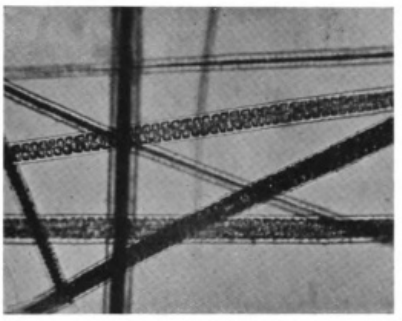
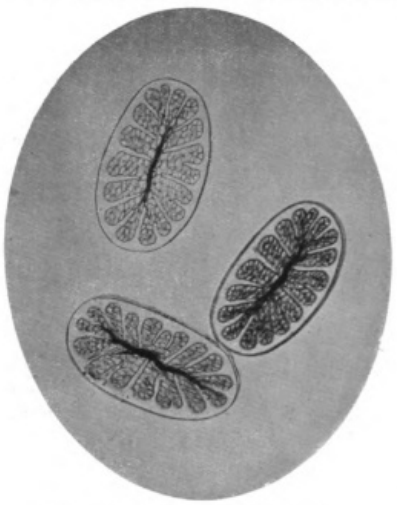
THE HAIRS OF MAMMALS.

WHEN the hairs of various kinds of animals are examined under the microscope, the remarkably varied nature of their structure is very noticeable. Even if the specimens have had no preliminary preparation for microscopic inspection they are extremely interesting objects, but when carefully prepared and mounted afford unlimited scope for investigation. Generally speaking the hairs of mammals present much the same appearance to the naked eye, the chief distinction being found in size and colour. This apparent similarity is observable also in birds in the early stages of their existence. With very young birds the body is often covered with hair, or, as it is termed, "down." This down merely serves the purpose of keeping the possessor warm, and in course of time is gradually replaced by feathers, which, in addition to being a protective covering for the body, are necessary for the purposes of flight.



ENGLISH SQUIRREL.

The distinction between the hairs of mammals and the feathers of fully-fledged birds is not so great as would appear at first sight. The quills of the porcupine and spines of the hedgehog, for instance, bearing a close resemblance to the quills of feathers, form connecting links between feathers and hairs.



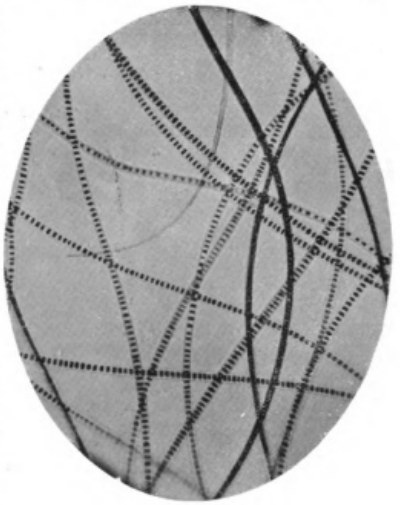
SECTIONS OF PECCARY HAIRS.

At present, however, we have only to consider the hairs of mammals. These hairs, when closely examined, differ to an enormous extent in both external and internal structure, and from the physiologist's standpoint range from the horns of the rhinoceros to the finest wool. The formation of hair takes place in a depression in the skin, which is known as the hair follicle. The hair is kept firmly in position in the follicle by a swelling at the base, which is termed the "bulb." Hairs are composed of two distinct parts, the cortex or exterior substance, and the medulla, or central portion. The cortex is composed of closely-connected horny scales of flattened and elongated shape. These scales overlap each other, but are so closely connected that, as a rule, no division is perceptible, even under the microscope, except in a prepared specimen. The scales can be separated by immersing the hair for some time in dilute sulphuric acid. An illustration of a hair which has been treated by acid is given here; the scales of the cortex are seen separating from the medulla.

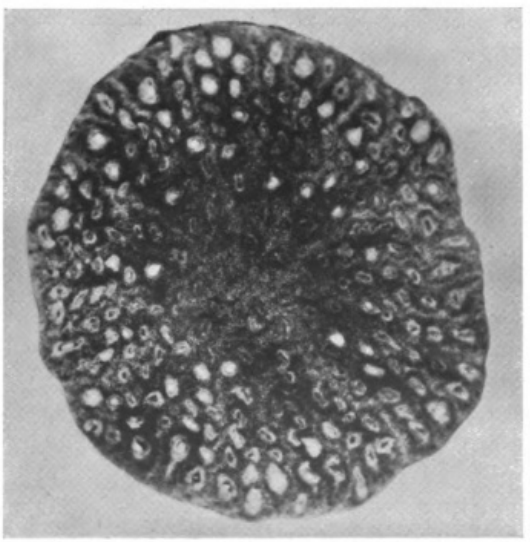
The cortical portion gives the colour, strength, and flexibility of the hair. The medulla or pith is of less dense structure; the cells generally contain globules of fat, but are sometimes filled only with air, in which case they appear black when viewed under the microscope. The cortical is generally the largest portion of the hair, but in some cases the medulla is of considerable width, and the cortex forms a comparatively thin envelope to the pith.

