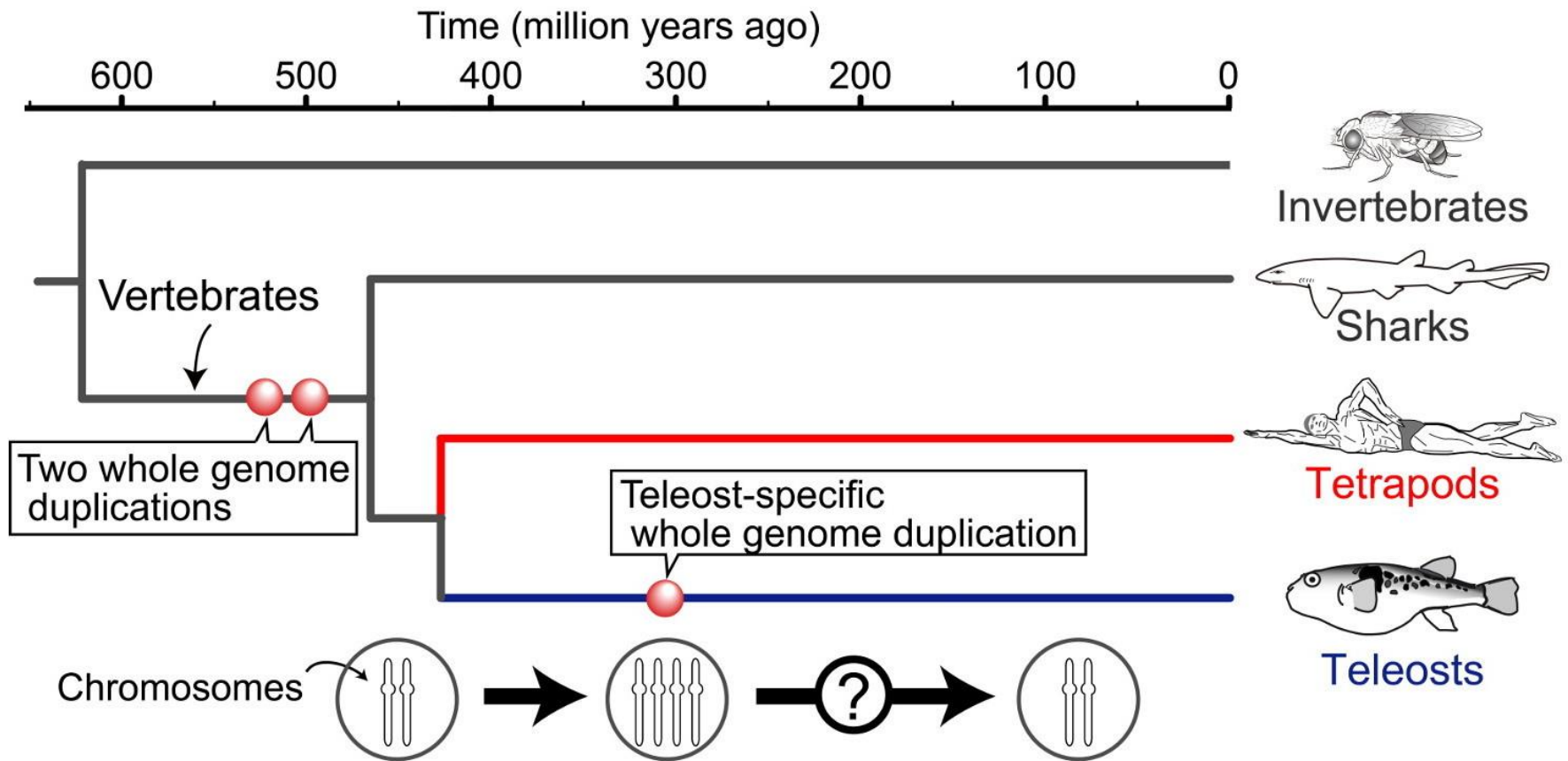


Appetite control and the AgRP neuronal system in zebrafish

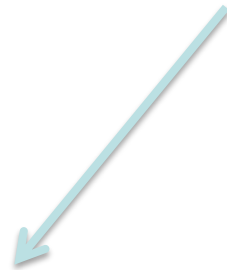
Yoav Gothilf
Dept. Neurobiology, Tel Aviv University
yoavgothilf@gmail.com

Note: Many slides were removed because these are unpublished data

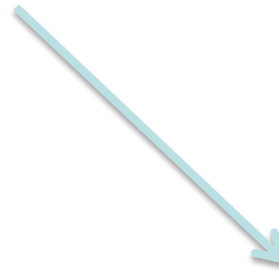


Whole genome duplication is a rare evolutionary event that has played a dramatic role in diversification

Zebrafish AgRPs:

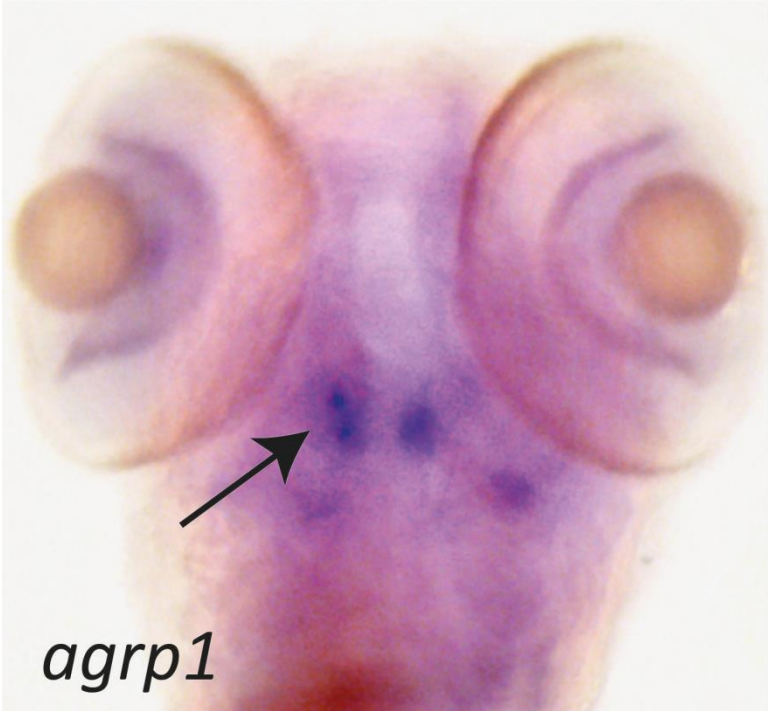


AgRP1



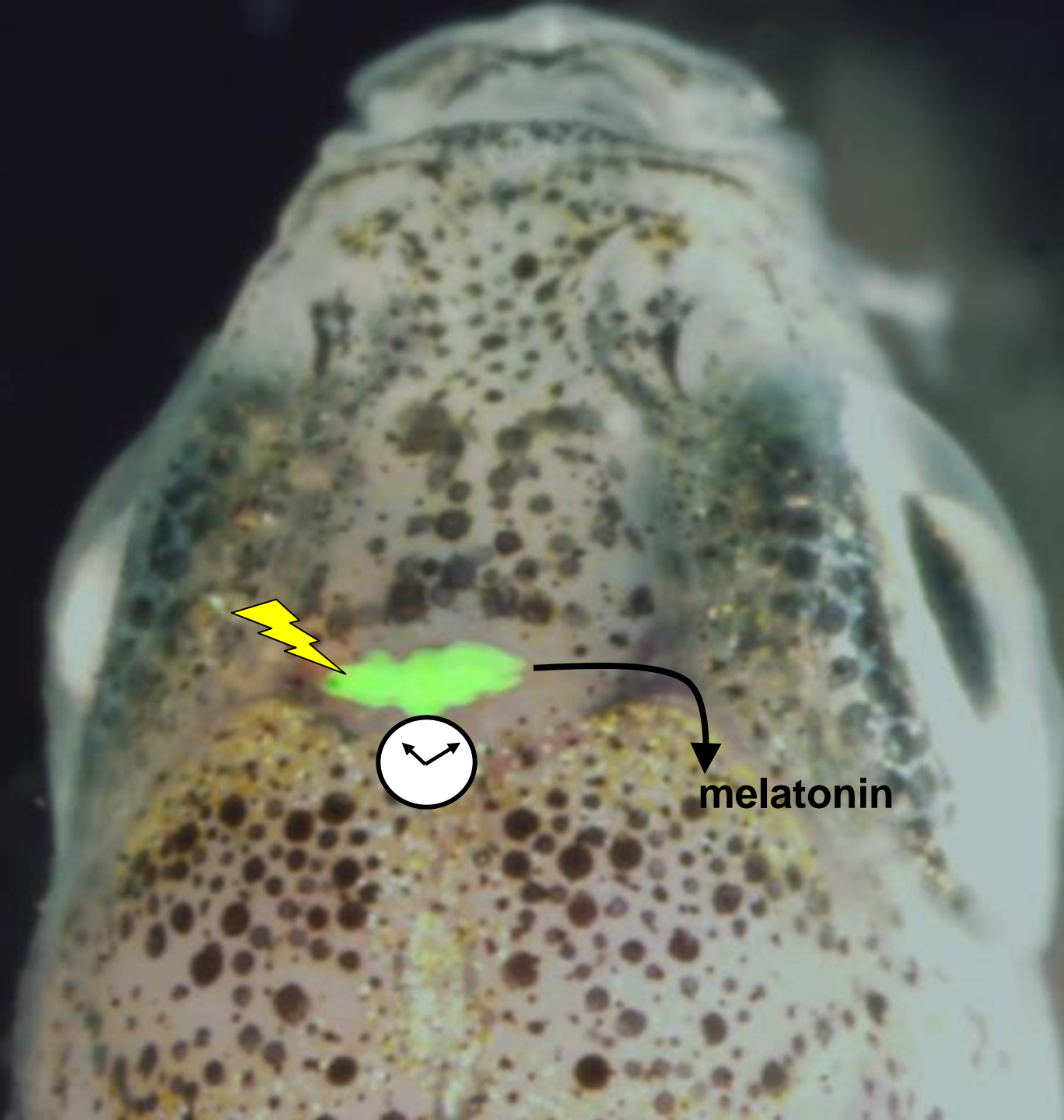
AgRP2

Hypothalamic specific



Pineal enhanced





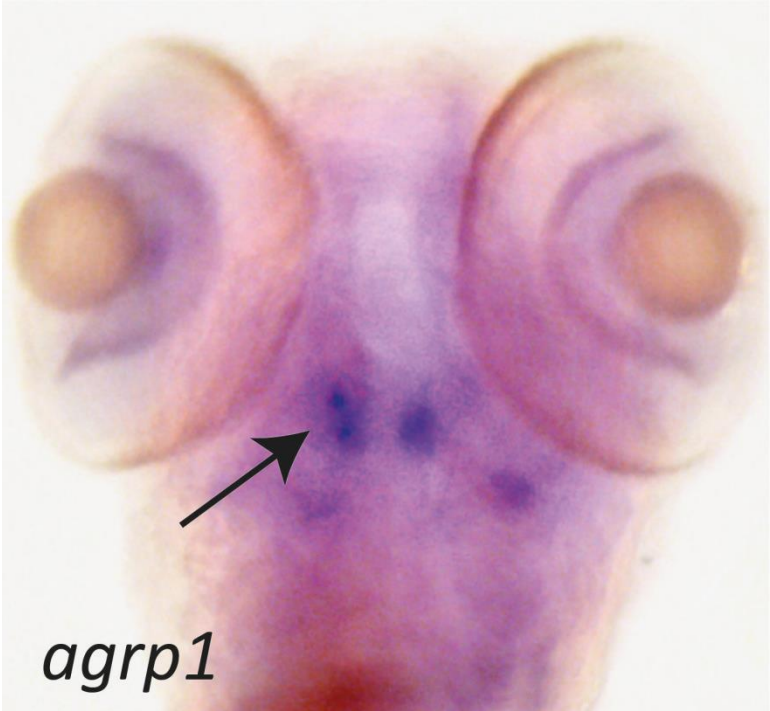
melatonin

- Photoreception
- Circadian clock
- Melatonin synthesis

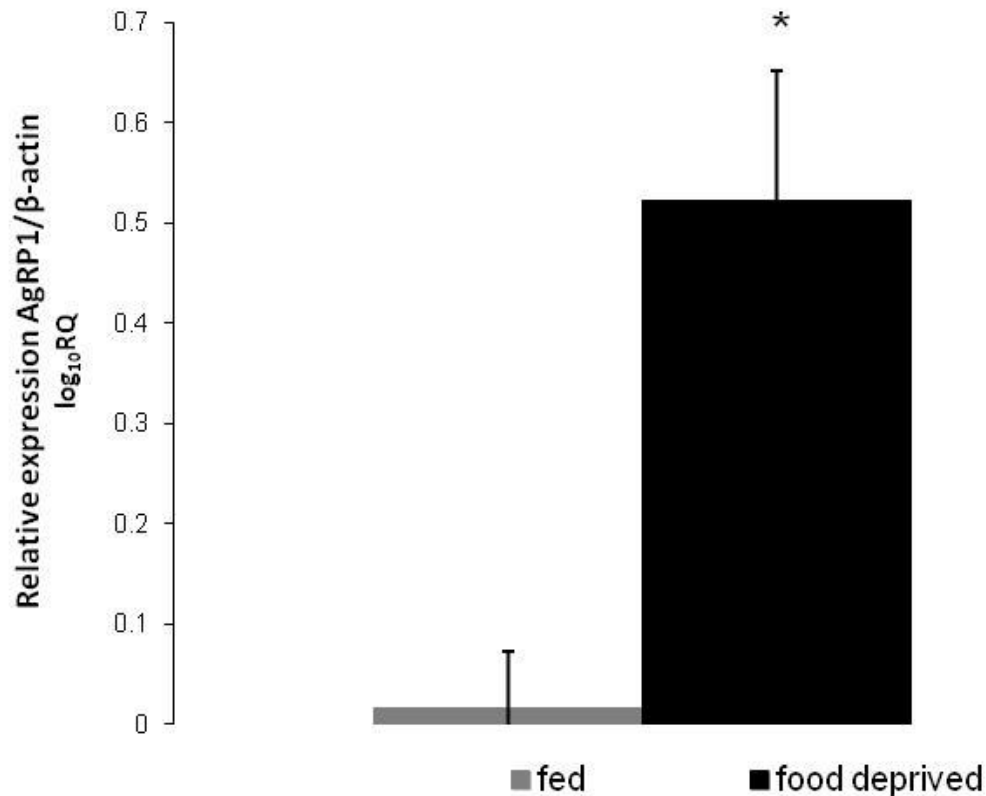
Table 1. A list of transcripts with high pineal expression, the 40 transcripts presented have the highest MFD.

