Scenario 2

Inference validation

Model A:
sympatric speciation rate is diversity-dependent

- Time has been fixed to T=8 for simulating and estimating parameters
- 10 simulated data have been generated by fixing extinction rate in the North to 1
- Sample size per generation = 400
- Generations = 7
- q=0.5
- Maximum number of species allowed 150

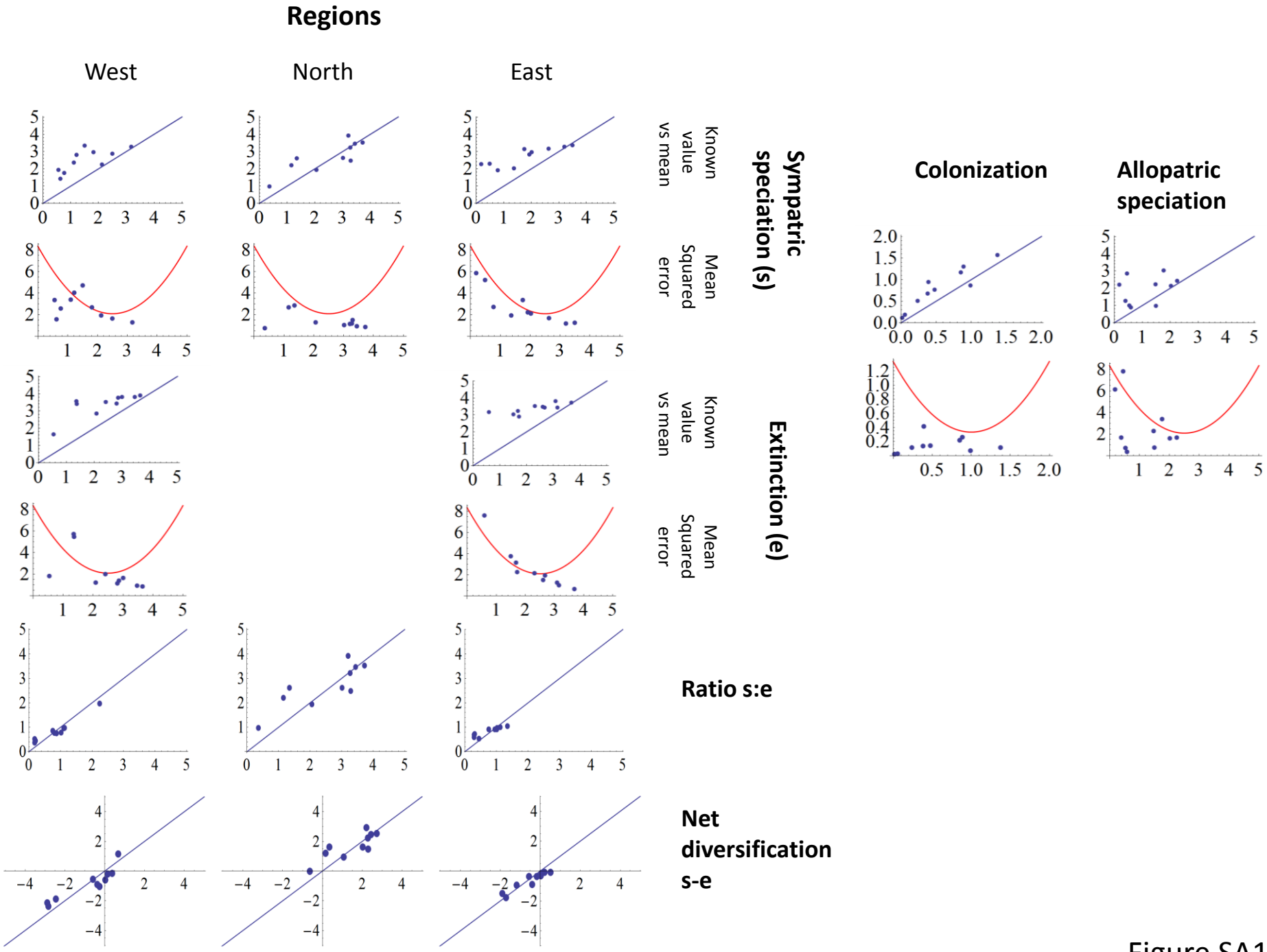

Regions
West
North
East
Known value vs mean
Mean Squared error
Sympatric speciation (s)
Known value vs mean
Mean Squared error
Extinction (e)
Ratio s:e
Net diversification s-e
Colonization
Allopatric speciation

Figure SA1

Distribution of correlation between sympatric speciation and extinction (S..._E...), and between sympatric speciation and colonization (S..._C).

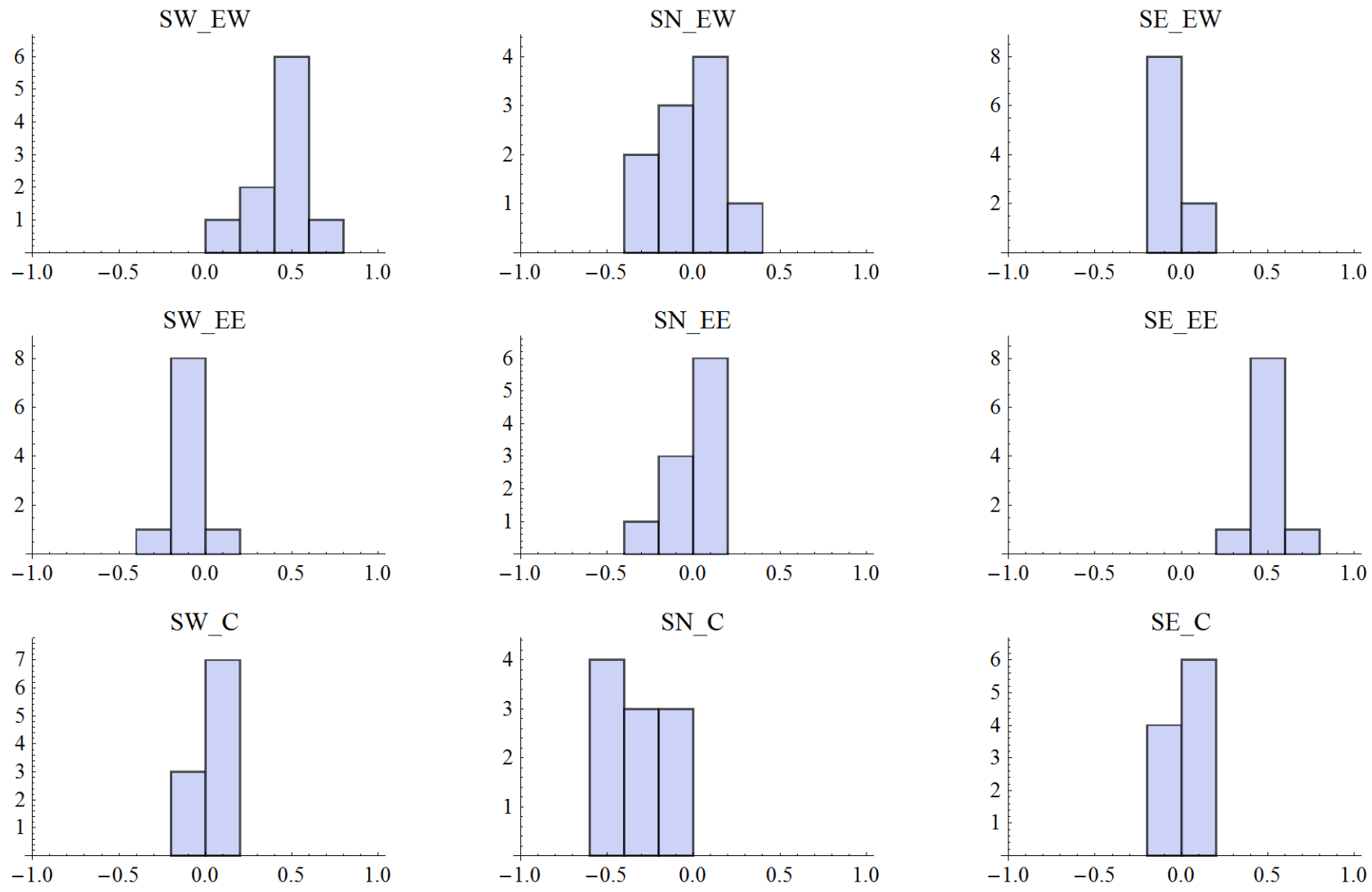


Figure SA2

Distribution of correlation between sympatric speciation (S..._S...), and between sympatric speciation and allopatric speciation (S..._A).

