

Britain before Man

地球科学专业英语教材

人类前的 不列颠

F.W. 邓宁等 编著
张浅深 编注

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写在前面

英国地质学家F.W.邓宁 (Dunning) 等编著的《人类前的不列颠》(Britain before Man)是一本面向大众的英语地球科学普及读物。这本小册子以浅近易懂的文字,简明而生动地介绍了不列颠(英国)的地质特征及自27亿年前一直到第四纪的地质发展历史。书的前面部分涉及到地质学的一些基本知识和原理,如板块、海底扩张、山脉形成、古地理重建、地壳构造的确定和地质年代划分等。本书虽是一本通俗读物,但在内容和观点上是比较新的,基本上反映了七十年代末世界地球科学,特别是英国地质研究所取得的成就和达到的水平。本书不仅可以帮助读者了解英国的地质特点和发展演化历史,而且也是一本学习地球科学专业英语的好材料。书中所用英语,文字流畅,语法结构严谨,词汇量适中。因此,本书十分适合我国综合大学地质系和地质院校的学生、青年教师和有一定英语基础的地质工作人员用来学习专业英语和提高阅读地质英语文献的能力。

1982年起,我为南京大学地球科学系高年级大学生、研究生和青年教师开设了地质专业英语精读课程。当时我选用《人类前的不列颠》这本书,加以注释,印成讲义,作为专业英语教学的基本教材。为了帮助我国学生学习专业英语,特别是提高专业英语的听说能力,原书作者之一R. H. 罗伯茨 (Roberts)先生在百忙之中应承朗读全文,录成了音带。罗伯茨先生长期在英国地质博物馆(伦敦)从事地质科普教育,擅长讲演,语音准确,吐字清晰。讲义(配合使用录音带和幻灯片)经多年的使用和实践,教学效果很好,深受学习者

的欢迎。在当前改革、开放的形势下，我国各高等院校地质系科都相继开设了专业英语课程，广大地质工作者学习专业英语的热情也愈来愈高涨。为了满足多方面对地球科学专业英语学习材料的需求，现将原讲义重新修订和整理，正式出版。为了便于我国读者的学习，给原书新编了目录，对书中一些在释义和语法上的疑难之处加以注释，个别地方作了删略。书末附有词汇表。原书共有精美彩色照片和插图122幅，本书未予收入。

由于个人的专业知识和语言水平有限，本书一定还存在不少缺点和错误，欢迎广大读者提出宝贵意见。

在本书正式付印之际，对南京大学教务处教材科、南京大学出版社和英国朋友罗伯茨先生的热情支持，表示衷心的感谢忱。南京大学大学外语部英语秘书专业学生张勤和化学系博士生苟少华两同志协助打字和校对，也一并表示感谢。

张浅深

1988年5月于南京大学地球科学系

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PREFACE

We live on a piece of the Earth's crust which has had an immensely long and eventful history, *at times shrouded in mystery*¹. Here we tell how it has travelled the globe and more than once lain at the bottom of the ocean; how it was buried to red-hot depths and sundered apart; and how it was frozen under ice sheets before emerging, with some help from our ancestors, as the unique landscape of Britain.²

1. 有时笼罩在神秘之中。 2. 整个句子是一个复合句, 其中三个 how (疑问副词)从句是主句谓语动词 tell 的宾语。with some help from our ancestors: 藉助于我们的祖先(这里指的是人类的地质作用)。

1 THE EARTH'S CRUST UNDER BRITAIN

The British Isles and the surrounding shallow seas are underlain by continental crust which is part of the Eurasian continental mass. Beyond to the north-west is the very different oceanic crust beneath the Atlantic Ocean. The continental crust under Britain is between 27 and 35 kilometres thick, as computed from the paths and speeds of earthquake waves set off by big explosions.* Since no drill hole has penetrated deeper than about 4500 metres, the composition of most of the crust can only be guessed at. It seems reasonable to assume that the deeper layers of the crust are very old and also that they should show signs of deep burial. Rocks of just this type, whose mineral constituents and crystalline textures show that they were once under high pressure and very hot, are found in the North-West Highlands of Scotland†