Gene Symbol	MFD	ISH Image
*BG305792	260	
†Pdc2	215	** (Kobayashi <i>et al.</i> , 2002)
*BI671344	200	
†Exorh	200	Pineal (Mano <i>et al.</i> , 1999)
†Rbp4	185	
†Pde6a	170	** (Vihtelic <i>et al.</i> , 2005)
†Gnat1	165	Pineal, Retina (Thisse <i>et al.</i> , 2004)
†Pde6c	150	** (Vihtelic <i>et al.</i> , 2005)
*BI671149	140	
*BI879853	120	
†Guk1	115	Pineal, Retina (Thisse <i>et al.</i> , 2004)
†Zgc:92682	115	Pineal, Retina (Thisse <i>et al.</i> , 2004)
†Opn1lw1	110	Pineal, Retina (Thisse <i>et al.</i> , 2004)
Gucy2f	105	** (Brockerhoff <i>et al.</i> , 2003)
†Aanat2	105	Pineal, Retina (Thisse <i>et al.</i> , 2004)
†GngT1	90	Pineal, Retina (Thisse <i>et al.</i> , 2004)
*AW826706	85	
†Zgc:73075	80	
†Tph1	80	Pineal (Thisse <i>et al.</i> , 2004)
†Arr3	80	Pineal, Retina (Thisse <i>et al.</i> , 2004)
†Zgc:73213	75	Pineal, Retina (Thisse <i>et al.</i> , 2004)
*BG308558	75	
†Tph2	70	Pineal, Brain (Rauch <i>et al.</i> , 2003)
*BI880166	70	
Elovl4	70	Pineal, Retina (Thisse <i>et al.</i> , 2004)
†Slc25a31	70	Pineal, Retina, Background (Thisse <i>et al.</i> , 2004)
Rlbp11	70	Pineal, Retina (Thisse <i>et al.</i> , 2004)
LOC563645	70	
†Arl312	65	Pineal, Retina (Thisse <i>et al.</i> , 2004)
*BI671344	60	
†Crx	60	Pineal, Retina (Thisse <i>et al.</i> , 2004)
*BI670871	55	
†Zgc:73310	50	** (Vihtelic <i>et al.</i> , 2005)
*BI671248	45	
†Rcv1	45	Pineal, Retina (Thisse <i>et al.</i> , 2004)
Ddc	45	Diencephalons, Midbrain (Thisse <i>et al.</i> , 2004)
*BI881745	40	
zgc:73359	40	Pineal, Retina (Thisse <i>et al.</i> , 2004)
nme2l	35	Pineal, Retina (Thisse <i>et al.</i> , 2004)
*BG738656	35	

Hypothalamic specific

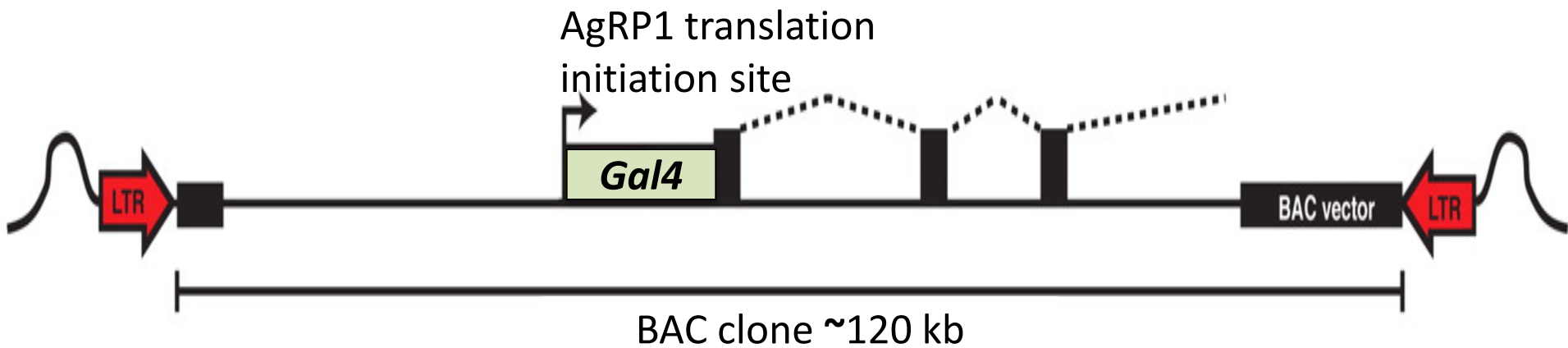


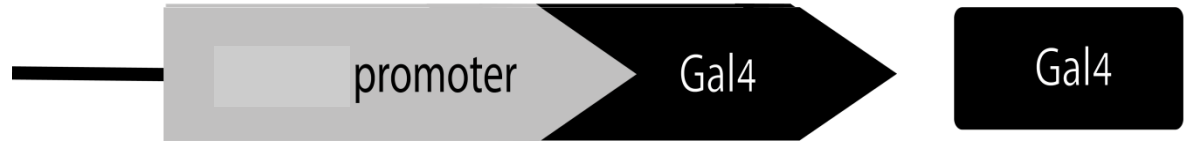
Zebrafish's AgRP₁ increases in response to food deprivation



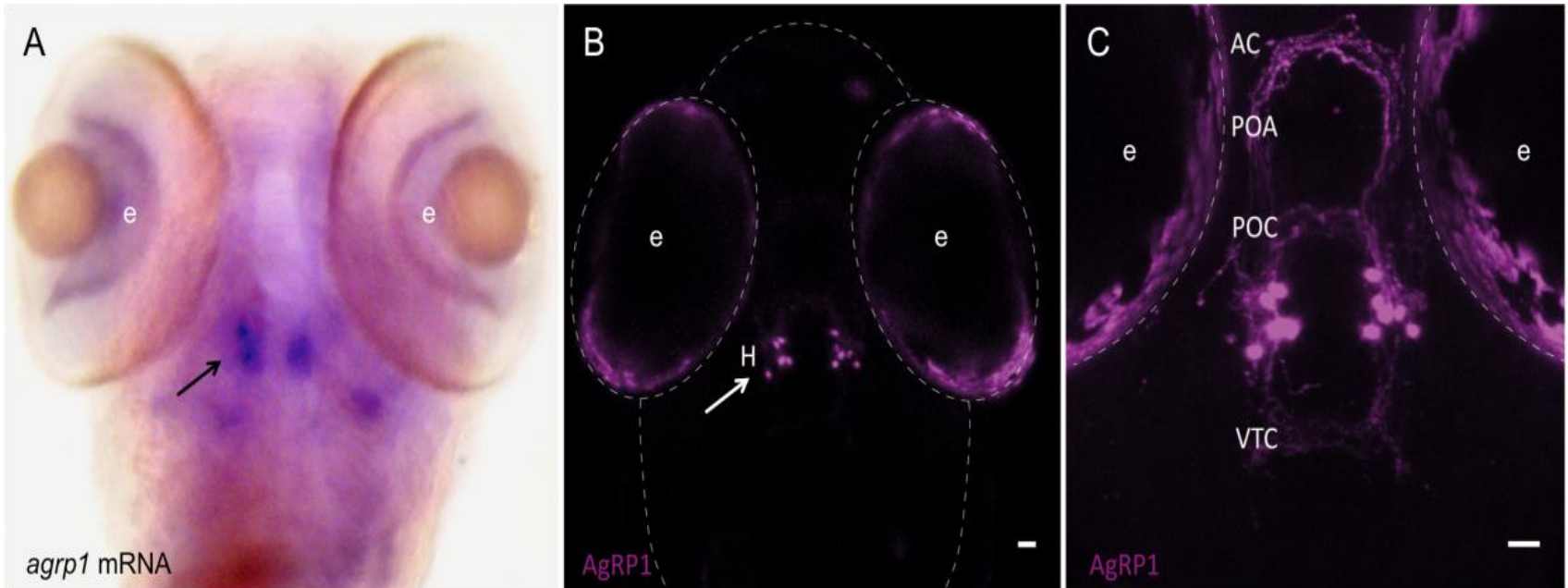
Quantitative real-time PCR analysis. Under food deprivation conditions, AgRP₁ (mRNA expression levels are elevated (p-value=0.0015)).

