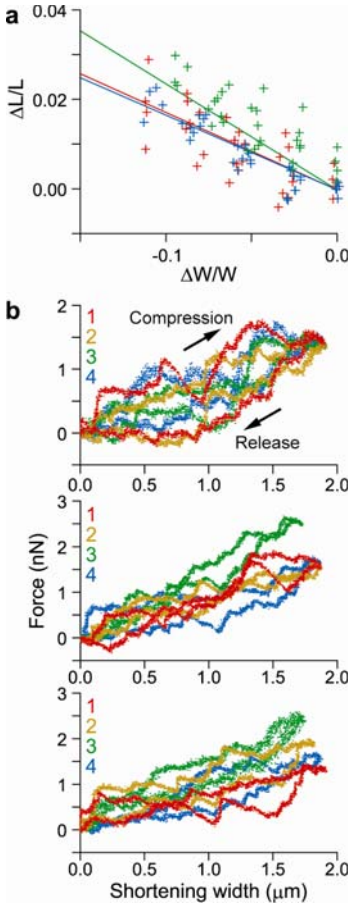
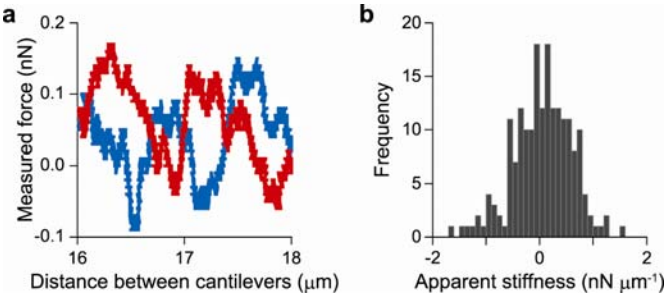
Supplementary Figure 1:
Elastic response of the meiotic spindle in small deformation



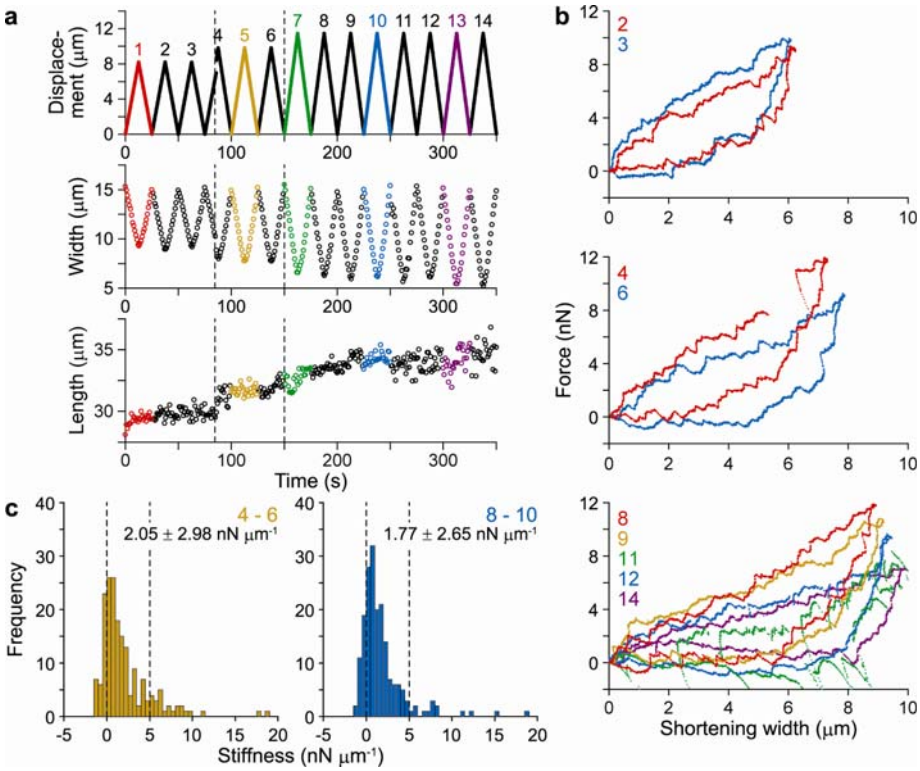
(**a**) Length vs. width deformation relationships in a small deformation (red crosses, 4 cycles of **Fig. 2a**; green and blue crosses, 4 cycles of other two spindles). Solid lines represent estimated relationship for the length change accompanied by the width change under the assumption that the 2D shape of the spindle is an ellipse with a constant circumference. The slope of these lines depends on the spindle size. (**b**) Force vs. compression relationship in a small deformation. (top) The spindle shown in **Fig. 2a**. (middle) The spindle shown by green crosses in **Fig. a**. (bottom) The spindle shown by blue crosses in **Fig. a**.

