

TPO 17 – 1 Europe's Early Sea Trade with Asia 欧亚地区早期的海洋贸易

In the fourteenth century, a number of political developments **cut** Europe's overland trade **routes** to southern and eastern Asia, with which Europe had **had** important and highly profitable commercial **ties** since the twelfth century. This development, *coming as it did when the bottom had fallen out of the European economy*, provided an impetus to a long-held desire to secure direct relations with the East by establishing a sea trade. **Widely reported, if somewhat distrusted**, accounts by figures like the famous traveler from Venice, Marco Polo, **of the willingness** of people in China to trade with Europeans and **of the immensity** of the wealth to be gained by such contact **made the idea irresistible**. Possibilities for trade **seemed promising**, but no hope existed for maintaining the traditional routes over land. A new way had to be found.

自 12 世纪起，欧洲就已经建立起与南亚和东亚之间高度互利的贸易关系，但 14 世纪时，政治的发展切断了双方的陆路贸易路线。政治的发展在将欧洲经济带入谷底的同时，也提供了一个新契机，为长久以来就有的与东方建立直接海上贸易的愿望提供了新的动力。例如威尼斯的马可波罗这样的人物所广泛宣传的（**尽管不尽可信**）中国人与欧洲人做贸易的主动意愿，这样的贸易可能带来的巨大财富，使得这样的想法难于抵御。贸易的可能性充满希望，但维持陆地传统路线的希望只是一个幻影。必须要寻找新的路线。

The chief problem was technological: How were the Europeans to reach the East? Europe's maritime tradition had developed in the context of easily navigable seas—the Mediterranean, the Baltic, and, **to a lesser extent**, the North Sea between England and the Continent—not of vast oceans. New types of ships were needed, new methods of finding one's way, new techniques for **financing so vast a scheme**. The **sheer** scale of the investment it took to begin commercial expansion at sea **reflects** the immensity of the profits that such East-West trade could create. Spices were the most **sought-after** commodities. Spices not only dramatically improved the taste of the European diet but also were used to **manufacture** perfumes and certain medicines. But even high-priced commodities like spices had to be transported **in large bulk** in order to **justify** the expense and trouble of sailing around the African continent all the way to India and China.

技术问题最为重要：欧洲人如何到达东方？欧洲的航海传统是在那些易于航行的海域中建立和发展起来的——地中海、波罗的海，以及一条比较狭长的海域，英格兰和欧洲大陆之间的北海，而这些都并非广阔的海洋。因此，开辟新的航线就需要新型的轮船、新的导航技术，以及支持这一庞大计划的新的融资技术。开启海上商业扩张投入的资金规模反映出东西方贸易所能创造出的巨大财富。香料在当时成为最受欢迎的商品。不仅显著提高了欧洲菜肴的口感，同时也被用于制作香水和一些药品。但即使是香料这样的高价商品也不得不**大批量**运输，以**平衡**绕行非洲运输至中国和印度所花费的巨额成本和麻烦。

The principal seagoing ship used throughout the Middle Ages was the galley, a long, low ship

批注 | 1]: **seemed promising**

看起来很有前途
(充满希望)

批注 | 2]: **so vast a scheme**

如此庞大的计划
【eg. 好大一条鱼】

批注 | 3]: **sheer scale**

• 庞大的规模
sheer
英 [ʃiə(r)] 美 [ʃɪr]
• adj. 绝对的；透明的；峻峭的；纯粹的
• adv. 完全；陡峭地
• vi. 偏航
• vt. 使偏航；使急转向
• n. 偏航；透明薄织物