AgRP1 BAC transgenesis

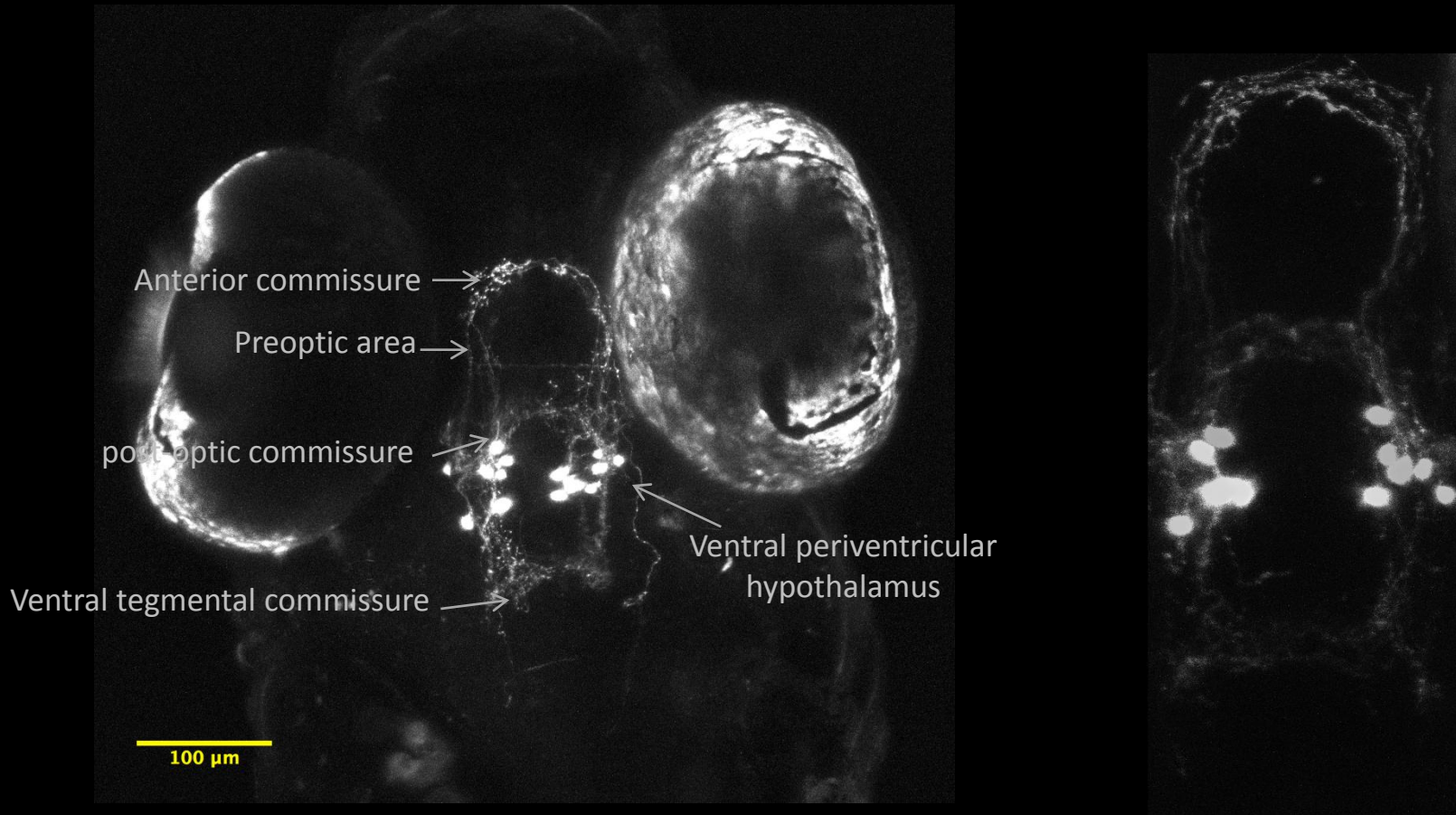




The *agrp1* transgenic line



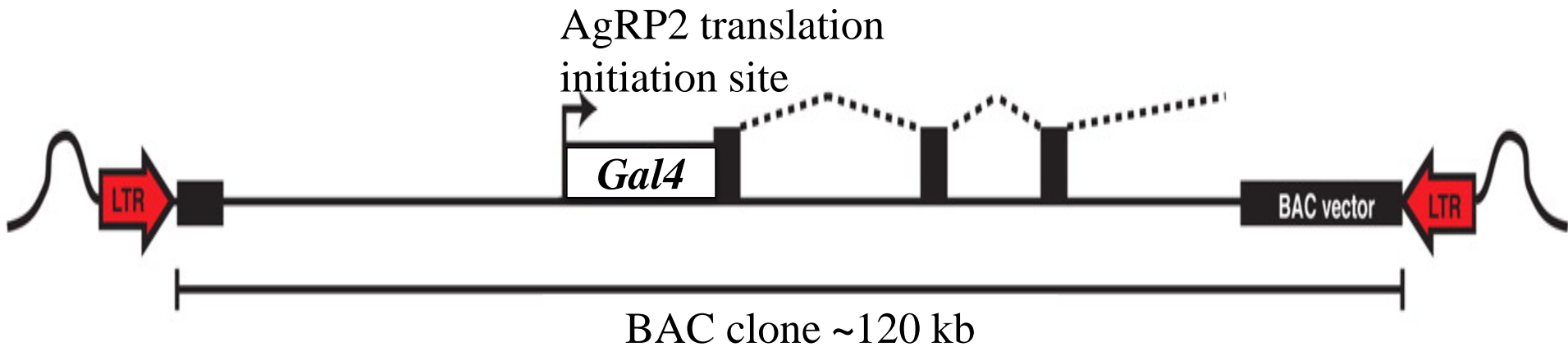
TgBAC(*agrp1*:Gal4-VP16), 6dpf dorsal view

