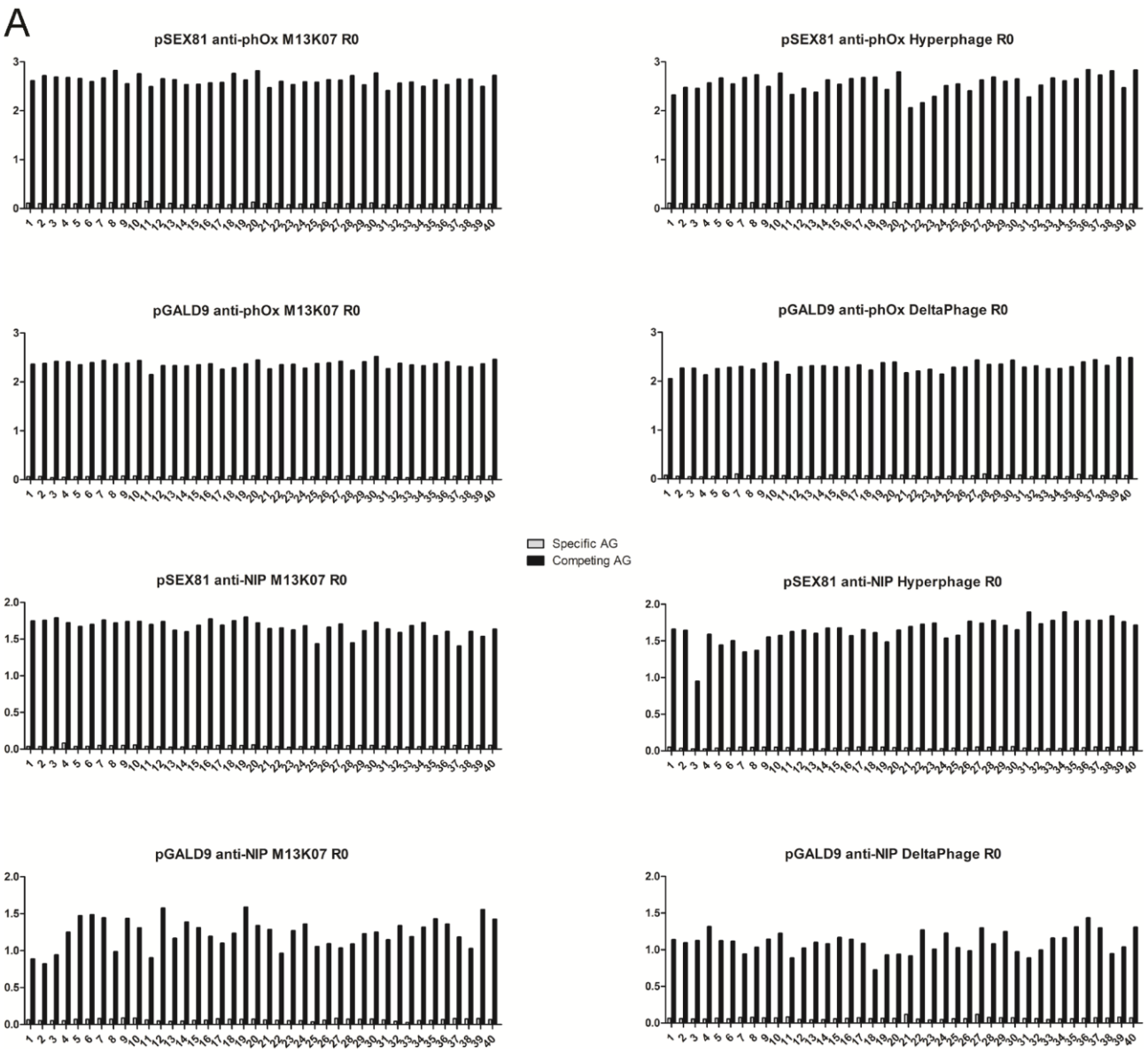
