

CONCERNING EARS.

BY R. LYDEKKER.

Like many other terms in general use, the word "ear" has a double signification. In its wider, and perhaps proper, sense it denotes the entire organ of hearing, both external and internal. On the other hand, in its more restricted signification it is confined entirely to the outer or external ear; and it is in this sense that it is most generally employed at the present day, as witness the fact that both seals and whales are commonly spoken of as being earless animals, although their internal organs of hearing are very strongly developed. In our translation of the Bible we have examples of both usages. Thus the somewhat curious phrase "the deaf adder which stoppeth her ears" refers, of course, to the internal organ of hearing, seeing that serpents have no external auricular appendage. On the other hand, in the reference to the cutting off the ear of one of the high priest's servants in the Garden of Gethsemane the term is employed in its more restricted sense, as denoting the external ear only. Similarly, when we speak of an animal having large or small or long or short ears, we refer solely to the external position of the auditory apparatus. And from the latter example it will be perfectly obvious that in its popular acceptation the word is now very generally, although by no means invariably (as when we speak of the "drum of the ear"), employed in this narrower sense.

Naturalists have felt the difficulty arising from this diversity of usage, and are accordingly in many cases accustomed to refer to the external ear as the "pinna" or "conch," while that portion of the ear lying within the skull is referred to as the internal ear. There is, however, no uniformity of usage even among writers of this class; and in the ordinary descriptions of mammals the term "ear" relates only to the external portion of the apparatus, as when we speak of the long-eared bat or the long-eared fox.

As already mentioned, it is in this more restricted signification that the word is employed in the present article. And here it may be remarked that mammals (or quadrupeds, as they are commonly called) are the only animals that possess ears, in this sense of the term; the so-called ears of the long-eared and short-eared owls being merely tufts of feathers, in no wise representing the mammalian ear. Curiously enough, this peculiarity is not given as one of the distinctive characteristics of mammals in at least many textbooks.

Not that all mammals have ears (in the present sense of the term). To a certain number of species, owing to peculiar modes of existence, such appendages would obviously be not only inconvenient, but absolutely useless, and they have accordingly been more or less completely discarded. The sea bears and sea lions (Fig. 1), which spend much of their time out of the water, are of special interest in this respect, as demonstrating that all earless mammals must be descended from ancestors with well-developed external ears. In the case of these sea bears and sea lions (hence collectively known as the "eared seals") the ears exist as tiny rudiments, which can be of no possible use to their owners, even when on land. Their presence suggests, however, that these animals have taken to an aquatic mode of existence at a later period than the true or typical seals, in which all traces of the ear have disappeared, as they also have in their cousins, the walrus. Whales, porpoises, dolphins, and their like afford other examples of aquatic mammals in which the ears have been completely lost; while the aperture of the internal ear is reduced to little more than the size of a pinhole. Not that we are to assume that whales and dolphins cannot hear; on the contrary, owing to the great sizes and peculiar shell-like form of the bones of their internal ears, it is perfectly clear that their powers of hearing must be very strongly developed, although it is by no means improbable that the vibrations of sound may be received and conducted from the water by the general surface of the body to the special organ of hearing.

Sea-cows, or dugongs, and manatees may be cited as other examples of aquatic mammals which have lost their ears; and since these creatures have no sort of relationship to whales and dolphins (beyond the fact that both are members of the mammalian class), it is quite clear that the loss has taken place independently in the two groups. The Australian duck-billed platypus is an exclusively fresh-water mammal in which the ears have completely disappeared; and other instances of the same nature are displayed by certain shrew mice inhabiting the streams of Tibet, as well as by some curious water mice from those of the Andes. In all these instances the loss of the ears has, of course, taken place quite independently.

Animals like the otter and the sea otter, which spend as much of their time out of the water as in it, present, as might have been expected, an intermediate condition in the matter of ears, these being smaller and more rounded than in many of their purely terrestrial relatives.

The loss of the ears is, however, by no means confined to aquatic mammals, as such appendages would

be just as much in the way, and every bit as useless, in the case of burrowing animals. Accordingly, we find that the ears have vanished in the moles of the northern hemisphere, in the golden moles of southern

the absence of close relationship between any of them (some being very widely sundered indeed) affords conclusive evidence that in each instance the loss of the ears has been an independent adaptation to the needs of a special mode of existence.