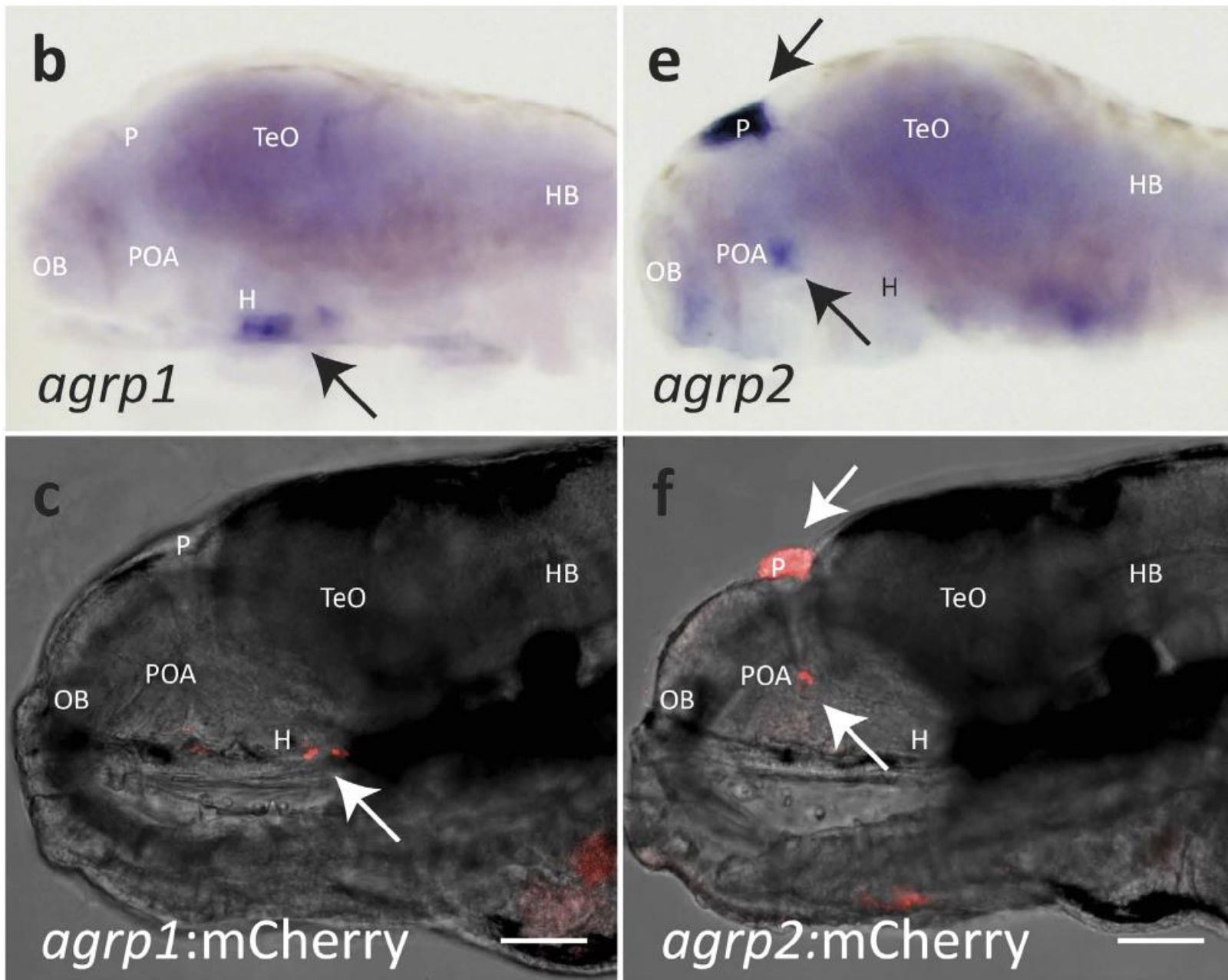


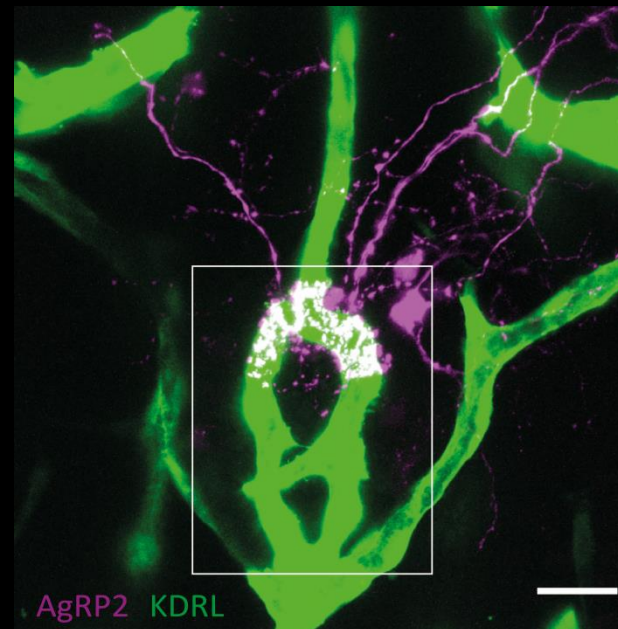
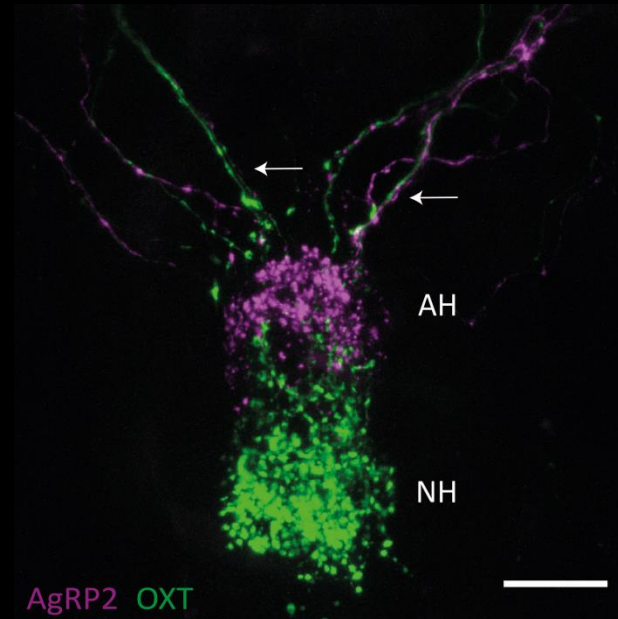
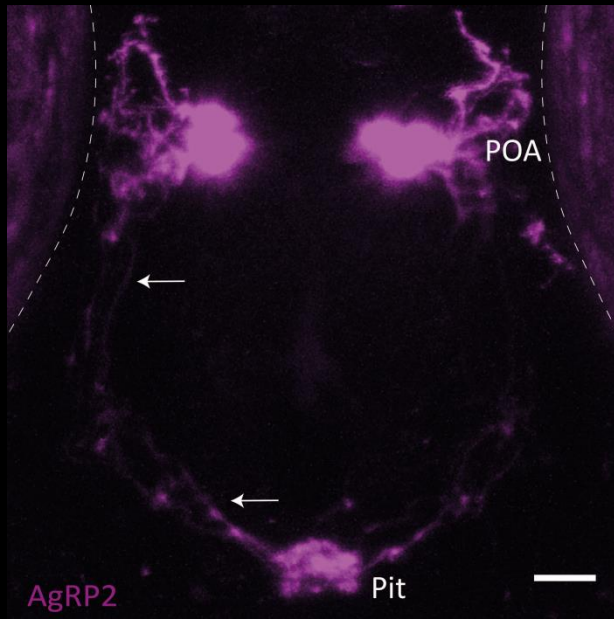
Pineal enhanced

