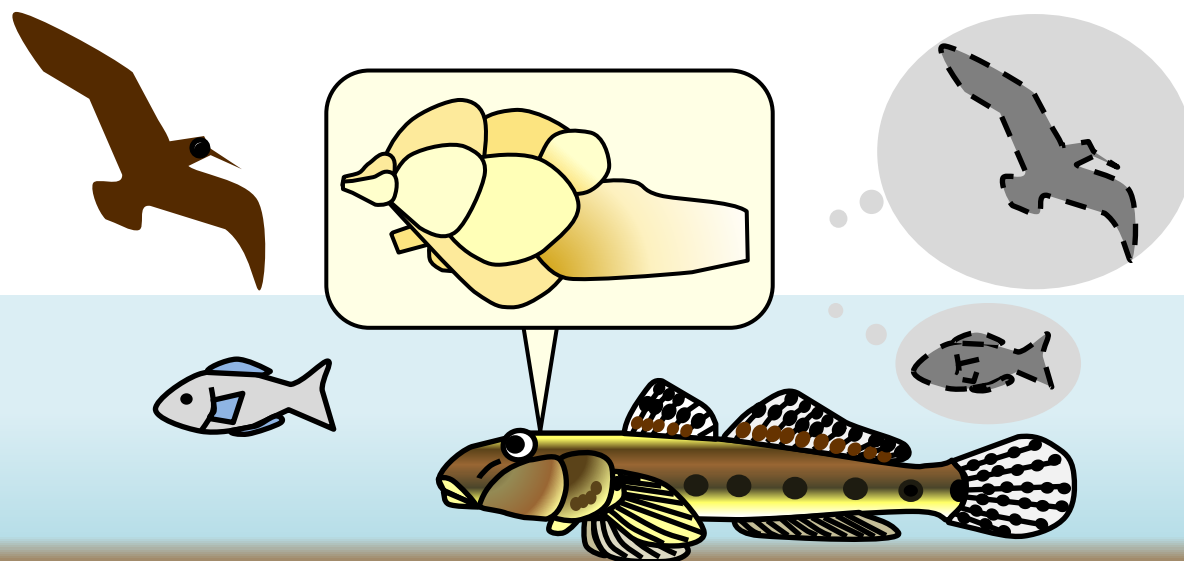


魚の視覚回路の解明、
そして上位レベルの視覚機能解析を可能に

Investigation of visual circuits in the brain of fish
toward the elucidation of higher visual functions



名古屋大学 高等研究院・大学院生命農学研究科
YLC特任助教

萩尾華子 Hanako Hagio

Why study visual pathways?

研究者

他個体や雌雄の認知の仕組みは？

Mechanism for cognition of other individuals, males and females?

漁師

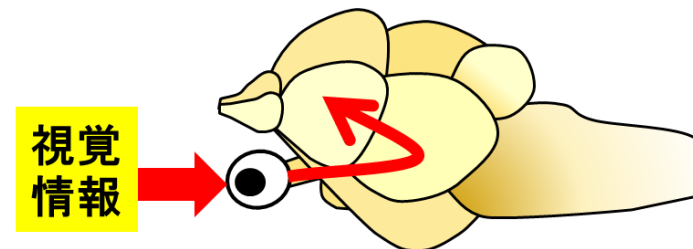
魚の色覚や擬似餌の形をどのように認識？

Color vision and how to recognize the shape of lures ?

