

**Table S1.** Variables related to evaporative cooling capacity and heat tolerance in 56 species of arid-zone birds representing 14 orders. For body temperatures ( $T_b$ ), “Norm” and “Max” refer to normothermic values at thermoneutrality and maximum values during acute heat exposure, respectively, and “Slope” is the slope of  $T_b$  as a function of air temperature ( $T_a$ ). Air temperature values refer to the inflection  $T_a$  above which  $T_b$  increases (“ $T_b$  infl.”), the upper critical limit of thermoneutrality (“ $T_{uc}$ ”), the  $T_a$  associated with the onset of panting (“Pant”), the inflection  $T_a$  for evaporative water loss (“EWL infl.”) and heat tolerance limit (“HTL”, the maximum  $T_a$  reached before the onset of severe hyperthermia). For resting metabolic rate and evaporative water loss, minimum thermoneutral values (“Min”), maximum values during acute heat exposure (“Max”) and the slope at  $T_a$  above the respective inflection values (“Slope”) are provided. “EHL/MHP” is the ratio of evaporative heat loss to metabolic heat production, and “Ref” is the reference (see footnotes). The numbers in parentheses after each species’ English name is minimum sample size for maximum EWL and RMR, and are typically much lower than the total number of individuals per species involved.

Species	Body mass g	Body temperature			Air temperature					Resting metabolic rate			Evaporative water loss			EHL/ MHP	Ref
		Norm °C	Slope °C °C <sup>-1</sup>	Max °C	$T_b$ infl. °C	$T_{uc}$ °C	Pant °C	EWL infl. °C	HTL °C	Min W	Slope W °C <sup>-1</sup>	Max W	Min g h <sup>-1</sup>	Slope g h <sup>-1</sup> °C <sup>-1</sup>	Max g h <sup>-1</sup>		
<b>Caprimulgiformes</b>																	
Common poorwill (5)	44.3	38.4	0.240	42.6	48.0	54.2		48.2	62.0	0.35	0.000	0.59	0.21	0.150	3.24	4.09	1
<i>Phalaenoptilus nuttallii</i>																	
Lesser nighthawk (3)	50.6	38.8	0.330	43.6	52.1	57.1		42.9	60.0	0.36	0.001	0.68	0.20	0.110	3.29	3.30	1
<i>Chordeiles acutipennis</i>																	
Australian owlet-nightjar (5)	44	37.5	0.470	43.7	47.2	50.7		45.3	52.0	0.40	0.003	0.79	0.21	0.210	2.51	2.37	1
<i>Aegotheles cristatus</i>																	
Rufous-cheeked nightjar (2)	52.2	39.0	0.120	41.7				39.5	56.0	0.30	0.001	0.32	0.28	0.099	2.49	5.15	2
<i>Caprimulgus ruficollis</i>																	
Freckled nightjar (2)	67.3	38.8	0.124	40.7	32.4			38.3	52.0	0.31	0.001	0.32	0.14	0.142	1.78	4.52	2
<i>Caprimulgus tristigma</i>																	
<b>Columbiformes</b>																	
Mourning dove (5)	104	41.0	0.041	41.9		45.9		45.9	58	0.66	0.017		0.74	0.210	4.40	3.08	3
<i>Zenaidura macroura</i>																	
White-winged dove (5)	147.3	41.4	0.056	42.7		46.5		46.5	60	0.94	0.019		0.99	0.383	8.00	3.69	3
<i>Zenaidura asiatica</i>																	
Namaqua dove (8)	37.1	40.3	0.110	43.1		35.3		40.9	60	0.27	0.004	0.35	0.15	0.096	2.36	4.66	4
<i>Oena capensis</i>																	
Laughing dove (5)	89.4	40.8	0.190	43.7		40.0			58	0.56	0.027	1.11	0.46	0.181	3.65	2.27	4
<i>Spilopelia senegalensis</i>																	
Cape turtle dove (7)	147.5	41.1	0.250	44.7		44.6			56	0.81	0.050	1.62	0.48	0.235	5.40	2.30	4
<i>Streptopelia capicola</i>																	
Crested pigeon (10)	186.5	40.6	0.380	44.3		46.6			62	1.00	0.065	2.13	1.12	0.268	7.26	2.75	4