批注 | 4]: **sought-after**

英 ['sɔ:t a:ftə(r)] 美 ['sɔ:t æftər]
• adj. 受欢迎的，很吃香的

批注 | 5]: **manufacture**

英 [ˌmænjuˈfæktʃə(r)] 美 [ˌmænjʊˈfæktʃər]
• n. 制造；产品；制造业
• vt. 制造；加工；捏造
• vi. 制造

批注 | 6]: **justify**

英 [ˈdʒʌstɪfaɪ] 美 [ˈdʒʌstɪfaɪ]
• vi. 证明合法；整理版面
• vt. 证明……是正当的；替……辩护

fitted with sails but driven primarily by **oars**. The largest galleys had as many as 50 oarsmen. Since they had relatively shallow **hulls**, they were unstable when driven by sail or when on rough water; hence they were unsuitable for the voyage to the East. Even if they **hugged** the African coastline, they had little chance of surviving a crossing of the Indian Ocean. Shortly after 1400, shipbuilders began developing a new type of vessel properly designed to operate in rough, open water: the caravel. It had a wider and deeper hull than the galley and hence could carry more cargo; increased stability made it possible to add multiple **masts** and sails. In the largest caravels, two main masts held large square sails that provided **the bulk of the thrust** driving the ship forward, while a smaller forward mast held a triangular-shaped sail, called a lateen sail, which could be moved into a variety of positions to **maneuver** the ship.

hug 英 [hʌg] 美 [hʌg] v. 拥抱; 紧抱; 紧贴, 缚紧; 紧靠, 紧挨; 暗自庆幸; 抱有, 坚持; 抱住 (自己的身体或某物) n. 拥抱, 紧抱; (摔跤中) 抓握	hull 英 [hʌl] 美 [hʌl] n. 船体; (果实的) 外壳 vt. [粮食] 去壳	maneuver 英 [mə'nʊvə] 美 [mə'nu:vər] n. [军] 机动; 演习; 策略; 调遣 vi. [军] 机动; 演习; 调遣; 用计谋 vt. [军] 机动; 演习; 用计; 调遣
--	--	--

中世纪应用最为广泛的海船是划桨帆船，船体低矮狭长能够使用帆，但主要还是靠**桨**操控。最大的划桨帆船有**50个划手**。由于船体相对较浅，靠帆航行或是在汹涌的海面上航行时很难保持稳定，因此它们不适合在去往东方的航线上航行。即使紧贴着非洲海岸线行驶，这种船也很难穿越印度洋。15世纪初，造船专家们开始研制一种能够适用于波涛汹涌的开放海域的新型船只——轻快帆船。这种海船船体比划桨帆船更宽更深，因此可以运送更多的货物，稳定性的提升使得船体能够增加多个桅杆和船帆。最大型的轻快帆船上，两根主桅杆撑起大块船帆就能够提供**足够的推力**驱动帆船前进，同时一个小型的前桅杆撑起一块三角形船帆，它可以移动到不同位置控制帆船。

The **astrolabe** had long been the primary instrument for navigation, having been introduced in the eleventh century. It operated by measuring the height of the Sun and the fixed stars; by calculating the angles created by these points, it determined the degree of latitude at which one stood. (The problem of determining longitude, though, was not solved until the eighteenth century.) By the early thirteenth century, Western Europeans had also developed and **put into use the magnetic compass**, which helped when clouds **obliterated** both the Sun and the stars. Also beginning in the thirteenth century, there were new maps refined by precise calculations and the reports of sailors that made it possible to trace one's path **with reasonable accuracy**. Certain **institutional** and practical norms had become established as well. A maritime code known as the Consulate of the Sea, which originated in the western Mediterranean region in the fourteenth century, won acceptance by a majority of sea goers as the **normative** code for maritime conduct; it defined **such matters as** the authority of a ship's officers, protocols of command, pay structures, the rights of sailors, and the rules of **engagement** when ships met one another on the sea-lanes. **Thus** by about 1400 the key elements **were in place** to enable Europe to begin its seaward adventure.

obliterate 英 [ə'blɪtəreɪt] 美 [ə'blɪtəreɪt] vt. 消灭; 涂去; 冲刷; 忘掉	normative 英 ['nɔ:mətɪv] 美 ['nɔ:rmətɪv] adj. 规范的, 标准的	be in place 在原位, 得其所, 在应有的位置上
--	---	---

批注 [7]: oar
 英 [ɔ:(r)] 美 [ɔ:(r)]
 •n. 桨; 橹; 桨手
 •vt. 划 (船)
 •vi. 划行

roar
 英 [rɔ:(r)] 美 [rɔ:(r)]
 •n. 咆哮; 吼; 轰鸣
 •vi. 咆哮; 吼叫; 喧闹
 •vt. 咆哮; 呼喊; 使.....轰鸣

