Supplementary information

Enzyme Homologues Have Distinct Reaction Paths through their Transition States

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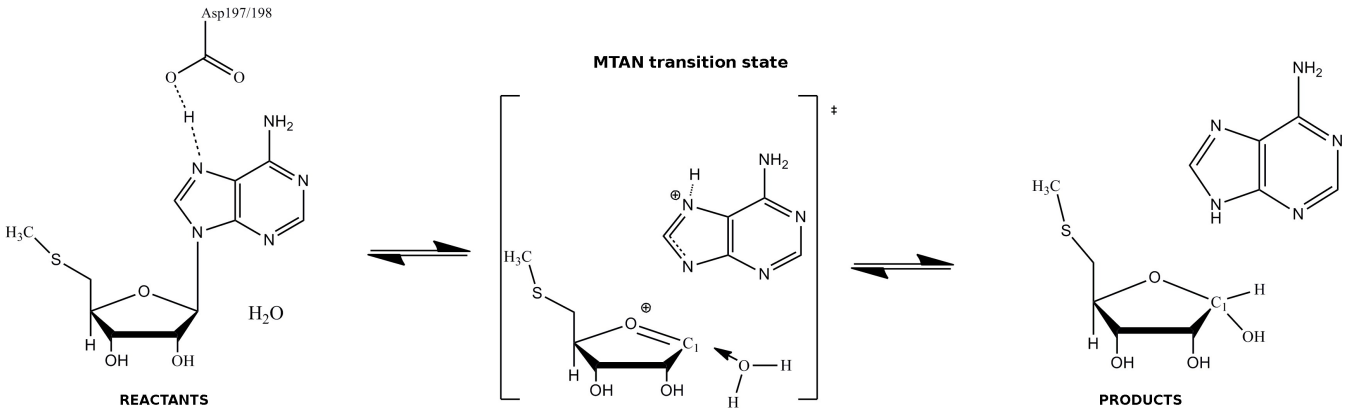


Figure S1: Reaction scheme of the catalytic mechanism.

