TPO 32 – 1 Plant Colonization
植物入侵

Colonization is one way in which plants can change the ecology of a site. Colonization is a process with two components: invasion and survival. The rate at which a site is colonized by plants depends on both the rate at which individual organisms (seeds, spores, immature or mature individuals) arrive at the site and their success at becoming established and surviving. Success in colonization depends to a great extent on there being a site available for colonization-a safe site where disturbance by fire or by cutting down of trees has either removed competing species or reduced levels of competition and other negative interactions to a level at which the invading species can become established. For a given rate of invasion, colonization of a moist, fertile site is likely to be much more rapid than that of a dry, infertile site because of poor survival on the latter. A fertile, plowed field is rapidly invaded by a large variety of weeds, whereas a neighboring construction site from which the soil has been compacted or removed to expose a coarse, infertile parent material may remain **virtually** free of vegetation for many months or even years **despite** receiving the same input of seeds as the plowed field.

问题 1： 询问 a site 是如何影响它的 colonization 的通过（plant species）；
问题 2： 询问单词意思（**virtually**）；
问题 3： 询问 why 作者提到（construction site）&（plowed field）；
问题 4： 询问单词意思（**despite**）；

移居是植物改变某个地点生态环境的方式之一。 移居过程包括两个阶段：入侵和存活。 一个地点被植物移居的速度取决于个体生物（种子、孢子、不成熟或成熟的个体）到达该地点并成功存活下来的速度。 移居的成功很大程度上取决于有一个合适的移居地点——一个安全的地点，因为火或伐树造成的干扰移除了竞争物种，或者将竞争和其他消极作用降低到了入侵物种能够移居的水平。入侵的速度既定，移居潮湿的、富饶的地点比移居干燥的、贫瘠的地点要快得多，因为在后者上存活率很低。 一块富饶的、耕耘过的田地会很快地被一大批种子入侵，然而临近一个土壤被压实了或暴露在粗糙贫瘠的基质上的建筑工地，可能几个月甚至几年都寸草不生，尽管得到了和耕作田地一样的种子。

Both the rate of invasion and the rate of extinction vary greatly among different plant species. Pioneer species-those that occur only in the earliest stages of colonization-tend to have high rates of invasion because they produce very large numbers of reproductive propagules (seeds, spores, and so on) and because they have an efficient means of dispersal (normally, wind).

问题 5： 等价替换语句（Sentences = which of the CHOICES）

不同植物种类的入侵速度和灭绝速度都有很大不同。 先锋物种——那些只出现在移居最早期阶段的物种——倾向于拥有高的入侵速度，因为它们能够产生大量的繁殖体（种子、孢子等），而且有高效的传播方式（通常是风）。

If colonizers produce short-lived reproductive propagules, then they must produce very large numbers unless they have an efficient means of dispersal to suitable new habitats. Many

plants depend on wind for dispersal and produce abundant quantities of small, relatively short-lived seeds to compensate for the fact that wind is not always a reliable means of reaching the appropriate type of habitat. Alternative strategies have evolved in some plants, such as those that produce fewer but larger seeds that are dispersed to suitable sites by birds or small mammals or those that produce long-lived seeds. Many forest plants seem to exhibit the latter adaptation, and **viable** seeds of pioneer species can be found in large numbers on some forest floors. For example, as many as 1,125 viable seeds per square meter were found in a 100-year-old Douglas fir/western hemlock forest in coastal British Columbia. Nearly all the seeds that had germinated from this seed bank were from pioneer species. The rapid colonization of such sites after disturbance is undoubtedly in part a reflection of the large seed bank on the forest floor.

问题 6：询问原因（larger seeds by birds or small mammals 而不是 by wind）；
问题 7：询问（the latter adaptation）指的是；
问题 8：询问单词意思（**viable**）；
问题 9：询问例子（100-year-old Douglas fir/western hemlock forest）是为了证明 which idea；
如果移居植物产生的是寿命短的繁殖体，它们必须大量生产，除非它们有一个有效的传播方式到达新的适宜的栖息地。 许多植物依靠风来传播种子；它们产生大量小的、相对短命的种子，以弥补一个事实：风不总是可靠的到达适当栖息地的方式。有些植物则进化出了另外的策略，例如有些植物产生数量较少却较大的种子，这些种子依靠鸟类或小型哺乳动物来被传播合适的地点，又如有些植物产生寿命长的种子。 许多森林植物似乎都展示了后一种适应性，在森林的地面上能发现大量先锋物种有繁殖力的种子。 例如，在英国哥伦比亚海岸有 100 年历史的道格拉斯冷杉/西部铁杉森林里，每平方米能找到 1125 粒有繁殖力的种子。 这个种子库里的几乎所有发芽的种子都是先锋物种留下的。 这些地点在扰乱后被快速移居，毫无疑问在一定程度上反映了林地里大量种子库的存在。

