世界的森林

WORLD FORESTS

中国林学会科技咨询服务部

前　言

这本《世界的森林》，是林业科技英语自学读物。选自美国、英国、德国、日本、芬兰及联合国粮农组织林业专家撰写的15篇论文和书刊。英语标准、流畅，内容丰富、新颖。每篇文章都有译文，并有生词和音标注释。读者可以在学习英语过程中，了解当前世界森林的现状，发展趋势，经营方向和美国、英国、德国、日本、芬兰等林业先进国家的林业政策，林业研究等状况及人类在保护和发展森林方面的迫切任务。

本书聘请由赵青儒同志主编，周祉同志审定。在编译中，难免存在不足之处，请读者提出批评。

为提高自学英语的水平和发音标准，聘请专家为本书录了音。

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科技咨询服务部
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森林是一个有生命的世界

THE FOREST AS A LIVING WORLD

No one can look at a large tree such as an ancient oak, a lofty beech, or venerable yew without being aware of the remarkable complexity of its structure; the massive trunk with its furrowed bark bearing its own flora of mosses and lichens; the buttressed base creating dark crevices where small animals may hide; the intricate pattern of bough, smaller branch, twig, bud and leaf with flowers and fruit according to season. The shade cast by the canopy and the spreading roots seeking nourishment in the surface soil greatly influence the vegetation of the forest floor and this, in turn, affects the animal life. Another important facet of this complex tree world may not be so obvious; all old trees are dead in parts, branches die through insect or fungal attack, the tree may be damaged by high winds and lightning and in some cases the whole of the heart-wood may have rotted away, leaving the

tree hollow but nevertheless still alive. In the primeval forest undisturbed by Man there is more dead wood than living, much still on the tree but even more on the forest floor. This is fully utilized by a rich insect fauna including some of our most magnificent species, as well as by fungi, algae and other primitive plants like mosses and liverworts.

This complex of living organisms and the non-living environment together form what the ecologist calls the *ecosystem*. All the plants and animals and the material on which they live are inseparably interrelated. That is, they depend on each other or else are affected in some way by the activities and processes taking place in other parts of the environment. The total system displayed by one tree is so complicated that it is far from being fully understood by the scientist—who has even more difficulty when trying to explain the way in which many trees live together to form the forest.

Almost any species of tree would serve as an example to examine more closely the different components of the forest ecosystem, but let us take the familiar oak tree, which is so widespread throughout the northern hemisphere. The genus is a large one and includes about 450 species. The Iberian peninsula has twelve and there are fifteen in the Balkans,

but by far the greatest concentration is in Mexico, which has about 125 endemic species and a further 75 which extend into North America or south into Colombia. Oaks are also abundant throughout Asia, reaching southern China, Japan and other parts of the Far East.

There are two native species in Britain, *Quercus robur* and *Q. petraea*, and they have dominated the forests in lowland regions for thousands of years partly because they grow very readily on many different types of soils and partly because they provided so many of Man's needs that they have been preserved and planted during centuries of woodland management. Throughout Europe the oak was regarded with special affection because it grows to a large size, providing acorns for feeding animals and tannin for preserving leather, while its timber is of great strength and durability; it also splits easily for construction work and coppices freely to supply an abundance of sticks and stakes.

The history of the oak in Britain can be traced back through the last 10,000 years, mainly from fossilized remains such as pieces of timber, twigs, charcoal, bud scales, leaves and fruit frequently found preserved in peat deposits of various kinds. Oaks occur abundantly in buried forests, that is

those trees killed at some time in the past and which have gradually become covered with peat, which accumulates during very wet conditions. These are usually called bog oaks, and are often stained almost black by the reaction of iron in the ground water with tannins in the wood, and when dry are exceedingly tough. The oaks that were entombed by the sea as it encroached over the Fenland Basin died about four thousand five hundred years ago, in the Neolithic period, and even in these subfossil trees we find traces of the fauna associated with them. These consist mainly of galleries made by boring beetles or larvae, but occasionally the insects themselves are found. A farmer splitting bog oaks for firewood, near the fenland town of Ramsey in Cambridgeshire, found large galleries which contained two perfect specimens of the splendid longhorn beetle *Cerambyx cerdo*. This species is still widespread in continental Europe and known as an insect of ancient forest, but is extinct in Britain. The tree trunk in which these two specimens were found was a large one, more than 12 m long, and the timber was dated by the carbon-14 method to be about 3690 years old.

Since that time the oak fauna has probably not

changed very much and the insect species which have disappeared from various parts of Europe have been lost mainly because man has destroyed their forest habitat. Nevertheless entomologists are agreed that the oak has one of the richest insect faunas of any tree and this is particularly so in northern Europe where the number of native tree species is not high. In general, native trees have richer faunas than introduced ones because their invertebrate life has evolved over a long period of time. When a tree is moved from its native environment to another country it is usually transported as seed so that it grows in its new home without any of the insect life which is adapted to live on it. An example in Britain is the sycamore, which was taken there in the sixteenth century and although it has gradually acquired a fauna, this is not nearly as rich as that found on oak.