Supplementary Figure 2:
Force response of the cytoplasmic extract upon the displacement of cantilever



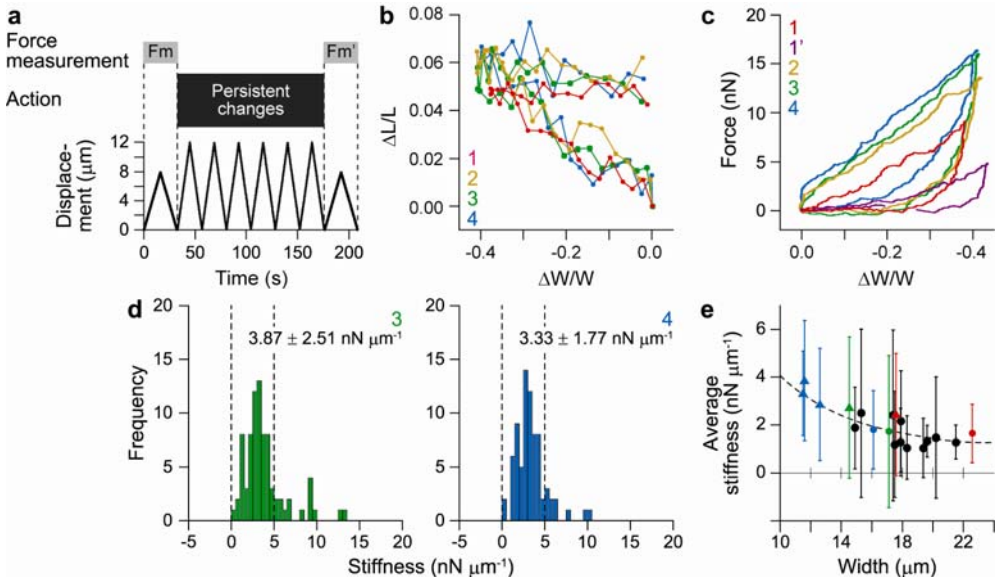
(**a**) Measured force vs. distance between manipulating and force-sensing cantilevers obtained during the approach of the manipulating cantilever toward the force-sensing cantilever at 0.5 μm s^{-1} (equal to the velocity in a small deformation performed perpendicular to the pole-to-pole axis, **Fig. 2**.). The measurements were performed in the cytoplasmic extract without spindles. The initial distance between the cantilevers was set to be nearly equal to the width of meiotic spindle, i.e., 18 μm. Those are two examples showing the force response (measured by the force-sensing cantilever) to the displacement of 2 μm of the manipulating cantilever. The effect of viscoelasticity of the cytoplasmic extract is estimated to be negligibly small for the force measurement of the spindle. However, unpredictable flow caused by nonuniform environment of inhomogeneous cytoplasmic extract sometimes occurred. The average measured force = 0.04 ± 0.09 nN (mean ± s.d., n = 10). (**b**) Histogram showing the distribution of the apparent stiffness, which was obtained by the same way as described in Methods.

Supplementary Figure 3:
Irreversible changes of the meiotic spindle in large deformation



(**a**) Displacement of the manipulating cantilever and the width and length changes of spindle during large deformation. (**b**) The force vs. compression relationships for the 2nd, 3rd, 4th, 6th, 8th, 9th, 11th, 12th, and 14th cycles are shown. (**c**) Histograms showing the stiffness distribution obtained in the 4th-6th and 8th-10th cycles of the large deformations (compared with the 1st-3rd cycles, $P = 0.188$ for the 4th-6th cycles, and $P = 0.024$ for the 8th-10th cycles). The average stiffness (mean ± s.d.) is shown at the upper right-hand corner in each figure.

Supplementary Figure 4:
Structural recovery of the meiotic spindle



(**a**) Experimental protocol for one compression cycle. The stiffness of the meiotic spindle was examined before (Fm) and after persistent changes of spindle morphology (Fm'). This compression cycle was repeated four times for the same spindle with intervals of 8 min in between the repetitive experiments. (**b**) Length vs. width deformation relationship obtained for four different cycles: (1) for the 1st, (2) the 2nd, (3) the 3rd, and (4) the 4th measurement performed at Fm in **Fig. a**. (**c**) Force vs. relative shortening ratio of the width obtained in **Fig. b**. (**d**) Histogram showing the stiffness distribution obtained for the 3rd and the 4th measurement (compared with the Force measurement 1 shown in **Fig. 5b**, $P < 0.0001$ for the 3rd measurement, and $P < 0.0001$ for the 4th measurement). The average stiffness (mean ± s.d.) is shown at the upper right-hand corner in each figure. (**e**) Dependence on width of the average stiffness of spindles. The data shown by black and colored circles were obtained from fifteen different spindles with various initial widths in the first one cycle of large deformation (n = 15, spontaneously assembled in egg extracts prepared from fifteen different preparations). The data shown by triangles (blue, the reorganized spindle in the 2nd (**Fig. 5b** right), the 3rd and the 4th (**Fig. d**) measurements; red and green, other two reorganized spindles) were obtained 8 ~ 10 min after mechanical perturbations to initial spindles shown by circles of each color (n =3). Error bars show the width (s.d.) of the stiffness distribution obtained from each spindle.