阅读空间 · 英汉双语主题阅读

迁徙之路

Invisible Highways

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毕永莲 译

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迁徙之路

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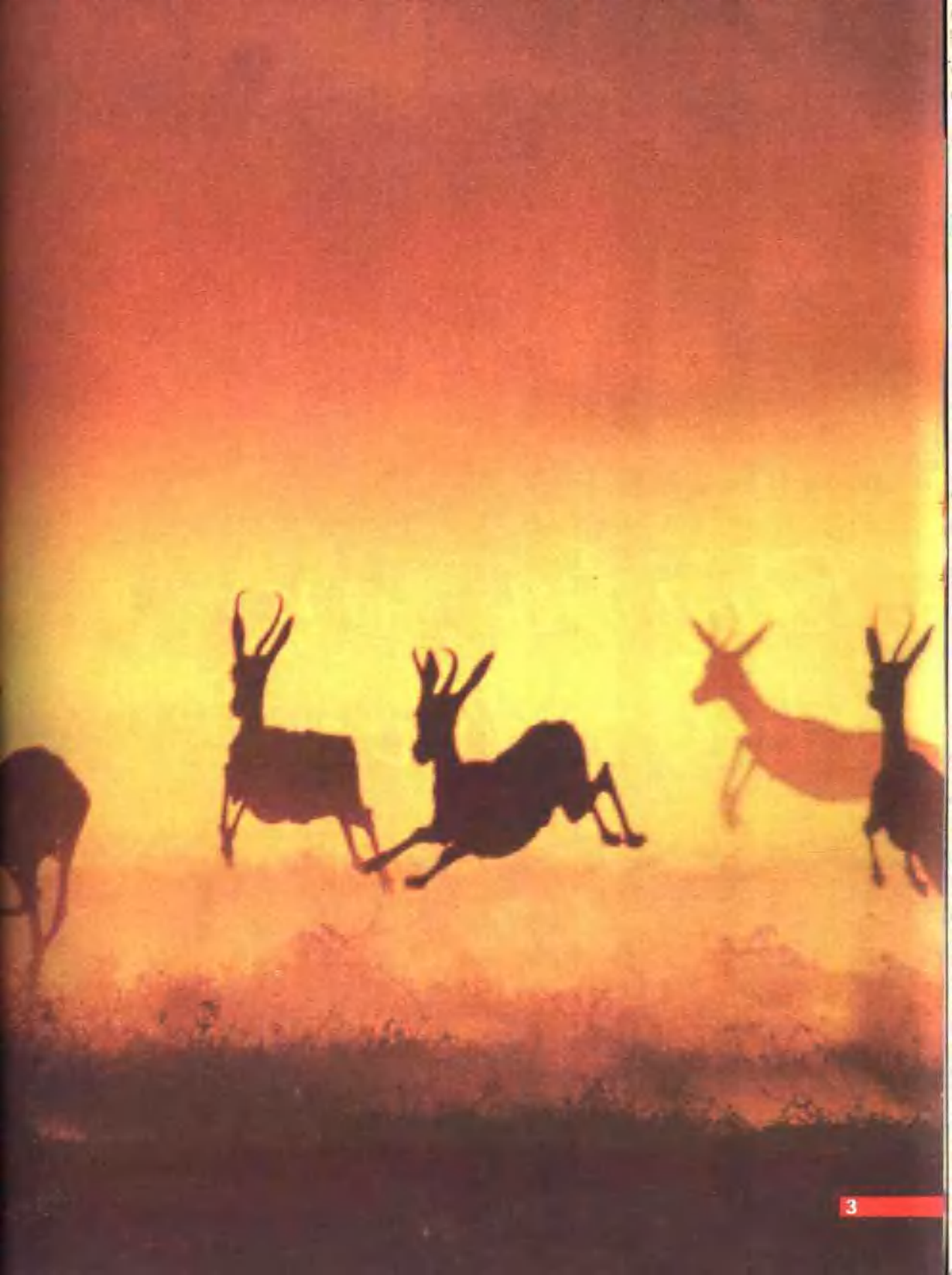
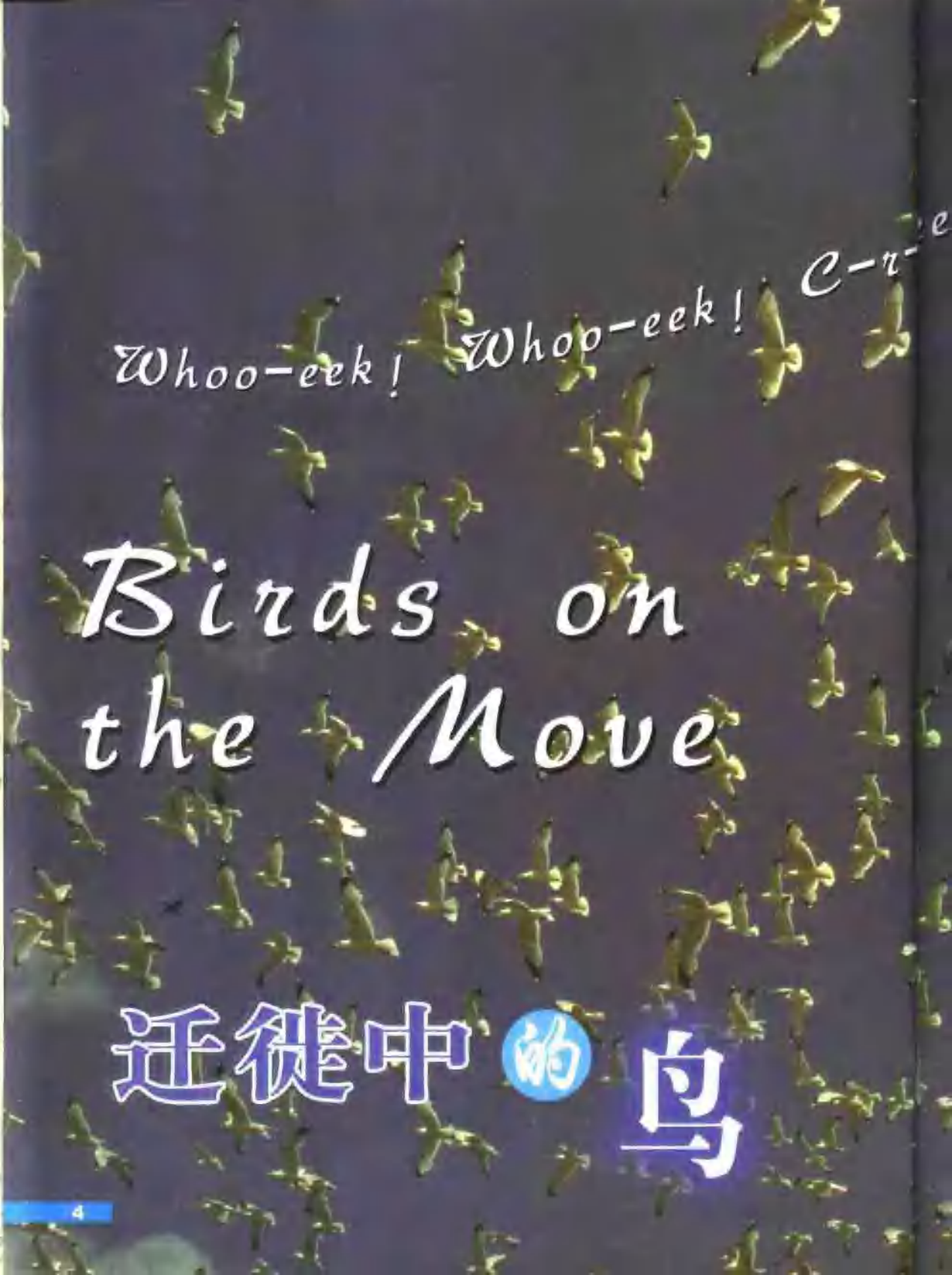
Editor's Message 编辑手记