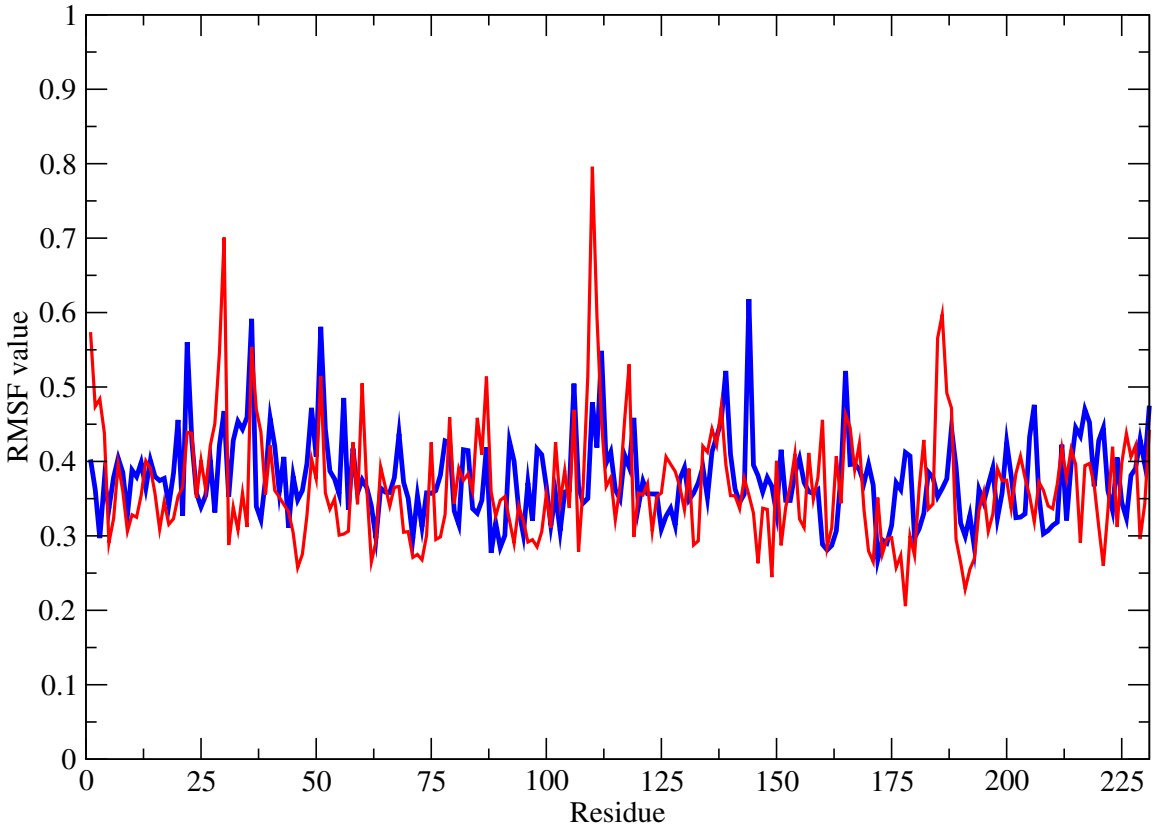
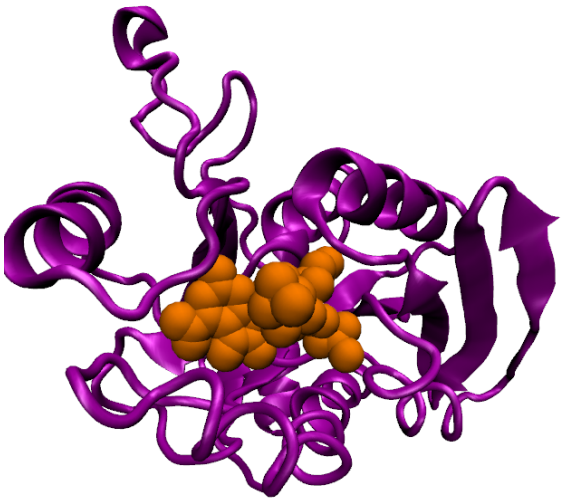
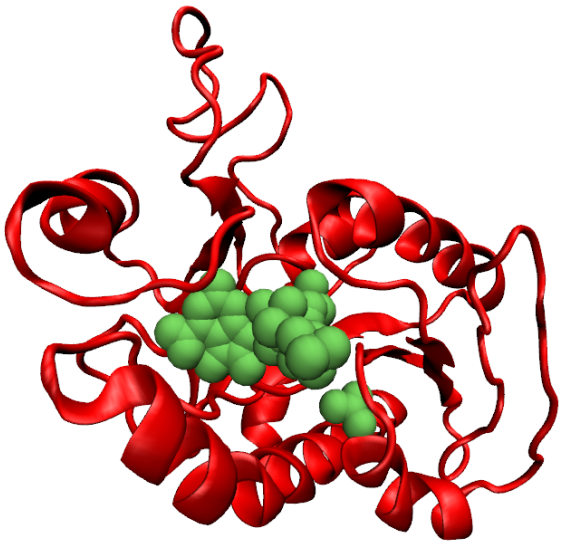


Figure S2: RMSF comparison between *V. cholerae* (blue) and *E. coli* (red) MTAN for reactive trajectories of 250fs.



(a)



(b)

Figure S3: (a) Active site volume of *Vibrio cholerae* MTAN, QM region (orange) (b) Active site volume of *Escherichia coli* MTAN, QM region (green).

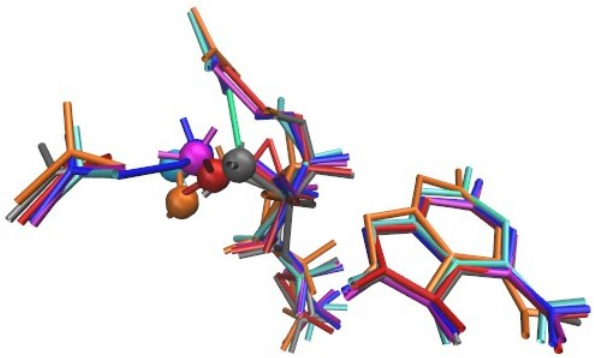


Figure S4: Superimposition of 6 transition state structures of VcMTAN. The catalytic water is given by a different color ball in each TS structure (orange, red, grey, magenta, blue, light blue). 5 distinct orientations are visible in this diagram, one obscured.