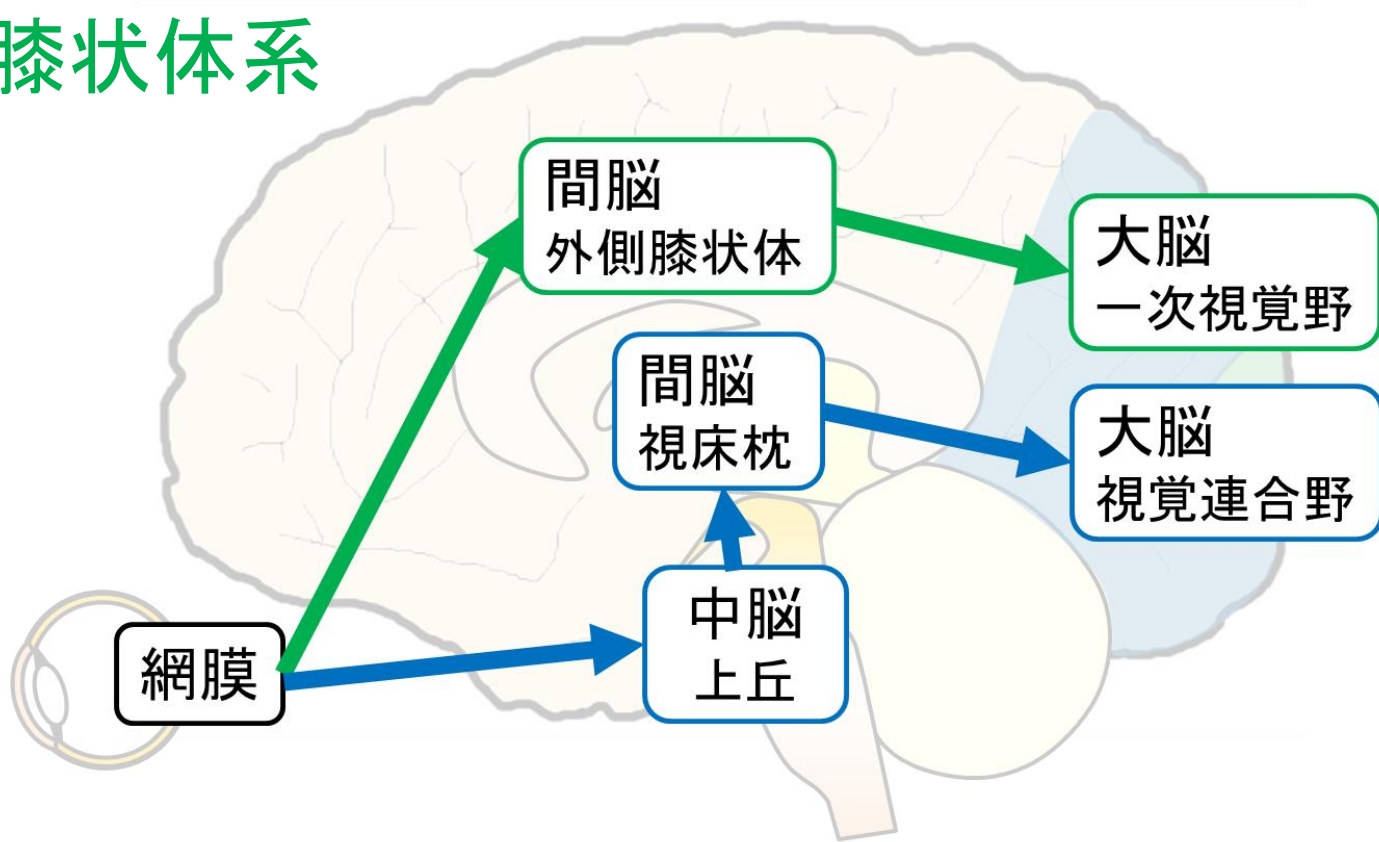
魚の視覚を理解するためには...

網膜から大脳にいたる視覚回路の解明が重要

In order to understand vision of fish,
it is the first step to reveal visual pathways from the retina to the telencephalon.