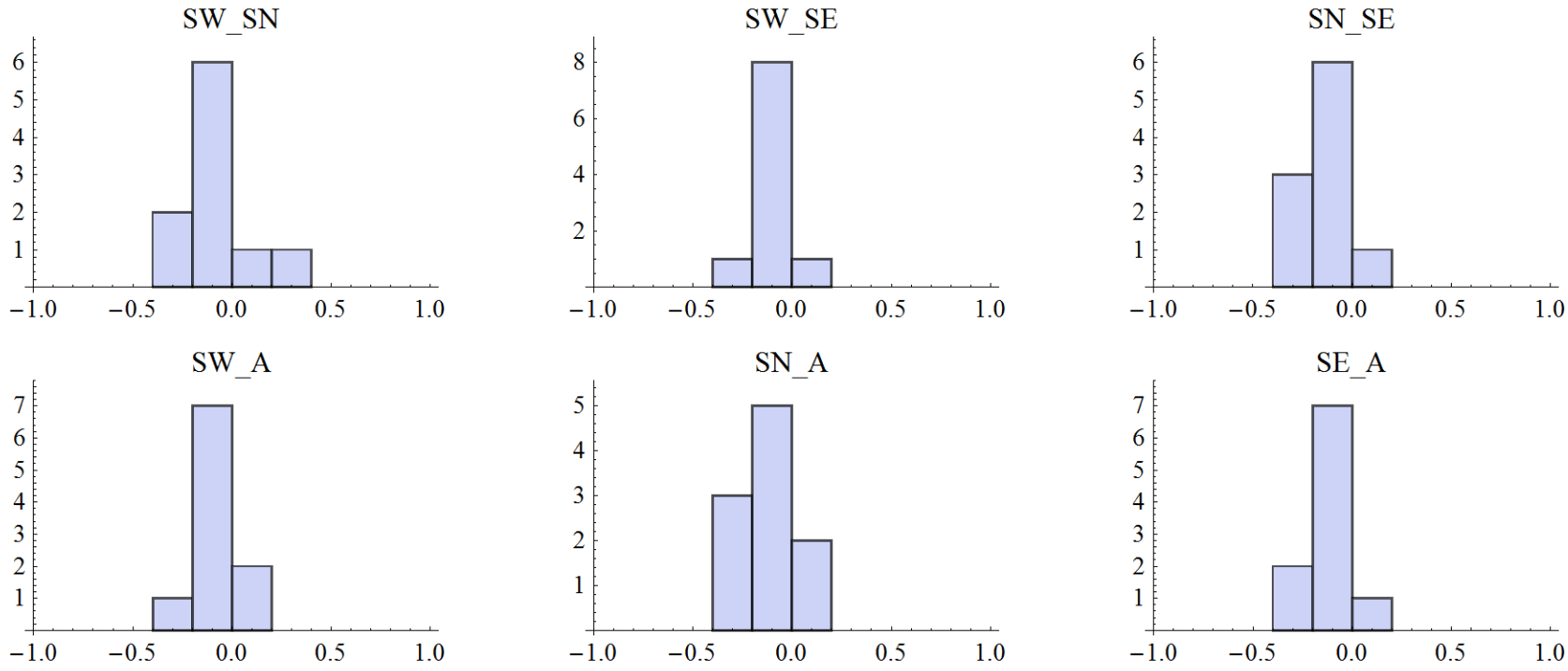


Figure SA3

Distribution of correlation between colonization and extinction (C_E...), and between allopatric speciation and extinction (A_E…).

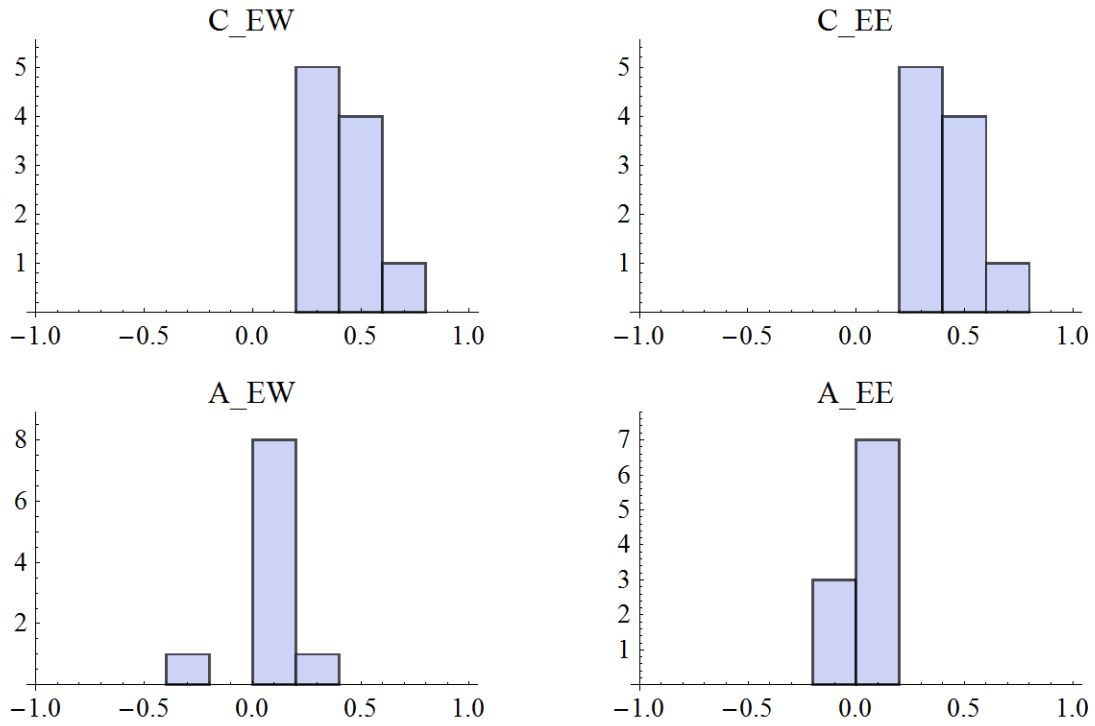


Figure SA4

Distribution of correlation between allopatric speciation and colonization (A_C), and between extinction (EW_EE).

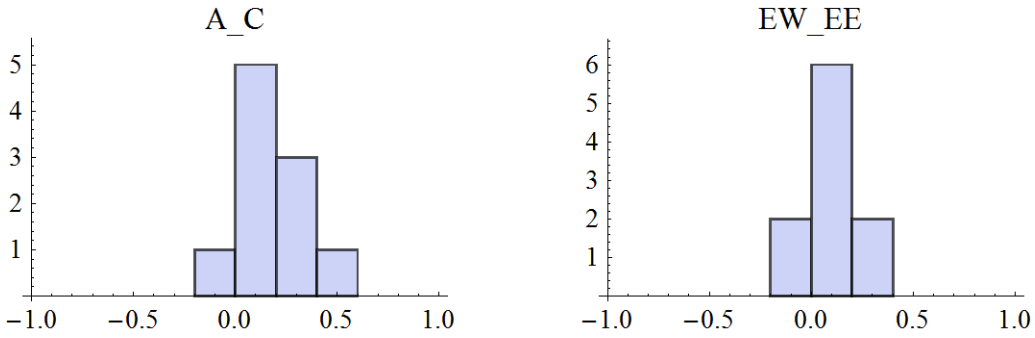


Figure SA5

Scenario 2

Estimates from Empirical data

Model A:
sympatric speciation rate is diversity-dependent

- Estimating parameters for empirical data while fixing extinction rate in the north to 1
- T=8
- Sample size = 400
- q=0.5
- Number of generation = 7
- Maximum number of species = 150

