

Supplementary Materials:

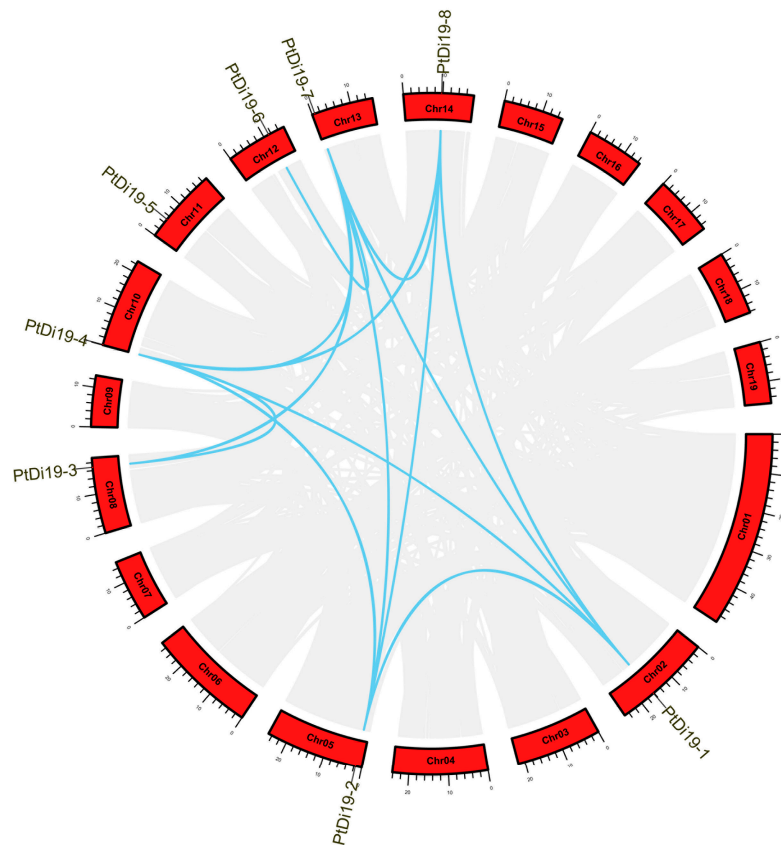


Figure S1. Chromosomal localizations and duplications of Di19 genes on *P. trichocarpa* chromosomes, of which the segmental duplicated Di19 genes indicated with blue lines.

