

Figure S1: Phenotypic properties of grey colony variants.

a. Grey colony variants are easily distinguished by avirulent translucent colony types. A section of an agar plate viewed using a stereo microscope, illuminated from below with oblique lighting. Wild type *A. baumannii* are known to phase switch between virulent opaque and avirulent translucent colony types. These colony types, only discernible when viewed in this way, are notably different from grey colony variants that are easily identified with the naked eye.

b. Grey colony variants have reduced motility. The spread of colonies on soft agar plates was recorded photographically and the area of spread quantified. Results are the average of five biological replicates and error bars indicate standard deviation from the mean. Individual measurements are shown as discrete datapoints. A two-tailed student's t-test was used to determine P. Source data are provided as a Source Data file.

c. Grey colony variants more readily form biofilms. Cells forming biofilms on the surface of microfuge tubes were stained with crystal violet dye. After drying, the dye was solubilised the amount

present quantified by measuring the A_{585} signal as a function of the number of cells present adjudged by $OD₆₀₀$ values. Results are the average of three biological replicates and error bars indicate standard deviation from the mean. Individual measurements are shown as discrete datapoints. A two-tailed student's t-test was used to determine P. Source data are provided as a Source Data file.

d. Grey colony variants are defective for capsule production. Cells separated by centrifugation in colloidal silica migrate according to the presence of capsule. Distances migrated were measured from the bottom of the microfuge tube containing the cell suspension. Results are the average of three biological replicates and error bars indicate standard deviation from the mean. Individual measurements are shown as discrete datapoints. A two-tailed student's t-test was used to determine P. Source data are provided as a Source Data file.

Figure S2: H-NS protects transcribed and essential genes from disruption by IS*Aba***13.**

a. A representative section of the *A. baumannii* **chromosome showing increased transposition into essential and transcribed genes in the absence of H-NS.** Genes are shown as arrows with essential genes coloured blue. The traces show read depths from RNA-seq, H-NS ChIP-seq and native Tn-seq experiments. In all cases positive and negative values indicate read depths for the top and bottom strand respectively. The region is centred approximately around position 1,589,000 of the genome.

b. Frequency of IS*Aba***13 insertion in different classes of genes.** The bar chart shows the total number of IS*Aba*13 insertions per kb, across two biological replicates, in the presence and absence of H-NS, and for H-NS bound, unbound, essential or transcribed genes. P values were derived using the student's T-test. Source data are provided as a Source Data file.

Figure S3: Patterns of H-NS binding, and IS*Aba***13 transposition, upstream of DNA regions used for** *in vitro* **DNA bridging assays.**

a. H-NS binding and IS*Aba***13 transposition patterns at the type six secretion system encoding locus.** Genes are shown as red arrows. The traces show read depths from H-NS ChIP-seq and native Tn-seq experiments. In all cases positive and negative values indicate read depths for the top and bottom strand respectively. The DNA region used for *in vitro* DNA bridging assays is indicated by the black bar.

b. H-NS binding and IS*Aba***13 transposition patterns at one of the existing chromosomal copies of IS***Aba***13.** As for above panel except that IS*Aba*13 is shown in blue.

a

b

Figure S4: Organisation of H-NS-39 and predicted interaction will full length H-NS.

a. Alignment of *E. coli* **and** *A. baumannii* **H-NS.** Residues that are identical (*), conserved (:), or semi-conserved (.) are indicated. The region of *E. coli* H-NS highlighted red is the region used by van der Valk and co-workers¹. The region of *A. baumannii* H-NS highlighted red corresponds to H-NS-39 used in this work.

b. Predicted interaction between *A. baumannii* **H-NS and H-NS-39.** The structural prediction was generated using AlphaFold 3⁹⁶. Full length H-NS is green and H-NS-39 is red.

