

TPO 20 – 1 Westward Migration 向西迁移

The story of the westward movement of population in the United States is, in the main, the story of the expansion of American agriculture of the development of new areas for the raising of livestock and the cultivation of wheat, corn, tobacco, and cotton. After 1815 improved transportation enabled more and more western farmers to escape a self-sufficient way of life and enter a national market economy. During periods when commodity prices were high, the rate of westward migration increased spectacularly. "Old America seemed to be breaking up and moving westward," observed an English visitor in 1817, during the first great wave of migration. Emigration to the West reached a peak in the 1830's. Whereas in 1810 only a seventh of the American people lived west of the Appalachian Mountains, by 1840 more than a third lived there.

美国西进运动的故事大体说来其实就是美国农业扩张的故事，也就是一场开辟用于饲养家畜以及种植小麦、玉米、烟草和棉花的新土地的运动。1815年之后，交通的改善使得越来越多的西部农民摆脱了自给自足的生活方式，进入了国家市场经济。在商品价格较高的那些年，西迁的比率飞速增长。一名英国游客于1817年评价道：“看来旧美国正在瓦解，并移向西部”，当时正值第一次迁移浪潮。西进运动在1830年达到了顶峰。1810年的时候，还仅有七分之一的美国人生活在阿巴拉契亚山的西侧，到1840年的时候这个数字超过了三分之一。

Why were these hundreds of thousands of settlers—most of them farmers, some of them artisans—drawn away from the cleared fields and established cities and villages of the East? Certain characteristics of American society help to explain this remarkable migration. The European ancestors of some Americans had for centuries lived rooted to the same village or piece of land until some religious, political, or economic crisis uprooted them and drove them across the Atlantic. Many of those who experienced this sharp break thereafter lacked the ties that had bound them and their ancestors to a single place. Moreover, European society was relatively stratified; occupation and social status were inherited. In American society, however, the class structure was less rigid; some people changed occupations easily and believed it was their duty to improve their social and economic position. As a result, many Americans were an inveterately restless, rootless, and ambitious people. Therefore, these social traits helped to produce the nomadic and daring settlers who kept pushing westward beyond the fringes of settlement. In addition, there were other immigrants who migrated west in search of new homes, material success, and better lives.

为什么这几十万的移民——大部分是农民，还有些是工匠——会离开东部开垦好的土地和建设好的城镇？美国社会的某些特征有助于解释这场声势浩大的移民。一些美国人的欧洲祖先几个世纪以来都扎根于同一个村庄或者同一片土地，直到宗教、政治或者经济危机才迫使他们离开故土，穿越大西洋。很多经历过这场巨变的人此后都失去了把他们祖先束缚在一个地方的纽带。而且，欧洲社会相对阶层化，职业和社会地位是世袭的。而在美国社会，等级结构没有这么严格，一部分人轻易就换了工作，并且他们相信提高社会和经济地位是他们的职责。这

批注 | 1: draw away from

- 抽离
- 超越

批注 | 2: thereafter

- 英 [ˌðeər'ɑ:ftə(r)] 美 [ˌðer'æftər]
- adv. 其后；从那时以后

批注 | 3: stratified

- 英 ['strætɪfaɪd] 美 ['strætɪfaɪd]
- adj. 分层的；形成阶层的；分为不同等级的
 - v. 使成层（stratify 的过去分词）

批注 | 4: inveterately

- adv. 积习地；根深蒂固地

批注 | 5: trait

- 英 [treɪt] 美 [treɪt]
- n. 特性，特点；品质；少许

批注 | 6: daring

- 英 [ˈdeərɪŋ] 美 [ˈderɪŋ]
- adj. 大胆的，勇敢的
 - n. 胆量，勇气
 - v. 敢（dare 的现在分词）

就导致很多美国人**骨子里**就是不安于现状、无根而且野心勃勃的人。因此这些社会特征有利于造就出那些会冲破居住地边缘向西行进的游荡的和**勇敢的**移民。此外，还有一些移民迁到西部是为了找寻新的家园，获得物质上的成功，过上更好的生活。

The West had plenty of attractions: the **alluvial** river bottoms, the **fecund** soils of the rolling forest lands, the black loams of the prairies **were tempting to** New England farmers working their rocky, sterile land and to southeastern farmers **plagued with** soil depletion and erosion. In 1820 under a new land law, a farm could be bought for \$100. The continued proliferation of banks **made it easier** for those without cash to **negotiate** loans in paper money. Western farmers borrowed with the confident expectation that the expanding economy would keep farm prices high, thus making it easy to repay loans when they **fell due**.