An adaptation that is well developed in colonizing species is a high degree of variation in germination (the beginning of a seed`s growth). Seeds of a given species exhibit a wide range of germination dates, increasing the probability that at least some of the seeds will germinate during a period of favorable environmental conditions. This is particularly important for species that colonize an environment where there is no existing vegetation to ameliorate climatic extremes and in which there may be great climatic diversity.

问题 10：询问 plants how manage to germinate 在这些区域（climatic diversity）的；
在定居物种中得到很好发展的一种适应机制是萌芽期（即种子生长的开始）的很大差别。 某个物种的种子在萌芽时间上会表现出较大的范围，以此来增加至少有一些种子可以在最适宜的条件下萌发的可能性。 这一点对于在没有现存的植被改善极端气候以及气候非常多变的环境中定居的物种尤其重要。

Species succession in plant communities, i.e., the temporal sequence of appearance and disappearance of species, is dependent on events occurring at different stages in the life history of a species. 【】Variation in rates of invasion and growth plays an important role in determining patterns of succession, especially secondary succession. 【】The species that are first to colonize a site are those that produce **abundant** seed that is distributed

successfully to new sites. 【】Such species generally grow rapidly and quickly dominate new sites, excluding other species with lower invasion and growth rates The first community that occupies a disturbed area therefore may be composed of species with the highest rate of invasion, whereas the community of the subsequent stage may consist of plants with similar survival rates but lower invasion rates.【】

问题 11：询问单词意思（**abundant**）；

问题 12：询问哪一个 determine the sequence（plants colonize a site）；

植物群落中的物种演替，即物种出现和消失的时间顺序，取决于在某一物种生活史不同阶段所发生的事件。 入侵和生长速度的不同在决定演替模式中发挥了重要作用，特别是在次生演替中。 在一个地点初次移居的物种是那些产生大量种子并成功传播的物种。 这些物种一般长得快，并很快控制新的领地，阻止其他入侵和生长速度低的物种的进入。 因此，第一个占领受干扰地区的群落可能包含入侵速度最快的物种，然而下一个阶段的群落可能包含具有相似存活率但较低入侵速度的物种。

TPO 32 – 2 Siam, 1851-1910
暹罗, 1851-1910

In the late nineteenth century, political and social changes were occurring rapidly in Siam (now Thailand). The old ruling families were being displaced by an evolving centralized government. These families were pensioned off (given a sum of money to live on) or simply had their revenues taken away or restricted; their sons were enticed away to schools for district officers, later to be posted in some faraway province; and the old patron-client relations that had bound together local societies simply disintegrated. Local rulers could no longer protect their relatives and attendants in legal cases, and with the ending in 1905 of the practice of forcing peasant farmers to work part-time for local rulers, the rulers no longer had a regular base for relations with rural populations. The old local ruling families, then, were **severed** from their traditional social context.

问题 1：询问单词意思（**severed**）；

问题 2：询问（situation）about（old ruling families）changed in 哪一个 ways；【Except】

十九世纪晚期，暹罗（现在的泰国）发生了政治和社会剧变。 旧的统治家族被逐渐演变的中央政府所取代。 这些家族被发抚恤金（给一笔钱维持生活），或简单地被剥夺或限制税收；他们的儿子被怂恿去上培养地方官员的学校，后来被派遣到一些偏远的省份；将旧式的地方社会结合在一起的保护人-委托人关系分崩离析。 地方统治者在法律案件中不能再保护他们的亲属和随从，并且随着强迫贫穷农民为地方统治者做兼职的行为在 1905 年被废除，地方统治者与农村人口不再有稳定的关系基础。 于是旧式地方统治家族与他们传统的社会环境切断了联系。

The same situation viewed from the perspective of the rural population is even more complex. According to the government's first census of the rural population, taken in 1905, there were about thirty thousand villages in Siam. This was probably a large increase over the figure even two or three decades earlier, during the late 1800s. It is difficult to imagine it now, but Siam's Central Plain in the late 1800s was nowhere near as densely settled as it is today. There were still forests closely surrounding Bangkok into the last half of the nineteenth century, and even at century's end there were wild elephants and tigers roaming the countryside only twenty or thirty miles away.

