里在你周围迅速移动。

WHAT IS AIR MADE OF?

Dry air is a mixture of gases. Dry air contains by volume.

78% nitrogen

21% oxygen

about 0.7% argon

about 0.3% carbon dioxide and other gases.

In tropical countries, the air is moist and contains about 3% water vapour.

Notice that 21% or about $\frac{1}{5}$ of the air is oxygen. Plants and animals cannot live without this oxygen. Plants also make use of carbon dioxide gas in their green leaves to make food when the sun is shining.

The composition of air 空气的成分