西部吸引人的地方很多：冲积河床、绵延起伏的林地的肥沃的土壤、大草原上的黑土，这些都吸引着在布满岩石又贫瘠的土地上劳作的新英格兰农民和**饱受**土壤损耗和流失困扰的东南部农民。根据 1820 年的一部新土地法，100 美元就可以买一个农场。银行的不断发展使得那些没有现金的人贷款变得更容易了。西部的农民在贷款的时候都满怀信心，他们预期经济的发展会使农场的价格节节攀升，因此**到期**时要偿还贷款就比较容易。

Transportation was **becoming less of a problem** for those who wished to move west and for those who had farm surpluses to send to market. **Prior to** 1815, western farmers who did not live on navigable waterways were connected to them only by dirt roads and mountain trails. Livestock could be driven across the mountains, but the **cost** of transporting bulky grains in this fashion **was several times greater than** their **value** in eastern markets. The first step toward an improvement of western transportation was the construction of turnpikes. These roads made possible a reduction in transportation costs and thus stimulated the commercialization of agriculture along their routes.

对于那些想要迁往西部的人以及手里有多余的农产品可以供给市场的人来讲，交通**也已经不成问题**。1815 年**前**，那些没有生活在通航的水路旁的西部农民只能从土路 and 山道去往市场。可以驱赶家畜翻越大山，但是以这种方式运输大批谷物的成本是这些谷物在东部市场上的价值的好几倍。改善西部交通的第一步就是修建收费高速公路。这些公路使得运输成本有降低的可能，并且因此刺激了沿途农业的商品化。

Two other developments **presaged** the end of the era of turnpikes and started a transportation revolution that resulted in increased regional specialization and the growth of a national market economy. First came the steamboat; **although** flatboats and keelboats **continued** to be important until the 1850's, steamboats eventually **superseded** all other craft in the carrying of passengers and freight. Steamboats were not only faster but also transported upriver freight for about one tenth of what it had previously cost on **hand-propelled** keelboats. Next came the Erie Canal, an enormous project in its day, spanning

批注 [7]: alluvial

英 [ə'lu:viəl] 美 [ə'lu:viəl]

•adj. 冲积的

批注 [8]: fecund

英 ['fi:kənd; 'fekənd] 美 ['fi:kənd; 'fekənd]

•adj. 肥沃的；多产的；丰饶的；生殖力旺盛的

批注 [9]: plague with

•用.....来烦扰人

•用.....来折磨人

批注 [10]: negotiate

英 [ni'gəʊʃieɪt] 美 [ni'gouʃieɪt]

•vt. 谈判，商议；转让；越过

•vi. 谈判，交涉

negotiate loans 协商贷款

批注 [11]: fall due

•到期

批注 [12]: presage

英 ['presɪdʒ] 美 ['presɪdʒ]

•v. 预示，预兆（尤指不祥之事）；预言，预感

•n. 预示，预兆；预感，预知

批注 [13]: supersede

英 [su:pə'si:d; ,sju:pə'si:d] 美 [su:pər'si:d]

•vt. 取代，代替；紧接着.....而到来

•vi. 推迟行动

批注 [14]: hand-propelled

•手推式

about 350 miles. After the canal went into operation, the cost per mile of transporting a ton of freight from Buffalo to New York City declined from nearly 20 cents to less than 1 cent. Eventually, the western states **diverted** much of their produce from the rivers to the Erie Canal, a shorter route to eastern markets.