Figure S5: Disruption of local DNA folding by H-NS-39 *in vivo***.**

a. Changes to 10 kb resolution contact frequencies in the presence of H-NS-39. The heatmap plots normalised 3C-seq contact frequencies, in cells without H-NS-39, divided by normalised contact frequencies from cells expressing H-NS-39. The contact ratios are grouped in 10 kb bins and axes indicate the genomic location of each bin in the pair.

b. Changes to 1 kb resolution contact frequencies in the presence of H-NS-39. As for the above panel except that values are binned at 1 kb resolution.

c-f. Changes to local DNA folding patterns in the presence of H-NS-39. In each panel, the heatmaps separately illustrate interaction frequencies between 1 kb sections of the *A. baumannii* chromosome, measured by 3C-seq, in the presence and absence of H-NS-39. An interaction pattern indicative of a loop is marked and signal in this region is lost in the presence of H-NS-39. The locations of genes (red arrows) are also shown alongside H-NS binding patterns determined by ChIP-seq with or without expression of H-NS-39.

b

Figure S6: Existing copies of ISAba13 do not interact with hot spots for ISAba13 transposition.

a. Existing copies of IS*Aba***13 are in poorly interactive regions of the chromosome.** The panel shows two heatmaps, each representing the *A. baumannii* chromosome divided into 1 kb sections. Sections are coloured according to the number of 3C-seq interactions and sorted on this basis, rather than by chromosomal position. Sections containing existing copies of IS*Aba*13 are labelled.

b. Location and frequency of 3C-seq interactions involving IS*Aba***13 at chromosomal positions 1.764 Mb (copy 1) and 3.863 Mb (copy 2).** The bar chart shows the frequency of interactions between each 1 kb chromosomal section and IS*Aba*13 copy 1 (cyan) or copy 2 (purple). Each IS*Aba*13 copy primarily interacts with neighbouring DNA regions but not sites elsewhere in the genome. Source data are provided as a Source Data file.

c. Location and frequency of IS*Aba***13 insertions in the presence and absence of H-NS.** The bar charts show the frequency of IS*Aba*13 insertions, in each 1 kb chromosomal bin, in the presence and absence of H-NS. In wild type cells, there are many hotspots for transposition that are H-NS bound regions. Comparison with panel b shows that these transposition hotspots do not interact with either copy of IS*Aba*13. In the absence of H-NS, the two regions of highest IS*Aba*13 transposition surround copies 1 and 2 of the insertion sequence at their starting chromosomal loci. Source data are provided as a Source Data file.

a

Figure S7: Insertion sequence *insH3* **is targeted to H-NS bound DNA in** *E. coli***.**

a. Global patterns of H-NS binding and *insH3* **transposition are correlated.** The panel shows two heatmaps, each representing the *E. coli* MG1655 chromosome divided into 1 kb sections. Sections are coloured according to the H-NS ChIP-seq binding signal (top) or the number of *insH3* insertions detected using native Tn-seq for wild type (bottom). The heatmap expansions are provided to aid comparison of H-NS binding and insertion frequency. The Pearson correlation coefficient (r) of the two datasets is shown.

b. Examples of H-NS mediated *insH3* **capture.** Selected chromosomal regions with H-NS ChIP-seq and native Tn-seq data shown. In both cases, traces indicate read depths with positive and negative values corresponding to the top and bottom DNA strand respectively. Genes are shown as arrows.

c. H-NS targets *insH3* **to prophage in** *E. coli***.** The panel shows the chromosomal region encompassing the CP4-57 prophage (marked by a solid black line). The phage genome contains two H-NS bound regions and both are targeted by *insH3*.

Figure S8: Schematic representation of the native Tn-seq method. Genomic DNA (gDNA) is sheared using treatment with dsDNA fragmentase. Following end repair and dA-tailing, adaptors are ligated on. This is followed by a PCR using a primer specific for the adaptor (blue arrow) and a primer complementary to the end of ISAba13 (green arrow). To increase specificity, a second hemi-nested PCR is done with the same adaptor primer and a primer complementary to IS*Aba*13 further downstream from the previous primer binding site. This is to ensure that only genuine IS*Aba*13::chromosome junctions are detected.

Table S1: Changes in gene expression in grey colony derivatives compared to wild types cells

¹Calculated using an exact test.

Table S2: Mobile genetic elements containing transposition hotspots dependent on H-NS

for native Tn-seq with *A. baumannii*

*insH3*_out For 1st PCR, binds near to the 5'end gataacgccttaaatggcgaagaaac of *insH3*

SUPPLEMENTARY REFERENCES

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