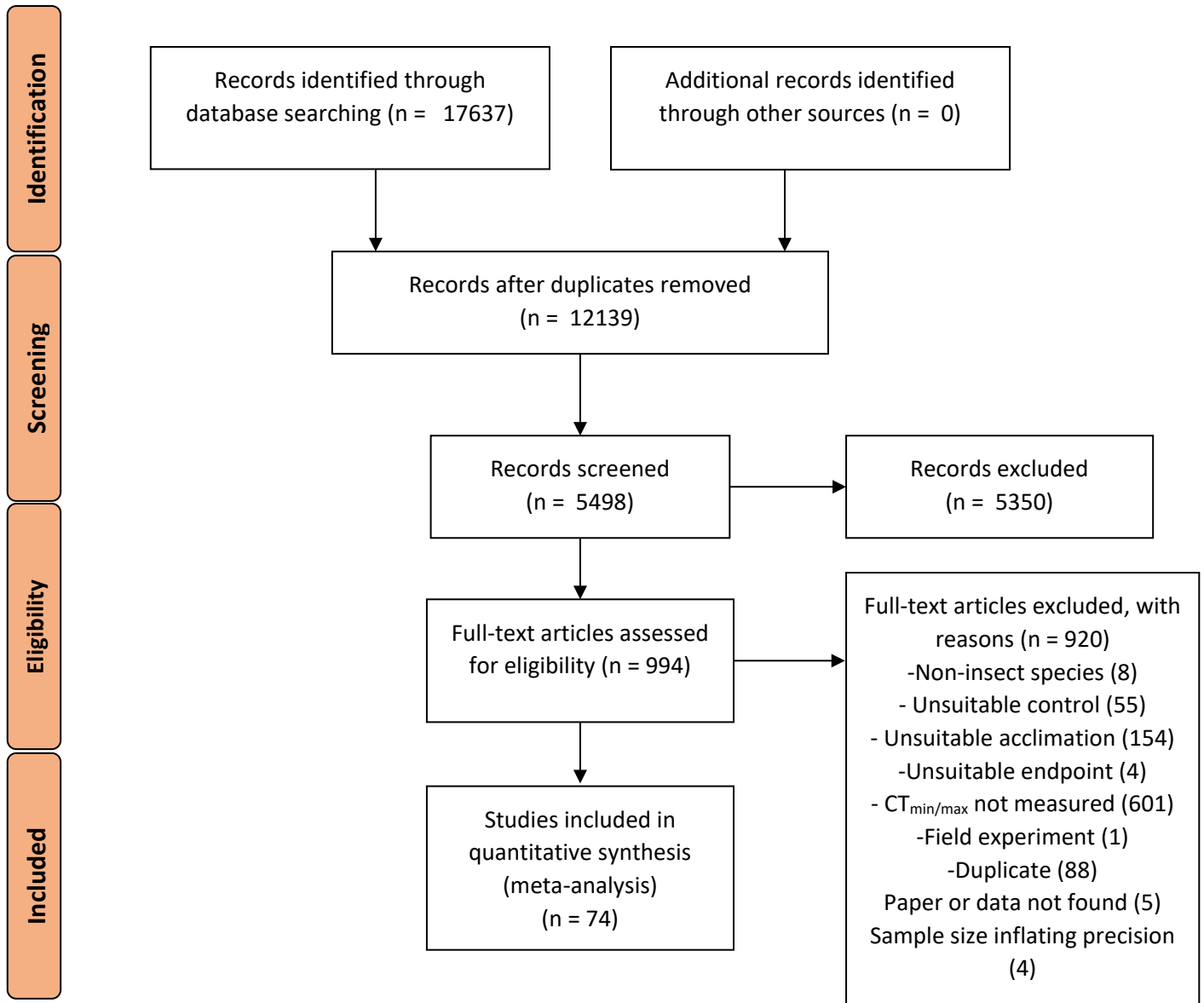
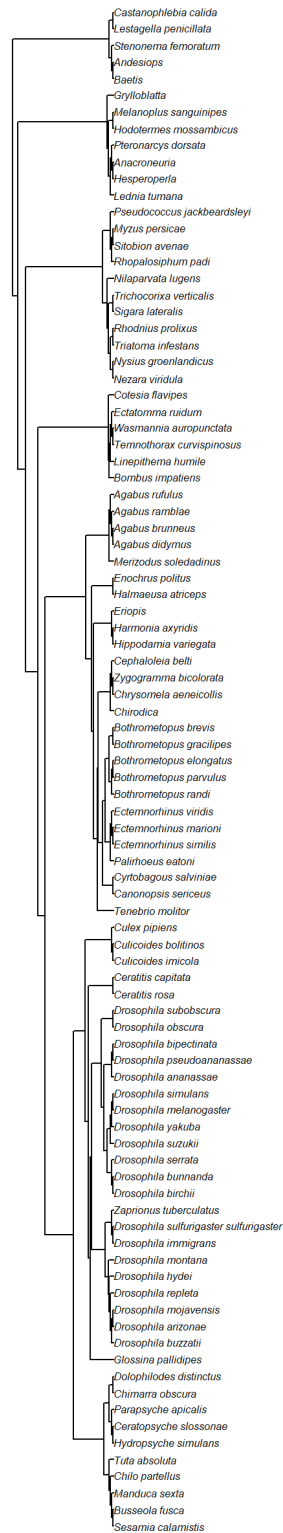


