

CHAPTER VII

THE RESPIRATORY ORGANS

The Larynx and Trachea. In the Crocodilia the framework of the larynx consists of three cartilages, of which two represent the arytenoids of the Mammalia; the third represents the thyroid and cricoid of mammals. The last is considerably larger than the first and is a broad closed ring, differing in form in the different species. In spite of the fact that some of them have a voice, the vocal cords, according to Bronn, are wanting in the Crocodilia. According to Henle the vocal apparatus is produced by the projection into the laryngeal cavity of the inner border of the small arytenoid cartilages and by the infolding, under these cartilages, of the mucous membrane of the larynx; this forms the thick but fairly free folds that, when the glottis is narrowed, are well adapted to produce the harsh tone of the animal.

The epiglottis is absent in the Crocodilia.

In many Crocodilia (*C. vulgaris*, for example) the trachea, Fig. 57, tr, forms a loop which begins in some species before hatching, in other species not

until long after hatching. In the genus *Alligator* the trachea is straight.

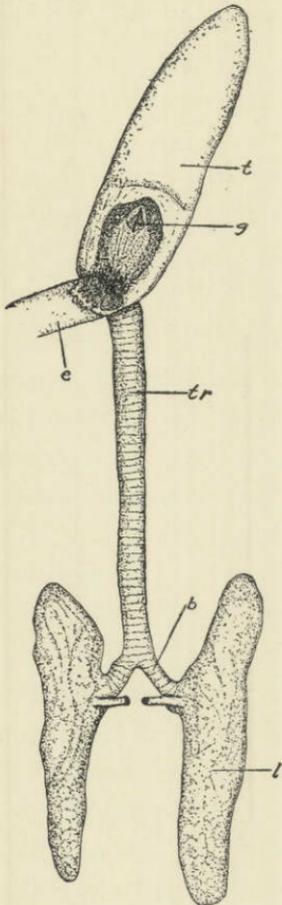


FIG. 57. RESPIRATORY ORGANS.

b, bronchus; *e*, oesophagus; *g*, glottis; *l*, lung; *l*, tongue; *tr*, trachea.

More universal than this looped structure there is found another peculiar structure in the crocodilian trachea. It is a short vertical partition in the stem just before its division into the two branches. This partition is partly membranous and possesses one or more stiffening cartilaginous strands which are outgrowths of so many cartilaginous rings of the trachea. The number of the stiffening fibers varies in the different species.

The number of the tracheal rings varies not only in the different species but also in different individuals of the same species. There are between fifty and sixty in *A. mississippiensis*. According to Rathke the number of rings in the individual animal almost certainly does not in-

crease with age. The number of rings is smallest in the gavials and greatest in the crocodiles (genus *Crocodylus*). The number of rings in the two

divisions of the trachea does not increase with age except, perhaps, in *C. acutus* and *biporcatus*. The lateral bend that the tracheal stem of so many Crocodilia exhibits is not due to the greater number of rings because in some species (gavials) where the bend is present the number of rings is smaller than in the Crocodilia where the bend is absent.

According to Rathke and others most of the tracheal rings are closed, but a varying, though at most small, number are open on the dorsal side. These openings become wider as the larynx is approached. The transverse muscle fibers which are found in the most anterior and largest of these breaks in the tracheal rings were found, says Rathke, in embryos after the middle period of incubation.

The cartilaginous rings of the bronchi, b, are also apparently open for a time after their formation, but soon close. Not infrequently in embryos and in young animals are found rings that are split like a fork, with one or both branches fused with neighboring branches.

The Lungs. The lungs, Fig. 57, 1, are more highly developed among the Crocodilia than among any other Saurian or Hydrosaurian group. The histological groundwork of the whole lung tissue is a connective tissue of fine elastic fibers. In the lungs, on the canal that appears as the elongation of the bronchus, cartilage appears, according to Rathke, as bands lying one behind the other; some of these

bands form complete, others partial rings; some of the latter are forked. The hindermost appear to be the broadest and most irregular. Their number is different in different species and varies in different individuals of the same species. They range in number, according to Rathke, from nine, in *A. lucius*, to twenty-five, in *C. acutus*.¹

The arterial branch, carrying venous blood to the lungs, develops a capillary network close to the alveolar walls, which leads away over the low alveolar septa, while over the tops of the higher septa and on the inner surface of the tube-like bronchial processes it forms a wide-meshed network of capillaries that are apparently chiefly nutrient.

All the respiratory capillaries are attached by only one side to the alveolar wall; the free side that projects into the air space of the alveolus is covered by a continuous pavement epithelium.

While the respiratory surfaces are covered with an alveolar epithelium of large polygonal cells, the free borders of all high septa and ridges, as well as the inner surfaces of the bronchial processes, are covered with ciliated cylindrical cells.

¹ Miller (45c) says: "In the crocodile and alligator the bronchus enters the lung near its center, and passes somewhat obliquely into the lung until it reaches the junction of the lower middle third; here it breaks up into eight to fifteen tubular passages. These tubular passages are studded with a great many air-sacs. In these animals the lung for the first time gives the structure as it is found in mammals. There are many air-sacs which communicate with a common cavity, or atrium, all of which in turn communicate with a single terminal bronchus. A single lobule of the mammalian lung is simply enlarged to form the lung of the crocodile; the lung of the former is only a conglomerate of that of the latter."