



Test 4

passage 1

The secret of staying young

保持年轻的秘密

Pheidole dentata, a native ant of the south-eastern U.S., isn't immortal. But scientists have found that it doesn't seem to show any signs of aging. Old worker ants can do everything just as well as the youngsters, and their brains appear just as sharp. 'We get a picture that these ants really don't decline,' says Ysabel Giraldo, who studied the ants for her doctoral thesis at Boston University.

Pheidole dentata 是美国东南部一种本地的蚂蚁，它们并不是永生不死的。但是科学家们发现这种蚂蚁并不会表现出任何衰老的迹象。年迈的工蚁可以像年幼一些的工蚁一样做任何事，并且它们的大脑同样敏锐。波士顿大学的 Ysabel Giraldo 将有关蚂蚁的研究作为博士学位论文的主题，她说，我们了解到这些蚂蚁的确不会衰老。

Such age-defying feats are rare in the animal kingdom. Naked mole rats can live for almost 30 years and stay fit for nearly their entire lives. They can still reproduce even when old, and they never get cancer. But the vast majority of animals deteriorate with age just like people do. Like the naked mole rat, ants are social creatures that usually live in highly organised colonies. 'It's this social complexity that makes *P. dentata* useful for studying aging in people,' says Giraldo, now at the California Institute of Technology. Humans are also highly social, a trait that has been connected to healthier aging. By contrast, most animal studies of aging use mice, worms or fruit flies, which all lead much more isolated lives.

这种抗衰老的能力在动物界中非常稀有。裸鼹鼠可以活 30 年左右并且在整个生命中保持健康。它们即使非常年迈依然可以繁衍后代，并且永远不会患癌症。但是大多数动物会像人一样，随着年龄的增长身体也会衰退。像裸鼹鼠一样，蚂蚁也是社会性的生物，生活在具有高度组织性的种群中。“正是这种社会复杂性使 *P. dentata* 对研究人类的衰老非常有用，”加



州理工学院的 Giraldo 说。人类同样是高度社会化的，这种特质与健康 and 衰老相关。相反地，多数有关衰老的动物研究使用老鼠、蠕虫或是果蝇，而它们都以更加独立的方式生存。

In the lab, *P. dentata* worker ants typically live for around 140 days. Giraldo focused on ants at four age ranges: 20 to 22 days, 45 to 47 days, 95 to 97 days and 120 to 122 days. Unlike all previous studies, which only estimated how old the ants were, her work tracked the ants from the time the pupae became adults, so she knew their exact ages. Then she put them through a range of tests.

在实验室中，*P. dentata* 工蚁一般可以存活大约 140 天。Giraldo 按照四种年龄范围观察它们：20 到 22 天、45 到 47 天、95 到 97 天和 120 到 122 天。不像之前的研究那样只预估了蚂蚁的年龄，她的研究追踪了蛹变为成虫的时间，因此她知道蚂蚁的确切年龄，之后将它们用于不同的研究中。

Giraldo watched how well the ants took care of the young of the colony, recording how often each ant attended to, carried and fed them. She compared how well 20-day-old and 95-day-old ants followed the telltale scent that the insects usually leave to mark a trail to food. She tested how ants responded to light and also measured how active they were by counting how often ants in a small dish walked across a line. And she experimented with how ants react to live prey: a tethered fruit fly. Giraldo expected the older ants to perform poorly in all these tasks. But the elderly insects were all good caretakers and trail-followers—the 95-day-old ants could track the scent even longer than their younger counterparts. They all responded to light well, and the older ants were more active. And when it came to reacting to prey, the older ants attacked the poor fruit fly just as aggressively as the young ones did, flaring their mandibles or pulling at the fly's legs.