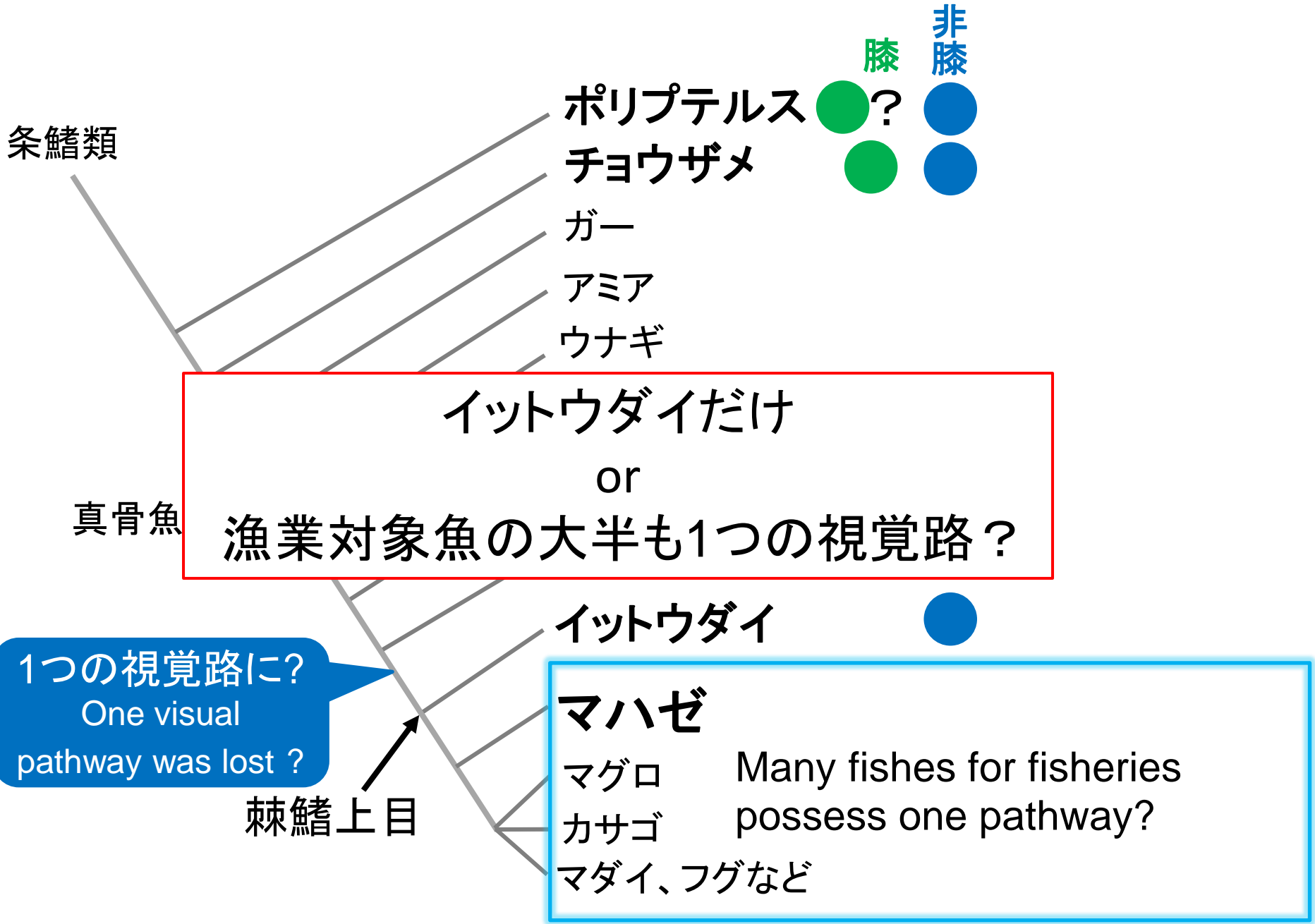


膝状体系



非膝状体系

外敵などを大まかな視覚処理で検出して大脳へ



条鰭類

ポリプテルス



膝
非膝

チョウザメ



ガー

アミア

ウナギ

イトウダイだけ
or
漁業対象魚の大半も1つの視覚路?

真骨魚

イトウダイ



マハゼ

マグロ

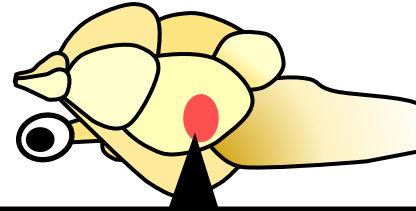
Many fishes for fisheries possess one pathway?

