but are specially numerous on the palms and soles. It is esti­mated that in the palm there are nearly 3000 to a square inch, while in the skin of the back they do not reach 500 to the same area. In the armpits and groins they are very large. Each consists of a single long tube, lined by columnar epithelium, and coiled up into a ball or glomerulus in the subcutaneous tissue, after which it pierces the corium and epidermis to reach the surface at the *porus sudoriferus.* Where the stratum corneum of the epidermis is thick the duct is twisted like a corkscrew as it goes through.

The *glands of Moll* in the eyelids and the ceruminous or wax glands of the ear are modified sweat glands; the former, when inflamed, cause a “ sty.”

Embryology

The skin is derived partly from the ectoderm and partly from the mesoderm of the embryo. The whole of the epidermis and its appendages are ectodermal, and in the early embryo consist of a single layer of cells; later on this becomes double, and the superficial layer is called the *epitrichium,* which, after the sixth month, is cast off and mixes with the secretion of the large sebaceous glands to form the soapy *vernix caseosa* with which the foetus is coated at birth. In the meantime the cells of the deeper layer divide and form the various layers of the epidermis already enumerated. It is held, however, by some observers that part of the epitrichium remains as the stratum corneum. The. mesodermal cells belong to the mesenchyme, and form the fibrous tissue of the true skin as well as the arrectores pilorum muscles and, in the scrotum, the *dartos* layer of unstriped muscle. In the sixth month fatty tissue appears in the deeper parts, and so the fat of the superficial fascia or sub­cutaneous tissue is formed. The nails are said to appear as thicken­ings of the epidermis at about the ninth week, quite at the tips of the digits. Later on they shift to the dorsal side, and in doing so carry the nerves in the nail bed with them. This is the only explanation available of the fact that the ventral nerves to the tips of the fingers encroach on the dorsal area. By about the twelfth week the nails are perfectly formed, but they do not reach the level of the finger tips until the eighth month. The hairs are developed in the third month of foetal life by ingrowths of the stratum mucosum of the epidermis into the corium. During the fourth and fifth months the body becomes covered by fine unpigmented hairs which are known as lanugo; these begin to disappear about the eighth month, but some remain until after birth. On the scalp, however, the hair at birth is often more deeply pigmented than that which succeeds it. The sebaceous and sweat glands, like the hair follicles, are ingrowths of the stratum mucosum of the epidermis into the corium. The former become very large in the later months of embryonic life, and secrete a large part of the above-mentioned vernix caseosa. The develop­ment of the mammary gland from modified sebaceous glands has already been referred to (see Mammary Gland).

For further details see J. P. M'Murrich, *Development of the Human Body* (London, 1906) ; J. C. Heisler, *Text-book of Embryology* (London, 1907) ; Quain’s *Anatomy,* vol. i. (London, 1908).

Comparative Anatomy

In the larval (gastrula) stage of the Amphioxus (lancelet) cilia are present on the surface, and in the superficial epidermal cells of some fishes and amphibian larvae there is a striated layer on the free edge which is looked upon as a relic of ancestral cilia.

*Skin Glands.—*The skin glands of the Cyclostomata (hags and lampreys) and fishes are generally unicellular and secrete slime which protects the surface of the body; the amount of slime poured out by some of the cyclostomes is enormous. Many of these slime cells, from their shape, are spoken of as goblet cells. Some of the tele- ostean fish have poison glands at the bases of their dorsal fins and opercula.

In the mud fish (Dipnoi) and amphibians multicellular spherical glands appear as involutions of the ectoderm. Sometimes, as in the so-called parotids of the toad, these form large masses. Reptiles and birds are singularly wanting in skin glands, though the latter have a large *uropygial gland* at the root of the tail which secretes oil to lubricate the feathers; it is the chief constituent of the “ parson’s nose ” of the fowl. In mammals, except the Cetacea, the sebaceous and sudoriparous glands already described in man are lound; some of the former sometimes attain a large size, as in the inter­digital gland of the sheep, Müller’s gland at the back of the pig’s knee and the suborbital gland of ruminants. In addi­tion to these, special scent-producing glands are often found in different parts, the most remarkable of which, perhaps, are the scent glands beneath the tail of the skunk, while in male monotremes there is a special poison gland in the leg which is connected with a spur in the foot.

*Pigment—* Pigment cells are present both in the dermis and epidermis of fishes and amphibians, and the pigment may be either intra- or extra-cellular. In many cases it is under the control of the nervous system, so that forms like the flat-fish and the common frog can adapt their coloration to that of their background. In animals permanently excluded from the light, pigment is absent. In reptiles movable pigment cells are often found, as in the chameleon, while in birds the pigment is some­times of great brilliancy in the necks and wattles. In mam­mals, as in man, the pigment is confined to the cells of the stratum mucosum layer of the epidermis.

*Scales.—*In the elasmobranch fishes scales are found composed of enamel superficially, and of dentine and bone deeply.

'hey are developed from the epidermis and dermis, and in almost every way resemble the teeth of these animals, which are only modifications of them. The bony basal part of each scale is plate-like, hence this kind of scale is known as *placoid.* In the ganoid fishes, such as the sturgeon, much larger plaques called *ganoid scales* form a complete armature. In the teleos- tean fishes the scales overlap like tiles and are either *cycloid,* having a smooth border, or *ctenoid,* in which the free posterior border is serrated. Existing amphibians are usually remark­able for absence of any skin armour, though in fossil forms (Stegocephala) it was very complete. The reptilian class is specially noticeable for the production of epidermal scales, which undergo many modifications. In the Ophidia they are cast off periodically in one mass as the snake’s slough, while in the Chelonia they form the different varieties of tortoise-shell. Bony structures, developed in the dermis, may underlie these epidermal horny thickenings, and are very strongly developed in the dorsal and ventral bony shields of the Chelonia (carapace and plastron), which secondarily fuse with the true endoskeleton. The armadillo is the only mammal which has a true bony exoskeleton.

*Feathers.—*Birds are remarkable for the possession of feathers, which are highly modified scales. The embryonic or *down feathers* are simple, and consist of a brush of hair-like *barbs* springing from a basal quill or *calamus.* From the whole length of each barb a series of smaller *barbules* comes off like branches of a shrub. The adult or *contour feathers* are formed at the bottom of the same follicles which lodge the down feathers and, by their growth, push these out. At first they are nothing more than enlarged down feathers, but soon one of the barbs grows enormously, and forms a main shaft or *rachis* to which the other barbs are attached on either side. From the sides of the barbs grow the barbules, just as in the down feathers, and these, in the case of the large wing feathers *(remiges)* and tail feathers (rectrices), are connected by minute hooks so that the feather vane, as opposed to the shaft, has a more resistant texture than it has in the feathers of the back or breast. The bird’s moult is comparable to the casting of the scales in the reptiles.

*Hairs.—*Hairs are only found in the mammalian class, and are divided into the long tactile bristles or vibrissae and the smaller hairs which maintain the warmth of the body. In some animals the hair of the body is composed of long, stiff hairs, which are probably