参考译文

Beehives Are Held Together by Their Mutual Gut Microbes

蜜蜂和它的肠道微生物

Every honeybee colony has its own unique scent like a fingerprint. And bees use that scent to recognize their nest mates—basically saying, “You smell like me, so I’m going to let you into the colony.”

就像人类的指纹一样，每个蜂群都有自己独特的气味。蜜蜂利用这种气味来识别它们的巢穴同伴——基本上就是在说:“你闻起来跟我其为一样，所以我会让你进入蜂巢。”

But here’s the mystery: If you transfer a baby bee into a new hive, not only does the colony accept it, but that bee will eventually smell like its adopted nest mates—even though they’re not genetically related.

但这里有个秘密:如果你把一只小蜜蜂转移到一个新的蜂巢，不仅新的蜂巢会接受了它，而且这只蜜蜂最终的气味也会和它被收养的蜂巢同伴一样——即使它们没有血缘关系。

“This kind of got us thinking, ‘Perhaps it’s not actually the genetics of the bee; it’s actually the genetics of the microbes that live within the bee.’”

“这让我们思考，‘也许这实际上不是蜜蜂的基因;这实际上是生活在蜜蜂体内的微生物的基因。’”

Cassondra Vernier is a postdoctoral researcher [now] at the University of Illinois. She knew gut microbes can affect the scent and communication of other animals, like hyenas.

Cassondra Vernier是伊利诺伊大学的博士后研究员。她知道肠道微生物可以影响其他动物的气味和沟通交流，比如鬣狗。

So she and her co-authors designed a series of experiments to test whether microbes also change the scent compounds coating the outside of honeybees, known as cuticular hydrocarbons.

因此，她和合著者设计了一系列实验，测试微生物是否也会改变蜜蜂表面的气味化合物--表皮碳氢化合物。

In one experiment, they fed different gut microbes to newly hatched sister bees. The bees developed distinct microbiomes—and they also produced different cuticular hydrocarbon scents. On the other hand ...

在一项实验中，他们给新孵化的姐妹蜂喂食不同的肠道微生物。这些蜜蜂进化出了不同的微生物群——它们也产生了不同的表皮碳氢化合物气味。另一方面…

“If they were treated with different inoculums, they recognized each other as non-nest mates. And they attacked each other, usually in the form of biting each other.”

“如果给它们注射不同的疫苗，它们就能认出彼此是没有巢的伴侣。就会互相攻击，通常是互相咬对方。”

In other words, bees from the same colony did not recognize each other when they had different gut microbes.

换句话说，当来自同一个蜂群的蜜蜂拥有不同的肠道微生物时，它们无法识别彼此。

Washington University [in St. Louis] biology professor and co-author Yehuda Ben-Shahar says the microbes are changing the bees physiologically and controlling their complicated social behaviors. But he adds this relationship is mutually beneficial for the bacteria and the bees.

圣路易斯华盛顿大学的生物学教授、合著者本-沙哈尔说，这些微生物正在从生理上改变蜜蜂，并控制它们复杂的社会行为。但他补充说，这种关系对细菌和蜜蜂来说是互惠互利的。

“The bees have to have some of these bacteria, so you have a system where this relationship serves the biology of both the bacteria and the host. And it gets to a point where it’s obligatory, so one cannot exist without the other.”

“蜜蜂必须有一些这样的细菌，这种微生物群服务于细菌和宿主。在某种程度上，它们互不分离。

Being able to distinguish nest mates from invaders is absolutely critical, Ben-Shahar says.

本-沙哈尔说，能够区分巢穴同伴和入侵者绝对是至关重要的。

Without that ability, bees would be vulnerable to nest parasites—and to other bees looking to steal their most precious commodity: honey. And so the entrance fee must be paid—not in dollars but in scents.

如果没有这种能力，蜜蜂就很容易受到巢内寄生虫的攻击，也容易受到其他想要偷走它们蜂蜜的蜜蜂的攻击。因此，入场费必须支付——不是美元，而是气味。

听力原文

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This is Scientific American’s 60-Second Science. I’m Shahla Farzan.

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For Scientific American’s 60-Second Science, I’m Shahla Farzan.