动物迁移时，并不是要“保暖”，而是去繁殖、寻找食物和躲避攻击，利用非凡的导向方式，如太阳、星星、地球磁力、化学气味、可视地标、直觉等等，上百万的动物跋涉几千公里与同类的其他成员会合。本书讲的就是它们的“奇异旅程”。

阅读本书时，请记住迁移的物种赖以生存的关键就是返回时它们所离开的栖息地依然在那儿。可是，在一个环境飞速改变的世界，无法保证这一点。所以，我们需要树立意识，保护这些自然栖息地，否则，将来值一迁徙的会是我们自己。





Birds on the Move

迁徙中的鸟

-ek! C-r-r-eek! c-r-r-eek!

by Faith Hickman Brynie

It's fall, and – while you may not see them – you just might hear them as they pass through your neighborhood. They are migrating wood ducks, and their clamorous calls are as distinctive as the swept-back crests on their heads and the iridescent gleam of their feathers. By the millions, wood ducks are leaving their summer homes in the north and heading south.

Wood ducks aren't the only birds on the move this time of year. In many parts of North America, songbirds, geese, *raptors*, and shorebirds are on the wing. Their flight isn't just random wandering. For many species, these movements are part of their regular seasonal *migration*: the movement of large numbers of creatures (not just birds migrate!) back and forth between their spring and summer breeding grounds and their winter territories.

For most animals living in the northern hemisphere, migration means heading north in spring and south come autumn, but that's not the only way to migrate. The *albatross* does just the opposite. It heads for colder northern climes come winter and spends its summers far south.

North-south travel is not the only kind of migration, either. Some birds, such as certain grouse and quail, migrate between higher and lower elevations, moving up and down the sides of mountain ranges. Some water birds migrate along

Raptor
A bird of prey
Albatross
Large, web-footed bird, chiefly of the oceans of the Southern Hemisphere, and having a hooked beak and long, narrow wings

秋天到了，也许你没有看到它们，只是听见它们从附近上空飞过的声音。它们是正在迁徙的林鸳鸯，它们的吵闹声就像头上向后掠的羽冠和闪着彩虹般灿烂光泽的羽毛一样独特。成百万只林鸳鸯离开它们在北方的夏天栖息地飞向南方。

在这个季节，林鸳鸯并不是惟一的候鸟。在北美洲的许多地区，鸣禽、鹅、猛禽和滨鸟都在迁徙旅途中，它们的飞行不是漫无目的的闲逛。对于许多物种来说，这些活动是有规律的季节性迁徙过程的一部分：大量的动物（并不是只有鸟类才迁徙）在它们春夏时期产仔繁殖的地方和冬天生活的地方来回往返。

对于居住在北半球的大多数动物来说，迁徙意味着春季往北方飞，秋季回到南方，但这并不是迁徙的惟一方式。信天翁的迁徙方式正好相反，它在冬天来临时飞到更寒冷的北方地区，而在遥远的南方度过夏季。

南北飞行也不是惟一的迁徙方式，一些鸟类，如一些松鸡和鹌鹑，在小丘的高处和洼地之间迁徙，在山脉两侧上上下下，有的水鸟则沿着河流和海岸线提供的天然地带迁移。

并不是所有的鸟类

the natural corridors provided by rivers and coastlines.

Not all birds migrate. Many quails, wrens, and woodpeckers never stray far from where they were hatched. Other birds - such as song sparrows, meadowlarks, and blue jays - make short migrations. In certain species, some individuals migrate, while others stay put. The timing of the travel varies as much as the birds themselves. Some migrate in short hops, leapfrogging their way from one feeding stop to the next over several weeks or months. Others make the trip nonstop. Eastern warblers fly from the east coast of North America to their winter grounds in the Caribbean and South America in a single flight of 80 to 90 hours. The Pacific golden plover, which cannot land on water, flies from Alaska to Hawaii without stopping.

The superstars among migrators are the long-distance travelers. Among them are the 300 species that leave the United States and Canada each fall and fly south to their winter homes in the West Indies, Central America, or South America. Some nighthawks and barn swallows fly from the Yukon and Alaska to their winter home in Argentina, a distance of more than 11,000 kilometers. The record-holding migrators are the Arctic terns. During summer in the Northern Hemisphere, they nest near the North Pole. They then fly south to Antarctica, enjoying a "second summer" near the South Pole - a travel distance of some 18,000 kilometers. You would travel about that far if you made two round-trip flights between Los Angeles and New York!