One of the most striking deviations from the general nature of hairs is to be found in the quill of the porcupine, which is constructed to serve the purpose of a formidable defensive weapon. The quill is of close texture on the outside, the interior being of a more open structure. This formation gives both strength and lightness to the spine. A photo-micrograph of a section through a porcupine's quill is reproduced here; in appearance it is not unlike a section of the stem of a plant.

A curious form of hair is found in the bat tribe. The cortical cells project from the hair at regular intervals. This projection is seen in the accompanying photograph of the hairs of an English bat. The hair of the Indian bat has a still more striking appearance; the projecting scales form a series of points arranged in circles at regular intervals round the hair. The hair of the elephant is of a very large size, and has an easily-recognised structure. As will be seen in the photograph of a transverse section, it seems to be composed of an amalgamation of several hairs. The hair of the American wild pig or peccary has also a very interesting and well-defined structure, the medulla being penetrated almost to the centre by the cortex at regular intervals, in a somewhat similar manner to the quill of the porcupine. A photograph of some transverse sections of peccary hairs is included in our illustrations. The hair of the squirrel is another interesting object. The medulla in this case is exceptionally large; the cortex forms a thin covering, which at short intervals pierces to the centre of the pith. In the hair of the rabbit the medulla is completely divided at regular intervals by the cortex. An illustration of a tiger's hair in course of disintegration by sulphuric acid is given to show the separation of the cortical scales. Another photograph showing the normal appearance of a tiger's hair is also reproduced.

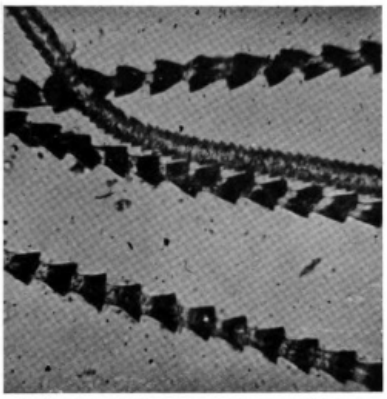


WILD RABBIT.



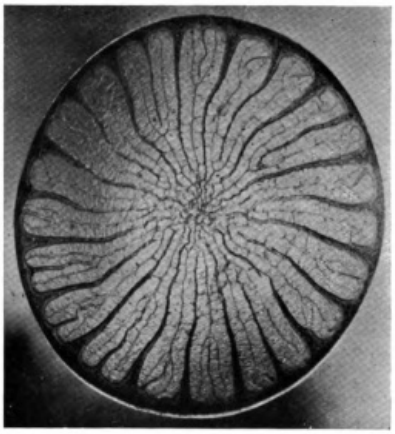
HAIR OF AFRICAN ELEPHANT—TRANSVERSE SECTION.

The horn of the rhinoceros when examined under the microscope is found to consist of what is practically a bundle of hairs. The horn is of cuticular growth, and is not composed of bony

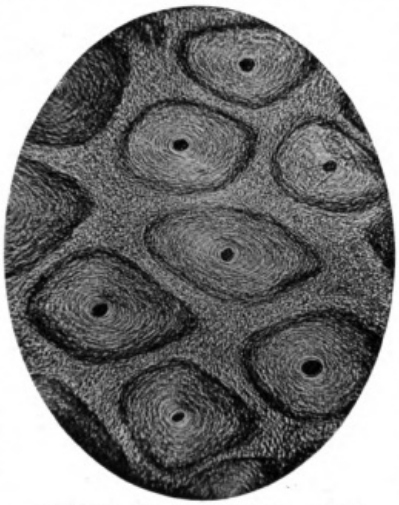


ENGLISH BAT.

material like the horns or antlers of the deer tribe. The horn of the prehistoric rhinoceros is in consequence missing when the skeleton of the animal is found. The rhino horn, however, though unable to stand the ravages of time, was impervious to the teeth of wolves and hyenas, and skulls have been found indented with the marks of the teeth of these animals, with the exception of a clear space on the skull where the animal's horn had defied the scavengers' jaws. A transverse section of a piece of rhinoceros horn is reproduced here. The mass of hairs of which it is composed is plainly seen in the illustration. The division of the medullary and cortical portions is very marked, the medulla being of small size in comparison with the cortex. J. I. PIGG.



PORCUPINE QUILL.