Another possible reason for the difference between the oak and the sycamore is that the former is generally associated with the richer fauna of warmer climates, whereas the latter belongs to a genus of trees exclusive to the cool temperate regions which have a much poorer fauna.

New Words and Expressions

1. living ['liviŋ] *a.* 有生命的
2. oak [ouk] *n.* 栎树
3. beech [bi:tʃ] *n.* 山毛榉
4. be aware of 知道，晓得
5. structure ['strʌktʃə] *n.* 结构，构造
6. trunk [trʌŋk] *n.* 树干
7. bark [bɑ:k] *n.* 树皮
8. flora ['flɔ:rə] *n.* 植物群，植物区系
9. moss [mɔs] *n.* 苔藓
10. lichen ['laiken] *n.* 地衣
11. buttress ['bʌtris] *n.* 板状干基
12. crevice ['krevis] *n.* 罅隙，裂缝
13. hide [haid] *v.* 隐藏
14. intricate ['intrikit] *a.* 错综的
15. bough [bau] *n.* 大枝
16. shade [ʃeid] *n.* 树荫
17. canopy ['kænəpi] *n.* 林冠
18. lightning ['laitniŋ] *n.* 闪电
19. rot [rɔt] *v.* 腐朽
20. algae ['ældʒi:] *n.* 水藻，海藻，藻类
21. liverwort ['livəwə:t] *n.* 苔纲

22. interrelate [intə(:)ri'leit] *v.* （使）互相联系
23. display [dis'plei] *v.* 显示
24. hemisphere ['hemisfiə] *n.* 半球
25. peninsula [pi'ninsjulə] *n.* 半岛
26. affection [ə'fekʃən] *n.* 感情
27. tannin ['tænin] *n.* 单宁
28. split [split] *v.* 劈开
29. stick [stik] *n.* 棍，棒
30. stake [steik] *n.* 木桩
31. fossilize ['fɔsilaiz] *v.* 变成化石
32. scale [skeil] *n.* 鳞苞
33. stain [stein] *v.* 染色
34. reaction [ri(:)'ækʃən] *n.* 反应
35. tough [tʌf] *a.* 坚韧的
36. entomb [in'tu:m] *v.* 埋葬
37. encroach [in'krouʧ] *v.* 侵入，侵蚀
38. fenland ['fenlænd] *n.* 沼泽地方
39. neolithic [ni:ou'liθik] *a.* 新石器时代的
40. fauna [fɔ:nə] *n.* （一个地方或一个时代的）动物，动物区系
41. gallery ['gæləri] *n.* 通道
42. trace [treis] *n.* 痕迹
43. beetle ['bi:tl] *n.* 甲虫
44. larva ['lɑ:və] *n.* 幼虫
45. bog oak 长期埋在泥炭地里变黑的橡树
46. specimen ['spesimin] *n.* 标本

47. extinct [iks'tiŋkt] *a*. 已绝种的
48. date [deit] *v*. 计算时间
49. carbon ['kɑ:bən] *n*. 碳
50. entomologist [entə'mɔlədʒist] *n*. 昆虫学家
51. invertebrate [in'və:tibrit] *n*. 无脊椎动物
52. sycamore ['sikəmɔ:] *n*. 悬铃木
53. acquire [ə'kwaiə] *v*. 带来

森林是一个有生命的世界

没有人看到象古代的栎树、高耸的山毛榉或古老的紫杉这样的大树而不知道其结构之异常复杂：在那魁伟的树干上，长着带有沟纹的树皮，养育着苔藓和地衣植物群；板状的根基造成许多黑暗的缝隙，里面隐藏着许多小动物；那形态不一的大枝、小枝、细枝、芽苞和叶子，以及随着季节而盛开的花朵和生长的果实。树冠投下的树荫和分布在表土里寻找养料的树根，都对林地上的植被有很大影响，而植被又影响着动物的生活。这个复杂的树木世界的另一个重要方面可能不是这样明显，例如：一切老树都是部分枯死的，一些树枝因受害虫和真菌的侵害而死亡；树木可能遭受大风和闪电的破坏，在有些情况下，整个心材已经腐朽，树心空了，但仍活着。在未受人类干扰的原始森林里，死木多于活木，许多枯死的木材仍然保留在树上，但更多的已遗留于林地。这些死木受到丰富的昆虫动物群（包括一些最漂亮的虫种）的充分利用，也受到真菌、水藻和其它苔藓及苔纲之类的原始植物的充分利用。

这个复杂的有生命的生物体与无生命的环境共同构成生态学家所谓的生态系统。一切植物和动物以及它们赖以生活的物质，都是紧密地相互联系的。也就是说，它们互相依存，否则，它们就会受到环境其它部分发生的活动和变化过程的侵袭。一棵树所显示的整个系统是这样的复杂，以至于

