Table 1. Occurrence of *abnormal abdomen* at later stages of development and among adult flies and values of selection coefficient against it in populations of *D. melanogaster*.

Population, month and year	Frequency of the anomaly in the sample, %				Coefficient of selection against the anomaly and its standard error
	Larvae and pupae		Imagines		
	q_0	n	q_1	n	
Dushanbe (Middle Asia) May 1975	5.85	427	8.27	701	- 0.45 ± 0.36
Tbilisi (Caucasus) May 1976	11.5	52	3.02	265	0.76 ± 0.14
Siniy Gay (Far East) October 1979	4.49	89	0.966	414	0.79 ± 0.15

In Dushanbe population the coefficient of selection against the normal phenotype $s=(q_1-q_0)/q_1(1-q_0)$ is 0.31 ± 0.17.

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Structure, function, and expression of a retinoid binding protein in *rugose* (*rg*) mutants.

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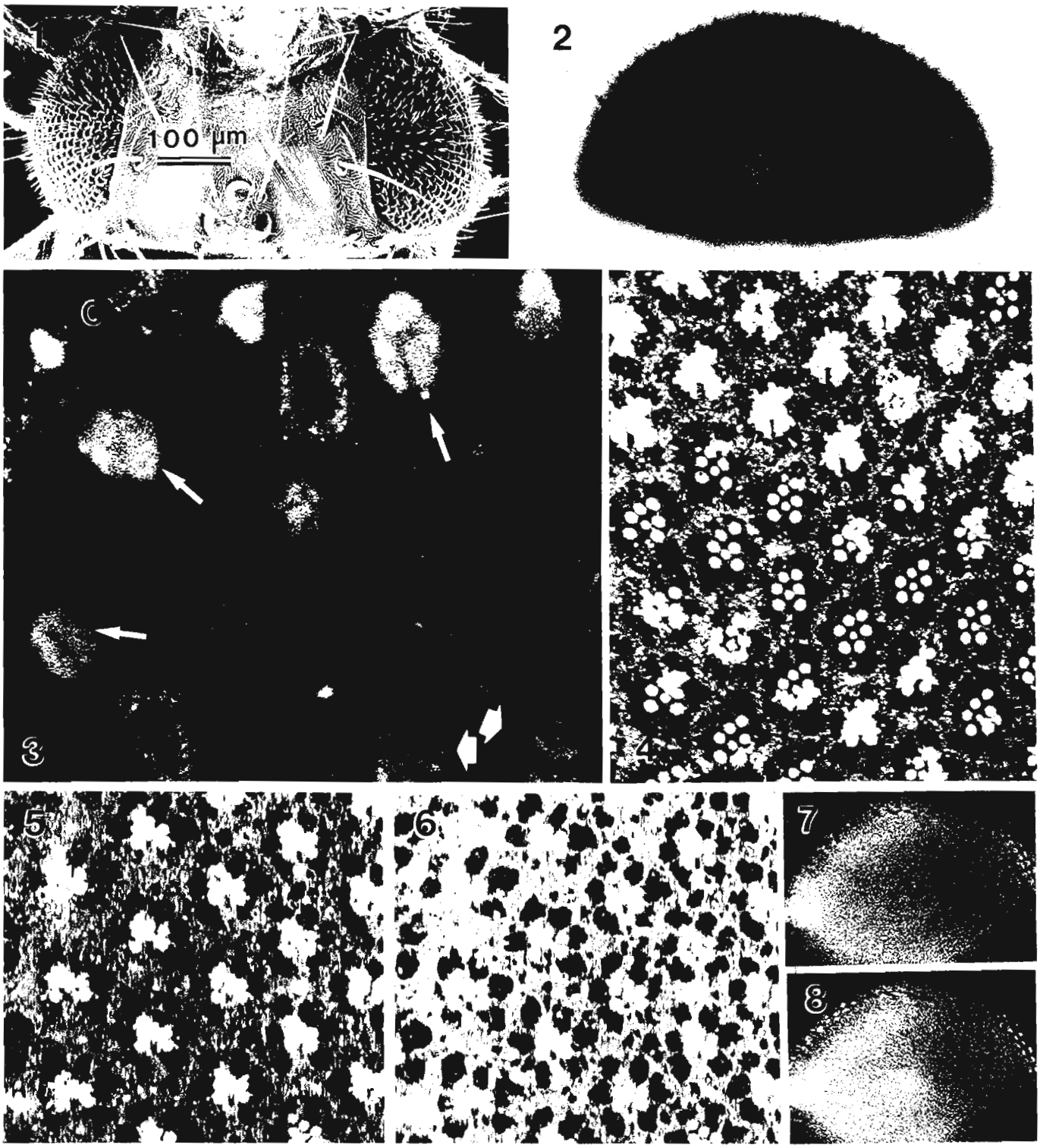
Rugose (*rg*) locus mutant *Drosophila* have rough compound eyes and abnormal cone (Semper) cell numbers due to cone cell specification defects (Renfranz and Benzer, 1989). Figure 1 is a scanning electron micrograph (SEM) showing that *rg*, the *x3* allele, has rough compound eyes but fairly normal ocelli. Despite this slight disarray, the eye seems to be fairly normal. For instance, higher magnifications show that the compound eyes have the usual array of corneal nipples, thought to be an antireflection adaptation (*e.g.*, Stark *et al.*, 1989). Another way to demonstrate that the compound eye is not too badly disorganized is the deep pseudopupil image (Figure 2, rg^{p3}). The deep pseudopupil is virtual image of the magnified rhabdomere tips and has been utilized for decades as a diagnosis of rhabdomere integrity (*e.g.*, Harris *et al.*, 1976). Although, the individual R1-6 and R7 receptors cannot be distinguished in this image (*cf.*, Harris *et al.*, 1976), the image is pretty good.