Supplementary Information

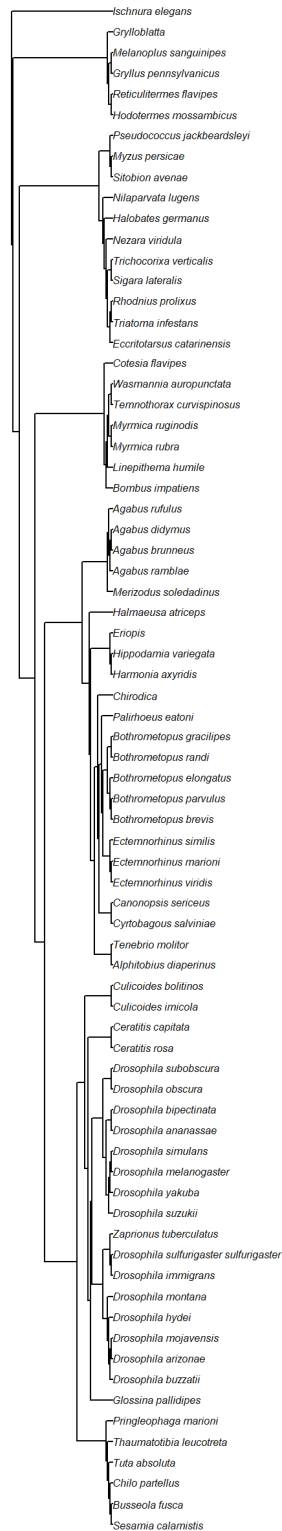


Supplementary Figure 1 PRISMA exclusion procedure detailing how records were screened. First, duplicates were removed, then study titles were briefly screened to remove those clearly unsuitable e.g. non-insect species. Of the remaining articles, abstracts were assessed in detail and, finally, full methodology of selected studies was evaluated. Four articles were removed later in the analysis due studies measuring a very large number of insects at one time, meaning the sample size and therefore precision of the study was inflated. It was deemed that this many insects could not be assessed at once accurately.

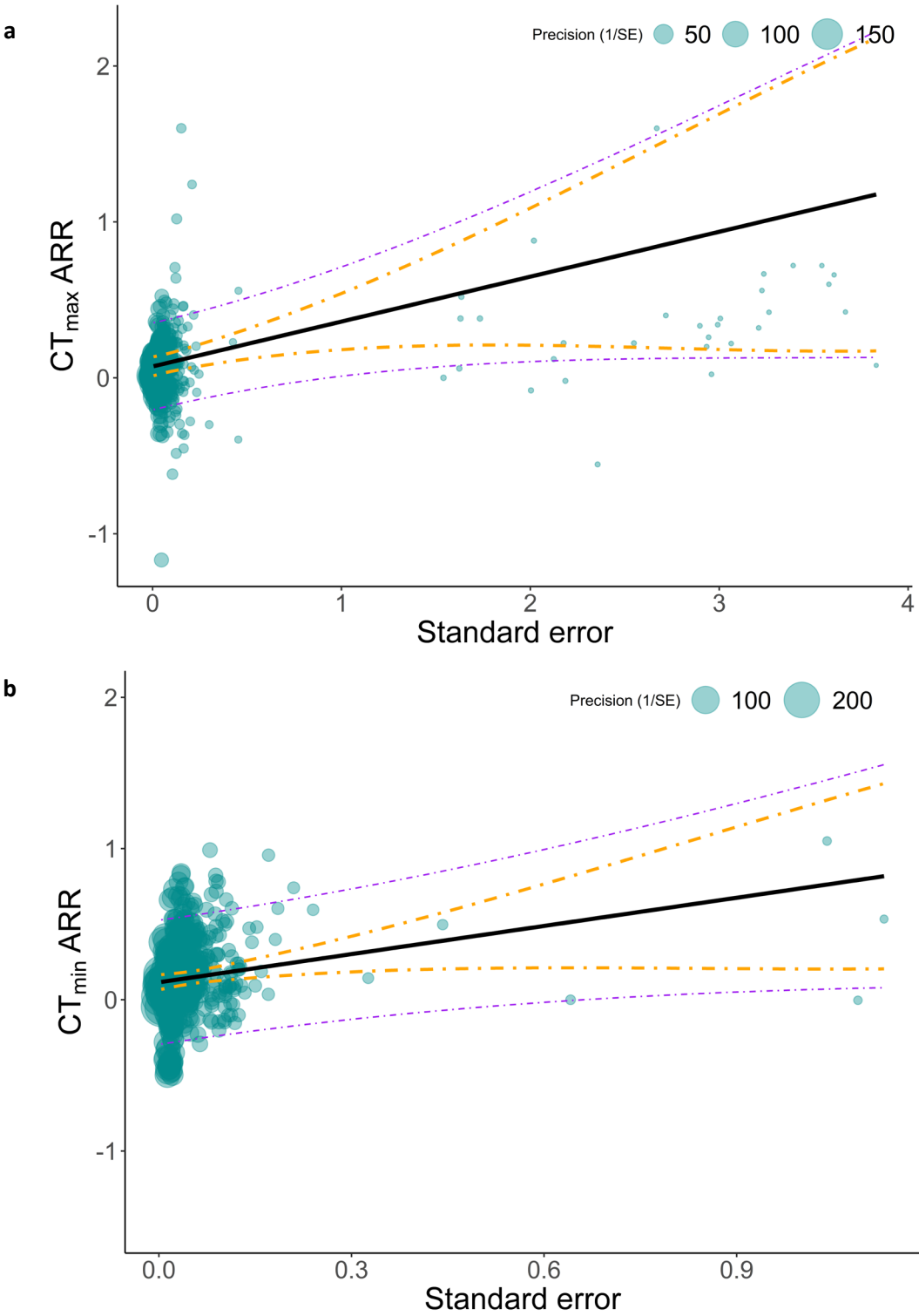
a



b



14 **Supplementary Figure 2** Phylogenetic tree used for (a) CT_{max} and (b) CT_{min} meta-analytic multi-level,
 15 random effects models. Phylogenetic trees were constructed using the Open Tree of Life and R
 16 packages 'rotl' and 'ape'.



Supplementary Figure 3 Relationship between (a) CT_{max} and (b) CT_{min} ARR (Acclimation Response Ratio) and standard error for Egger's regression test. A positive relationship shows positive publication bias. 95% confidence intervals are depicted by orange dotted lines, prediction intervals are purple dotted lines. The precision of the study (1/SE) is proportional to the size of each data point.

