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The glossy eye of *lozenge* (*lz*) studied by high power scanning electron microscopy (SEM) of compound eyes and ocelli.

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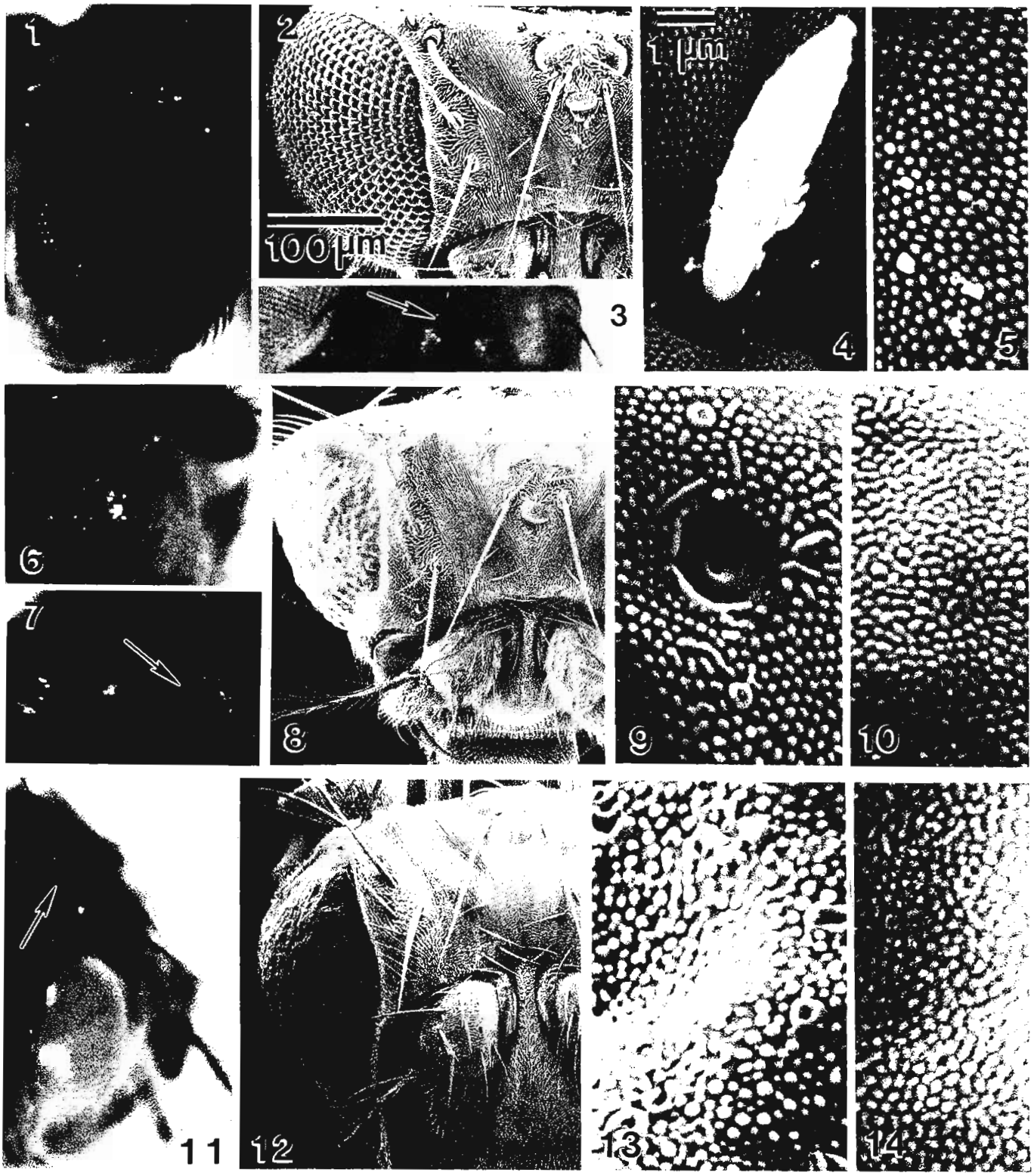
Mutants of the *lozenge* (*lz*) gene have been known since 1925 (Lindsley and Grell, 1968). Among their widespread defects are grossly abnormal eyes. There is substantial contemporary interest in the molecular and developmental mechanisms in the *lz* eye (Batterham *et al.*, 1996; Crew *et al.*, 1997; Daga *et al.*, 1996; Flores *et al.*, 1998). The compound eyes of *lz* appear shiny, hence the name "glossy" of one allele. A fine-grained roughness of the eye's surface, the "corneal nipple array," serves as an antireflection coating in some insects (Bernhard *et al.*, 1970; Bernhard *et al.*, 1965), and corneal nipples are present in *Drosophila* compound eyes and simple eyes (ocelli) (Stark *et al.*, 1989). The purpose of this study was to examine the surface of *lz* eyes with scanning electron microscopy (SEM) at a high enough magnification to resolve corneal nipples.

