

The Nature and Science of **MUD**

泥浆的奥秘



Jane Burton and Kim Taylor 著 杨晓洪 译



外语教学与研究出版社

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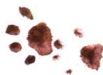
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What is Mud?

泥浆是什么？

Mud forms when soil is mixed with water. Soil is made up of grains of sand and dust that have been worn away from rocks. Soil also contains many little bits of dead plants and animals. This **organic** material in soil—called **humus**—is what makes it rich in food for plants and animals.

Soil can become mud when large animals trample in a rain pool. Sand grains, dust and humus from the soil become stirred into the water together. When the animals go away and the pool becomes still, the heavier sand grains sink to the bottom quickly. But the fine grains and humus may take several days to settle and form a layer of mud on top of the sand. The mud contains most of the humus that was in the soil and so it is rich in plant food, but the constant trampling stops any plants from growing around the pool.

当土壤和水混合在一起时，就形成了泥浆。土壤是由沙粒和岩石经磨损后形成的灰尘组成的，土壤中还有许多死亡植物和动物的细小颗粒。这种叫做腐殖土的有机物使得土壤含有可供动植物之需的丰富养料。

当大型的动物踩在雨水坑里时，能使土壤变成泥浆。土壤中的沙粒、灰尘和腐殖土就搅拌在水里。当动物走后，水坑便平静下来，比较重的沙粒很快就沉淀在坑底，但微小的颗粒和腐殖土要经过几天才能沉淀下来，在沙粒之上形成泥浆层。泥浆含有土壤中大部分的腐殖土，所以它含有促使植物生长的丰富养料，但是动物不停的践踏将使任何植物都不能在水坑周围生长。



When large animals like these Eland and Impala come down to drink, they trample soil at the edge of the pool, making mud. The Marabou Storks in the background have already had a drink; now they stand around, resting and preening.

当大型动物如这些大角斑羚和黑斑羚下来饮水时，它们在水坑周围踩来踩去，使泥土变为泥浆。不远处的秃鹫早已饮了水；它们正四处站着休息，用嘴整理羽毛。

Citrus Swallowtail and white butterflies sometimes gather in swarms on the mud at the edge of pools where large animals come to drink. The butterflies flutter down to sip liquid food from the rich mud.

橘黄色凤蝶和数种白蝶有时成群地聚集在大型动物饮水的水坑周围的泥浆上。蝴蝶们拍着翅膀飞下来啜饮肥沃的泥浆中的液体食物。





Mud by the Sea

海边的泥浆

Glasswort or Marsh

Samphire grows where few other plants can live—on estuary mud flats.

欧洲海蓬子生长在植物罕见的地方——河流入海口处的淤泥滩上。

A fast-flowing river is often loaded with soil that the rain has washed off the land. Further down river, the water flows less quickly and the sand it carries sinks to the bottom, forming sand banks. As a big river flows slowly into the sea, all that is left of the soil it carried is the fine **silt**. This gradually sinks to the bottom at the river **estuary** where the incoming tide stops the river flow twice each day, giving the silt time to settle to the bottom. Here, a thick layer of mud forms, sometimes building up into vast **mud flats**.

Estuary mud is especially rich and each square metre may contain many thousands of small creatures. Estuary mud is also good for plants. It is very **fertile** and special **maritime** plants start to grow in it. Their roots hold the mud together so that it cannot be washed away and, in time, it becomes land.

Mud flats not only provide food for birds but they are also a safe resting place for them. These Black-headed Gulls cannot be surprised by a fox because a land animal of that size would sink into the soft mud if it tried to walk on it.

淤泥滩不仅为鸟类提供食物，而且还是鸟类安全的栖息地。这些黑头鸥不会受到狐狸的惊扰，因为像狐狸那么大的陆地动物，如果试图在淤泥滩上行走的话，就会陷到柔软的泥浆里。





◀ The thick black mud of an estuary provides rich food for plants and animals. Here, Cord Grass is starting to grow in the mud, holding it together with its roots. Little Spire Shells are climbing up the grass out of the mud.