Heading	Description
rowid	ID of row
studyid	ID of study
popid	ID of insect population
ord	Order
fam	Family
gen	Genus
sp	Species
full_sp	Genus + species. Some species have been changed to synonyms or to higher names in their taxonomy so they are recognised in the synthetic tree of life.
habitat	Aquatic or terrestrial
source	Laboratory or field source. Lab if one or more generations is under lab conditions.
development	Holometabolous or hemimetabolous
acclim_stage	Life stage at which acclimation took place
ctm_stage	Life stage at which CTL assay took place
tsr	Whether acclimation was within a life stage or between stages to investigate the temperature-size rule.
sex	Male, female, mixed or both/unknown
lat	Latitude in degrees
stand_lat	Latitude in degrees away from equator
lat_bin	Latitude in 10 degree bins
mass	Wet mass of insect (mg) extracted from original papers
all_mass	Wet mass of insect (mg) extracted from original papers and other sources
acclim_temp	Acclimation temperature (°C)
cont_temp	Control temperature (°C)
acclim_dur	Duration of acclimation period in hours. Data were only included if acclimation was stated in hours. If recorded as the length of a life stage, the cell is left blank.
acclim_type	Constant or fluctuating temperature during acclimation
ctlimit	CT _{max} or CT _{min}
ramp_rate	Rate of temp ramp (°C/min)
groupID	Treatments within a group use pairwise comparisons to calculate ARR (e.g., 10-12°C, 12-15°C, 15-20°C).
treat	CTL of treatment group
treatSD	Standard deviation of treatment group
treatN	Sample size of treatment group
cont	CTL of control group
contSD	Standard deviation of control group
contN	Sample size of control group
simpctend	End point at which critical thermal limit is measured, simplified into groupings
data_type	The source of the data collected e.g. table, graph, directly from author
author	First author of paper
title	Paper title
journal	Journal name
year	Year of publication
webpage	Link to paper webpage
ARR	Calculated Acclimation Response Ratio
var	Calculated variance
precision	Calculated precision (1/Standard Error)
diff	Difference between two acclimation temperatures used for ARR calculation

26 **Supplementary Table 2** Intercept multi-level meta-analytic, random effects models for upper (CT_{max}) and lower (CT_{min}) critical thermal limits, to test whether ARR
 27 (Acclimation Response Ratio) is significantly different from zero. Significant results (95% CIs do not span zero) are highlighted in bold. CI.lb: lower bound of the 95%
 28 confidence interval; CI.ub: upper bound of the 95% confidence interval. $R^2_{marg.}$: R^2 marginal, the variance explained only by moderators. $R^2_{cond.}$: R^2 conditional, the variance
 29 explained by moderators and random effects.

Limit	k	estimate	t	CI.lb	CI.ub	AICc	I^2_{total}	I^2_{study}	$I^2_{phylogeny}$	$I^2_{species}$	I^2_{row}	$R^2_{marg.}$	$R^2_{cond.}$
CT_{max}	803	0.091	2.98	0.030	0.153	-797.2	0.972	0.151	0.153	0.177	0.491	<0.001	0.495
CT_{min}	571	0.147	7.17	0.106	0.188	-292.4	0.991	0.361	<0.001	<0.001	0.630	<0.001	0.364

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31 **Supplementary Table 3** Univariate multi-level meta-analytic, random effects models for upper critical thermal limit (CT_{max}) ARR (Acclimation Response Ratio) for all
 32 moderators. Results for intercept models are displayed. Results are highlighted in bold where 95% CIs do not overlap between groups or where regressions are significant
 33 for continuous variables. (rob.) is where a robust model was used because the residuals were not homogeneous. CI.lb: lower bound of the 95% confidence interval; CI.ub:
 34 upper bound of the 95% confidence interval. $R^2_{marg.}$: R^2 marginal, the variance explained only by moderators. $R^2_{cond.}$: R^2 conditional, the variance explained by moderators
 35 and random effects.

Model	Comparison	k	estimate	t	CI.lb	CI.ub	AICc	I^2_{total}	I^2_{study}	$I^2_{phylogeny}$	$I^2_{species}$	I^2_{row}	$R^2_{marg.}$	$R^2_{cond.}$
<i>~duration</i>		521	<-0.001	-0.05	<-0.001	<0.001	-588.3	0.963	0.351	0.345	0.267	<0.001	<0.001	0.642
	Intercept	-	0.077	2.27	0.009	0.145	-	-	-	-	-	-	-	-
<i>~ramp rate</i>		803	0.020	0.45	-0.067	0.106	-794.8	0.973	0.162	0.479	0.160	0.171	0.001	0.508
	Intercept	-	0.085	2.44	0.015	0.155	-	-	-	-	-	-	-	-
<i>~mass (rob.)</i>		614	<0.001	0.94	-0.001	0.003	-689.3	0.976	0.032	0.443	0.313	0.188	0.047	0.567
	Intercept	-	0.142	2.74	0.024	0.153	-	-	-	-	-	-	-	-
<i>~acclimation stage</i>	Early life	803	0.105	3.98	0.053	0.156	-791.4	0.970	0.157	0.530	0.094	0.189	0.013	0.461
	Adulthood	-	0.069	2.63	0.017	0.120	-	-	-	-	-	-	-	-
	Whole life	-	0.076	2.63	0.019	0.132	-	-	-	-	-	-	-	-
	Several generations	-	0.080	1.85	-0.005	0.164	-	-	-	-	-	-	-	-