Two *lz* alleles were examined: lz^{77a7} (red-eyed) is an eye-specific null (Flores *et al.*, 1998) while lz^{r15} (white-eyed) is a complete null (G. Flores, personal communication). The shininess of eyes illuminated with a Fiber-Lite (Dolan-Jenner 180) was assessed with a dissection microscope (Olympus SZ40), and the light microscopic images were captured with an MTI CCD72 camera and printed with a Sony UP-5200MD video printer. For SEM, heads were dissected, dehydrated in an ethanol series, critical point dried, fixed to stubs, sputter coated and viewed on a Hitachi S570 SEM.

The accompanying plate shows control animals on top (Figures 1-5), red-eyed lz^{77a7} in the middle (Figures 6-10), and white-eyed lz^{r15} on the bottom (Figures 11-14]) The calibration bar for



Figures 1 to 14 (described in the text).

low power SEMs (Figures 2, 8, and 12) is 100 μm (shown in Figure 20, while for high magnification SEMs (Figures 4, 5, 9, 10, 13, and 14) is 1 μm (shown in Figure 4).

Our light micrographs verify the well-known fact that *lz* (red-eyed lz^{77a7} [Figures 6 and 7] and white-eyed lz^{r15} [Figure 11]) compound eyes are shiny compared with those of our red-eyed (Figure 1) and white-eyed (Figure 3) controls. At the resolution of the dissection microscope, it is not possible to state whether *lz* ocelli look different from the corresponding wild-type controls (white-eyed control Figure 3 arrow, red-eyed lz^{77a7} Figure 7 arrow, white-eyed lz^{r15} Figure 11 arrow). Our low power SEM's verify for the gross abnormalities of the compound eyes and present (to our knowledge for the first time) a reasonably normal ocellar countenance (compare Figure 8 red-eyed lz^{77a7} and Figure 12 white-eyed lz^{r15} with Figure 2 wild-type).

High power SEMs show that red-eyed lz^{77a7} (Figure 9) and white-eyed lz^{r15} (Figure 13) compound eyes do have corneal nipples which look much like those of control flies (Figure 4) except with more irregularities. For ocelli, red-eyed lz^{77a7} (Figure 10) and white-eyed lz^{r15} (Figure 14) exhibit a fairly normal corneal nipple array compared with that of control flies (Figure 5).

Based on the importance of corneal nipples as an antireflection coating and the shininess of the *lz* eyes, we might have expected to see a greater disturbance in the corneal nipple array of *lz* compound eyes. The subtlety of the nipple disarray suggests alternative explanations for the glossy compound eyes. Probably the irregularity of the array and curvature of the cornea over each facet is the primary determinant of shiny compound eyes. At the level of surface morphology, we conclude that *lz* ocelli are largely normal.

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Ovarian fluctuating asymmetry: a stable property among *Drosophila* species.

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Fluctuating asymmetry (FA), which estimates the imprecision with which bilateral traits are determined during the development, is receiving increasing attention among evolutionary biologists (Palmer and Strobeck, 1986; Moeller and Swaddle, 1997).

FA is a special kind of phenotypic plasticity and is known to increase under environmental stress. A major, hotly debated problem is to know whether FA *per se* may be a target of natural selection (Moeller and Thornhill, 1997). Such a possibility should imply some genetic determinism of this trait.

FA is difficult to estimate for metrical traits (*e.g.*, fruit fly wing length) because of possible measurement errors (see Moeller and Swaddle). By contrast, ovaries are made of numerous tubules