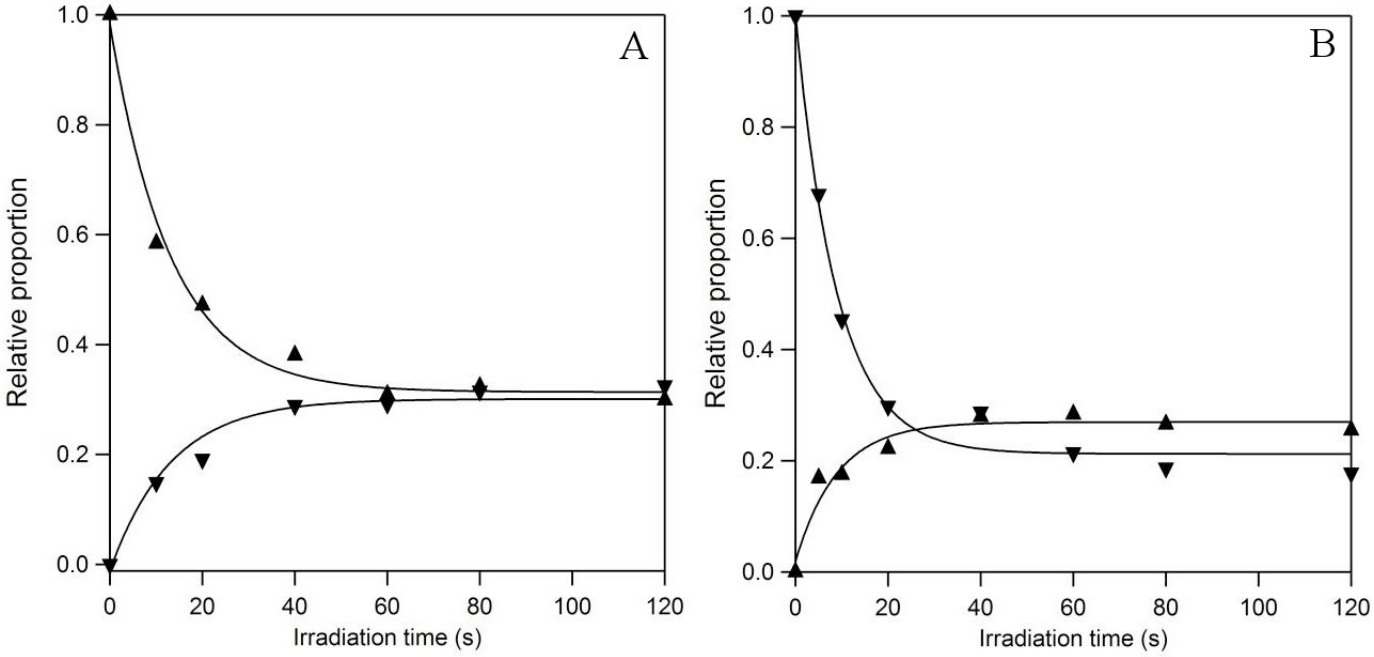

Fig. S1. UV isomerization of all-trans RA to 13-cis RA and vice-versa. UV irradiation at 365 nm of 25 µM solutions of all-trans RA (**A**) and 13-cis RA (**B**) in acetonitrile:EM 1:1 (v/v) at 25°C. The photoconversion extent extracted from the capillary electrophoresis electropherograms of the irradiated solution is plotted as a function of time. Up-pointing triangles, all-trans RA; down-pointing triangles, 13-cis RA; lines, exponential fits. Notice that illumination of an all-trans RA solution leads to an exponential decay of its concentration and the simultaneous formation of 13-cis RA within a characteristic time 13±2 s. Conversely, illumination of a 13-cis RA solution leads to an exponential decay of the concentration of 13-cis RA and increase of all-trans RA within a characteristic time 9±2 s. Beyond 50 s, the solution composition does not vary anymore on a 100 s timescale. In addition, it does not depend on the nature of the initial stereoisomers : all-trans RA and 13-cis RA coexist in similar relative proportions (0.25±0.05), the remaining initial amount being transformed in other RA stereoisomers (Neveu et al., 2008).