On the other hand, in burrowing animals which pass only a portion of their time underground we find very variable conditions of ear development. For instance, in the curious scaly anteaters, or pangolins, of Asia and Africa—creatures which look more like reptiles than mammals—the ears are very small, indeed, and must be almost useless. Accordingly, it is natural to suppose that these anteaters spend a large portion of their time in their burrows, as indeed appears to be the case. Again, in many of the South American armadillos, which may be found at all hours of the day above ground, although most, if not all, of them are burrowers, the ears are, on the contrary, very strongly developed, being in one instance so large as to have earned for their owner the name of *mulita*, or little mule. The ears are still larger in that most remarkable animal, the African ant bear, or aard-vark, which spends the whole of the daylight hours deep down in its burrows, but wanders abroad at night in search of the white ants on which it feeds. During its nocturnal wanderings large ears are probably essential to its safety; and when in its burrow these appendages must doubtless be in some manner folded back so as to be out of harm's way.

Within the limits of particular groups, large ears may be taken, as a rule, to indicate either great powers of hearing or the necessity of catching every wave of sound. Thus, forest-dwelling animals generally have much larger, and especially broader, ears than their relatives inhabiting open country. An excellent instance of this is afforded by the okapi of the Semliki forest, as contrasted with the giraffe of the more open districts of Africa—the ears in the one case being excessively broad and leaf-like, while in the other they are comparatively narrow and pointed. Similarly, Grevy's zebra, which inhabits scrub jungles in Somaliland and northeast Africa generally, has much larger and wider ears than the ordinary zebras of the open veldt.

In the larger hoofed mammals, coming under the designation of "big game," there is great variety in the size of the ears, which is not always easy of explanation, although it is probably connected in a great degree with the nature of the ground they inhabit. Remarkable contrasts in this respect are afforded by the reed bucks of Africa (Fig. 2) and the wild sheep of Central Africa (Fig. 3), the ears being as proportionately large in the one instance as they are small in the other. As implied by their name, reed bucks frequent the dense reed brakes fringing many of the African rivers, and have, therefore, to depend in great part for safety on the acuteness of their hearing. Wild sheep, on the other hand, dwell on the open mountain plateaus, and rely chiefly on their senses of sight and smell for warning of the presence of enemies. It has, indeed, been suggested that the great spiral horns of the wild sheep of Central Africa act the part of megaphones in conducting sound to the small ears; but this theory not only requires proof, but is probably altogether unnecessary. Rhinoceroses (Fig. 4) are remarkable for their tube-shaped ears; this is, however, only an ultra development of what occurs in the case of the horse. Among the smaller mammals, mention may be made of the desert-dwelling Yarkand jerboa and the African long-eared fox and fennec (which are also inhabitants of open country) as species furnished with enormous ears. In these animals, as in other long-eared species, the size of the ear is correlated with a great development of that portion of the internal organ of hearing technically known as the bulla (= bubble), which appears on the under surface of the skull as a bubble-like shell of bone. It might be thought that the long ears of the species just mentioned controvert what has been mentioned with regard to such a feature being characteristic of forest-dwelling animals. That rule applies, however, only to large mammals, which are able to see considerable distances; small creatures being deprived of this advantage and, therefore, requiring the aid of hearing to protect them in their exposed haunts.

The creatures that have proportionately the largest ears of all are certain kinds of bats, such as the European long-eared bat and the Indian false vampire, the ears in these cases being furnished with an additional internal organ known as the earlet. The value of long ears to nocturnal flying animals like bats is, of course, self-evident. It is, however, noteworthy that many kinds of bats, such as the horseshoe bat, are furnished with peculiar leaf-like organs on the muzzle, which probably enable them to find their way in the darkness without, or with little aid from, the sense of hearing; and among such species we accordingly find that the size of the ears is moderate. Certain bats are altogether peculiar in that the two ears are united for a greater or smaller length at their bases on the crown of the head.

