

## 論文の内容の要旨

論文題目 **Analysis of pharyngeal arch patterning by Hox and Dlx genes: evolutionary and developmental implication for vertebrates craniofacial morphogenesis**  
(Hox/Dlx 遺伝子による咽頭弓のパターニングの解析: 脊椎動物の頭頸部形態形成に対する進化発生的な示唆)

氏名 北沢太郎

Pharyngeal Arches (PAs) are segmental structures characteristic of the pharyngula stage of vertebrates. PAs are colonized by neural crest cells (NCCs), migratory multipotent progenitors arising from the anterior dorsal neural tube. Cranial neural crest cells (CNCCs), which originate from forebrain to hindbrain levels of the neural tube, give rise to most skeletal elements of the head. The anterior-posterior (AP) identity of each PAs is specified by the combination of *Hox* genes it expresses. The first PA (PA1) is *Hox*-negative, whereas the second and third PAs (PA2 and PA3) are specified by *Hoxa2* and *Hoxa3*, respectively. In contrast to patterning along the AP axis, their dorsoventral (DV) identity is, at least in part, specified by the *Dlx*-code. The maxillary process, the dorsal part of PA1, is specified by *Dlx1/Dlx2*, whereas the mandibular process, the ventral part of PA1, is mainly specified by *Dlx5/Dlx6*. Despite extensive studies on these homeobox genes in various species, the molecular mechanisms underlying their capacity to topologically specify the body plan remain unsolved. In this paper I analyzed the function of *Hox* and *Dlx* genes in CNCCs utilizing various *Hox*- and *Dlx*-related mutant mice, and dissected their crosstalk in PAs patterning. Through rewriting experiments of the *Hox*- and *Dlx*- codes in PAs, I also revealed developmental and evolutionary origins of the styloid process and tympanic membrane, providing new interpretation of the evolution of the mammalian middle ear.