We were interested in the *rg* mutant with its cone cell phenotype because we had been investigating a protein, RFABG = retinoid and fatty acid binding glycoprotein, expressed in cone cells (Shim *et al.*, 1997). Figure 3 shows a selected confocal micrograph (fluorescein optics) of *w*



Figures 1-8. See text.

rg^{x3} labeled with anti-RFABG of the compound eye just beneath the cornea (C) demonstrating that several ommatidia have 2 or 3 cone cells (arrows) instead of the normal complement of 4. Importantly, this fly was white-eyed (*w*), and the rhabdomeres (arrowheads) do not stain in *w*, as noted previously (Shim *et al.*, 1997). In addition to staining cone cells, anti-RFABG also stains the intraommatidial matrix surrounding the rhabdomeres (Shim *et al.*, 1997), as seen in Figure 3.

Curiously, anti-RFABG seemed to reveal mosaicism in rg^{p3} of labeled, partially labeled, and unlabeled intraommatidial matrices within the compound eye (Figure 4). This would make sense if some facets lack all cone cells altogether. However, the apparent mosaicism may be a fairly interesting artifact. Since confocal microscopy allows optical sectioning, we obtained a z-focus series of 6 optical sections, even through this 1 μm section. Figures 5 and 6 show the top and bottom optical slices, respectively. Note that there is no intraommatidial RFABG at the bottom of the section, implying that the labeling does not penetrate the entire section. Then the appearance of mosaicism in Figure 4 would be explained by an optical section through a slightly uneven slice that is only stained at the surface.

Our original purpose was to use *rg*'s cone cell reduction in a study of RFABG. In the process, we discovered that rhabdomeres in red-eyed flies fluoresce brightly [obvious from comparison of Figures 4 - 6 with Figure 3 (white-eyed)]. We speculate that fixation extracts a portion of the eye color pigments which gravitate to the rhabdomeres where they fluoresce.

Since *rg* reduces cone cells (which express RFABG) *rg* might impair visual pigment if RFABG's retinoid binding were important for rhodopsin synthesis. The transmission of 579 nm (yellow) light through the deep pseudopupil (Figure 8) is decreased by 480 nm (blue) stimulation (Figure 7). $W\ rg^{x3}$ was used since white eyes are needed for this standard assay of visual pigment level (Stark and Johnson, 1980). Even though *rg*'s pseudopupil is not exemplary (Figure 8 and Figure 2), the transmission decrease (Figure 7) is substantial, indicating that visual pigment is abundant. ERG (electroretinogram) analyses (not shown) confirm that visual function is strikingly normal, considering the rough eye phenotype.

In summary, in the absence of an RFABG mutant, we had hoped that *rg*'s reduction in the cone cells which express RFABG would show a visual defect but found otherwise. This could mean one of two things: either RFABG is not important in visual function or that *rg* does not decrease RFABG enough to answer the question. Despite this negative outcome, we report two incidental observations that might be of interest to researchers: (1) that antibody labeling does not not penetrate beyond the surface of a section; and (2) that rhabdomeres fluoresce in red-eyed flies.

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