In the great majority of the larger animals the ears

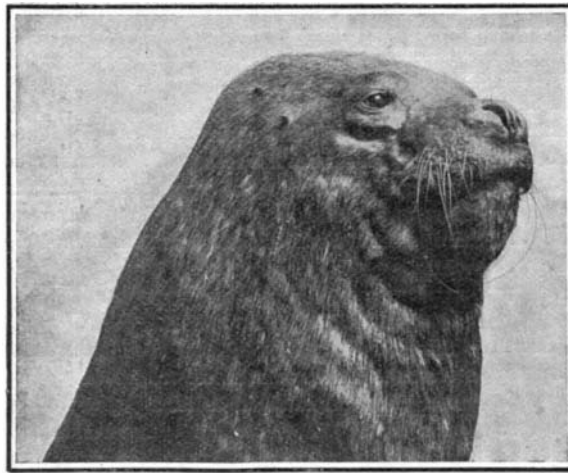


Fig. 1.—HEAD OF SEA-LION, SHOWING THE RUDIMENTARY EAR.

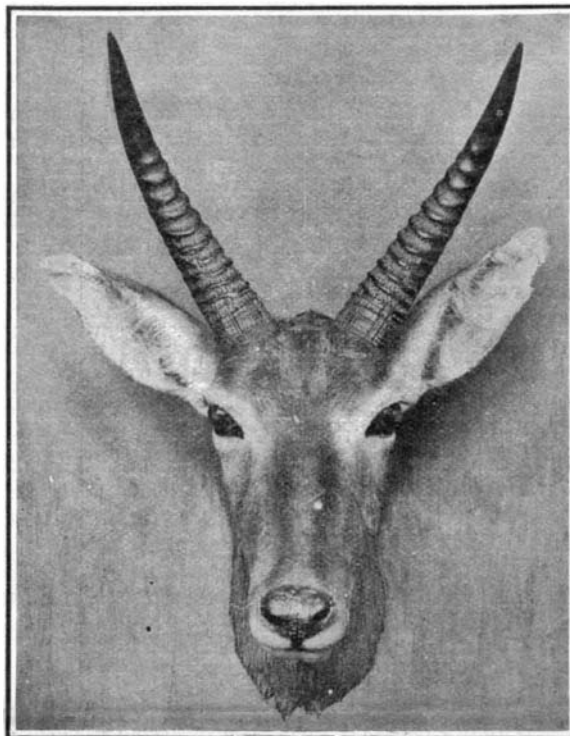


Fig. 2.—THE LARGE EARS OF THE REED BUCK.

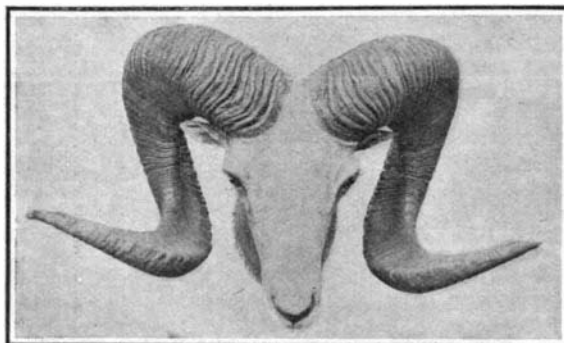


Fig. 3.—HEAD OF WILD SHEEP, SHOWING THE SMALL SIZE OF THE EAR.

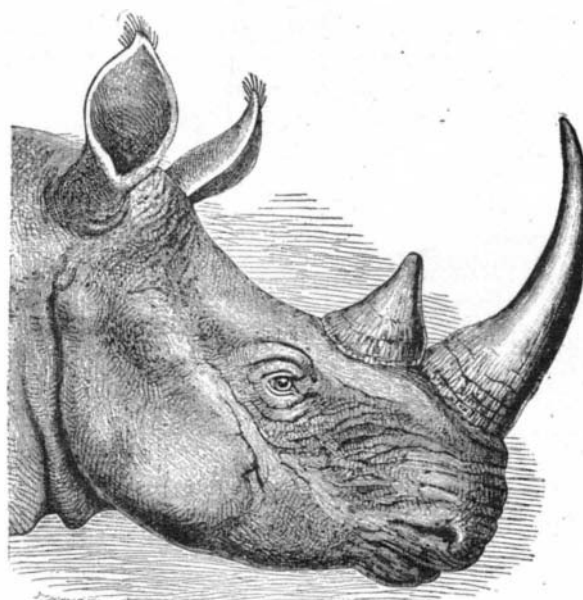
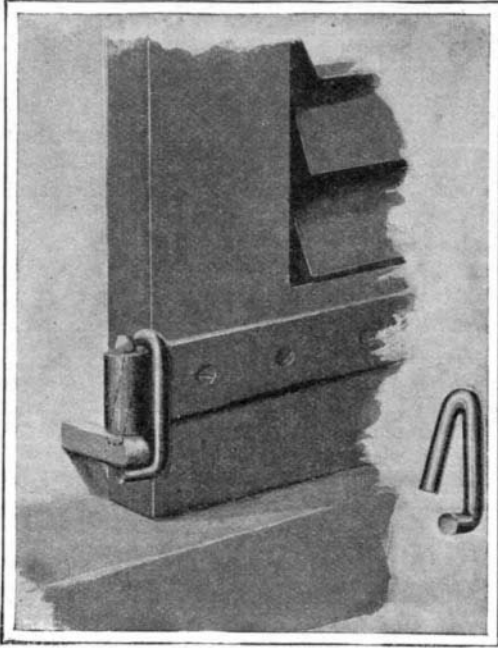