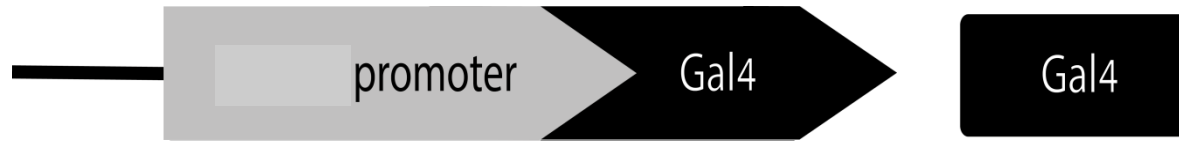


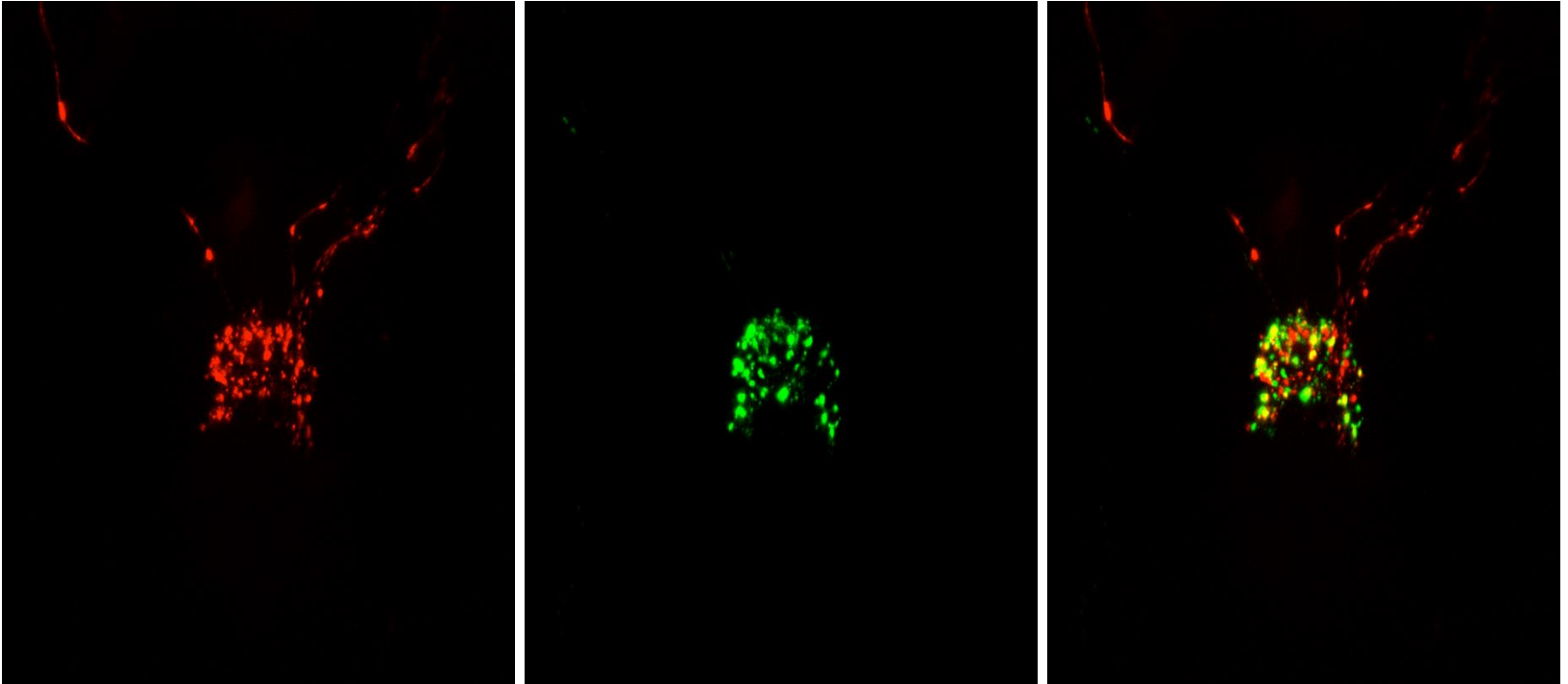
AgRP2 BAC transgenesis

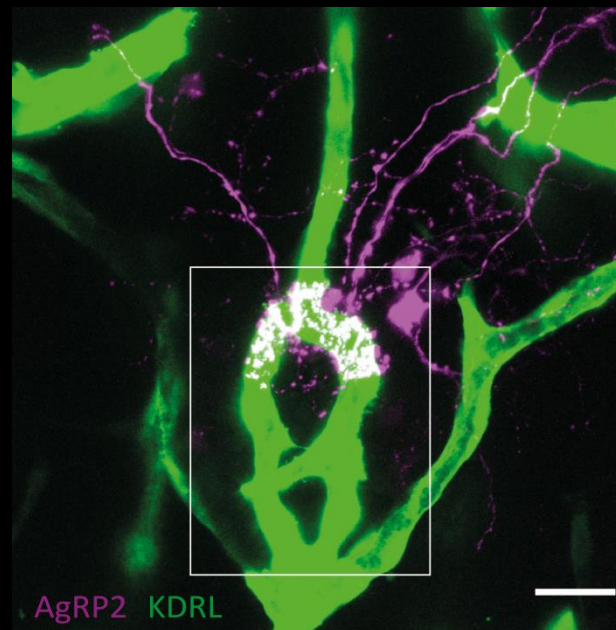
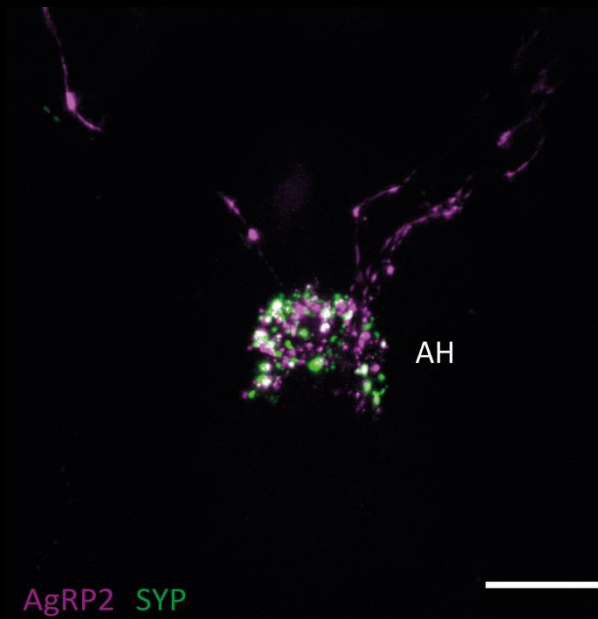
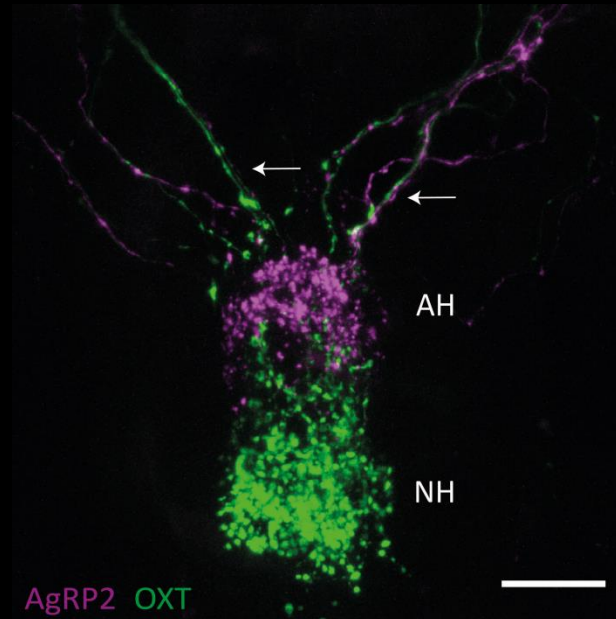
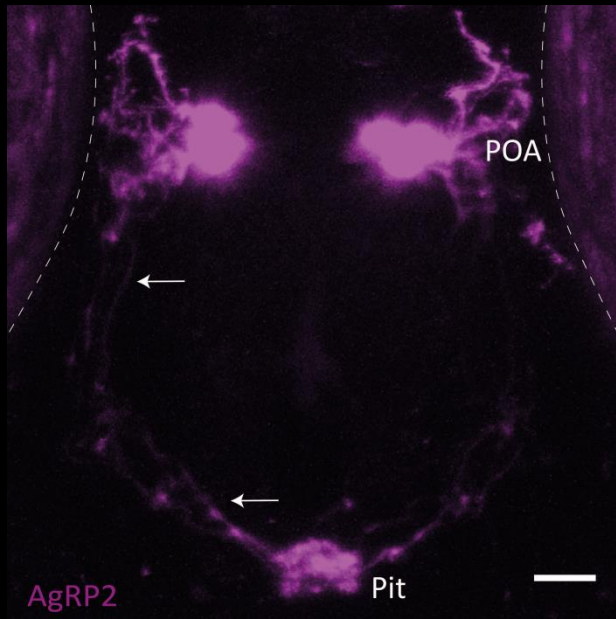