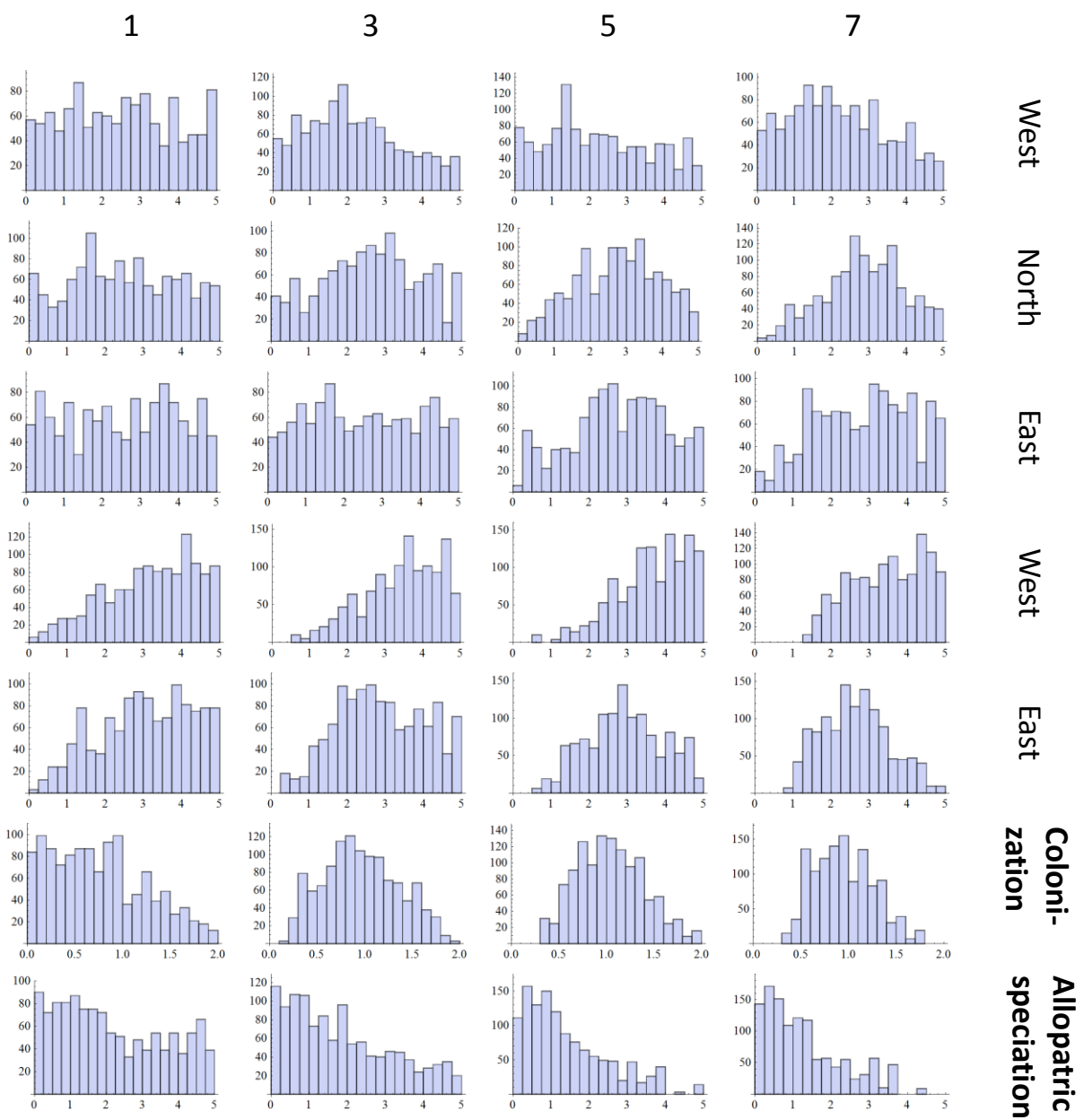

Generations
1
3
5
7
Sympatric speciation
West
North
East
Extinction
West
East
Coloni-zation
Allopatric speciation

Figure SA6

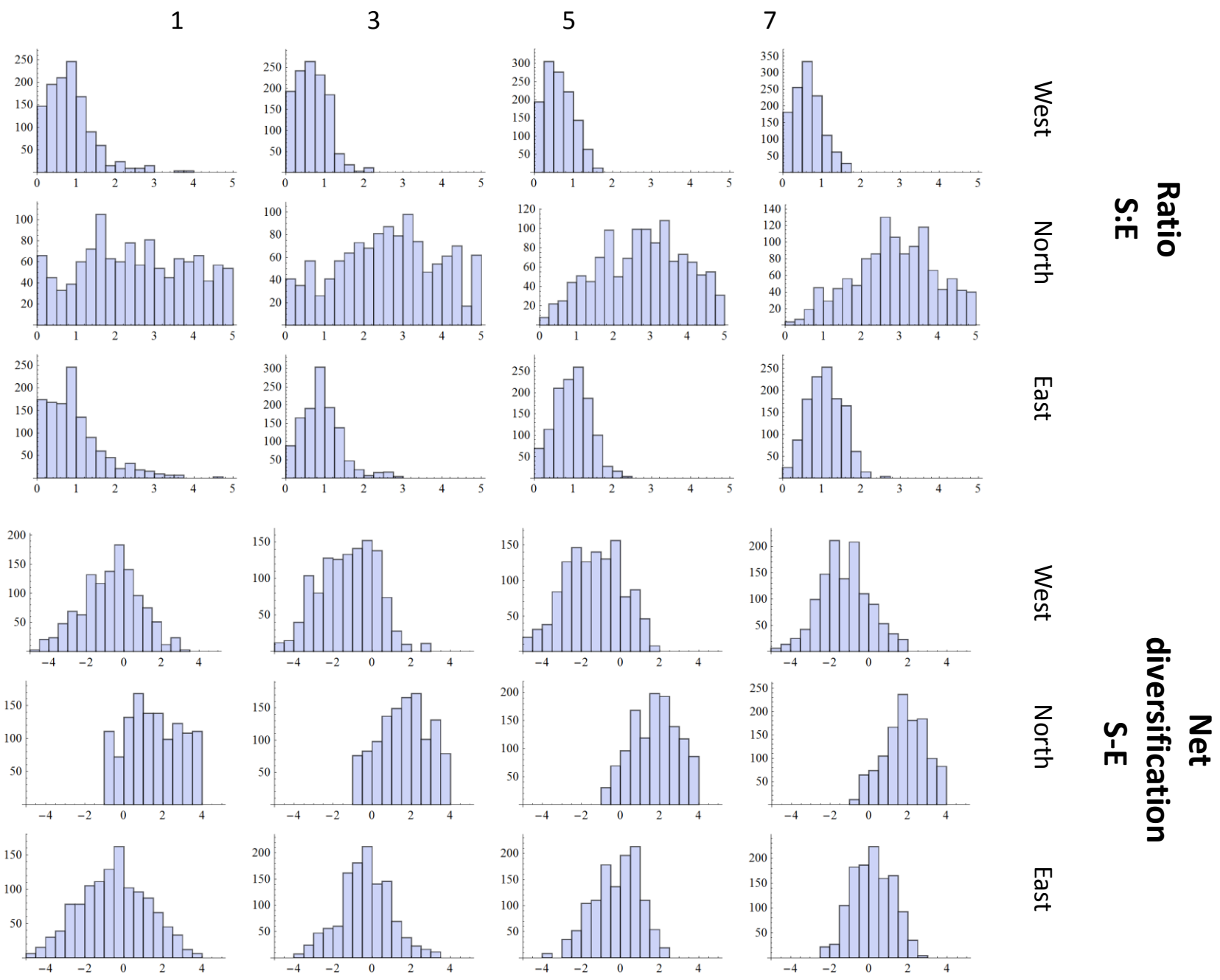

Generations
1
3
5
7
Ratio S:E
West
North
East
Net diversification S-E
West
North
East

Figure SA7

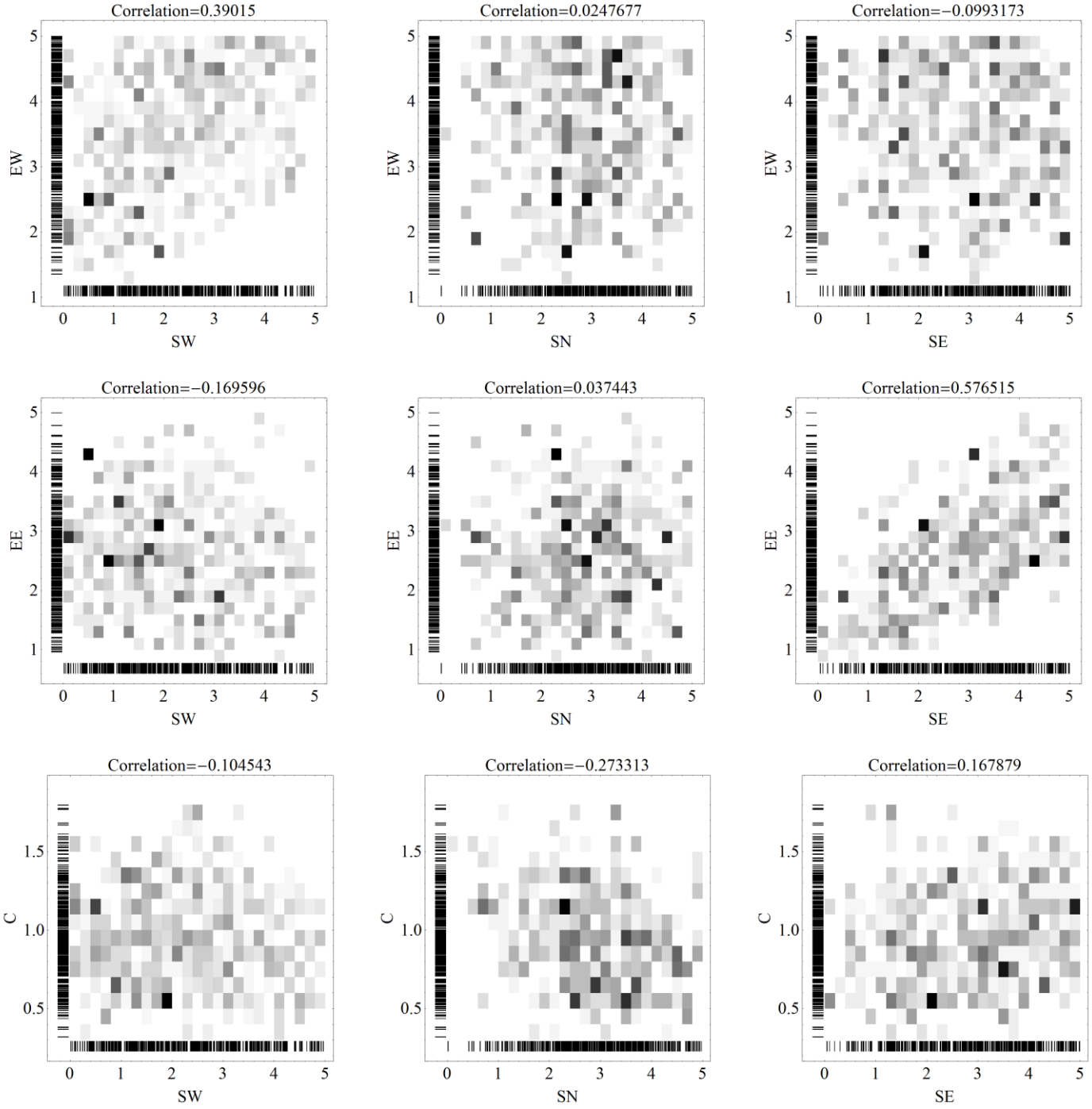

Correlation=0.39015
EW
SW
Correlation=0.0247677
EW
SN
Correlation=−0.0993173
EW
SE
Correlation=−0.169596
EE
SW
Correlation=0.037443
EE
SN
Correlation=0.576515
EE
SE
Correlation=−0.104543
C
SW
Correlation=−0.273313
C
SN
Correlation=0.167879
C
SE