Fig. 4.—THE WHITE RHINOCEROS HAS A CURIOUS TUBULAR EAR.

and eastern Africa, in the marsupial mole of Australia, in the great strand mole of Cape Colony, and in the tiny and repulsive-looking naked sand rats of Somaliland. All these creatures, it should be observed, pass practically the whole of their lives underground; and



conform more or less to the ordinary conical and pointed type. A modification of this type also obtains in the lemurs of Africa and Asia; some of which—the African galagos—share with certain bats the power of folding up their ears when at rest. On the other hand, when we reach the higher monkeys and apes, we find the ears assuming that flattened and depressed form characteristic of the human species, this type

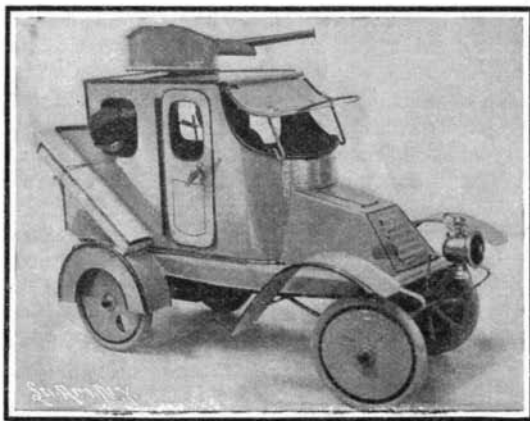


WINDOW-BLIND GUARD.

being probably the one best adapted to an arboreal existence, at any rate in the case of comparatively large animals.

Adaptation to a life spent in the forest, where upright ears on the top of the huge head (which is used in pushing a way through the thickets) would be inconvenient and liable to injury, must probably be regarded as the reason why elephants have acquired ears of a flap-like and depressed type. No diminution in the power of hearing is, however, thereby induced, for when an elephant scents danger it immediately cocks its huge sail-like ears, and thus catches every available sound vibration.

If proof were needed that the size and upright position of ears is correlated with the necessity of catching all possible waves of sound, we have it in the fact that among domesticated animals there is a tendency for these appendages to drop, or "lop," as in the case of spaniels and rabbits. That the ears of spaniels and "lop-rabbits" tend to grow to a great size, has nothing to do with the argument, the excessive development in these cases being due, as in the tails of



A Toy War Automobile.

domesticated sheep, to a kind of degenerate or retrograde action.

In this it has been possible to refer to a few only of the most salient points connected with the ears of mammals. The observant reader, when his attention has once been directed to it, will, however, not fail to find the subject an attractive one, wherein he may find a field of wide interest.

#### NEW TOY AUTOMOBILES.

BY OUR PARIS CORRESPONDENT.

