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15、动物如何听到声音 1. When we talk about ears, we usually mean the oddly wrinkled appendages on the sides of our heads. 1、当我们提到耳朵，通常指那个生长在我们头部两侧的奇怪的褶皱的附属肢体。 2. We are aware that at the end of the central hole in this outer ear there is something called the middle ear, with an eardrum and a few little bones. Even deeper lies the inner ear, the organ with which we "hear". 2、我们知道，在外耳中孔的底部有东西称为中耳，它由一个耳鼓和一些小骨骼构成。而真正能使我们“听”的器官在更深处的内耳。 3. Animals such as dogs and cats also have conspicuous outer ears, but few of us probably ever stopped to think whether there might be such a thing as a middle and inner ear beneath those pointed tips. Yet, we know very well that these animals hear. 3、诸如猫和狗这样的动物也有引人注目的外耳，但很少人能够停下来去想，在竖立的尖儿下面，是否那里也有类似于中耳和内耳的东西。但是我们很清楚地知道这些动物都能够听到。 4. Birds are even more mysterious, because here we do not even see an outer ear. The same is true to still a larger degree of such animals as frogs and fishes, although in the frog we can at least see an eardrum. 4、鸟类甚至更为神秘，因为我们甚至看不到它们有一个外耳。还有很大数量的动物如青蛙和鱼类也是如此，虽然我们至少可以看到青蛙有一个耳鼓。 5. Again, at one time or another, you may have found that all such

animals hear. Hunters know that birds are attracted by artificial calls, and fishermen emphasize that you should be as quiet(原文quite) as possible if you dont want to go home empty handed. And if you ever hunted frogs in your childhood, you know how softly you had to tread! Moreover, it seems absurd that birds should sing and frogs croak, if they could not even hear their own voices.

5、此外，你可能曾经发现所有的这些动物都在听。猎人们知道鸟类会被人造的声音所吸引，渔夫们则强调，如果你不想空手而归的话就要尽可能的安静。如果你在童年抓过青蛙，你应该知道要多么轻柔地走动。说实在，青蛙在叫，鸟儿在唱，如果它们甚至听不到自己发出的声音，岂不荒谬。

6. By direct observations and many experiments, biologists have discovered that practically all animals have some sense of hearing or vibration.

Earthworms feel vibrations in the soil, fish can be trained to respond to certain tones, male mosquitoes are attracted by the sound of the female, and frogs will respond to a tape recording of their own

voices. 6、通过直接观察和许多试验，生物学家已经发现，实际上所有的动物都具有某种听觉或振动感。蚯蚓在土壤里能感觉震动，鱼类可以训练的对特定的音调有反应，雄性蚊子可以被雌性蚊子的声音所吸引，青蛙对它们自己的声音的录音有所反应。

7. The inner ear is composed of delicate membranes which bear dense patches of specialized cells called maculae. Each of these collections of cells can carry a message to the brain. What message is carried by a macula depends upon how it is affected. The message which is carried is not, however, always connected with the hearing sense. For instance, a certain kind of tadpole can tell the

depth of the water it is swimming in by the pitch of a tone which is produced by its own lungs. 7、内耳由脆弱的薄膜构成，它承载着密集的由被称作斑疹的特殊细胞构成的片。每个这样的细胞群都能够把信息传递给大脑，而斑疹承载怎样的信息依赖于它是怎样受影响的。但是被承载的信息并不总是与听觉相连。举个例子，有一种蝌蚪能感知它所游泳之处水的深度，它是通过某种自己肺部产生的声音的音调来判定的。 8. In the human and all other mammals, the macula has developed into an organ which can easily be seen. This organ is called the cochlea. This spiral shaped organ contains the macula itself and it is called "organ of Corti" after its discoverer. If you have ever seen a snail shell, you know how a cochlea looks. 8、对于人类和其他所有哺乳类动物来说，斑疹已经进化成为一种很容易看见的器官，这种器官称作“耳蜗”。这一螺旋形的器官包括了MACULAE本身，以及后来被其发现者称为“CORTI”的器官。如果你看到过蜗牛的壳，你就知道耳蜗的形象。 9. When sound waves enter the cochlea, which is really a tube coiled around, they set a membrane into a back and forth motion and cause a new wave. This is something like the way in which high and low sounds are produced by a flute or whistle. The high sounds are produced when the air is prevented by the holes from going through, while the low sounds are produced by allowing more of the air to pass. All this is what produces the differences between high and low sounds. The loudness of a sound is evidently produced by how much the membrane is cause to move. 9、当声波进入耳蜗这条盘旋的管道，它令薄膜前后移动并且产生新的波动。这种方式类似于长

笛或是哨子所产生的高低音。当洞穴被阻挡导致空气不能通过通道时就产生高音，而有更多空气通过通道时则产生低音。这些造成了高音和低音的不同。而声音的大小则明显的决定于耳膜运动。

10. Whether or not hearing is really produced in all animals by the effect of pressure is not definitely known by scientists as yet. We do know, however, that nature has set up some very delicate hearing mechanisms for its creatures. Scientists must explore much further for more knowledge about how animals use their ears.

10、对于所有的动物来说，听觉是否真的因为气压的影响而产生，至今科学家们仍然没有明确的了解。但是我们知道，自然界已经为它的生物们建立了一些非常精细的听觉机制。科学家们必须进行更加深入地探讨才能够对动物如何应用它们的耳朵获得更多的知识。

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