Giraldo 观察了蚂蚁如何照看种群中年幼的个体，记录了每一只蚂蚁关注、转移和喂养它们的频率。她比较了 20 天和 95 天的蚂蚁对帮助自己找到食物的气味的追踪情况。她测试了蚂蚁对光线的反应，并通过记录蚂蚁在一个小碟子中沿线活动的频率来测量它们的活动程



度。并且她测试了蚂蚁如何对生物饵料做出反应：一只被绳子拴着的果蝇。Giraldo 预测年龄更大的蚂蚁在这些任务上表现更差。但实际上年龄更大的蚂蚁在照看和沿迹活动方面都做得很好——95 天的蚂蚁甚至比更年幼的蚂蚁更好地追踪气味。它们对光线的反应都很好，并且年长的蚂蚁更加主动。在对食物的反应方面，年龄更大的蚂蚁像年幼的蚂蚁一样富有侵略性地向果蝇发出攻击，张开下颚骨或拉拽果蝇的腿部。

Then Giraldo compared the brains of 20-day-old and 95-day-old ants, identifying any cells that were close to death. She saw no major differences with age, nor was there any difference in the location of the dying cells, showing that age didn't seem to affect specific brain functions. Ants and other insects have structures in their brains called mushroom bodies, which are important for processing information, learning and memory. She also wanted to see if aging affects the density of synaptic complexes within these structures—regions where neurons come together. Again, the answer was no. What was more, the old ants didn't experience any drop in the levels of either serotonin or dopamine—brain chemicals whose decline often coincides with aging. In humans, for example, a decrease in serotonin has been linked to Alzheimer's disease.

之后 Giraldo 比较了 20 天和 95 天蚂蚁的大脑，寻找近乎死亡的细胞。她没有发现与年龄相关的巨大差异，在接近死亡细胞的位置方面也没有发现差异，这意味着年龄似乎不会影响具体的大脑机能。蚂蚁和其他昆虫大脑中有称为蕈形体的结构，这种结构对加工信息、学习和记忆非常重要。她同样希望知道衰老是否影响这些结构中突触复合体的密度——在这个区域，神经元聚合在一起。同样地，答案是否定的。此外，年长的蚂蚁在五羟色胺和多巴胺水平上并没有下降——大脑中这些化学物质的下降往往伴随着衰老。例如，在人类中，五羟色胺的减少通常与阿尔茨海默症相关。

'This is the first time anyone has looked at both behavioral and neural changes in these ants so thoroughly,' says Giraldo, who recently published the findings in the Proceedings of the Royal Society B. Scientists have looked at some similar aspects



in bees, but the results of recent bee studies were mixed—some studies showed age-related declines, which biologists call senescence, and others didn't. 'For now, the study raises more questions than it answers,' Giraldo says, 'including how *P. dentata* stays in such good shape.'

“这是人们第一次如此彻底地关注这些蚂蚁在行为和神经层面的变化。” Giraldo 说，她最近在 *Proceedings of the Royal Society B* 上发表了自己的发现。科学家们研究了蜜蜂一些类似的方面，但是近期蜜蜂研究的结果是多样的——一些研究显示出与年龄相关的退化，生物学家称之为衰老，而另一些则没有。“目前来说，研究提出的问题比它解答的更多，” Giraldo 说，“包括 *P. dentata* 如何保持这样良好的状态。”

Also, if the ants don't deteriorate with age, why do they die at all? Out in the wild, the ants probably don't live for a full 140 days thanks to predators, disease and just being in an environment that's much harsher than the comforts of the lab. 'The lucky ants that do live into old age may suffer a steep decline just before dying,' Giraldo says, but she can't say for sure because her study wasn't designed to follow an ant's final moments.

同样的，如果蚂蚁不会随着年龄而衰老，它们为何最终都会死去？在野外，由于捕食者、疾病或者仅仅由于环境比实验室中的舒适条件严酷许多，蚂蚁或许无法存活 140 天。“能够活得比较久的幸运一些的蚂蚁可能会在死亡前遭受急剧的衰退，” Giraldo 说，但是她无法确定这一点，因为她的研究并非追踪蚂蚁的整个生命周期。

'It will be important to extend these findings to other species of social insects,' says Gene E. Robinson, an entomologist at the University of Illinois at Urbana-Champaign. This ant might be unique, or it might represent a broader pattern among other social bugs with possible clues to the science of aging in larger animals. Either way, it seems that for these ants, age really doesn't matter.

