Erratum: Polymer Reptation and Nucleosome Repositioning

H. Schiessel, J. Widom, R. F. Bruinsma, and W. M. Gelbart
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In our Letter we calculated the diffusion constant of a nucleosome along DNA. When inserting numbers into Eq. (3) we used the wrong value of $\lambda$: It should read "$(1/7)k_BT/\text{Å}" instead of "$(1/20)k_BT/\text{Å}"." The loop-formation energy for a ten base-pair loop is then $\Delta U = 23k_BT$. This leads to a diffusion constant $D$ of the order of $10^{-17}$ cm$^2$/s, a value that is considerably lower than estimated in our Letter. Hence typical repositioning times are of the order of 1 h (instead of seconds as stated in our Letter). This is consistent with the experimental observation that nucleosomes are only partially redistributed after 1 h of incubation at elevated temperatures; cf. Fig. 1 in Ref. [1]. It might also explain the fact that nucleosome mobility is significantly suppressed when the temperature is lowered from 37 to 4 °C; indeed, no redistribution is observed after 1 h, as expected from the fact that $D \propto \exp(-\Delta U/k_BT)$ is 1/13 for our new estimate of $\Delta U$. Finally, the force required to move a nucleosome at the speed of RNA polymerase elongation is of the order of tens of nN, far more than the forces generated by the motor protein.

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