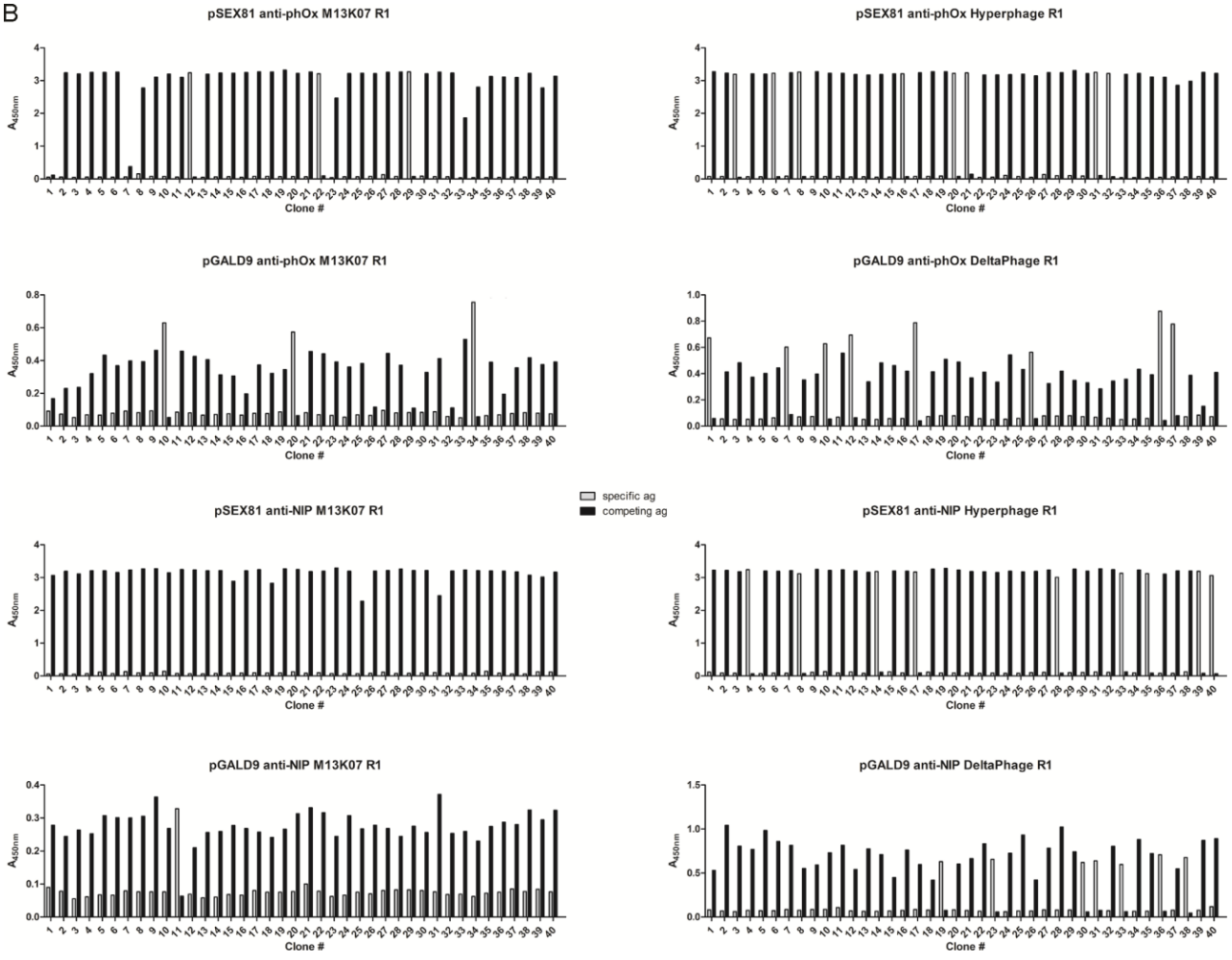
Table S1. Summary of TEM analysis