Figure SA8

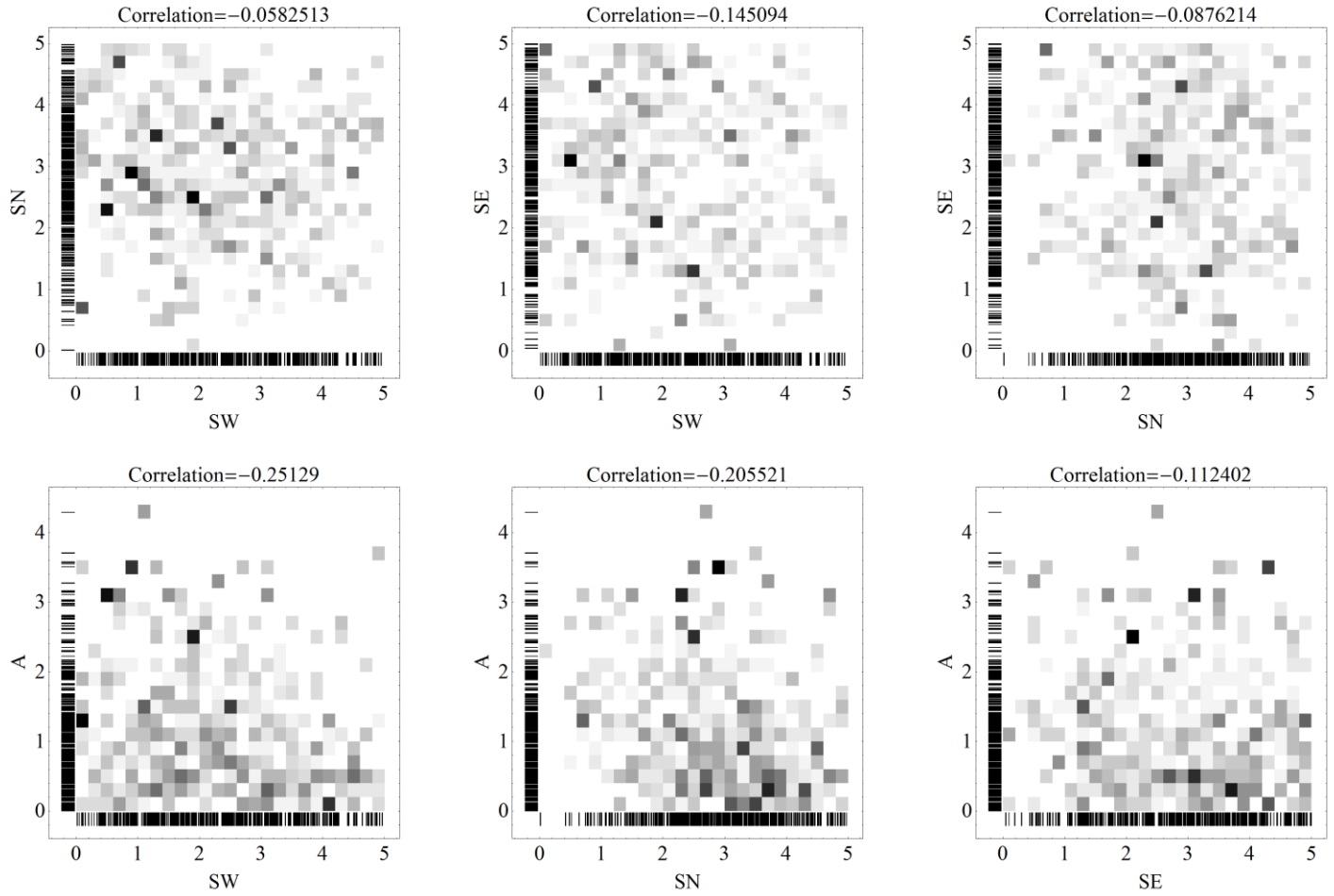

Correlation=−0.0582513
SN
SW
Correlation=−0.145094
SE
SW
Correlation=−0.0876214
SE
SN
Correlation=−0.25129
A
SW
Correlation=−0.205521
A
SN
Correlation=−0.112402
A
SE

Figure SA9

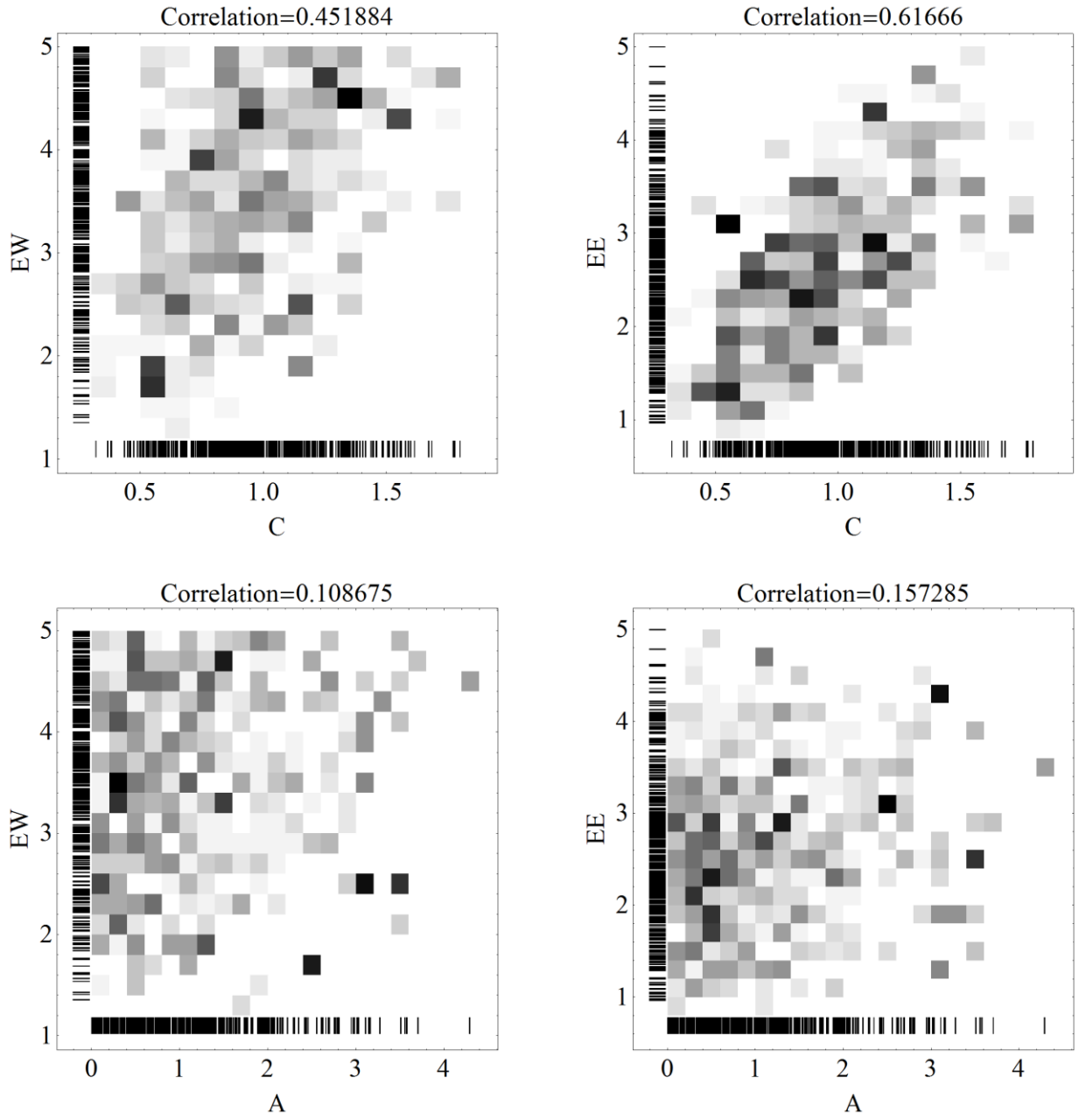
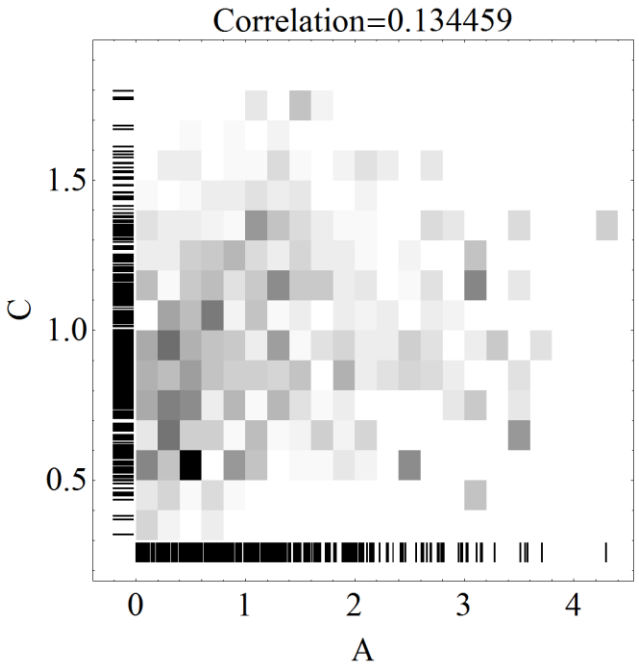