<i>~source</i>	Laboratory	803	0.105	2.87	0.032	0.177	-795.4	0.973	0.162	0.175	0.163	0.472	0.004	0.517
	Field	-	0.083	2.34	0.013	0.154	-	-	-	-	-	-	-	-
<i>~habitat</i> (rob.)	Aquatic	803	0.090	2.01	<0.001	0.180	-795.0	0.973	0.160	0.166	0.167	0.479	<0.001	0.507
	Terrestrial	-	0.093	2.74	0.025	0.161	-	-	-	-	-	-	-	-
<i>~end point</i>	Death	803	0.071	0.62	-0.160	0.302	-794.3	0.974	0.205	0.126	0.198	0.446	0.076	0.577
	Activity	-	0.085	2.01	0.002	0.167	-	-	-	-	-	-	-	-
	Clinging	-	0.072	1.19	-0.047	0.191	-	-	-	-	-	-	-	-
	Righting	-	0.212	3.97	0.105	0.318	-	-	-	-	-	-	-	-
	Stimulus response	-	0.050	1.15	-0.035	0.136	-	-	-	-	-	-	-	-
	Motor response	-	0.078	1.92	-0.002	0.158	-	-	-	-	-	-	-	-
<i>~latitude</i>		701	-0.001	-1.20	-0.002	<0.001	-607.8	0.972	0.294	0.071	0.148	0.459	0.004	0.530
	Intercept	-	0.115	2.81	0.033	0.198	-	-	-	-	-	-	-	-
<i>~latitude</i> (field-caught subset)		187	-0.001	-0.72	-0.005	0.003	12.4	0.944	0.380	0.032	<0.001	0.532	0.010	0.441
	Intercept	-	0.106	1.38	-0.053	0.265	-	-	-	-	-	-	-	-
<i>~sex</i>	Female	803	0.057	1.55	-0.016	0.130	-794.0	0.972	0.158	0.143	0.191	0.480	0.022	0.517
	Male	-	0.093	2.32	0.014	0.171	-	-	-	-	-	-	-	-
	Both	-	0.087	2.20	0.010	0.164	-	-	-	-	-	-	-	-
	Unknown	-	0.108	3.24	0.043	0.173	-	-	-	-	-	-	-	-
<i>~development</i>	Holometabolous	803	0.045	1.48	-0.015	0.105	-799.2	0.970	0.166	0.080	0.201	0.523	0.058	0.492
	Hemimetabolous	-	0.135	3.95	0.067	0.203	-	-	-	-	-	-	-	-
<i>~development</i> (juvenile subset)	Holometabolous	591	0.034	1.28	-0.020	0.087	-777.4	0.960	0.006	0.097	0.093	0.763	0.025	0.224
	Hemimetabolous	-	0.092	2.54	0.019	0.165	-	-	-	-	-	-	-	-
Temperature-size rule	Between	803	0.091	2.66	0.024	0.158	793.9	0.972	0.159	0.157	0.168	0.488	<0.001	0.498
	Within	-	0.092	2.95	0.031	0.153	-	-	-	-	-	-	-	-

36 **Supplementary Table 4** Univariate multi-level meta-analytic, random effects models for lower critical thermal limit (CT_{min}) ARR (Acclimation Response Ratio) for all
37 moderators. Results for intercept models are displayed. Results are highlighted in bold where 95% CIs do not overlap between groups or where regressions are significant
38 for continuous variables. (rob.) is where a robust model was used because the residuals were not homogeneous. CI.lb: lower bound of the 95% confidence interval; CI.ub:
39 upper bound of the 95% confidence interval. R²_{margin}: R² marginal, the variance explained only by moderators. R²_{cond}: R² conditional, the variance explained by moderators
40 and random effects.

Model	Comparison	k	estimate	t	CI.lb	CI.ub	AICc	I ² _{total}	I ² _{study}	I ² _{phylogeny}	I ² _{species}	I ² _{row}	R ² _{margin}	R ² _{cond}
~duration (rob.)		375	<0.001	0.64	<-0.001	<0.001	-291.8	0.989	0.232	0.016	<0.001	0.741	0.018	0.264
	Intercept	-	0.098	5.52	0.062	0.133	-	-	-	-	-	-	-	-
~ramp rate (rob.)		571	0.017	0.31	-0.091	0.125	-290.7	0.992	0.367	<0.001	<0.001	0.625	<0.001	0.370
	Intercept	-	0.142	5.41	0.089	0.194	-	-	-	-	-	-	-	-
~mass		464	<-0.001	-0.63	-0.001	<0.001	-205.8	0.992	0.992	0.399	<0.001	<0.001	0.594	0.002
	Intercept	-	0.151	5.72	0.098	0.204	-	-	-	-	-	-	-	-
~acclimation stage	Early life	571	0.196	6.36	0.136	0.257	-289.7	0.992	0.372	<0.001	<0.001	0.619	0.016	0.385
	Adulthood	-	0.129	5.43	0.082	0.176	-	-	-	-	-	-	-	-
	Whole life	-	0.128	3.27	0.051	0.204	-	-	-	-	-	-	-	-
	Several generations	-	0.164	2.47	0.034	0.295	-	-	-	-	-	-	-	-
~source (rob.)	Laboratory	571	0.163	8.83	0.126	0.200	-292.3	0.991	0.348	<0.001	<0.001	0.643	0.012	0.359
	Field	-	0.112	6.21	0.076	0.147	-	-	-	-	-	-	-	-
~habitat	Aquatic	571	0.038	0.43	-0.139	0.215	-291.9	0.991	0.358	<0.001	<0.001	0.633	0.010	0.368
	Terrestrial	-	0.153	7.31	0.111	0.195	-	-	-	-	-	-	-	-
~end point (rob.)	Death	571	0.052	1.59	-0.013	0.117	-283.4	0.992	0.376	<0.001	<0.001	0.616	0.023	0.393
	Activity	-	0.152	2.52	0.032	0.272	-	-	-	-	-	-	-	-
	Clinging	-	0.150	4.65	0.085	0.214	-	-	-	-	-	-	-	-
	Natural position	-	0.038	2.14	0.003	0.073	-	-	-	-	-	-	-	-
	Righting	-	0.168	4.11	0.086	0.249	-	-	-	-	-	-	-	-

	Stimulus response	-	0.146	4.16	0.076	0.216	-	-	-	-	-	-	-	-
	Motor response	-	0.172	4.06	0.087	0.256	-	-	-	-	-	-	-	-
<i>~latitude</i>		471	-0.001	-0.97	-0.002	0.001	-207.1	0.990	0.369	<0.001	<0.001	0.622	0.004	0.375
	Intercept	-	0.169	4.26	0.089	0.250	-	-	-	-	-	-	-	-
<i>~latitude</i> (field subset; rob.)		144	-0.001	-1.64	-0.002	<0.001	-188.7	0.946	<0.001	0.048	<0.001	0.898	0.019	0.069
	Intercept	-	0.127	4.02	0.062	0.191	-	-	-	-	-	-	-	-
<i>~sex</i>	Female	571	0.186	5.80	0.123	0.249	-289.5	0.991	0.359	<0.001	<0.001	0.632	0.024	0.377
	Male	-	0.158	4.26	0.085	0.231	-	-	-	-	-	-	-	-
	Both	-	0.164	5.19	0.102	0.226	-	-	-	-	-	-	-	-
	Unknown	-	0.096	2.75	0.028	0.165	-	-	-	-	-	-	-	-
<i>~development</i>	Holometabolous	571	0.138	5.83	0.090	0.186	-291.1	0.992	0.3633	<0.001	<0.001	0.629	0.004	0.368
	Hemimetabolous	-	0.174	4.22	0.091	0.257	-	-	-	-	-	-	-	-
<i>~development</i> (juvenile subset)	Holometabolous	473	0.126	4.51	0.070	0.183	-263.4	0.991	0.429	<0.001	<0.001	0.562	0.013	0.440
	Hemimetabolous	-	0.189	3.60	0.083	0.296	-	-	-	-	-	-	-	-
Temperature-size rule	Between	571	0.114	2.88	0.036	0.191	-291.1	0.992	0.395	<0.001	<0.001	0.597	0.007	0.402
	Within	-	0.152	6.87	0.108	0.195	-	-	-	-	-	-	-	-