カサゴ

マダイ、フグなど

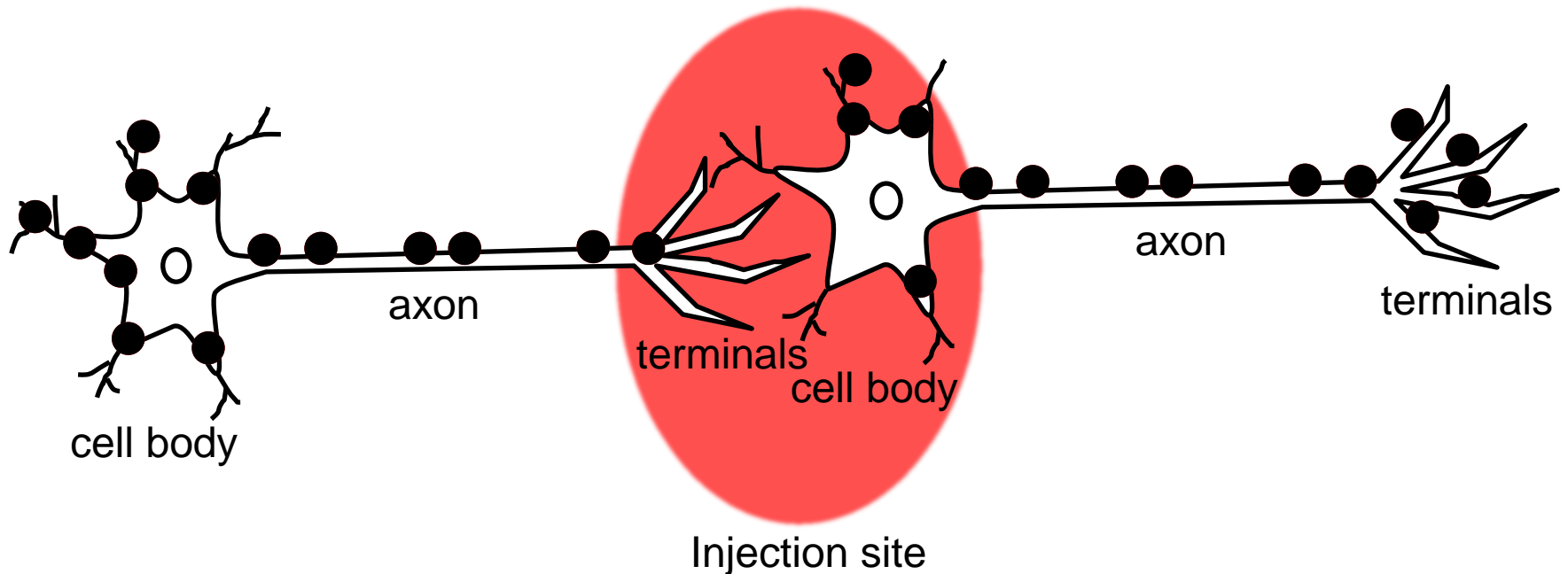
1つの視覚路に?
One visual pathway was lost?

棘鰭上目

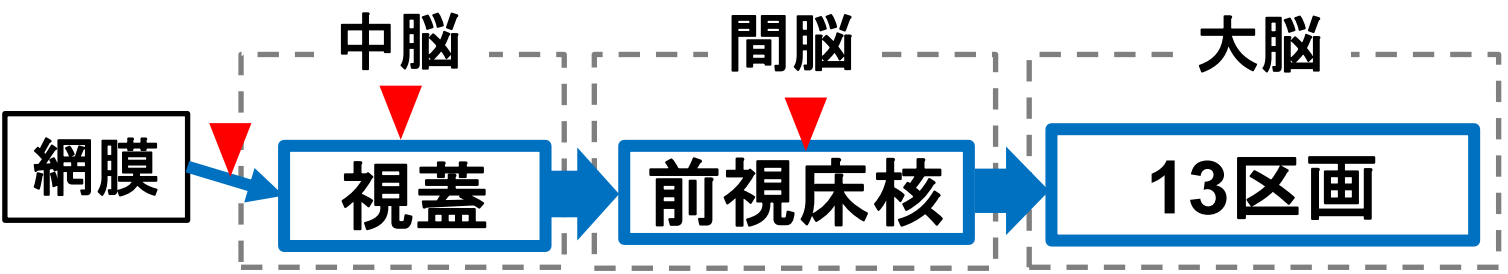


ニューロン(神経細胞)内で運ばれるトレーサー物質を
視神経や脳に注入

Injections of biocytin & biotinylated dextran amine (BDA)
into the optic nerve and brain