Correlation=0.451884
EW
C
Correlation=0.61666
EE
C
Correlation=0.108675
EW
A
Correlation=0.157285
EE
A

Figure SA10


Correlation=0.134459
C
1.5
1.0
0.5
0
1
2
3
4
A

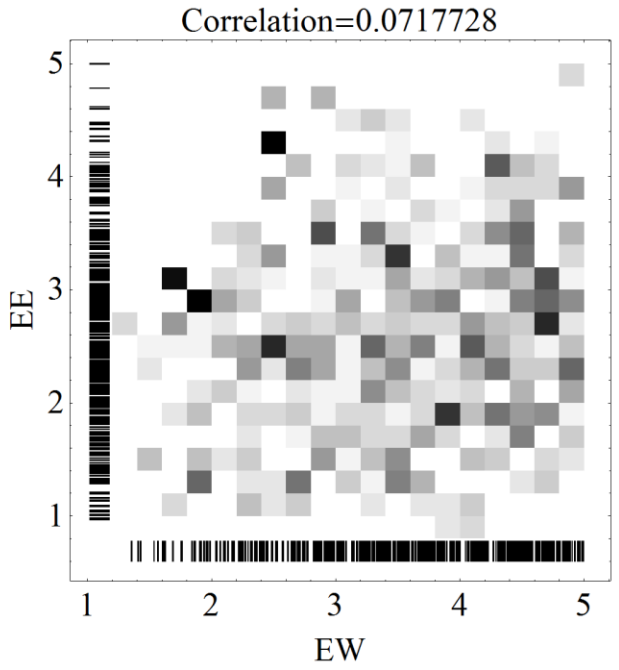

Correlation=0.0717728
EE
5
4
3
2
1
1
2
3
4
5
EW

Figure SA11

Scenario 2

Inference validation

Model B:
extinction rate is diversity-dependent

- Time has been fixed to T=8 for simulating and estimating parameters
- 10 simulated data have been generated by fixing extinction rate in the North to 1
- Sample size per generation = 400
- Generations = 7
- q=0.5
- Maximum number of species allowed 150

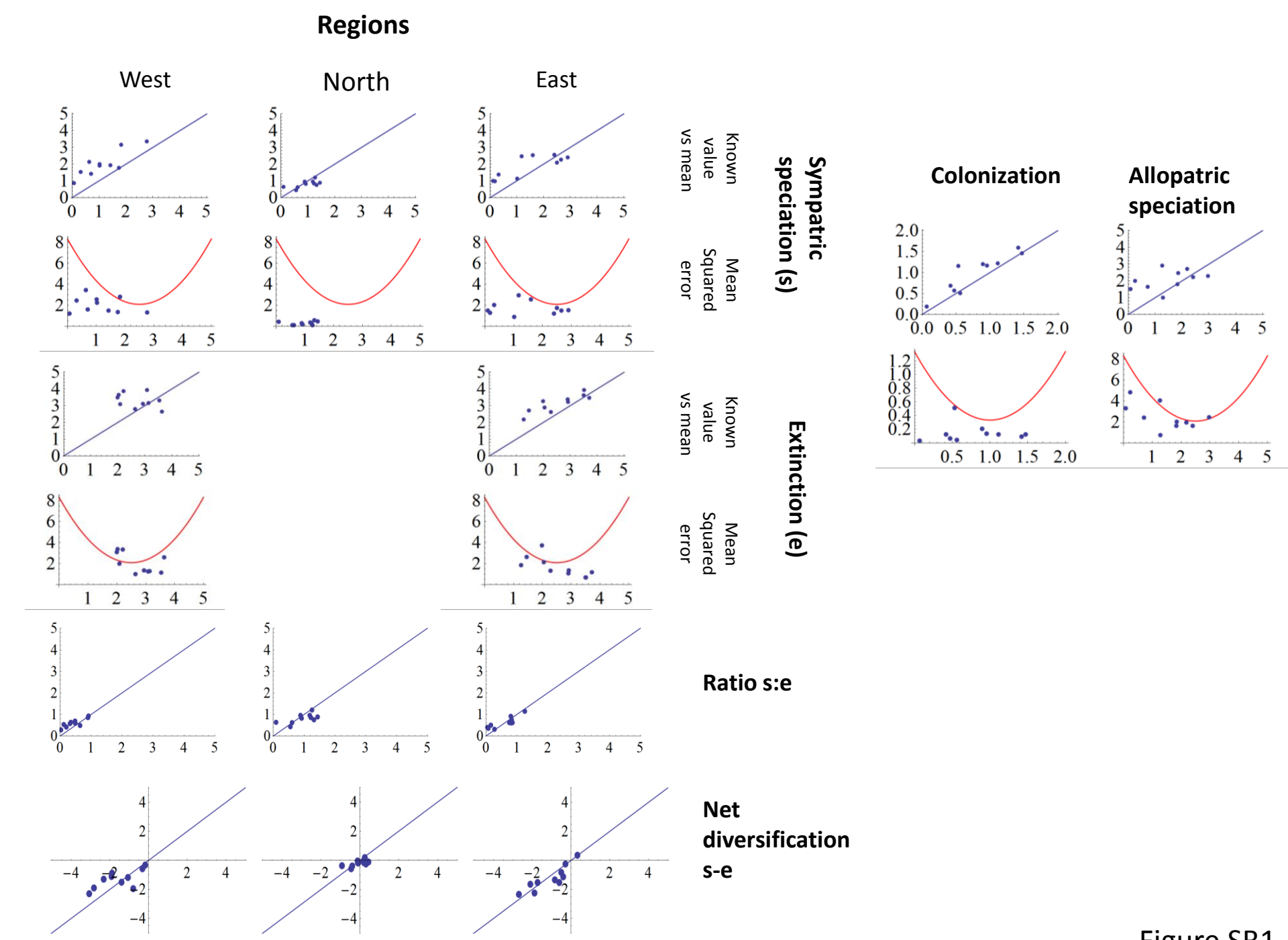

Regions
West
North
East
Known value vs mean
Mean Squared error
Sympatric speciation (s)
Extinction (e)
Ratio s:e
Net diversification s-e
Colonization
Allopatric speciation

Figure SB1

Distribution of correlation between sympatric speciation and extinction (S..._E...), and between sympatric speciation and colonization (S..._C).

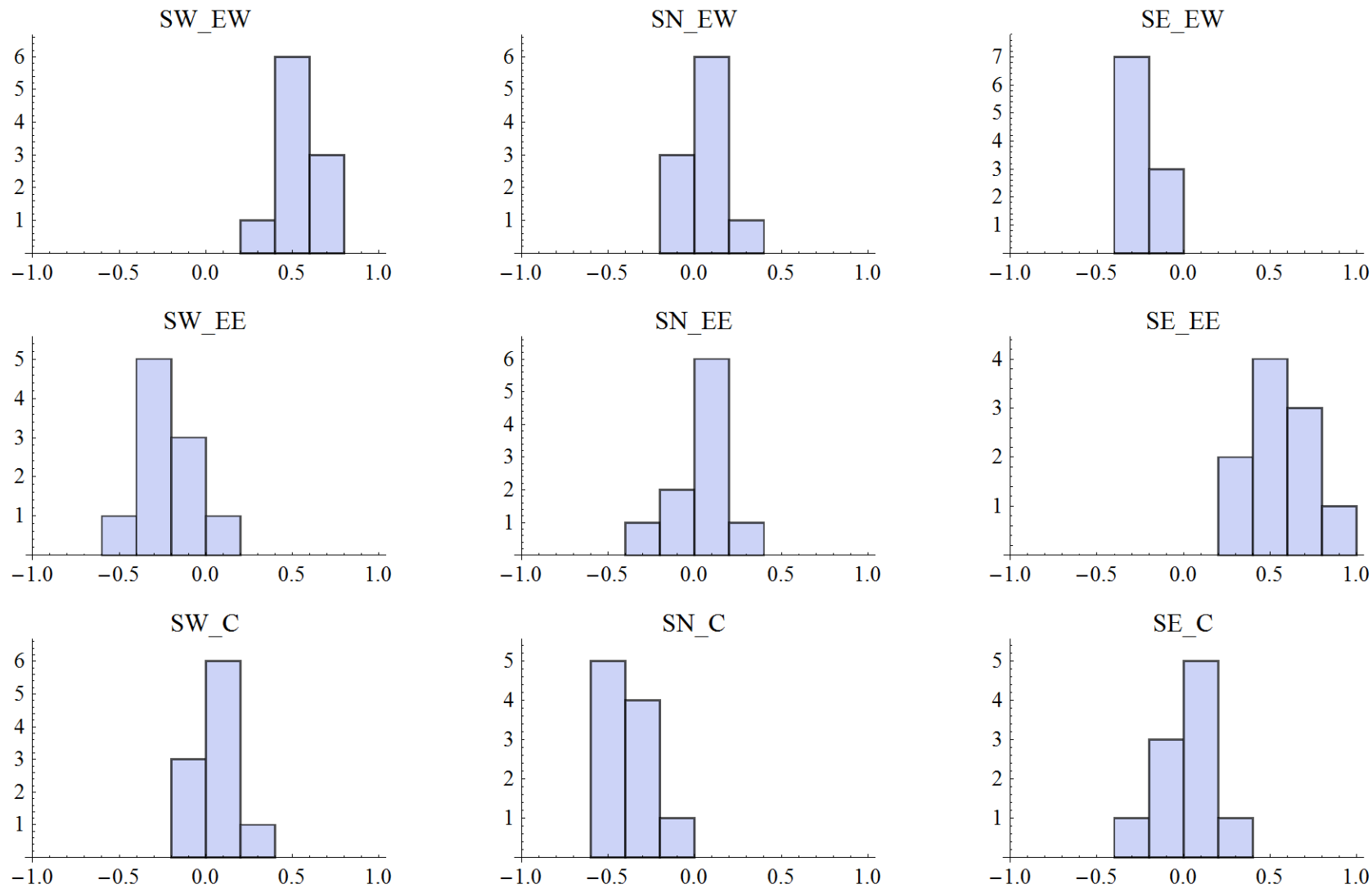


Figure SB2

Distribution of correlation between sympatric speciation (S..._S...), and between sympatric speciation and allopatric speciation (S..._A).