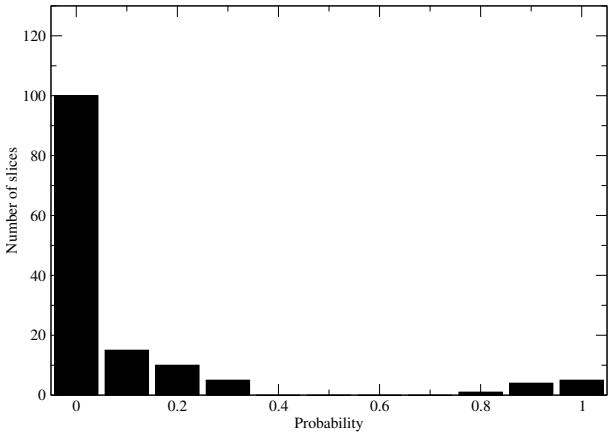


Figure S5: Committor distribution for VcMTAN constraining only C1′-N9, C1′-Ow distances.

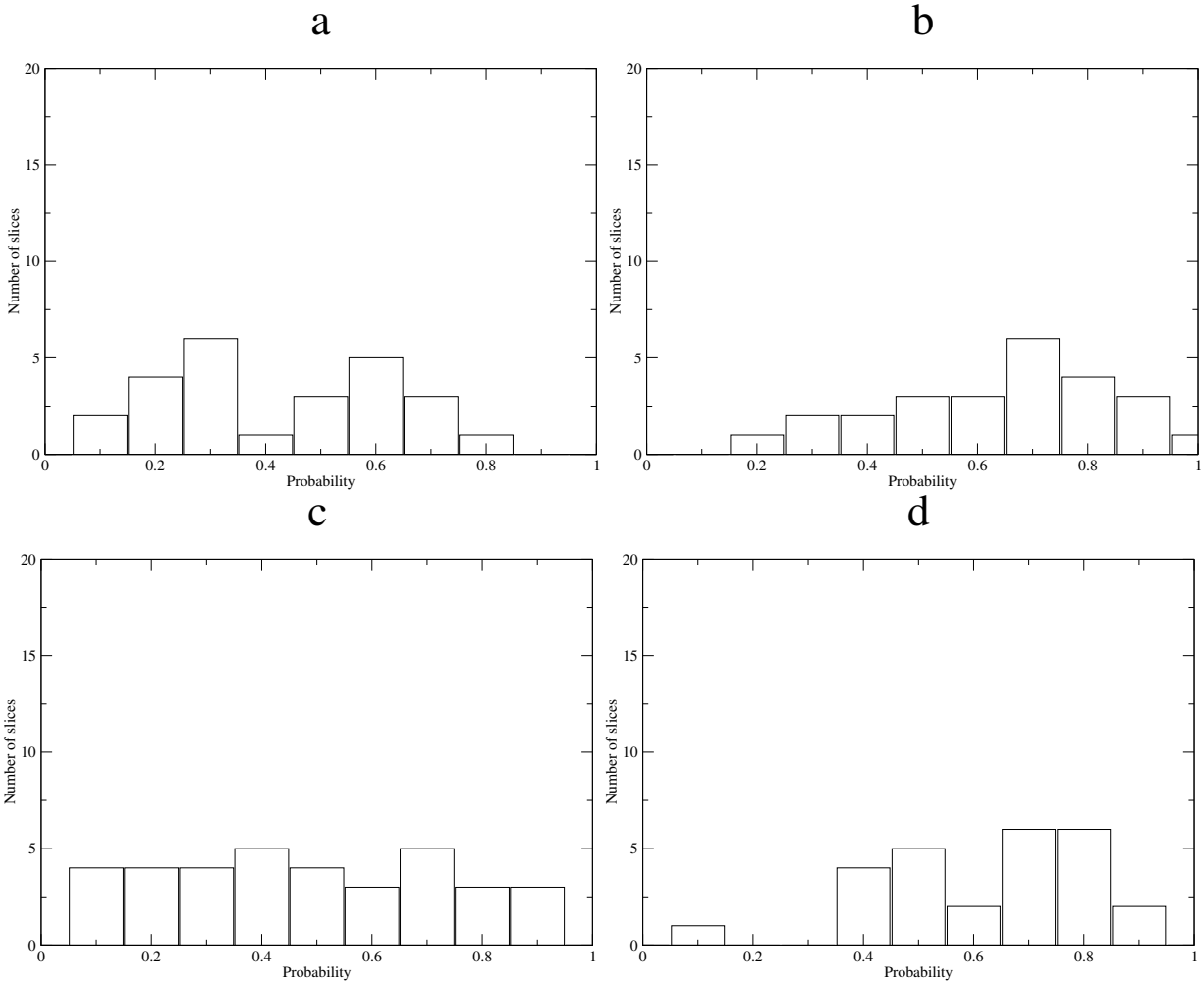


Figure S6: (a) to (d) Committor distribution for VcMTAN constraining C1′-N9, C1′-Ow distances and QM region of the active site for TS1 to TS4 respectively.