“将这些发现延伸至其他社会性昆虫物种非常重要，” 伊利诺伊大学厄巴纳香槟分校的昆虫学家 Gene E. Robinson 说。这种蚂蚁或许是独特的，或者它代表了社会性昆虫中一种更广



泛的模式，并为更大型动物的衰老研究提供可能的线索。无论何种方式，似乎对这些蚂蚁而言，年龄都是无关紧要的。

Passage 2

Why zoos are good

为什么动物园有诸多好处

Scientist David Hone makes the case for zoos

科学家 David Hone 详述动物园的优点

A In my view, it is perfectly possible for many species of animals living in zoos or wildlife parks to have a quality of life as high as, or higher than, in the wild. Animals in good zoos get a varied and high-quality diet with all the supplements required, and any illnesses they might have will be treated. Their movement might be somewhat restricted, but they have a safe environment in which to live, and they are spared bullying and social ostracism by others of their kind. They do not suffer from the threat or stress of predators, or the irritation and pain of parasites or injuries. The average captive animal will have a greater life expectancy compared with its wild counterpart, and will not die of drought, of starvation or in the jaws of a predator. A lot of very nasty things happen to truly 'wild' animals that simply don't happen in good zoos, and to view a life that is 'free' as one that is automatically 'good' is, I think, an error. Furthermore, zoos serve several key purposes.

A 在我看来，那些生活在动物园或野生动物园中的物种，其生活质量很可能和生活在野外的物种一样高或者更高。动物园中的动物有多样化、高质量的饮食，可以获得所有需要的补充品，并且它们的各种疾病也能够得到治疗。它们的活动会受到一定程度的限制，但它们有安全的生存环境，更少受到物种中其他个体的攻击和排斥。它们不需要承受来自捕食者的威胁和压力，也没有寄生虫或伤病带来的刺激和痛苦。一般圈养动物会比野生动物有更长的寿命，并且不会死于干旱、饥饿或是捕食者。真正“野生”的动物会面临一些非常危险的情况，



而管理得当的动物园中不会有这些风险，而且我认为将“自由的”生活视为自然而然就可以“运转良好”是一种错误的观念。此外，动物园有几个核心的目的。

B Firstly, zoos aid conservation. Colossal numbers of species are becoming extinct across the world, and many more are increasingly threatened and therefore risk extinction. Moreover, some of these collapses have been sudden, dramatic and unexpected, or were simply discovered very late in the day. A species protected in captivity can be bred up to provide a reservoir population against a population crash or extinction in the wild. A good number of species only exist in captivity, with many of these living in zoos. Still more only exist in the wild because they have been reintroduced from zoos, or have wild populations that have been boosted by captive bred animals. Without these efforts there would be fewer species alive today. Although reintroduction successes are few and far between, the numbers are increasing, and the very fact that species have been saved or reintroduced as a result of captive breeding proves the value of such initiatives.

B 首先，动物园有利于保护动物。世界上有大量物种正在灭绝，而且有更多的物种正经受着越来越严重的威胁并因此濒临灭绝。此外，有一些灭绝是突发的、快速的、出人意料的，或只是在很晚时才被发现。通过圈养被保护的物种可以被养育以提供储备种群，从而避免野外的物种灭绝。很多物种只在圈养状况下生存，它们中的很多生活在动物园中。依然有很多物种只在野外生存，这是因为它们从动物园被放归，或者通过圈养长大的动物繁育了更多数量的野生动物。如果没有这些努力，如今存在的物种数量会少得多。尽管动物放归的成功案例并不多见，但数量依然在增加，并且物种通过圈养哺育被挽救或放归野外这一事实也证明了这种措施的价值。

C Zoos also provide education. Many children and adults, especially those in cities, will never see a wild animal beyond a fox or pigeon. While it is true that television documentaries are becoming ever more detailed and impressive, and many natural history specimens are on display in museums, there really is nothing to compare



with seeing a living creature in the flesh, hearing it, smelling it, watching what it does and having the time to absorb details. That alone will bring a greater understanding and perspective to many, and hopefully give them a greater appreciation for wildlife, conservation efforts and how they can contribute.

