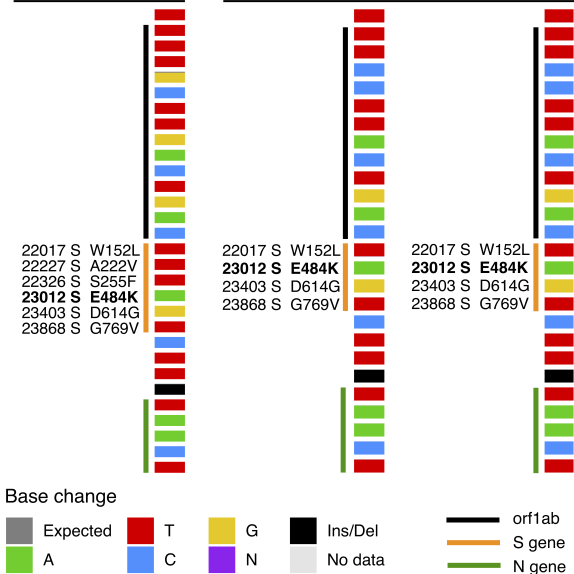


# Vaccine breakthrough

# Outbreak samples



**Figure 1.** SARS-CoV-2 variants from Philadelphia containing the E484K spike substitution. Substitutions relative to reference USA-WA1 shown by colored tiles, with the 5' end at top; viral coding regions marked by color code (lower right). Substitutions in spike are labelled (E484K in bold). The left genome was from a vaccine breakthrough; the right two from an outbreak. Mean read depth over S gene was 3479-fold.