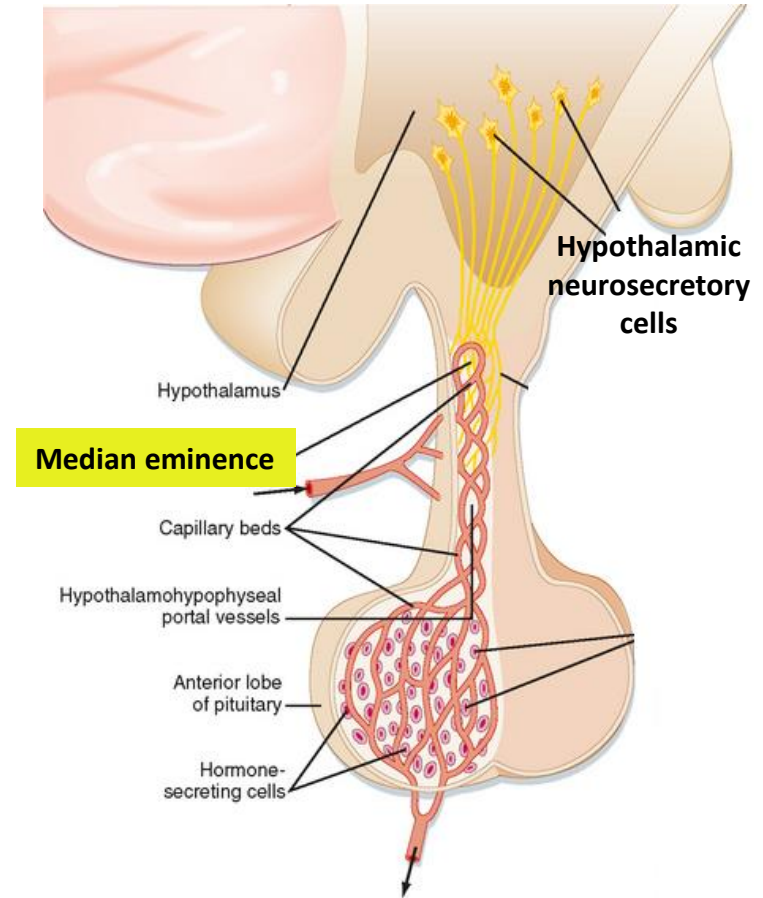


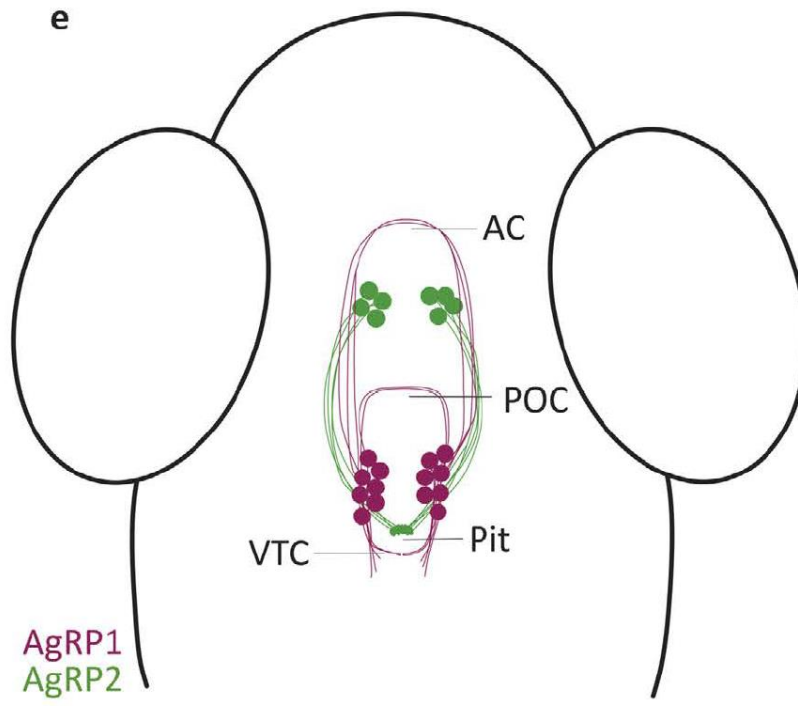
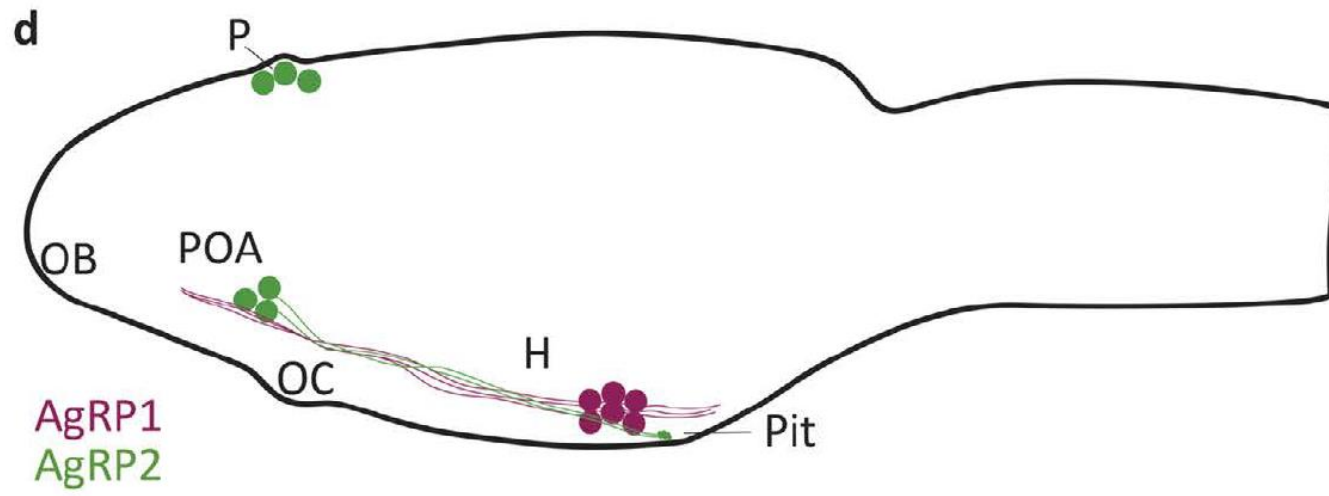


