

in Birds and Amphibia, and is the common cavity receiving the orifices of the intestinal, sexual, and urinary organs.

In Birds the cloaca usually forms a very wide vesicular dilatation, a continuation properly of the intestinal tube, nearly as long as it is broad, and invested externally to a considerable extent by peritoneum and lined with mucous membrane, a muscular layer being interposed between these two. The rectum enters the upper and anterior part of the cavity, protected by a circular fold, and to the left behind it the oviducts in the female, or the two vasa deferentia in the male, terminate from either side upon papilliform eminences, provided with similar folds; behind these papillæ is found a well-developed plexus of vessels, or rete mirabile. Between and posterior to the orifices of the excretory ducts of the sexual organs, those of the ureters are found in juxtaposition with each other, while behind them is situated a very prominent circular valve, beneath which the bursa Fabricii opens directly by a small aperture; last of all, is the large circular aperture of the cloaca which at the same time constitutes the external anal outlet. The space between the two circular folds guarding the urethro-sexual cavity and the rectum, has been regarded as a rudimentary receptacle for the urine. The penis, when present, arises from the lower wall of the cloaca, where it is either surrounded by folds, or situated, as in the Ostrich, in a special pouch.

The cloaca is closed by a circular sphincter muscle. From the longitudinal muscular layer particular fasciculi are developed, or, as in the large Brevipennes or short-winged birds, muscles of considerable size, which are inserted into the ischium and expand or open the cloaca. Peculiar muscles are connected with those of the cloaca for moving the penis when present, such as an elevator and retractor of that organ.

REFERENCES

TO

THE PRINCIPAL WORKS UPON THE ANATOMY OF BIRDS.

In addition to the list of General Works upon Comparative Anatomy given at page 61, consult the very excellent article AVES by Professor Owen in Todd's Cyclopædia of Anatomy and Physiology, and that of BIRDS by Dr. Macartney in Rees's Cyclopædia; also Tiedemann's Handbuch der Zoologie, Bd. 2, 1810.

Tegumentary System.

Nitzsch's System der Pterylographie, with an Appendix upon the development and microscopic structure of Feathers by H. Burmeister. Halle, 1840, 4to, with 10 copper-plate illustrations.

Schreger de bursis mucosis subcutaneis, 1825, fol.

Osseous System.

Nitzsch's Osteographische Beiträge zur Naturgeschichte der Vögel. Halle, 1811, with two copper-plates.

Pander and D'Alton, the Second Part of their "Vergleichenden Osteologie" contains illustrations of the skeletons of Rapacious and Struthious Birds.

Brandt, Beiträge zur Kenntniss der Naturgeschichte der Vögel. St. Petersburg, 1839, 4to, are rich in osteological details.

Platner, Bemerkungen über das Quadratbein und die Paukenhöhle der Vogel. Leipzig, 1839, 4to.

Earle, in Philosophical Transactions, 1822.

Berthold, Beiträge zur Anatomie, Zootomie und Physiologie. Göttingen, 1831.

Kuhlmann, Dissertatio de absentia Furculæ in Psittaco pullario. Kiliæ, 1842, 8vo.

Owen, Trans. of Zoological Society, vol. 2, monograph upon the Anatomy of the Apteryx.

Bergmann, über die Bewegungen von radius und Ulna am Vogelflügel. Müller's Archiv. 1839.

Muscular System.

Edward d'Alton de Strigum musculis commentatio. Halæ, 1837.

Nitzsch, Artikel Dermorhynchi in Ersch und Gruber's Encyklopädie, Band 24.

Owen, Anatomy of Apteryx, op. cit.

Naumann, Naturgeschichte der Vögel Deutschlands, contains observations, with figures, upon flight of Birds.

Nervous System.

- A. Meckel, in Fr. Meckel's Archiv. für die Physiologie, Band. 2.
 Swan, Illustrations of the Comparative Anatomy of the nervous system, Part 4.
 Thuet, Disquisitiones anatomicae Psittacorum. Turici, 1838, 4to.
 Ritzel, Commentatio de nervo trigemino et glosso-pharyngeo avium. Fulda, 1843, 8vo.
 Schlemm, Observations neurologicae. Berol, 1834, 4to.