问题 3：询问哪一个陈述是 true of Siam in 1905；

同样的情况从农村人口的角度看要更加复杂。 根据政府 1905 年对农村人口的做的第一次普查，暹罗大约有 30,000 个村庄。 这个数字比二三十年前，1800 年代后期的数字有了一个大的增长。尽管现在很难想象，但暹罗中央平原在 1800 年代后期的定居人口远不及现在密集。直到十九世纪末期曼谷周边仍然有森林环绕，野生大象和老虎漫步在二三十公里外的乡村。

Much population movement involved the opening up of new lands for rice cultivation. Two things made this possible and encouraged it to happen. First, the opening of the kingdom to the full force of international trade by the Bowring Treaty (1855) rapidly encouraged economic specialization in the growing of rice, mainly to feed the **rice-deficient portions** of Asia (India and China in particular). The average annual volume of rice exported from Siam grew from under 60 million kilograms per year in the late 1850s to more than 660 million kilograms per

year at the turn of the century; and over the same period the average price per kilogram doubled. During the same period, the area planted in rice increased from about 230,000 acres to more than 350,000 acres. This growth was achieved as the result of the collective decisions of thousands of peasant families to expand the amount of land they cultivated, clear and plant new land, or adopt more intensive methods of agriculture.

问题 3： 询问短语（**rice-deficient portions**）指的什么意思；

问题 4： 询问经济 growth 的 signs 除了（？）；【Except】

问题 5： 询问 farming families increase the amount of rice part by（？）；

大多数人口迁移都涉及开垦新的土地用于种植水稻。 两个因素使之成为可能并促进了它的发展。首先，通过博林条约，王国的国际贸易全面开放，迅速促进了水稻种植业经济的专门化，主要供给水稻供给不足的亚洲国家（尤其是印度和中国）。 暹罗水稻平均年出口量在十九世纪 50 年代末不足 6 千万千克/年，到世纪之交已经增长到 6.6 多亿千克/年，与此同时每千克水稻的平均价格翻倍了。 同一时期，水稻种植面积从 230,000 英亩增长到超过 350，000 英亩。这个增长是成千上万的农民家庭集体决定扩张耕种土地数量，开垦种植新的土地，或是采用更高效耕作方式的结果。

【】They were able to do so because of our second consideration. 【】They were relatively freer than they had been half a century earlier. 【】Over the course of the Fifth Reign (1868–1910), the ties that bound rural people to the aristocracy and local ruling elites were greatly reduced. Peasants now paid a tax on individuals instead of being required to render labor service to the government. 【】Under these conditions, it made good sense to thousands of peasant families to in effect work full-time at what they had been able to do only part-time previously because of the requirement to work for the government: grow rice for the marketplace.

问题 6： 询问发生了什么?（instead of being required to render labor service）

问题 7： 询问哪一个最好的描述了 p3 和 p4 的关系；

问题 12： 插入语的位置➔【】;

农民们能够这样做还有第二个原因。 他们比半个世纪以前相对更自由了。 在第五朝代（1868-1910）统治时期，贵族及地方统治势力对农民的束缚减轻了。 农民现在可以以个人身份缴税，而不必为政府服劳役。 在这种情况下，广大农民家庭可以全职地从事农业生产，种植水稻去卖，而不像以前那样因为要服劳役而只能兼职生产。

Numerous changes accompanied these developments. The rural population both **dispersed** and grew, and was probably less homogeneous and more mobile than it had been a generation earlier. The villages became more vulnerable to arbitrary treatment by government bureaucrats as local elites now had less control over them. By the early twentieth century, as government modernization in a sense caught up with what had been happening in the countryside since the 1870s, the government bureaucracy intruded more and more into village life. Provincial police began to appear, along with district officers and cattle registration and land deeds and registration for **compulsory** military service. Village handicrafts diminished or died out completely as people bought imported consumer goods, like cloth and tools, instead of making them themselves. More economic variation took shape in rural

villages, as some grew prosperous from farming while others did not. As well as can be measured, rural standards of living improved in the Fifth Reign. But the statistical averages mean little when measured against the harsh realities of peasant life.