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47 **Supplementary Table 5** Multivariate multi-level meta-analytic, random effects models for upper critical thermal limit (CT_{max}) ARR (Acclimation Response Ratio). Top four
48 best models are shown, calculated using the ‘dredge’ from the MuMIn package. Estimate: difference in ARR compared to the reference group or the coefficient for
49 regressions. Reference groups are indicated in subscript. Results are highlighted in bold where 95% CIs do not overlap between groups or where regressions are significant
50 for continuous variables. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. R² marg.: R² marginal, the variance
51 explained only by moderators. R² cond.: R² conditional, the variance explained by moderators and random effects.

Rank	Model	Comparison	k	estimate	t	CI.lb	CI.ub	AICc	I ² _{total}	I ² _{study}	I ² _{phylogeny}	I ² _{species}	I ² _{row}	R ² _{marg.}	R ² _{cond.}
1	~development <i>hemimetabolous</i>	Holometabolous	803	-0.090	-2.12	-0.175	-0.006	-799.2	0.970	0.165	0.077	0.204	0.524	0.059	0.491
2	~development <i>hemimetabolous</i> + acclimation stage <i>adulthood</i>	Holometabolous	803	-0.073	-2.02	-0.145	-0.001	-792.5	0.969	0.165	0.037	0.214	0.551	0.064	0.467
		Early life	-	0.034	2.29	0.005	0.064	-	-	-	-	-	-	-	-
		Whole life	-	0.007	0.43	-0.024	0.038	-	-	-	-	-	-	-	-
		Several generations	-	0.009	0.24	-0.062	0.080	-	-	-	-	-	-	-	-
3	~development <i>hemimetabolous</i> + <i>SOURCE</i> <i>field-caught</i>	Holometabolous	803	-0.095	-2.12	-0.185	-0.006	-797.5	0.971	0.176	0.087	0.197	0.510	0.061	0.507
		Laboratory		0.023	0.82	-0.033	0.080								
4	~development <i>hemimetabolous</i> + acclimation stage <i>adulthood</i> + <i>SOURCE</i> <i>field-caught</i>	Holometabolous	803	-0.078	-2.04	-0.154	-0.002	-790.4	0.969	0.178	0.044	0.209	0.538	0.065	0.481
		Early life	-	0.033	2.21	0.004	0.063	-	-	-	-	-	-	-	-
		Whole life	-	0.005	0.32	-0.027	0.037	-	-	-	-	-	-	-	-
		Several generations	-	0.007	0.18	-0.065	0.078	-	-	-	-	-	-	-	-
		Laboratory	-	0.019	0.69	-0.036	0.074	-	-	-	-	-	-	-	-

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55 **Supplementary Table 6** Multivariate multi-level meta-analytic, random effects models for lower critical thermal limit (CT_{min}) ARR (Acclimation Response Ratio). Top four
56 best models are shown, calculated using the 'dredge' from the MuMIn package. Estimate: difference in ARR compared to the reference group or the coefficient for
57 regressions. Reference groups are indicated in subscript. Results are highlighted in bold where 95% CIs do not overlap between groups or where regressions are significant
58 for continuous variables. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. R² marg.: R² marginal, the variance
59 explained only by moderators. R² cond.: R² conditional, the variance explained by moderators and random effects.

Rank	Model	Comparison	k	estimate	t	CI.lb	CI.ub	AICc	I ² _{total}	I ² _{study}	I ² phylogeny	I ² _{species}	I ² _{row}	R ² _{marg.}	R ² _{cond.}
1	~source_{field-caught} (rob.)	Laboratory	571	0.052	2.24	0.006	0.098	-292.3	0.991	0.348	<0.001	<0.001	0.643	0.012	0.359
2	<i>Intercept model</i>	-	571	0.147	7.17	0.106	0.188	-292.4	0.991	0.361	<0.001	<0.001	0.630	<0.001	0.364
3	~sex_{female} + acclimation stage adulthood (rob.)	Male	571	-0.024	-0.68	-0.048	<0.001	-289.1	0.992	0.375	<0.001	<0.001	0.616	0.055	0.413
		Mixed	-	-0.024	-0.61	-0.098	0.050	-	-	-	-	-	-	-	-
		Unknown	-	0.124	-2.54	-0.211	-0.036	-	-	-	-	-	-	-	-
		Early life	-	0.084	2.52	0.027	0.141	-	-	-	-	-	-	-	-
		Whole life	-	-0.014	-0.33	-0.195	0.168	-	-	-	-	-	-	-	-
		Several generations	-	0.022	0.32	-0.144	0.188	-	-	-	-	-	-	-	-
4	~habitat_{aquatic}	Terrestrial	571	0.115	1.27	-0.067	0.297	-291.9	0.991	0.358	<0.001	<0.001	0.633	0.010	0.368

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62 **Supplementary Table 7** Conditional average best moderators from multivariate multi-level meta-analytic, random effects models for upper thermal limit (CT_{max}) ARR
63 (Acclimation Response Ratio), ranked by AICc. Estimate: difference in ARR compared to the reference group or the coefficient for regressions. Significant results (95% CIs do
64 not overlap between groups or significant regressions for continuous variables) are highlighted in bold. Reference groups are indicated in subscript. SE: standard error. CI.lb:
65 lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval.