HOW, WHEN, AND WHY

In the days and weeks before migration, migratory birds eat large quantities of food. The way their bodies use the energy from that food changes, too, so they gain a great deal of weight. Some small species, such as the black-poll warbler, as much as double their body weight. The stored energy will fuel them as they travel. Some species that migrate from Nova Scotia in the fall use

都需要迁徙。许多鹌鹑、鹪鹩和啄木鸟从来不去离它们出生地很远的地方活动。另外一些鸟，如会唱歌的鹨鸡、草地鹨和蓝松鸦，只进行路程很短的迁徙。在某些物种中，有些单独迁徙，另外的则集体行动。旅行的时间，就像鸟的品种那样多种多样。一些迁徙是短暂的迁徙，历时数周或数月，从一个采食点到下一个采食点交替前进；一些迁徙则是不停留地长期跋涉，东方的鸣禽从北美的东海岸飞到在加勒比海和南美洲的冬天栖息地，一个单程飞行就需要80～90个小时。太平洋的金鸻鸟，由于它们不能在水上停留，从阿拉斯加到夏威夷就必须不停地飞行。

迁徙中的超级明星，是长途旅行者，其中有300个物种每年秋天离开美国和加拿大，向南飞往在西印度群岛、中美洲和南美洲的冬季家园。一些夜鹰和家燕从育空河和阿拉斯加飞到它们在阿根廷的冬季家园，行程超过了11 000公里，这个迁徙纪录的保持者是北极的燕鸥。在北半球的夏季，它们把巢筑在北极的附近，然后向南飞往南极洲，在南极附近享受“第二个夏天”，其行程大约有18 000公里，相当于在洛杉矶和纽约之间飞行两个来回。

如何、何时和为何迁徙

在迁徙前的几天或几周里，候鸟要摄入大量的食物。它们的身体利用食物能量的方式也发生变化，因此它们的体重增加了许多。一些小的物种，像黑顶白颊的林莺，它们的体重比平常要重一倍，它们飞行的时候，贮藏的能量会补充它们的体能。秋季从加拿大的新斯科舍省迁徙的一些物种以记录在档的最高的速度消耗着能量，这比一个人在四分钟时间里来回跑的路程中消耗的能量还要多。贮藏的脂肪不

energy at the highest continuous rate ever recorded for any animal – more than a human running end-to-end four-minute miles. The stored fat provides more than fuel. As it is "burned" for energy, one of its byproducts is water. This gives birds a built-in water supply. That's especially important to those that fly long distances over deserts or oceans, where freshwater stops are impossible.

Migratory birds have internal "clocks" that tell them not only the time of day, but also when the seasons are changing. As the hours of daylight lengthen in spring and shorten in fall, levels of certain ***hormones*** in the birds' bodies change. Many species that sleep quietly at night during other seasons now begin to hop and flutter their wings all night long. The duration of this "nocturnal restlessness" is important. Species that show migratory restlessness for the longest periods are the birds that migrate farthest.

As important as day-length clues may be, migratory birds have an inter-

Hormones
– A substance produced by one tissue and conveyed to another to promote growth or other activity

仅仅提供能量，当脂肪"燃烧"而释放能量时，其副产品之一就是水。这使鸟类有了自身的水供给。对于要长途飞行穿越没有淡水供应点的沙漠或者海洋的鸟类来说，这种供水机能是非常重要的。

候鸟的身体内部有"生物钟"，这不仅能告诉它们一天的时间，而且也能告诉它们季节何时变化。随着春季白天变长和秋季白天变短，鸟类体内的某种荷尔蒙的水平就会发生变化，许多在其他季节的夜里睡得很安静的鸟类，现在开始整夜地跳动和拍打翅膀，这种持续的"夜间不休息"是十分重要的。那些能够长时间不休息的迁徙鸟类，就是能够迁移到最远的地方的鸟类。

与白天长短的预知能力同等重要的是，候鸟有一种内在的判断力，知道什么时候适合飞行。欧洲的科学家研究了在欧洲哺育、

nal sense of when it's time to take flight. European scientists worked with warblers that breed in Europe and migrate to Africa for the winter. They kept large populations of the birds in captivity, and exposed them to carefully controlled periods of light and dark. Even when the day length in their cages was held constant, the birds' behavior corresponded to the season outside. They gained weight before their normal time of migration. They became restless at night, just as did

在冬天迁徙到美洲的鸣禽。他们捕获了大量的鸣禽，将它们置于经过严格控制白日和夜间的环境中。即使鸟笼子里的白日时间长度始终不变，鸟的行为仍和外界季节的变化相适应：在通常迁徙的季节前，它们仍要增加体重；和其野生的同类一样，夜里仍然不再休息。鸟类有一种自身的计时机制，被称为年节律（circ，拉丁语，其意为“大约”），这使鸟类即使在没有经历白

A Fine Day for Flying

by Faith Hickman Brynie

适合飞行的好天气

If ever any animal needed a reliable weather forecast, it's a migrating bird. A storm can blow a bird far off its course, and severe temperatures, winds, or precipitation can mean death along the way. Since they cannot count on the weather bureau for information, some birds seem to have their own, built-in weather prediction system. Some even use changes in the weather to make their journey easier.

