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Original design by Jane Walker

The eagerly awaited DNA sequence of the human X chromosome, which was published in March 2005, has within it the ingredients of a unique chromosome: the stuff it is made of (mainly repeats), what happened before and after it gained independence from the Y chromosome, and the mechanics of how one copy of it is permanently inactivated in every female cell. This last feature — dosage compensation — has intrigued biologists for years, as they strive to define its molecular basis and explain how the variety of dosage-compensation mechanisms seen in mammalian and non-mammalian species could have evolved.

Two Opinion articles in this issue try to make sense of the complicated dosage-compensation mechanism that exists in mammals. On page 410, Khanh Huynh and Jeanie Lee propose that the two main types of inactivation that occur at sequential points in mammalian development reflect the evolution of the two mechanisms — a primitive 'imprinted' inactivation and a more recently emerged 'random' version — that arose sequentially during the evolutionary history of X-chromosome inactivation. Wolf Reik and Annabelle Lewis (page 403) provide another explanation: they argue that the imprinted form of chromosome inactivation emerged with the evolution of autosomal imprinting, which itself would have arisen due to the selective pressure imposed by having a placenta.

This May marks the award of the March of Dimes Research Prize in Developmental Biology, which this year goes to Oliver Smithies and Mario Capecchi for the pioneering work that they independently carried out on mammalian gene targeting. In the Essay on page 419, Oliver Smithies gives us a personal tour of his research career, which is also documented in an interview that is printed on page 350. An essay by Mario Capecchi, and an interview, will be published in our June issue.

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