Moderator	estimate	SE	z	CI.lb	CI.ub
Development: holometabolous _{hemimetabolous}	-0.080	0.030	2.65	-0.139	-0.020
Acclimation stage: Early life _{adulthood}	0.036	0.015	2.46	0.007	0.065
Acclimation stage: Several generations _{adulthood}	0.008	0.036	0.22	-0.063	0.079
Acclimation stage: Whole life _{adulthood}	0.007	0.016	0.46	-0.024	0.038
Source: Laboratory _{field-caught}	0.019	0.026	0.72	-0.032	0.070
Ramp rate	0.013	0.041	0.31	-0.068	0.093

71 **Supplementary Table 8** Full average best moderators from multivariate multi-level meta-analytic, random effects models for upper thermal limit (CT_{max}) ARR (Acclimation
72 Response Ratio), ranked by AICc. Estimate: difference in ARR compared to the reference group or the coefficient for regressions. Significant results (95% CIs do not overlap
73 between groups or significant regressions for continuous variables) are highlighted in bold. Reference groups are indicated in subscript. SE: standard error. CI.lb: lower bound
74 of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval.

Moderator	estimate	SE	z	CI.lb	CI.ub
Development: holometabolous _{hemimetabolous}	-0.080	0.030	2.65	-0.139	-0.021
Acclimation stage: Early life _{adulthood}	0.015	0.020	0.74	-0.025	0.055
Acclimation stage: Several generations _{adulthood}	0.003	0.024	0.14	-0.043	0.049
Acclimation stage: Whole life _{adulthood}	0.003	0.011	0.28	-0.018	0.024
Source: Laboratory _{field-caught}	0.005	0.016	0.33	-0.026	0.037
Ramp rate	0.002	0.015	0.10	-0.027	0.030

Supplementary Table 9 Conditional average best moderators from multivariate multi-level meta-analytic, random effects models for lower thermal limit (CT_{min}) ARR (Acclimation Response Ratio), ranked by AICc. Estimate: difference in ARR compared to the reference group or the coefficient for regressions. Significant results (95% CIs do not overlap between groups or significant regressions for continuous variables) are highlighted in bold. Reference groups are indicated in subscript. SE: standard error. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval.

Moderator	estimate	SE	z	CI.lb	CI.ub
Source: Laboratory _{field-caught}	0.049	0.036	1.38	-0.021	0.119
Acclimation stage: Early life _{adulthood}	0.079	0.034	2.34	0.0128	0.144
Acclimation stage: Several generations _{adulthood}	0.030	0.067	0.45	-0.102	0.162
Acclimation stage: Whole life _{adulthood}	-0.005	0.040	0.11	-0.083	0.074
Sex: Male _{female}	-0.027	0.035	0.77	-0.096	0.042
Sex: Mixed _{female}	-0.025	0.039	0.64	-0.100	0.051
Sex: Unknown _{female}	-0.121	0.047	2.56	-0.213	-0.028
Habitat: Terrestrial _{aquatic}	0.114	0.093	1.23	-0.068	0.2961
Development: Holometabolous _{hemimetabolous}	-0.050	0.048	1.06	-0.143	0.043
Ramp rate	0.021	0.069	0.30	-0.114	0.155

97 **Supplementary Table 10** Full average best moderators from multivariate multi-level meta-analytic, random effects models for lower thermal limit (CT_{min}) ARR (Acclimation
98 Response Ratio), ranked by AICc. Estimate: difference in ARR compared to the reference group or the coefficient for regressions. Significant results (95% CIs do not overlap
99 between groups or significant regressions for continuous variables) are highlighted in bold. Reference groups are indicated in subscript. SE: standard error. CI.lb: lower bound
100 of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval.

Moderator	estimate	SE	z	CI.lb	CI.ub
Source: Laboratory _{field-caught}	0.023	0.035	0.67	0.091	-0.045
Acclimation stage: Early life _{adulthood}	0.042	0.046	0.90	0.132	-0.049
Acclimation stage: Several generations _{adulthood}	0.016	0.051	0.31	0.116	-0.084
Acclimation stage: Whole life _{adulthood}	-0.002	0.029	0.08	0.055	-0.060
Sex: Male _{female}	-0.009	0.024	0.39	0.039	-0.057
Sex: Mixed _{female}	-0.009	0.026	0.33	0.042	-0.059
Sex: Unknown _{female}	-0.042	0.064	0.66	0.083	-0.167
Habitat: Terrestrial _{aquatic}	0.046	0.081	0.57	0.205	-0.113
Development: Holometabolous _{hemimetabolous}	-0.014	0.034	0.42	0.053	-0.082
Ramp rate	0.001	0.013	0.05	0.026	-0.024

115 **Sensitivity analyses**

116 **Supplementary Table 11** Leave-one-out sensitivity analysis for multi-level meta-analytic, random effects models of upper thermal limit (CT_{max}) ARR (Acclimation Response
117 Ratio). Individual studies, species or families were removed iteratively to check for outliers. SE: standard error. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper
118 bound of the 95% confidence interval.

Moderator	estimate	z	SE	CI.lb	CI.ub
Study	0.091	2.96	0.031	0.030	0.153
Species	0.091	2.97	0.031	0.030	0.153
Family	0.091	2.96	0.031	0.030	0.153

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124 **Supplementary Table 12** Leave-one-out sensitivity analysis for multi-level meta-analytic, random effects models of lower thermal limit (CT_{min}) ARR (Acclimation Response
125 Ratio). Individual studies, species or families were removed iteratively to check for outliers. SE: standard error. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper
126 bound of the 95% confidence interval.

Moderator	estimate	z	SE	CI.lb	CI.ub
Study	0.147	7.08	0.021	0.105	0.189
Species	0.147	7.11	0.021	0.105	0.189
Family	0.147	7.04	0.021	0.105	0.189

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Supplementary Table 13 Intercept multi-level meta-analytic, random effects models for upper and lower thermal limits, $CT_{\max}$ and $CT_{\min}$ respectively, without fluctuating data. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. $R^2_{\text{marg.}}$: R^2 marginal, the variance explained only by moderators. $R^2_{\text{cond.}}$: R^2 conditional, the variance explained by moderators and random effects. Significant results (95% CIs do not span 0) are highlighted in bold.