3. 这是根据大爆破所产生的地震波的传播路径和速度计算得出来的。这里 as 作关系代词，用来引导定语从句，对主句所作的陈述进行附加说明。 4. 苏格兰西北高地。

and in the islands of the Outer Hebrides⁵. They also underlie the Rockall Bank⁶, which is a detached part of the continent far out in the Atlantic. These crystalline rocks are known to be at least 2700 million years old, though probably not as old as the oldest rocks so far dated (from West Greenland, Rhodesia, Minnesota and Enderby Land in the Antarctic⁷) which are between 3500 and 4000 million years old (the age of the Earth is 4600 million years). It can be supposed that similar old rocks form a layer running under most if not all of the British Isles. Small patches of old crystalline rock come to the surface in the southeastern tip of Ireland and in central Anglesey⁸, but the next extensive outcrops after Scotland are in the Channel Islands and Brittany⁹. The thickness of the old crystalline layer must vary a lot; it is known from the surface structure that in some places, such as the Solway Firth¹⁰, younger rocks plunge deeply down while the depth to the base of the crust remains unchanged; in fact, some geologists think that the

-
5. 外赫布里底群岛(位于苏格兰以西, 在大西洋中)。 6. 罗科尔浅滩(在不列颠群岛以东的大西洋中, 从地质上说, 它原是欧洲大陆分离出去的一部分)。
 7. 西格陵兰、罗得西亚(非洲人称为津巴布韦)、明尼苏达(美国州名)及南极洲的恩德比地。这些都是地球上最古老岩石出露的地方。 8. 安格尔西岛(位于威尔士西北)。
 9. 除苏格兰外大片露头(指古老的结晶岩石)见于海峡群岛(位于英吉利海峡)和布列塔尼(在法国)。 10. 索尔韦湾(在英兰格与苏格兰之间)。

old crystalline layer may be *missing*¹¹ altogether under southern Scotland and central Ireland. Precisely how and when the first continental crust under Britain began to form is unknown. Probably it originated towards the end of the mysterious first 1000 million years of the Earth's history by repeated remelting of volcanic lava and ash. Subsequently, portions of newer, mainly sedimentary crust have been 'welded' onto the old crystalline layer. These in turn have been reworked by further compressions and heating and injected with molten rock from deep sources. Finally, undisturbed layers of sedimentary rock have been deposited over all these older components.

11. 缺失(现在分词作表语)。

2 PLATES, OCEANS AND MOUNTAINS

Most geologists accept that the outer solid Earth *is made up of*¹² separate plates which are continually growing by addition of fresh volcanic rock at the mid-ocean ridges in the process called sea-floor spreading. Moving slowly outwards from the ridges across the ocean floor, the plates eventually sink back into the Earth's interior along subduction zones beneath ocean trenches, generating earthquakes and chains of volcanoes. Many mountain ranges are composed of sedimentary rocks which were deposited both in deep water in association with volcanic rocks like those found in mid-ocean ridges and volcanic island chains, *and*¹³ in shallow-water on continental shelves. All these rock formations are strongly folded and overthrust. *This has led geologists to suppose that fold-mountain ranges originated when continental masses and volcanic*

12. 由……组成 (= is composed of). 13. 这里的 and 与前面的 both 搭配。

*island chains carried about on moving plates collided with each other after the oceanic crust separating them was totally consumed in subduction zones*¹⁴. These mechanisms are known as plate tectonics. *Despite*¹⁵ the popularity of plate tectonic solutions, *the classical 'ensialic' theory of mountain-building still finds some support*¹⁶. In this, thick piles of sedimentary and volcanic rock accumulate in transcontinental downwarps or 'geosynclines' supposedly located over descending currents in the Earth's interior. When the continental crust below the downwarps melts, the sediments are squeezed between the converging sides. Although this process is nowhere seen happening today, *it may have happened in the more remote past*¹⁷. Studies of rock magnetism have shown that continental masses on opposite sides of many younger fold-mountain belts have drifted together, but similar studies of older fold-belts in Canada and Africa have failed to detect any such movement.

14. 这是一句较复杂的复合句，以连词 *that* 引导的从句作主句中宾语补足语 *to suppose* 的宾语。这个宾语从句本身是一个复合句，含有一个以 *when* 引导的时间状语从句。后者的谓语是 *collided* (注意不是 *carried*)，而它又是一个复合句，含有一个以 *after* 引导的时间状语从句。 15. 尽管 (= *in spite of*)。

16. 经典的关于造山运动的“硅铝层”学说仍然获得某些支持。 17. 但是它(指这一过程)在更为遥远的过去也许发生过。在情态动词 *may* 后面用完成时态，表示对过去的推测。注意这里 *may* 指过去。

3 RECONSTRUCTING PAST ENVIRONMENTS

The reconstruction of ancient environments depends on a close knowledge of present-day environments such as deserts, river estuaries, deep-sea troughs, volcanic lava fields, coral reefs and ice-fields. *Features diagnostic of these environments*¹⁸ are sought in older hardened deposits of all ages. Because older rock formations are frequently deformed, weathered, eroded or otherwise altered, the full reconstruction of an environment in all its detail is a *complex piece of detective work*¹⁹. And occasionally rocks and structures are found which have no apparent analogues in the world today²⁰.

