



#### GROTESQUE FACE

This drawing shows, in enlarged size, the bizarre head of a horseshoe bat. Many species are equally impressive for extremely ugly features which belie their character.

large ears. When the head is enlarged, as in the models shown in this exhibit, these structures give the face an extraordinary grotesque appearance unlike that of any other mammal.

Such developments are found chiefly in bats that pursue flying insects, and probably help direct the flight of their owners. In some cases they are better developed in males, and then they may have a sexual significance.

#### THE MEANING OF BATS' TEETH:

Ancestral bats lived on insects, and had skulls and teeth suited to seizing and crushing such prey. Many modern bats have retained this habit, and their teeth have changed but little.

Other bats have adopted very different food habits. These enlarged models of the skulls of bats that live on various kinds of food show how the skull, and especially the teeth, are suited to each particular kind of food. A vampire bat would be unable to chew up an insect, but neither could an insect-eating bat make a satisfactory wound in an animal to lap its blood.

#### TAILS OF BATS:

The early ancestors of bats undoubtedly had long mouse-like tails that extended out behind the body as in other mammals. Tails much like this are still found in a few living bats, which are popularly known as "mouse-tailed bats."

In most bats there is a tail membrane stretched between the hind legs, and the tail bones act as a support for this membrane. Both the tail and its membrane have completely disappeared in some bats, while other related species exhibit various intermediate stages that show how the tail and membrane have gradually degenerated in the course of evolution.

A BAT'S SKELETON shows how the bones have been modified to enable these

creatures to fly. All the usual bones are represented, but many of them are so distorted that they look unlike the corresponding bones of other mammals.

Most striking is the skeleton of the wings. These look like grotesque, enormously enlarged hands—which is just what they are. The long and slender fingers serve as "ribs" to support the flight membrane.

The collar bone is large and powerful and there is a keel on the breast bone to provide attachment for the flight muscles.

VAMPIRE BATS are not the huge blood-sucking monsters that many people imagine. On the contrary, they are small inoffensive-looking creatures apparently much like many other bats.

Vampires are found only in tropical parts of South and Central America, where they are very common. During the day they retire in colonies to rock caves or hollow trees, emerging at night to feed on the blood of mammals and birds.

Looking like a great spider, a vampire crawls about over its victim until it has found a suitable spot, then gouges out a little slice of skin with its teeth and laps up the blood that flows from the wound. This slight loss of blood usually does not inconvenience the victim.

#### FIREARMS IN THE FAR EAST

Examples of early firearms from Far Eastern countries are on exhibition in several halls of Field Museum's Department of Anthropology.

When the American Indians had the misfortune to be discovered by the Spaniards, the three principal means employed by the invaders to subdue them were the horse, firearms, and treachery. The Indians had neither horses nor firearms.

As the Museum exhibits above mentioned indicate, the story was different when the Spaniards and Portuguese set out to conquer parts of Asia. In 1571 the Spaniards entered the Bay of Manila and, to their surprise, were greeted by cannon fire from the citadels of two fortified towns. Antonia de Morga, a Spanish writer, relates that long before the arrival of the Spaniards, the Philippine Islanders had bronze culverins and cast iron pieces for defense. When the Portuguese took Malacca, in 1510, they captured 3,000 artillery pieces, 2,000 of which were bronze, the rest iron.

After the Spaniards settled in the Philippines, they sent spies to China to find out whether she could be conquered as easily as Mexico and Peru. These emissaries were Augustinian friars, whose reports are still extant. They returned and reported that it could not be done, because China was very populous, and had standing armies equipped with horses and firearms. This deterred the Spanish governors from any attempt to invade China, and it might be argued that it was the invention of gun-

powder that saved China from the fate of Mexico and Peru.

Firearms were employed in China, India, Java, Sumatra, Borneo, Siam, Cambodia, and Korea long before the arrival of any Europeans in Asia. Gunpowder was invented in China about the middle of the sixth century, and was first employed only in the manufacture of firecrackers and fireworks. Large guns were made there about the beginning of the twelfth century.

In the Museum's Hall of the Philippines (Hall H) are exhibited nine bronze cannon, so-called *lantaka*, captured by American forces from the Moros on Mindanao. Some of these are of Chinese manufacture, and are decorated with ancient Chinese designs; some were made by the Moros themselves in imitation of the Chinese models, and others were imported from Borneo.

In the Museum's Korean collection there are two copper cannons and one iron mortar. One cannon bears an inscription in Chinese characters which reveals that it was made for the imperial palace at Seoul in 1747. Its weight is 31 pounds.

In the Chinese collections (Hall 32) are two heavy muskets, called "jingals," actually used during the Boxer Rebellion of 1900, and captured by American soldiers. Their weights are 32 and 40 pounds respectively. The exhibit includes also iron and leaden cannon balls, and self-loading repeating crossbows with magazines that held ten or more arrows, discharged in rapid succession without reloading. The principle on which the arrow-chamber is constructed is almost identical with that of the magazine mechanism of modern rifles as first applied to the Winchester in 1867. In China this type of magazine was used many centuries ago. A series of matchlock guns made by the Tibetans may also be seen in Hall 32.

The Arabs learned the gunpowder formula—saltpeter, sulphur, and charcoal—from the Chinese. They exported saltpeter from China under the name "Chinese snow." After the conquest of Spain, the Arabs introduced there the secret of gunpowder and guns. From Spain this knowledge spread rapidly thereafter to all the other countries of Europe.

#### Nature's Bombs Exhibited

Have you seen the volcanic bombs in Clarence Buckingham Hall (Hall 35)? Violent explosions in volcanic craters threw fragments of lava, so hot that they were plastic like putty, high in the air. Their rapid whirling motion shaped the plastic masses into characteristic rounded and elongated forms which by the time they fell were stiffened enough by cooling to retain their shapes.

It is merely a coincidence that many of those exhibited come from France, Japan, and New Zealand where bombs of another kind have been falling recently.





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