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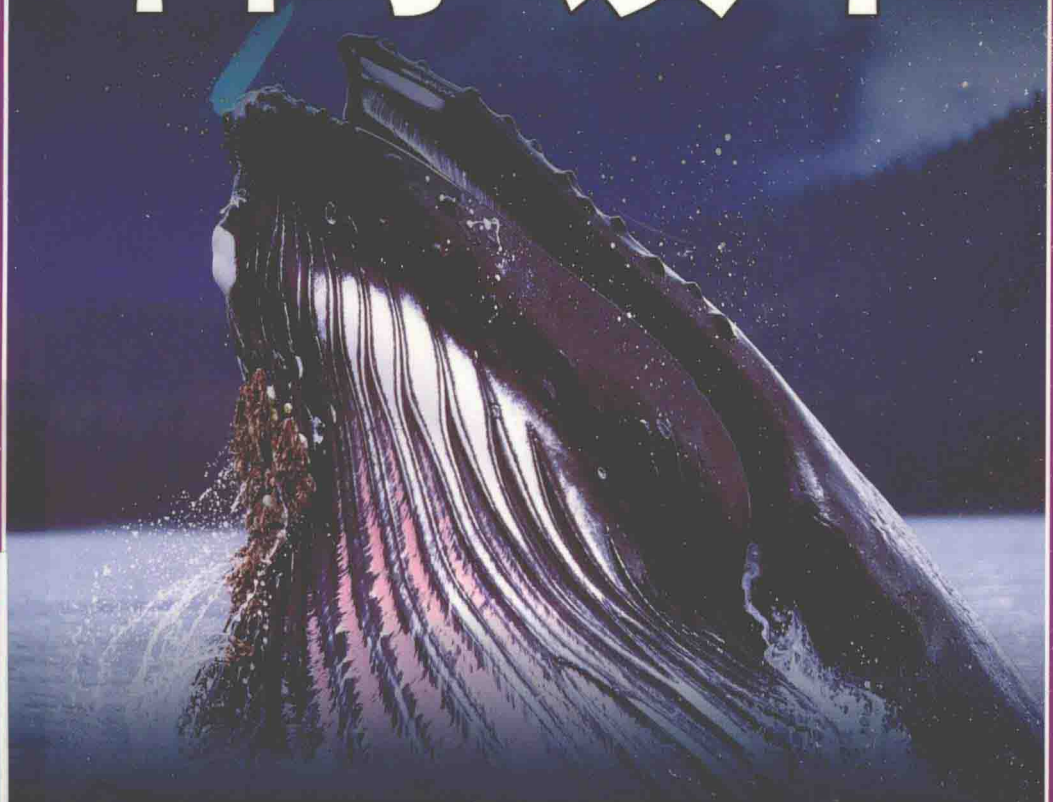
SCIENCE READERS

科学读本 5



〔美〕文森特·默奇（Vincent Murche）/著

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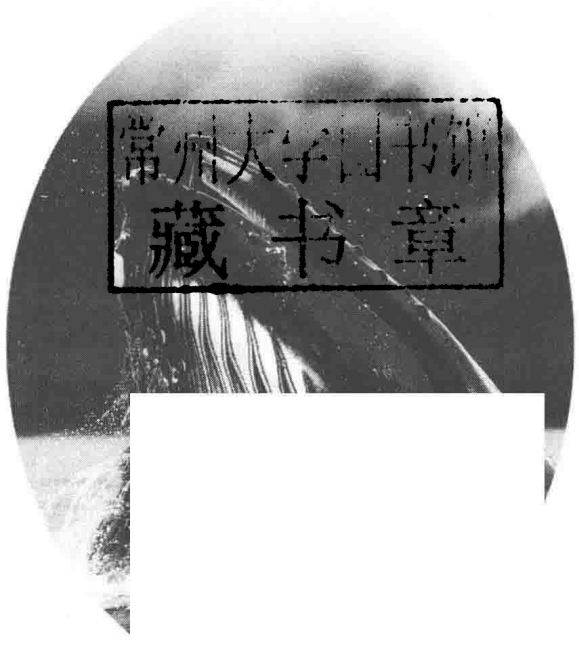