还有两个发展预示着高速公路时代的到来,并引发了一场运输革命,使得生产日益地区专业化,国家市场经济持续增长。第一个是蒸汽船,虽然直到 1850 年平底船和龙骨船一直是相当重要的交通工具,蒸汽船最终取代了所有其它的船来运输乘客和货物。蒸汽船不仅快,而且向上游运输货物的成本约是先前用手划龙骨船的十分之一。第二个就是伊利运河,它在当时是一项庞大的工程,跨越了约 350 英里。运河投入运营后,从布法罗(“水牛城”)向纽约运输一吨货物的成本从每英里 20 美分下降到了不到 1 美分。最终,西部各州都将不少农产品从以往的自然河道转到了伊利运河这条通往东部市场的捷径上来。

批注 [15]: **divert**

英 [dar'vɜ:t] 美 [dar'vɜ:rt]

- vt. 转移; 使...欢娱; 使...转向
- vi. 转移

TPO 20 – 2 Early Settlements in Southwest Asia 西南亚的早期定居点

The universal global warming at the end of the Ice Age had dramatic effects on temperate regions of Asia, Europe, and North America. Ice sheets retreated and sea levels rose. The **climatic changes** in southwestern Asia were more subtle, in that **they involved** shifts in mountain snow lines, rainfall patterns, and vegetation cover. However, these same cycles of change had **momentous** impacts on the sparse human populations of the region. At the end of the Ice Age, no more than a few thousand foragers lived along the eastern Mediterranean coast, in the Jordan and Euphrates valleys. **Within 2,000 years**, the human population of the region numbered in the tens of thousands, all as a result of village life and farming. **Thanks to** new environmental and archaeological discoveries, we now know something about this remarkable change in local life.

冰河时代末期全球普遍升温，这对亚洲、欧洲和北美洲的温带地区产生了巨大的影响。冰原后退，海平面上升。亚洲西南部气候的变化则更加细微，因为涉及到山脉雪线、降水类型和植被覆盖的变化。然而，这些相同的变化周期对该地区稀少的人口产生了重要的影响。在冰河时代末期，地中海东部沿岸的约旦河和幼发拉底河流域仅生活着数千人。**随后的两千年内**，农村生活和农业使该地区的人口数量变成了数以万计人。**正是由于**在环境和考古学方面的新发现，我们才得以了解当地生活中发生的这种显著变化。

Pollen samples from freshwater lakes in Syria and elsewhere tell us forest cover expanded rapidly at the end of the Ice Age, for the southwestern Asian climate was still cooler and considerably wetter than today. Many areas were richer in animal and plant species than they are now, making them highly favorable for human occupation. About 9000 B.C., most human settlements lay in the area along the Mediterranean coast and in the Zagros Mountains of Iran and their foothills. Some local areas, *like the Jordan River valley, the middle Euphrates valley, and some Zagros valleys*, were more densely **populated** than elsewhere. Here more **sedentary** and more complex societies flourished. These people exploited the landscape intensively, foraging on hill slopes for wild cereal grasses and nuts, while hunting gazelle small, swiftly running desert animal and other **game** on grassy lowlands and in river valleys. Their settlements contain exotic objects such as seashells, stone bowls, and artifacts made of obsidian (volcanic glass), all traded from **afar**. This considerable volume of intercommunity exchange brought a degree of social complexity **in its wake**.

来自叙利亚和其他地方的淡水湖的**花粉样本**向我们揭示出在冰河时代末期森林覆盖迅速增长，这是因为当时亚洲西南部的气候比现在要更凉爽，而且要湿润得多。当时很多地区的动植物种类要比现在丰富，这就使得这些地区非常适宜人类居住。大约在公元前 9000 年，大部分人类定居点都位于地中海沿岸以及伊朗的扎格罗斯山脉和丘陵地带。某些局部地区，例如约旦河谷、幼发拉底河谷中部以及某些扎格罗斯谷地的人口就比别的地方要更密集。更加**稳定**、更为复杂的社会在这里兴旺发展起来。这些人对该地貌进行高强度的开发，他们在山坡上采集野

批注 [16]: **involve**

英 [ɪn'vɒlv] 美 [ɪn'vɑ:lʌ]

vt. 包含；牵涉；使陷于；潜心于

批注 [17]: **momentous**

英 [mə'mentəs] 美 [moʊ'men'təs]

•adj. 重要的；重大的

批注 [18]: **populated**

英 ['pɑ:pjuleɪtɪd] 美 ['pɑ:pjuler'tɪd]

•adj. 有人口居住的；（印刷集成电路板）安装有元件的；粒子数增加的

•v. 居住于……中；构成……的人口（populate 的过去式和过去分词）

populate

英 ['pɒpjuleɪt] 美 ['pɑ:pjuler'tɪ]