问题 8： 询问单词意思（**dispersed**）；

问题 9： 询问单词意思（**compulsory**）；

问题 10： 询问陈述 is true of Siam's rural people during the Fifth Reign；

问题 11： 询问 the government bureaucracy intruded in village life by （？）；

这些发展带来了很多改变。 农村人口在增长的同时更加分散，且与上一代相比同质性更低，而移动性更大。 村庄更容易受到政府官僚的专制对待，因为地方势力现在的控制力降低了。到 20 世纪初，因为政府的现代化在某种意义上已经赶上了自十九世纪七十年代以来在农村所发生的一切，政府官僚主义对乡村生活的影响越来越深入。 乡下警察开始出现，伴随出现的还有地方官员，牲畜登记和土地契约，兵役注册。 农村手工艺减少甚至完全消失了，因为人们购买进口的商品，像布匹和工具，而不用自己制作了。 更多的经济变化在农村形成，因为有些人通过种地变得富裕而有些人没有。 另一个可以测量的指标是，农村生活水平在在第五朝代期间提高了。 但与艰难的农民现实生活相比，统计学平均值说明不了什么。

TPO 32 – 3 Distributions of Tropical Bee Colonies
热带蜂群的分布

In 1977 ecologists Stephen Hubbell and Leslie Johnson recorded a dramatic example of how social interactions can produce and enforce regular spacing in a population. They studied competition and nest spacing in populations of stingless bees in tropical dry forests in Costa Rica. Though these bees do not sting, **rival** colonies of some species fight fiercely over potential nesting sites.

问题 1：询问单词意思（**rival**）；

1977 年，生态学家 Stephen Hubbell 和 Leslie Johnson 记录了一个有关社会交互作用如何能在种群中产生并维持空间分布规则的生动例子。 他们在 Costa Rica 的热带旱地森林中研究了无刺蜜蜂种群中的竞争关系和巢穴间距。 尽管这些蜜蜂不能叮刺，一些种类的敌对群体间会为了潜在筑巢位置激烈斗争。

Stingless bees are abundant in tropical and subtropical environments, where they gather nectar and pollen from a wide variety of flowers. They generally nest in trees and live in colonies made up of hundreds to thousands of workers. Hubbell and Johnson observed that some species of stingless bees are highly aggressive to members of their species from other colonies, while other species are not. Aggressive species usually forage in groups and feed mainly on flowers that occur in high-density clumps. Nonaggressive species feed singly or in small groups and on more widely distributed flowers.

问题 2：询问 species of stingless bees are highly aggressive to members（？）；

无刺蜜蜂在热带和亚热带环境中广泛存在，它们从各种各样的花上收集花蜜和花粉。 它们一般栖居在树上，群居生活，一个蜂巢由几百到几千工蜂组成。 Hubbell 和 Johnson 观察到，一些种类的无刺蜜蜂对于来自其他蜂巢的本种蜜蜂具体很强的攻击性，但其他种类的蜜蜂则不然。攻击性物种通常集体出动觅食，主要以密集的花丛为食。无攻击性的物种通常单独觅食，或以小团体形式觅食，它们主要以分散的花为食。

Hubbell and Johnson studied several species of stingless bees to determine whether there is a relationship between aggressiveness and patterns of colony distribution. They predicted that the colonies of aggressive species would show regular distributions, while those of nonaggressive species would show random or closely grouped (clumped) distributions. They concentrated their studies on a thirteen-hectare tract of tropical dry forest that contained numerous nests of nine species of stingless bees.

问题 3：询问（Hubbell and Johnson）hypothesize what?

Hubbell 和 Johnson 研究了几种无刺蜜蜂来确定攻击性和群体分布之间是否存在联系。 他们预测攻击性物种的群体将呈现规则分布，而无攻击性物种的群体将呈现随机分布或集群分布。他们把研究集中于热带旱地森林中一个 13 公顷的地带，这个地带中包含了 9 种无刺蜜蜂众多的巢穴。

Though Hubbell and Johnson were interested in how bee behavior might affect colony distributions, they recognized that the availability of potential nest sites for colonies could also

affect distributions.【】So as one of the first steps in their study, they mapped the distributions of trees suitable for nesting.【】They found that potential nest trees were distributed randomly through the study area.【】They also found that the number of potential nest sites was much greater than the number of bee colonies.【】What did these measurements show the researchers? The number of colonies in the study area was not limited by availability of suitable trees, and a clumped or regular distribution of colonies was not due to an underlying clumped or regular distribution of potential nest sites.

问题 4：询问为什么第一步研究（as one of the first steps in their study）是这个?

