**Survival of Plants and Animals in Desert Conditions**

**沙漠环境中动植物的求生策略**

The harsh conditions in deserts are intolerable for most plants and animals. Despite these conditions, however, many varieties of plants and animals have adapted to deserts in a number of ways. Most plant tissues die if their water content falls too low: the nutrients that feed plants are transmitted by water; water is a raw material in the vital process of photosynthesis; and water regulates the temperature of a plant by its ability to absorb heat because water vapor lost to the atmosphere through the leaves helps to lower plant temperatures. Water controls the volume of plant matter produced. The distribution of plants within different areas of desert is also controlled by water. Some areas, because of their soil texture, topographical position, or distance from rivers or groundwater, have virtually no water available to plants, whereas others do.

沙漠中的严酷环境对于大部分动植物来说都是难以忍受的。然而，尽管如此，还是有多样的动植物通过各种方式最终适应了沙漠环境。如果水含量过低，大部分植物组织会死亡；植物所汲取的养分是通过水分来传输的；水分也是光合作用这个关键过程中的成分；同时，水分通过吸收热量来调节植物体的温度，因为水蒸气通过叶片蒸腾到空气中的过程可以帮助植物降低温度。水分控制着植物物质的产出量。沙漠中不同地区的植物的分布也受水分的控制。在有些地区，因为土质、地形位置或者与河流或地下水的距离等因素，几乎没有水分提供给植物，而其他一些地方则相反。

The nature of plant life in deserts is also highly dependent on the fact that they have to adapt to the prevailing aridity. There are two general classes of vegetation: long-lived perennials, which may be succulent (water-storing) and are often dwarfed and woody, and annuals or ephemerals, which have a short life cycle and may form a fairly dense stand immediately after rain.

沙漠中植物的特征很大程度上取决于它们对这种普遍干旱条件的适应程度。沙漠地区的植物大致可以分为两类：寿命较长的多年生植物，经常是比较矮小的木本植物，这类植物一般都是多肉植物（可以储水）；以及一年生或寿命更短的植物，这类植物生命周期短，可能在降雨后快速而密集地形成。

The ephemeral plants evade drought. Given a year of favorable precipitation, such plants will develop vigorously and produce large numbers of flowers and fruit. This replenishes the seed content of the desert soil. The seeds then lie dormant until the next wet year, when the desert blooms again.

那些寿命短的植物“躲避”干旱。在一个降雨比较充足的年份中，这类植物会迅速生长，并且会大量地开花结果。如此一来，这类植物的种子会遍布沙漠。这些种子会静静地休眠直到下一个雨量较充沛的年份，再次在沙漠中绽放。

The perennial vegetation adjusts to the aridity by means of various avoidance mechanisms. Most desert plants are probably best classified as xerophytes. They possess drought-resisting adaptations: loss of water through the leaves is reduced by means of dense hairs covering waxy leaf surfaces, by the closure of pores during the hottest times to reduce water loss, and by the rolling up or shedding of leaves at the beginning of the dry season. Some xerophytes, the succulents (including cacti), store water in their structures. Another way of countering drought is to have a limited amount of mass above ground and to have extensive root networks below ground. It is not unusual for the roots of some desert perennials to extend downward more than ten meters. Some plants are woody in type — an adaptation designed to prevent collapse of the plant tissue when water stress produces wilting. Another class of desert plant is the phreatophyte. These have adapted to the environment by the development of long taproots that penetrate downward until they approach the assured water supply provided by groundwater. Among these plants are the date palm, tamarisk, and mesquite. They commonly grow near stream channels, springs, or on the margins of lakes.

多年生植物会采用各种躲避机制以适应干旱。大部分的沙漠植物可能最好都被归类为旱生植物。这类植物进化出了抗旱适应机制：覆盖在蜡质叶子层表面的浓密的绒毛，在温度最高的时候闭合气孔，在干旱季初期卷起或脱落叶片都可以减少经过叶片的水分的流失。有些旱生植物在植物组织中贮存水分，如多肉植物（包括仙人掌）。另一种抵抗干旱的方法是抑制植物地上部分的生长，转而发展广泛的地下根系网络。有些多年生沙漠植物的根系可以向下延伸10米多深，这种情况（在沙漠中）并不少见。有些植物是木本植物，这种适应机制可以防止因水压（下降）产生萎蔫而引起的植物细胞解体。另一类沙漠植物类别则是地下水湿生植物。这类植物通过繁衍长的主根来适应环境，这些主根可以向下穿透直达地下水提供的充足水源。这类植物包括枣椰树、柽柳以及牧豆树属的一些灌木。这类植物通常情况下沿溪流，河道或者是湖泊边缘分布。

Animals also have to adapt to desert conditions, and they may do it through two forms of behavioral adaptation: they either escape or retreat. Escape involves such actions as aestivation, a condition of prolonged dormancy, or torpor, during which animals reduce their metabolic rate and body temperature during the hot season or during very dry spells.

动物也必须要适应沙漠环境，它们通过两种行为模式来适应沙漠：逃离或撤退。逃离包括一些类似于夏眠这样的行为，这一行为可以使得动物们在酷暑难耐或炎热季节依靠长期的休眠或蛰伏来降低它们的新陈代谢速率和体温。

Seasonal migration is another form of escape, especially for large mammals or birds. The term retreat is applied to the short-term escape behavior of desert animals, and it usually assumes the pattern of a daily rhythm. Birds shelter in nests, rock overhangs, trees, and dense shrubs to avoid the hottest hours of the day, while mammals like the kangaroo rat burrow underground.

季节性迁徙是逃离行为的另一种表现方式，特别是对于大型哺乳类动物和鸟类而言。撤退一词是用于形容短期的沙漠动物逃离行为的，而且这通常被认为是一种日常性的节律模式。鸟类在巢穴、岩石悬垂处、树丛以及茂密的灌木丛中寻找庇护以躲避一天当中最热的那几个钟头，而像更格卢鼠这样的哺乳动物则选择藏身于地下的洞穴中。

Some animals have behavioral, physiological, and morphological (structural) adaptations that enable them to withstand extreme conditions. For example, the ostrich has plumage that is so constructed that the feathers are long but not too dense. When conditions are hot, the ostrich erects them on its back, thus increasing the thickness of the barrier between solar radiation and the skin. The sparse distribution of the feathers, however, also allows considerable lateral air movement over the skin surface, thereby permitting further heat loss by convection. Furthermore, the birds orient themselves carefully with regard to the Sun and gently flap their wings to increase convection cooling.

有些动物还具有行为学、生理学以及形态学（结构）上的适应机制，以确保它们可以抵抗极端环境。例如，鸵鸟的羽毛具有这样的结构特征：毛很长但不太浓密。当气温变热时，鸵鸟便会竖起背上的羽毛，因此增加太阳辅射与娇嫩皮肤之间的屏障的厚度。然而，这些稀疏排列的羽毛同时也确保了皮肤表面横向空气流动的进行，因此通过对流达到散热的效果。此外，鸵鸟会根据太阳的位置谨慎调整自己的方向，轻轻拍打翅膀以增加对流的降温效果。