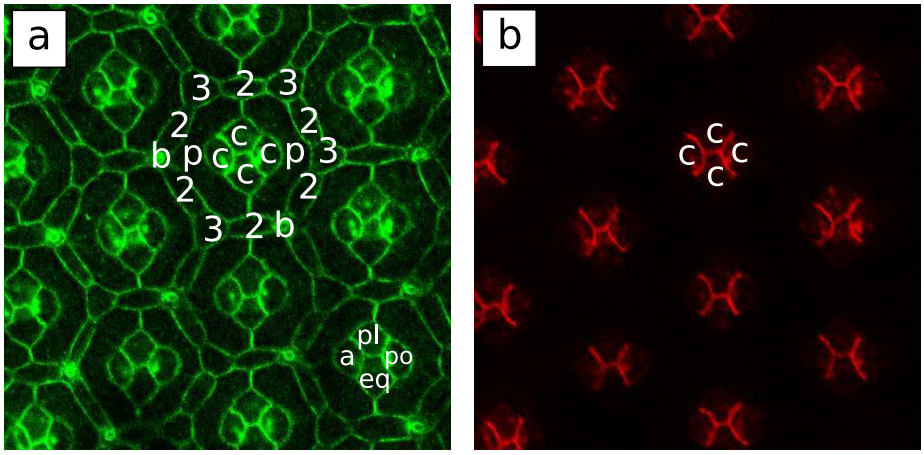

Fig. 7. Confocal microscopy images of the Drosophila retina. The pictures measure 100 mm ´ 100 mm. (*a*) b-Catenin, a component of the adherens junction, is stained green. Nearly all catenin fluorescence between the cone cells is seen in a layer of 1.26 mm thick. One ommatidium consists of four cone cells (c) and two primary pigment cells (p), surrounded by six secondary (2) and three tertiary (3) pigment cells and three bristle cells (b). In this particular ommatidium, one bristle cell is replaced by a tertiary pigment cell. The cone cells can be subdivided into a polar (pl), equatorial (eq), anterior (a) and posterior (po) cone cell, according to their position. (*b*) N-cadherin fluorescence in the same plane of focus. N-cadherin is restricted to the cone-cone interfaces.

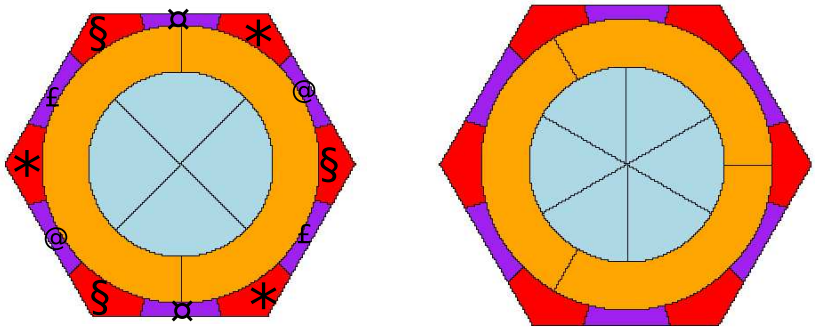

Fig. 8. Initial conditions of each simulation with four cone cells and two primary pigment cells (*Left*) and six cone cells and three primary pigment cells (*Right*). Periodic boundary conditions imply that the secondary pigment cells (purple) and tertiary pigment cells (red) that are marked with the same symbol, are treated as parts of the same cell.

Table 1. Simulation parameters of the wild-type ommatidium in the variable tension model

Parameter	**Symbol**	**Value**	
E-cadherin-mediated adhesion	J_E	150	¶
N-cadherin-mediated adhesion	J_N	450	¶
C - C adhesion	J_{CC}	$J_N + J_E$	
C - P adhesion	J_{CP}	J_E	
P - P adhesion	J_{PP}	J_E	
P - 2, P - 3 adhesion	J_{P2}, J_{P3}	J_E	
2, 3 adhesion	J_{23}, J_{22}, J_{33}	800	†
C - 2, C - 3 adhesion	J_{C2}, J_{C3}	70	‡
Random fluctuation allowance	T	125	†
Area modulus	λ_A	0.75	¶
Perimeter modulus	λ_P	0.5	¶
Size of total hexagon	A_{hex}	25160	†
Sum of all target areas	$\sum_{cells} A_{0i}$	$0.95\ A_{hex}$	
Target area of C	A_{0C}	$\left(\sum_{cells} A_{0i}\right)/16$	
Target area of P	A_{0P}	$11\left(\sum_{cells} A_{0i}\right)/40$	
Target area of 2	A_{02}	$\left(\sum_{cells} A_{0i}\right)/30$	
Target area of 3	A_{03}	$\left(\sum_{cells} A_{0i}\right)/20$	
Target perimeter of C	P_{0C}	$0.75 \times 2\sqrt{\pi A_{0C}}$	¶
Target perimeter of P	P_{0P}	$1.5 \times 2\sqrt{\pi A_{0P}}$	¶
Target perimeter of 2,3	P_{02}, P_{03}	$1 \times 2\sqrt{\pi A_{02}}$	†