•vt. 居住于；构成人口；移民于；殖民于

批注 [19]: **sedentary**

英 ['sedntri] 美 ['sednteri]

•adj. 久坐的；坐惯的；定栖的；静坐的

批注 [20]: **game**

英 [geɪm] 美 [geɪm]

•n. 游戏；比赛；猎物，野味

•adj. 勇敢的

•vi. 赌博

批注 [21]: **afar**

英 [ə'fɑ:(r)] 美 [ə'fɑ:r]

•adv. 遥远地，在远处

生的谷物和坚果，在长满青草的低地和河谷中捕捉瞪羚及其他**猎物**。在他们的定居点发现了从远方交易获得的外来物品，例如贝壳、石碗和黑曜石（火山玻璃）制成的工艺品。这种数量可观的社会间的交换**随后**给社会带来了一定的复杂度。

批注 [22]: in its wake

- >在其初期
- >在其之后

Thanks to extremely **fine-grained** excavation and extensive use of **flotation** methods (through which seeds are recovered from soil samples), we know a great deal about the foraging practices of the inhabitants of Abu Hureyra in Syria's Euphrates valley. Abu Hureyra was founded about 9500 B.C. a small village settlement of **cramped** pit dwellings (houses dug partially in the soil) with reed roofs supported by wooden uprights. For the next 1,500 years, its inhabitants enjoyed a somewhat warmer and damper climate than today, living in a well-wooded **steppe** area where wild cereal grasses were abundant. They **subsisted off** spring migrations of Persian gazelles from the south. With such a favorable location, about 300 to 400 people lived in a sizable, **permanent** settlement. They were no longer a series of small bands but lived in a large community with more **elaborate** social organization, probably grouped into **clans** of people of common descent.

批注 [23]: cramped

英 [kræmpt] 美 [kræmpt]

- adj. 狭窄的；难懂的；难辨的
- v. 用夹钳夹；约束（cramp 的过去分词）

批注 [24]: steppe

英 [step] 美 [step]

- n. 大草原，[地理] 干草原（特指西伯利亚一带没有树木的大草原）

批注 [25]: subsist on

- 靠...生存

极精细的挖掘和**浮选法**（可以从土壤样本中发现种子）的广泛使用使得我们对叙利亚境内的幼发拉底河流域阿布胡赖拉的居民的觅食习惯有了深入的了解。阿布胡赖拉是建于公元前 9500 年的一座小村庄，村庄里都是狭小的洞穴房（房子的一部分是挖到地下的），芦苇做的屋顶是用木头柱子支撑的。随后的 1 500 年，该地的居民享受着比我们现在略为温暖潮湿的气候，他们居住在树木繁茂的大草原，那里生长着大量的野生谷类植物。他们喂养着从南部地区迁移过来的波斯瞪羚的后代。在这个地理位置绝佳的地方，大约有 300~ 400 人居住在一个比较大的**永久**定居点。他们不再是一系列的小型部落而是住在一起的大社区，拥有更**复杂的**社会组织，很有可能是按照共同祖先划分为不同的**部族**。

The flotation samples from the excavations allowed botanists to study shifts in plant-collecting habits **as if** they were looking through a telescope at a changing landscape. Hundreds of tiny plant remains show how the inhabitants exploited nut harvests in nearby pistachio and oak forests. However, as the climate dried up, the forests retreated from the **vicinity** of the settlement. The inhabitants turned to wild cereal grasses instead, collecting them by the thousands, while the percentage of nuts in the diet fell. By 8200 B.C., drought conditions were **so** severe **that** the people abandoned their long-established settlement, perhaps dispersing into smaller camps.