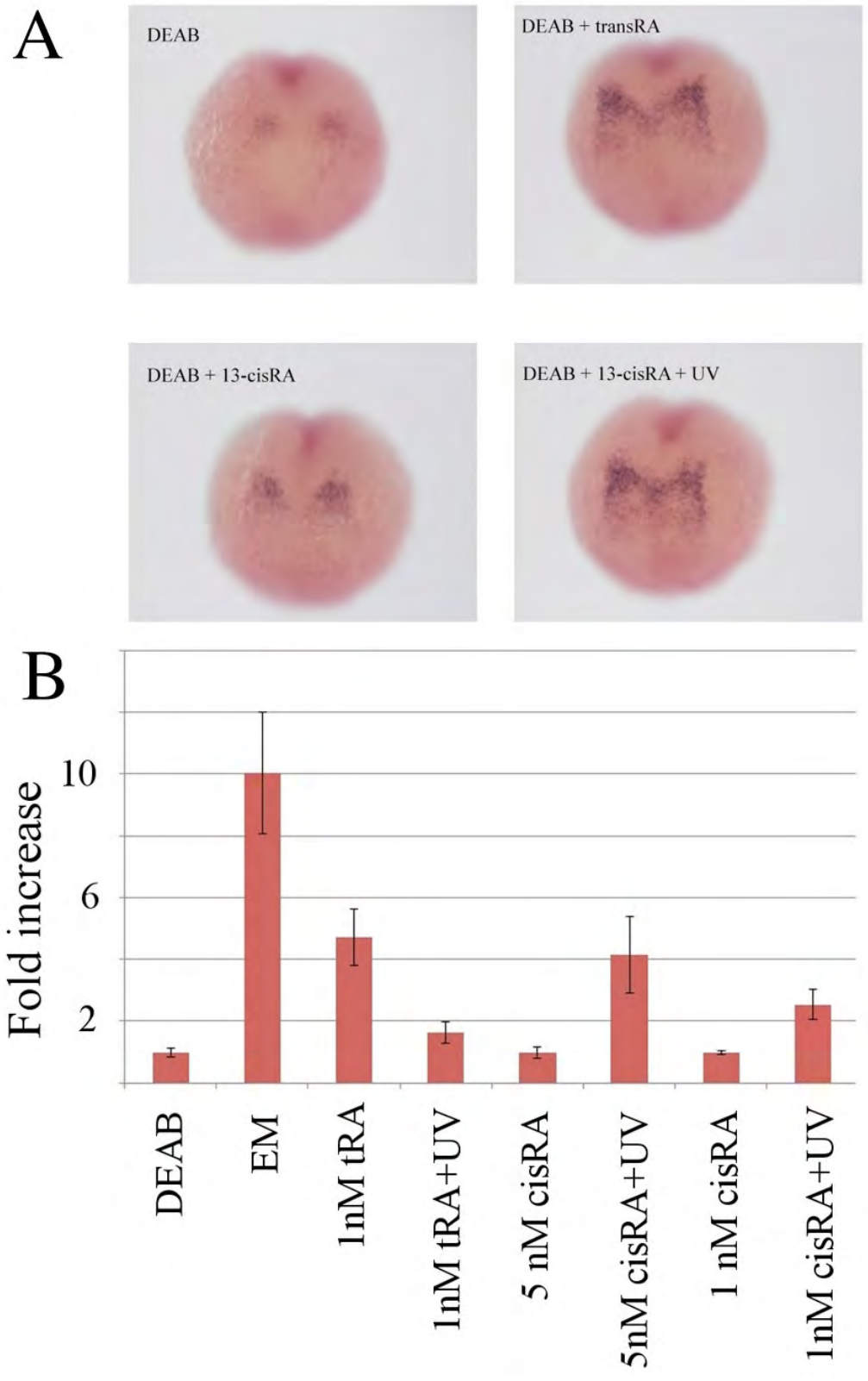

Fig. S2. Response of *hoxb1a* to transient exposure to all-trans RA. Quantification of the response of *hoxb1a* to various transient exposures to all-trans RA (tRA) and 13-cis RA (cisRA). The embryos were incubated from sphere stage in 10 µM DEAB (except for the control incubated in embryo medium, EM), exposed at 90% epiboly for 5 minutes to various concentrations of all-trans RA and 13-cis RA and UV illuminated (for 1 minute) or not. (**A**) In situ hybridization at the 1- to 2-somite stage against *hoxb1a1* (blue) for embryos incubated in DEAB with or without 5 nM 13-cis RA, DEAB + 1 nM all-trans RA and DEAB + 5 nM 13-cis RA + 1 minute UV illumination (rescue of *hoxb1a* expression is visible). (**B**) Quantification of the expression of *hoxb1a* by RT-qPCR in various conditions. Note that