河口湾厚厚的黑色泥浆为动植物提供了丰富的食物。图中的绳草正开始在泥浆中生长，它用根须将泥浆拢在一起。带螺壳的腹足纲软体小动物正沿着伸出泥浆的绳草向上爬。

奔流的河水经常携带着雨水从大地上冲刷下来的泥土。河水流向下游时，其流速会减慢，它携带的沙子会沉淀下去，形成沙洲。当一条大河缓慢流入大海时，水里留下的只是泥土里颗粒微小的淤泥。这些淤泥逐渐在河口湾沉淀下来，因为在河口湾每天有两次潮汐阻止大河流动，这就给了淤泥沉淀的时间。在河流入海口，一层厚厚的泥浆形成了，有时还会形成广阔的淤泥滩。

河口湾的泥浆特别肥沃，每平方米的面积里包含有成千上万的微小生物。河口湾的泥浆也利于植物生长。它非常肥沃，一些特殊的海洋植物可以在泥浆里生长。它们的根部将泥浆聚拢在一起，这样，水就不会把泥浆冲走，久而久之，便形成了陆地。





Smelly Mud

发酵(有臭味)的泥浆

Mud is often black and smelly. It is black where plant material in it has rotted in the absence of **oxygen**. Only the top centimetre or two of mud contains oxygen—it is **aerobic**. Oxygen from air or water cannot reach the mud underneath and it becomes **anaerobic**. Anaerobic mud produces smelly gases including **rotten egg gas**. It also produces **methane**, sometimes called marsh gas. Natural gas, which comes from oil wells and is piped into houses for heating and cooking, is mostly methane and was probably formed in mud millions of years ago.

Only special kinds of animals can live in mud because there is so little oxygen in it. Mostly, animals have to come to the surface of the mud to breathe.

泥浆通常是黑色的，并泛着臭味。当泥浆中的植物体因为缺氧而腐烂时，泥浆就呈黑色。泥浆只在其表层的一二厘米中含氧——这部分叫做含氧层。空气和水中的氧气不能进到泥浆深处，因此泥浆深处就叫做缺氧层。缺氧层的泥浆产生有臭味的气体，其中包括硫化氢。它也产生有时叫做沼气的甲烷。从油井开采出来通过管道送到居所里被用于取暖做饭的天然气，大部分是甲烷，并且可能是几百万年前在泥浆中形成的。

只有特殊种类的动物可以在泥浆中生存，因为泥浆里几乎没有氧气。这些动物大部分都要钻到泥浆表面来呼吸。

Here is some really smelly mud left when a pond dried out. A Moorhen has walked across it and left its tracks. Pond snails have also left their tracks. The shiny area where the snails have been crawling is interesting because it shows faint colours caused by **bacteria**. It is the bacteria in mud that make the smelly gases. They are able to live without any oxygen at all.

图中是一个池塘干涸后留下的很臭的泥浆。母红松鸟横穿而过，并留下了它的足印；椎实螺也留下了印迹。蜗牛所爬过的闪亮的区域非常有趣，因为它展示了由细菌形成的暗淡的颜色。正是这些可以在无氧的泥浆环境中生长的细菌造成了有臭味的气体。

A worm cast of black mud shows where a lugworm is living in its burrow.

蚯蚓筑巢形成的黑泥表明了沙蝎居住的洞穴的位置。

These mud-living **midge larvae** are red because their blood contains **haemoglobin**, just like our blood. Blood with haemoglobin is much better at absorbing oxygen than is the clear blood of other insect larvae.

这些生长在泥浆中的蠓虫幼体是红色的，因为它们的血液中含有血红蛋白，就像人体的血液一样。它们含血红蛋白的血液比其他昆虫幼体的无色血液更利于吸收氧气。





Mud-loving Trees

喜欢在泥浆中生长的树

A male fiddler crab
scuttles sideways.

一只雄性招潮蟹飞快地向另一侧
横行。

Mangrove trees also have
other special roots that grow
out from their trunks and then
downwards, forming props to
help support the trees in the
soft mud.

美洲红树还有一些特别的根，这
些根从树干上生长出来后垂下，
支撑生长在柔软泥浆中的树体。

Soft, sticky mud seems an unlikely soil for trees to grow—especially mud that is covered twice a day by sea water. But forests of small trees called **mangroves** grow on tropical mud flats. Some mangroves grow right down to the **low water mark**, showing only their tops when the tide is in.

Mangrove trees produce hundreds of spiky **aerial roots** which grow 10-30 centimetres upwards from beneath the mud. Aerial roots have many **lenticels** on their surfaces. These are tiny **pores** through which the roots breathe. Down in the mud, there is no oxygen and so mangroves need plenty of lenticels.

