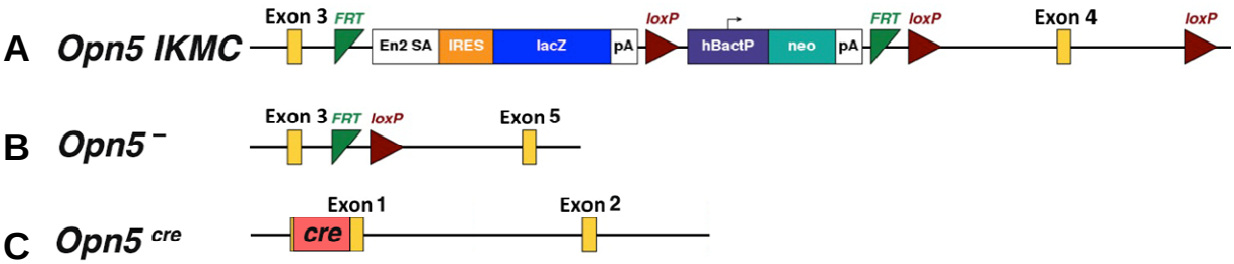

Figure S1. *Opn5* alleles. Related to STAR methods.

(**A**)Schematic of the *Opn5* allele as targeted in ES cells by the International Knockout Mouse Consortium. Exons are numbered yellow boxes. *FRT*, FLP recombinase site-specific recombination sites. En2 SA, *Engrailed 2* splice acceptor. IRES, internal ribosome entry sequence. Lacz, β-galactosidase open reading frame. pA, polyadenylation signal. loxP, cre recombinase site specific recombination sequences. hbactP, human β-actin promoter. Right-facing arrow indicates the start point of transcription for hbactP. neo, the neomycin resistance gene. (**B**) The *Opn5*$^{-}$ allele generated after germ-line deletion at *Frt* then *LoxP* sites. (**C**) The *Opn5*^{cre} allele was generated by targeting the cre recombinase open reading frame into Exon 1 of the *Opn5* gene using CRISPR methods.