C 动物园同样对教育有益。很多儿童和成年人，尤其是那些住在城市中的人，除了狐狸和鸽子不会看到任何一种野生动物。尽管电视纪录片正变得越来越细致和吸引人，很多自然历史标本也在博物馆中展览，但事实上没有什么能与亲身观察生物、倾听它们、感受它们、观察它们在做什么以及花时间了解更多细节相比。单单这样就可以让人们对于很多生物有更深入的理解，并且有望让他们更好地理解野生动物、保护措施以及他们自身能够做的贡献。

D In addition to this, there is also the education that can take place in zoos through signs, talks and presentations which directly communicate information to visitors about the animals they are seeing and their place in the world. This was an area where zoos used to be lacking, but they are now increasingly sophisticated in their communication and outreach work. Many zoos also work directly to educate conservation workers in other countries, or send their animal keepers abroad to contribute their knowledge and skills to those working in zoos and reserves, thereby helping to improve conditions and reintroductions all over the world.

D 除此之外，通过标识、对话和演说，同样可以在动物园中对人们进行教育，这些方式都可以直接向参观者们传达有关他们正在观察的动物及其所在地的信息。这方面是动物园曾经做得不足的地方，但是他们如今在交流和推广工作上做得越来越精细。很多动物园同样直接为其他国家的动物保护人员提供教育，或者将他们的动物饲养员派往国外，用他们的知识和技能帮助那些在动物园和自然保护区工作的人，从而有助于改善全世界的环境和动物放归。

E Zoos also play a key role in research. If we are to save wild species and restore and repair ecosystems we need to know about how key species live, act and react. Being able to undertake research on animals in zoos where there is less risk and fewer variables means real changes can be effected on wild populations. Finding



out about, for example, the oestrus cycle of an animal or its breeding rate helps us manage wild populations. Procedures such as capturing and moving at-risk or dangerous individuals are bolstered by knowledge gained in zoos about doses for anaesthetics, and by experience in handling and transporting animals. This can make a real difference to conservation efforts and to the reduction of human-animal conflicts, and can provide a knowledge base for helping with the increasing threats of habitat destruction and other problems.

E 动物园同样在研究中扮演关键角色。如果我们要保护野生物种并且恢复和修复生态系统，我们就需要了解主要的物种如何生存、活动以及交流。能够在动物园这种更少风险、更少变量的状态下对动物进行研究，意味着可以对野生种群的变化真正起到作用。例如，查明动物的发情期或繁殖率有助于我们管理野生种群。像找到并且转移处于风险中或有危险的动物这样的措施，就是得到了从动物园中获得的有关麻醉剂量的知识，以及帮助和转移动物的经验的支持。这可以让保护行为和减少人与动物的冲突变得截然不同，并且建立一个知识库，以帮助解决越来越多的栖息地破坏以及其他方面的问题。

F In conclusion, considering the many ongoing global threats to the environment, it is hard for me to see zoos as anything other than essential to the long-term survival of numerous species. They are vital not just in terms of protecting animals, but as a means of learning about them to aid those still in the wild, as well as educating and informing the general population about these animals and their world so that they can assist or at least accept the need to be more environmentally conscious. Without them, the world would be, and would increasingly become, a much poorer place.

F 总之，考虑到很多正在发生的有关环境的全球性威胁，我认为动物园对于大量物种的长期生存至关重要。它们不仅在保护动物方面非常重要，也是一种了解动物从而在野外对它们提供保护的方式，并且可以教育和引导大众了解这些动物，从而能让人们帮助它们，或者至少使人们接受需要有更强的环境意识这一观念。如果没有它们，世界将会变得越发荒芜。



Passage 3

Chelsea Rochman, an ecologist at the University of California, Davis, has been trying to answer a dismal question: Is everything terrible, or are things just very, very bad?

加利福尼亚大学戴维斯分校的生态学家 Chelsea Rochman 一直试图回答一个令人沮丧的问题：一切都很糟糕了吗，或者仅仅是情况变得很差？

Rochman is a member of the National Center for Ecological Analysis and Synthesis marine-debris working group, a collection of scientists who study, among other things, the growing problem of marine debris, also known as ocean trash. Plenty of studies have sounded alarm bells about the state of marine debris; in a recent paper published in the journal Ecology, Rochman and her colleagues set out to determine how many of those perceived risks are real.

