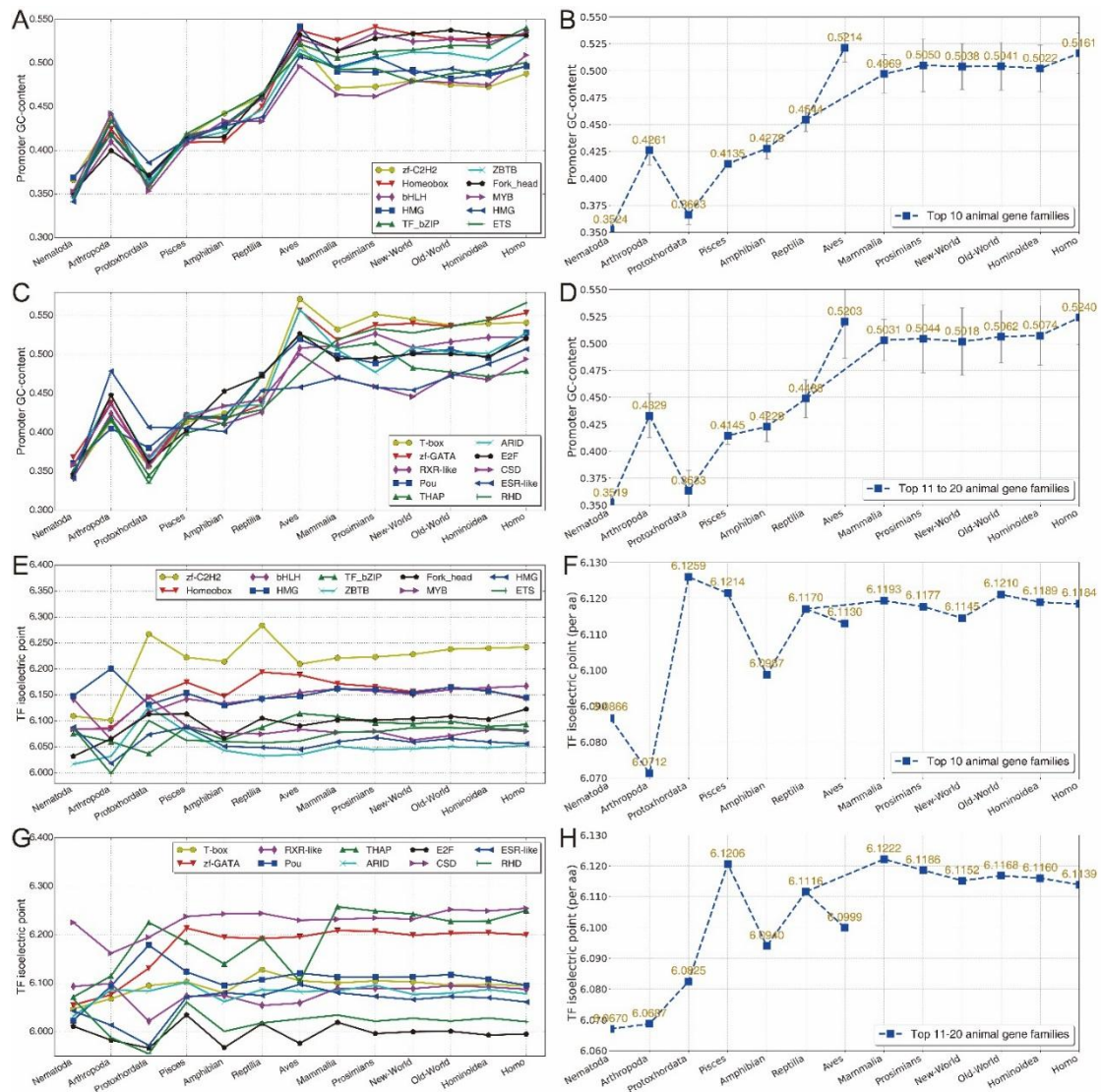# Supplementary Materials

Supplementary Figure S1 Trends in promoter GC-content and TF isoelectric points in gene families

A Promoter GC-content in top 10 gene families. **B** Trend in promoter GC-content in top 10 gene families. **C** Promoter GC-content in top 11–20 gene families. **D** Trend in promoter GC-content in top 11–20 gene families. **E** TF isoelectric points in top 10 gene families. **F** Trend in TF isoelectric points in top 10 gene families. **G** TF isoelectric points in top 11–20 gene families. **H** Trend in TF isoelectric points in top 11–20 gene families. As signatures, promoter GC-content and TF isoelectric points shared the same increasing trend in gene families.

Supplementary Table S1. Dataset summary. The datasets involved in our study include both genome and proteome sequences and cover almost the entire evolutionary history of both animal and plant kingdoms.