the expression of *hoxb1a* in 1 nM all-trans RA is similar to the expression in 5 nM 13-cis RA + UV. Note further that the expression of *hoxb1a* is similar in 1 nM all-trans RA and 13-cis RA after UV illumination, as expected since in each case the concentration of all-trans RA after illumination is the same. Error bars are statistical errors on the mean from five experiments (each RT-qPCR assay was performed in triplicate).

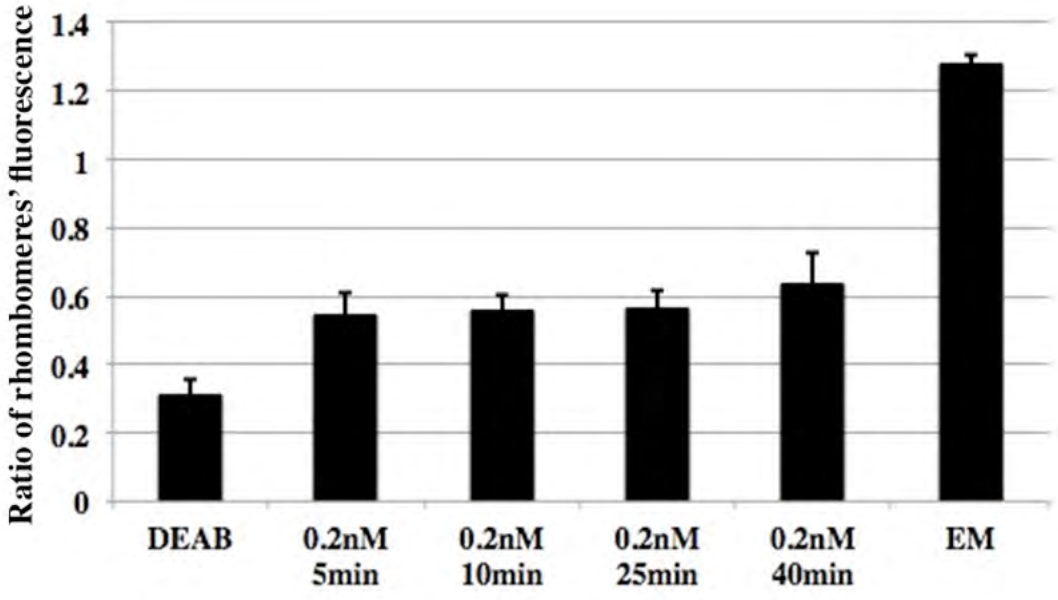

Fig. S3. Response to transient exposure to all-trans RA for various times. Ratio of GFP fluorescence at 24 hpf in r5 versus r3 in transgenic embryos incubated in EM or 10 µM DEAB from sphere stage and transiently incubated at that stage in 0.2 nM all-trans RA for various times (5, 10, 25 and 40 minutes). The partial rescue of GFP expression in r5 is similar in all cases.

