**S1 Text**

**Calculation of the C-ring diameter**

Molecular weight of YscQfull = 34,412.6 Da (Gen Bank accession AAD16827).

Assuming an average partial specific volume v2 = 0.73 cm3/g [1], the minimal radius of spherical protein is: Rmin = (3V/4π)1/3 = 0.066 MW 1/3 (MW, molecular weight in Dalton: Rmin, minimal radius in nanometer) [1].

**Rmin(YscQfull)** = 0.066 \* 34,4121/3 nm = **2.147 nm**

In a circle composed of 22 subunits, the radius of a single subunit corresponds to an angle of  
 = 360/44 = 8.18 degrees.

**r(C-ring)** = Rmin(YscQfull) / sin() **= 15.1 nm**

Reference

1. Erickson HP (2009) Size and shape of protein molecules at the nanometer level determined by sedimentation, gel filtration, and electron microscopy. Biol Proced Online 11: 32–51. doi:10.1007/s12575-009-9008-x.