批注 [8]: 使用, 应用; 投入使用

批注 [9]: institutional
 英 [ˌɪnstɪ'tju:ʃənl] 美 [ˌɪnstɪ'tu:ʃənl]
 •adj. 制度的; 制度上的
 •学会的; 由来已久的; 习以为常的
 •公共机构的; 慈善机构的

批注 [10]: engagement
 英 [ɪn'geɪdʒmənt] 美 [ɪn'geɪdʒmənt]
 •n. 婚约; 约会; **交战**; 诺言; 进场 (游戏术语)
 •n. 参与度 (指用户点赞、转发、评论、下载文档、观看视频、咨询等交互行为)

自 11 世纪**星盘**引入欧洲以来，它已经成为航海的重要工具。星盘通过测定太阳和恒星的高度来计算罗盘与星体之间的夹角，并以此确定测量者所处的纬度。（而经度测量的难题，直到 18 世纪才得以解决）。13 世纪初，西欧人也发明并开始使用磁罗盘，在云彩遮挡住太阳和星星的情况下帮助他们辨识方向。也是在 13 世纪初期，经过精密计算，绘制的地图更为精准，加上航海日志，使航行变得**可靠而准确**。特定的制度和实际规范也日趋完善。14 世纪，一部起源于地中海西部地区的《海运法典》为大多数水手们所接受，成为海事行为的规范标准。法典规定了船长的职权范围、命令协议、薪酬结构、水手们的权利，以及航行中与其他船只的交战规则。**因此**，直到大约 1400 年，正是这些重要的因素的具备，欧洲人才能够开启他们的海上冒险之旅。

TPO 17 – 2 Animal Signals in the Rain Forest 雨林中的动物信号

The daytime quality of light in forests **varies with** the density of the vegetation, the angle of the Sun, and the amount of cloud in the sky. Both animals and plants have different appearances in these various lighting conditions. A color or pattern that is relatively **indistinct** in one kind of light may be quite **conspicuous** in another.

森林中白天的光照质量随着植被密度、太阳角度以及天空中云的数量的变化而变化。在不同的光照条件下，动植物会有不同的外貌。在某种光照下相对较难辨认的颜色或式样，在另外一种光照下也许会变得相当显眼。

In the varied and constantly changing light environment of the forest, an animal must be able to send visual signals to members of its own species and at the same time avoid being detected by predators. An animal can hide from predators by choosing the light environment in which its pattern **is least visible**. This may require moving to different parts of the forest at different times of the day or under different weather conditions, or it may be achieved by changing color according to the changing light conditions. Many species of amphibians (frogs and toads) and reptiles (lizards and snakes) are able to change their color patterns to camouflage themselves. Some also signal by changing color. The chameleon lizard has the most striking ability to do this. Some chameleon species can change **from a rather dull appearance to a full riot of carnival colors** in seconds. **By this means**, they signal their level of aggression or **readiness** to mate.

在多样和不断变化的森林光照环境下，动物必须能够发送视觉信号给自己的同类，同时避免被捕食者发现。动物可以选择**最不易看得见**的光照环境来躲避捕食者的视线。这就要求动物能在白天不同的时间或者在不同的天气条件下移动到森林的不同方位，或者，它们也可以根据不同的光照来改变自身的颜色。很多两栖动物（青蛙和蟾蜍）和爬行动物（蜥蜴和蛇）都可以通过改变颜色图案来伪装自己。有些动物还通过改变颜色来发出信号。变色龙在这方面有着最惊人的能力。有些变色龙物种可以在几秒钟之内就**把暗淡的外表变得灿烂夺目**。**通过这种方式**，它们可以传达出攻击程度和交配**意愿**。

Other species take into account **the changing conditions of light** by performing their visual displays only when the light is favorable. A male bird of paradise may put himself in the **limelight** by displaying his spectacular plumage in the best stage setting to attract a female. Certain butterflies move into spots of **sunlight that have penetrated to the forest floor** and display by opening and closing their beautifully patterned wings in the bright spotlights. They also compete with each other for the best spot of sunlight.