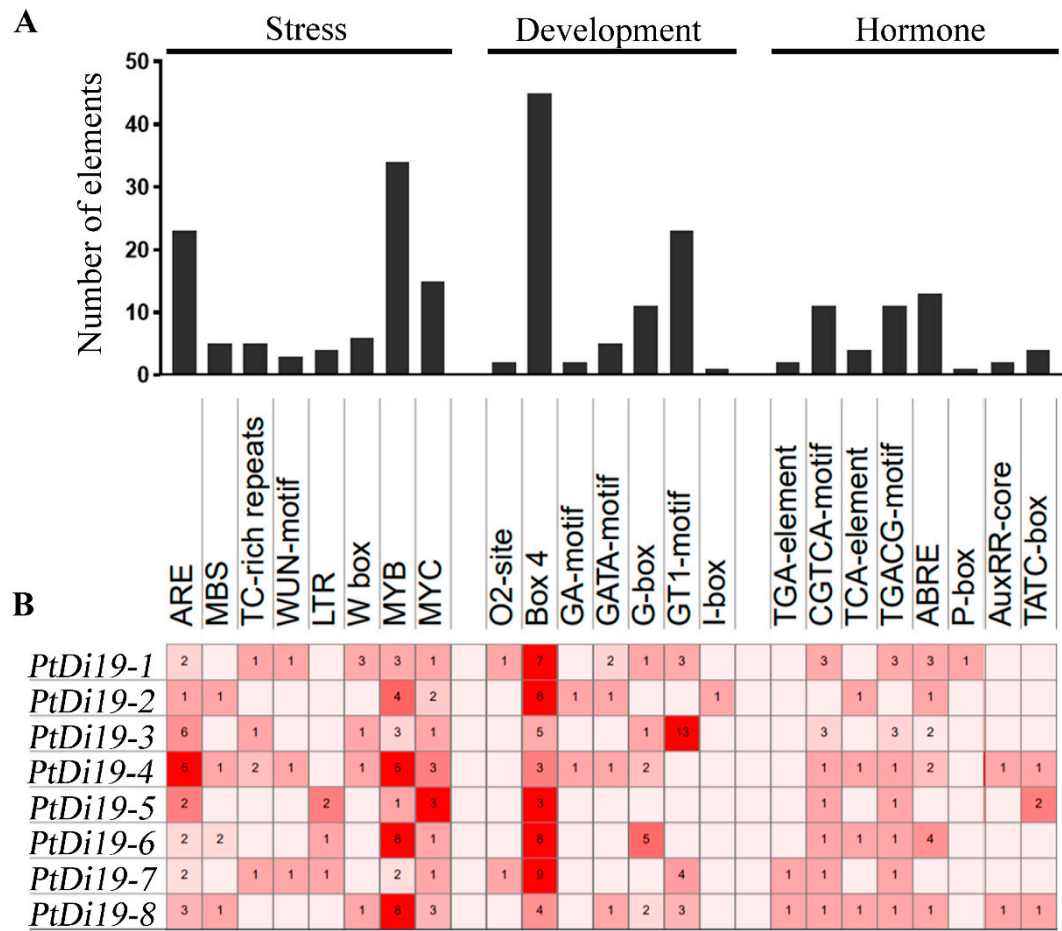


Figure S2. Various cis-acting elements in *PtDi19* genes. **(A)** The number of cis-acting elements in response to various factors. **(B)** The number of occurrences of each cis-acting elements.

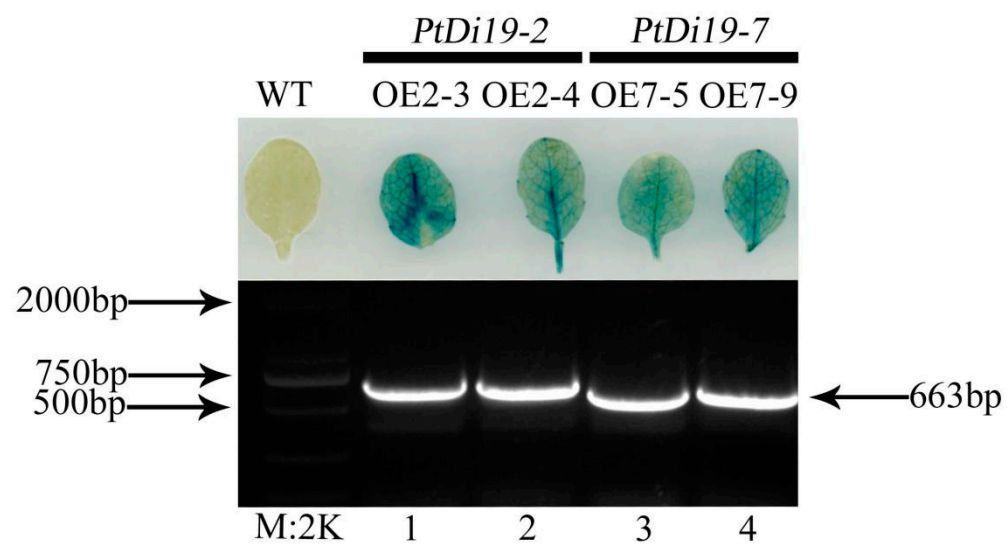


Figure S4. Identification of *PtDi19-2* and *PtDi19-7* transgenic *Arabidopsis*.