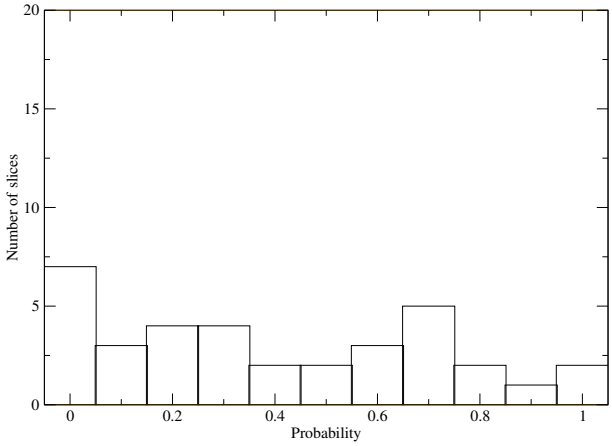


Figure S7: Committor distribution for TS1, with the set of residues found for TS3.

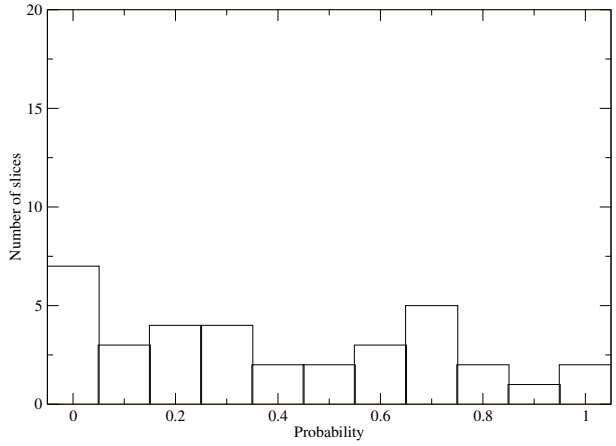


Figure S8: Committor distribution for EcMTAN when we applied the set of residues of TS3.