其他的物种则只有在光照对它们有利的时候才会利用光照，来进行视觉上的自我展现。雄性极乐鸟会置身于汇聚的光线之下，在最佳的场景中展现自己缤纷绚烂的羽翼，以吸引雌鸟的注意。某些蝴蝶则飞到穿透森林的太阳光点处，在明亮的光点中扇动着带有美丽图案的翅膀来展现自己。它们还会互相争夺最佳的光照位置。

批注 [11]: indistinct

英 [ˌɪndɪˈstɪŋkt] 美 [ˌɪndɪˈstɪŋkt]

•adj. 模糊的，不清楚的；朦胧的；难以清楚辨认的

distinct

英 [dɪˈstɪŋkt] 美 [dɪˈstɪŋkt]

•adj. 明显的；独特的；清楚的；有区别的

批注 [12]: riot

英 ['raɪət] 美 ['raɪət]

•n. 暴乱；放纵；蔓延
•vi. 骚乱；放荡
•vt. 浪费，挥霍

carnival

英 ['kɑːnɪvl] 美 ['kɑːrnɪvl]

•n. 狂欢节，嘉年华会；饮宴狂欢

批注 [13]: readiness

英 ['redɪnəs] 美 ['redɪnəs]

•n. 敏捷，迅速；准备就绪；愿意

批注 [14]: limelight

英 ['laɪmlaɪt] 美 ['laɪmlaɪt]

•n. 众人注目的中心；石灰光，石灰光灯
•v. 使受到注目

Very little light filters through the canopy of leaves and branches in a rain forest to reach ground level-or close to the ground-and at those levels the yellow-to-green wavelengths predominate. A signal might be most easily seen if it is **maximally** bright. In the green-to-yellow lighting conditions of the lowest levels of the forest, yellow and green would be the brightest colors, but when an animal is signaling, these colors would not be very visible if the animal was sitting in an area with a yellowish or greenish background. The best signal **depends not only on** its brightness **but also on** how well it contrasts with the background against which it must be seen. In this part of the rain forest, therefore, red and orange are the best colors for signaling, and they are the colors used in signals by the ground-walking Australian brush turkey. This species, which lives in the rain forests and scrublands of the east coast of Australia, has a brown-to-black plumage with bare, bright-red skin on the head and neck and a neck **collar** of orange-yellow **loosely hanging skin**. During **courtship** and aggressive displays, the turkey enlarges its colored neck collar by inflating **sacs** in the neck region and then flings about a **pendulous** part of the colored signaling **apparatus** as it utters calls designed to attract or repel. **This impressive display** is clearly visible in the light spectrum illuminating the forest floor.

pendulous 英 ['pendjələs] 美 ['pendʒələs] adj. 下垂的, 悬垂的; 摇摆的	apparatus 英 [ˌæpə'reɪtəs] 美 [ˌæpə'ræɪtəs] n. 装置, 设备; 仪器; 器官
---	--

很少有光能够穿透热带雨林的树冠层到达地平面——或是接近地面——而能达到底部的主要是黄绿光波。如果是色彩极为明亮的信号, 可能更容易被看见。在森林底层的黄绿光照条件下, 黄色和绿色是最明亮的颜色, 但是当动物发送信号时, 如果处于浅黄或浅绿的背景下, 这些颜色就不容易看到了。最佳的信号不仅取决于其明亮度, 还在于它与背景颜色的对比度。因此, 在热带雨林这块区域, 红色和橙色是最佳的信号颜色, 而这也是地面行走的澳大利亚灌丛火鸡最善于使用的信号颜色。这个物种生活在澳大利亚东海岸的雨林和灌木丛中, 长着黑棕色的羽毛, 有着光秃秃、亮红色的头和脖子, 颈圈上是一层橙黄色的**松垮垮的皮**。在**求爱期**和发起进攻时, 火鸡通过给颈部液囊充气扩张颈圈, 晃动着下垂的鲜艳的信号装置, 随之发出叫声来吸引异性或击退敌人。在照亮雨林底层的光谱环境下, 能够清晰地看到这种让人印象深刻的展示。

Less colorful birds and animals that inhabit the rain forest tend to rely on forms of signaling other than the visual, particularly over long distances. **The piercing cries** of the rhinoceros hornbill characterize the Southeast Asian rain forest, as do the unmistakable calls of the gibbons. In densely wooded environments, sound is the best means of communication over distance because in comparison with light, it travels with little **impediment** from trees and other vegetation. In forests, visual signals can be seen only at short distances, where they are not obstructed by trees. The male riflebird exploits both of these modes of signaling simultaneously in his courtship display. The sounds **made as each wing is opened** carry extremely well over distance and **advertise** his presence widely. The **ritualized** visual display communicates **in close quarters** when a female has approached.