AgRP neurons in mice also innervate the pituitary

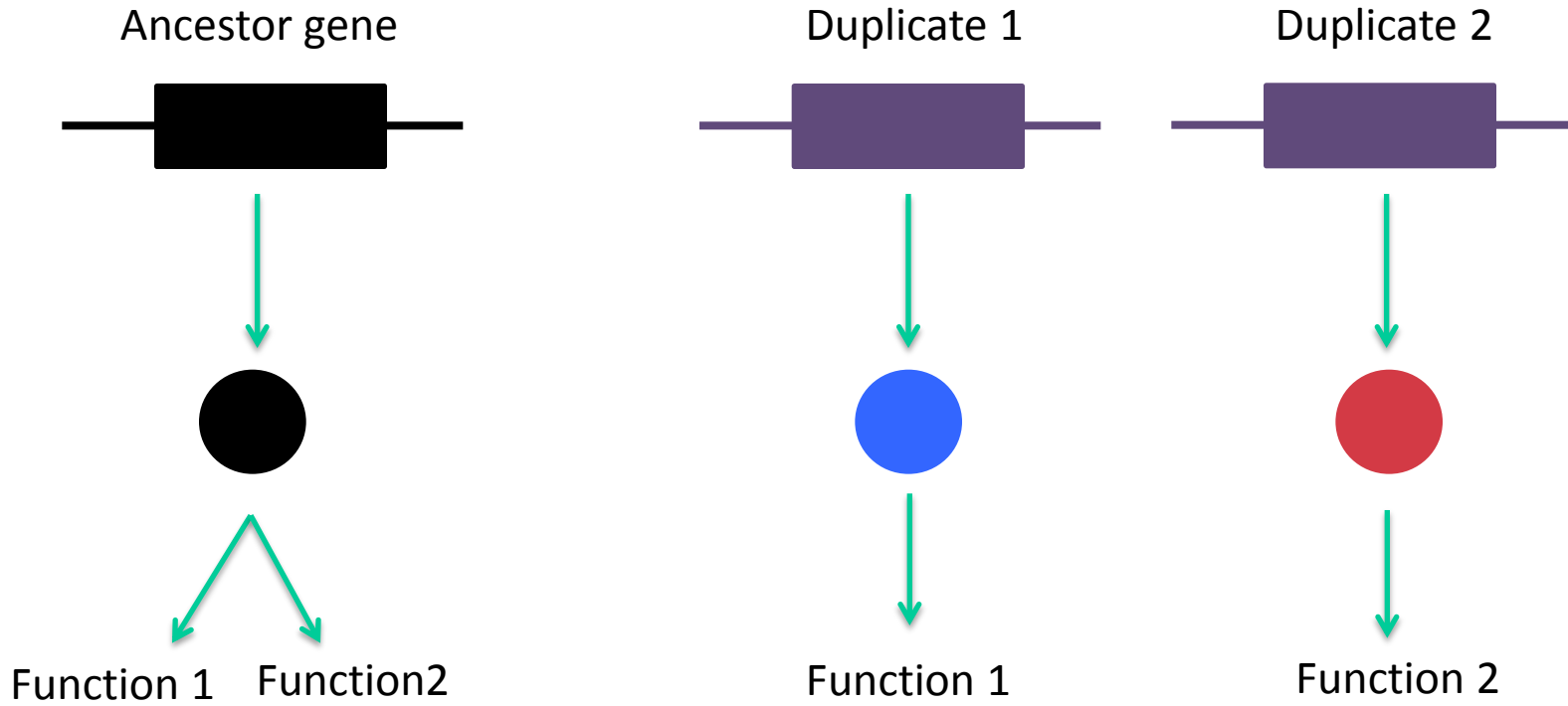
Table 1. Distribution and relative abundance of AGRP-immunoreactive fibers and terminals in the rat CNS

Anatomical sites	Agrp
Compact	–
Ventral part	+++
Dorsal hypothalamic area	++
Lateroanterior hypothalamic nucleus	+
Lateral hypothalamic area	+++
Ventrolateral hypothalamic nucleus	++
Perifornical nucleus	++++
Posterior hypothalamic area	+
Arcuate nucleus	++++
Median eminence, internal part	+++
Median eminence, external part	+
Medial tuberal nucleus	++
Supramammillary nucleus	+



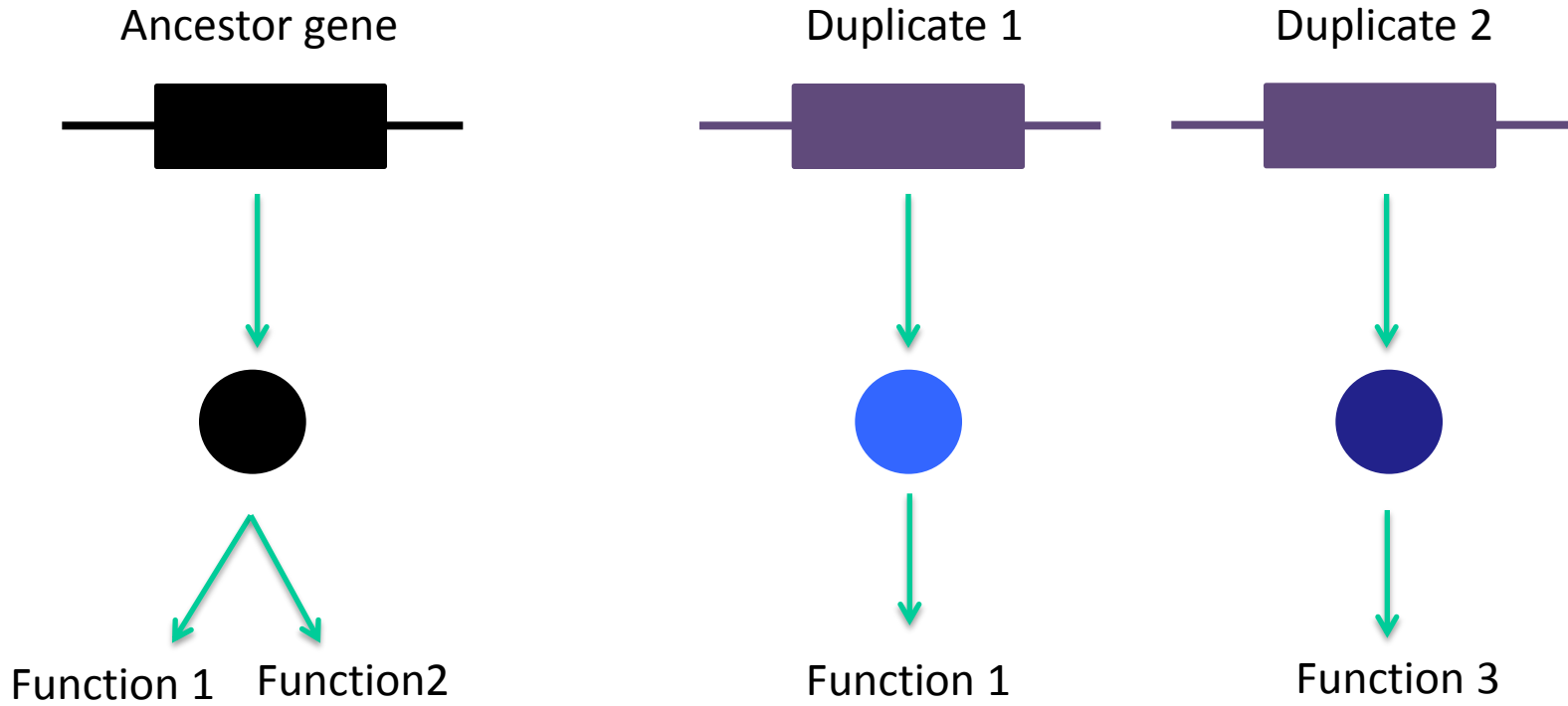


Genome duplication scenarios



Subfunctionalization

Genome duplication scenarios



Neofunctionalization