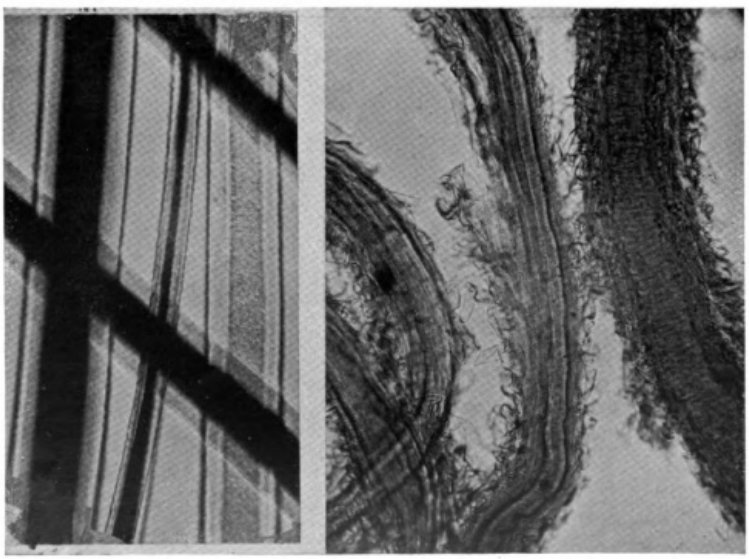
PORTION OF RHINOCEROS HORN.

IN THE HAUNTS OF THE BITTERN.

THE arrival in these islands of a select company of bitterns, duly signalised by the shooting of specimens of them at various places in the country, has served to call attention to the fact that what we term the common bittern is now but a rare visitor to the British Isles. Inasmuch as the bird in question is known to us as the common member of the genus only serves to accentuate the lamentable fact that it was in the past a frequent denizen of the marshlands of the country. That it is so no longer is due to many causes, which may be succinctly set down under the headings of persecution on the one hand and drainage upon the other. Whether it is ever likely to re-establish itself in any suitable quarters which may be still open to it, is very doubtful, and the shooting of the few which have, by design or accident, visited our shores this winter, is not calculated to exercise any serious effect upon the matter one way or the other. It is generally thought that the few which have come were blown over here from Holland; but this is probably incorrect, as bitterns once set down in the land of dykes and canals would not be likely to be so high in flight as to be driven over the North Sea. The greater probability is that these were members of very long flights from much further north and east, which were making their way to warmer and more favoured localities, and were driven beyond the intended limits of their migration.

The food of the bittern is of such a nature that a spell of severe frost speedily reduces the supply of it to vanishing point; but, inasmuch as these birds invariably leave any favoured haunts which it is usual for winter to bind in a frozen covering, before the frost sets in, it is only unusual happenings which would compel them to long flights at the present time of year. These haunts are essentially marshlands, and the more pronounced they are in the characteristics chiefly associated with country of this description, the greater the favour in which they are held by this bird. Nowadays, even in the most remote of our fenlands, we have none of the essentials which captivate the bittern. The fens retain to some extent the features, but they have lost the atmosphere, of true marshland, no longer exists. The solitude unbroken save by the hoarse cry of bittern The angler, the gunner, the all-slaughtering naturalist invade the privacies of the fens, the shriek of the locomotive, and the throb of the steam-launch are over the lands and the waters. To a not insignificant extent, the same may be maintained with partial truth of many other marsh and fen lands of the Continent. It is necessary nowadays to go very far afield to discover the bittern serene and secure in haunts of the character and surroundings which may be claimed to be its own.

The vast marshes of the lower Danube are the paradise of the bird. Here is everything which the heart of bittern, common or otherwise, can possibly desire, and here you can see, and watch, and study the curious bird under circumstances such as no Western European country can possibly offer. Miles upon miles of silent tortuous waterways threading their course through luxuriant growth of reed and rush, anon opening into wide lakes and lagoons, anon losing themselves in the greater channels of the main river. Willows of every age and size fringe their banks or spread out into woods over the lands of the marsh. As the spring flood water ceases to rise, stays at its highest level, and then drops as quickly as it rises, the bitterns arrive; not by tens or hundreds, but by thousands, until almost upon every willow, upon every stump, upon every knoll of dry ground standing out from the waste of rushing, swirling, eddying flood may be seen the seemingly stolid but actually keen and watchful figure of the bittern. With long neck sunk beneath the hunched-up wings, the beak hung upon its breast, its lengthy legs bent beneath, the piercing eye, however, ever intent, ever watching, the bird offers but a reverse idea of what it is when standing erect, or rising in flight. No one who sees a bittern for the first time dead, extended upon the ground, would recognise it as the same bird as it stands sentinel by the creek-side. As one passes up these Danube waterways, following them from their point of egress to the main river, it is almost an unbroken solitude which is encountered. There is nought to remind of the outer world beyond, nought to be seen but the wild bird life, the wild marsh nature within. At the time of flood, when first the bitterns arrive, only the fringe of willows marks the course of the creeks from the waste of waters everywhere around. As the flood subsides, and the marsh resumes its summer contour, the water of the creeks sinks beneath the level of the banks, the growth of reed and other marsh



TIGER (NORMAL). TIGER (CORTICAL SCALES SEPARATING).