There has been held at Paris, during the last six years, an annual toy exhibition which is organized by M. Lepine, the Prefect of Police, and is intended to bring out the most interesting novelties of the year. Inventors, and especially the small manufacturers of toys, are encouraged by the models exhibited and the prizes which are awarded, and by the fact that the leading toy dealers visit the show and take up anything that seems novel. As Paris has a



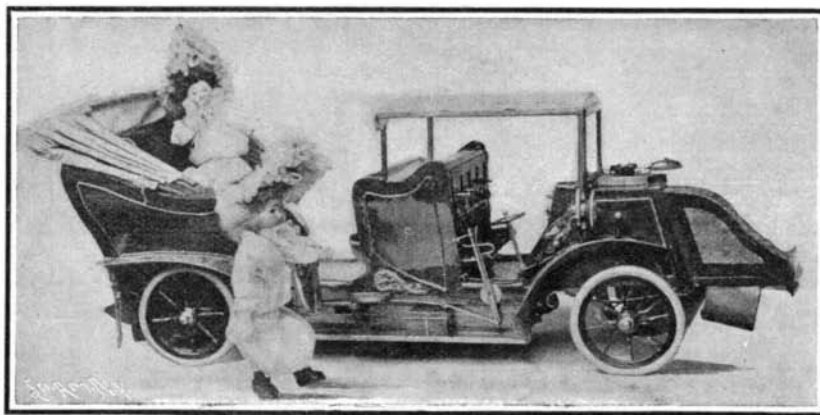
The Collapsible Automobile Wrecked.

very large trade of this character, the show is now recognized as one of the features in developing the industry. Seeing that the public is having its attention directed more and more toward scientific and mechanical progress, such as airships, automobiles, and the like, it is only natural that mechanical toys should figure somewhat prominently at the present exhibition. We illustrate some of the designs which attracted the greatest attention. One is a very ingenious device in the shape of a collapsible automobile, which is so built that it will run for a certain distance at a high speed and then suddenly collapse, throwing the chauffeur out and giving an excellent imitation of a real motor accident. Another is a model of a large-sized touring car, and the third a model of the Charron-Girardot-Voigt war automobile.

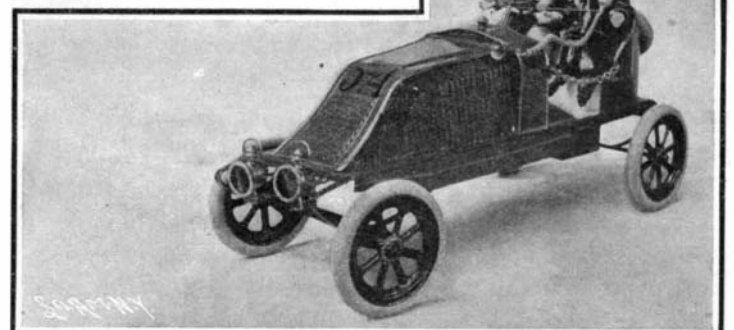
#### WINDOW-BLIND GUARD.

The fact that the ordinary hinges used on window blinds and shutters are inadequate for the office they serve, is often demonstrated in a high wind by the unhinging of a blind. In the usual construction it is the weight of the blind which keeps the hinges in place, and no provision is made for retaining the blind when the latter is accidentally lifted. To remedy this deficiency, a simple device has been invented, which may be attached to any blind hinge of standard make to guard against dislodgment. This window-blind guard is illustrated in detail in the accompanying engraving, which also shows the device in position on a shutter hinge. The hinge comprises the usual hanger, whose spiked end is driven into the window casement or the wall of the building. The hanger carries a pintle adapted to enter the eye or sleeve of the leaf hinge, which is attached to the blind. Between the sleeve and blind the guard is applied. The guard is made of stout wire bent to form a hook at the upper end, which hooks over the upper edge of the leaf. The lower end of the wire is formed with a finger, which projects approximately at right angles to the body of the guard. This finger is adapted to engage the under side of the hanger, thus preventing the leaf from being lifted off the pintle. The illustration shows the blind in closed position, and it will be evident that the blind may be opened without interference from the guard, whose finger will merely rotate with the leaf hinge while the blind is being swung open. A patent on this improved window-blind guard has just been granted to Mr. Louis D. Richardson, 789 Cranston Street, Providence, R. I.

A novelty which has been brought out during the present season consists of a skate which folds so completely that a pair may be carried in a man's pocket or a lady's muff. On the foot the folding skate has much the same appearance as the ordinary one, but upon being removed the portions by which it is attached to



A Model of a Comfortable Touring Car.



The Machine Before the Wreck.

