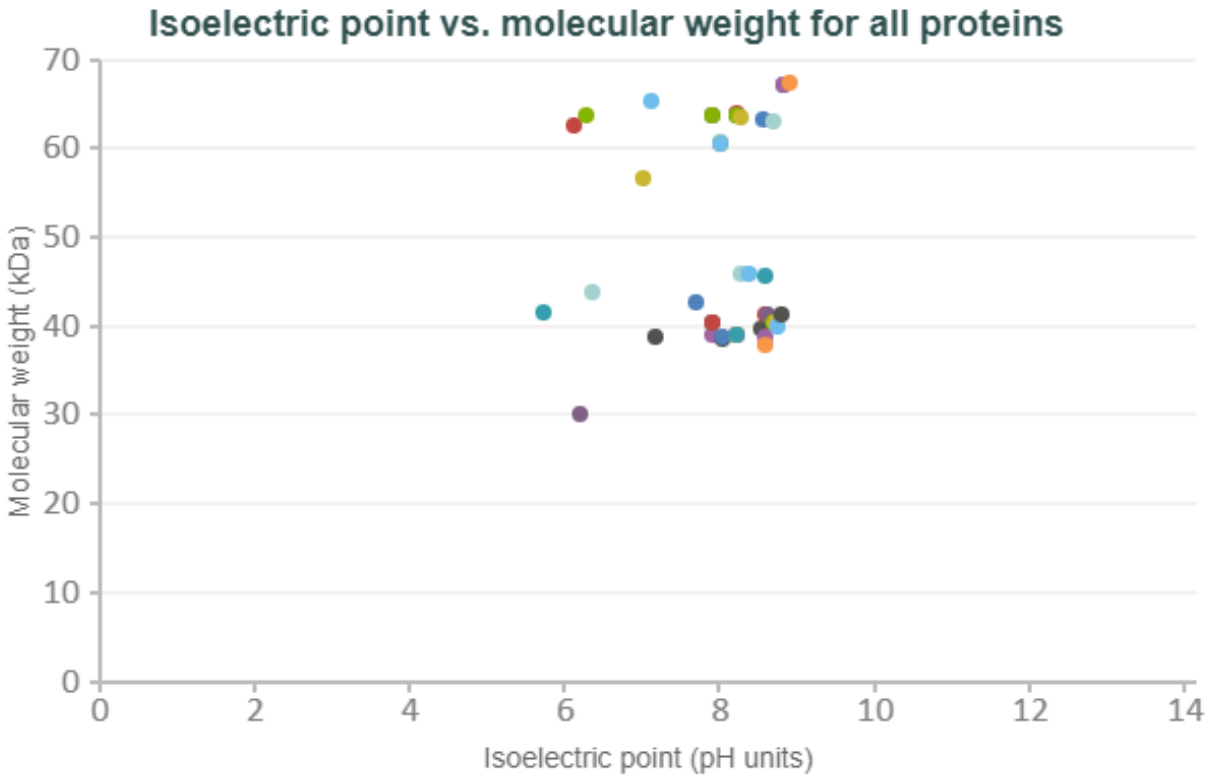


Figure S1. Molecular weight (kDa) vs. isoelectric point plots of TaPIN genes.

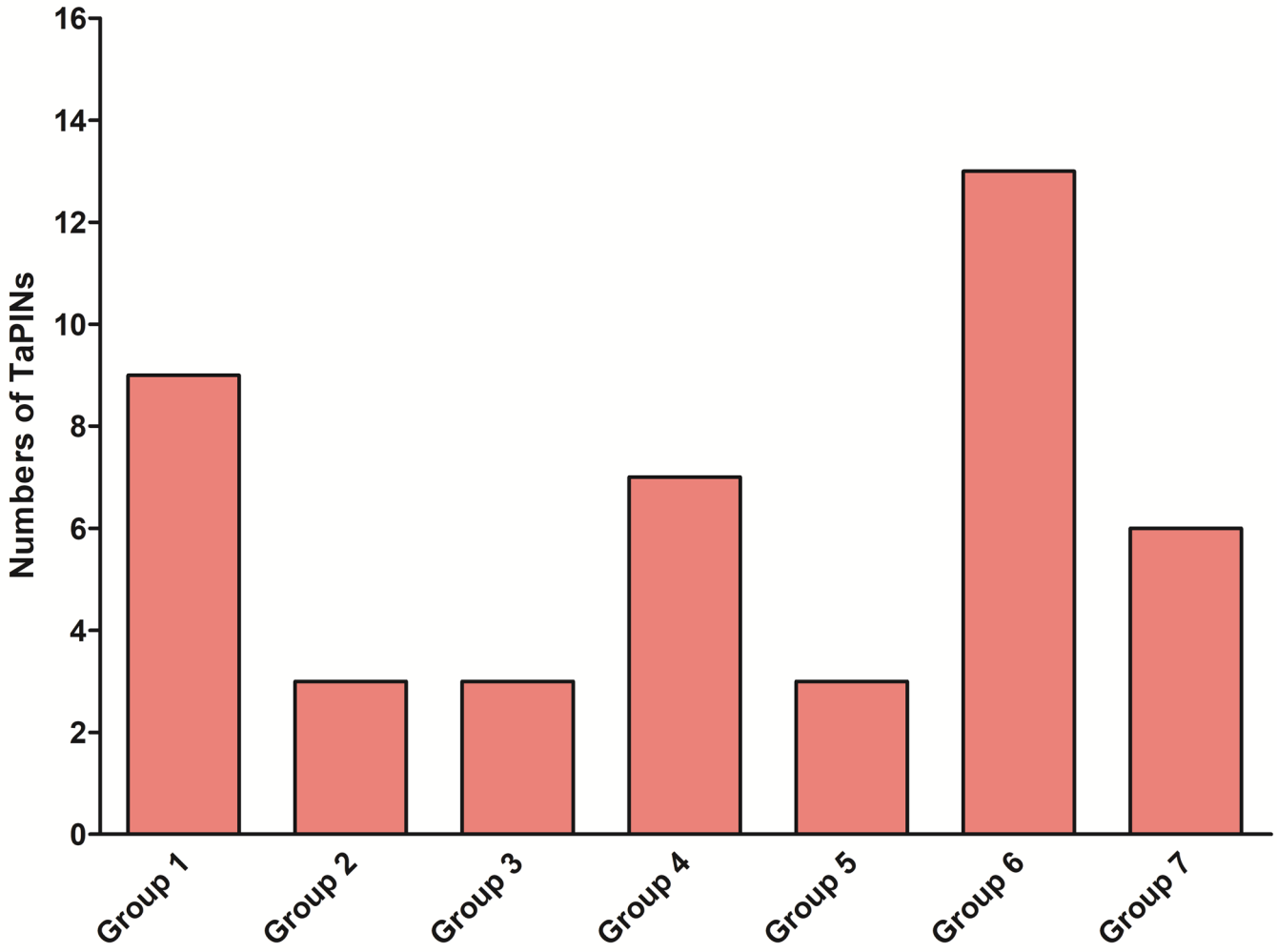


Figure S2. Distribution of TaPINs in different group of phylogenetic tree.

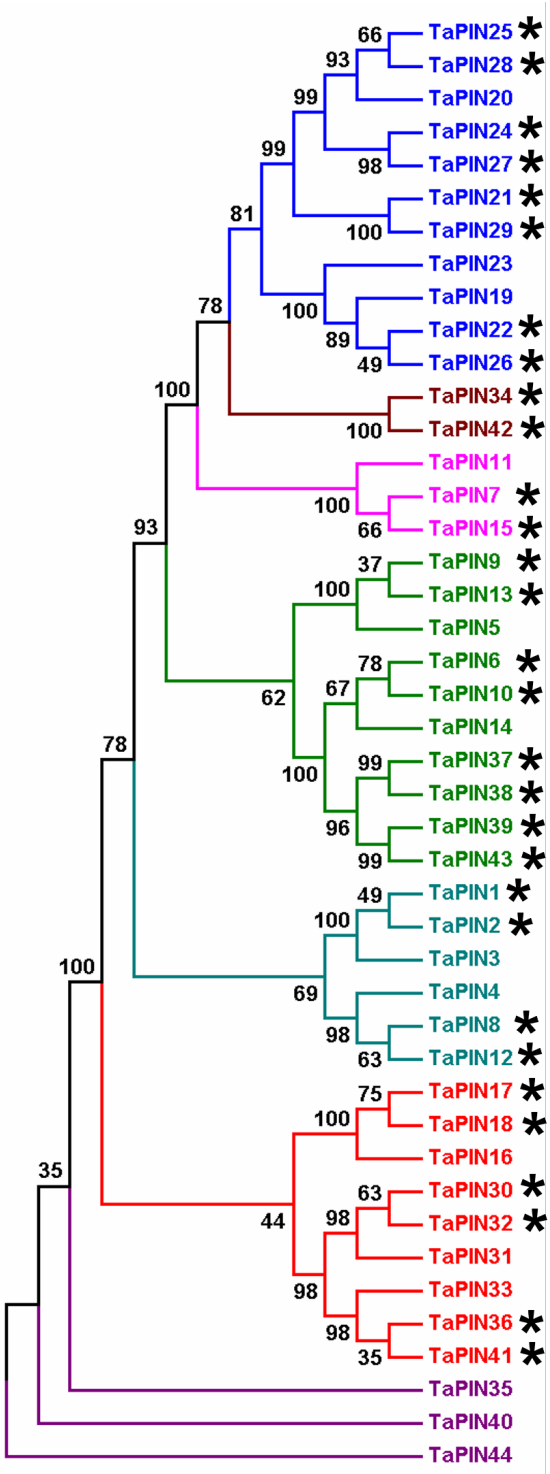

TaPIN25
TaPIN28
TaPIN20
TaPIN24
TaPIN27
TaPIN21
TaPIN29
TaPIN23
TaPIN19
TaPIN22
TaPIN26
TaPIN34
TaPIN42
TaPIN11
TaPIN7
TaPIN15
TaPIN9
TaPIN13
TaPIN5
TaPIN6
TaPIN10
TaPIN14
TaPIN37
TaPIN38
TaPIN39
TaPIN43
TaPIN1
TaPIN2
TaPIN3
TaPIN4
TaPIN8
TaPIN12
TaPIN17
TaPIN18
TaPIN16
TaPIN30
TaPIN32
TaPIN31
TaPIN33
TaPIN36
TaPIN41
TaPIN35
TaPIN40
TaPIN44

Figure S3: Phylogenetic analysis of TaPIN genes. A phylogenetic tree was constructed using MEGAX with the neighbor-joining (NJ) method and 1000 bootstrap replications. Black asterisk indicate the duplicated genes.

