During S phase, not only does DNA have to be replicated, but also newly synthesized DNA molecules have to be connected with each other. This sister chromatid cohesion is essential for the biorientation of chromosomes on the mitotic or meiotic spindle, and is thus an essential prerequisite for chromosome segregation. Cohesion is mediated by cohesin complexes that are thought to embrace sister chromatids as large rings. Cohesin binds to DNA dynamically before DNA replication and is converted into a stably DNA-bound form during replication. This conversion requires acetylation of cohesin, which in vertebrates leads to recruitment of sororin. Sororin antagonizes Wapl, a protein that is able to release cohesin from DNA, presumably by opening the cohesin ring. Inhibition of Wapl by sororin therefore “locks” cohesin rings on DNA and allows them to maintain cohesion for long periods of time in mammalian oocytes, possibly for months or even years.