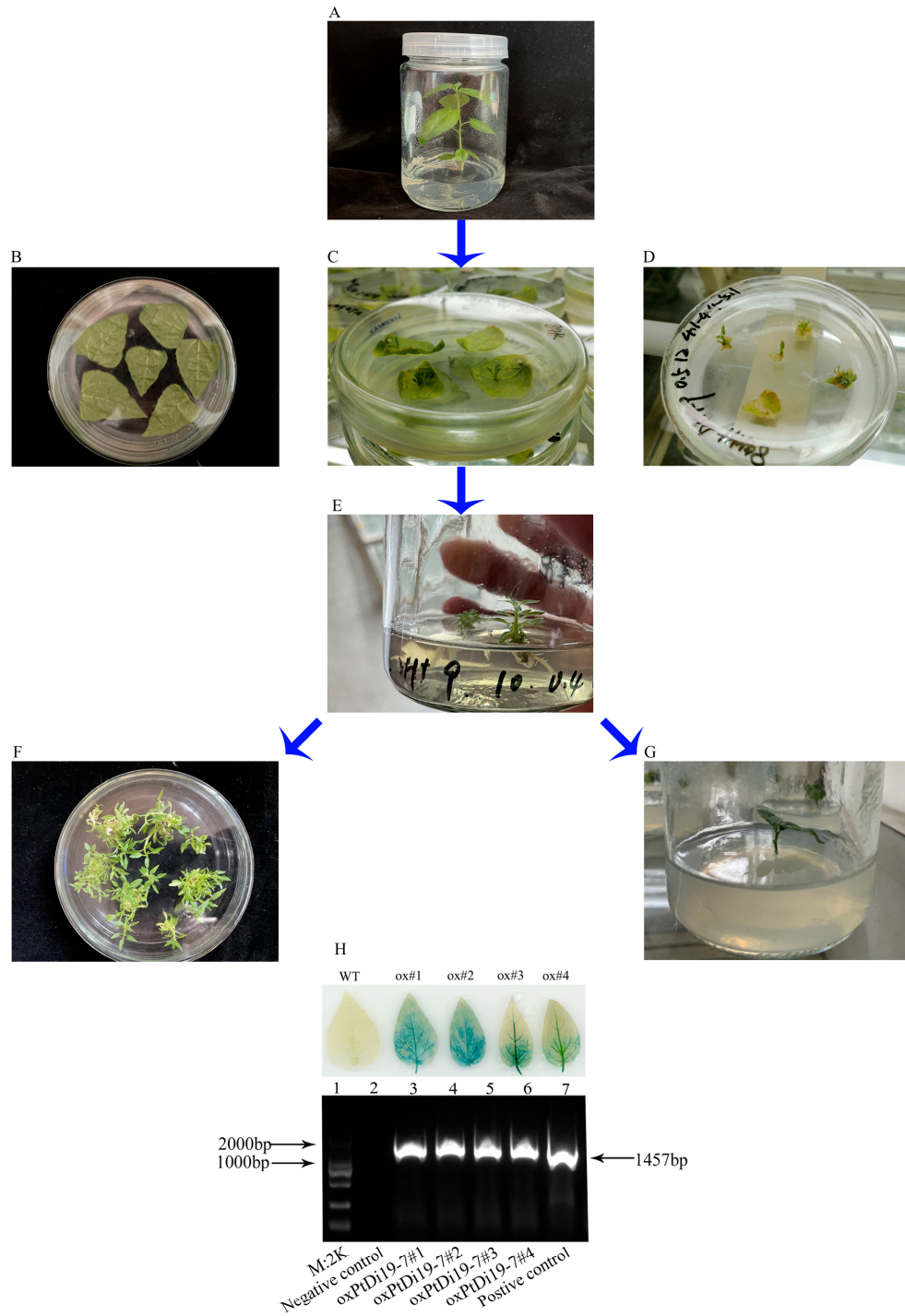


Figure S5. Acquisition and validation of *PtDi19-7* positive plants. **(A)** One-month old tissue culture plantlets of wild-type poplar 84K. **(B)** After infection, 84K poplar leaves were put into co-culture medium for dark culture. **(C)** After three days of dark culture, the leaves were placed into screening differentiation medium. **(D)** The differentiated buds were placed in bud elongation medium. **(E)** The elongated buds were placed in the screening rooting medium. **(F)** Put the leaves into the propagation medium for differentiation. **(G)** The stem segments were inserted into the rooting medium for propagation. **(H)** The four lines were identified by GUS staining and PCR.

