Table S2: Values of the effective total cellular concentrations of the chemotaxis proteins used in our pathway model (Eqs. 1-11). These values derive from the total numbers of each chemotaxis protein per cell measured in Ref. (20) for strain RP437 in rich medium for all proteins but FliM, and from those in Refs. (21, 22) for FliM, also in rich medium. For CheA and FliM, we take into account additional constraints imposed by the assembly of chemoreceptor arrays and flagellar motors, respectively, as explained in Models and methods in the main text. We use the standard *E. coli* cell volume of 1.4 fL (11, 23).

Protein	Total concentration (μM)	Notes and references
CheA	2.97	1/6 of the chemoreceptor concentration, 17.8 μM (20).
CheY	9.73	(20)
CheZ	3.80	(20)
CheB	0.28	(20)
CheR	0.17	(20)
FliM	1.43	(21, 22). The 16% of FliM that are free (24) are discounted.

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