SUPPLEMENTARY MATERIAL

The *Arabidopsis thaliana* poly(ADP-ribose) polymerases 1 and 2 modify DNA by ADP-ribosylating terminal phosphate residues

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Supplementary Material Table S1. Sequences of the oligonucleotides and their duplexes used in this study[a].

Name	Oligonucleotides sequences and structures
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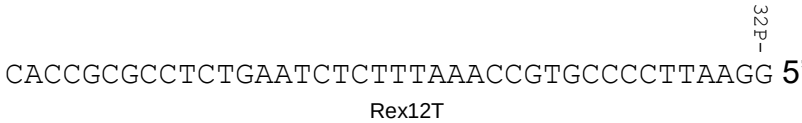
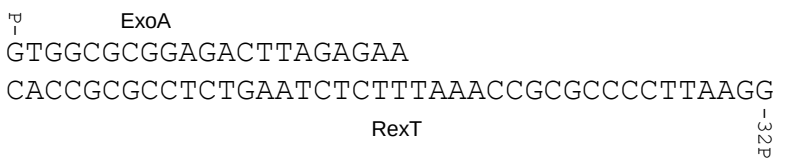
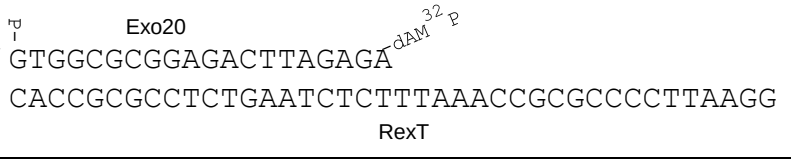
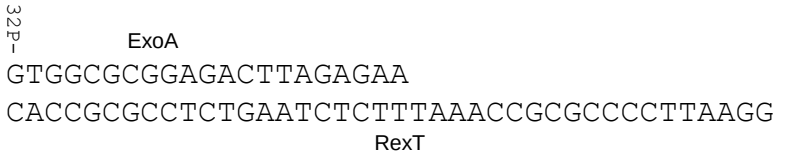
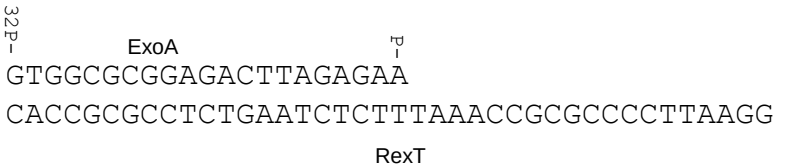