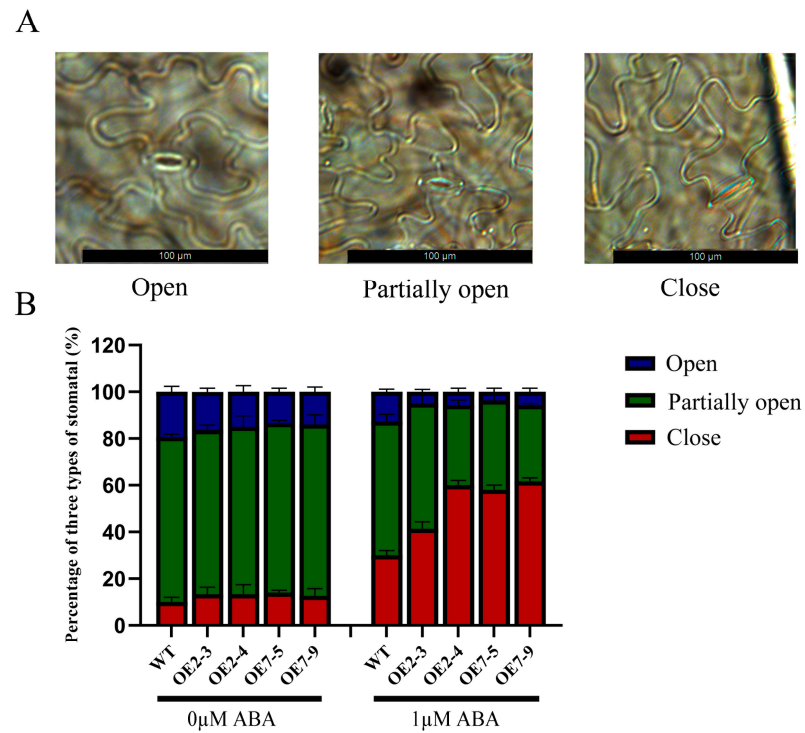


Figure S6. ABA-induced stomatal closure in transgenic *Arabidopsis*. **(A)** Scanning electron microscopy images of three types of stomatal apertures. **(B)** The percentage of three types of stomatal apertures in the leaves of transgenic and WT plants under normal and 1 μ M ABA treatment.

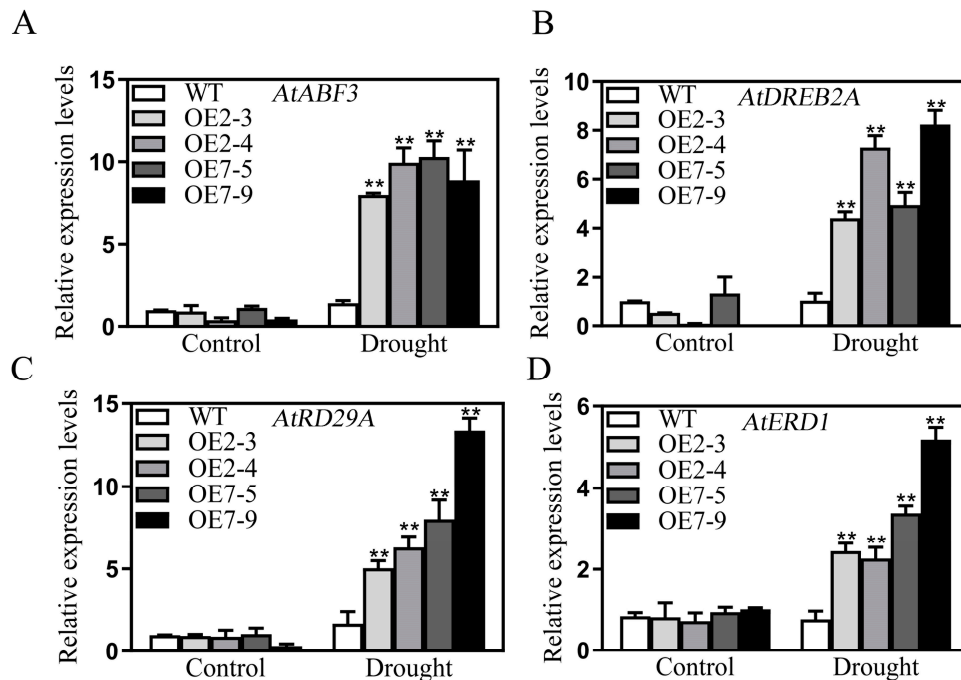


Figure S7. Expression of ABA/drought-related genes of *PtDi19-2* and *PtDi19-7* overexpression in *Arabidopsis*. The transcript levels of *AtABF3* **(A)**, *AtDREB2A* **(B)**, *AtRD29A* **(C)** and *AtERD1* **(D)** measured by qRT-PCR under unstressed conditions or drought treatment for 10 d. ** $p < 0.01$.