Rochman 是国家生态分析与整合中心海洋废弃物工作组的一员，这个工作组由科学家组成，在众多主题中重点研究不断加剧的海洋废弃物问题，也就是海洋垃圾问题。大量研究已经为海洋垃圾问题敲响了警钟；在最近发表在《生态学》杂志上的一篇文章中，Rochman 和她的同事们希望确定这些隐患中有多少是真实存在的。

Often, Rochman says, scientists will end a paper by speculating about the broader impacts of what they've found. For example, a study could show that certain seabirds eat plastic bags, and go on to warn that whole bird populations are at risk of dying out. 'But the truth was that nobody had yet tested those perceived threats,' Rochman says. 'There wasn't a lot of information.'

Rochman 说，通常科学家们会在研究的结尾对他们的发现会造成的更广泛影响做出推断。例如，一份研究可以说明某种海鸟误食塑料袋，并进而警示人们整个鸟群都可能面临灭绝。“但事实是没有人验证过这些潜在的威胁，” Rochman 说。“实际上信息并不充分。”



Rochman and her colleagues examined more than a hundred papers on the impacts of marine debris that were published through 2013. Within each paper, they asked what threats scientists had studied - 366 perceived threats in all - and what they'd actually found.

Rochman 和她的同事们研究了 2013 年以来发表的一百多篇有关海洋垃圾影响的论文。在每篇论文中，他们探求科学家们研究了哪些威胁——总共 366 种感知到的威胁——以及他们的实际发现。

In 83 percent of cases, the perceived dangers of ocean trash were proven true. In the remaining cases, the working group found the studies had weaknesses in design and content which affected the validity of their conclusions - they lacked a control group, for example, or used faulty statistics.

在 83% 的案例中，海洋垃圾的潜在危险被证明是真实的。在剩余的案例中，工作组发现这些研究在设计和内容方面存在缺陷，这些缺陷影响了研究结论的有效性——比如，它们缺少控制组，或使用了错误的统计数据。

Strikingly, Rochman says, only one well-designed study failed to find the effect it was looking for, an investigation of mussels ingesting microscopic plastic bits. The plastic moved from the mussels' stomachs to their bloodstreams, scientists found, and stayed there for weeks - but didn't seem to stress out the shellfish.

Roehman 说，令人吃惊的是，只有一项设计完善的研究没有发现它预期的影响，这是一项有关贻贝误食微小塑料碎片的调查。科学家发现，塑料从贻贝的胃部移动到血液中，并在那里停留了几个星期——但似乎并没有使这一甲壳类动物受到损伤。

While mussels may be fine eating trash, though, the analysis also gave a clearer picture of the many ways that ocean debris is bothersome.

尽管贻贝误食垃圾或许没有影响，但是分析依然清楚地指出海洋垃圾在很多方面是令人烦恼的。



Within the studies they looked at, most of the proven threats came from plastic debris, rather than other materials like metal or wood. Most of the dangers also involved large pieces of debris - animals getting entangled in trash, for example, or eating it and severely injuring themselves.

在人们分析的研究中，多数已知的威胁来自塑料垃圾，而不是金属或木材等其他垃圾。多数危险同样包括大型垃圾——例如，动物被困在垃圾中或误食垃圾使自己受到严重的伤害。

But a lot of ocean debris is 'microplastic', or pieces smaller than five millimeters. These may be ingredients used in cosmetics and toiletries, fibers shed by synthetic clothing in the wash, or eroded remnants of larger debris. Compared to the number of studies investigating large-scale debris, Rochman's group found little research on the effects of these tiny bits. 'There are a lot of open questions still for microplastic,' Rochman says, though she notes that more papers on the subject have been published since 2013, the cutoff point for the group's analysis.