批注 [15]: maximally
[ˈmæksɪməli]
•adv. 最大地; 最高地

批注 [16]: sac
英 [sæk] 美 [sæk]
•n. [生物] 囊; 液囊

批注 [17]: **The piercing cries**
刺耳的叫声

批注 [18]: advertise
英 [ˈædvətaɪz] 美 [ˈædvɜrtɑɪz]
•vt. 通知; 为...做广告; 使突出
•vi. 做广告, 登广告; 作宣传

批注 [19]: ritualized
英美 [ˈrɪtʃuəlaɪzɪd]
•adj. 仪式化的; 程式化的
•v. 仪式化 (ritualize 的过去式)

批注 [20]: quarter
英 ['kwɔ:tə(r)] 美 ['kwɔ:rtər]
•n. 四分之一; 地区; 季度; 一刻钟; 两角五分; 节
•vi. 住宿; 驻扎
•vt. 将...四等分; 供某人住宿
•num. 四分之一

in close quarters
But In Close Quarters 但在近距
高
in close quarters with 与

对于生活在热带雨林中的色彩不那么鲜艳的鸟类和动物来说，它们则倾向于发出其他形式的信号而非视觉信号，尤其是在跨越长距离时。比如说，东南亚雨林中极有代表性的能发出尖锐叫声的犀鸟和叫声清厉的长臂猿。在树木繁茂的环境中，声音是最好的跨距离传播手段。因为，相较于视觉信号，声音几乎不受树木和其他植被的干扰。在森林中，只能在不被树木阻挡的近距离地方看到视觉信号。雄性极乐鸟在求爱期则同时运用了这两种信号传送方式。它**张开翅膀时发出的**声响能够极好地传送到远距离之外，铺天盖地地宣传着它的仪表风采。而当雌鸟吸引而来时，它那仪式化的视觉展现就得以**近距离地**进行交流。

TPO 17 – 3 Symbiotic Relationships 共生关系

A symbiotic relationship is an interaction between two or more species in which one species lives in or on another species. There are three main types of symbiotic relationships: parasitism, commensalism, and mutualism. The first and the third can be key factors in the structure of a **biological community**; **that is,** all the populations of organisms living together and potentially interacting in a particular area.

共生关系是两种或更多物种之间的一种交互作用，其中一个物种要么在另一个物种中生存要么依赖另外一个物种生存。共生关系共有三种类型：寄生、共栖和互利共生。其中第一种和第三种是一个**生物群落**结构的关键要素。**所谓生物群落**，指的是在某个特定区域内，所有生物体共同生存并且潜在地相互影响。

Parasitism is a kind of predator-prey relationship in which one organism, the parasite, derives its food **at the expense of** its symbiotic associate, the host. Parasites are usually smaller than their hosts. An example of a parasite is a tapeworm that lives inside the **intestines** of a larger animal and absorbs nutrients from its host. Natural selection *the process that results in the survival of individuals or groups best adjusted to the conditions under which they live* **favours** the parasites that are best able to find and feed on hosts. At the same time, defensive abilities of hosts are also selected for. As an example, plants make chemicals toxic to fungal and bacterial parasites, along with ones toxic to predatory animals (sometimes they are the same chemicals). In vertebrates, the immune system provides a multiple defense against internal parasites.

寄生现象是一种捕食式的关系，其中，寄生物通过削弱其寄主而获得自身所需食物。寄生物的形体往往小于寄主。绦虫是寄生的例子之一，它生活在较大型动物的肠道中，并吸收寄主体内的营养。自然选择是**导致能适应环境的个体或群体存活的过程**，自然选择**青睐**那些最能够寻找寄主并能依靠寄主存活的寄生虫。同时，防御能力强的寄主也被选择出来。比如说，有些植物会产生对真菌和细菌寄生物有毒的化学物质，也会产生那些对捕食动物有毒的化学物质（有时这些化学物质是一样的）。而对于脊椎动物来说，其身体的免疫系统可以对体内的寄生物进行多层防御。

