Table S1. Process IDs for *Rattus* sp. *coi* barcodes deposited the Barcode of Life Data System (BOLD) database

Sampling site	Process ID
Johor	UMNPA004-20 – UMNPA056-20
	UMNPA058-20 – UMNPA068-20
Perak	UMNPA069-20
	UMNPA071-20 – UMNPA076-20
	UMNPA078-20 – UMNPA080-20
	UMNPA082-20 – UMNPA083-20
	UMNPA085-20
	UMNPA087-20 – UMNPA091-20
	UMNPA093-20 – UMNPA102-20
	UMNPA161-20 – UMNPA194-20
	UMNPA196-20 – UMNPA216-20
	UMNPA218-20 – UMNPA223-20

Table S2. Small mammals captured at different habitat types

Habitat type	n	Animal	n
Plantation	121	*Rattus tanezumi* R3 mitotype	78
		Tupaia glis	21
		Rattus tiomanicus	12
		Rattus exulans	7
		Rattus argentiventer	3
Human dwelling	47	*Rattus tanezumi* R3 mitotype	26
		Tupaia glis	13
		Rattus tiomanicus	6
		Rattus exulans	2
Paddy field	26	*Rattus argentiventer*	22
		Rattus exulans	2
		Rattus tanezumi R3 mitotype	1
		Rattus tanezumi s.s.	1
Rubbish dumpsite	13	*Rattus tanezumi* R3 mitotype	10
		Tupaia glis	2
		Rattus exulans	1
Forest border	10	*Rattus tiomanicus*	4
		Tupaia glis	4
		Rattus tanezumi R3 mitotype	1
		Rattus exulans	1

Table S3. Chigger infestation status based on animal host species, sex and maturity

Host species	Infestation rate	Mean chigger intensity	Median chigger intensity	Range
Rattus tanezumi R3 mitotype	99/116 (85%)	282	192	5-1,511
Tupaia glis	36/40 (90%)	238	94	2-2,735
Rattus exulans	8/13 (61%)	201	139	17-746
Rattus tiomanicus	20/22 (91%)	117	80	3-477
Rattus argentiventer	5/25 (20%)	63	27	1-156

Host gender	Infestation rate	Mean chigger intensity	Median chigger intensity	Range
Female	82/103 (80%)	278	147	1-2,735
Male	87/114 (76%)	206	141	2-975

Host maturity	Infestation rate	Mean chigger intensity	Median chigger intensity	Range
Adult	119/149 (80%)	274	146	1-2,735
Juvenile*	48/65 (74%)	164	127	6-731

Season	Infestation rate	Mean chigger intensity	Median chigger intensity	Range
Dry	118/125 (94%)	292	175	3-2,735
Wet	51/92 (55%)	124	112	1-588

*Sub-adults and juveniles were combined into a single category for this analysis

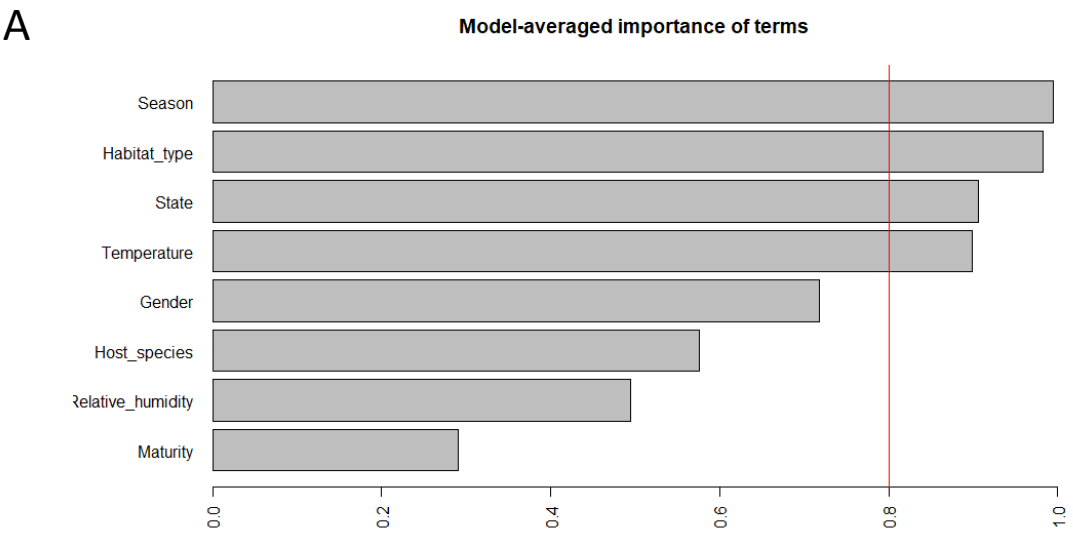
Table S4. Number of small mammals with the indicated chigger species richness