但是很多海洋垃圾属于“微型塑料”，或者小于五毫米的碎片。这些可能是化妆品或者化工工具中的元素，合成衣物洗涤时的纤维，或者大量垃圾腐化后的残留物。与调查大型垃圾的研究数量相比，Rochman 的工作组在有关这些小型垃圾的影响方面没有看到太多研究。“依然有很多关于微型塑料的存疑问题，” Rochman 说，尽管她注意到自 2013 年这一工作组分析的分界点以来，更多关于这一主题的研究被发表。

There are also, she adds, a lot of open questions about the ways that ocean debris can lead to sea-creature death. Many studies have looked at how plastic affects an individual animal, or that animal's tissues or cells, rather than whole populations. And in the lab, scientists often use higher concentrations of plastic than what's really in the ocean. None of that tells us how many birds or fish or sea turtles could die from plastic pollution - or how deaths in one species could affect that animal's predators, or the rest of the ecosystem.



她补充道，在有关海洋废弃物如何导致海洋生物的死亡方面同样有一些存在争议的问题。很多研究关注的是塑料如何影响个体动物，或者动物的组织或细胞，而非整个动物种群。在实验室中，科学家通常使用比海洋中实际浓度更高的塑料。这些都没有告诉我们有多少鸟类、鱼类或是海龟死于塑料污染——或者一个物种中出现的死亡如何影响动物的捕食者，或者生态系统中的其他物种。

‘We need to be asking more ecologically relevant questions,’ Rochman says. Usually, scientists don’t know exactly how disasters such as a tanker accidentally spilling its whole cargo of oil and polluting huge areas of the ocean will affect the environment until after they’ve happened. ‘We don’t ask the right questions early enough,’ she says. But if ecologists can understand how the slow-moving effect of ocean trash is damaging ecosystems, they might be able to prevent things from getting worse.

Rochman 说，“我们需要提出与生态更为相关的问题”。通常，对于油轮意外地泄漏整船石油并污染大片海洋这类事件，科学家们直到事情发生才能准确地知道灾难对环境产生的影响。“我们并没有在足够早的时间提出正确的问题，”她说。但是如果生态学家可以了解海洋垃圾对生态系统长期的破坏效应，他们或许可以防止事情变得更糟。

Asking the right questions can help policy makers, and the public, figure out where to focus their attention. The problems that look or sound most dramatic may not be the best places to start. For example, the name of the ‘Great Pacific Garbage Patch’ - a collection of marine debris in the northern Pacific Ocean - might conjure up a vast, floating trash island. In reality though, much of the debris is tiny or below the surface; a person could sail through the area without seeing any trash at all. A Dutch group called ‘The Ocean Cleanup’ is currently working on plans to put mechanical devices in the Pacific Garbage Patch and similar areas to suck up plastic. But a recent paper used simulations to show that strategically positioning the cleanup devices closer to shore would more effectively reduce pollution over the



long term.

提出正确的问题可以帮助政策制定者以及公众确定将注意力放在哪里。看上去或听上去最明显的问题或许并不是最佳的着手处。例如，“大太平洋垃圾带”这个名字——北太平洋聚集的海洋废弃物——可能让人想到一个巨大的、漂浮的废弃物岛。而实际上，很多垃圾是微小的或是在海面之下；一个人可以航行穿过这片区域却完全看不到任何垃圾。一个叫做“海洋清理”的荷兰团体如今正在制定计划，将机械设施用于太平洋垃圾带和类似区域以清理塑料。但最近的一篇论文使用模拟方法表明，从长期来看，有策略地将清理设备投放到离海滨更近的地方可以更有效地减少污染。

‘I think clearing up some of these misperceptions is really important,’ Rochman says. Among scientists as well as in the media, she says, ‘A lot of the images about strandings and entanglement and all of that cause the perception that plastic debris is killing everything in the ocean.’ Interrogating the existing scientific literature can help ecologists figure out which problems really need addressing, and which ones they’d be better off - like the mussels - absorbing and ignoring.

“我认为消除掉这些误解真的非常重要，” Rochman 说。在科学家和媒体中，她说，“很多关于动物搁浅和被困的图像导致人们认为塑料废弃物正在杀死海洋中的一切。”认真审视现存的科学文献可以帮助生态学家找出哪些问题是真正需要解决的，以及哪些问题他们最好了解 and 忽略——比如贻贝的现象。