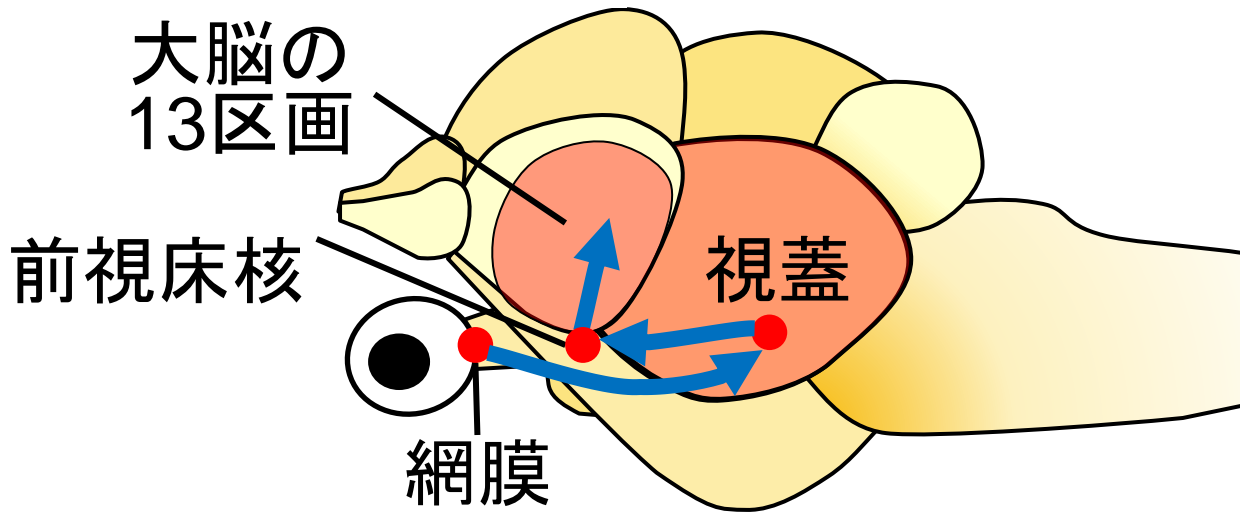
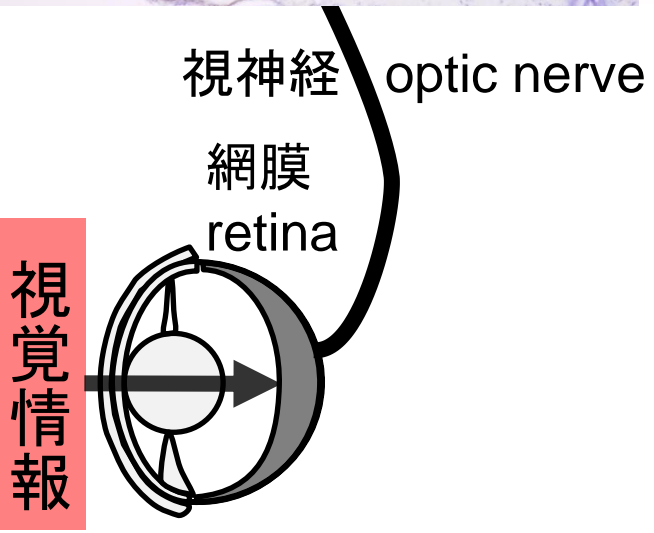
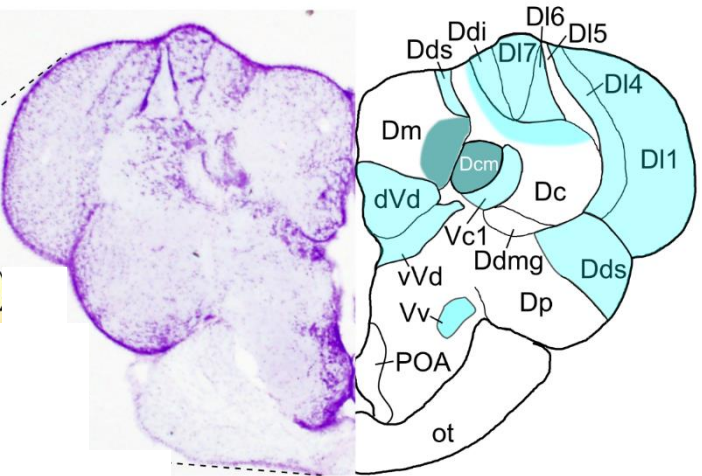
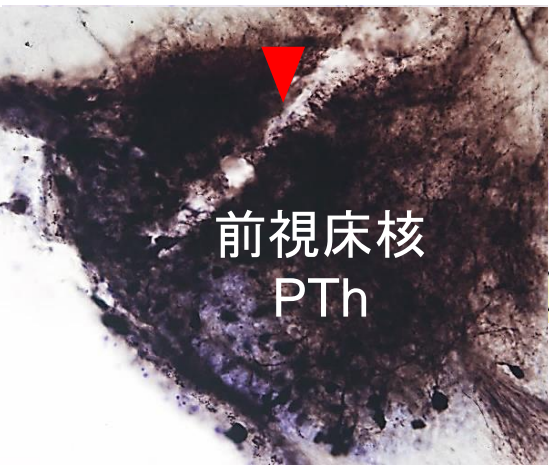
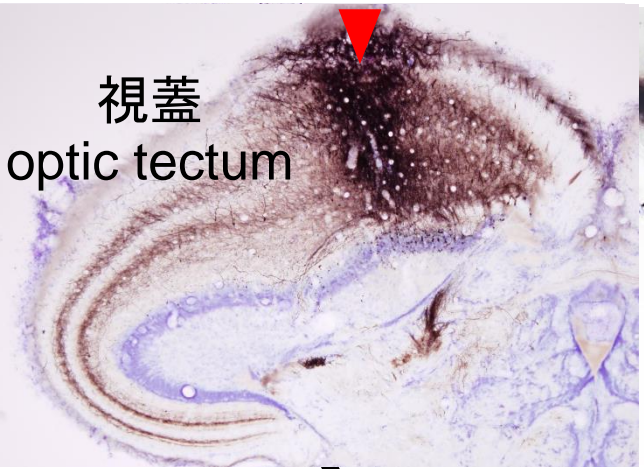