In autumn, many shorebirds and songbirds fly from the eastern North American coast across the western edge of the North Atlantic Ocean. Tim and Janet Williams at Swarthmore College in Pennsylvania have observed the birds leaving from all along the coast, as far south as Miami and as far north as Nova

如果有些动物需要具备一种可靠的预报天气的能力，那就是候鸟。暴风雪能够把鸟吹离其行程路线，而且途中恶劣的气温、狂风或者暴雨雪，对鸟类来说就意味着死亡。由于它们不能从气象局获得相关信息，一些鸟似乎具备属于它们自己的、天生的天气预报系统，有些鸟甚至可以利用天气的变化，使其旅行更容易。

秋天，许多滨鸟和鸣禽从北美洲东部海岸飞过北大西洋的西部海岸。宾夕法尼亚州斯沃斯莫尔学院的蒂姆和珍尼特·威廉斯观察了在南到迈阿密、北到新斯科舍省之间从海岸线飞离的鸟类。鸟类首先飞到海岸线地区，在那里，它们吃入能找

their wild cousins. The birds have a built-in timing mechanism, referred to as a *circannual rhythm* ("circ" meaning approximately), that helps keep them in sync with the change of seasons without experiencing a change in day length.

Migration is so important that the knowledge of when, where, and how to travel is inherited. Young birds don't need to learn to migrate. That knowledge is "hard-wired" into their brains as they develop in the egg. A

天长度变化的情况下，也能与季节的变化保持同步。

迁徙对鸟类非常重要，因而那些关于什么时间迁徙、迁往哪里、如何飞行的知识，鸟类都是通过遗传获得的。幼鸟不需要学习迁徙，当它们在蛋壳中发育的时候，这些知识就已"硬件固化"于它们的大脑中了。大量的实验表明，这种结论是正确的。在一个实验中，科学

Scotia. The birds first fly to coastal areas, where they fatten up on the plentiful food supply they find there. Then they just seem to hang around, waiting for favorable weather.

The Williamses have found that the best predictor for departure is the passage of a cold front. The front brings falling temperatures, clear skies, rising barometric pressure, and (most important for the birds) winds blowing from the northwest. When these winds come, the birds rise into the air, all together, and by the millions. They depart from the coast and point their beaks to the south-southwest. They continue this orientation for the entire flight. The winds first push the birds out over the ocean to the southeast. But the wind direction changes when they hit the trade winds of the Caribbean, and they are pushed back toward the southwest. Although they never change their direction of flight, they follow a curved path that takes them to their winter home in South America. Without the help of the winds, the birds would run out of fuel and perish somewhere in the South Atlantic.

The Williamses feel sad that these wonderful feats may soon become a thing of the past. "The great flights of shorebirds are gone forever," they say. "In the 1800s, shorebirds would pass over Bermuda in great flocks that stretched from horizon to horizon for more than 24 hours. Now, only a few birds can be seen over the islands. The songbirds and shorebirds are threatened by a loss of habitat in the south and breeding areas in the north."

到的大量食物，使自己肥胖起来。然后它们在周围徘徊飞行，等待合适的天气离开。

威廉斯一家发现，鸟类飞离的最好预示是冷锋的到来。冷锋使气温下降、天空晴朗、气压升高，（对于鸟类最重要的是）还刮起了西北风。当西北风来临的时候，几百万只鸟儿一起飞上天空，它们离开海岸，将它们的喙指向南方或西南方，在整个飞行过程中，它们保持这个方向。开始的时候，风把鸟儿吹向东南方向的洋面上。但是当遇到加勒比海的信风时，风向会改变，它们就被吹往西南方向。尽管鸟儿从不改变飞行方向，但它们还是沿着一条曲线形的道路，飞到了南美洲它们冬天的栖息地。不借助风力，鸟儿会耗尽能量，消失在南大西洋的某个地方。

威廉斯一家感到非常遗憾，因为这些奇妙的技艺也许不久就将成为过去的事情。"滨鸟的壮观飞行永远消失了，"他们说，"在19世纪，滨鸟成群结队地飞越百慕大，从天际这边一直延伸到天际那边，持续时间超过24小时。现在，只有为数不多的鸟儿能够飞过这些海岛。南方栖息地和北方繁殖地的丧失威胁着鸣禽和滨鸟。"

number of experiments have shown this to be true. In one set, scientists switched eggs between the nests of herring gulls, which do not migrate, and lesser black-backed gulls, which do. Despite their rearing by nonmigrating parents, the lesser black-backed gulls migrated, leaving their foster parents behind.