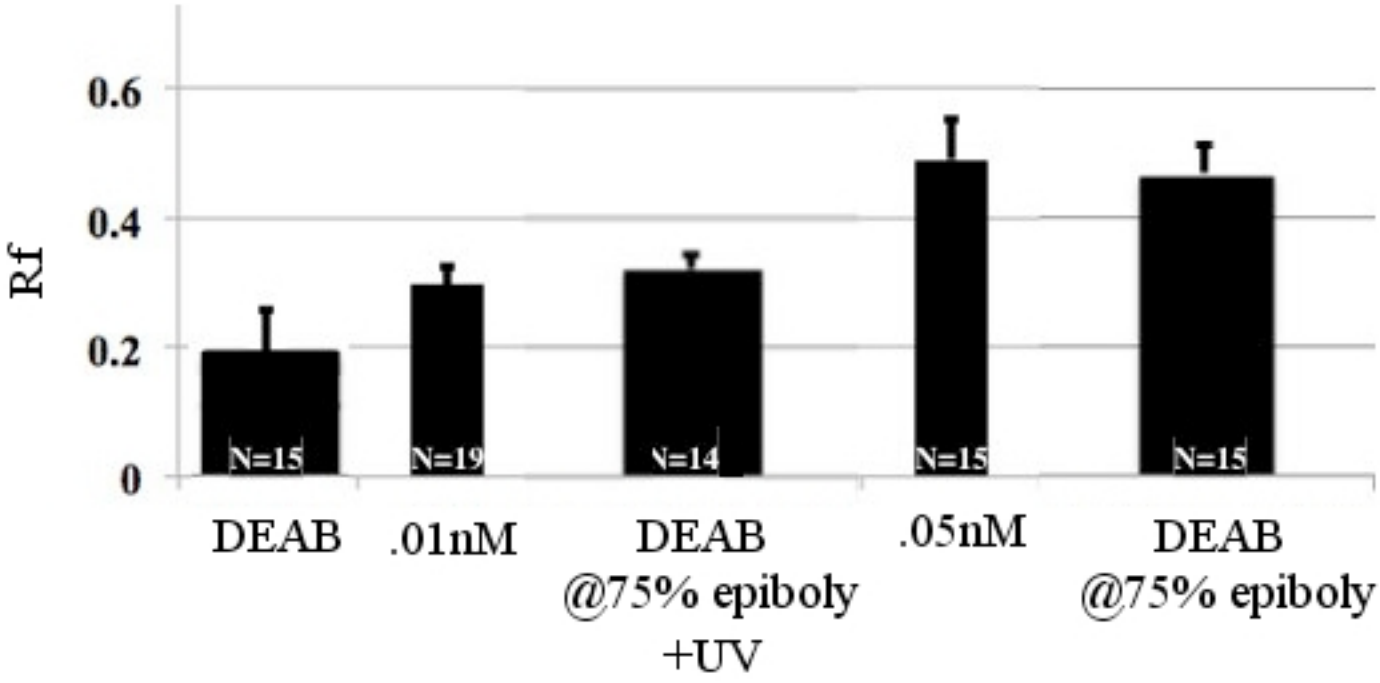

Fig. S4. Estimating the all-trans RA concentration at 75% epiboly. To estimate the concentration of all-trans RA at 75% epiboly, we incubated embryos from that stage on in DEAB and illuminated (or not) the embryos for 1 minute with UV light. We then compared the response of these embryos (the ratio of GFP fluorescence in r5 versus r3 at 24 hpf, Rf) to the response observed in embryos incubated in DEAB from sphere stage and exposed at 75% epiboly to a pulse of all-trans RA of various concentrations. Since UV illumination inactivates about 80% of the endogenous all-trans RA, we deduce from this comparison that the endogenous all-trans RA concentration at that stage is ~0.05 nM, which is reduced upon UV illumination to ~0.01 nM all-trans RA consistent with the result of rescue by transient incubation at 75% epiboly of an embryo incubated in DEAB from sphere stage in these concentrations of all-trans RA.