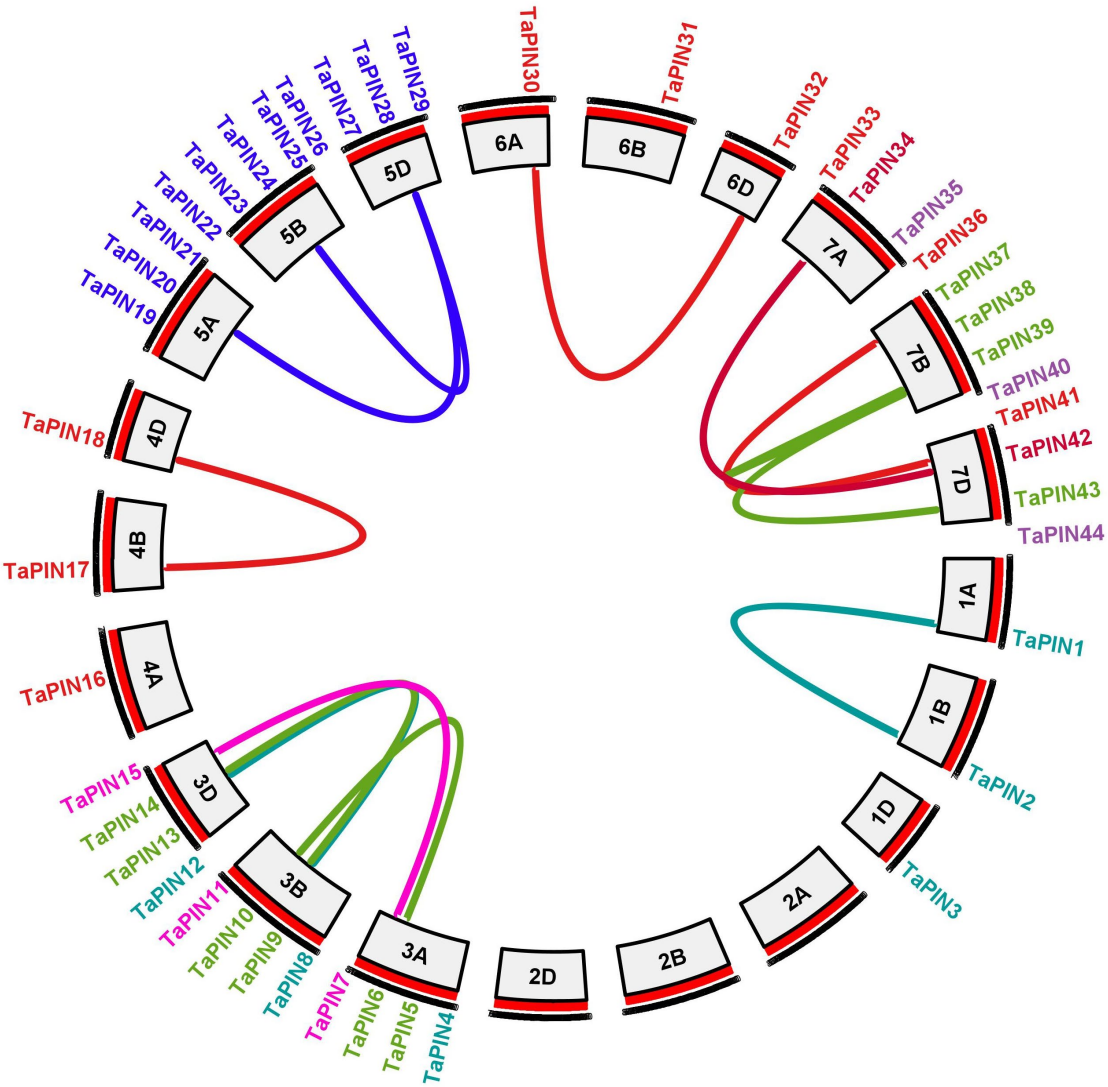


Figure S4: Chromosomal distribution and duplicated PIN gene pairs in wheat. Duplicated PIN gene pairs are connected with lines with distinct colors. The figure was generated using TBtools.

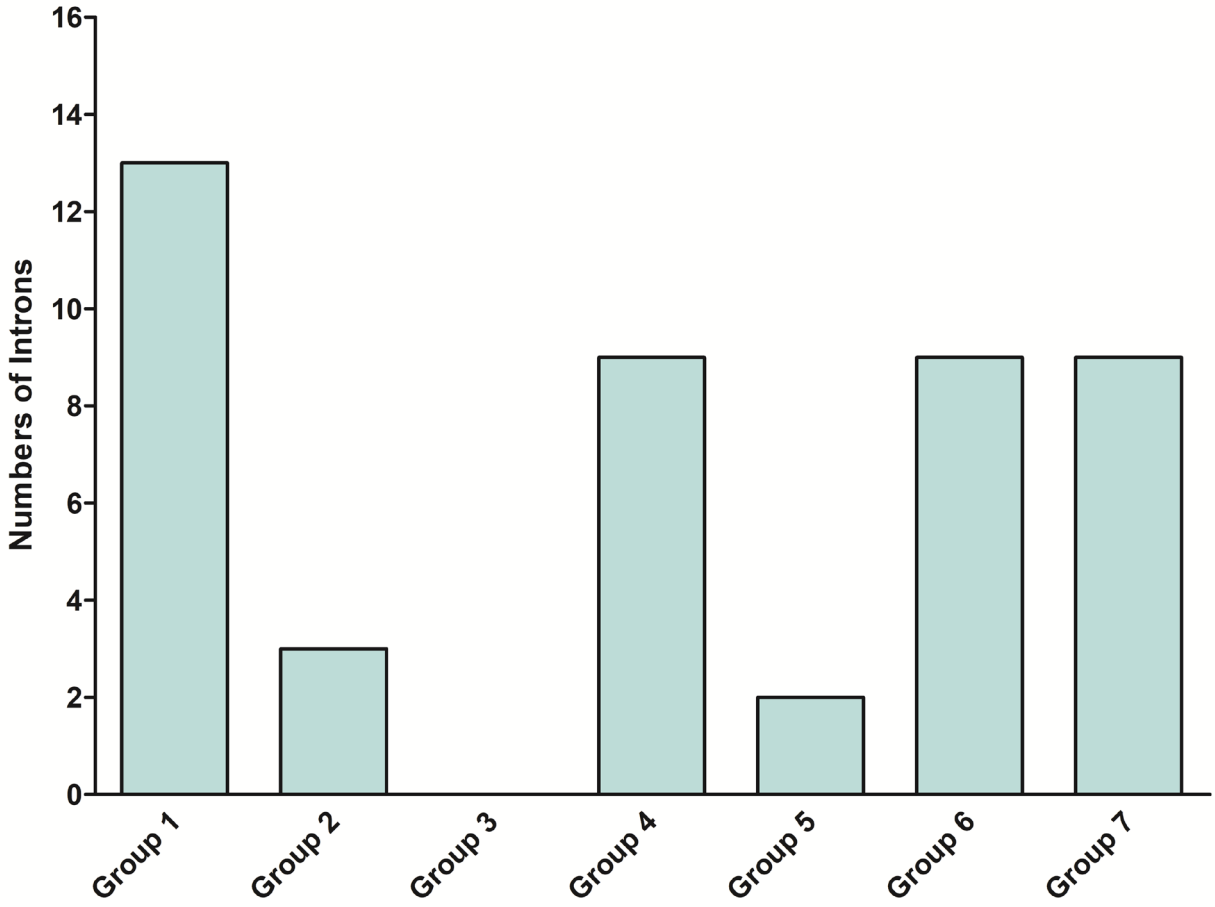
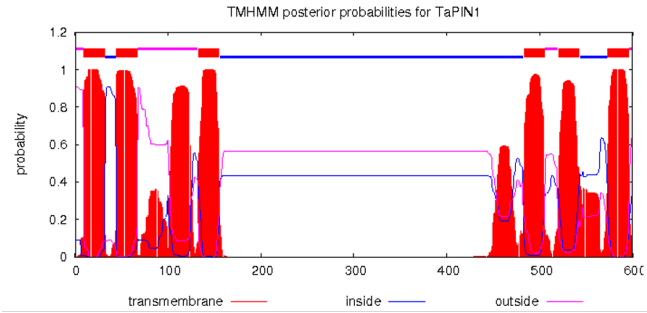
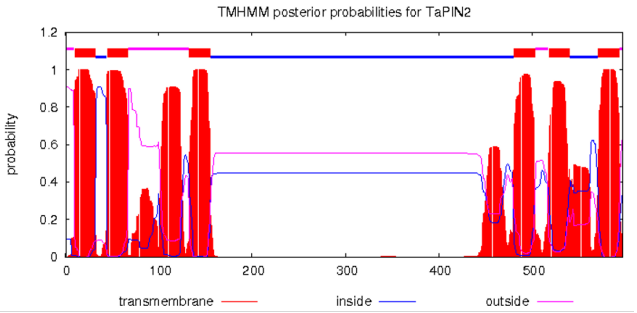
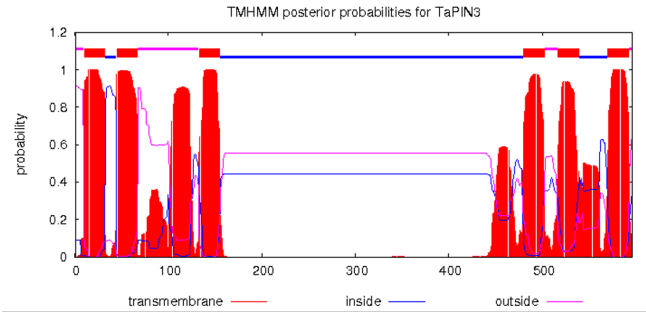
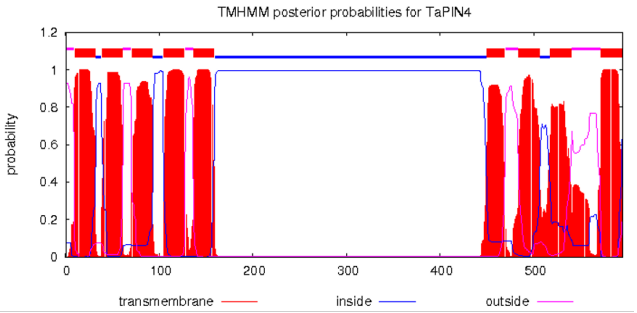


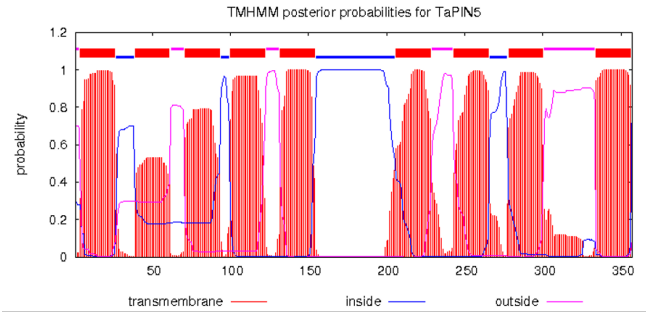
Figure S5. Distribution of number of introns of TaPINs genes in different group of phylogenetic tree.