从挖掘物中获取的浮选样本使得植物学家可以研究他们采集植物习性的变化，**就像**是通过望远镜观看变化的景致。几百个小型植物残留物显示了这些居民是如何采集附近森林里的开心果和橡子的。然而，随着气候变干燥，森林从定居点的**附近**向后退缩。居民就转而采集大量的野生谷物，而坚果在饮食中所占的比例下降了。到公元前 8200 年的时候，干旱变得非常严重以至于人们放弃了他们的长久居住地，也许分散成小的群落了。

Five centuries later, about 7700 B.C., a new village rose on the **mound**. At first the inhabitants still hunted gazelle **intensively**. Then, about 7000 B.C., **within the space of a few generations**, they switched abruptly to herding domesticated goats and sheep and to growing einkorn, pulses, and other cereal grasses. Abu Hureyra grew rapidly until it covered nearly 30 acres. It was a **close-knit** community of rectangular, one-story mud-brick houses, joined by narrow lanes and courtyards, finally abandoned about 5000 B.C.. Many complex factors led to the **adoption** of the new economies, not only at Abu Hureyra, but at many other locations such as `Ain Ghazal, also in Syria, where goat toe bones showing the **telltale** marks of abrasion caused by foot **tethering** (binding) **testify to** early herding of domestic stock.

五个世纪以后，大约是公元前 7700 年，**高地**上出现了一个新的村庄，最初那里的居民仍然集中于猎取瞪羚。后来大约在公元前 7000 年，没过几代，这些居民就忽然转向饲养家养的山羊和绵羊，并种植单粒小麦、豆类及其它谷类植物。阿布胡赖拉迅速壮大，最终扩张到了近 30 英亩。它是一座**结构紧凑**的矩形村庄，单层的泥砖房屋与狭窄的小道和院子相连，这座村庄最终于公元前 5000 年被废弃。有很多复杂的因素导致人们**采用**新的经济形式，这不只是发生在阿布胡赖拉，在其它很多地方例如在艾因加扎勒和叙利亚发现的山羊的趾骨上就有显示足部被**栓**（绑）造成的磨损的**迹象**，这就**证明**该地出现了早期的畜牧业。

批注 [26]: intensively

英 [ɪn'tensɪvli] 美 [ɪn'tensɪvli]

•adv. 强烈地；集中地

批注 [27]: within the space of a few generations

在几代人的时间内

批注 [28]: close-knit

英 [ˌkləʊs 'ni:t] 美 [ˌkləʊs 'ni:t]

•adj. 紧密的；严谨的；紧密结合着的

批注 [29]: telltale

英 ['telteɪl] 美 ['telteɪl]

•adj. 报警的；泄密的；搬弄是非的

•n. 迹象；指示器；搬弄是非者

批注 [30]: tethering

英 ['teðərɪŋ]

•n. 系留放牧

•v. 练栓；拘束（tether 的 ing 形式）

tether

英 ['teðə(r)] 美 ['teðər]

•n. 系链；拴绳

•v. （用绳或链）拴住

TPO 20 – 3 Fossil Preservation 化石的保存

When one considers **the many ways** by which organisms are completely destroyed after death, it is **remarkable** that fossils are **as common as** they are. Attack by scavengers and bacteria, chemical decay, and destruction by erosion and other geologic **agencies** make the **odds** against preservation very high. However, the **chances of escaping complete destruction are vastly improved** if the organism happens to have a mineralized skeleton and dies in a place where it can be quickly buried by sediment. Both of these conditions are often found on the ocean floors, where shelled invertebrates (organisms without spines) flourish and are covered by the continuous rain of sedimentary particles. Although most fossils are found in marine sedimentary rocks, they also are found in terrestrial deposits left by streams and lakes. **On occasion**, animals and plants have been preserved after becoming **immersed** in **tar** or **quicksand**, trapped in ice or lava flows, or **engulfed** by rapid falls of volcanic ash.

如果想想生物在死之后被完全摧毁的种种方式，能够这样频繁出现化石是一件很令人惊讶的事。食腐动物和细菌的破坏、化学性腐烂、腐蚀以及其它地质**因素**都会非常不利于保存。不过，如果生物体碰巧具有矿化的骨骼并且死于可以迅速被沉积物掩埋的地方，摆脱被完全摧毁的几率便会大大增加。海底通常就具有上述的两方面条件，这里生活着很多带壳的无脊椎动物（没有脊椎的动物），不断累积的似雨的沉积颗粒会把它们掩埋起来。虽然多数的化石是在海洋沉积岩中发现的，但是在溪流和湖泊留下的陆地沉积物中也发现过。**有时**，浸入**焦油**和**流沙**、陷入冰或熔岩流或被急速降落的火山灰吞噬的动植物得以保存下来。