For	Dataset name	#Species	#Sequences	Database
	Animal TFs	97	125145	AnimalTFDB
	Animal TF-cofactors	97	80058	AnimalTFDB
	Animal proteomes	74	2132385	Ensemble, UniProt
Fig. S1	Animal promoters	249	8503028	Ensemble
	Animal exons	249	49639643	Ensemble
	Animal coding sequences	249	7311335	Ensemble
Fig. 1	Animal promoters	249	8503028	Ensemble
	Animal TFs/TF-cofactors	97	205203	AnimalTFDB
Fig. 2	Plant promoters	62	3458140	EnsemblePlants
	Plant TFs/TF-cofactors	161	315985	PlantTFDB

Supplementary Table S2. The isoelectric point values of 20 amino acids at 25 degrees Celsius

Amino-acid	Abbreviation	Isoelectric-point (pI)
Isoleucine	Ile	6.02
Valine	Val	5.97
Leucine	Leu	5.98
Phenylalanine	Phe	5.48
Cysteine	Cys	5.05
Methionine	Met	5.74
Alanine	Ala	6.01
Glycine	Gly	5.97
Threonine	Thr	5.87
Serine	Ser	5.68
Tryptophan	Trp	5.89
Tyrosine	Tyr	5.66
Proline	Pro	6.48
Histidine	His	7.59
Glutamic acid	Glu	3.22
Glutamine	Gln	5.65
Aspartic acid	Asp	2.77
Asparagine	Asn	5.41
Lysine	Lys	9.74
Arginine	Arg	10.76

Supplementary Table S3. Isoelectric point (pI) t-test (P-value) of TFs/TF-cofactors and proteomes. The second column shows the P-value of T-Test between TFs and TF-cofactors, and the third one between TFs/TF-cofactors and whole-proteomes.

Categories	TFs & TF-cofactors	TFs/TF-cofactors & whole-proteomes
Nematoda	4.02E-05	0.0492
Arthropoda	1.66E-03	5.08E-06
Protoxhordata	1.90E-21	1.05E-14
Pisces	0	0
Amphibian	2.77E-24	1.55E-27
Reptilia	8.43E-112	3.36E-142
Aves	1.88E-138	6.45E-67
Mammalia	0	0
Prosimians	4.87E-131	2.41E-127
New World monkeys	4.47E-134	2.38E-161
Old World monkeys	0	0
Hominoidea	3.35E-226	1.91E-269
Homo	2.97E-41	8.05E-35

Supplementary Table S4. The animal gene families in AnimalTFDB database.

Gene family	Gene number
zf-C2H2	40689
Homeobox	16134
bHLH	8770
TF_others	6514
HMG	4803
TF_bZIP	4580
ZBTB	3888
Fork_head	3531
MYB	2572
ETS	2559
THR-like	1888
T-box	1638
zf-GATA	1291
RXR-like	1220
Pou	1197
THAP	1023
ARID	998
E2F	966
CSD	953
ESR-like	910
RHD	907
PAX	853
IRF	844
MH1	806
MBD	763
RFX	696
STAT	621
CUT	605
CP2	599
HSF	580
zf-MIZ	575
SAND	548
DM	510
zf-C2HC	509
AP-2	471
SRF	464
Tub	461
zf-BED	438
AF-4	431
Miscellaneous	424
COE	414

TSC22	365
TEA	360
CTF/NFI	355
zf-LITAF-like	296
NGFIB-like	291
P53	289
Runt	283
TF_Otx	281
CSRNP_N	278
zf-CCCH	241
GTF2I	232
LRRFIP	230
GCFC	218
HPD	217
SF-like	216
CSL	204
HMGA	199
HTH	193
zf-NF-X1	188
DACH	187
GCM	175
PC4	166
NDT80/PhoG	164
CG-1	152
NF-YB	121
NF-YC	104
GCNF-like	101
NF-YA	101
CBF	99
Nrf1	99
NCU-G1	93
zf-GAGA	2

Supplementary Table S5. The animal genes in AnimalTFDB database.

Gene Name	Gene Family
TFAP2D	AP-2
BHLHA15	bHLH
MLXIPL	bHLH
EBF1	COE
TFCP2L1	CP2
ONECUT2	CUT
ELF3	ETS
GTF2IRD1	GTF2I
BBX	HMG
SOX18	HMG
BARX2	Homeobox
DBX2	Homeobox
DRGX	Homeobox
HOXD11	Homeobox
LHX4	Homeobox
MYBL1	MYB
TERF1	MYB
POU2F1	Pou
POU4F3	Pou
RFX6	RFX
DEAF1	SAND
TBX15	T-box
CREB3L2	TF_bZIP
MAFB	TF_bZIP
CARF	TF_others
PHTF1	TF_others
NR1H4	THR-like
NR1I3	THR-like
RORB	THR-like
TULP4	Tub
ZBTB20	ZBTB
ZNF131	ZBTB
GTF3A	zf-C2H2
PRDM10	zf-C2H2
PRDM13	zf-C2H2
PRDM16	zf-C2H2
ZNF366	zf-C2H2
ZNF513	zf-C2H2
ZNF536	zf-C2H2

Supplementary Table S6. The plant gene families in PlantTFDB database.

Gene family	Number
bHLH	28698
MYB	22032
ERF	21129
NAC	19997
C2H2	17740
bZIP	15498
MYB_related	15369
WRKY	14549
B3	10609
G2-like	9874
C3H	9693
GRAS	9304
HD-ZIP	8602
M-type_MADS	7541
FAR1	7527
LBD	7216
MIKC_MADS	6918
Trihelix	6256
Dof	5655
GATA	5335
ARF	4578
HSF	4574
AP2	4461
TALE	4433
TCP	4187
SBP	4168
NF-YB	3099
Nin-like	2766
ZF-HD	2589
NF-YA	2461
NF-YC	2446
WOX	2358
ARR-B	2354
HB-other	2277
CO-like	2125
GRF	1876
E2F/DP	1781
YABBY	1719
DBB	1651
CPP	1612
GeBP	1564
BES1	1549

CAMTA	1343
SRS	1327
BBR-BPC	1256
EIL	1234
LSD	957
RAV	690
VOZ	635
Whirly	530
HB-PHD	477
NF-X1	403
S1Fa-like	359
LFY	253
HRT-like	249
STAT	214
SAP	164
NZZ/SPL	109