Limit	k	estimate	t	CI.lb	CI.ub	AICc	I ² _{total}	I ² _{study}	I ² _{phylogeny}	I ² _{species}	I ² _{row}	R ² _{marg.}	R ² _{cond.}
$CT_{\max}$	738	0.085	2.84	0.025	0.146	-713.6	0.971	0.030	0.175	0.198	0.567	<0.001	0.416
$CT_{\min}$	556	0.154	7.18	0.111	0.197	-276.6	0.992	0.363	<0.001	<0.001	0.629	<0.001	0.366

Supplementary Table 14 Intercept multi-level meta-analytic, random effects models for upper and lower thermal limit, $CT_{\max}$ and $CT_{\min}$ respectively, without Drosophilidae data. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. $R^2_{\text{marg.}}$: R^2 marginal, the variance explained only by moderators. $R^2_{\text{cond.}}$: R^2 conditional, the variance explained by moderators and random effects. Significant results (95% CIs do not span 0) are highlighted in bold.

Limit	k	estimate	t	CI.lb	CI.ub	AICc	I ² _{total}	I ² _{study}	I ² _{phylogeny}	I ² _{species}	I ² _{row}	R ² _{marg.}	R ² _{cond.}
$CT_{\max}$	421	0.094	2.77	0.026	0.162	-267.4	0.978	0.427	0.132	0.205	0.314	<0.001	0.679
$CT_{\min}$	377	0.121	4.73	0.070	0.173	-339.6	0.981	<0.001	0.088	0.178	0.715	<0.001	0.27

Supplementary Table 15 Intercept multi-level meta-analytic, random effects models for upper and lower thermal limit, $CT_{\max}$ and $CT_{\min}$ respectively, with Drosophilidae data only. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. $R^2_{\text{marg.}}$: R^2 marginal, the variance explained only by moderators. $R^2_{\text{cond.}}$: R^2 conditional, the variance explained by moderators and random effects. Significant results (95% CIs do not span 0) are highlighted in bold.

Limit	k	estimate	t	CI.lb	CI.ub	AICc	I ² _{total}	I ² _{study}	I ² _{phylogeny}	I ² _{species}	I ² _{row}	R ² _{marg.}	R ² _{cond.}
$CT_{\max}$	382	0.036	0.45	-0.140	0.212	-533.2	0.971	0.014	0.325	0.111	0.521	<0.001	0.463
$CT_{\min}$	194	0.225	3.20	0.066	0.383	-14.3	0.997	0.477	<0.001	<0.001	0.520	<0.001	0.479

152 **Supplementary Table 16** Univariate multi-level meta-analytic, random effects models for upper critical thermal limit (CT_{max}) ARR (Acclimation Response Ratio), with
153 Drosophilidae data only. Significant results (95% CIs do not overlap between groups or significant regressions for continuous variables) are highlighted in bold. CI.lb: lower
154 bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. R²_{marg.}: R² marginal, the variance explained only by moderators. R²_{cond.}: R²
155 conditional, the variance explained by moderators and random effects.

Model	Comparison	k	estimate	t	CI.lb	CI.ub	AICc	I ² _{total}	I ² _{study}	I ² _{phylogeny}	I ² _{species}	I ² _{row}	R ² _{marg.}	R ² _{cond.}
<i>~duration</i>		149	<-0.001	-2.03	<-0.001	<-0.001	-413.5	0.779	<-0.001	0.115	0.115	0.549	0.053	0.333
	Intercept	-	0.044	4.97	0.023	0.066	-	-	-	-	-	-	-	-
<i>~ramp rate</i>		382	0.002	0.02	-0.245	0.249	-528.7	0.959	0.018	0.104	0.104	0.732	<0.001	0.237
	Intercept	-	0.042	1.97	-0.006	0.091	-	-	-	-	-	-	-	-
<i>~mass</i>		351	-0.003	-0.19	-0.038	0.032	-461.3	0.964	0.016	0.122	0.122	0.703	<0.001	0.270
	Intercept	-	0.047	1.49	-0.025	0.119	-	-	-	-	-	-	-	-
<i>~acclimation stage</i>	Early life	382	0.052	2.24	0.006	0.098	-528.5	0.959	0.009	0.112	0.112	0.726	0.011	0.251
	Adulthood	-	0.025	1.32	-0.012	0.062	-	-	-	-	-	-	-	-
	Whole life	-	0.051	2.92	0.017	0.085	-	-	-	-	-	-	-	-
<i>~endpoint</i>	Activity	382	0.032	0.032	-0.012	0.075	-527.5	0.959	0.013	0.110	0.110	0.726	0.008	0.249
	Stimulus response	-	0.056	0.056	0.009	0.103	-	-	-	-	-	-	-	-
	Motor response	-	0.047	0.047	-0.05	0.140	-	-	-	-	-	-	-	-
<i>~latitude</i>		380	<0.001	-0.21	-0.001	0.001	-524.1	0.959	0.029	0.102	0.102	0.727	<0.001	0.242
	Intercept	-	0.046	1.79	-0.013	0.106	-	-	-	-	-	-	-	-
<i>~sex</i>	Female	382	0.028	1.59	-0.007	0.063	-533.3	0.959	0.008	0.111	0.111	0.728	0.017	0.253
	Male	-	0.060	3.29	0.024	0.096	-	-	-	-	-	-	-	-

157 **Supplementary Table 17** Univariate multi-level meta-analytic, random effects models for lower critical thermal limit (CT_{min}) ARR (Acclimation Response Ratio), with
158 Drosophilidae data only. Significant results (95% CIs do not overlap between groups or significant regressions for continuous variables) are highlighted in bold. CI.lb: lower
159 bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. R²_{marg.}: R² marginal, the variance explained only by moderators. R²_{cond.}: R²
160 conditional, the variance explained by moderators and random effects.