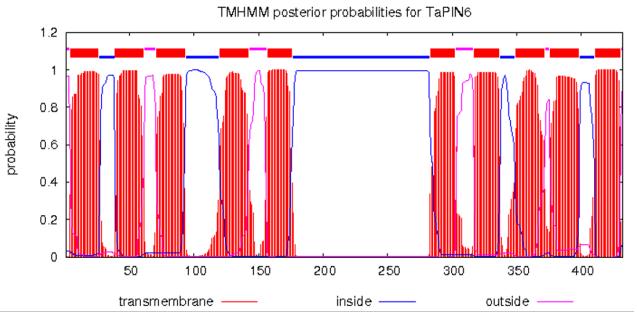

TMHMM posterior probabilities for TaPIN1
probability
transmembrane
inside
outside

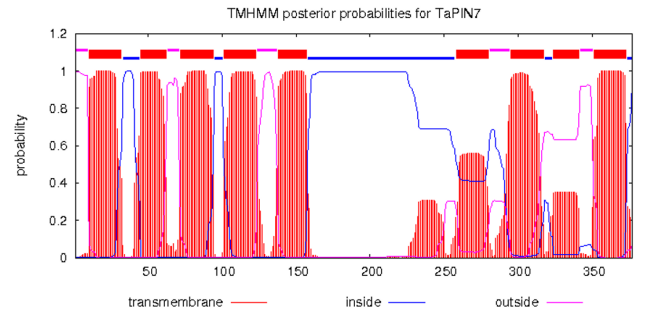

TMHMM posterior probabilities for TaPIN2
probability
transmembrane
inside
outside

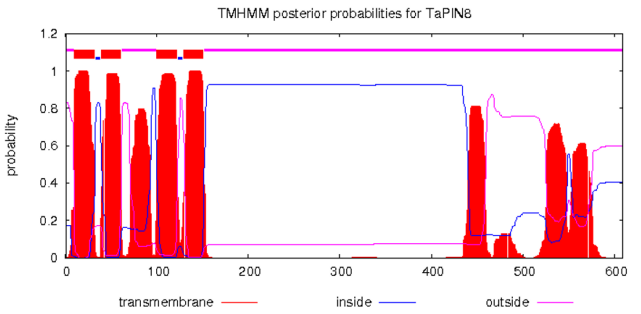

TMHMM posterior probabilities for TaPIN3
probability
transmembrane
inside
outside

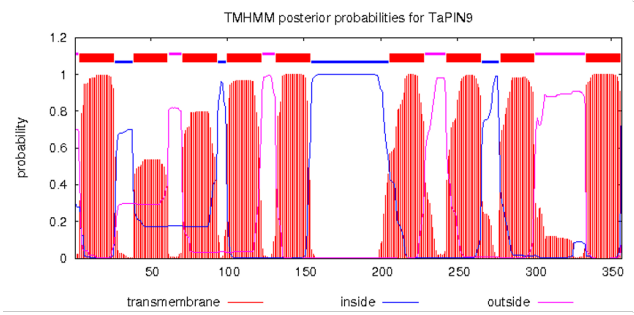

TMHMM posterior probabilities for TaPIN4
probability
transmembrane
inside
outside

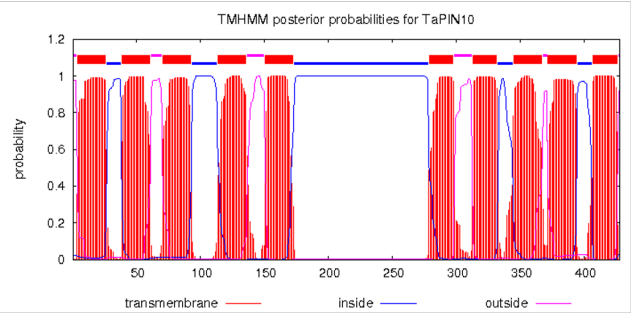

TMHMM posterior probabilities for TaPIN5
probability
transmembrane
inside
outside

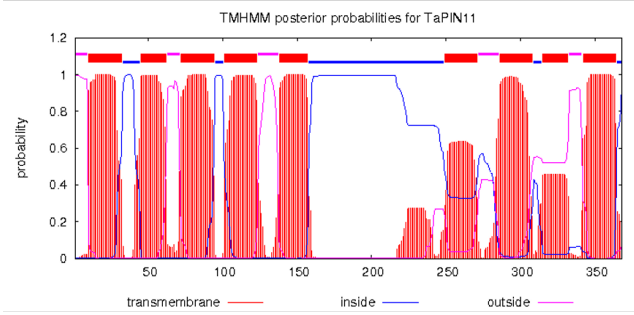

TMHMM posterior probabilities for TaPIN6
probability
transmembrane
inside
outside

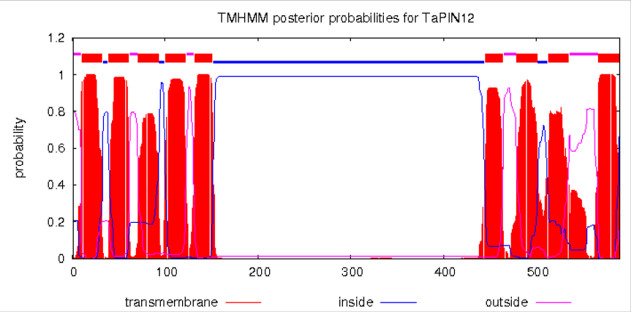

TMHMM posterior probabilities for TaPIN7
probability
transmembrane
inside
outside

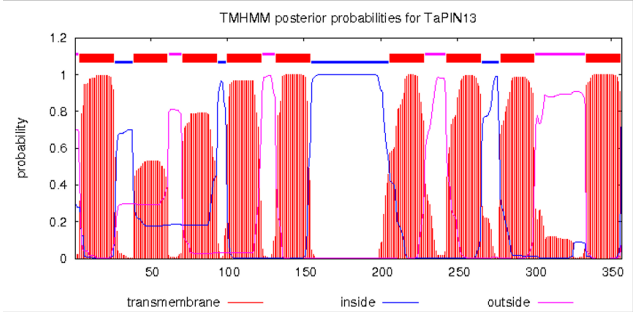

TMHMM posterior probabilities for TaPIN8
probability
transmembrane
inside
outside

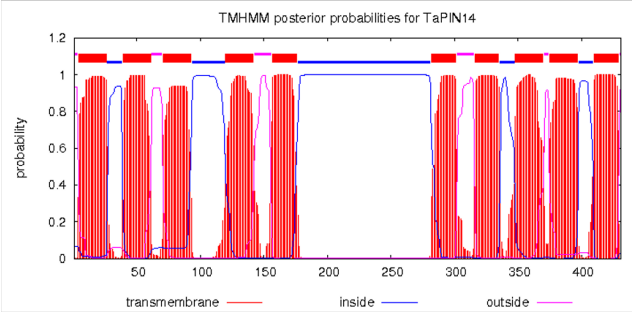

TMHMM posterior probabilities for TaPIN9
probability
transmembrane
inside
outside

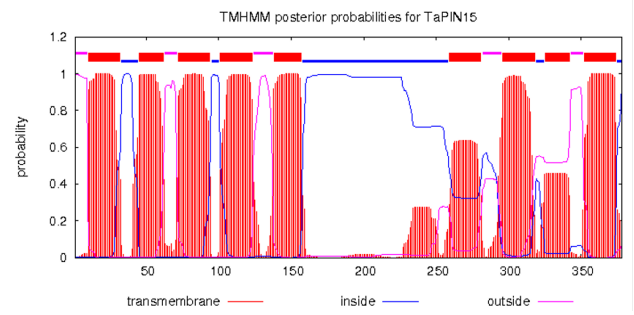

TMHMM posterior probabilities for TaPIN10
probability
transmembrane
inside
outside

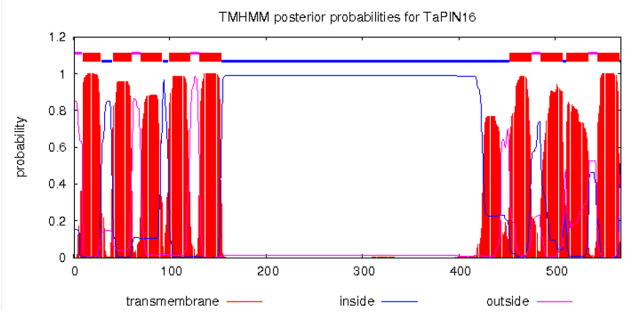

TMHMM posterior probabilities for TaPIN11
probability
transmembrane
inside
outside

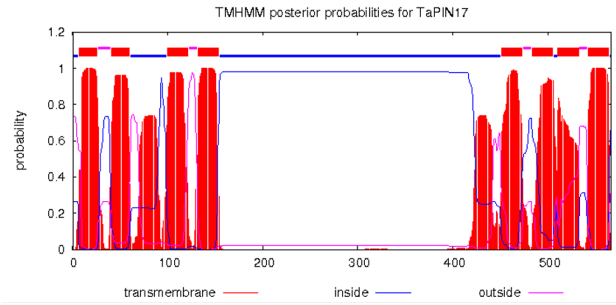

TMHMM posterior probabilities for TaPIN12
probability
transmembrane
inside
outside

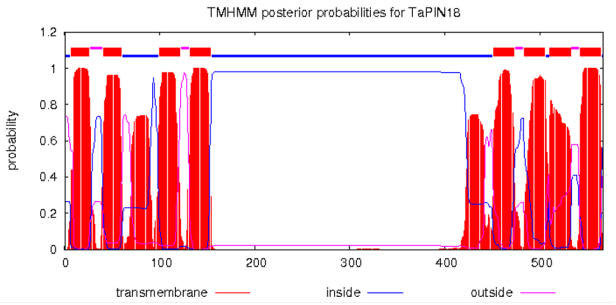

TMHMM posterior probabilities for TaPIN13
probability
transmembrane
inside
outside

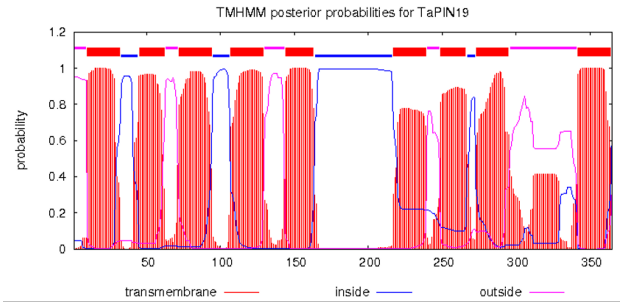

TMHMM posterior probabilities for TaPIN14
probability
transmembrane
inside
outside