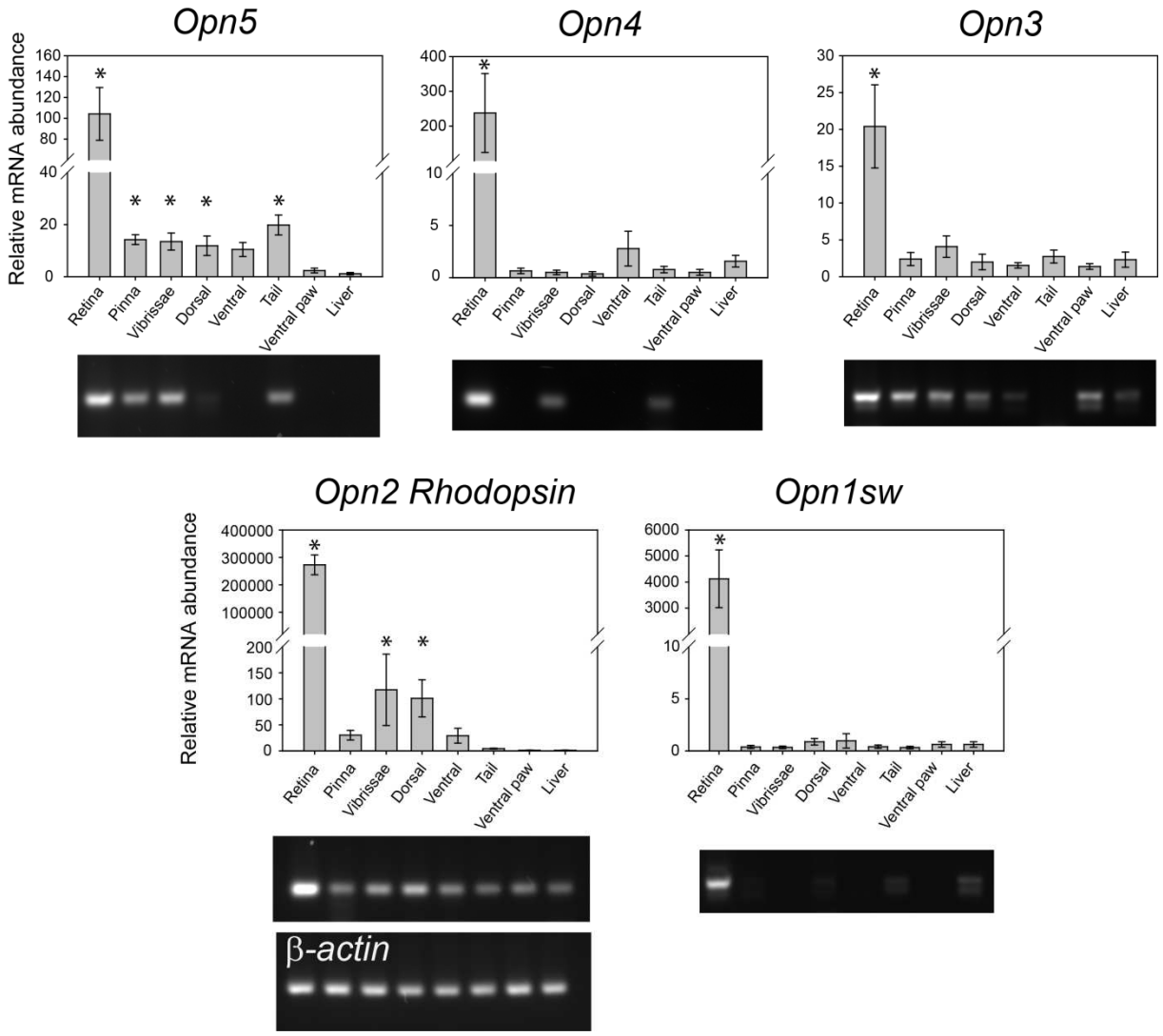

Figure S2. Opsin expression in skin areas. Related to Figure 1. Quantitative RT-PCR was used to compare levels of expression of *Opn5*, *Opn4*, *Opn3*, *Opn2* (rhodopsin), and *Opn1sw* (short wavelength cone opsin) in tissues indicated. All values represent the mean ± SEM of ΔΔ Ct RT-PCR comparing transcript levels to β *actin* relative to expression in liver. * indicates $p < 0.05$ in ANOVA Tukey post-hoc. N = 5 for each. Below each is an example of agarose gel electrophoresis of one replicate's amplicons from RT-PCR run.