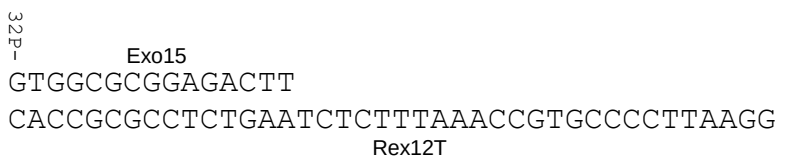
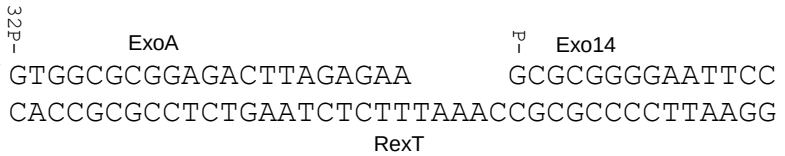
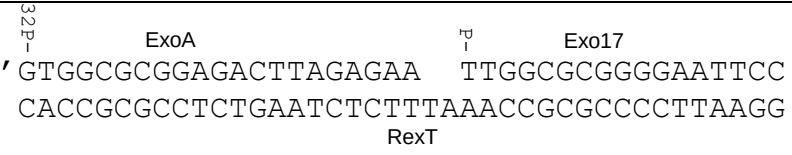
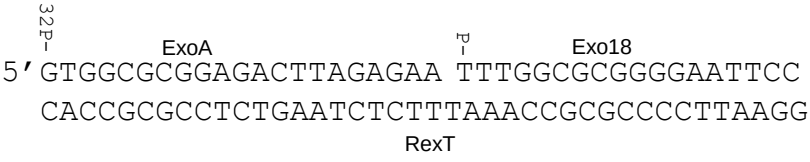
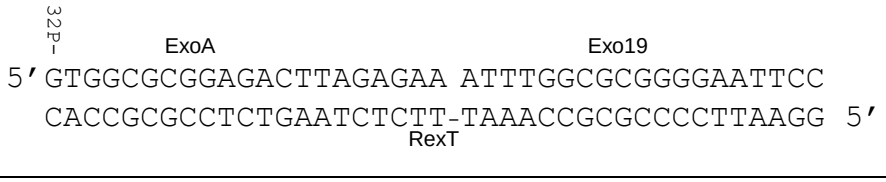
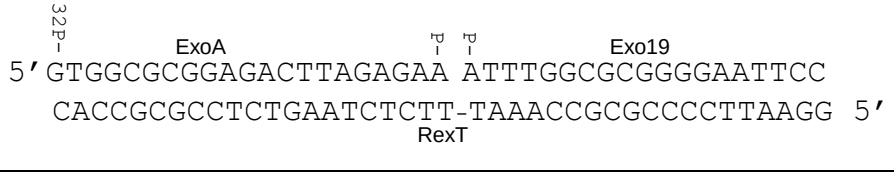
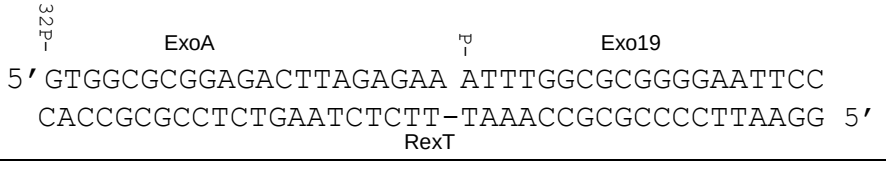
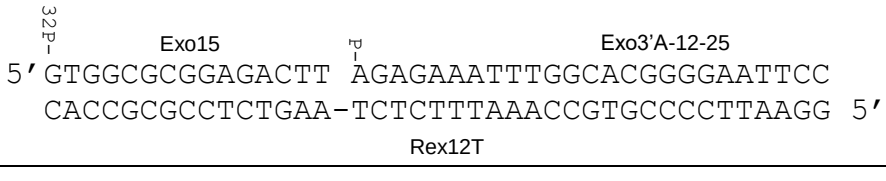
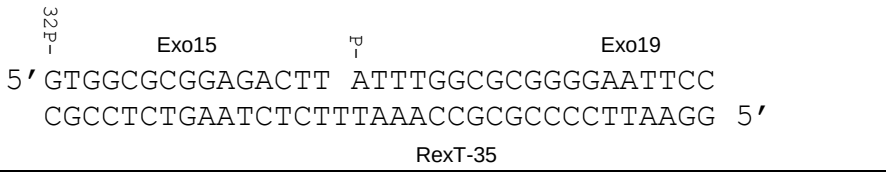
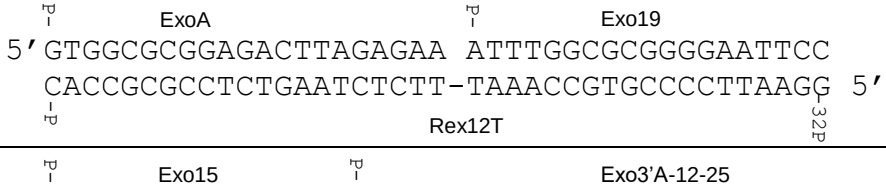
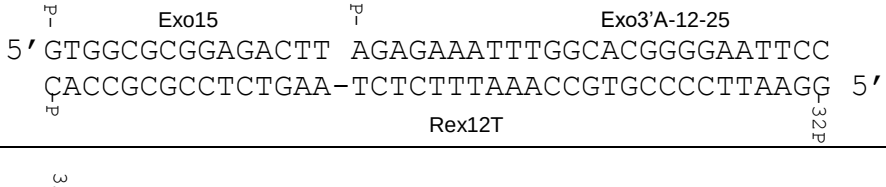
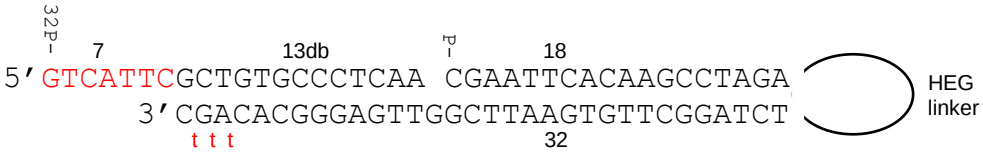
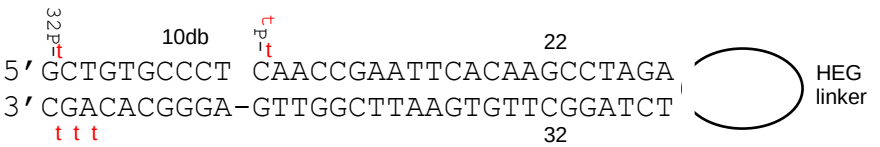
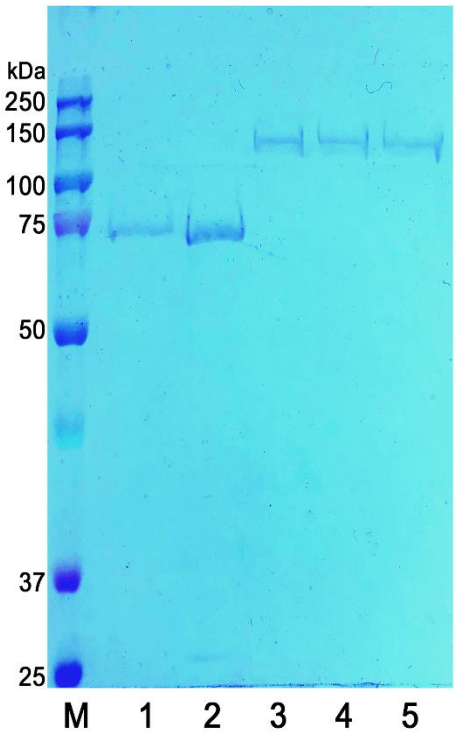
S2	
S3	
S4	
S5	
S6	
S7	
S8	
S9	
S10	