<i>Ocyphaps lophotes</i>																	
<b>Strigiformes</b>																	
Elf owl (4) <i>Micrathene whitneyi</i>	39.7	38.8	0.230	42.9		42.0		36.8	46	0.40	0.030	0.58	0.33	0.110	1.46	1.67	5
Western screech-owl (7) <i>Megascops kennicotti</i>	101	39.1	0.290	43.2	37.3	46.4		41.5	54	0.77	0.120	1.47	0.59	0.280	4.16	1.98	5
Spotted eagle-owl (3) <i>Bubo africanus</i>	667.9	39.1	0.53	44.2	50.9	48.2	36.7	34.9	59	2.38	0.261	4.66	1.79	0.64	14.04	2.75	6
<b>Pterocliformes</b>																	
Burchell's sandgrouse (3) <i>Pterocles burchelli</i>	192.9	39.0	0.241	43.6	34.5	43.8	44.4	42.9	56	1.16	0.137	2.89	0.71	0.445	7.84	2.03	7
Namaqua sandgrouse (7) <i>Pterocles namaqua</i>	165.8	39.4	0.1	43.2	47.5	36	42.5	38	60	0.83	0.011	1.14	1.01	0.29	7.48	5.49	6
<b>Cuculiformes</b>																	
African cuckoo (2) <i>Cuculus gularis</i>	110	40.0	0.279	43.9	32.8		40.9	42.7	49	0.64	0.022	1.86	0.48	0.238	2.91	1.47	8
<b>Coraciformes</b>																	
Lilac-breasted Roller (6) <i>Coracias caudatus</i>	94.5	40.7	0.161	43.5	36.7	47.5	41.2	44.7	53	0.69	0.040	1.00	0.85	0.337	5.01	3.39	8
<b>Apodiformes</b>																	
Little swift (7) <i>Apus affinus</i>	25.9	38.5	0.4	44.7	35.7	28.7	37.6	36.5	48	0.33	0.014	0.55	0.10	0.08	1.08	1.39	6
<b>Piciformes</b>																	
Acacia pied barbet (7) <i>Tricholaema leucomelas</i>	32.4	41.1	0.26	44.4	37.5	38.2	39.9	38.2	50	0.57	0.045	1.04	0.21	0.16	2.13	1.42	6
<b>Coliiformes</b>																	
White-backed mousebird (9) <i>Colius colius</i>	36.2	40.1	0.29	44.1	35.5	38.6	39.7	37.9	48	0.34	0.038	0.62	0.16	0.12	1.47	1.64	6
<b>Charadriformes</b>																	
Spotted thick-knee (5) <i>Burhinus capensis</i>	434.3	40.5	0.24	44.3	40.7	47.5	44.5	42.8	56	2.03	0.418	5.61	1.83	1.51	23.52	3.15	6
<b>Galliformes</b>																	
Gambell's quail (5) <i>Callipepla gambelii</i>	160.7	41.1	0.170	43.6		41.1		41.1	52	0.71	0.022		0.67	0.196	3.10	2.14	3
<b>Falconiformes</b>																	
Greater kestrel (2) <i>Falco rupicoloides</i>	255.8	41.1	0.16	43.98	38	43.1	43.2	39.2	55	1.69	0.198	4.32	0.88	0.66	10.86	2.02	6
<b>Psittaciformes</b>																	

Mulga parrot (3) <i>Psephotellus varius</i>	54.6	40.1	0.250	43.4	30.0	40.8	40.9	40.2	48	0.65	0.050	1.38	0.37	0.230	2.66	1.71	9
Galah (7) <i>Eolophus roseicapilla</i>	266.3	39.8	0.170	44.1	30.0	40.2	42.7	41.3	54	2.07	0.070	4.40	1.15	0.660	11.64	1.79	9
<b>Passeriformes</b>																	
Scaly-feathered weaver (7) <i>Sporopipes squamifrons</i>	10.4	40.1	0.370	44.7		35.5		40.0	48	0.16	0.005	0.21	0.04	0.047	0.45	1.41	10
Sociable weaver (7) <i>Philetairus socius</i>	24.9	41.3	0.320	44.7		39.9			52	0.33	0.010	0.44	0.08	0.126	1.56	2.22	10
White-browed sparrow-weaver (6) <i>Plocepasser mahali</i>	39.4	41.2	0.210	44.8		42.1			54	0.53	0.032	0.84	0.16	#REF!	2.58	1.93	10
Yellow-plumed honeyeater (6) <i>Lichenostomus ornatus</i>	16.7	40.1	0.352	45.0	35.0	33.9	40.8	37.6	46	0.32	0.017	0.52	0.12	0.088	0.82	1.20	11
Spiny-cheeked honeyeater (2) <i>Acanthagenys rufogularis</i>	41.7	40.3	0.301	44.4	34.6	40.3	40.9	38.1	48	0.56	0.047	1.09	0.23	0.181	1.94	1.32	11
Chestnut-crowned babbler (4) <i>Pomatostomus ruficeps</i>	52	40.7	0.233	44.2	35.5	36.1	40.7	42.2	48	0.59	0.025	0.95	0.30	0.230	2.15	1.57	11
Grey butcherbird (8) <i>Cracticus torquatus</i>	86	40.0	0.278	44.5	34.8	41.6	40.4	42.2	50	1.13	0.074	1.75	0.59	0.323	3.91	2.17	11
Apostlebird (5) <i>Struthidea cinerea</i>	117.6	40.7	0.576	43.9	45.7	44.9	41.7	41.4	52	1.12	0.094	1.64	0.58	0.299	4.07	1.67	11
Lesser goldfinch (5) <i>Spinus psaltria</i>	9.7	41.2	0.210	44.5		36.2		43.4	50	0.27	0.009	0.38	0.18	0.052	0.87	1.55	12
House finch (8) <i>Haemorhous mexicanus</i>	18.1	40.8	0.177	44.9		39.3		38.6	50	0.38	0.016	0.63	0.13	0.098	1.30	1.39	12
Pyrrhuloxia (3) <i>Cardinalis sinuatus</i>	33.6	40.7	0.273	43.7		39.7		40.2	49	0.60	0.025	0.74	0.58	0.132	1.77	1.47	12
Cactus wren (4) <i>Campylorhynchus brunneicapillus</i>	34.5	41.0	0.271	44.5		37.0		38.1	50	0.53	0.018	0.67	0.24	0.137	2.06	2.06	12
Northern Cardinal (3) <i>Cardinalis cardinalis</i>	39.4	40.8	0.268	44.6		37.0		37.8	50	0.68	0.040	1.19	0.33	0.180	2.60	1.50	12
Abert's towhee (6) <i>Melozone aberti</i>	41.8	41.9	0.194	43.8		36.7		37.6	48	0.71	0.019	0.96	0.41	0.151	2.11	1.48	12
Curve-billed thrasher (6) <i>Toxostoma curvirostre</i>	70.9	40.4	0.316	44.3		42.6		45.6	50	0.87	0.097	1.62	0.39	0.270	4.02	1.68	12

