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Cover  During meiotic maturation, cohorts of oocytes synchronously re-enter the cell cycle and complete meiosis. This is a process that occurs in the absence of transcription and depends on the regulated translation of stored maternal transcripts. Shown here is an immunofluorescence analysis of 60 Dicer-deficient mouse oocytes using an antibody directed against the spindle component, β-tubulin (red). DNA was counterstained with Sytox green. In the absence of Dicer, mouse oocytes develop abnormal spindles and often fail to complete the first meiotic division, revealing a novel role for small RNAs during meiosis. [For details, see Murchison et al., p. 682, and related paper by Tang et al., p. 644.]