¶: Free parameter adjusted to compare to wildtype observation. †: Parameters which value has little effect on the images. ‡: Parameter of no effect on the images, since cone cells almost never touch secondary or tertiary pigment cells. Target perimeters are expressed as a factor times the perimeter of a circle having the specific target area. E.g. a prefactor of 1 indicates that the target perimeter of the cell equals the perimeter if the cell is round and has an area equaling its target area. A cell with a prefactor > 1 (like the primary pigment cells) can deviate much from a round shape. Abbreviations: N, N-cadherin; E, E-cadherin; C, cone cell; P, primary pigment cell; 2, secondary pigment cell; 3, tertiary pigment cell.

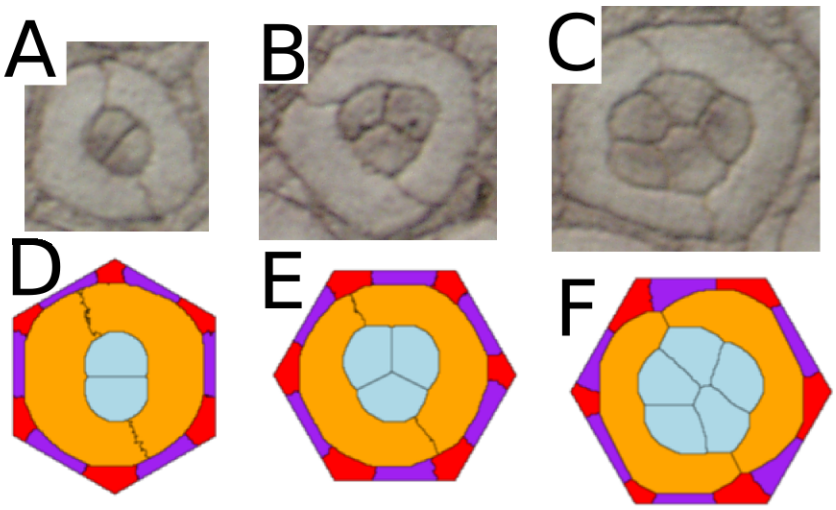

Fig. 9. Experiments and simulations showing ommatidia with two (A and D), three (B and E), and five (C and F) cone cells. [A-C are reproduced with permission from ref. 1 (Copyright 2004, Nature Publishing Group).]
1. Hayashi T, Carthew RW (2004) *Nature* 431:647-652.

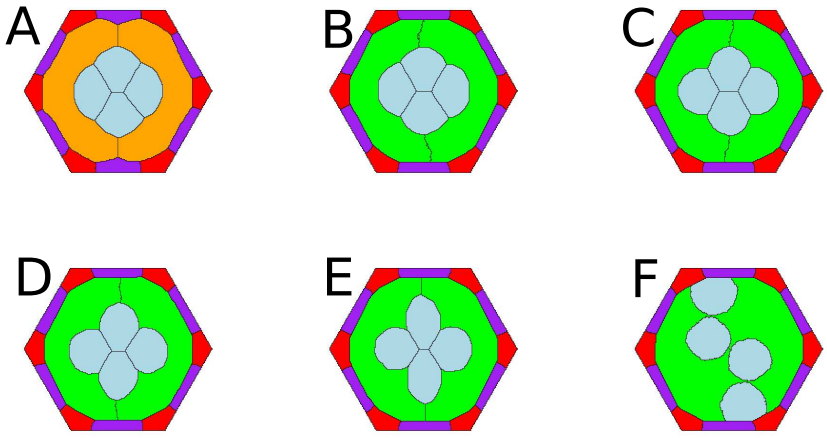

Fig. 10. Determination of the adhesion between cone cells and two N-cadherin misexpressing pigment cells. Simulations are shown with values $J_{Cp} = 150$ (A), 600 (B), 700 (C), 750 (D), 800 (E), 850 (F). A corresponds to wild type, and D corresponds best to the misexpression experiment (Fig. 4G).