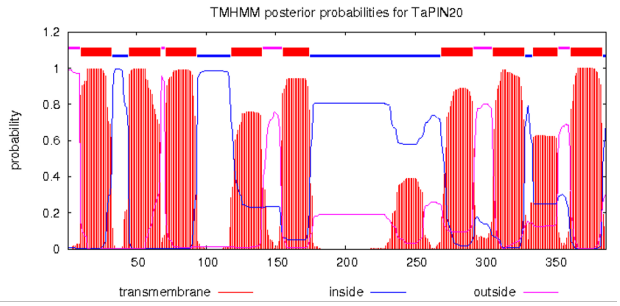

TMHMM posterior probabilities for TaPIN15
probability
transmembrane
inside
outside

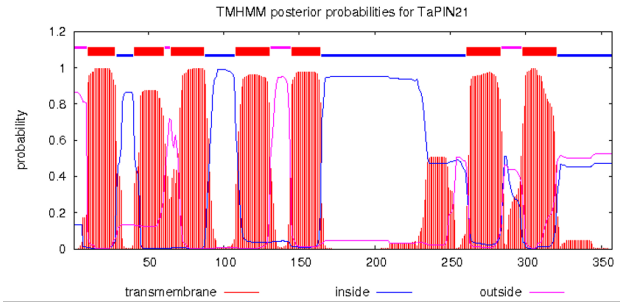

TMHMM posterior probabilities for TaPIN16
probability
transmembrane
inside
outside

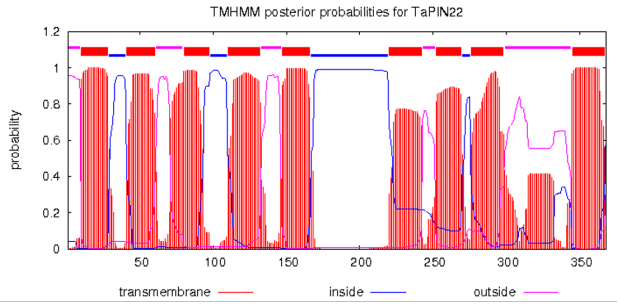

TMHMM posterior probabilities for TaPIN17
probability
transmembrane
inside
outside

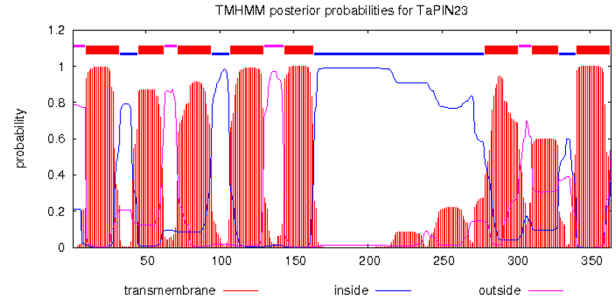

TMHMM posterior probabilities for TaPIN18
probability
transmembrane
inside
outside

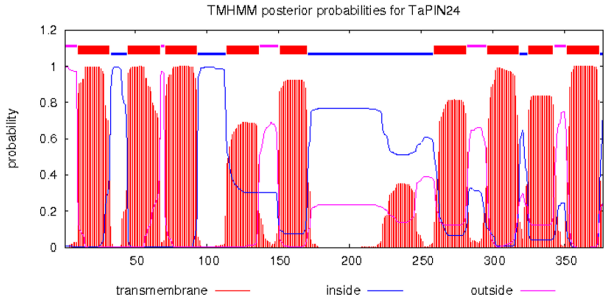

TMHMM posterior probabilities for TaPIN19
probability
transmembrane
inside
outside

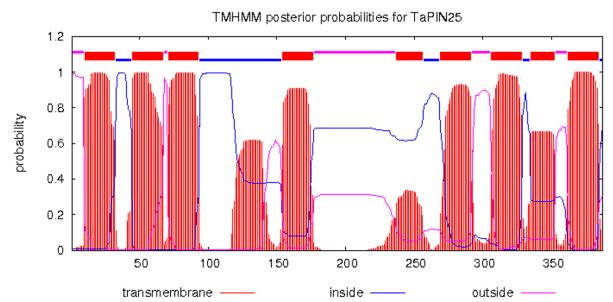

TMHMM posterior probabilities for TaPIN20
probability
transmembrane
inside
outside

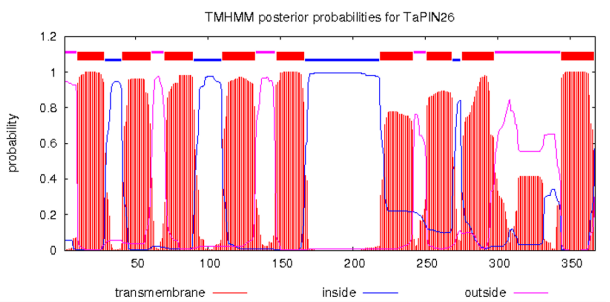

TMHMM posterior probabilities for TaPIN21
probability
transmembrane
inside
outside

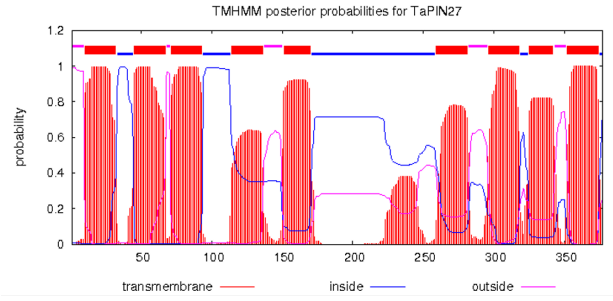

TMHMM posterior probabilities for TaPIN22
probability
transmembrane
inside
outside

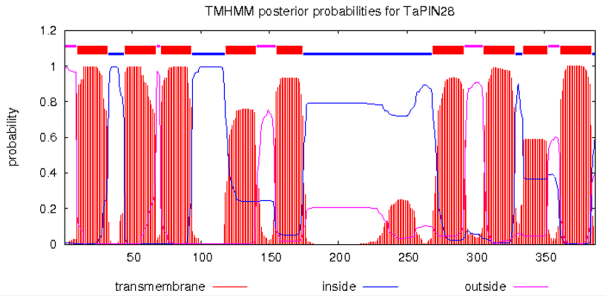

TMHMM posterior probabilities for TaPIN23
probability
transmembrane
inside
outside

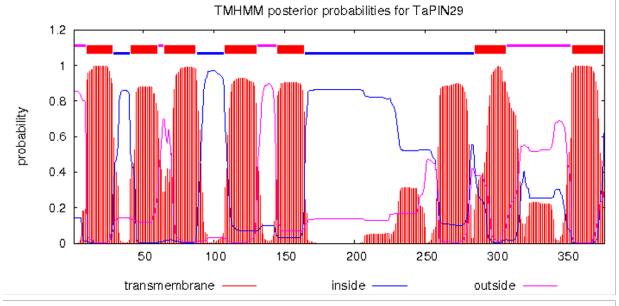

TMHMM posterior probabilities for TaPIN24
probability
transmembrane
inside
outside

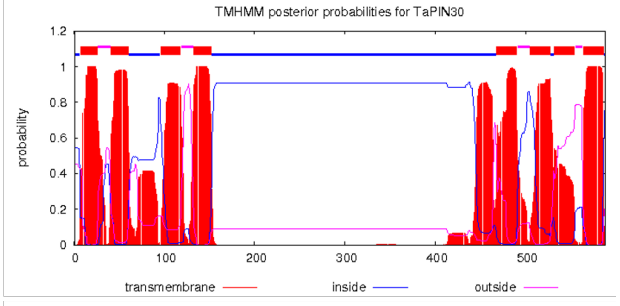

TMHMM posterior probabilities for TaPIN25
probability
transmembrane
inside
outside

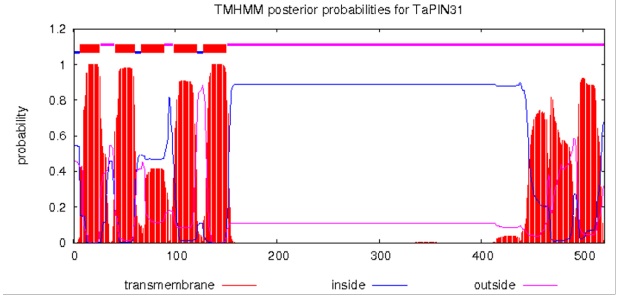

TMHMM posterior probabilities for TaPIN26
probability
transmembrane
inside
outside

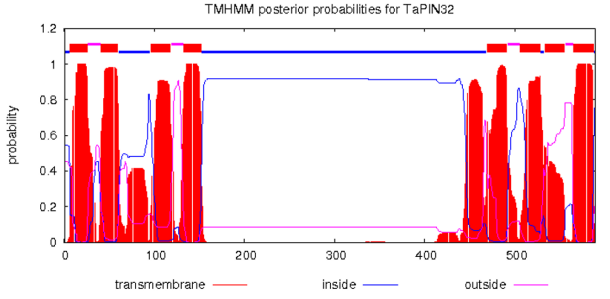

TMHMM posterior probabilities for TaPIN27
probability
transmembrane
inside
outside

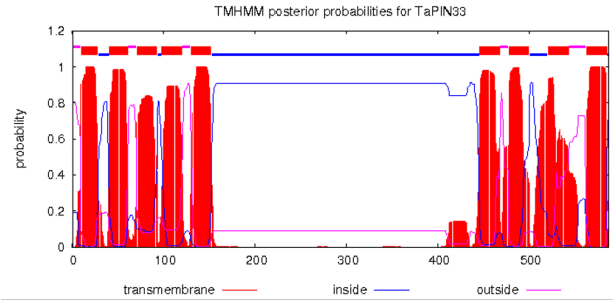

TMHMM posterior probabilities for TaPIN28
probability
transmembrane
inside
outside

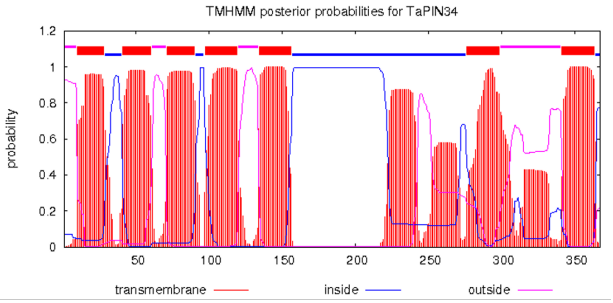

TMHMM posterior probabilities for TaPIN29
probability
transmembrane
inside
outside