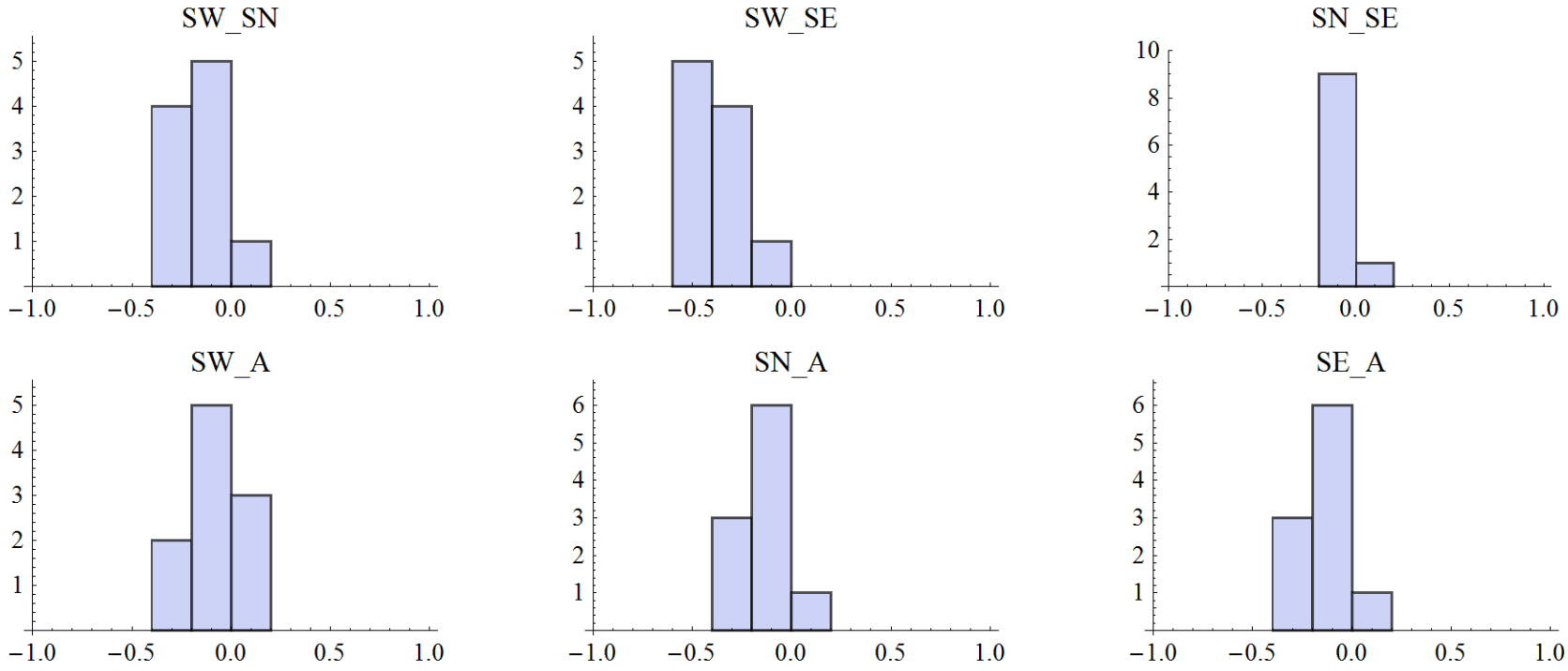


Figure SB3

Distribution of correlation between colonization and extinction (C_E...), and between allopatric speciation and extinction (A_E…).

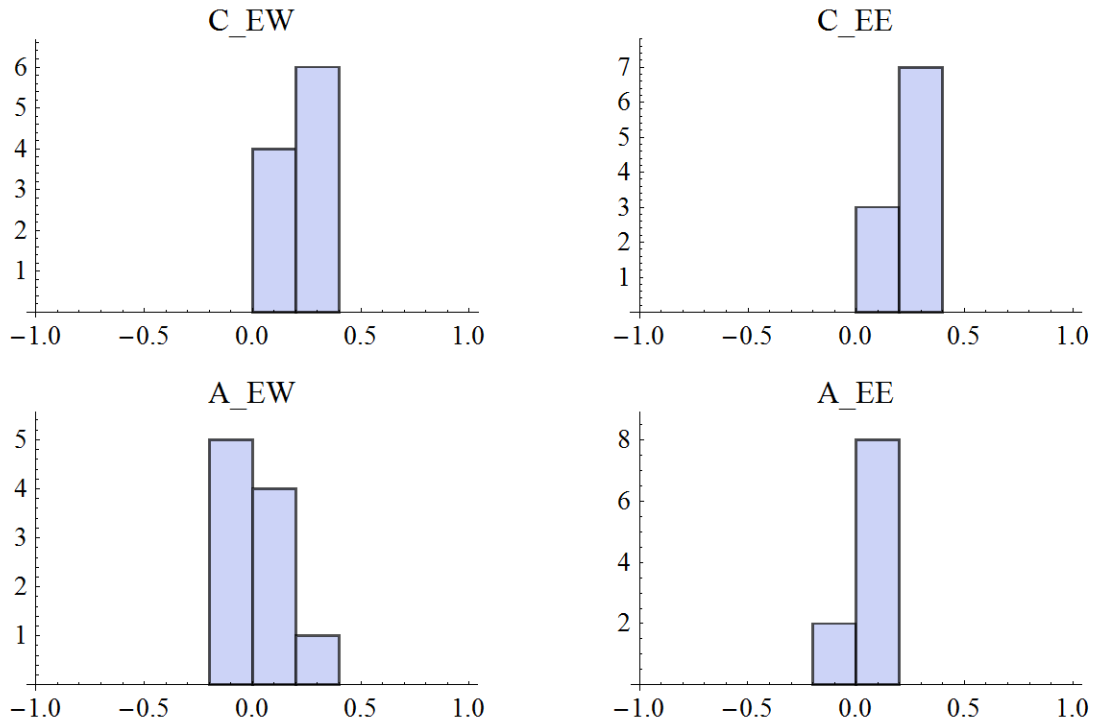


Figure SB4

Distribution of correlation between allopatric speciation and colonization (A_C), and between extinction (EW_EE).

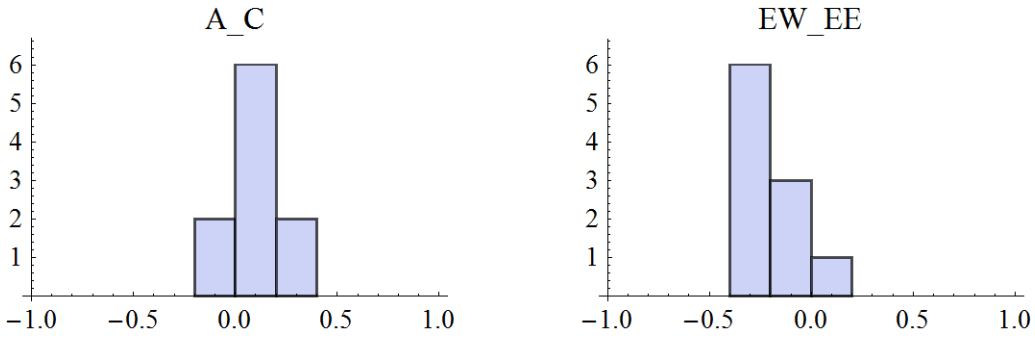


Figure SB5

Model B:
extinction rate is diversity-dependent

- Estimating parameters for empirical data while fixing extinction rate in the north to 1
- T=8
- Sample size = 400
- q=0.5
- Number of generation = 7
- Maximum number of species = 150

Generations
1
3
5
7
Sympatric speciation
Extinction
West
North
East
West
East
Coloni-
zation
Allopatric
speciation