The rounded pebbles in conglomerates indicate former beaches and similar 'high-energy' environments where the energy of waves or currents was

18. 用以判断这些环境的特征。 19. 一件复杂的侦探性工作 20. 偶而还发现今天世界上没有明显对比物的岩石和构造。这里以 which 引导的定语从句修饰 rocks 和 structures。

capable of grinding together large stones²¹. Ripple-marks found on bedding planes of sandstone have usually formed in shallow water while²² patterns of connected infilled cracks in shale or siltstone beds betray their formation in sun-dried mudflats. Peculiar lobate and fluted shapes (sole marks) on the undersides of greywacke-mudstone layers indicate currents presumed to be similar to the deep-water 'turbidity currents' responsible for²³ breaking submarine telephone cables.

Characteristic flattened textures in certain volcanic formations show that they are ignimbrites formed by the welding together of red-hot particles from 'glowing cloud' eruptions²⁴; the welding can only occur on dry land. In contrast, pillow-lavas form only under water. Rounded sand grains in sandstones indicate deserts while the slope of dune-sandstone layers shows the direction of prevailing winds. Salt and gypsum layers result from strong evaporation in hot arid climates while glacial conditions are suggested by fossil²⁵ boulder clay or tillite.

21. 能将巨大的石头互相磨碾。(be) capable of 指物时作“能”、“可能”和“可能会(被)”解。 22. 这里的 while 及本节下面的另两个 while 都是并列连词, 用来表示“对照关系”, 作“而”和“另一方面”解。 23. responsible for: 对(发生的事)负责, 造成(某情况), 是……原因。这里指深水“浊流”造成水下电(话)缆的折断。 24. “炽热火山灰云”喷发。 25. 这里的 fossil 作“古”解。

4 BUILDING UP THE STRUCTURE

The bedrock of the British Isles is built up from rock formations laid down in a long succession of different environments²⁶. Each environment gave place to²⁷ its successor in consequence of²⁸ earth movements which also affected in some degree the deposition of sediment in different parts of that particular environment²⁹. Gentle uplift caused shallowing of the sea and emergence of the sea bed as dry land, so that marine sediments are overlain by terrestrial sediments resting on a surface of erosion. Gentle subsidence flooded former land surfaces so that shallow-water marine sediments rest on terrestrial sediments. Quite small uplifts or subsidences of a hundred metres or less changed the environment radically from, say, a river floodplain to a coral sea, and vice versa³⁰. But the rock formations produced

26. 不列颠群岛的基岩是由一大套在不同环境下形成的岩层所构成的。 27. give place to: 让位给。 28. 由于……缘故。 29. 以 which 引导的这一定语从句, 从形式上看是限制性的, 但在意义上却是非限制性的。 30. 比如说, 河流泛滥平原变为珊瑚海, 反之亦然。这里 say 用作插入语。

in these environments, however *different*³¹, lie more or less conformably one layer on top of another.

At intervals in British geological history, much more powerful, mainly horizontal forces have acted on the crust, *causing violent deformation of the rock layers, accompanied by heating and crystallisation of the rock on a regional scale, and followed by the injection of molten igneous rock into the folded layers*³². These great events, perhaps caused by collisions of continents borne along on plates³³, gave rise to³⁴ mountainous terrains in which the folded and overthrust rock formations were subjected to rapid erosion. Within the mountains, local rift valleys and lake basins accumulated terrestrial sediments. Sooner or later, the mountains themselves were reduced to a plain which, by gentle subsidence, disappeared under the sea. The younger terrestrial and marine sedimentary layers rest discordantly on the upturned, worn-down edges of the older

31. 不管如何不同(指沉积环境)。这是省略形式的让步状语从句, 后面省略了 **they are**。 32. 引起了岩层的强烈变形, 伴随而来的是区域性规模的岩石受热和结晶作用, 接着熔融的岩浆岩侵入到褶皱岩层中。这里 **causing violent deformation of the rock layers** 系分词短语作状语, 表示强烈的水平力作用于地壳所引起的结果; **accompanied by heating and crystallisation of the rock on a regional scale** 和 **followed by the injection of molten igneous rock into the folded layers** 这两个分词短语作定语, 用来修饰 **deformation**。 33: 一起着生在板块上的大陆的碰撞。这里 **borne** 是 **bear** 的过去分词, 作定语, 用来修饰 **continents**。 34. **give rise to**: 引起。