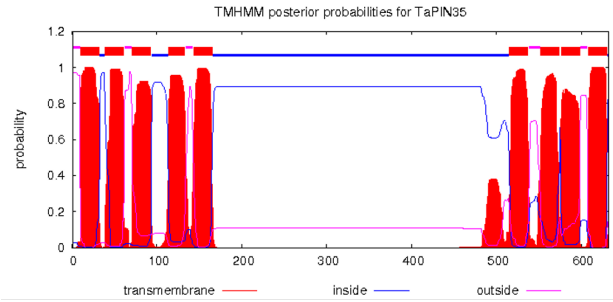

TMHMM posterior probabilities for TaPIN30
probability
transmembrane
inside
outside

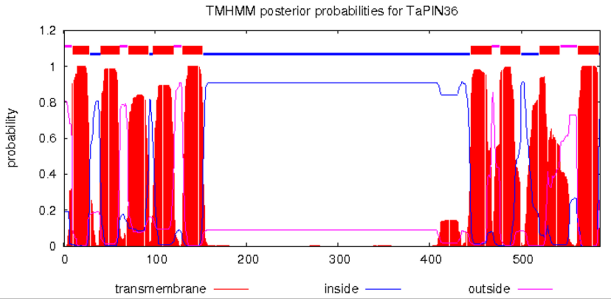

TMHMM posterior probabilities for TaPIN31
probability
transmembrane
inside
outside

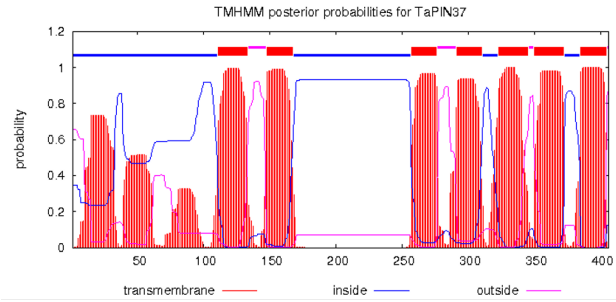

TMHMM posterior probabilities for TaPIN32
probability
transmembrane
inside
outside

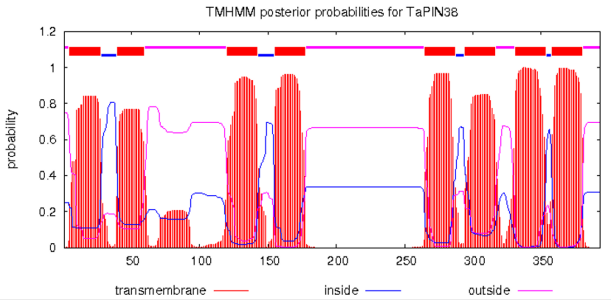

TMHMM posterior probabilities for TaPIN33
probability
transmembrane
inside
outside

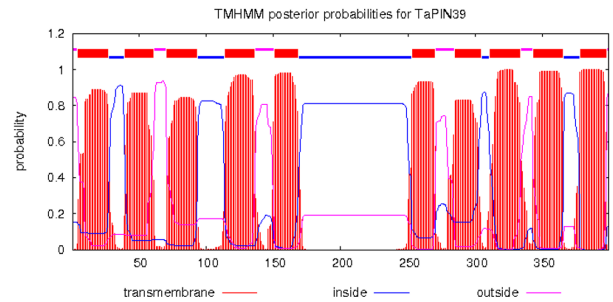

TMHMM posterior probabilities for TaPIN34
probability
transmembrane
inside
outside

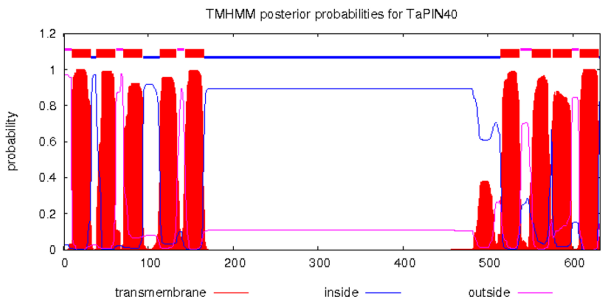

TMHMM posterior probabilities for TaPIN35
probability
transmembrane
inside
outside


TMHMM posterior probabilities for TaPIN36
probability
transmembrane
inside
outside


TMHMM posterior probabilities for TaPIN37
probability
transmembrane
inside
outside


TMHMM posterior probabilities for TaPIN38
probability
transmembrane
inside
outside


TMHMM posterior probabilities for TaPIN39
probability
transmembrane
inside
outside


TMHMM posterior probabilities for TaPIN40
probability
transmembrane
inside
outside

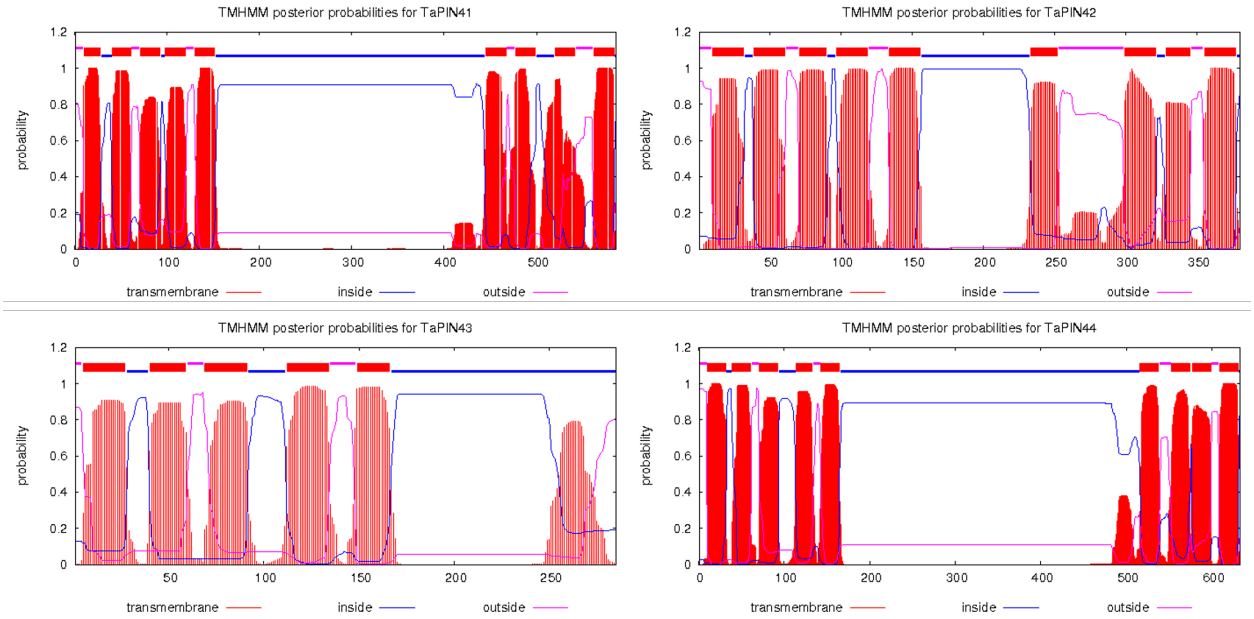
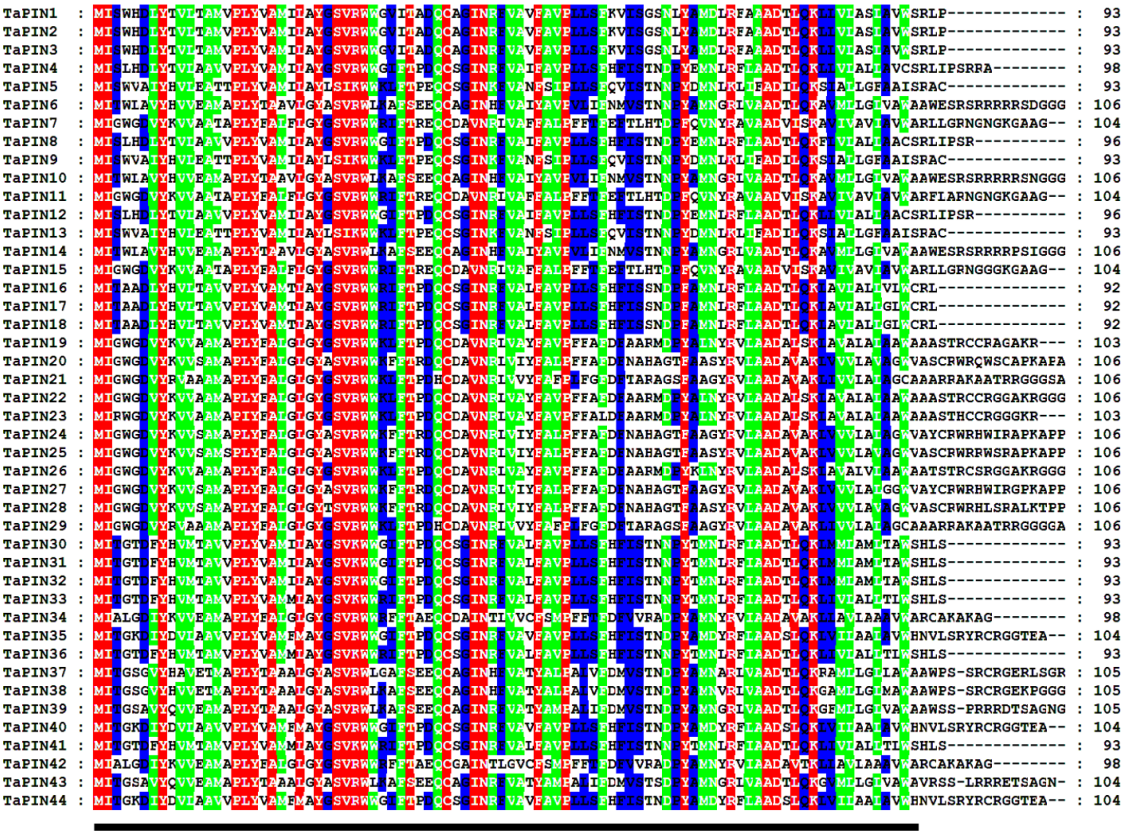
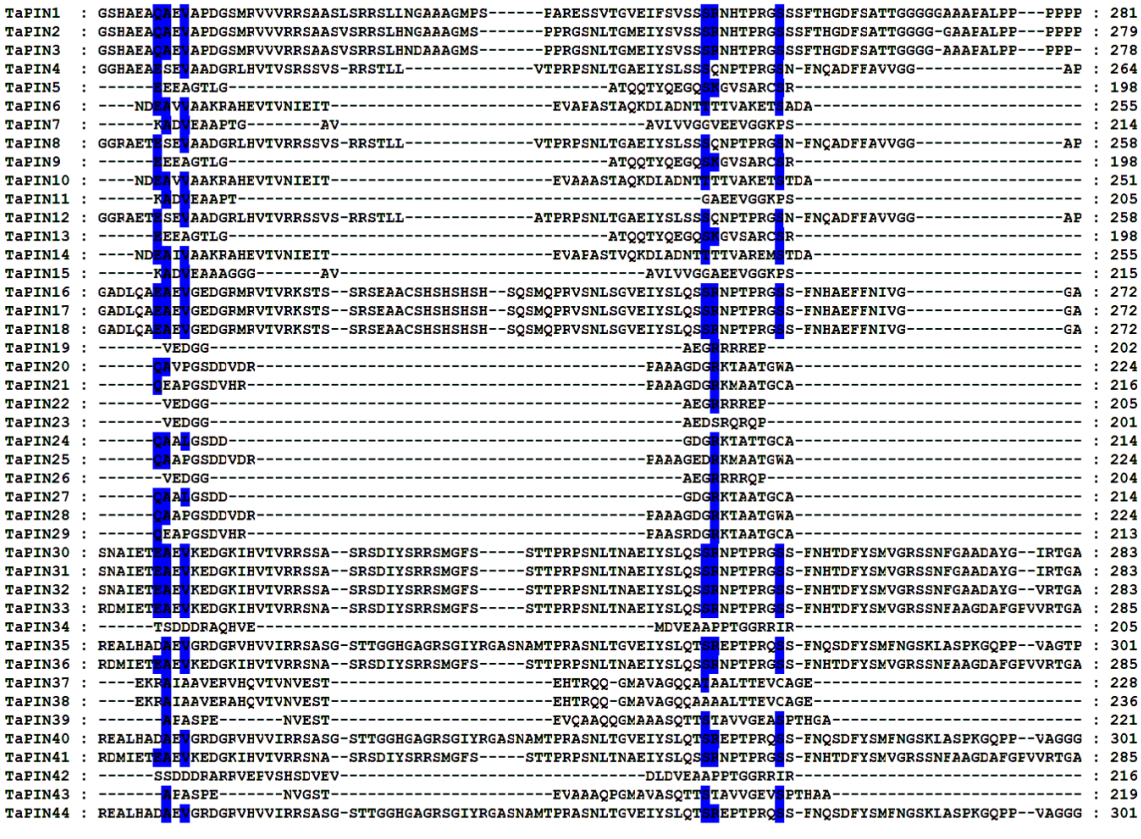
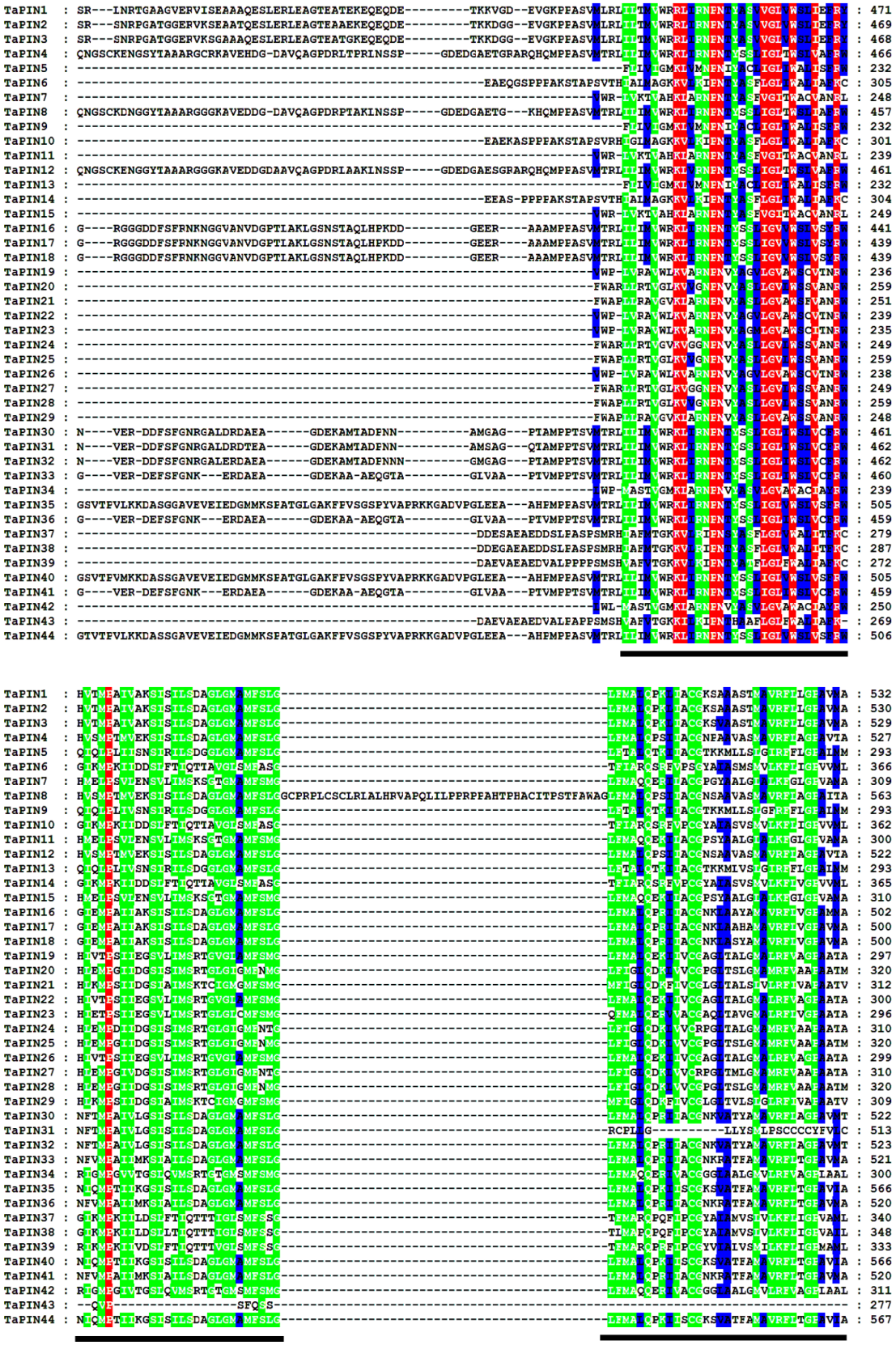


