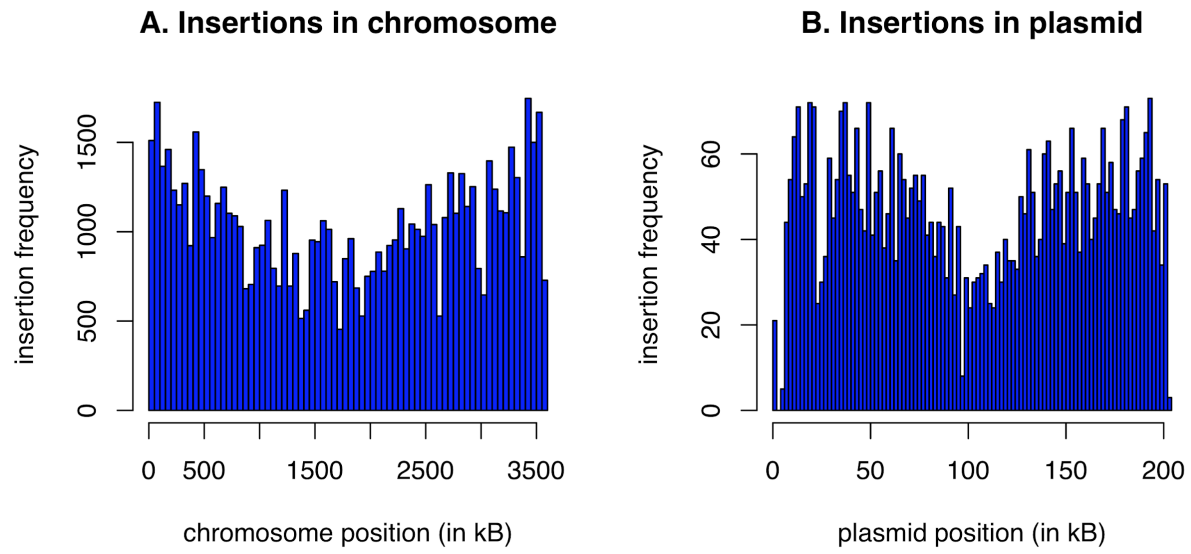


Supplementary Figure 1. Genes of the *de novo* UMP biosynthesis pathway are marked in green, all of these genes are essential for viability in the JW710 background that contains a deletion of *upp*. In contrast, all 8 of these genes are non-essential in the wild-type DvH background, as the intact *upp* provides a route to synthesize UMP.



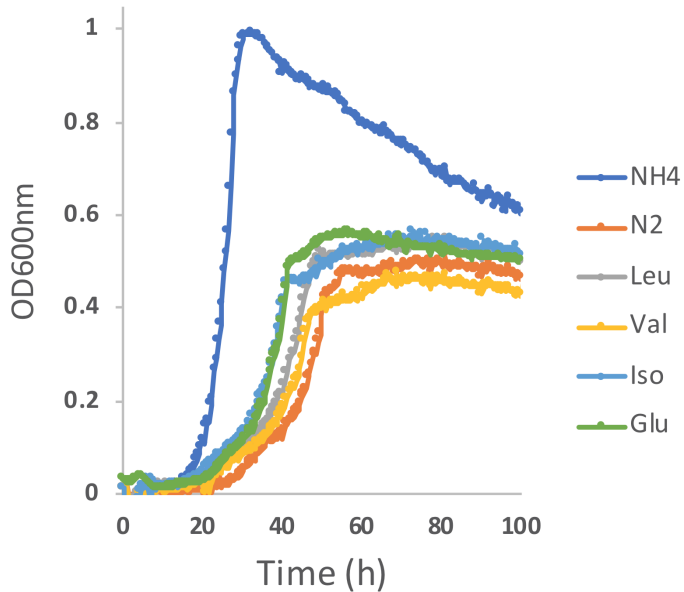
Supplementary Figure 2. Insertion coverage of mapped transposon insertions in the DvH JW710 RB-TnSeq mutant library across the chromosome (A) and megaplasmid (B).

Order	Family	Genus	Organisms	Biotin gene cluster	
Desulfobacteriales	Desulfobacteraceae	Desulfovibrio	<i>Desulfovibrio vulgaris</i> DP4		
			<i>Desulfovibrio vulgaris</i> Hildenborough		
			<i>Desulfovibrio vulgaris</i> Miyazaki		
			<i>Desulfovibrio vulgaris</i> RCH1		
		Desulfovibrio	<i>Desulfovibrio alaskensis</i> G20		
			<i>Desulfovibrio</i> sp. A2		
		Bilophila	Desulfobacteriaceae	<i>Desulfovibrio piger</i> ATCC 29098	
				<i>Bilophila wadsworthia</i> ATCC 49260	
				<i>Bilophila wadsworthia</i> 3_1_6	
				<i>Bilophila</i> sp.4_1_30	
Halodesulfobrio	Desulfobacteriaceae	<i>Halodesulfobrio aestuarii</i> DSM 10141			
		<i>Halodesulfobrio marisindiminis</i> DSM 17456			
		<i>Halodesulfobrio spirochaetisodalis</i>			
Desulfovermiculus	Desulfohalobiaceae	<i>Desulfovermiculus halophilus</i> DSM 18834			
		<i>Desulfathermus okinamensis</i>			
Desulfomicrobium	Desulfomicrobiaceae	<i>Desulfomicrobium baculatum</i> DSM 4028			
		<i>Desulfomicrobium escambiense</i> DSM 10707			
		<i>Desulfomicrobium orale</i> DSM 12838			
Desulfobacter	Desulfobacteraceae	<i>Desulfobacter vibriiformis</i> DSM 8776			
		<i>Desulfobacterium vacuolatum</i> DSM 3385			
Desulfifona	Desulfobacteraceae	<i>Desulfifona spongiiphila</i>			
		<i>Candidatus magnetomorum</i> sp. HK1			
Synthrophus	Synthrophaceae	<i>Synthrophus aciditrophilus</i> SB			
		<i>Synthrophus gentianae</i> DSM 8423			
		<i>Desulfoglaeba alkenexedans</i> ALDC			
Synthrophobacter	Synthrophobacteraceae	<i>Synthrophobacter fumaroxidans</i> MPOB			
		<i>Desulfurisprillum indicum</i> S5			
Chrysiogenales	Chrysiogenaceae		<i>Desulfurisprillum indicum</i> S5		

Deltaproteobacteria

Chrysiogenetes

Supplementary Figure 3. Biotin cluster genes conservation in Deltaproteobacteria and Chrysiogenetes. The *birA* genes are shown only when located in the direct vicinity of a *bio* gene. In *Halodesulfobivrio spirochaetisodalis* genome, the gene homolog to DvH DORF41491 was added to the original annotation. The regions of *Desulfobacterium vacuolatum* DSM 3385 genome shown in the figure represent the end and beginning of two separate contigs.



Supplementary Figure 4. Growth of DvH in lactate-sulfate minimal medium with different compounds as the sole source of nitrogen: N₂ (90%atm), NH₄, valine, leucine, isoleucine and glutamate (20mM). Measurements were made in a Bioscreen growth analysis system and each curve is the average of four replicates.