Table S1. Drought-induced 19 (Di19) identified in *P. trichocarpa* and collected about related physical information.

Name	Gene Identifier	Chr	Location coordinates (5'- 3')	ORF	Protein			
				length (bp)	Length (aa.)	PI	Mol.Wt. (Da)	Exons
<i>PtDi19-1</i>	Potri.002G200500	2	16159751--16164658	678	225	4.44	25425.1	5
<i>PtDi19-2</i>	Potri.005G020900	5	1607415--1611963	663	220	5.77	24360.65	5
<i>PtDi19-3</i>	Potri.008G213400	8	16819228--16821768	645	214	5.2	23840.53	5
<i>PtDi19-4</i>	Potri.010G000800	10	98928--101749	648	215	5.23	23974.8	5
<i>PtDi19-5</i>	Potri.011G057200	11	5042374--5046433	702	233	6.17	26389.41	5
<i>PtDi19-6</i>	Potri.012G086500	12	11356226--11359696	627	208	6.23	22994.5	5
<i>PtDi19-7</i>	Potri.013G011200	13	704912--709386	663	220	5.58	24326.49	5
<i>PtDi19-8</i>	Potri.014G125500	14	9660838--9664353	672	223	4.47	25116.84	5

Table S2. Ka/Ks value for duplicate Di19 genes in *P. trichocarpa*.

Pt/Pt	Ka	Ks	Ka/Ks	Duplication date (million years)
<i>PtDi19-1/PtDi19-2</i>	0.347256236	1.65487904	0.209837836	55.16263467
<i>PtDi19-1/PtDi19-7</i>	0.360892376	1.394709067	0.258758177	46.49030223
<i>PtDi19-1/PtDi19-8</i>	0.062087142	0.307389753	0.201981822	10.2463251
<i>PtDi19-1/PtDi19-4</i>	0.393649989	2.249275657	0.175011892	74.97585523
<i>PtDi19-2/PtDi19-7</i>	0.031228281	0.300922206	0.103775264	10.0307402
<i>PtDi19-2/PtDi19-4</i>	0.291104633	1.778188465	0.163708538	59.27294883
<i>PtDi19-3/PtDi19-4</i>	0.050059836	0.202274308	0.247484894	6.742476933
<i>PtDi19-3/PtDi19-7</i>	0.299337727	1.278989763	0.234042317	42.6329921
<i>PtDi19-4/PtDi19-7</i>	0.268509127	1.695637705	0.158352888	56.52125683
<i>PtDi19-6/PtDi19-7</i>	0.689255171	3.088808691	0.223145957	102.9602897
<i>PtDi19-7/PtDi19-8</i>	0.344690151	1.635918177	0.21070134	54.5306059
<i>PtDi19-8/PtDi19-4</i>	0.401384399	1.72237506	0.233041228	57.412502

Table S3. Details of conservative motifs

Motif	Length	Sequence information
1	41	DDLRAEFPCPCYEDFDIVGLCCHJDEEHPVEAKNGVCPVC
2	32	LSJLRKELREGNLQSLGSSCIVSSSNAAPD
3	21	RVGVDMVAHITLQHGNJFKSQ
4	21	DQEEKAKRSEFVQGILLSTIL
5	11	LLSSFILNFPD
6	11	MDSDSWTSRLA
7	15	YQSALQSRSDLFMGF
8	11	RKRRLRRGGSP
9	29	SKQPSLSSETSSAKKSSDENVLERNVQSS
10	13	AAKRQYALQHHP
11	29	YDAHLQVLLGDGGYRSNNTVGNVSHTATD
12	14	SHLDRLGIDDFEVE
13	14	NSSAKRAAPSHMWK
14	6	EEIDGD
15	11	KSKCYKDEPYP
16	6	LQNWKT
17	15	RKSQKSGAWTGSSAM
18	12	YFEGPPQCMGRN
19	15	YRLEEAAKYQSGPCQ
20	6	NFWFRP