问题 5：等价替换语句（Sentences = which of the CHOICES）

问题 12：插入语的位置➔【】;

尽管 Hubbell 和 Johnson 对蜜蜂的行为怎样影响群体分布很感兴趣，他们意识到潜在筑巢位置的可获得性也会影响群体的分布。 因此在他们研究的第一步，他们绘制了适合筑巢的树的分布图。 他们发现潜在筑巢的树在研究区域内是随机分布的。 他们还发现潜在筑巢位置的数量比蜜蜂群体的数量要多得多。这些测量结果说明什么呢？ 研究区域的蜜蜂群体数量并不受可获得的适宜的树的限制，蜂群集群分布或规则分布不是由于潜在筑巢位置的集群分布或规则分布。

Hubbell and Johnson mapped the nests of five of the nine species of stingless bees accurately, and the nests of four of these species were distributed regularly. All four species with regular nest distributions were highly aggressive to bees from other colonies of their own species. The fifth species was not aggressive, and its nests were randomly distributed over the study area.

问题 6：询问（Hubbell and Johnson）determined?

问题 7：询问作者为什么表明（The fifth species wa…）;

Hubbell 和 Johnson 精确绘制了 9 种无刺蜜蜂中 5 种蜜蜂的巢穴，其中 4 种蜜蜂的巢穴是规则分布的。 这四种巢穴规则分布的物种都对来自其他群体的本物种蜜蜂具有高度攻击性。 第五个物种不具有攻击性，它们的巢穴在研究区域是随机分布的。

The researchers also studied the process by which the aggressive species establish new colonies. Their observations provide **insights into** the mechanisms that establish and maintain the regular nest distribution of these species. Aggressive species apparently mark prospective nest sites with pheromones, chemical substances secreted by some animals for communication with other members of their species. The pheromone secreted by these stingless bees attracts and aggregates members of their colony to the prospective nest site; however, it also attracts workers from other nests.

问题 8：询问 phrase 意思（**insights into**）;

问题 9：询问（mark prospective nest sites with pheromones）的一个结果;

研究者们也研究了攻击性物种建立新蜂巢的过程。 他们的观察洞悉了这些物种建立和维持巢穴规则分布的机制。 攻击性物种显然是利用信息素来标记可能的巢穴地点，信息素是一些动物分泌出来用于和同种类其他成员交换信息的化学物质。 这些无刺蜜蜂分泌的信息素吸引并召集同群的成员前往可能的筑巢地点，然而，信息素也会吸引其他群体的工蜂。

If workers from two different colonies arrive at the prospective nest at the same time, they may fight for possession. Fights may be **escalated** into protracted battles. The researchers observed battles over a nest tree that lasted for two weeks. Each dawn, fifteen to thirty workers from two competing colonies arrived at the contested nest site. The workers from the two colonies faced off in two swarms and displayed and fought with each other. In the displays, pairs of bees faced each other, slowly flew vertically to a height of about three meters, and then grappled each other to the ground. When the two bees hit the ground, they separated, faced off, and performed another aerial display. Bees did not appear to be injured in these fights, which were apparently ritualized. The two swarms abandoned the battle at about 8 or 9 A.M. each morning, only to reform and begin again the next day just after dawn. While this contest over an unoccupied nest site produced no obvious mortality, fights over occupied nests sometimes kill over 1,000 bees in a single battle.

问题 10：询问 phrase 意思（escalated）；

问题 11：询问 support 哪一个 idea 关于（fights over occupied nests）；

如果来自不同蜂巢的工蜂同时到达潜在的筑巢地点，它们会为了占有而打斗。 打斗会恶化为持久的战役。 研究者观测到因为一棵筑巢树持续两周的战役。 每天清晨，15 到 30 只来自敌对蜂巢的工蜂到达争议筑巢地点。 来自两个蜂巢的工蜂迎面飞成两群，相互示威打斗。 在示威中，一对蜜蜂相互面对，慢慢垂直飞到大约三米的高度，然后相互扭打到地面。 当两只蜜蜂撞到地面，它们分开，各自飞走，去执行另一轮空中示威。 在这些打斗中蜜蜂并没有表现出被伤害，这些打斗显然是仪式性的。 两群蜜蜂每天早上在 8 点或 9 点时放弃战斗，而第二天清晨又重新整队开始战斗。 尽管针对潜在筑巢点的竞争没有明显的致命性，对已有筑巢点的战斗有时在一场战斗中就能杀死 1000 只蜜蜂。