Model	Comparison	k	estimate	t	CI.lb	CI.ub	AICc	I ² _{total}	I ² _{study}	I ² _{phylogeny}	I ² _{species}	I ² _{row}	R ² _{marg.}	R ² _{cond.}
<i>~duration</i>		41	-0.001	-5.70	-0.002	-0.001	-10.9	0.997	0.088	<0.001	<0.001	0.091	0.469	0.516
	Intercept	-	0.171	3.61	-0.431	0.773	-	-	-	-	-	-	-	-
<i>~ramp rate</i>		194	0.011	0.04	-0.500	0.523	-13.0	0.997	0.494	<0.001	<0.001	0.502	<0.001	0.496
	Intercept	-	0.222	2.24	-0.007	0.450	-	-	-	-	-	-	-	-
<i>~mass</i>		184	-0.005	-0.23	-0.056	0.045	-3.6	0.997	0.473	<0.001	<0.001	0.524	<0.001	0.475
	Intercept	-	0.233	3.08	0.058	0.409	-	-	-	-	-	-	-	-
<i>~acclimation stage</i>	Early life	194	0.356	3.78	0.170	0.543	-20.3	0.997	0.595	<0.001	<0.001	0.402	0.077	0.628
	Adulthood	-	0.241	2.65	0.061	0.421	-	-	-	-	-	-	-	-
	Whole life	-	0.121	1.32	-0.060	0.302	-	-	-	-	-	-	-	-
	Activity	194	0.149	1.07	-0.208	0.506	-13.9	0.997	0.529	<0.001	<0.001	0.468	0.107	0.581
	Clinging	-	0.084	0.36	-0.507	0.675	-	-	-	-	-	-	-	-
	Righting	-	0.333	1.80	-0.144	0.809	-	-	-	-	-	-	-	-
	Stimulus response	-	0.343	2.48	-0.012	0.699	-	-	-	-	-	-	-	-
	Motor response	-	0.072	0.30	-0.547	0.691	-	-	-	-	-	-	-	-
<i>~latitude</i>		191	-0.001	-0.36	-0.003	0.002	-10.4	0.997	0.502	<0.001	<0.001	0.495	0.001	0.503
	Intercept	-	0.237	2.41	-0.004	0.475	-	-	-	-	-	-	-	-
<i>~sex</i>	Female	194	0.229	2.77	0.066	0.392	-11.9	0.997	0.500	<0.001	<0.001	0.497	0.009	0.506
	Male	-	0.197	2.21	0.021	0.372	-	-	-	-	-	-	-	-
	Mixed	-	0.293	1.35	-0.222	0.809	-	-	-	-	-	-	-	-

161 **Publication bias**

162 **Supplementary Table 18** Egger's regression test (two-sided) for intercept multi-level, random effects meta-analytic model for upper critical thermal limit (CT_{max}) ARR
163 (Acclimation Response Ratio). SE: standard error. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. Significant results
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Moderator	k	estimate	t	SE	CI.lb	CI.ub
Intercept	803	0.073	2.37	0.031	0.011	0.134
$\sqrt{v}$ variance	-	0.288	2.17	0.133	0.028	0.548

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169 **Supplementary Table 19** Egger's regression test (two-sided) was significant for intercept multi-level, random effects meta-analytic model for upper critical thermal limit
170 (CT_{max}) ARR (Acclimation Response Ratio) so SE^2 was run as a moderator to find predicted estimate without publication bias. SE: standard error. CI.lb: lower bound of the 95%
171 confidence interval; CI.ub: upper bound of the 95% confidence interval. Significant results are highlighted in bold.

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Moderator	k	estimate	t	SE	CI.lb	CI.ub
Intercept	803	0.091	2.97	0.031	0.030	0.152
SE^2	-	0.043	0.67	0.06v5	-0.084	0.170

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179 **Supplementary Table 20** Egger’s regression test (two-sided) for the best multi-level, random effects meta-analytic model (as selected using the MuMIn package) for upper
180 critical thermal limit (CT_{max}) ARR (Acclimation Response Ratio). SE: standard error. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence
181 interval. Significant results are highlighted in bold.

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Moderator	k	estimate	t	SE	CI.lb	CI.ub
Intercept	803	0.116	3.43	0.034	0.048	0.183
vvariance	-	0.288	2.17	0.133	0.028	0.548
Development: Homogeneous	-	-0.088	-2.14	0.041	-0.169	-0.006

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187 **Supplementary Table 21** Egger’s regression test (two-sided) for intercept multi-level, random effects meta-analytic model for lower critical thermal limit (CT_{min}) ARR
188 (Acclimation Response Ratio). SE: standard error. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. Significant results
189 are highlighted in bold.

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Moderator	k	estimate	t	SE	CI.lb	CI.ub
Intercept	571	0.116	4.67	0.025	0.066	0.165
vvariance	-	0.621	2.21	0.282	0.068	1.174

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197 **Supplementary Table 22** Egger’s regression test (two-sided) was significant for intercept multi-level, random effects meta-analytic model for lower critical thermal limit
198 (CT_{min}) ARR (Acclimation Response Ratio) so SE² was run as a moderator to find predicted estimate without publication bias. SE: standard error. CI.lb: lower bound of the 95%
199 confidence interval; CI.ub: upper bound of the 95% confidence interval. Significant results are highlighted in bold.

Moderator	k	estimate	t	SE	CI.lb	CI.ub
Intercept	571	0.144	6.94	0.021	0.102	0.185
SE ²	-	0.635	1.28	0.497	-0.341	1.611

204 **Supplementary Table 23** Egger’s regression test (two-sided) for the best multi-level, random effects meta-analytic model (as selected using the MuMIn package) for lower
205 critical thermal limit (CT_{min}) ARR (Acclimation Response Ratio).SE: standard error. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence
206 interval. Significant results are highlighted in bold.

Moderator	k	estimate	t	SE	CI.lb	CI.ub
Intercept	571	0.068	1.92	0.035	-0.003	0.139
vvariance	-	0.695	2.46	0.283	0.140	1.249
Source: laboratory	-	0.064	1.85	0.035	-0.004	0.133

214 **Supplementary Table 24** Univariate multi-level meta-analytic, random effects models for upper critical thermal limit (CT_{max}) ARR (Acclimation Response Ratio), investigating
215 year as a moderator. SE: standard error. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. Significant results are
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Moderator	k	estimate	t	SE	CI.lb	CI.ub
Intercept	803	1.73	0.42	4.157	-6.59	10.046
Year	-	-0.001	-0.39	0.002	-0.005	0.003

222 **Supplementary Table 25** Univariate multi-level meta-analytic, random effects models for lower critical thermal limit (CT_{min}) ARR (Acclimation Response Ratio), investigating
223 year as a moderator. SE: standard error. CI.lb: lower bound of the 95% confidence interval; CI.ub: upper bound of the 95% confidence interval. Significant results are
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Moderator	k	estimate	t	SE	CI.lb	CI.ub
Intercept	571	4.103	0.60	6.809	-9.574	17.780
Year	-	-0.002	-0.58	0.003	-0.009	0.005