The term "fossil" often implies petrification, **literally** a transformation into stone. After the death of an organism, the soft tissue is ordinarily consumed by scavengers and bacteria. The empty shell of a snail or clam may be left behind, and if it is sufficiently durable and resistant to dissolution, it may remain basically unchanged for a long period of time. Indeed, unaltered shells of marine invertebrates are known from deposits over 100 million years old. In many marine creatures, however, the skeleton is composed of a mineral variety of calcium carbonate called aragonite. **Although** aragonite has the same composition as the more familiar mineral known as calcite, it has a different crystal form, is relatively unstable, and in time changes to the more stable calcite.

术语“化石”常常意味着石化，**字面意思**就是变成了石头。生物体死后，软组织一般会被食腐动物和细菌吃掉。可能会留下蜗牛或蛤蜊空壳，如果空壳足够坚固并且能抵御分解，就有可能在很长时间内基本上保持原样。事实上，我们现在所知的在沉积物中发现的海洋无脊椎动物保存良好的壳已超过了1亿年之久。不过，很多海洋生物的骨骼是由称为霏石的各式碳酸钙矿物质组成的。**虽然**霏石与我们更为熟悉的矿物方解石具有同样的组成，但是它的晶型不同，相对不稳定，最终会变成更稳定的方解石。

Many other processes may alter the shell of a clam or snail and enhance its chances for preservation. Water **containing dissolved silica, calcium carbonate, or iron** may **circulate**

批注 [31]: **remarkable**

英 [rɪ'mɑ:kəbl̩] 美 [rɪ'mɑ:rəkəbl̩]

•adj. 卓越的；非凡的；值得注意的

批注 [32]: as ... as 结构，有比较的涵义。

这一整句的准确理解很重要。

批注 [33]: **odds**

英 [ɒdʒ] 美 [ɑ:dʒ]

•n. 几率；胜算；不平等；差别

批注 [34]: **immerse**

英 [ɪ'mɜ:s] 美 [ɪ'mɜ:rs]

•vt. 沉浸；使陷入

批注 [35]: **engulf**

英 [ɪn'gʌlf] 美 [ɪn'gʌlf]

•vt. 吞没；吞食，狼吞虎咽

批注 [36]: **circulate**

英 ['sɜ:kjələɪt] 美 ['sɜ:rkjələɪt]

•vi. 传播，流传；循环；流通

•vt. 使循环；使流通；使传播

through the enclosing sediment and be deposited in **cavities such as marrow cavities and canals in bone** once occupied by blood vessels and nerves. In such cases, the original composition of the bone or shell remains, but the fossil is made harder and more durable. This addition of **a chemically precipitated substance** into pore spaces is termed "permineralization."

很多其他过程也许会改变哈喇壳或蜗牛壳并且增加它被保存下来的几率。含有溶解的二氧化硅、碳酸钙或铁的水可能会在封闭的沉积物中流动，并沉积到诸如骨髓腔和骨头管道内，这些骨头管道曾经由血管和神经占据。这种情况下，骨和壳的原始组成没有改变，但是形成的化石更坚硬并且更持久。这种在孔隙中填充**化学沉积物**的过程就叫做“完全矿化”。

Petrifaction may also **involve a simultaneous exchange of the original substance of a dead plant or animal with mineral matter of a different composition**. This process is termed "replacement" because **solutions** have dissolved the original material and replaced it with an equal volume of the new substance. Replacement can be a marvelously precise process, so that **details of shell ornamentation, tree rings in wood, and delicate structures in bone** are accurately preserved.

石化还可能同时涉及死亡的动植物的原有物质与不同组成的矿物质的交换作用。该过程叫做“置换作用”，因为**溶液**溶解了原始物质并将其置换成为等体积的新物质。置换是一个让人难以置信的精确过程，贝壳装饰的细节、树木的年轮以及骨骼的精细结构都被精准地保存下来。

Another type of fossilization, known as carbonization, occurs when soft tissues are preserved as **thin films of carbon**. Leaves and tissue of soft-bodied organisms such as jellyfish or worms may accumulate, become buried and compressed, and lose their **volatile constituents**. The carbon often remains behind as a **blackened silhouette**.