One visual pathway in yellowfin goby



~~膝状体系~~

非膝状体系

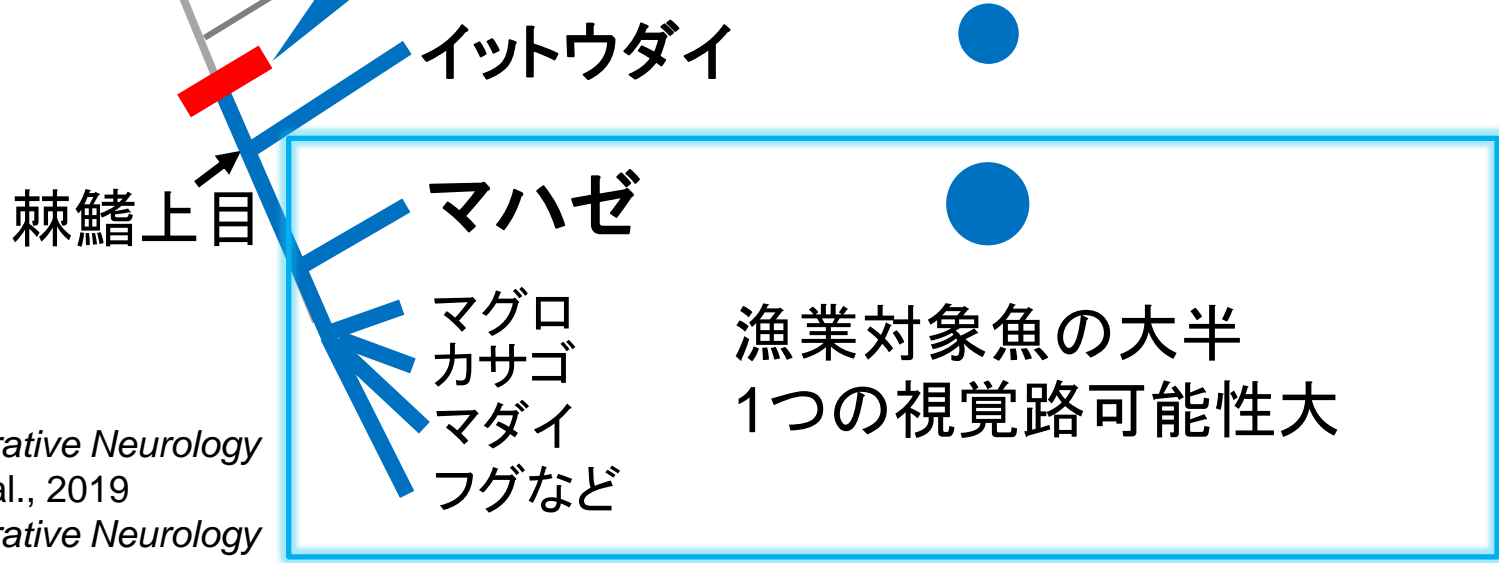


① Evolution of visual pathways in fish

もともと魚は
2つの視覚路持っていたが
The common ancestor of actinopterygians
possessed two pathways



棘鱗上目の共通祖先で
1つの視覚路(非膝状体系)のみに
A geniculate-like pathway was lost in the common ancestor of
acanthopterygians, which include many species for fisheries



