jet (that of the famous quasar 3C273), and still do not detect any counter-jet at a limiting brightness of 1 part in 5,300 relative to the jet. This limit on the counter-jet brightness is perilously close to the brightness predicted by the model, though the authors emphasize that "the canonical model is not threatened". Clearly, it is important to push to still fainter levels on this quasar.

The second important result is the detection of superluminal motion in the jet at distances of about 400 light years from the core. The relativistic model for one-sided jets requires near-light-speed motion throughout the length of the jet. The controversial case of the radio galaxy 3C120 notwithstanding[7,8], superluminal motion is really well documented only on very small scales (tens of light years) at the bright bases of jets. Moreover, the most famous one-sided jet of all — which is associated with the radio galaxy M87 — shows subluminal motion on all scales from light years to thousands of light years from the core[9,10].

Although Davis, Unwin and Muxlow hold the current world record in two important categories (lowest limit on counter-jet brightness and greatest distance from the nucleus at which superluminal motion has been detected), we can expect these records to be relatively short-lived. The observational technique of very-long-baseline interferometry (VLBI), with which these results were obtained, is evolving rapidly. The Very-Long Baseline Array (VLBA), currently under construction by the National Radio Astronomy Observatory in the United States, will provide the most powerful dedicated VLBI facility to date. The combination of the VLBA with the existing and future global network of radio telescopes will mean that astronomers can look forward to a decade of exciting discoveries concerning the enigmatic quasars and their jets. □

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CELL CYCLE

Checkpoints and spindles

Paul Nurse

ONE of the more remarkable features of the cell cycle is the extraordinary fidelity of the processes that are necessary for the precise reproduction and segregation of all the components required for successful cell division. Discussing the mechanisms responsible for coordinating these processes, Hartwell and Weinert[1] suggested that a key role is played by 'checkpoints' acting during the cell cycle. This idea has now been cleverly applied to account for the dependence of the completion of mitosis on correct spindle function[2,3].

Many events in the cell cycle must be completed in a definite order: for example, chromosome replication has to occur before chromosome segregation, and, as a result, mitosis cannot be correctly carried out unless the earlier event of S phase has been accomplished. Several mechanisms could account for this temporal control. An early event in a sequence might produce some component or structure that is essential for a subsequent event; such a substrate–product relationship would make the later event dependent upon the earlier one. It would be very difficult to disrupt the timing of events linked in this way, because their dependency is an essential part of the process necessary for progression through the sequence. Temporal order might also be achieved through a timer mechanism operating so that the earlier event occurs after a short time and the later event after a longer time. In this case it would be easy to interfere with the temporal order because blocking the earlier event would not

In the eye of the fly

C. Harris & J. Crum

THE study of invertebrate phototransduction is likely to benefit enormously from new preparations of isolated *Drosophila* photoreceptor cell clusters, which, as reported by C. Zuker and colleagues last month, are amenable to patch-clamp analysis (R. Ranganathan *et al. Nature* **354**, 230–232; 1991). Others have also successfully prepared isolated photoreceptors (R. C. Hardie *et al. Neuron* **6**, 477–486; 1991). The picture shows a false-colour scanning electron micrograph of one of the roughly 800 photoreceptor cell clusters contained in each compound eye of a *Drosophila* pupa. Each cluster contains eight photoreceptor cell neurons. Ranganathan *et al.* found that the entry of extracellular calcium ions was required for the deactivation of these photoreceptors following exposure to light. What makes the technique especially powerful is that it allows the functional dissection of *Drosophila* phototransduction mutants; screening such mutants revealed that deactivation was defective in the homozygous *inaC* (*inactivation-no-afterpotential C*) mutant (although excitation appeared normal). Expression of the *inaC* phenotype was dependent on extracellular calcium, suggesting that normal *inaC* activity is calcium-dependent. In this week's *Science*, the same group extend their analysis to show that *inaC* encodes an isoform of protein kinase C (eye-PKC). According to their current model, light-induced activation of the G-protein-coupled rhodopsin results in activation of the *norpA* gene product phospholipase C and production of inositol trisphosphate and diacyglycerol, which in turn promote the influx of extracellular sodium and calcium. The large rise in intracellular calcium activates eye-PKC, which then inhibits phototransduction, perhaps by phosphorylating phospholipase C, the G protein or the light-activated ion channel itself. **Kevin Davies**