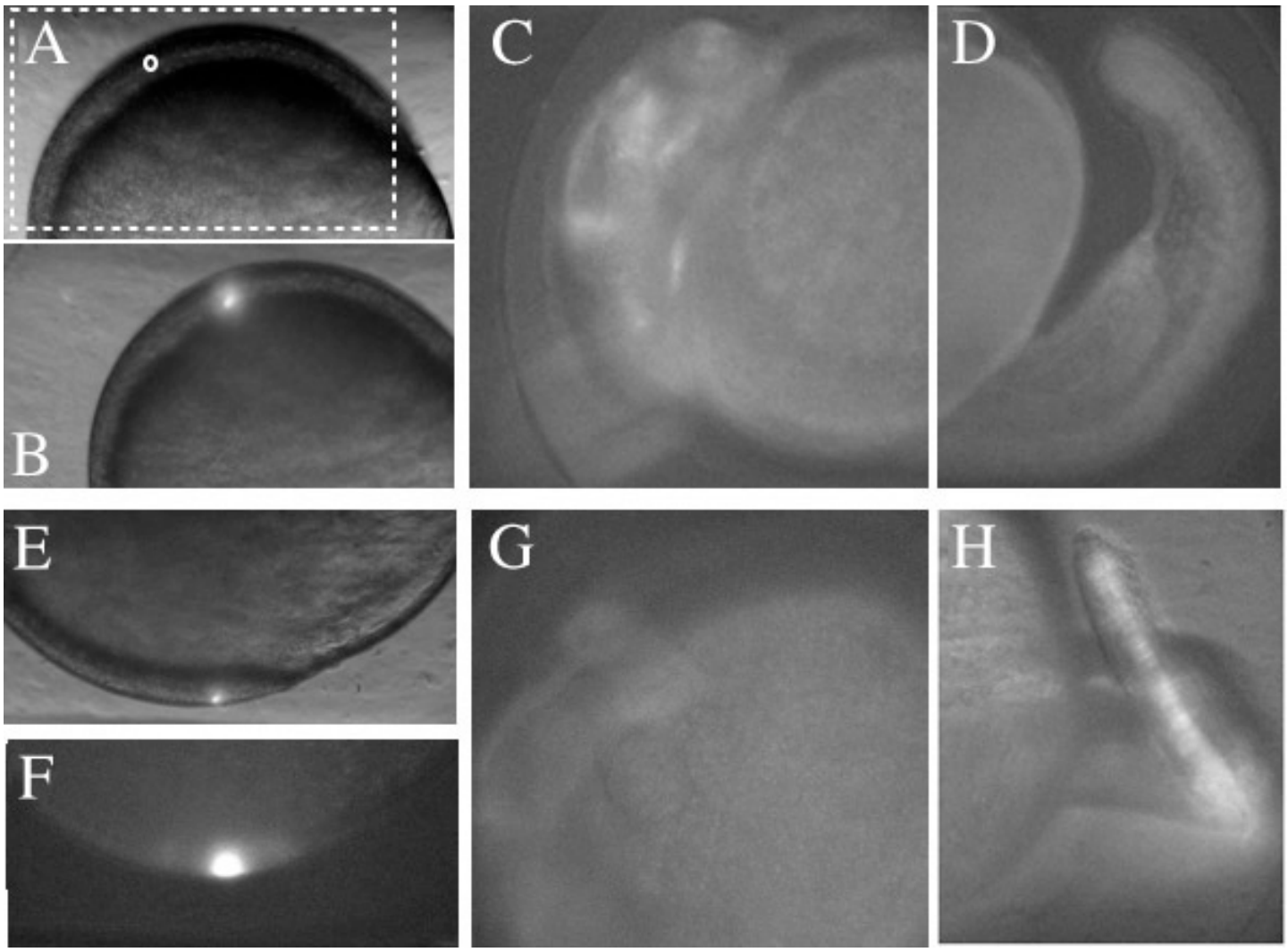

Fig. S5. Local labeling with photo-activation of Kaede. Local illumination with a UV laser at ~80% epiboly in the precursor of the head region. To confirm the localization of the UV laser illumination we used the photoconversion of Kaede (from green to red fluorescence) to track the fate of the illuminated region. The mRNA encoding Kaede (Kohei et al., 2006) was injected at the one-cell stage. (**A**) Embryo overview. The boxed region indicating the anterior part of the embryo corresponds to the area shown in B,C. The region indicated by the small circle was selected for UV irradiation. (**B**) Twenty seconds of UV irradiation (bright spot) in the circled region in A. (**C**,**D**) At 24 hpf, red fluorescence from diffused Kaede was observed in the head (C), but not in the tail (D). (**E**) UV irradiation for 20 seconds in a region (bright spot) that develops into the tail. (**F**) Corresponding red fluorescent image immediately after photoconversion. (**G**,**H**) At 24 hpf, red fluorescence was observed in the tail (H) but not in the head (G).