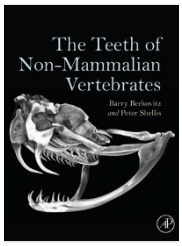
BOOK REVIEW



THE TEETH OF NON-MAMMALIAN VERTEBRATES

Barry Berkovitz and Peter Shellis
2017; Academic Press
price £60.90 pp. 354
ISBN: 9780128028506

This book, by very experienced authors with great understanding of the subject, provides an encyclopaedic knowledge with a large number of beautiful photographic illustrations of every non-mammalian dentition commonly found on this planet. All show the anatomy of teeth in the jaws, as well as their development and a detailed explanation of tooth replacement to illustrate the feature of all types of continuous, biological regeneration found in fish especially, but also in amphibians and reptiles. The types of illustration include whole skulls, close-up photographs of the details of the teeth *in situ,* optical microscopy, electron microscopy, CT tomograms, drawings, diagrams, tables and charts embedded within the text that is a feast for comparative dental anatomy enthusiasts, those needing to teach on diversity of dental adaptations, and those in research activities. References in all sections are comprehensive and extensive, a valuable source for postgraduate students.

The information is arranged in a logical systematic order, even including the jawless cyclostomes with pseudo-teeth adapted for their scavenging and sucker-type lifestyle. Within the groups covered, cartilaginous fish (sharks, rays and chimaeras), osteichthyan fish (holosteans, teleosts) amphibians (caecilians, newts, frogs), reptiles (lizards, snakes, crocodiles) is each given its scientific name as order, genus and species. In addition their diet, feeding and processing the detailed histology of tooth attachment, hinged teeth, and pharyngeal teeth is given. All these sections are luxuriously illustrated including a whale shark with a wide open terminal mouth collecting suspended plankton for processing as filtration through the gills, and a clutch of brooding caecilian embryos surrounded by the long tail of the adult. Within the reptiles, the Iberian worm and Florida mole lizards have illustrations of great clarity, to see adult teeth and their relationships to the bone of the jaw and the typical reptilian joint. The fang teeth of snakes are dealt with in some detail as at least six types of venomous snake are described.

The section on tooth formation is also lavishly illustrated with quality photomicrographs of stained histological sections of their early development and a diagram summarising the molecular signals that regulate these events during each histological stage. In these photomicrographs we can see in amphibians the connection of all the successor teeth, through an epithelial dental lamina, illustrating how these regulated teeth are later used as replacements for the *in situ* teeth.

Tooth replacement and ontogeny of the whole dentition is dealt with in a very thorough way, with details of rates of replacement and the pattern of their replacement at numbered jaw positions. One example in particular stands out as an amazing replacement mechanism and is that of the fish, monk goby, where 27 generations of one tooth position are illustrated from the earliest tooth germ to the one shed from the jaw. This section ends with details on the molecular control of the pattern of the dentition, comparing mouse with human, known as the odontogenic homeobox code for specifying incisors, canine and molars.

The last two chapters deal with the tissue structures of the dentine and pulp with transmission and scanning electron micrographs and photomicrographs, many illustrating the varieties of dentine that make up fish dentitions, including one that is as hypermineralised as enamel, but is formed only from the inside pulpal tissue. The entire book is a very scholarly work, it contains everything one needs to know about teeth in vertebrates below those of mammals, and a reference for anyone in the field of comparative oral biology, through which we can understand and compare and contrast the human dentition.

Moya Smith