Figure SB6

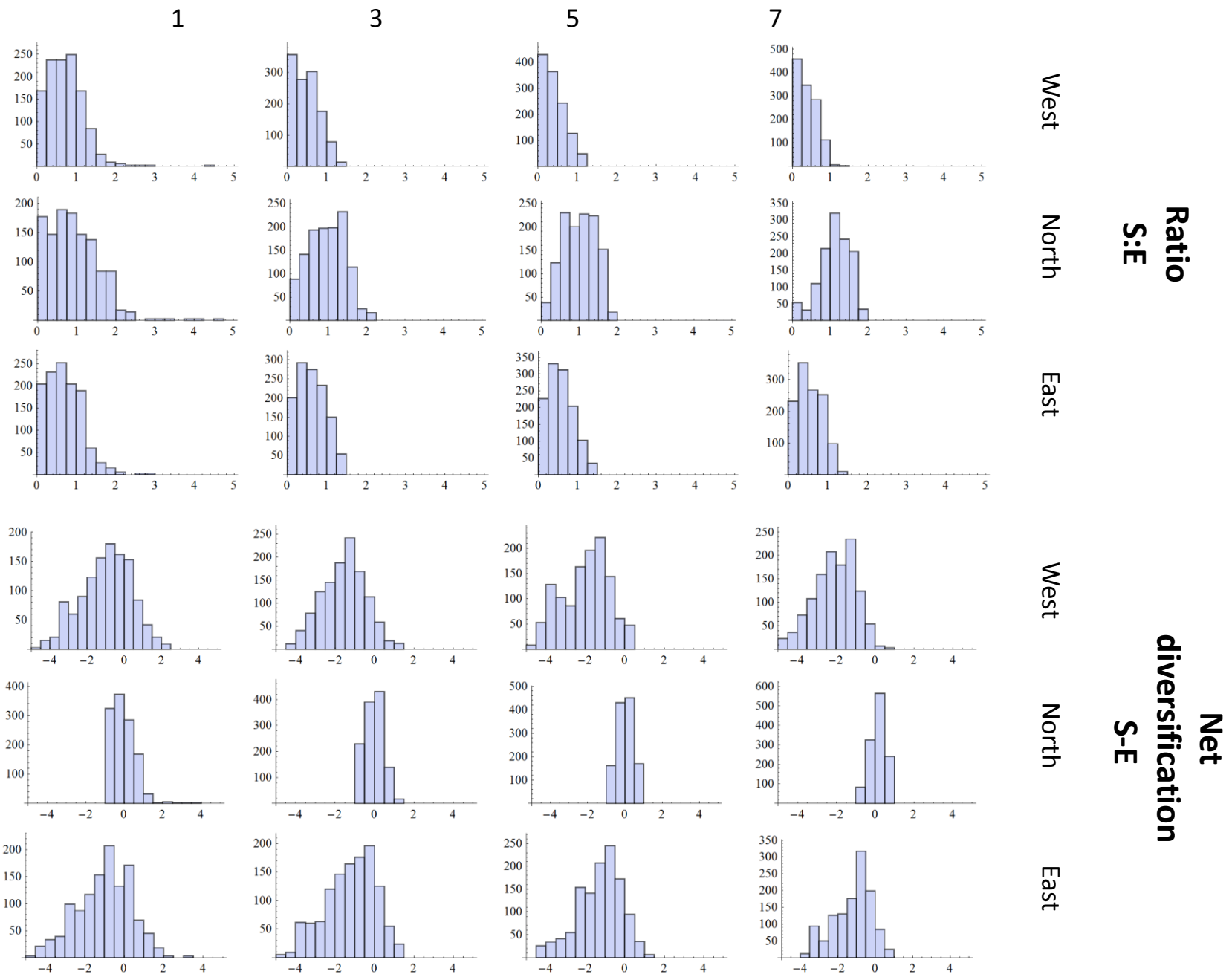

Generations
1
3
5
7
Ratio S:E
West
North
East
Net diversification S-E
West
North
East

Figure SB7

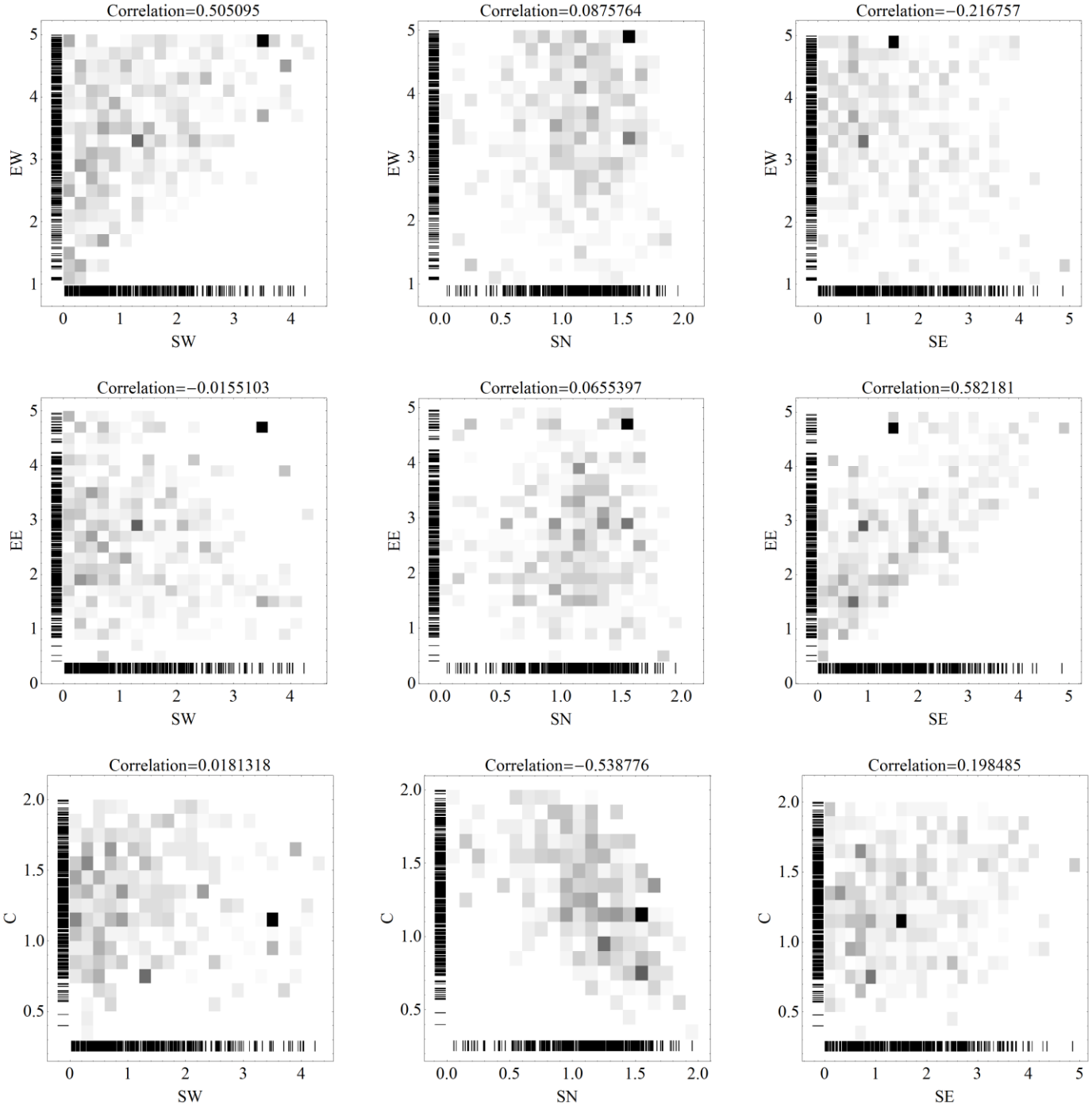

Correlation=0.505095
EW
SW
Correlation=0.0875764
EW
SN
Correlation=−0.216757
EW
SE
Correlation=−0.0155103
EE
SW
Correlation=0.0655397
EE
SN
Correlation=0.582181
EE
SE
Correlation=0.0181318
C
SW
Correlation=−0.538776
C
SN
Correlation=0.198485
C
SE