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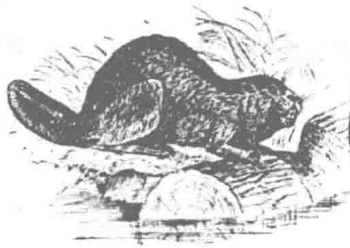
Reading enables us to see with the keenest eyes, to hear with the finest ears, and listen to the sweetest voices of all time.

—James Russell Lowell



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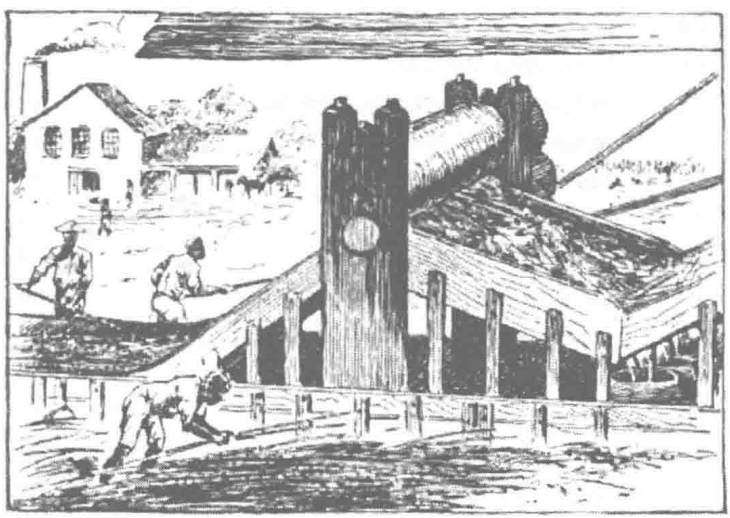
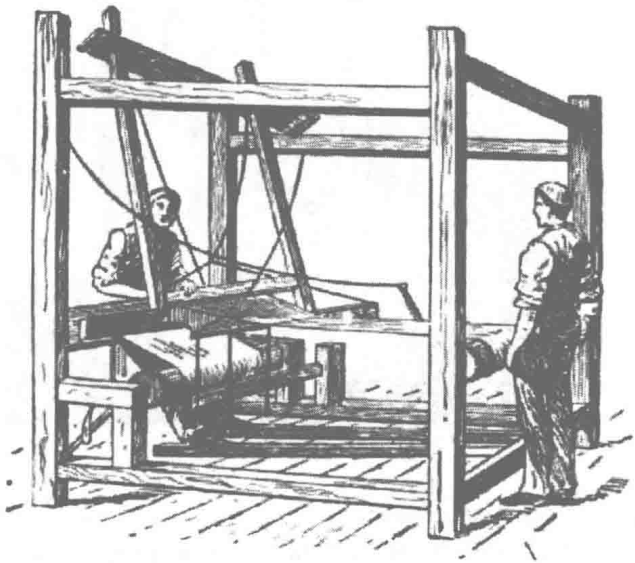




Lesson 01

Matter

Our young scientists are still eagerly pressing onward in their search for knowledge, under the careful and sympathetic guidance of their teacher, Mr. Wilson. Step by step they have been advancing through the various stages, beginning with simple facts, either such as were evident to their own observation, or such as could be shown by simple experiment. In this way they have acquired a rich store of scientific facts, and they are now, in the higher stages, learning to offer simple explanations of these facts, and to familiarize themselves with the proper names for the various objects and operations with which they come in contact.

Last year's course made this very evident, and it will become more so as they proceed to higher subjects. Both boys have still a scientific institute as their goal, where they mean to make their mark some day.