Chigger species richness	Number	Percentage (%)*
1	116	53.5
2	46	21.2
3	40	18.3
4	14	6.5
5	1	0.5

*Out of total number of small mammals (n=217)

Table S5. Number of each small mammal species with chigger coinfestation

Host species	Total	Number coinfested	Percentage (%)
Rattus argentiventer	25	0	0
Rattus exulans	13	7	53.8
Rattus phylogenetic R3	116	66	56.9
Rattus tanezumi	1	0	0
Rattus tiomanicus	22	11	50.0
Tupaia glis	40	17	42.5



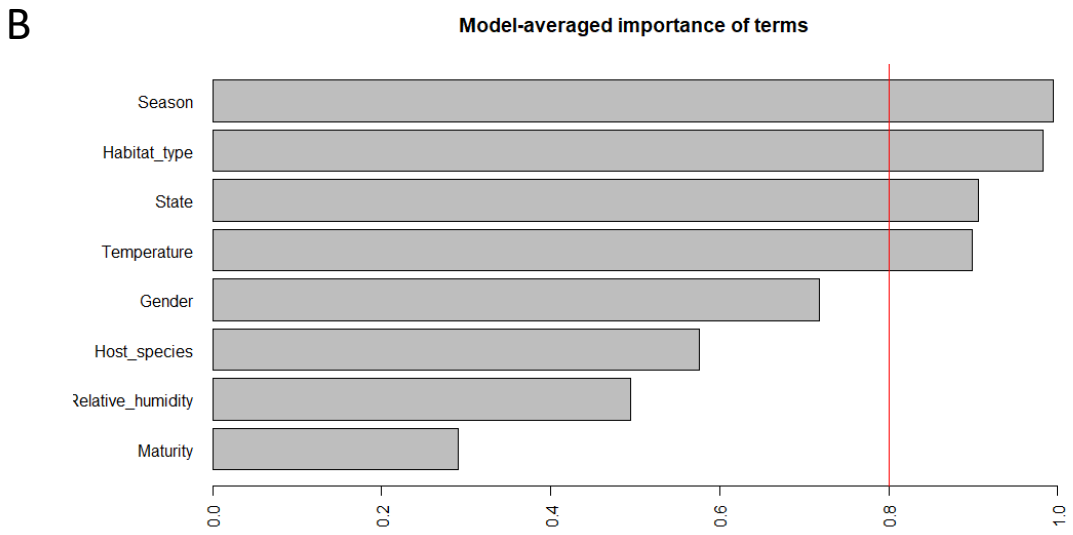


Figure S1. Model-average importance of terms of independent variables explaining chigger (a) abundance and (b) species richness. The variables with an importance score of >80% proportion support (x-axis, default in the "gmulti" package in R) were included in the final model.

Table S6. Significant variables from best selected model for explaning chigger abundance

Parameters/effects	Log ratio Chi-square	P-value	Variance inflation factor
Habitat_type***	67.220	<0.001	1.529
Temperature	0	0.9845	1.075
Season***	21.743	<0.001	1.112
State*	4.969	0.0258	1.313
Observation			216
Log-likelihood			-1191.987
AICc			2400
The Goodness of Fit/Coefficient of determination (R^2)			0.9999761

Table S7. Significant variables from best selected model for explaining chigger species richness

Parameters/effects	Log ratio Chi-square	P-value	Variance inflation factor
Habitat_type***	56.053	<0.001	1.543
Relative_humidity*	5.341	0.0208	1.230
Season***	35.594	<0.001	1.093
State***	11.933	<0.001	1.286
Observation			216
Log-likelihood			-285.057
AICc			586.115
The Goodness of Fit/Coefficient of determination (R^2)			0.9999894