Helper phage	Average length (no. counted)	No. polyphages
M13K07	1.173 ± 0.082 μm (87)	1 (2x genome)
DeltaPhage	1.162 ± 0.078 μm (59)	2 (2x genome)
Hyperphage	1.005 ± 0.078 μm (39)	3 (2x genome)

FIGURE S1


A
pSEX81 anti-phOx M13K07 R0
pSEX81 anti-phOx Hyperphage R0
pGALD9 anti-phOx M13K07 R0
pGALD9 anti-phOx DeltaPhage R0
Specific AG
Competing AG
pSEX81 anti-NIP M13K07 R0
pSEX81 anti-NIP Hyperphage R0
pGALD9 anti-NIP M13K07 R0
pGALD9 anti-NIP DeltaPhage R0

B


pSEX81 anti-phOx M13K07 R1
pSEX81 anti-phOx Hyperphage R1
pGALD9 anti-phOx M13K07 R1
pGALD9 anti-phOx DeltaPhage R1
specific ag
competing ag
pSEX81 anti-NIP M13K07 R1
pSEX81 anti-NIP Hyperphage R1
pGALD9 anti-NIP M13K07 R1
pGALD9 anti-NIP DeltaPhage R1
A450nm
Clone #

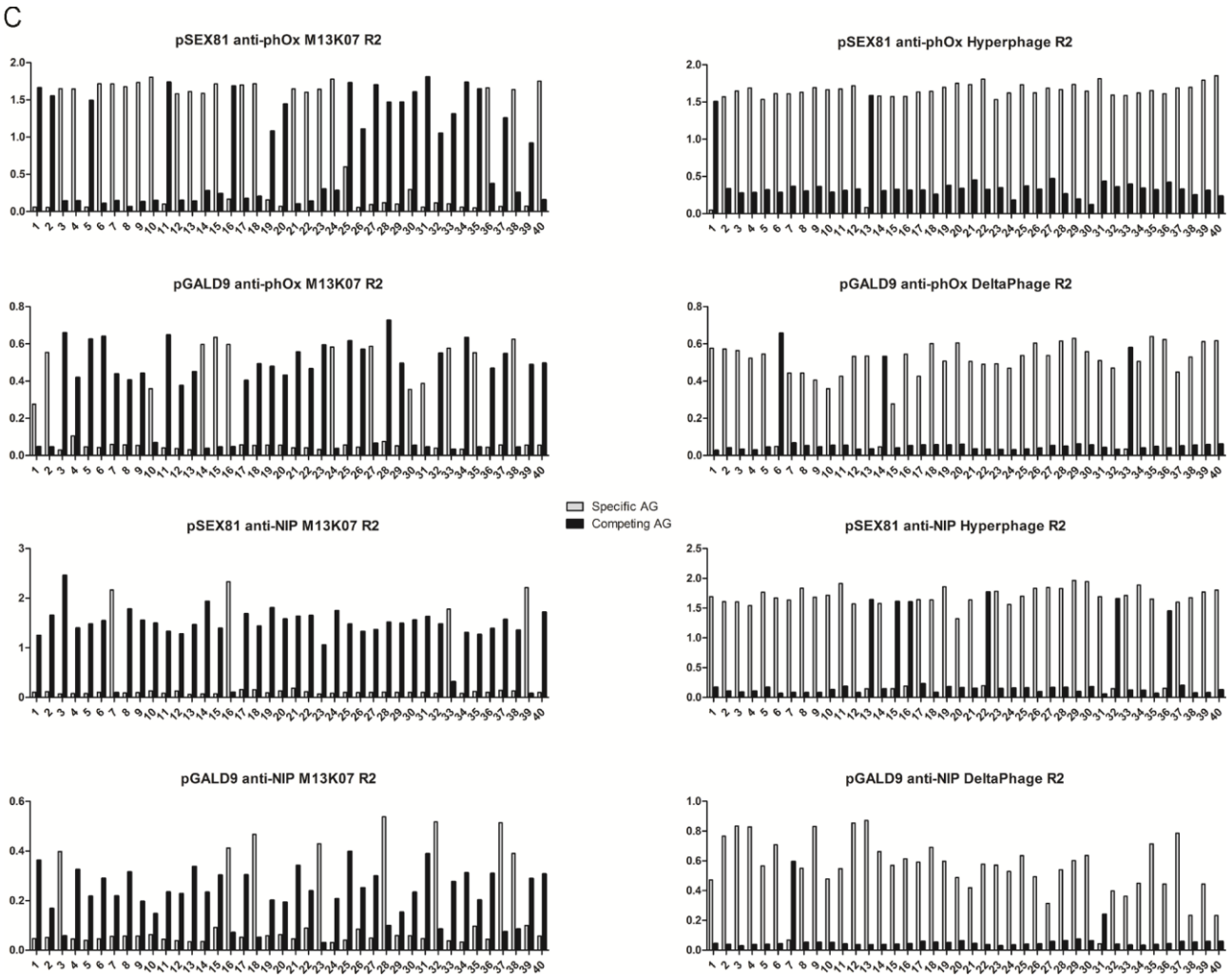


Figure S1. Single clone screening before and after two rounds of antigen selection. *E. coli* TOP10F´ cells were transduced with the input libraries or the amplified eluates after selection, plated in dilutions on agar plates containing 100 µg/ml ampicillin, and grown ON at 37°C. 40 random clones from each mock library were picked and grown in individual wells on a 96-well plate. The phagemids were rescued by helper phage super-infection and the resulting supernatants tested for reactivity to both antigens in a phage capture ELISA as described in Materials and Methods. Whereas M13K07 was used for pIII phagemid rescue, DeltaPhage was used with the pIX phagemid. The latter was done to amplify the signal at low valence pIX display to irrevocably reveal true positives. (**A**) R0 represents the original input libraries, where 1000 antigen specific phages were mixed with 10^{10} phages of the irrelevant specificity. Grey bars represent antigen specific reactivity (positive), and black bars represent the competing specificity (negative). (**B**) R1 represents the amplified output after one round of selection. (**C**) R2 represents the amplified output after two round of selection. The ELISA result is summarized in Table 1.