"I remember," said Mr. Wilson, "I began last year's course by introducing a new word—matter. We have since then used this word, rather than speak of a substance, an article, or a body, I will now try and help you to form a clearer conception of what we mean by it. This brick lying on the table shall give us the start.

"Without taking it up, I want you to tell me all you can about it. You will, of course, begin by describing its shape, size, and color. But how did you gain this information? Your eyes told you. You learned it through the sense of sight.

"Now take the brick in your hands and shut your eyes, and you will learn something more, through another sense—the sense of touch. This tells you that the body is hard and rough. A blind man could tell that.

"But let us leave the brick and turn our attention to these two bottles. Each contains a clear liquid. The liquids are totally unlike each other, but neither of the above senses can tell us this. How can we find out? Here we have to rely upon another sense—the sense of smell—to distinguish the two bodies; this tells us that one is water, the other paraffin oil.

"We might take a piece of salt and a piece of sugar, cut to exactly the same size and shape, and it would be impossible to tell one from the other, by either of the senses to which we have already appealed. We put our tongue to each, and we learn at once what we want to know, but this time through another sense—the sense of taste.

"I think I have shown you enough to make the rest of my explanation simple. Everything around us which appeals to us in this way, through one or more of our senses, we call matter.

"By the name matter, then, we mean every substance that exists, every substance about which we may learn through our senses. The air around us is matter. We know that it has an existence, for although we can neither see, smell, nor taste it, we can hear it when it is in motion, and we can feel it as it rushes through our mouth and nostrils in the act of breathing.

"Suppose I now show you a little experiment. I have here a small piece of gun-cotton, which is a highly explosive substance. I place it in the palm of my hand and apply a lighted taper. The result is a sudden flash; the substance burns so rapidly that every particle of it disappears, and yet the hand scarcely feels the heat.

"What has become of the gun-cotton? It has not been destroyed; it has simply been converted into another form, and has passed away in the air as an invisible gas."

"That reminds me, sir," said Fred, "of what we learned about the burning of the candle, the coal-gas, and the lump of coal. These things are not destroyed in the burning. They are simply changed into other forms."

"Yes, my lad, you are quite right," said Mr. Wilson. "The candle contains matter in the form of tallow and wick. These substances, as well as the coal, are formed of hydrogen and carbon. The burning simply uses them to form new substances. It uses the hydrogen to form water-vapor, and the carbon to form carbonic acid gas, both these new substances being at once absorbed into the air around.

"Nothing is destroyed. The coal and the tallow are changed into new forms. That is all.

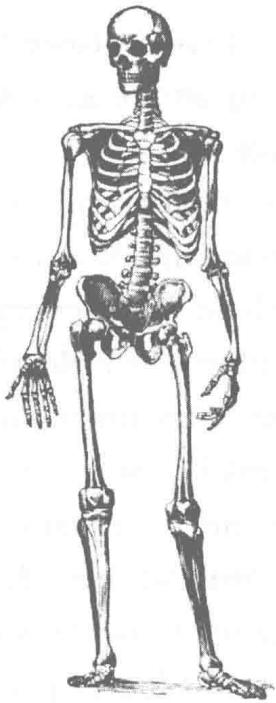
"What happens when we dissolve substances in water? These substances disappear; they seem to be destroyed. But we know they are there still, for we can recover them easily by evaporating the water.

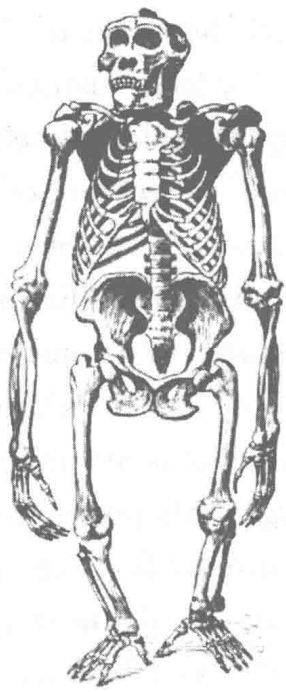
"It is just so with every kind of matter that exists. We may grind it into powder, dissolve it in water, and even burn it, but we cannot get rid of it—we cannot destroy it. We merely change its form; for matter is indestructible."