S11	
S12	
S13	
S14	
S15	
S16	
S17	
S18	
S19	
S20	

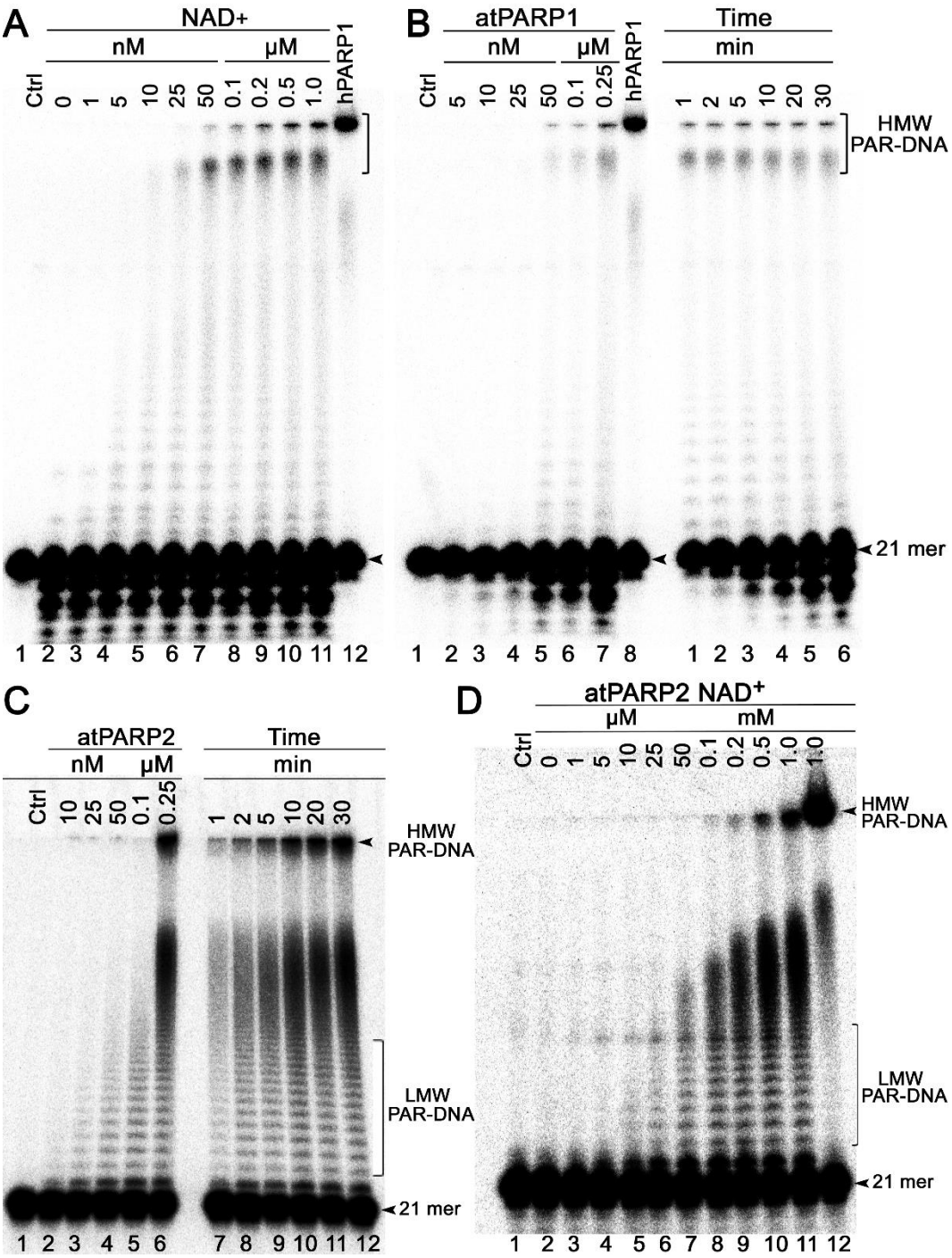
[a]The symbol "t" designates modified nucleotide containing a thiophosphate group; "HEG linker" denotes hexaethyleneglycol linker [(CH2-CH2-O)6]; "Dbait" designates a long single-stranded hairpin