Figure SB8

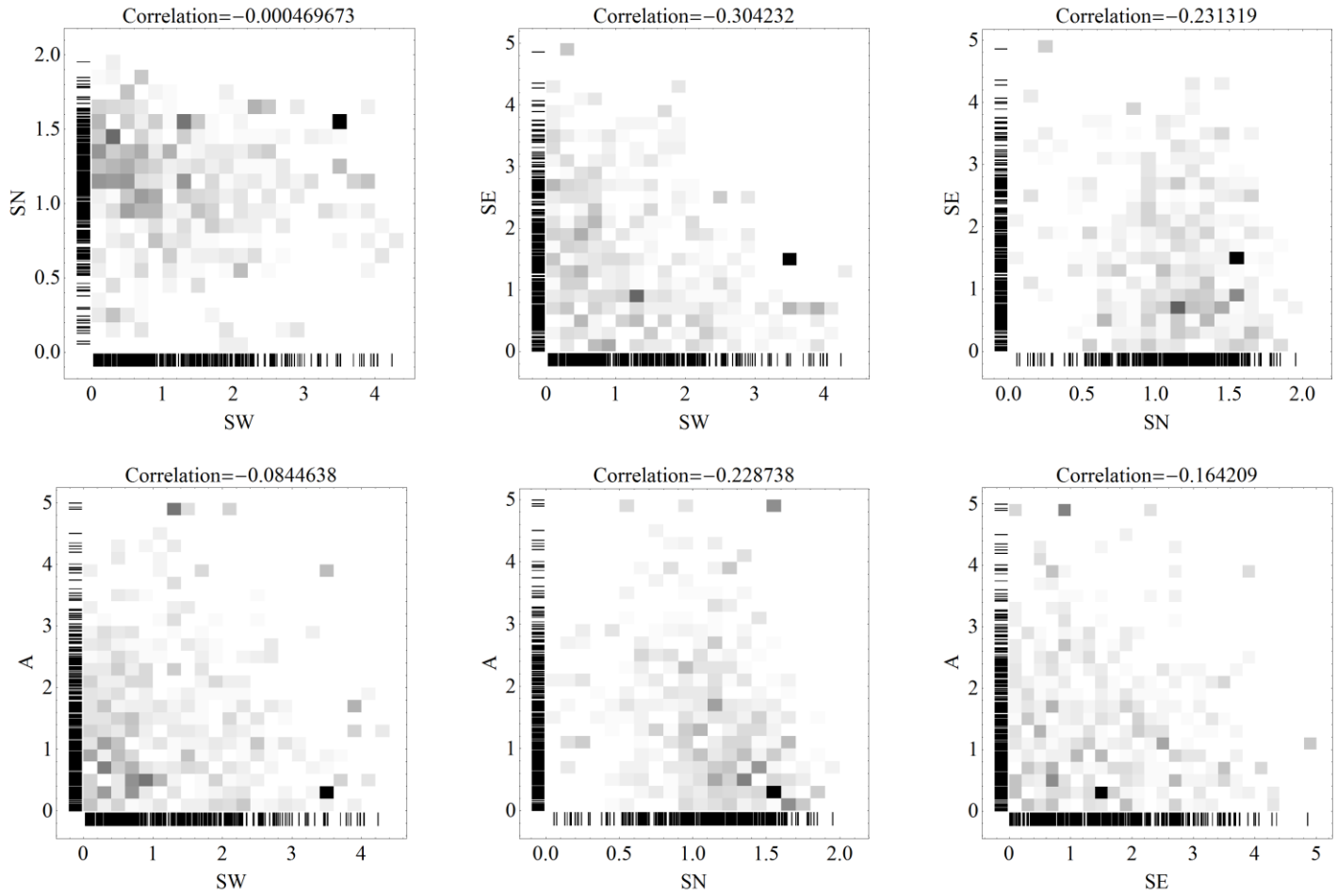

Correlation=−0.000469673
SN
SW
Correlation=−0.304232
SE
SW
Correlation=−0.231319
SE
SN
Correlation=−0.0844638
A
SW
Correlation=−0.228738
A
SN
Correlation=−0.164209
A
SE

Figure SB9

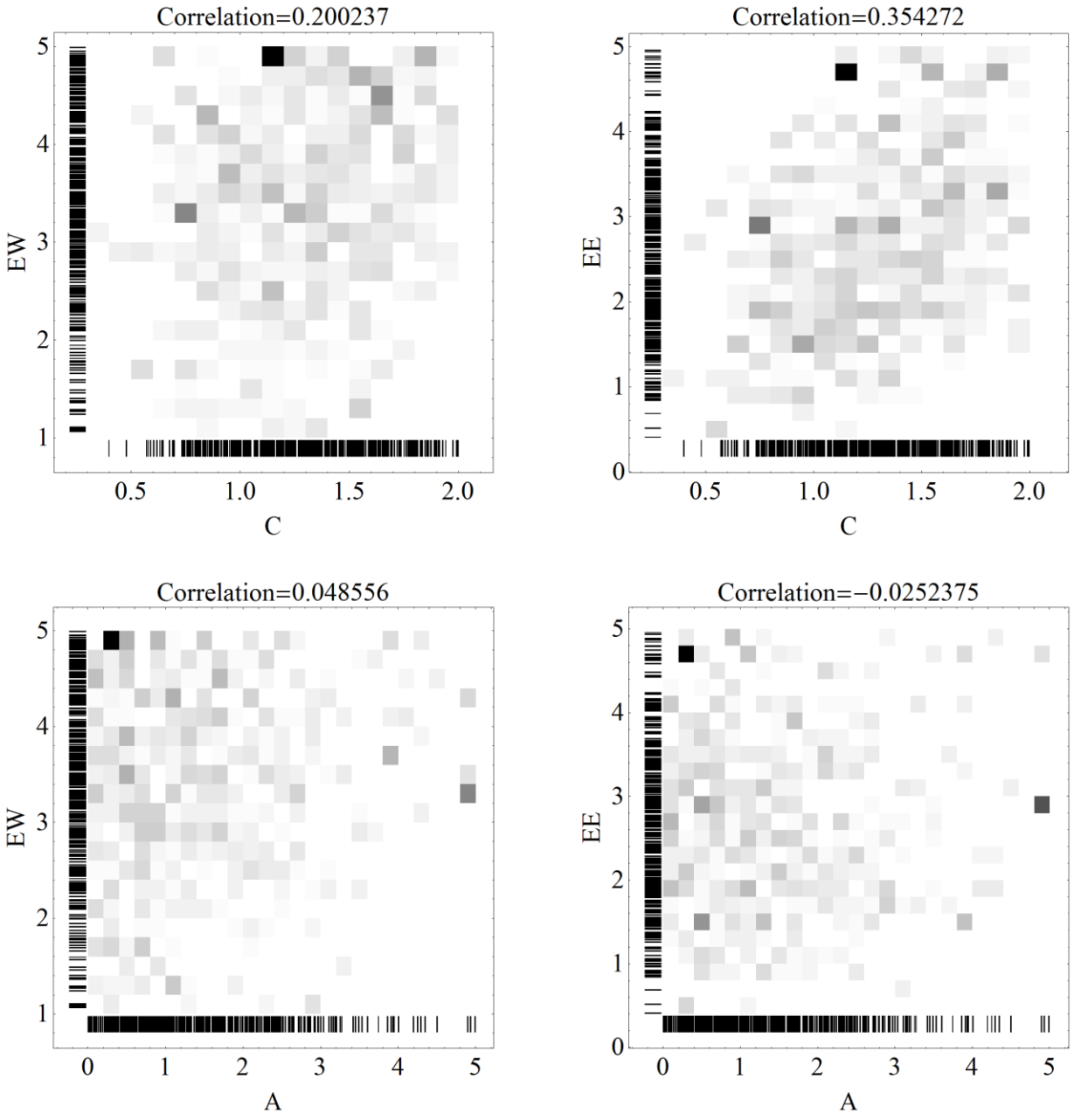
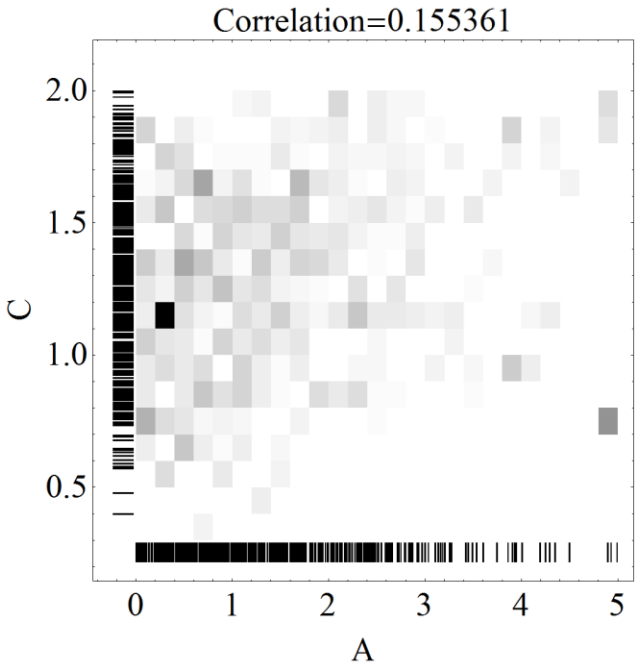

Correlation=0.200237
EW
C
Correlation=0.354272
EE
C
Correlation=0.048556
EW
A
Correlation=−0.0252375
EE
A

Figure SB10


Correlation=0.155361
C
A
2.0
1.5
1.0
0.5
0
1
2
3
4
5

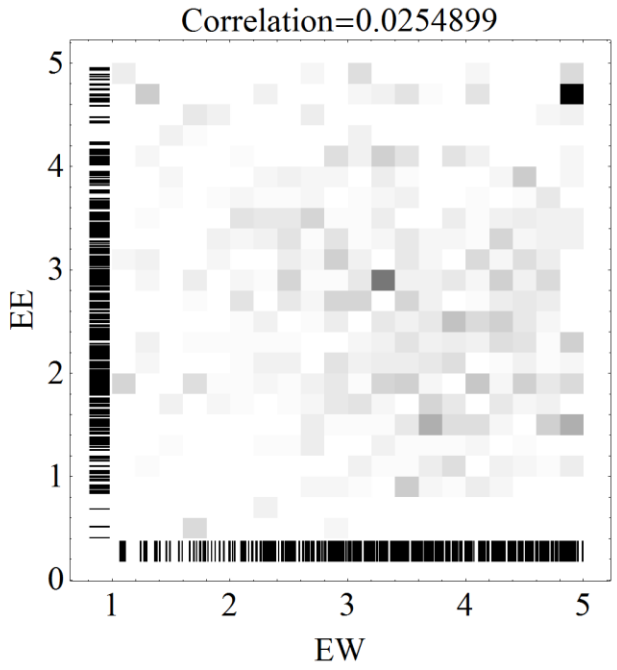

Correlation=0.0254899
EE
EW
5
4
3
2
1
0
1
2
3
4
5

Figure SB11