Birds inherit the knowledge they need to complete their first migration, says John Phillips, a biologist at Virginia Polytechnic Institute in Blacksburg. He describes experiments done in Europe with different groups of the same bird species. The groups normally migrate in different directions. One group goes southeast. The other goes southwest. When scientists raise the young birds in the laboratory, where they cannot learn from parents, the birds still fly in the same direction as their ancestors did. They don't need to be taught. When the two species are crossed – a male from one group mated with the female from the other group – their offspring migrate in a direction halfway in between. They fly due south.

Migrating birds spend a lot of time and trouble migrating. The obvious question is "Why?" The answer is simple. They gain more from moving than from staying. The gain may be a better food supply, greater safety from predators, or a better environment for breeding, nesting, and raising young. Those wood ducks you hear calling are proof that migration aids both survival and reproduction. Their numbers are large and increasing every year. Next March and April, listen again. You'll hear them *Whoo-eek-ing* and *C-r-r-eek-ing* as they make their return journey north – only one species among many of those birds on the move.

家把不会迁徙的银鸥和会迁徙的黑背鸥的蛋在巢中调换了一下。尽管小黑背鸥是被不会迁徙的父母养大的，它们还是会丢下自己的养父母去迁徙。

布林克堡的弗吉尼亚理工学院的生物学家约翰·菲利普认为，鸟类能够通过遗传学到首次迁徙所必需的知识。他描述了一个在欧洲完成的实验，在实验中将同一种鸟分成不同组，这几组通常要往不同的方向迁徙，其中一组要飞向东南，另一组要飞向西南。科学家是在实验室将小鸟养大的，而在实验室它们是不能向父母学习的，但它们仍然能够像其前辈那样，朝着相同的方向迁徙，它们不需要教。当来自不同组别的一只雄鸟和一只雌鸟交配时，其幼鸟朝着上述两种方向的中间迁徙，飞往正南方。

在迁徙中，候鸟要花费大量的时间，克服大量的困难。一个明显的问题是"为什么"。答案很简单：和留在原地比，它们能够从迁移活动中得到更多的收获。这个收获也许是更好的食物供应，更安全地躲避食肉动物的侵袭，或者是更好的繁殖、筑巢和抚养幼鸟的环境。你听到的林鸳鸯的叫声就是迁徙有助于生存和繁殖的证据。它们的数量庞大，并且每年都在不断增长。明年的三四月，又会重新听到它们的叫声。当它们返回北方时，你将听到它们"呼……唉"和"克……唉"的叫声——而这仅仅是众多迁徙鸟中的一类。

The Atlantic Flyway: Bird Superhighway

by Elizabeth J. Scholl

The coastal route of the Atlantic Flyway (dark red line) has its northern origin in the eastern Arctic islands and the coast of Greenland. The principal routes to the Flyway are indicated here by the lighter red lines.

粗红线：大西洋飞行之路的海岸路线。其北起点为北极群岛的东部和格陵兰岛的海岸。
细红线：飞行之路的几条主要路线。

Imagine a superhighway that extends from the Arctic down the eastern coast of the United States, and all the way to the tip of South America. This route is real – it's called the Atlantic Flyway, and its travelers are birds. Though no two species of birds will follow exactly the same migration route along the flyway, each bird's path is like a lane within this superhighway. Birds weave in and out, sometimes crossing paths, and sometimes *diverging*.