At times, it is actually possible to watch the effects of natural selection in host-parasite relationships. For example, Australia during the 1940's was **overrun** by hundreds of millions of European rabbits. The rabbits destroyed **huge expanses of** Australia and threatened the sheep and cattle industries. In 1950, myxoma virus, a parasite that affects rabbits, was **deliberately** introduced into Australia to control the rabbit population. Spread rapidly by mosquitoes, the virus **devastated** the rabbit population. The virus was less deadly to the offspring of surviving rabbits, **however,** and it caused less and less harm over the years. Apparently, genotypes (the genetic make-up of an organism) in the rabbit population were

批注 [21]: at the expense of
•以...为代价；由...支付费用

批注 [22]: intestine
英 [ɪn'testɪn] 美 [ɪn'testɪn]
•n. (脊椎动物的)肠；(无脊椎动物的)肠管
•adj. 内部的；国内的

批注 [23]: overrun
英 [ˈəʊvərʌn] 美 [ˈoʊvərʌn]
•v. 泛滥；超出；蹂躏；覆盖(某地)；占领(领土)；比(机器的另一部分)转速快
•n. 泛滥，蔓延；超出限度；(车辆的)超限运动；(机场跑道的)保险道

批注 [24]: deliberately
英 [dɪ'lɪbəreɪtli] 美 [dɪ'lɪbəreɪtli]
•adv. 故意地；谨慎地；慎重地

批注 [25]: devastate
英 ['devəsteɪt] 美 ['devəsteɪt]
•vt. 毁灭；毁坏

批注 [26]: 提前翻译：
提到前面，结合逗号前面的句子，先翻译。

selected that were better able to resist the parasite. **Meanwhile**, the deadliest **strains** of the virus perished with their hosts as natural selection favored strains that could infect hosts but not kill them. Thus, natural selection stabilized this host-parasite relationship.

有时候, 寄生关系的自然选择效应也可能在现实中被观察到。比如说, 二十世纪四十年代, 亿万只欧洲兔在澳大利亚泛滥成灾。兔子肆虐了**广袤的**土地, 并给牛羊业带来了极大的威胁。1950年, 为了控制兔灾, 澳大利亚特意引进了一种名为粘液瘤病毒的可影响兔子的寄生虫。通过蚊子的快速传播, 兔子数量急剧减少。**然而**, 这种寄生虫对于生存下来的兔群的后代就没有那么致命了, 而且这种伤害逐年减小。显然, 该兔群的遗传性状(生物体的基因结构)经过了自然选择, 已经具备了更好地抵抗粘液瘤病毒的能力。**同时**, 由于自然选择更倾向于那些能够感染寄主但不致其死的品系, 这种病毒最致命的品系也逐渐地衰败了。这样, 自然选择便使得寄主-寄生虫的关系趋于稳定。

选项分析: 33/42

organisms **that survive a parasitic attack** do so **in spite of** the natural selection process

尽管有自然选择的过程, 但在**寄生攻击下存活下来**的生物体也会这样做

In contrast to parasitism, in **commensalism**, one partner benefits without significantly affecting the other. Few cases of absolute commensalism probably exist, because it is unlikely that one of the partners will be completely unaffected. **Commensal** associations sometimes involve one species' obtaining food that is **inadvertently** exposed by another. For instance, several kinds of birds feed on insects **flushed out of** the grass by grazing cattle. It is difficult to imagine how this could affect the cattle, but the relationship may help or hinder them in some way not yet recognized.

与寄生关系相反, 在共生关系之中, 一方受益, 也不会给另一方带来严重影响。然而在现实中, 纯粹的共生关系几乎不存在, 因为很难有一方会完全不受影响。共生关系有时候表现为这样一种方式, 一个物种寻觅的食物经由另外一个物种不经意地暴露出来。比如说, 有一些以昆虫为食的鸟类会被放牧中的牛群赶出草地。很难说这个对牛群会带来什么影响, 但这样的关系也许正以一种我们尚未认知到的方式在帮助或阻碍着它们。