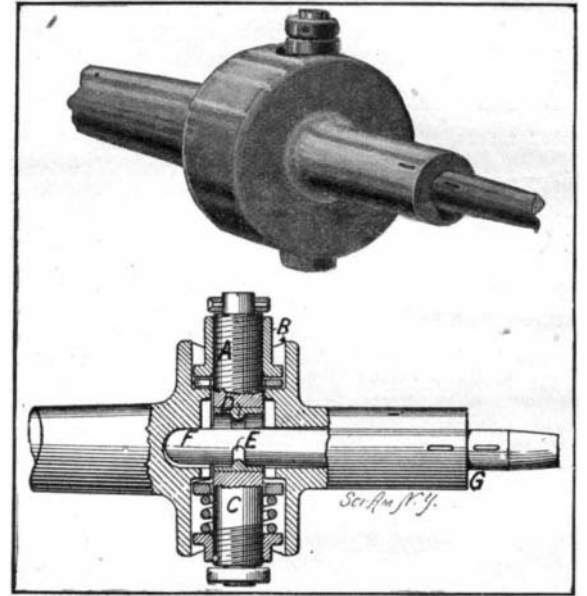
#### NEW TOY AUTOMOBILES.

the shoe are foldable so that they occupy a position parallel to the blade. Thus they form a flat shape less than a half-inch in thickness. A wallet is furnished with each pair, one skate being fitted into each of the pockets. It makes a parcel less than an inch in thickness and of a length slightly greater than that of the skate.

#### CHUCK FOR ROCK DRILLS.

The accompanying engraving illustrates a chuck of novel form adapted for holding rock drills with sufficient yield to prevent their breaking under pounding or jarring strains of the driving mechanism. The chuck is of such form that the drill may be quickly placed and securely held between two opposed springs.

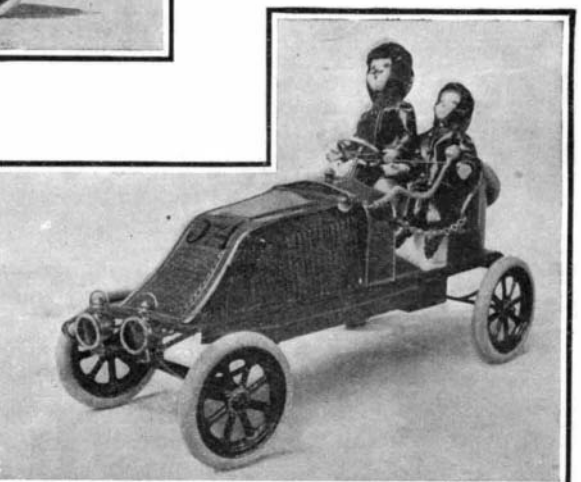
One of our views shows a section of the chuck. It



CHUCK FOR ROCK DRILLS.

will be observed that the chuck comprises a tubular member formed with a circular enlargement. In the circular enlargement a transversely extending chamber is provided. Fitted into this chamber is a stud A, threaded at its upper end to receive a nut B. Between this nut and shoulder in the chamber is a split spring washer. In an opening in the stud A is a sleeve D, formed with a central rib, which is adapted to engage a groove E in the drill shank. The lower end C of the stud is threaded to receive a nut, and between this nut and a washer which bears against a shoulder in the chamber, is a coil spring. Collars are provided at opposite ends of the stud to prevent entire removal of the nuts. The latter are loosened when it is desired to insert a drill in the bore of the chuck.

The chuck and drill are provided with notches, which are adapted to be brought into alinement when the drill is inserted, so as to bring the groove E in proper position. The bore is slightly tapered to a larger diameter at its outer end. The nuts on the stud are now screwed down against their respective springs, and as one of the springs is stronger than the other, the shank of the drill will be pressed by the rib of sleeve D to the position illustrated, with the inner end bearing against the upper side of the bore at F, and the outer end bearing against the lower side of the bore at G. When the drill is in use it will yield against the action of the springs, and thereby serve as a cushion to take up any lateral strains which are imposed upon it. A patent on this improved



drill chuck has recently been granted to Peter McKay, of Day Dawn, Murchison, Western Australia.

Cork forests exist in several parts of Morocco, and when order is established, and the cost of transport is lessened by the construction of roads and bridges, these forests may well be turned to profit.