Burchell's starling (5) <i>Lamprotornis australis</i>	109.1	40.7	0.184	43.0	34.2	31.0	35.9	33.3	49	1.19	0.042	1.54	1.00	0.231	3.99	1.78	13
Grey-backed sparrow-lark (7) <i>Eremopterix verticalis</i>	16	39.6	0.340	44.9	33.3	36.0	40.5	38.6	53	0.25	0.012	0.39	0.09	0.080	1.08	1.89	14
Stark's lark (2) <i>Spizocorys starki</i>	17.9	40.7	0.250	45.0	34.4	37.8	40.4	38.4	52	0.25	0.010	0.43	0.08	0.100	1.24	2.00	14
Fawn-coloured lark (3) <i>Calendulauda africanoides</i>	23	40.5	0.320	44.5	34.8	35.2	41.8	37.1	49	0.31	0.010	0.44	0.15	0.090	0.92	1.82	14
Spike-heeled lark (5) <i>Chersomanes albofasciata</i>	25	40.9	0.300	44.9	33.8	37.2	41.9	40.2	50	0.36	0.010	0.49	0.16	0.110	1.34	1.87	14
Red lark (5) <i>Calendulauda burra</i>	38.3	40.6	0.250	44.7	36.2	36.6	38.0	36.1	50	0.31	0.009	0.53	0.24	0.080	1.48	1.58	15
Karoo long-billed lark (7) <i>Certhilauda subcoronata</i>	40	40.5	0.240	44.6	33.5	38.9	41.8	39.1	53	0.49	0.014	0.69	0.22	0.160	2.34	2.35	14
Orange River white-eye <i>Zosterops pallidus</i> (4)	7.7	40.2	0.440	44.7	35.3	35.7	40.0	38.4	46	0.19	0.012	0.30	0.12	0.090	0.85	1.92	14
Lark-like bunting (4) <i>Emberiza impetuani</i>	14.2	40.4	0.280	44.4	29.0	28.5	39.3	37.9	48	0.24	0.007	0.39	0.11	0.110	1.14	1.97	14
Marico flycatcher (4) <i>Bradornis mariquensis</i>	21.8	40.1	0.380	45.1	34.7	30.6	39.9	39.9	47	0.32	0.009	0.42	0.15	0.090	0.83	1.32	14
Red-eyed bulbul (4) <i>Pycnonotus nigricans</i>	30.1	40.4	0.260	43.9	40.1	37.5	39.8	38.1	52	0.45	0.025	0.86	0.22	0.170	2.61	2.27	14
Common fiscal (3) <i>Lanius collaris</i>	37.3	41.2	0.320	44.7	35.8	37.8	40.0	40.6	49	0.50	0.050	0.86	0.26	0.340	3.04	2.20	14
Fork-tailed drongo (2) <i>Dicrurus adsimilis</i>	43.7	42.2	0.210	45.2	31.3	42.3	42.3	42.2	50	0.53	0.056	1.12	0.26	0.210	2.21	1.74	14
Crimson-breasted shrike (9) <i>Laniarius atrococcineus</i>	46.2	40.4	0.300	44.3	35.5	38.2	40.6	40.1	48	0.59	0.058	1.10	0.23	0.280	1.91	1.58	14
Southern pied babbler (2) <i>Turdoides bicolor</i>	69.9	41.2	0.260	44.7	41.4	41.0	38.2	38.6	52	0.71	0.048	1.26	0.30	0.210	3.13	1.65	16

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