The third type of symbiosis, mutualism, benefits both partners in the relationship. **Legume** plants and their nitrogen-fixing bacteria, and the interactions between flowering plants and their pollinators, are examples of mutualistic association. In the first case, the plants provide the bacteria with **carbohydrates** and other organic compounds, and the bacteria have **enzymes** that act as **catalysts** that eventually add nitrogen to the soil, enriching it. In the second case, pollinators (insects, birds) obtain food from the flowering plant, and the plant has its pollen distributed and seeds dispersed much more efficiently than they would be if they were carried by the wind only. Another example of mutualism would be the bull's horn acacia tree, which grows in Central and South America. The tree provides a place to live for ants of the **genus** *Pseudomyrmex*. The ants live in large, hollow thorns and eat sugar secreted

批注 [27]: **strain**

英 [streɪn] 美 [streɪn]

- n. 张力; 拉紧; 负担; 扭伤; 血缘
- vi. 拉紧; 尽力
- vt. 拉紧; 滥用; 滤去; 竭力
- n. (植物、动物的) 品种; 种类

批注 [28]: **commensalism**

英 [kə'mensəlɪzəm] 美 [kə'mensəlɪzəm]

- n. [生态] 共栖; 共生

批注 [29]: **commensal**

英 [kə'mensl] 美 [kə'mensl]

- adj. 共生的; 共餐的
- n. 共生体; 共生植物(或动物)

批注 [30]: **inadvertently**

英 [ɪnəd'vɜ:tntli] 美 [ɪnəd'vɜ:rtntli]

- adv. 无意地, 不经意地

批注 [31]: **flush out of**

- (从隐蔽处) 驱逐出去

批注 [32]: **enzyme**

英 ['enzɑɪm] 美 ['enzɑɪm]

- n. [生化] 酶

批注 [33]: **catalyst**

英 ['kætəlɪst] 美 ['kætəlɪst]

- n. [物化] 催化剂; 刺激因素

批注 [34]: **genus**

英 ['dʒɪ:nəs] 美 ['dʒɪ:nəs]

- n. 类, 种; [生物] 属

by the tree. The ants also eat yellow structures **at the tip of leaflets**; these are protein rich and seem to have no function for the tree except to attract ants. The ants benefit the host tree by attacking **virtually** anything that touches it. They sting other insects and large herbivores (animals that eat only plants) and even clip surrounding vegetation that grows near the tree. When the ants are removed, the trees usually die, probably because herbivores damage them so much that they are unable to compete with surrounding vegetation for light and growing space. The complex **interplay** of species in symbiotic relationships highlights an important point about communities: Their structure depends on a web of diverse connections among organisms.

第三种关系，互利共生，是指共生双方能够互利互惠。其中典型的例子有豆科植物和固氮细菌，以及开花植物和授粉生物。在第一个例子中，植物可以为细菌提供碳水化合物以及其他一些化合物，而这些细菌则能产生一种起催化作用的酶，它最终增加土壤中的氮元素来丰富土壤。在第二个例子中，授粉生物（昆虫、鸟类等）从开花植物中获取食物，而植物则可以通过它们来传递花粉和种子，这比仅仅依靠风来传递要高效得多。还有一个互利共生的例子是生长在美国中南部的牛角金合欢树。这种树为一种伪蚁属的蚂蚁提供了栖居地。这些蚂蚁住在大的中空荆棘丛中，汲取金合欢树分泌出来的糖分。它们还吃树叶末端的黄色组织：这个部分富含蛋白质。但是除了吸引蚂蚁，这些蛋白质似乎对树本身没有任何功能。而这些蚂蚁们则可以帮助它们的寄主攻击外界几乎所有的威胁。它们会叮咬昆虫和食草动物（只以植物为食的动物），甚至可以削减生长在树周围的其他植物。一旦蚂蚁被清除掉，这种树就难以存活，很可能是因为它们被食草动物损害而无力与周围的其他植物争夺阳光和生长空间。共生关系中物种间错综复杂的相互影响揭示了群落中很重要的一点，即结构的建立依赖于生物间千变万化的联系网络。

批注 [35]: at the tip of
在...的顶端、末端

批注 [36]: **virtually**
英 ['vɜ:rtʃuəli] 美 ['vɜ:rtʃuəli]
•adv. 事实上，几乎；实质上

批注 [37]: **interplay**
英 ['ɪntəpleɪ] 美 ['ɪntəpleɪ]
•n. 相互影响，相互作用
•vi. 相互影响，相互作用