Hagio et al., 2018
The Journal of Comparative Neurology
Kawaguchi & Hagio et al., 2019
The Journal of Comparative Neurology

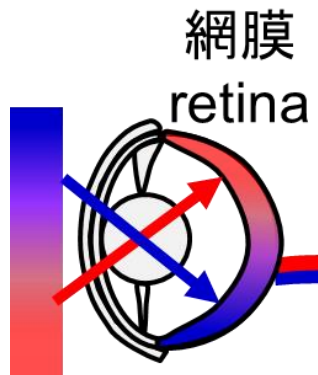
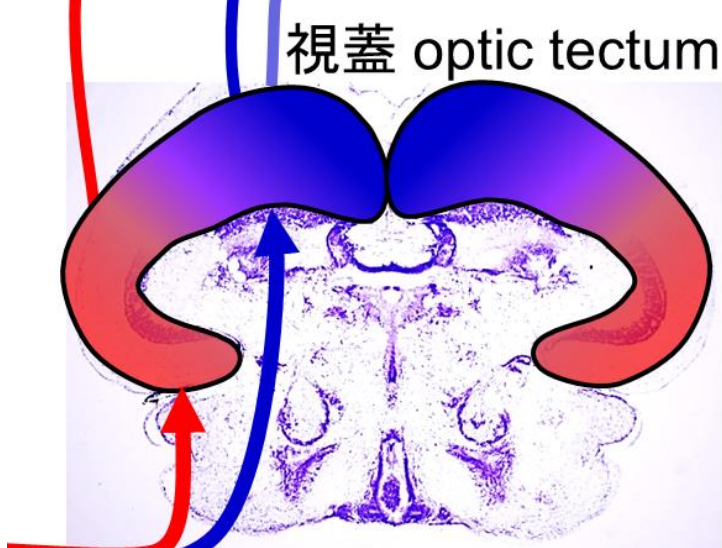
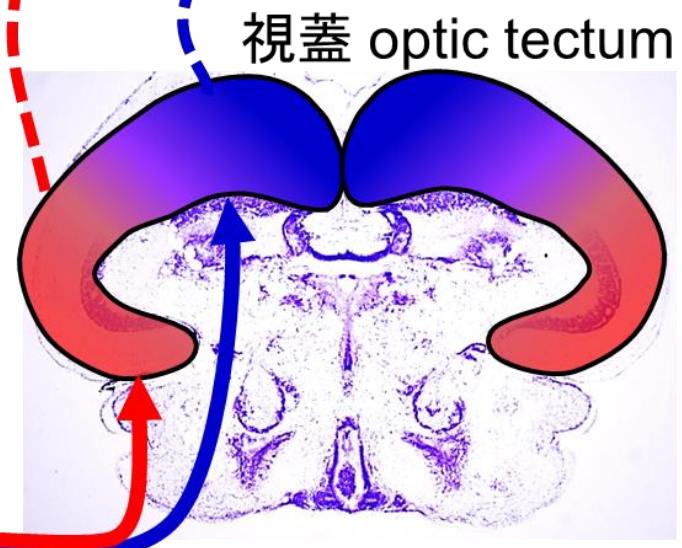
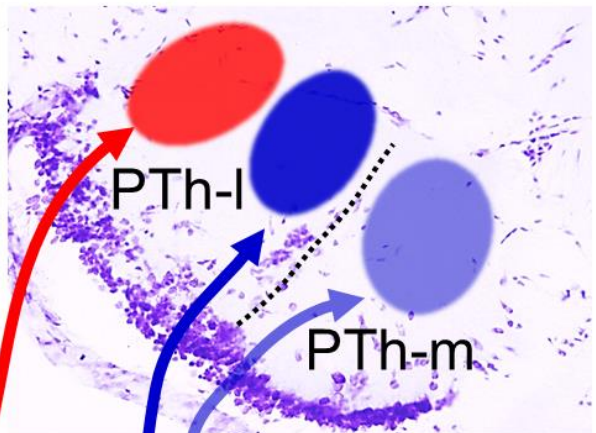
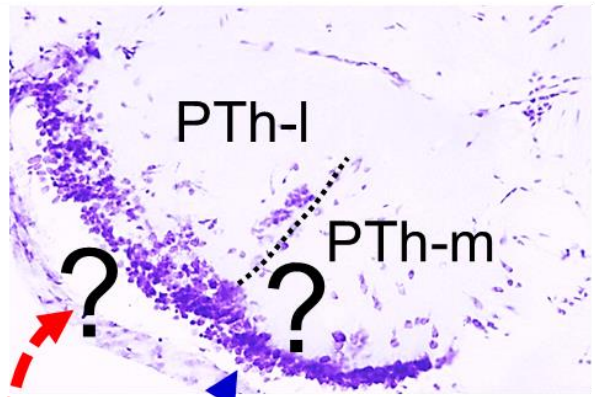
マハゼを漁業対象魚の視覚研究モデル動物として確立