Lesson 02

Man and Brute

Step by step our lessons have made us familiar, in some degree, with the build of the human body, and, through it, with the general structure of the various members of the brute creation. We are now in a position to carry our investigations a little farther, taking still the human body as the type, and following up, as we meet with them, the various adaptations of it to suit the requirements of each





animal. Let us commence with the head, which, as you know, consists of two distinct parts—the skull and the face.

The skull or cranium is formed of eight plates of bone, firmly joined together at their edges, so as to make an oval box to lodge and protect the brain. There is a round hole in the base of this bony box, through which the spinal cord passes into the canal provided for it, and on either side of this aperture is a smooth bony projection, by which the skull rocks on the topmost vertebra of the spinal column. These projections are termed condyles.

Turning next to the face, we find that it consists of no less than fourteen distinct bones, all of them, except one—the lower jaw—firmly and immovably fixed to each other and the bones of the skull. These fourteen bones provide five large cavities for lodging and protecting the sense organs of sight, smell, and taste.

So far, the structure of man and of all mammals is on similar lines. But man stands immeasurably above any of these creatures. "Endowed with an intellect capable of indefinite improvement, he exhibits but little of that instinct which guides the operations of the lower animals. His knowledge is the result of observation, and is matured by thought; his power of speech and the capability of writing are faculties entirely his own, whereby he can communicate his ideas and transmit to posterity the results of his experience. By no means highly gifted as

relates to his bodily strength, his swiftness is very far inferior to that of most animals of his size. Possessing neither strength of jaw nor canine fangs, he is destitute of offensive weapons, and his body being not even clothed with hair, few creatures are, in this respect, left so utterly defenseless, nay, in addition to these disadvantages, he is, of all animals, the longest in acquiring even that strength which is necessary for the supply of his simplest wants, and yet this very feebleness is to him an advantage, compelling him to have recourse to that intelligence with which he has been so highly endowed. Absolutely dependent upon parental care for his support, he must necessarily derive from that source the education of his intellect, as well as of his physical powers, and hence is established an attachment as durable as it is sacred. The very length of his pupilage necessarily gives birth to habits of family subordination, which ultimately lay the foundation of all social order, and tend to multiply indefinitely the advantages derivable from that mutual co-operation, whereby he has succeeded in subjecting or in repelling the attacks of inferior animals—in clothing himself so as to defy the inclemencies even of the most rigorous climate, and in spreading his race over the surface of the earth.

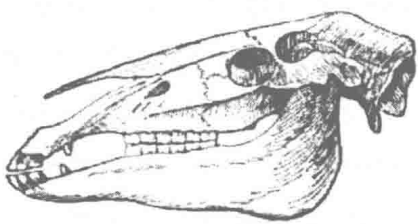
"Nevertheless, in reviewing the grand scene of nature, the supremacy of the human race seems to be manifested in nothing more strikingly than in the privilege conferred

upon mankind of studying the Creator's works, and learning the great lessons they are so well calculated to teach.

"Of all the countless creatures that now throng the busy scene of life, or that successively have faded from existence, not one has been permitted to inquire from whom or whence it received its being. Man alone has been taught to recognize his Maker's hand, which formed all living things, each in its separate sphere, and still upholds and guides the wondrous system He Himself created."

So then it is man's intellectual power which raises him to this lofty height, utterly unapproachable by the rest of

God's creatures. In man the brain-case is developed; in the lower animals, on the contrary, the development is in the direction of the face, and not of the skull. The face is always disproportionately large as compared with the skull.



That this is no mere chance accident may be readily seen by comparing the heads of a man, a gorilla, and a