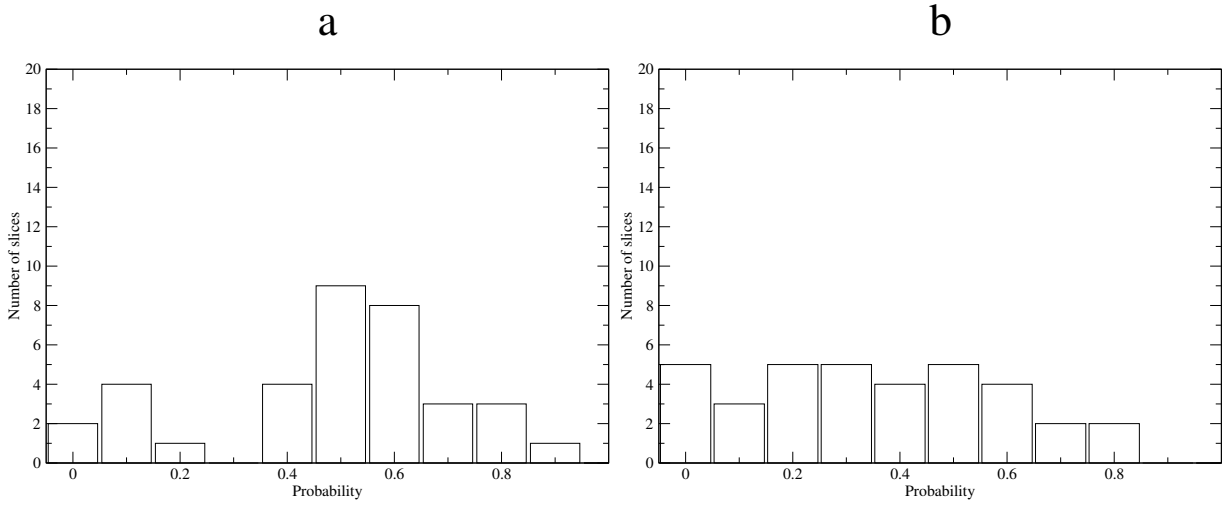


Figure S9: (a) Committor distribution for EcMTAN, constraining C1′-N9, C1′-Ow distances. (b) Committor distribution for EcMTAN, constraining C1′-N9, C1′-Ow distances and active site.

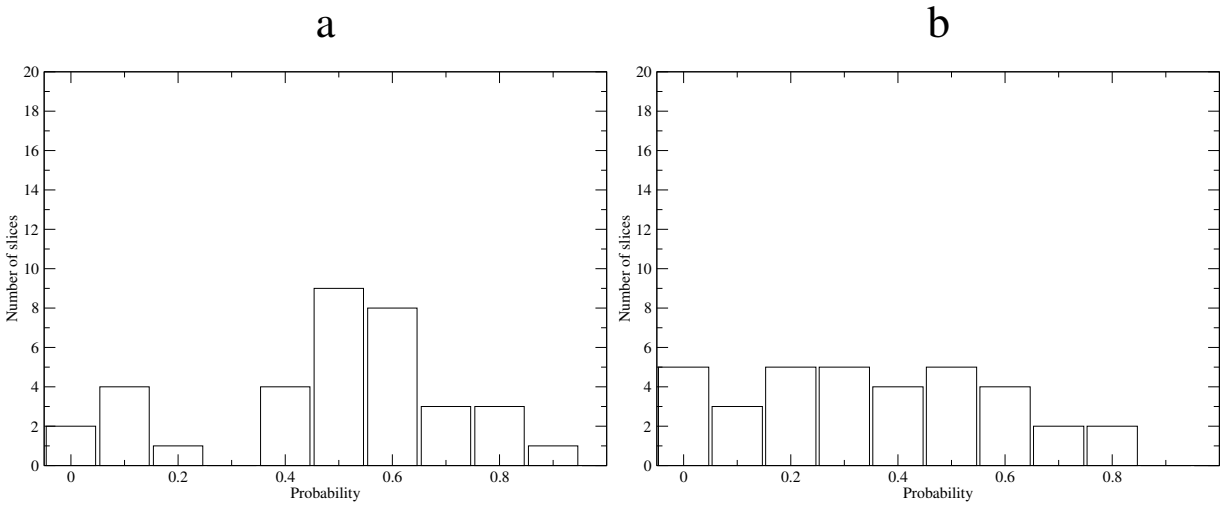


Figure S10: (a) Committor distribution of TS4 of VcMTAN and (b) Committor distribution of TS3 of VcMTAN applying the set of residues we found for EcMTAN.

Video

Supplementary video 1: Representative Reaction Coordinate for VcMTAN. The active site is colored yellow, the oxygen of the catalytic water molecule is represented by a red ball and the anomeric carbon by a grey ball. The trajectory length is 250 fs.

Supplementary video 2: Reaction Coordinate for EcMTAN. The active site is colored orange, the oxygen of the catalytic water molecule is represented by a red ball and the anomeric carbon by a grey ball. The trajectory length is 250 fs.