② Retinotopic organization of visual pathways to diencephalon

yellowfin goby

前視床核 Two subnuclei of PTh
lateral: PTh-l & medial: PTh-m

前視床核 Two subnuclei of PTh
lateral: PTh-l & medial: PTh-m



魚類と哺乳類の脳内連絡が類似

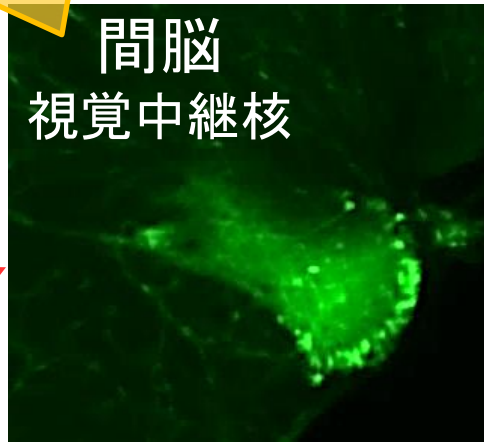
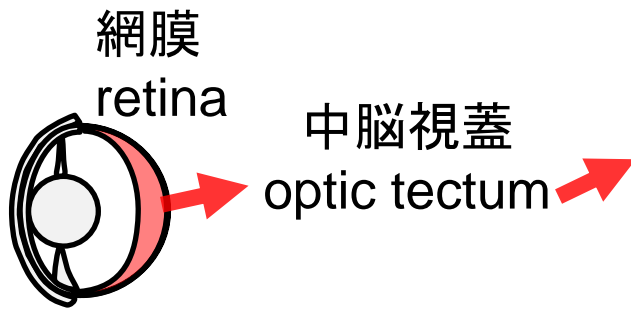
③ A gene specifically expressed in the diencephalic visual neurons

共同研究 collaboration

CNRS研究所 in France

留学 to France

間脳視覚中継核ニューロンでGFP発現
diencephalic visual neurons
expressing GFP



Bloch & Hagio et al., *eLife* (co-first author)

形態学・組織化学 生理学・分子生物学的手法

最新技術を自在に駆使してユニークな神経科学研究に励みたい

学術領域

水産業界

国内外の
共同研究

魚の視覚や他の神経系解明

In the future,
I would like to contribute not only to the academic field but also to the fisheries industry.

学生の皆さんへ

目標・計画を立て、大学の支援制度を最大限に活用して学び経験し、多くの方と交流し、好きな研究を