oligonucleotide in which complementary parts of DNA tethered with hexaethyleneglycol linker; “P” designates a phosphate group, “^{32}P” designates [γ-^{32}P]-ATP labeled oligonucleotide termini; “dAM^{32}P” designates [α-^{32}P]-3'-dATP (cordycepin 5'-triphosphate) labeled oligonucleotide termini; following abbreviations “ExoA”, “Exo20”, “Exo15”, “10RT”, “T19RT”, “10db”, “7-13db”, “Exo19”, “Exo18”, “Exo17”, “Exo14”, “Exo3’A-12-25”, “RexT”, “Rex12T”, “RexT-35”, “RT-A” “50-db”, “54-db” designate the single-stranded oligonucleotide fragments used to construct DNA structures. In DNA structure referred as “S19” the 7 nt 5’ single-stranded overhang highlighted in red.

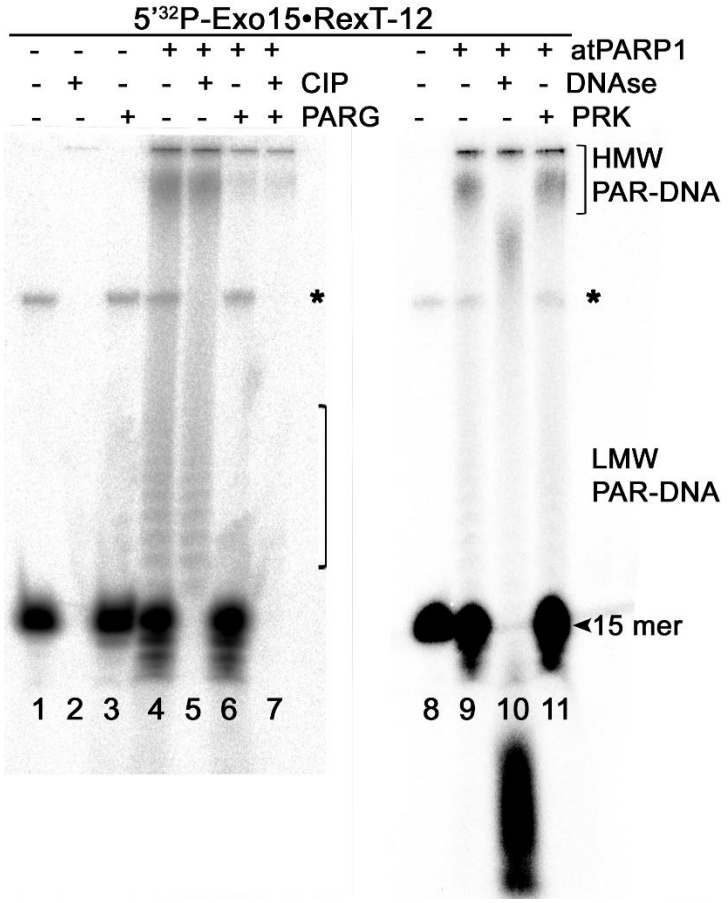
Supplementary Material Figures S1-S4.



Supplementary Figure S1. SDS-PAGE analysis of the purified wild type and mutant Arabidopsis atPARP2 and atPARP1 proteins. Lane M, protein size markers; lane 1, 1 µg atPARP2-WT; lane 2, 1 µg atPARP2-E614K mutant; lane 3, 1 µg atPARP1-WT; lane 4, 1 µg atPARP1-E960K mutant; lane 5, 1 µg atPARP1 E960Q mutant. For details, see Materials and Methods.