Organs of the Senses.

- Soemmerring de oculorum sectione horizontali. Gotting, 1818, fol.
 Krohn, in Müller's Archiv. 1837, upon the structure of the Iris.
 Huschke, Commentatio de pectinis in oculo avium potestate. Jenæ, 1827, 4to.
 R. Wagner, Beiträge zur Anatomie der Vögel in den Abhandlungen der mathematisch-physikalischen Klasse der bayerischen Akademie. München, 1832, S. 295.
 Breschet, Recherches Anatomiques et Physiologiques sur l'organe de l'audition chez les oiseaux. Par. 1836, fol. 8 plates.
 Steifensand, über die Ampullen des Gehörorgans, Muller's Archiv. 1835.
 Huschke, in Müller's Archiv. 1835.
 Windischmann, de penitiori auris in amphibiis structura, contains good illustrations and descriptions of cochlea in the ear of Birds.
 Scarpa, Disquisitiones anatomicae de auditu et olfactu. Ticini, 1789.
 Nitzsch, über die Nasendrüse in Meckel's Archiv. für Physiol. Band. 6.
 Huber, de lingua et osse hyoïdeo pici viridis. Stuttg. 1821.
 Duvernoy sur les organes de déglutition de la classe des Oiseaux et Reptiles, in Mém. de la Soc. d'Hist Nat. de Strasbourg, tom. 1.

Digestive System.

- Rapp. über die Tonsillen der Vögel, Müller's Archiv. 1843.
 L'Herminier in Annales des Sciences Naturelles, 1837 (on craw of Palamedea cornuta).

Organs of Circulation.

- Nitzsch, Observationes de avium arteria carotide. Halæ, 1829, 4to.
 Barkow, Untersuchungen über das Schlagader-system der Vögel, in Meckel's Archiv. f. Anat. und Physiol. 1819.
 Hahn, De arteriis anatis commentatio, Hanov. 1830.
 Lauth, sur les vaisseaux lymphatiques des Oiseaux, in Ann. des Sciences Naturelles, 1825.
 Weber, in Mayer's Aneleken für vergleichende Anatomie, Band 2, Bonn. 1838. (Upon Lymphatic sinus of Cassowary.)

Organs of Voice and Respiration.

- Henle, Vergleichend-anatomische Beschreibung des Kehlkopfs. Leipzig, 1839. 4to.

Yarrell, on organs of voice in Birds, Linnaean Transactions, vol. 16. Observations on trachea of Birds, vol. 15. Ramsey upon tracheæ of Birds, in vol. 4.

Cuvier, in Millin's Magasin Encyclopédique, vol. 2. Humboldt, Beobachtungen aus der Zoologie und vergleichenden Anatomie, Heft. 1.

Savart, in Froriep's Notizen, Band. 16, 1827. Joh. Müller's Schrift über die Compensation der physischen Kräfte am menschlichen Stimmorgan mit Bemerkungen über die Stimme der Säugetiere, Vögel, &c., Berl. 1839.

Eyton, monograph of Anatidæ, Lond. 1838 (figures of inferior laryngeal labyrinth). Retzius, on the cells of the Lungs, in Froriep's Notizen, Bd. 35.

Edward Weber, über den Bau der Lungen und den Mechanismus des Athmens beiden Vögeln. Braunschweig, 1841.

Organs of Secretion.

- Joh. Müller's de glandularum structura, Lips. 1829, fol.
 Nitzsch, Pterylographia avium, Heft 1 (upon Uropygial gland).
 Huschke, de Bursæ Fabricii origine. Jenæ, 1838, 4to.
 Berthold, in novis actis Leopold Acad. tom. 14.

Organs of Generation.

- R. Wagner's Beiträge, &c., supra cit.
 Joh. Müller's Schrift über zwei verschiedene Typen in dem Baue der erectilen männlichen Geschlechts-organe bei den straussartigen Vogeln. Berlin, 1838.
 Geoffroy St. Hilaire, Mémoire du Muséum d'Hist. Nat. tom. 9 (upon the Cloaca).