In the course of evolution, different animal groups have evolved different mechanisms to aid hatching process. Enzymatic or mechanical mechanism of this process can be distinguished. The mechanical way of hatching involves the tearing of egg sheaths by means of sharp, cuticular outgrowths or egg teeth characteristic for oviparous vertebrates. Due to their origin and structure, vertebrate egg teeth can be divided into two types. The first type present in the embryos of birds, turtles, crocodilians, tuatara, and monotremes is a keratinized structure derived from epithelial cells. The second type of egg tooth found in the embryos of squamates, monotremes, and marsupials has similar structure to that of definitive teeth. The egg tooth of squamates may occur as single, as in most species, or in a double form, as in representatives of Gekkota and Dibamia. The literature review indicates that the process of egg-tooth differentiation in modern squamates is poorly understood. Therefore, the aim of this study was to analyze egg-tooth development in different squamate species and to compare the structure of these structures. Selected squamate species have been used: two representatives of Unidentata - brown anole Anolis sagrei and grass snake Natrix natrix, and two representatives of Gekkota: mourning gecko Lepidodactylus lugubris and leopard gecko Eublepharis macularius. The study was conducted using light and electron microscopy (SEM, TEM) and computed microtomography. On the basis of the performed studies on the differentiation of the egg teeth in selected species of squamates, it can be stated that: each egg tooth of the the studied species arises from a single tooth germ and differentiates directly from the oral epithelium. The shape and spatial orientation of the egg teeth of the studied species change during embryonic development, and these changes are species-specific. The egg teeth of the studied Unidentata representatives (grass snake, brown anole) are implanted acrodontally, whereas the egg teeth of Gekkota (mourning gecko, leopard gecko) are set subpleurodontally. The manner in which the egg teeth are connected to the premaxillary bone facilitates their loss shortly after hatching of the juveniles. The egg teeth of the embryos of the studied species are connected to the premaxillary bone by a ligamentous tissue. Fibers forming the ligamentous tissue in embryos of brown anole and grass snake lie in the vertical axis, whereas in embryos of leopard gecko and mourning gecko they lie in the horizontal axis. The different arrangement of fibers may be related to the different cushioning of forces acting on the egg tooth during hatching. The mechanism that initiates the mineralization of the predentin in the egg tooth of grass snake embryos is different from the mechanism that initiates the mineralization of the predentin in the definitive tooth of mammals. The ultrastructure of the cells that build the enamel organ and the dental papilla of the differentiating egg tooth germ of grass snake embryos resembles the ultrastructure of the cells that build analogous structures of mammalian definitive tooth germs.

Similarly, the ultrastructure of the degenerating cells of the outer enamel epithelium, stellate reticulum, and inner enamel epithelium of the enamel organs of the definitive tooth buds of the grass snake and brown anole resembls the ultrastructure of the stellate reticulum during the early stages of involution. Shortly before hatching, programmed cell death processes occur in the cells of the enamel organ and the dental papilla of the egg teeth of grass snake and brown anole embryos, but the mechanism of this death requires further study. Based on the results of structural studies, the process of egg tooth differentiation of the studied species can be divided into four phases: 1. initiation phase, 2. bud phase, 3. cap phase, and 4. bell phase. On the basis of ultrastructural findings, these phases can be reduced to 3 stages: 1. bud formation (initiation phase and bud phase), 2. bud maturation (cap phase and early bell phase), and 3. preeruptive (late bell phase).