There are four North American flyways. Scientists estimate that five billion birds travel along them in the spring and fall! They are the Atlantic Flyway, the Mississippi Flyway, the Central Flyway, and the Pacific Flyway. Flyways often follow major *topographical* features such as

Diverging
Moving in different directions

Topographical
Representing graphically the physical fetures of a place or region

想象一下，有这么一条高速公路，从北极开始，沿着美国东海岸，一路向下通到南美洲的最南端。这条道路确实存在，叫大西洋飞行之路，其旅行者是鸟儿。尽管没有两种鸟会沿着这条飞行之路采取一模一样的迁徙路线，但是每一只鸟的飞行路线就像是这条高速公路内的车道。鸟儿们飞进飞出，有时横穿道路，有时分叉飞行。

北美洲有四条迁徙飞行之路。科学家估计，在春季和秋季有50亿只鸟儿沿着这些线路飞行！这四条线路是大西洋飞行之路、密西西比河飞行之路、中美洲飞行之路和太平洋飞行之路。

大西洋飞行之路：鸟类高速公路

coastlines, large rivers, and mountain ranges. It's ideal for many migrating birds that in North America, coastlines, several major rivers, and mountain chains happen to run in north-south directions.

The Atlantic Flyway is sometimes called the seafarer's route because a large section of it follows the Atlantic Ocean, along the eastern coast of the United States. From the Florida coast, some birds cross to Cuba, a 240-kilometer nonstop trip, while others travel an additional 144 kilometers to the island of Jamaica to winter. Only about a third of all North American migrating birds fly an additional 800 kilometers across the Caribbean Sea to the coast of South America.

FREQUENT FLYERS

Birds that travel the Atlantic flyway are called *neotropical* migrants, or *neotrops* for short. Neotropical migrants include all birds that travel between North America, the Caribbean, and Central and South America. About half of all 700 or so species of birds in North America are neotrops. They include songbirds such as robins and bluebirds; many hawks; waterfowl such as ducks and swans; and shorebirds, like the sandpiper and sanderling. *Ornithologists* agree that neotropical migrants developed their current migration routes between 10 and 30 million years ago. Some species make the trip nonstop, while others make at most one or two stopovers along the way. Still others spend a month or more each spring and fall in transit between their summer and winter homes.

Ornithologists Scientists who study birds

Why do they do it? Traveling is dangerous, and researchers estimate that only half of the birds that migrate south each fall survive to return the following spring. Most birds fly south because food sources, particularly insects, are not available in colder cli-

飞行之路经常依据地形的特点，如海岸线、大河和山脉，而形成。在北美洲，海岸线、几条主要的河流和山川恰好都是南北走向的，这对于很多候鸟来说非常理想。

大西洋飞行之路有时被称为航海者之路，因为这条路大部分是沿着大西洋和美国的东海岸行进的。一些鸟儿从佛罗里达海岸开始，飞到古巴，历经240公里的不停歇飞行。还有的鸟儿要多飞144公里，到牙买加岛过冬。只有约三分之一的北美洲候鸟再飞800公里，跨越加勒比海，到达南美洲的海岸。

常见的飞鸟

在大西洋飞行之路上的鸟，被称为新热带候鸟，或者称为临时的新热带候鸟。新热带候鸟包括所有飞行在北美洲、加勒比海和中美洲及南美洲之间的鸟类。在北美洲的700多种鸟类中，大约有一半左右是新热带候鸟，包括像红腹滨鹬和蓝色鸣禽之类的鸣禽；许多种鹰；像野鸭、天鹅之类的水鸟；以及像鹬和三趾滨鹬之类的滨鸟等。鸟类学家认为，新热带候鸟在1000～3000万年前就已经形成了现在的迁徙路线。有些鸟类中途不歇息，而其他鸟类中途至多歇息一到两次。还有一些鸟儿每年的春秋季要用一个月或更多的时间往返飞翔于其在夏天和冬天的栖息地。

mates during the winter. Food sources are abundant in warmer climates. So, what makes them fly back north? Some birds, such as red knots (small shore birds with reddish faces), fly nearly 16,000 kilometers north in the spring, from the southern tip of South America to the Arctic, where they will lay and hatch their eggs.

Ornithologists believe that breeding birds have a better chance of survival in the north, even in the frigid Arctic, as there are fewer predators and more land for the birds to use as their nesting sites. At high latitudes the long summer days give parents more time to gather food for their young. And there is also less competition for food than there would be in warmer areas, where there are many more *resident birds*.

"REST STOP 3,200 KILOMETERS AHEAD"

Like human travelers who take a break at rest stops on the road, birds that make the journey along the Atlantic Flyway need to stop to rest and "fuel up," so that they have the energy to complete their trips. Some birds, such as plovers, fly over 3,200 kilometers without landing. Over time, migrating birds have come to know not only the best places to stop on the flyway, but also the best time to arrive at them.