Table S4. Fluorescence quantitative primer sequence collection

Name	Forward primers	Reverse primers
<i>UBQ10</i>	GTTGATTTTTGCTGGGAAGC	GATCTTGGCCTTCACGTTGT
<i>PtDi19-1</i>	GTGCACAGCCTAGTTTATCAAG	CTGTACGAACTCACTTCTCCTT
<i>PtDi19-2</i>	AATGGGAATGTATCAAACGCAG	GAACCGCAAGTAAAAGTCTCTG
<i>PtDi19-3</i>	CTCGCTTCTCAACTTCTTCAAG	ACCAACAACATCAAAATCCTCG
<i>PtDi19-4</i>	CGTAAGAGAAGATTGCGAAAGG	GAGCTTGCTTCAACAGAAGAAA
<i>PtDi19-5</i>	AGTCTAAAGTCGCCGTTTGTCC	CCCTAACAGCACTTGCAGATGA
<i>PtDi19-6</i>	CAGCATGATGAACCTTTCAACA	GCAAAGCTCTAGAAGATCGTTG
<i>PtDi19-7</i>	GGACAGACTTACTTTCAAGTCA	AATTTCTTGACGCTAACAAGGC
<i>PtDi19-8</i>	CTTGGCACCTGATCCATTATTG	CCTGTACGAACTCACTTCTCTT

Table S5. Marker genes primer sequences collected

Name	Forward primers	Reverse primers
<i>AtActin</i>	TCGTTGCCCTCCAGAGA	TACTCTGCCTTTGCGATCCA
<i>AtABF3</i>	CTTTGTTGATGGTGTGAGTGAGC	GTGTTTCCACTATTACCATTGCTG
<i>AtRD29A</i>	TGAAAGGAGGAGGAGGAATGGTTGG	ACAAAACACACATAAACATCCAAAGT
<i>AtDREB2A</i>	GCGATTTTCATCTGGATCACATT	GCAGGTTCCCTCGCATCCTT
<i>AtERD1</i>	CCACCGACTCCTCTCTGCTT	AAGGGAGATTCCGAGATATGAAGA

Table S6. Collection of primer sequences related to vector construction

Name	Forward primers	Reverse primers
<i>PtDi19-2</i>	ATGGATGCTGATTCATGGAGTGC T	CTATAAAATATCATCGAGAATTGT AGACAACAACAGCC
<i>PtDi19-7</i>	ATGGATGCTGATTCATGGAGTGC T	CTATAAAATGTCATCAGGAATTGT AGAC
<i>p1301-PtDi19-2</i>	TGCGGTACCATGGATGCTGATTC AT	CGCTCTAGACTATAAAATATCATC GAG
<i>p1301-PtDi19-7</i>	CGGGATCCATGGATGCTGATTCA TGG	ACGCGTCGACCTATAAAATGTCAT CAGG
<i>p1305-PtDi19-2</i>	TGCTCTAGAATGGATGCTGATTC AT	CGCGGATCCTATAAAATATCATCGA GA
<i>p1305-PtDi19-7</i>	GCTCTAGAGCATGGATGCTGATT CA	TCCCCCGGGGGTAAAATGTCATC A
<i>pGBKT7-PtDi19-2</i>	CGGGATCCAATTGTAGACAACA A	CGCGGATCCCTATAAAATATCATC G
<i>pGBKT7-PtDi19-2-N-C</i>	CGGGATCCAATTGTAGACAACA A	CGGGATCCAATTGTAGACAACAA
<i>pGBKT7-PtDi19-2-N</i>	CGGAATTCATGGATGCTGATTCA T	CGGGATCCTCCATGTTGTAGG
<i>pGBKT7-PtDi19-7</i>	GGAATTCCATGGATGCTGATTCA	CGGGATCCCGCTATAAAATGTCA

pGADT7-PtDi19-	TCCCCCGGGATGGATGCTGATT	CGGGATCCCTATAAAATGTCATCA
7	CAT	GGAATT