连科学家都远远不能充分了解，而如果他试图解释许多树木是如何生活在一起，构成森林的，那就更为困难了。

几乎任何一个树种都可以作为仔细研究森林生态系统不同成分的例子，但是，我们还是以我们熟悉的、遍布于北半球的栎树为例。栎属是一个大属，包括大约450个种。伊比利亚半岛有12个种，巴尔干半岛有15个种。但是最多的种集中于墨西哥，那里大约有125个当地特有的种。还有75个种延伸到北美或南美的哥伦比亚。在全亚洲，栎树也很丰富，一直延伸到中国南部、日本和远东的其它部分。

英国有两个乡土种，即英国栎和无梗花栎。几千年来，它们在低地森林里占优势。一方面因为它们很容易在许多不同类型的土壤上生长，另一方面因为它们提供了人类需要的许多东西，所以，在林地管理的许多世纪中，人们不但保护而且还栽植了这种树木。在整个欧洲，人们以特殊的感情对待栎树，因为它能长成大树，提供饲养动物的橡子和保护皮革的单宁，它的木材强度大，耐久，橡木还容易加工，用于建筑；橡树易于萌生，可供应大量小杆材。

在英国，栎树的历史可以追溯到过去的一万年，主要根据多次发现的、保存于各种泥炭土沉积物中的残遗化石，象木片、树皮、木炭、芽鳞、叶子和果实来判断。在被掩埋地下的森林里常发现大量栎树，这些栎树是在过去某个时候被致死后，逐渐被泥炭土掩盖，在很潮湿的条件下累积起来的。它们常被做叫沼栎。而由于地下水中的铁与木材所含单宁的作用，几乎常被染成黑色。当树木干燥时就变得非常坚韧。在苏兰特盆地遭到海侵而被埋葬的栎树，大约是在4500年以前的新石器时代枯死的。即使在这些亚化石树木里，我们也

发现了与它们有关的动物的痕迹，主要是化石内有天牛或其幼虫开凿的通道，但偶而也发现了昆虫。在靠近剑桥郡拉姆齐的芬兰特镇里，一个农民用斧劈沼栎作烧柴时，发现了许多大通道，其中还有两只完整的栎黑天牛(Cerambyx cerdo)的尸体。这个种现在仍然遍布欧洲大陆，而且是已知的古代森林昆虫，但在英国已经绝种了。发现这两只天牛尸体的那个树干很大，长达12米以上，用碳14法计算的年代，大约已有3690年。

从那个时候以来，寄生于栎树的动物区系可能没有多大变化。一些昆虫种之所以在欧洲好多地方已经绝迹，主要因为人类破坏了它们的森林生境。但是，昆虫学家们一致认为，与其它任何树种相比，栎树上的昆虫动物最为丰富，在乡土树种数量不多的北欧尤其如此。总的来看，乡土树上的动物比新进树木上的动物更为丰富，因为乡土树上无脊椎动物的生活已经经历了很长一个时期。当一棵树木从其原产地迁移到另一个地方时，常常就象种子那样从一处运到另一处。因此，在新的生长地生长时，就没有任何昆虫能适于在它上面生活了。在英国，可举悬铃木为例子来说明这一问题。它是在第16世纪时被引入英国的，虽然悬铃木上已逐渐寄居了一个动物区系，但其种类并不象栎树上那样丰富。

栎树不同于悬铃木的另一个可能的原因是前者处于比较温暖的气候，动物比较丰富，而后者属于寒冷气候区的属，所以动物较少。

（节选自英国《森林世界》一书）

今日之森林

THE FOREST TODAY

Throughout his long history Man seldom adapted himself to the forest as a home and the few tribes known today as inhabitants of tropical forests are exceptions to the main course of evolution. In Africa, where human origins can be traced back in time further than elsewhere, our earliest ancestors probably lived in the open savanna by the forest edge or, as some believe, along the shores of lakes. The forest itself was regarded with a certain amount of fear, because of the enemies and predatory animals it sheltered. For centuries, therefore, Man's energies were devoted mainly to pushing back the limits of the forest to create more land for cultivation and more grassland for grazing, but retaining sufficient woodland for sport, for the herds of swine which dug for roots and ate the acorn crop, and to perpetuate the many types of timber needed in everyday life. Gradually the forest became fragmented into smaller units and the species of trees

in them were selected according to their value and use, while the others disappeared or survived only in marginal areas.

In historical times our exploitation of the forest was often motivated by greed and desire for quick profits. We have already seen that in the early days of colonial America the European immigrants recklessly exploited the virgin forests, partly to increase the farmland and partly because they thought that in so vast a country trees were inexhaustible. As in the case of the disappearing buffalo, they came to believe that there were always more 'out west'. Throughout the world the misuse of axe and saw, fire and over-grazing destroyed the forest and led to the disruption of watersheads, erosion and loss of soil fertility, flooding and blocking of waterways with silt. This story has been repeated time and time again, yet the process still goes on, particularly in undeveloped tropical countries where virgin forest areas are unexploited and the lessosns of conservation have not yet been learned.

It is only in comparatively recent times that scientists have been able to demonstrate the many dramatic changes which may take place when the protective cover of trees is removed, particularly in regions of high rainfall. Trees not only provide may