Bird rest stops are called staging areas. One of the major staging areas for shorebirds along the Atlantic Flyway is Delaware Bay, between Delaware and New Jersey. Each May, over one million shorebirds stop on their spring migration along the Atlantic Flyway at just the same time as when horseshoe crabs lay their eggs.

The number of horseshoe crab eggs at this staging area is the greatest in the Western Hemisphere. Each female horseshoe crab lays up to 80,000 green eggs! Birds gorge themselves, doubling their body weights

resident birds
Those that stay in one area year-round

这些鸟类为什么要迁徙呢？旅行非常危险，研究人员估计每年秋天迁徙到南方的鸟儿，只有一半能够在第二年春天返回来。大多数鸟类飞到南方，因为在冬季寒冷的气候里，食物特别是昆虫不易获得，而在温暖的气候环境中食物充足。既然这样，又是什么使得它们飞回北方呢？一些鸟类如红腹滨鹬（一种红脸的小滨鸟），在春天要向北飞行近16 000公里，从南美洲的最南端飞到北极地区，在那里居住和孵卵。

鸟类学家认为，在北方，即使在寒冷的北极地区，养育鸟儿成功的机会要大些，因为那里极少食肉动物，而且有更多的地方适合鸟类筑巢安家。在高纬度地区，长长的夏天使父母有更多的时间为幼雏捕获食物。相对于有众多留鸟的温暖地区来说，这里觅食的竞争也小得多。

"前方3200公里是补给站"

像人类旅行者在路上需要停下来休息一样，鸟儿沿着大西洋飞行之路飞行时也需要停下来休息并"补充能量"，这样，它们才有充足的能量完成它们的旅程。一些鸟类如鸻鸟，飞行超过3200公里也不着陆。在这段时间内，候鸟不仅知道飞行路上最好的停留休息地，而且知道到达那里的最佳时间。

鸟类休息的地方，叫集结地。对于飞行于大西洋飞行之路上的滨鸟来说，最重要的集结地是位于美国新泽西州和特拉华州之间的特拉华湾。每年五月，100多万只春季沿着大西洋飞行之路迁徙的滨鸟停留在这里，而这个时候也是蟹产卵的季节。

在这个西半球的集结地蟹蛋的数量是最多的，每只雌蟹能够产80 000只绿卵！鸟儿狼吞虎咽，在两到三个星期内体重就能加倍，身体变得十

in two to three weeks and becoming strong enough to complete their migrations.

"CAUTION! HUMANS!"

In addition to the many natural hazards migrating birds encounter, including predators, storms, diseases, and lack of food sources due to natural disasters, birds that travel the Atlantic Flyway are facing increasing problems caused by humans.

Habitat destruction along the Atlantic Flyway, caused by home- and office-building, and shopping-center construction, has caused the populations of many neotropical migrants to decline in the United States, as well as in Central and South America. Other threats by humans include the use of horseshoe crabs as bait by fishermen. In addition, Delaware Bay is crossed by about 1,000 oil tankers each year. An oil spill would spell disaster for migrating shorebirds.

Fortunately, conservationists are working to preserve habitats along the Atlantic Flyway, and teaching others the importance of preserving them. Some students have joined the Shorebird Sister Schools Program, and have become pen pals with students who live along other areas of their flyways, in order to learn about migrating shorebirds, their habitats, and ways they can help them.

分强壮，足以完成迁徙之旅。

"小心！人类！"

除了会遇到许多自然灾害，包括食肉动物、暴风雨、疾病，由于自然灾害导致的食物短缺等，飞行于大西洋飞行之路的候鸟们还面临着越来越严重的来自人类的威胁。

由于兴建居民房、办公楼和商业中心，沿大西洋飞行之路的候鸟栖息地遭到破坏，使美国以及中、南美洲的许多新热带候鸟的数量不断下降。其他的人类的威胁还包括渔民用蚕作鱼饵。另外，特拉华湾每年大约有1000艘油轮通过，石油污染给这些迁徙的候鸟带来了致命的灾难。

幸运的是，环境保护者正在努力保护大西洋飞行之路沿途的候鸟栖息地，并宣扬保护这些栖息地的重要性。一些学生加入了"滨鸟姊妹学校"的项目，并且和居住在飞行之路其他地区的学生成为笔友，目的是为了更多地了解迁徙的滨鸟、它们的栖息地以及帮助它们的方式。