

**S7 Table: Secondary structural elements in stalk/knob regions.** #=residue number, AA=residue type, and SS=secondary structure type. DSSP was used to assign the secondary structure type for residues in stalk/knob regions from the crystal structures [86]. SS are designated as:  $\alpha$ -helix: H,  $3_{10}$  helix :G, extended strand: E, bend: S, hydrogen bonded turn: T. Blank fields have 'coil' secondary structure. Blank AA fields indicate unmodeled residues. Residues at the tips of the two knob 'loops' (114-118 and 127 -133 in the ElsE Fabs and 114-120 and 132-137 in Bess7) are highlighted in bold; these might be expected to interact with Env.

	Bess7		ElsE1		ElsE2		ElsE5		ElsE6		ElsE7		ElsE8		ElsE9		ElsE11_1		ElsE11_2	
#	AA	SS	AA	SS	AA	SS	AA	SS	AA	SS	AA	SS	AA	SS	AA	SS	AA	SS	AA	SS
92	C		C		C		C		C		C		C		C		C		C	
93	T		T		T		T		T		T		T		T		T		T	
94	T	E	T	E	T	E	T	E	T	E	T	E	A	E	T		T	E	T	
95	V	E	V	E	V	E	V	E	V	E	V	E	V	E	V	E	V	E	V	E
96	H	E	H	E	H	E	H	E	H	E	H	E	V	E	R	E	R	E	R	E
97	Q	E	Q	E	Q	E	Q	E	Q	E	Q	E	Q	E	Q	E	Q	E	Q	E
98	T	E	Q	E	Q	E	Q	E	Q	E	Q	E	E	E	Q	E	Q	E	Q	E
99	T	E	T	E	T	E	T	E	T	E	T	E	T	E	V	E	T	E	T	E
100	K	E	R	E	R	E	R	E	R	E	R	E	R	E	H	E	R	E	R	E
101	T		K	E	K	E	K	E	K	E	K	E	K	E	K	E	K	E	K	E
102	T		G	E	S	E	G	E	S	E	S	E	S	E	T	E	S	E	S	E
103	K	E	C		C		C		C		C		C		C		C		C	
104	E	E	P		P		P		P		P		P		P		P		P	
105	C		D	T	G	T	D	S	A	S	D	S	D	T	Q	S	D	T	D	T
106	P		G	T	G	T	G	S	G	S	G	S	G	T	G	S	G	T	G	T
107	E	T	W		Y		W		Y		W		W		W		W		W	
108	G	T	R	E	T	E	S	E	T	E	M	E	R	E	R	E	T	E	T	E
109	Y		F	E	F	E	F	E	L	E	F	E	F	E	F	E	L	E	L	E
110	N	E	G	H	G	G	G	T	A	T	G	S	G	T	G	H	A	H	A	H
111	W	E	W	H	Y	G	W	T	K	T	F	T	W	T	W	H	K	H	K	H
112	D		D	H	D	G	D	T	D	T	D	T	D	T	D	H	D	H	D	H
113	D	S	C	H	C	G	C	T	C	T	C		C	T	C	H	C	H	C	H
114	<b>G</b>		<b>G</b>	<b>T</b>	<b>G</b>	<b>T</b>	<b>G</b>	<b>T</b>	<b>G</b>				<b>G</b>	<b>T</b>	<b>G</b>	<b>T</b>	<b>G</b>	<b>T</b>	<b>G</b>	<b>T</b>
115	<b>C</b>		<b>F</b>		<b>F</b>		<b>F</b>						<b>F</b>		<b>F</b>		<b>F</b>		<b>F</b>	
116	<b>G</b>		<b>H</b>		<b>H</b>								<b>H</b>		<b>H</b>		<b>Y</b>		<b>Y</b>	
117	<b>S</b>	<b>G</b>	<b>G</b>	<b>S</b>	<b>G</b>	<b>S</b>							<b>G</b>	<b>S</b>	<b>G</b>	<b>S</b>	<b>G</b>	<b>S</b>	<b>G</b>	<b>S</b>
118	<b>E</b>	<b>G</b>	<b>Y</b>	<b>T</b>	<b>W</b>	<b>T</b>							<b>Y</b>	<b>T</b>	<b>Y</b>	<b>T</b>	<b>Y</b>	<b>T</b>	<b>Y</b>	<b>T</b>
119	<b>L</b>	<b>G</b>	<b>G</b>	<b>T</b>	<b>G</b>	<b>T</b>			<b>G</b>		<b>G</b>		<b>G</b>	<b>T</b>	<b>G</b>	<b>T</b>	<b>G</b>	<b>T</b>	<b>G</b>	<b>T</b>
120	<b>G</b>		<b>Q</b>	<b>T</b>	<b>S</b>	<b>T</b>	<b>!</b>		<b>S</b>	<b>T</b>	<b>S</b>		<b>T</b>	<b>T</b>	<b>S</b>	<b>T</b>	<b>S</b>	<b>T</b>	<b>S</b>	<b>T</b>
121	<b>C</b>		<b>E</b>	<b>T</b>	<b>D</b>	<b>T</b>	<b>E</b>		<b>E</b>	<b>T</b>	<b>E</b>	<b>S</b>	<b>E</b>	<b>T</b>	<b>D</b>	<b>T</b>	<b>E</b>	<b>T</b>	<b>E</b>	<b>T</b>
122	<b>G</b>	<b>S</b>	<b>D</b>	<b>S</b>	<b>D</b>	<b>S</b>	<b>D</b>		<b>D</b>	<b>S</b>	<b>D</b>	<b>S</b>	<b>D</b>	<b>S</b>	<b>D</b>	<b>S</b>	<b>D</b>		<b>D</b>	<b>S</b>
123	<b>G</b>	<b>S</b>	<b>C</b>	<b>E</b>	<b>C</b>	<b>E</b>	<b>C</b>	<b>E</b>	<b>C</b>	<b>E</b>	<b>C</b>	<b>E</b>	<b>C</b>	<b>E</b>	<b>C</b>	<b>E</b>	<b>C</b>	<b>E</b>	<b>C</b>	<b>E</b>
124	<b>A</b>	<b>S</b>	<b>Y</b>	<b>E</b>	<b>Y</b>	<b>E</b>	<b>Y</b>	<b>E</b>	<b>Y</b>	<b>E</b>	<b>V</b>	<b>E</b>	<b>Y</b>	<b>E</b>	<b>Y</b>	<b>E</b>	<b>Y</b>	<b>E</b>	<b>Y</b>	<b>E</b>
125	<b>D</b>	<b>S</b>	<b>E</b>	<b>S</b>	<b>P</b>	<b>S</b>	<b>D</b>	<b>S</b>	<b>D</b>	<b>S</b>	<b>D</b>	<b>S</b>	<b>E</b>	<b>S</b>	<b>E</b>	<b>S</b>	<b>D</b>	<b>S</b>	<b>D</b>	<b>S</b>
126	<b>C</b>	<b>S</b>	<b>D</b>		<b>D</b>	<b>S</b>	<b>D</b>		<b>D</b>		<b>D</b>		<b>D</b>		<b>D</b>	<b>S</b>	<b>D</b>		<b>D</b>	