Figure S6. The Predicted Transmembrane Helices of the TaPIN Proteins. The transmembrane domains were identified using TMHMM2: (www.cbs.dtu.dk/services/TMHMM/) and SOSUI software tools (http://www.cbs.dtu.dk, http://harrier.nagahama-i-bio.ac.jp). The red peaks representing the predicted transmembrane domain and blue color line indicate the central hydrophobic loop of proteins.







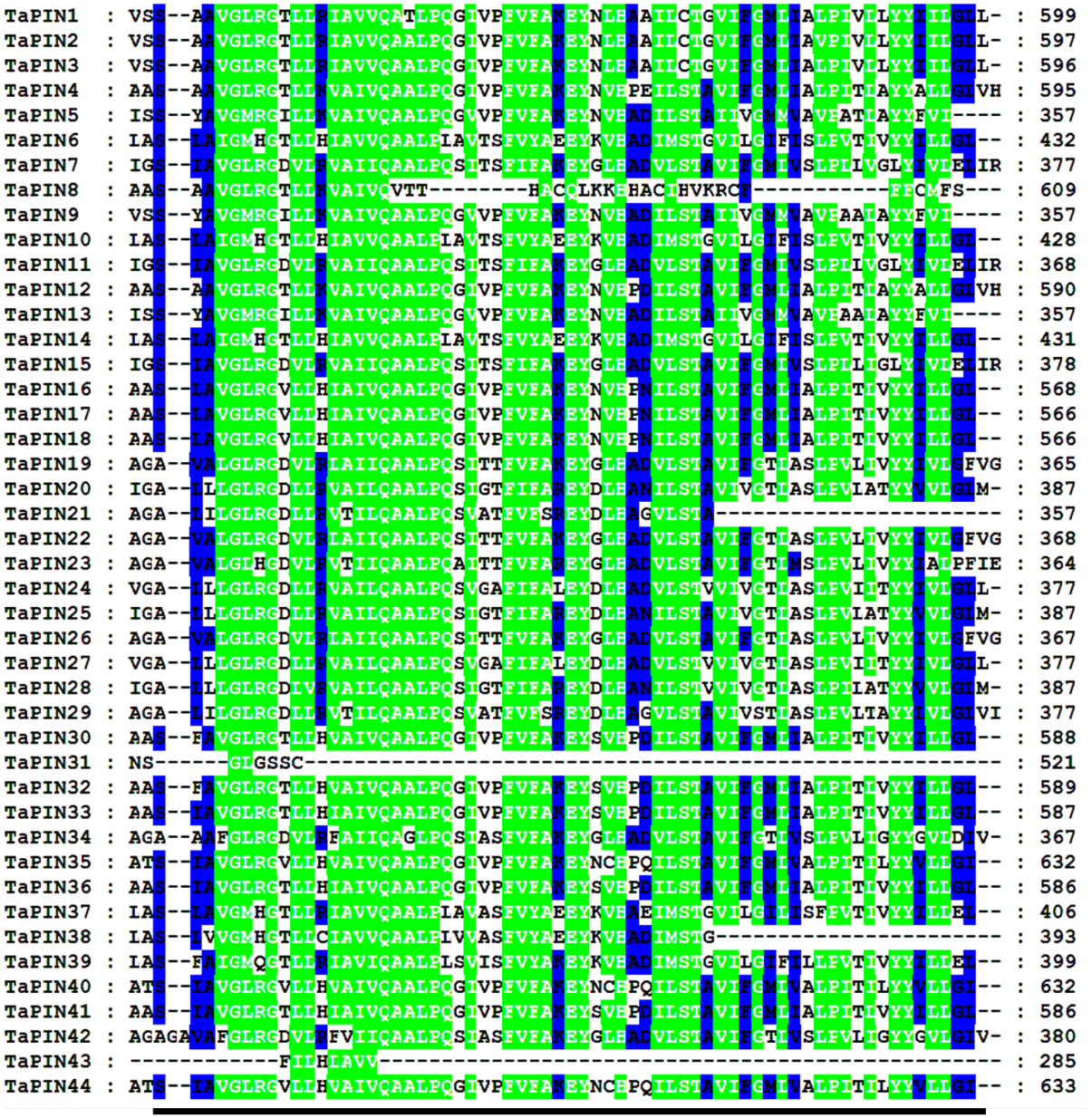
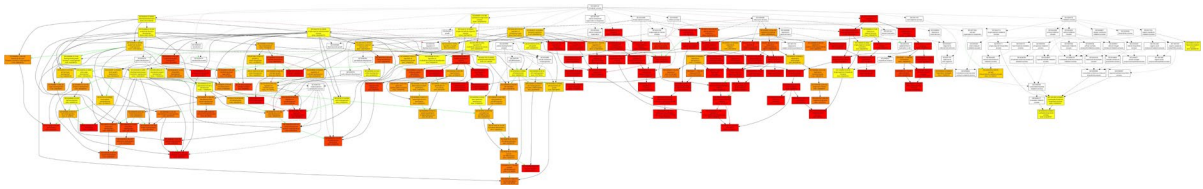
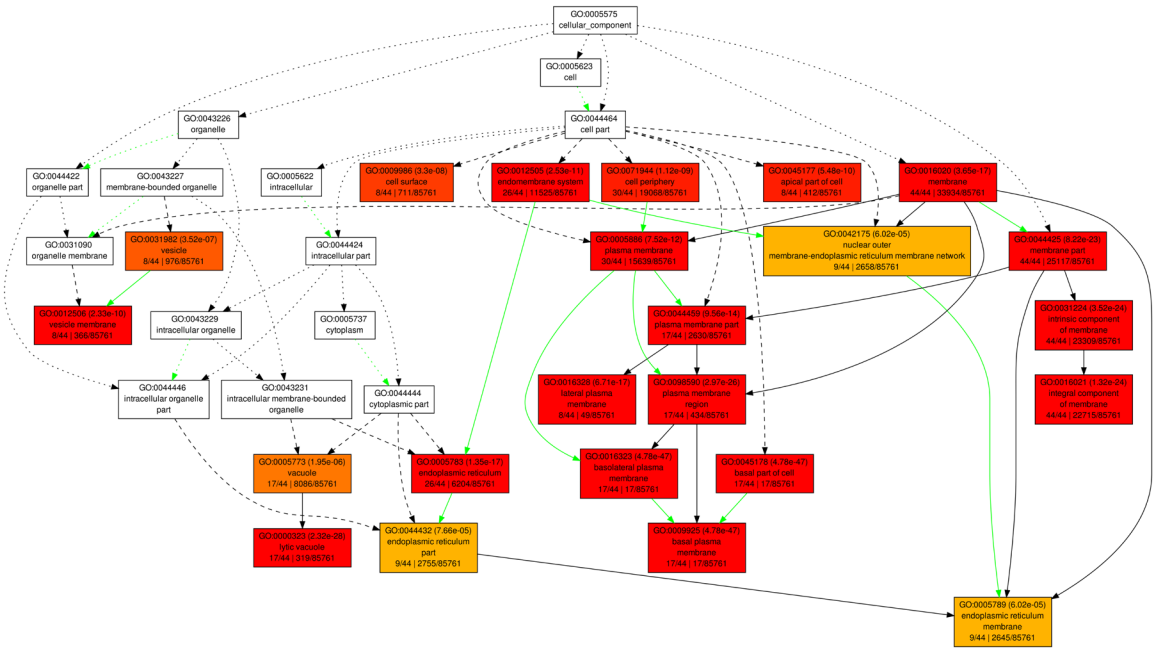