另一种类型的石化，称为“碳化”，当软组织以**碳薄膜的形式**保存时会发生碳化。树叶和软体动物例如水母或蠕虫的组织可能会堆积起来，被掩埋并被压实，然后其中的**挥发性成分**会消失。碳通常以一种黑色轮廓的形式被保留下来。

Although it is certainly true that the possession of hard parts enhances the prospect of preservation, organisms having soft tissues and organs are also occasionally preserved. Insects and even small invertebrates have been found preserved in the hardened resins of conifers and certain other trees. X-ray examination of thin **slabs** of rock sometimes reveals the **ghostly** outlines of tentacles, digestive tracts, and visual organs of a variety of marine creatures. Soft parts, including skin, hair, and **viscera** of ice age mammoths, have been preserved in frozen soil or in the **oozing tar** of oil seeps.

虽然拥有坚硬的部分的确会增加保存的可能性，但是具有软组织和器官的生物偶尔也会被保存下来。在针叶树以及某些其它的树种的凝固树脂中就发现了昆虫甚至是很小的无脊椎动物。

批注 [37]: thin films

[θɪn fɪlmz]

•薄膜

film

英 [fɪlm] 美 [fɪlm]

n. 电影；**薄膜**；胶卷；轻烟

•vt. 在...上覆以薄膜；把...拍成电影

•vi. 摄制电影；生薄膜；变得朦胧

批注 [38]: blackened

英 美 ['blækənd]

•adj. 变黑的；被抹黑的，被诋毁的；烧焦的，煮糊的

•vt. 使变黑；诋毁；烧焦，煮糊；（化妆时）把（脸或头发）染黑；（天空）变暗，阴沉下来（blacken 的过去式和过去分词）

批注 [39]: silhouette

英 [ˌsɪlu'et] 美 [ˌsɪlu'et]

•n. **轮廓**，剪影

•vt. 使...照出影子来；使...仅仅显出轮廓

批注 [40]: slab

•n. 厚板，平板；混凝土路面；厚片

•vt. 把...分成厚片；用石板铺

批注 [41]: ghostly

•adj. 幽灵的；可怕的；影子似的

批注 [42]: viscera

英 ['vɪsərə] 美 ['vɪsərə]

•n. 内脏；内容（viscus 的复数）

对岩石薄片的 X 射线检查有时会发现影子似的触角轮廓、消化道和很多种海洋生物的视觉器官。冻土或石油渗漏时渗出的焦油中保存了包括皮肤、毛发和冰河时代猛犸象的内脏在内的软组织。

The probability *that actual remains of soft tissue will be preserved* is improved if the organism dies in an environment of rapid deposition and oxygen deprivation. Under such conditions, the destructive effects of bacteria are diminished. The Middle Eocene Messel Shale (from about 48 million years ago) of Germany accumulated in such an environment. The **shale** was deposited in an oxygen-deficient lake where **lethal** gases sometimes bubbled up and killed animals. Their remains accumulated on the floor of the lake and were then covered by clay and silt. Among the **superbly preserved** Messel fossils are insects with **iridescent** exoskeletons (hard outer coverings), frogs with skin and blood vessels intact, and even entire small mammals with preserved fur and soft tissue.

如果生物体死于一个快速沉积和缺氧的环境，会有助于软组织残骸的保存。在这种条件下，细菌的破坏性影响会降低。德国始新世中期的麦塞尔页岩（来自 4800 万年前）就是在这种环境下积累起来的。该页岩在一个缺氧的湖泊里沉积，那里时有致命的气体冒出并杀死动物。动物的残骸在湖底聚集，然后被粘土和淤泥所覆盖。在保存完好的麦塞尔化石中有带闪亮外骨骼（硬质外部覆盖物）的昆虫，皮肤和血管完好无损的青蛙，甚至是毛皮和软组织都完整保存的小型哺乳动物。

批注 [43]: superbly

英 [su:'pɜːbli; sju:'pɜːbli]

美 [su:'pɜːrblɪ]

•adv. 雄伟地；壮丽地；上等地；庄重地

批注 [44]: iridescent

英 [ɪrɪ'desnt] 美 [ɪrɪ'desnt]

•adj. (因光线不同而) 色彩斑斓的

•adj. 彩虹色的

•adj. 荧光色的