Amazing tree-climbing fish called mudskippers live on the mud around mangrove trees. Some kinds of mudskippers grow to 15 centimetres or more and they hop about over the mud after the tide has gone down. They use their front fins like legs and haul themselves up the aerial roots of the mangroves.





像树这样高大的植物看来好像是不能在松软粘稠的——尤其是每天还要经两次海水覆盖的泥浆中生长的。但是矮小的美洲红树林却生长在热带淤泥滩。一些红树恰恰生长在低潮线处，在潮汐到来之时，只露出它们的顶部。

美洲红树有成百上千的又细又尖的气生根，这些根从泥浆里长出有10厘米到30厘米不等。气生根表面有许多皮孔，那些根通过这些细孔来呼吸。因为在泥浆底下没有氧气，所以美洲红树需要丰富的皮孔。

令人惊异的可以爬树的弹涂鱼就生活在美洲红树周围的泥浆上。某些种类的弹涂鱼种可以长到15厘米或更长，当退潮后，它们就在泥浆上四处蹦跳。它们用前鳍当腿来拖曳它们的身体，爬到美洲红树露在空气中的气生根上。

Mudskippers

climb out of the water onto mangrove roots and onto mud. They display to each other by raising the fins on their backs like flags.

弹涂鱼从水中爬到红树根和泥浆上。它们张开背部类似旗子的鳍来彼此展示。



When the tide goes out beneath the mangroves, armies of fiddler crabs tip-toe out of their mud burrows. The male has one enormous, brightly coloured claw for signalling and for fighting with other males. His other claw is quite small and is used by the crab for putting mud into his mouth. The mud contains many organic particles which are good crab food. Female fiddlers do not have a big claw. Instead, they have two small claws and so can feed twice as quickly as males.

When the crabs sense that the tide is coming in, they return to their burrows. Just before the water laps over them, each crab seals itself in its burrow by closing the entrance with a neat plug of mud. A pocket of air trapped inside the burrow keeps the crab alive until the tide goes out again.

当潮汐退到美洲红树下面时，大群的招潮蟹就从它们的泥窝里悄悄地钻出来。雄性的招潮蟹有一只巨大的色彩鲜艳的大钳子，这只钳子是用来发信号和与其他雄性招潮蟹争斗的。它的另一只钳子非常小，是用来往嘴里拨泥浆的。泥浆中有许多有机物微粒，这是招潮蟹很好的食物。雌性招潮蟹没有大钳子，它们只有两只小钳子。所以它们进食的速度是雄性的两倍。

当招潮蟹感觉到潮汐将至时，它们就钻回自己的泥浆窝里。在潮水拍打上它们之前，每只招潮蟹都用光滑的泥浆将蟹窝的入口塞住，把自己封在窝内。封在窝里的那点儿空气可以使招潮蟹活到潮汐退去。

The male fiddler crab waves his one huge claw in the air to warn other males away from his burrow. If they come too close, there may be a fight.

雄性招潮蟹在空中挥舞着它那巨大的钳子警告其他同类远离它的洞穴。如果有其他雄性招潮蟹靠得太近，将会发生一场角逐。



The female fiddler crab has two small claws which she uses for scooping mud into her mouth.

雌性招潮蟹有两只小钳子，它用这两只钳子往嘴里捞泥。



A muddy mangrove swamp is home to hoards of fiddler crabs which dig their burrows amongst the roots of the mangroves and come out to feed on the mud when the tide is down. The heron in the distance is probably looking for crabs to eat.

泥泞的红树沼泽是招潮群体部落的栖息地。它们把洞穴挖在红树根系之中，并在退潮之后爬出洞来以泥为食。远处的鹭可能正在找蟹吃。



Foot-prints and Beak-marks

足迹和长喙印

This sort of shrimp is found in estuaries.
这是在河口湾处发现的虾。

The organic material in mud provides food for shrimps, worms, snails and other animals which burrow in it. Vast numbers of birds often gather on mud flats to feast on these small creatures. Ducks have beaks that are specially good for dabbling on the surface of wet mud and finding all the small creatures that live there.