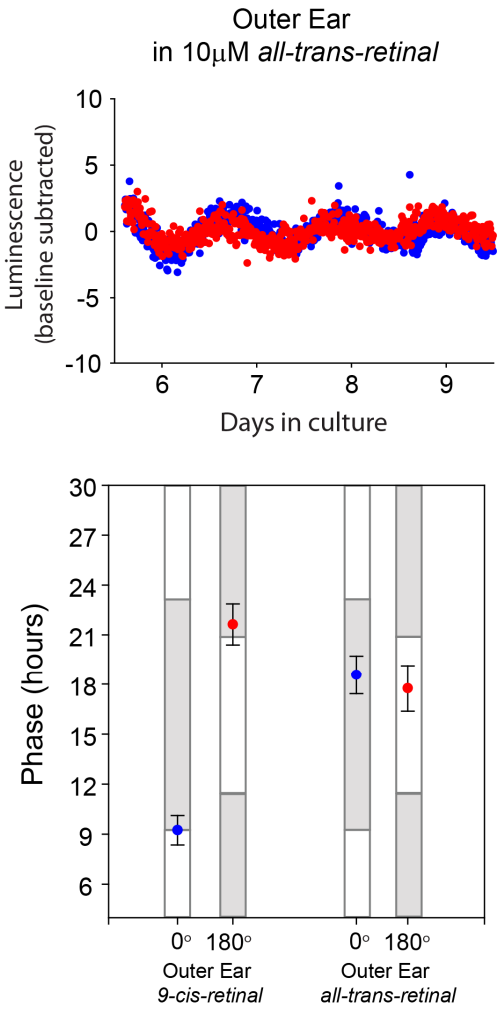

Figure S3. Cultures of outer ear do not photoentrain in *all-trans*-retinaldehyde. Related to Figure 2. Luminescence traces of cultured outer ear (pinna) from *Per2*^{Luc} mice after 5 days of an LD cycle *ex vivo* from wild-type mice with 10μM *all-trans*-retinaldehyde in the culture media (upper panel). Phase of the peak of *Per2*^{Luc} luminescence on the day after 5 days of LD in either the 0^{o} or 180^{o} position of a photoentrainment apparatus (lower panel). Points show mean ± SEM. White and grey bars represent times at which the tissues experienced light or dark in the previous LD cycle. *9-cis-retinal* data is the same as Figure1. *All-trans-retinal*: n = 7 pairs.

Oligonucleotides	
REAGENT or RESOURCE	**SOURCE**
Circadian genes for qPCR:	
Per1 forward: 5′-CCCAGCTTTACCTGCAGAAG-3′	[S1]
Per1 reverse: 5′-ATGGTCGAAAGGAAGCCTCT-3′	[S1]
Per2 forward: 5′-CCAACACAGACGACAGCATC-3′	[S1]
Per2 reverse: 5′-TCTCGCAGTAAACACAGCCT-3′	[S1]
Bmal1 forward: 5′-GACATTTCCTCAACCATCAGCG-3′	[S1]
Bmal1 reverse: 5′-GCATTCTTGATCCTTCCTTGGT-3′	[S1]
Dbp forward: 5′-CGAAGAACGTCATGATGCAG-3′	[S1]
Dbp reverse: 5′-GGTTCCCCAACATGCTAAGA-3′	[S1]
Cry2 forward: 5′-CACTGGTTCCGCAAAGGACTA-3′	[S2]
Cry2 reverse: 5′-CCACGGGTCGAGGATGTAGA-3′	[S2]
Rev-erbα forward: 5′- ACCTTTGAGGTGCTGATGGT-3′	[S2]
Rev-erbα reverse: 5′- CTCGCTGAAGTCAAACATGG-3′	[S2]
β–actin forward: 5′-AAA GAG AAG CTG TGC TAT GTT G-3′	[S1]
β–actin reverse: 5′-CAT AGA GGT CTT TAC GGA TGT C-3′	[S1]
Opsin genes for qPCR:	
Opn5 forward: 5’-AGCTTTTGGAAGGCCAGAC-3’	[S3]
Opn5 reverse: 5’- CAGCACAGCAGAAGACTTC-3’	[S3]
Opn4 forward: 5’- TCTGTTAGCCCCACGACATC-3’	[S1]
Opn4 reverse: 5’- TGAACATGTTTGCTGGTGTCC-3’	[S1]
Opn3 forward: 5’- CTGTTCGGAGTCACCTTCAC -3’	[S1]
Opn3 reverse: 5’- GTATGTCTAGGATGTACCTGTTC -3’	[S1]
Opn2 forward: 5’- CTTTGCCACACTTGGAGGTGA -3’	[S1]
Opn2 reverse: 5’- TGATCCAGGTGAAGACCACAC -3’	[S1]
Opn1sw forward: 5’- TCACGGATACTTCCTCTTTGGTC -3’	[S1]
Opn1sw reverse: 5’- GGCCAACTTTGCTAGAAGAGAC -3’	[S1]

Table S1. Primer sequences. Related to STAR Methods.

Supplemental References

S1. Buhr, E.D., and Van Gelder, R.N. (2014). Local photic entrainment of the retinal circadian oscillator in the absence of rods, cones, and melanopsin. Proc Natl Acad Sci U S A *111*, 8625-8630.

S2. Amador, A., Campbell, S., Kazantzis, M., Lan, G., Burris, T.P., and Solt, L.A. (2018). Distinct roles for REV-ERBα and REV-ERBβ in oxidative capacity and mitochondrial biogenesis in skeletal muscle. PLoS One *13*, e0196787.

S3. Tarttelin, E.E., Bellingham, J., Hankins, M.W., Foster, R.G., and Lucas, R.J. (2003). Neuropsin (Opn5): a novel opsin identified in mammalian neural tissue. FEBS Lett *554*, 410-416.