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► **COVER:** 'Aglow' by Patrick Morgan, inspired by the Reviews on p899 and p923.


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The conventional view of a centromere is a piece of DNA that ensures chromosomes hook properly onto microtubules, so that they can part seamlessly during cell division. Over the past few years, studies have revealed some of the additional and equally vital roles carried out by the centromere, as well as refining our understanding of its fundamental properties. These advances are discussed in two Reviews in this issue.

Robin Allshire and Gary Karpen (p923) attempt to explain how a relatively small, repeat-rich stretch of poorly conserved DNA is recognized by the cell and used as a foundation for positioning of one, and only one, kinetochore. In eukaryotes, the correct spot is defined epigenetically by the deposition of the centromeric histone H3 variant, CENP-A. As with so many crucial functions in biology, CENP-A must be delivered to the right place by the right combination of RNA molecules and proteins, and at the right time during the cell cycle.

This function alone raises many research questions, such as how positioning and timing are regulated, and how centromere identity is propagated. But there is more to a centromere than being a site of kinetochore assembly. Gloria Brar and Angelika Amon (p899) discuss the increasingly recognized importance of centromeres at various stages of meiosis I — for example, in the pairing of homologous chromosomes, in the loss of cohesion to allow chromosome separation and in kinetochore orientation.

But what defines a centromere? At the moment it is still not entirely clear what unites the long stretches of satellite DNA in humans and the 125-bp sequence in budding yeast — beyond, that is, being essential to cell viability and genome integrity and consequently to fertility and health.

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