SUMMARY

The sensory olfactory epithelium of the nasal cavity and the vomeronasal sensory epithelium (VSE) are the peripheral parts of the main and accessory olfactory systems, respectively, in tetrapods. The accessory olfactory system is generally well developed in squamate reptiles (lizards and snakes) and is crucial for detection of pheromones and prey odors. Based on their ontogenetic and/or functional associations, the vomeronasal organ (VNO), nasal cavity, lacrimal duct, choanal groove, and associated parts of the superficial (soft tissue) palate are called here the naso-palatal complex. This complex exhibits considerable morphological diversity in squamates, but still little is known about the embryological basis of this variation. Moreover, despite the numerous studies on the developing VSE in squamates, especially in snakes, an ultrastructural analysis, as far as we know, has never been performed.

The aims of the study were: 1. analysis of the naso-palatal complex development in three species of lizards: the brown anole *Anolis sagrei* (Iguania), two members of the Gekkota: the mourning gecko *Lepidodactylus lugubris* (Gekkonidae) and the leopard gecko *Eublepharis macularius* (Eublepharidae); 2. analysis of the vomeronasal sensory epithelium in the grass snake *Natrix natrix* (Colubroidea). Light microscopy, electron microscopy (SEM, TEM) and X-ray microtomography were used in this investigation.

The structural analysis of the differentiating naso-palatal complex of the studied lizards showed that: the origin of the vomeronasal organ and nasal cavity is the same as in other tetrapods, but the lacrimal duct in the brown anole develops largely beyond the nasolacrimal groove; initial fusion of the facial prominences varies across amniotes, including squamates; the subconchal fold is involved in formation of the choanal groove; the lacrimal duct initially connects to the anterior half of the choanal groove, but in the brown anole and leopard gecko this connection gradually increases in later development; the squamate maxillary folds may be homologous to the mammalian palatal shelves, which form the secondary palate; the loss of the lateral nasal concha in anoles (Dactyloidae) is secondary and the loss of this structure might have taken place in the common ancestor of the Phrynosomatidae and a clade containing Dactyloidae and Polychrotidae; the lateral nasal concha of squamates is homologous to the posterior concha of *Sphenodon*, while the anterior concha of *Sphenodon* is homologous to the squamate anterior extension of the lateral nasal concha (anterior part) and the subconchal fold (posterior part); the closure of the choanal groove in anoles (Dactyloidae) may be an adaptation for more effective

delivery of the Harderian gland secretion to the VNO duct; developmental sequences of the early and late developmental phase of the naso-palatal complex in the studied species exhibit the highest evolutionary conservatism; there is no strong embryological support for any of the main squamate phylogenies (morphological and molecular).

The structural and ultrastructural analysis of differentiating sensory epithelium of the vomeronasal organ in the grass snake showed that: different populations of basal cells occur at the base of the differentiating VSE: undifferentiated basal cells, characteristic for the adult ophidian VSE, and, probably, radial glia-like cells, described previously in mouse embryos; the various structure and ultrastructure of neurons located at different parts of the VSE provide evidence for neuronal maturation and aging similarly as in postnatal neurogenesis in the VSE; the incorporation of the more apically located neurons to the receptor cell columns by further undulation of the basal lamina, and thus the intrusion of the connective tissue compartment toward the VNO lumen, beside cell proliferation, may be a major mechanism causing the growth of the columns in the VSE of snakes.