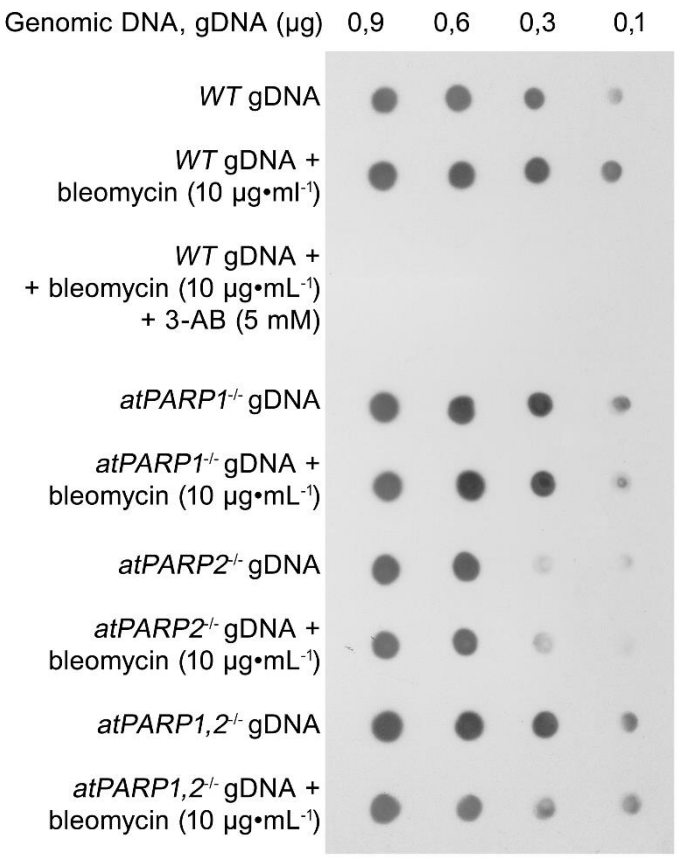


Supplementary Figure S2. The atPARP1- and atPARP2-catalysed DNA PARylation in the presence of varying concentrations of NAD^+, protein and incubation time. (**A**) Protein concentration and time dependence of atPARP1-catalysed DNA PARylation. (**B**) NAD^+ concentration dependence of atPARP1-catalysed DNA PARylation. (**C**) Protein concentration and time dependence of atPARP2-catalysed DNA PARylation. (**D**) NAD^+ concentration dependence of atPARP2-catalysed DNA PARylation.



Supplementary Figure S3. Denaturing PAGE analysis of the products of digestion of PAR-DNA adducts by various enzymes. To generate PAR-DNA products 20 nM 5'-[^{32}P]-labelled Exo15•Rex12T^{rec} duplex was incubated with 250 nM atPARP1 in the presence of 1mM NAD^+ for 30min at 37°C. After incubation, the reaction mixtures were heated for 20 min at 80°C and then incubated either in the presence of 50 pg•μL^{-1} PARG (in ADPR buffer) for 60 min at 37°C, or 10 U CIP (in CIP buffer) or 10.5 U DNAse I (in buffer with 0.5 mM $CaCl_2$) for 30 min at 37°C or 50 μg•mL^{-1} proteinase K for 30 min at 50°C in the presence of 0.1% SDS. Arrows indicate HMW and LMW PAR–DNA products and free 15 mer oligonucleotide. Asterisk indicates a nonspecific ligation product produced by *E. coli* NAD^+-dependent DNA ligase A. For more details, see Materials and Methods.

Supplementary Figure S4. Formation of the PAR-DNA products by atPARP2 for MALDI-TOF MS analysis. 25-250 nM atPARP2 was incubated with 20 nM 5'-[^{32}P]-labelled p10•RT-A^{Nick} oligonucleotide duplex (also referred as S18) in the presence of 1 mM NAD$^+$ for 30 min at 37°C. The reaction products were analyzed by denaturing PAGE. Arrow indicates free 10 mer oligonucleotide. For more details, see Materials and Methods.



Supplementary Figure S5. Detection of PAR-DNA adducts in gDNA extracted from 14-days-old seedlings grown under either normal conditions or genotoxic stress. Different quantities of gDNA in TE buffer (10 mM Tris-Cl pH 8.0, 1 mM EDTA) were spotted onto a nylon membrane, followed by the pan-ADP-ribose reagent (MABE1016) dot blotting. For more details, see Materials and Methods.