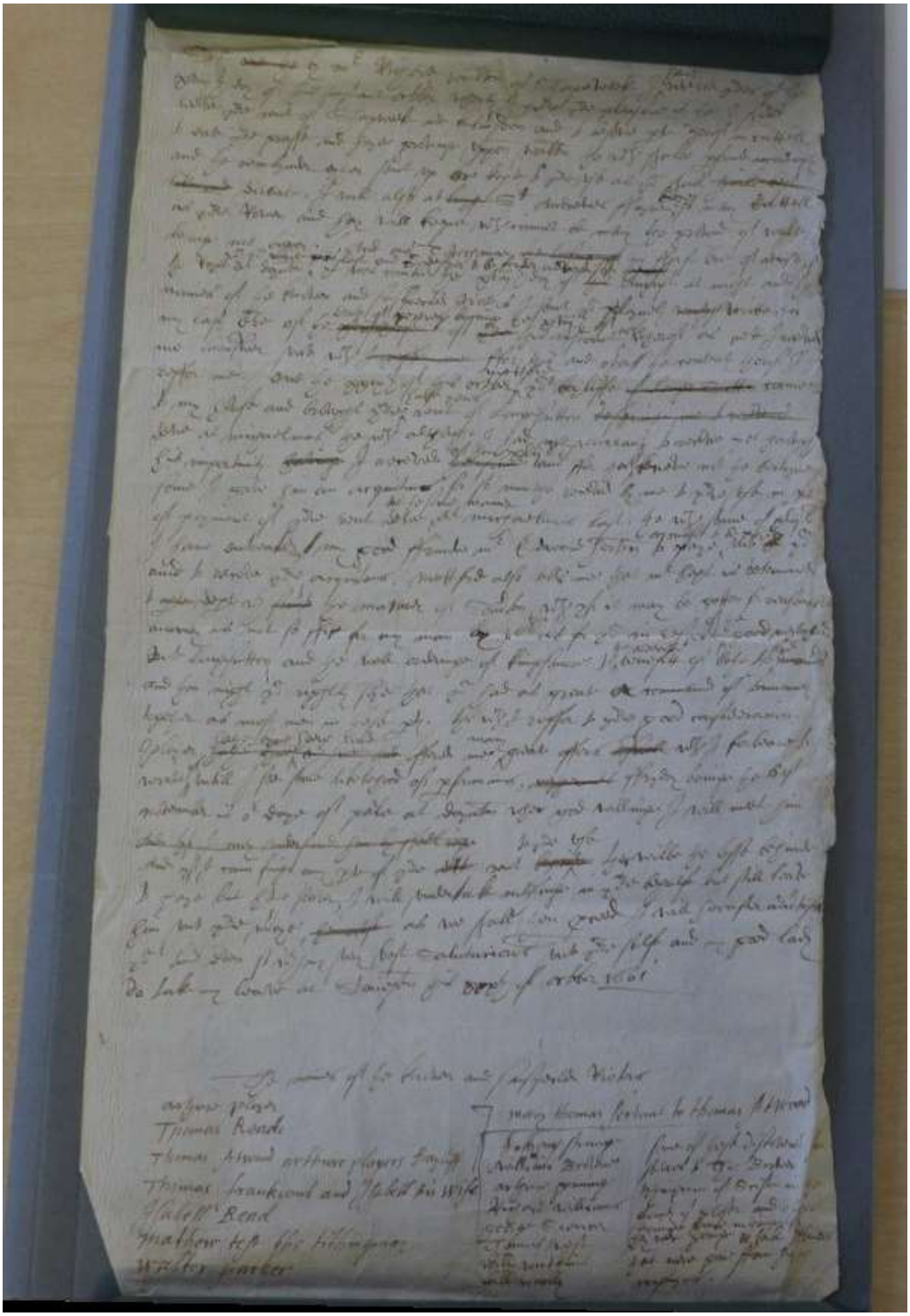DDH1papers22921