Figure S7. Alignment of the TaPINs protein sequences. The highly conserved regions of the TaPIN proteins were underlined with black color. Colored and shaded amino acids are chemically similar residues. Dashes indicate gaps introduced to maximize the alignment of homologous region.

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cell
GO:0043226
organelle
GO:0044464
cell part
GO:0044422
organelle part
GO:0043227
membrane-bounded organelle
GO:0005622
intracellular
GO:0009986 (3.3e-08)
cell surface
8/44 | 711/85761
GO:0012505 (2.53e-11)
endomembrane system
26/44 | 11525/85761
GO:0071944 (1.12e-09)
cell periphery
30/44 | 19068/85761
GO:0045177 (5.48e-10)
apical part of cell
8/44 | 412/85761
GO:0016020 (3.65e-17)
membrane
44/44 | 33934/85761
GO:0031090
organelle membrane
GO:0031982 (3.52e-07)
vesicle
8/44 | 976/85761
GO:0044424
intracellular part
GO:0005886 (7.52e-12)
plasma membrane
30/44 | 15639/85761
GO:0042175 (6.02e-05)
nuclear outer
membrane-endoplasmic reticulum membrane network
9/44 | 2658/85761
GO:0044425 (8.22e-23)
membrane part
44/44 | 25117/85761
GO:0012506 (2.33e-10)
vesicle membrane
8/44 | 366/85761
GO:0043229
intracellular organelle
GO:0005737
cytoplasm
GO:0044459 (9.56e-14)
plasma membrane part
17/44 | 2630/85761
GO:0031224 (3.52e-24)
intrinsic component
of membrane
44/44 | 23309/85761
GO:0044446
intracellular organelle
part
GO:0043231
intracellular membrane-bounded
organelle
GO:0044444
cytoplasmic part
GO:0016328 (6.71e-17)
lateral plasma
membrane
8/44 | 49/85761
GO:0098590 (2.97e-26)
plasma membrane
region
17/44 | 434/85761
GO:0016021 (1.32e-24)
integral component
of membrane
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GO:0005773 (1.95e-06)
vacuole
17/44 | 8086/85761
GO:0005783 (1.35e-17)
endoplasmic reticulum
26/44 | 6204/85761
GO:0016323 (4.76e-47)
basolateral plasma
membrane
17/44 | 17/85761
GO:0045178 (4.78e-47)
basal part of cell
17/44 | 17/85761
GO:0000323 (2.32e-28)
lytic vacuole
17/44 | 319/85761
GO:0044432 (7.66e-05)
endoplasmic reticulum
part
9/44 | 2755/85761
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membrane
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membrane
9/44 | 2645/85761

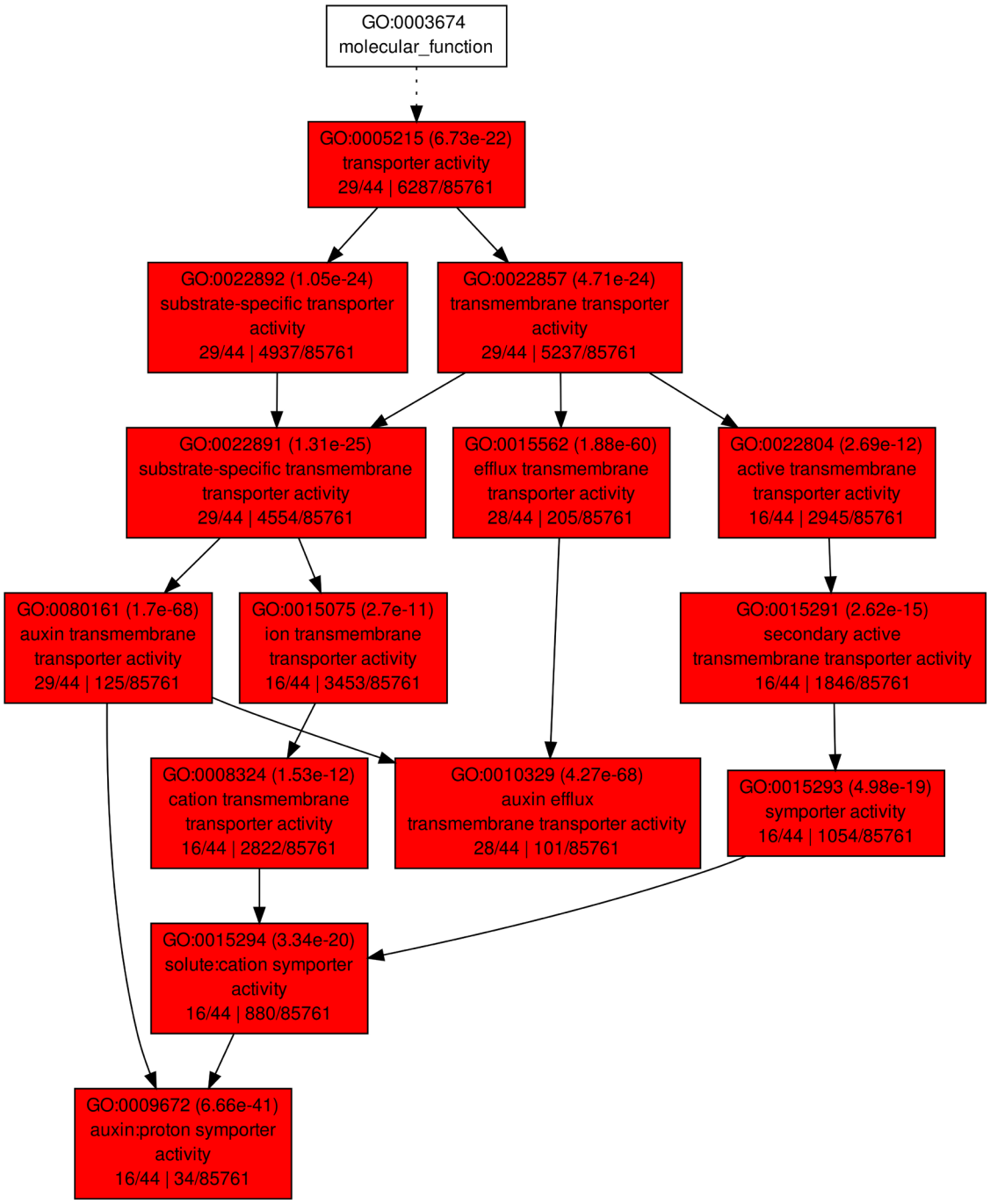

Figure S8. Gene ontology term distribution TaPIN gene family predicted using AgriGO **A.** Biological Process. **B.** Cellular component. **C.** Molecular function.