Many kinds of **waders** also feed on mud flats. There is a wader with the right length of beak to reach nearly every mud-dweller—from tiny

泥浆中的有机物为在泥浆中筑巢的虾、蚯蚓、蜗牛等动物提供食物。大量的鸟类会经常聚集在淤泥滩上尽情饱餐这些小生物。鸭子的嘴特别擅长在泥浆的表层搜寻，并能找到所有生存在那里的小生物。

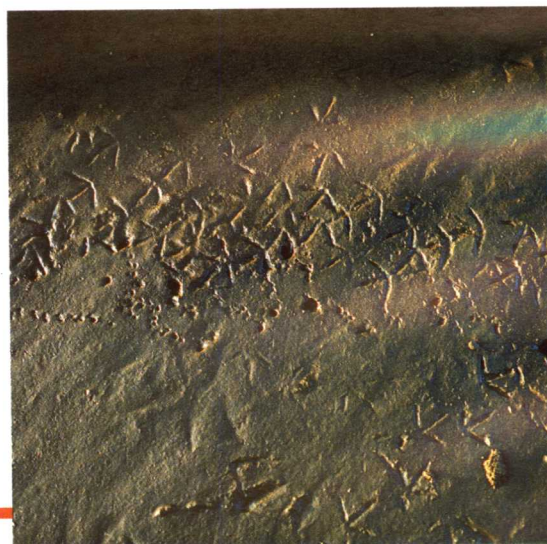
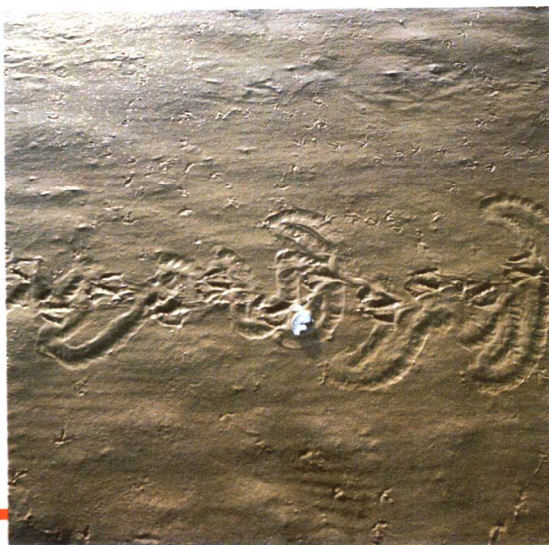
有很多种涉水鸟也在淤泥滩觅食。几乎所有的泥浆小生物都有被吃掉的可能。总会有某一种涉水鸟长有正好可以捕到它们的喙——从可以捕食泥浆表面

A Shelduck swings its head from side to side leaving a regular pattern of beak marks on each side of its webbed footprints.

一只雌麻鸭把头从一边摆到另一边，它的脚蹼印两边留下了规则的嘴印。

Small waders such as Dunlin jab their beaks into the mud leaving rows of little holes.

小型涉水鸟如鹤和鹭，将它们的喙猛戳进泥中，留下一排排小洞。





Bar-tailed Godwits are large waders with slightly up-turned beaks while Great Knots are half their size and have slightly down-curved beaks. They all have to wait at the water's edge until the tide goes down so that they can start feeding on the mud flats.

birds with short beaks that pick shrimps and snails off the surface to big birds with long beaks, straight or curved, that **probe** deep for worms and shellfish.

Birds feeding on mud flats leave a criss-cross pattern of three-toed footprints. There are round holes at intervals where their beaks have probed the mud. Ducks leave webbed footprints and a regular pattern of beak marks where they have dabbled. With practice, it is possible to tell what kind of bird has left which tracks.

斑尾塍鹬是一种大型的涉水鸟，它们有微微上翘的喙；而大节体型只有斑尾塍鹬一半那么大，它的喙微微下弯。它们都得等在水边直到退潮，才能在淤泥滩中觅食。

的虾和蜗牛的短喙的小鸟到可以捕食到泥浆深处的蚯蚓和贝类的拥有长长的直喙和弯喙的大鸟。

在淤泥滩觅食的鸟类在泥浆上留下了杂乱无章的三趾脚印。中间还夹杂着鸟喙探入泥浆所形成的圆洞。鸭子在觅食过的地方留下它们的脚蹼印和规则的嘴印。通过实践，人们有可能辨认出鸟类所留下的不同痕迹。

A Mink leaves well-spaced five-toed footprints.

在泥浆中也有其他动物留下的脚印。图为一只水貂在泥浆中留下的匀称的五趾脚印。

A dog leaves footprints with four toes spaced around a central pad.

一只狗留下的足印的形状是四趾围绕着中心脚掌。