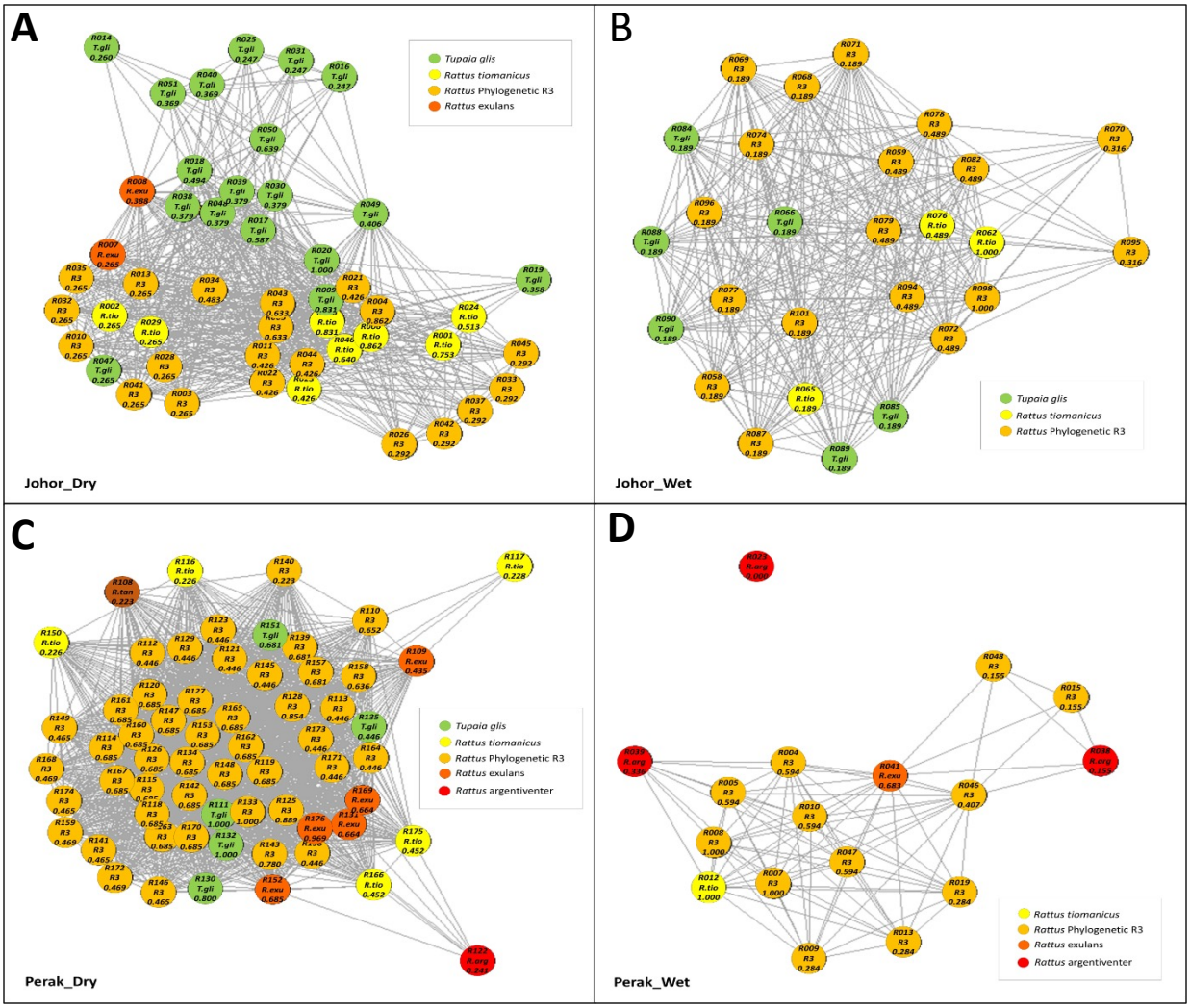


Figure S2. Unipartite network models at host individual levels by state and season. (a, b) Johor. (c, d) Perak. (a, c) Dry season. (b, d) Wet season.

Table S8. Linkage density and V-ratio based on sampling site and season

Network parameters	Johor/Dry (n = 48)	Johor/Wet (n = 27)	Perak/Dry (n = 62)	Perak/Wet (n = 17)
Linkage density	10.9255	10.7105	21.6172	5.2812
V-ratio (chigger-host)	12.3597	16.1200	33.9133	5.4729

Bipartite network parameters were calculated using 'bipartite' package in R freeware.

Table S9. Prevalence of *Orientia tsutsugamushi* in small mammals from the Johor and Perak sites

Category	n	Number of *Orientia* infection	Prevalence of infection (%)	[95% CI]
Host species				
R. argentiventer	25	2	8.00	1.4 to 27.5
R. exulans	12	2	16.7	2.9 to 49.1
R. tanezumi R3 mitotype	115	18	15.7	9.8 to 23.9
R. tanezumi s.s.	1	0	0	0
R. tiomanicus	21	1	4.8	0.3 to 25.9
T. glis	40	2	5.00	0.9 to 18.2
Host gender				
Female	102	13	12.8	7.2 to 21.2
Male	112	12	10.7	5.9 to 18.3
Maturity				
Adult	149	18	12.1	7.5 to 18.7
Sub-adult	41	6	14.6	6.1 to 29.9
Juvenile	24	1	4.2	0.2 to 23.1
Habitat type				
Forest border	9	0	0	0
Human dwelling	47	4	8.5	2.8 to 21.3
Paddy field	26	2	7.7	1.3 to 26.6
Plantation	119	18	15.1	9.5 to 23.1
Rubbish dumpsite	13	1	7.7	0.4 to 37.9
State				
Johor	99	10	10.1	5.2 to 18.2
Perak	115	15	13.0	7.7 to 20.9
Season				
Dry	123	14	11.4	6.6 to 18.7
Wet	91	11	12.1	6.5 to 21.0
Total	**214**	**25**	**11.7**	**7.9 to 16.9**