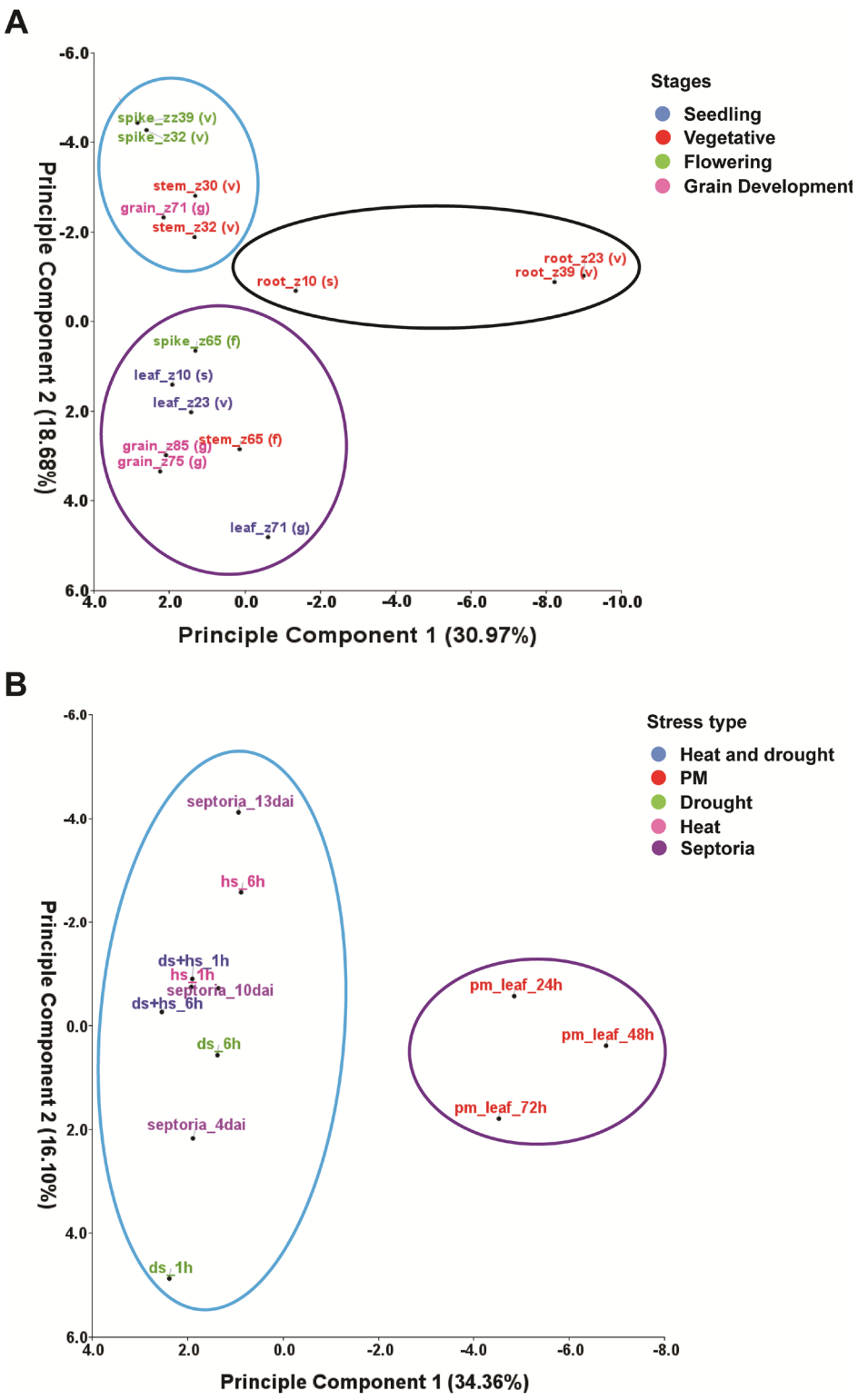

Figure S9: PCA plots displaying grouping of different (A) Developmental stages (B) Biotic and abiotic stress conditions based on the TaPIN expression pattern.

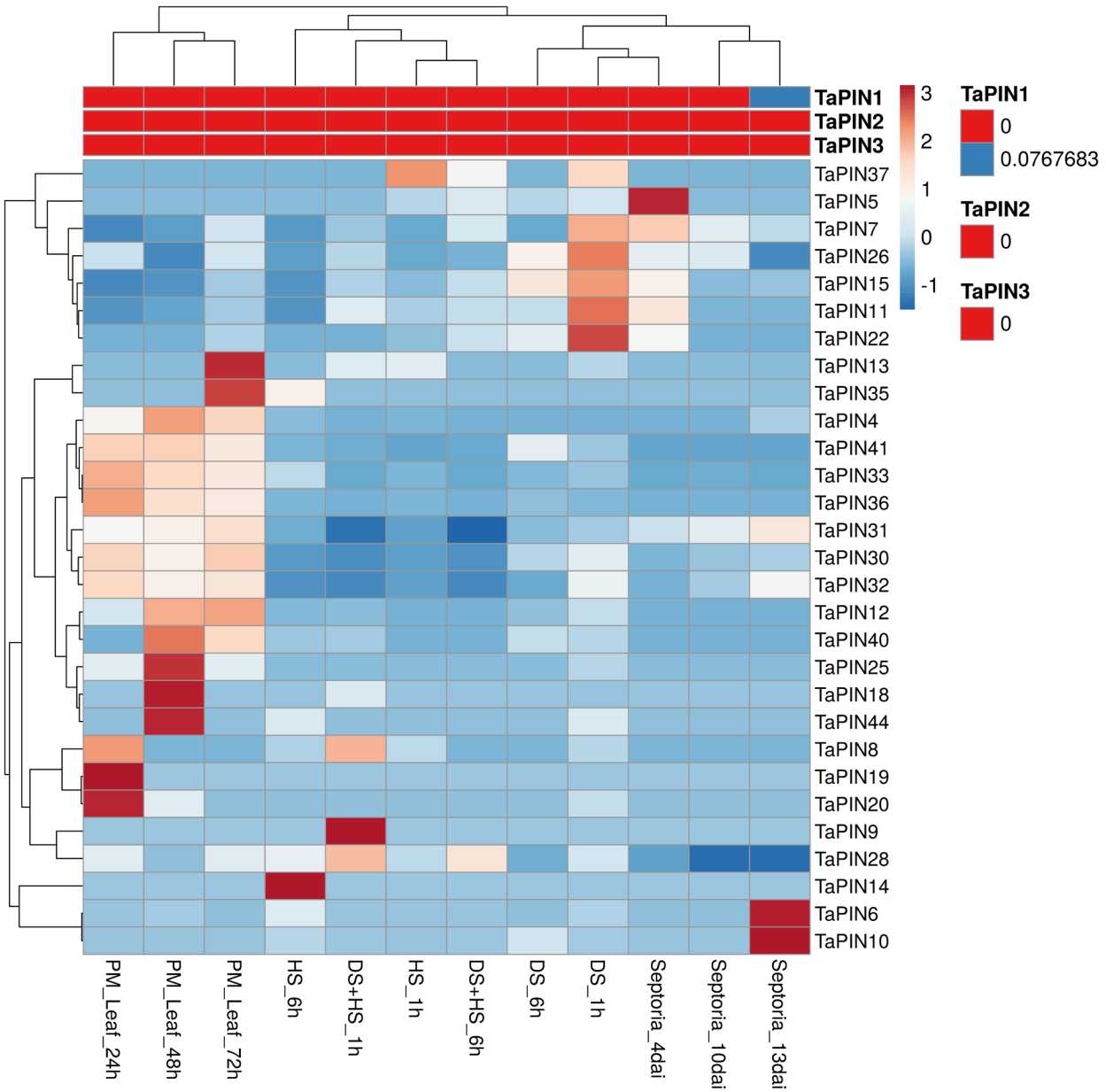

Figure S10: Heatmaps representing the expression pattern of TaPIN genes in different stress conditions. TPM values were directly used to construct the heatmaps. FPKM values were directly used to create the heatmaps. DS: Drought stress, HS: Heat stress, h: hour, d: days. PM: Powdery mildew.

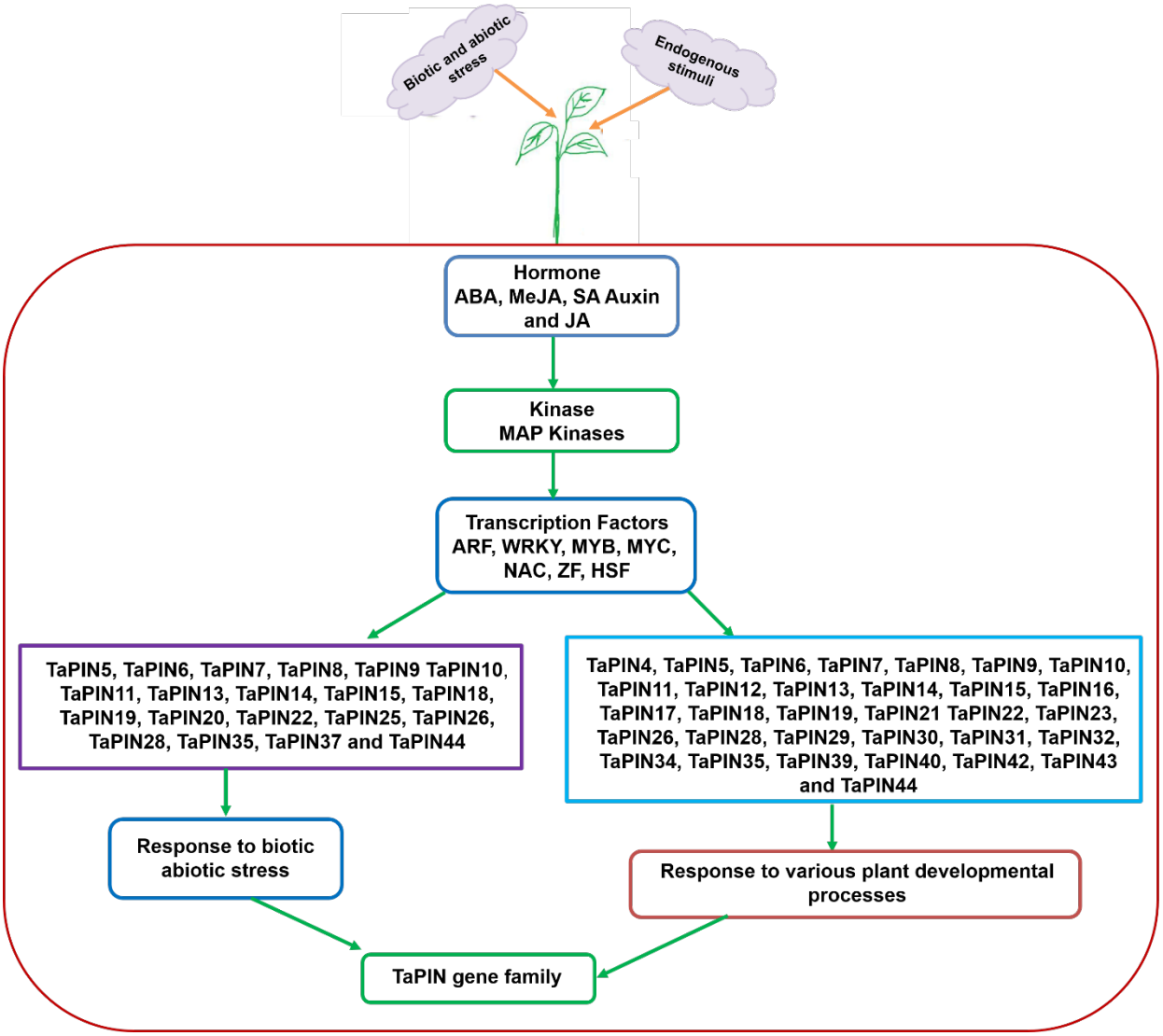

Figure S11. A possible function of TaPIN gene family in various plant developmental processes and diverse stress conditions. ABA: Abscisic acid; MeJA: Methyl jasmonate; SA: Salicylic acid; JA: Jasmonic acid; MAP: Mitogen-activated protein kinase; ARF: Auxin response factors; MYB: Myeloblastosis; NAC: No apical meristem; ZF: Zinc Finger and HSF: Heat shock factors.