



Fig. S1. Predicted versus measured $V_{max} J_o$. V_{max} oxygen consumption determined from Eadie–Hofstee analysis in rat (light grey) and sparrow (dark grey) compared with measured State 3 oxygen consumption rate from previous investigations by Kuzmiak et al. for P+M (triangles), G+M (squares), PC+M (circles), P+G+M (diamonds) and G+M+A (plus signs) (Kuzmiak et al., 2012). $y=1.15x+2$ (dashed line) and $y=1.3x-160$ (dotted line) for rat and sparrow, respectively.

Functional integrity of mitochondria isolated from rat and sparrow skeletal muscle provided pyruvate + malate as fuel

	Rat	Sparrow
State 3 J_O (nmol O ₂ ·mg ⁻¹ ·min ⁻¹)	753 ± 81	548 ± 9
ADP/O	2.83 ± 0.15	3.00 ± 0.04
RCR	5.5 ± 0.8	5.4 ± 1.0

Table S1

State 3 (maximal) J_O , ADP phosphorylated per oxygen atom consumed (ADP/O), and RCR (State 3/State 4). Values are means ± s.e.m.

J _o /V _{max}			
Fuel	ΔG _{ATP} (kcal·mol ⁻¹)	Rat	Sparrow
P+M	-13.0	80%	67%
	-13.5	66%	51%
	-14.0	50%	34%
G+M	-13.0	79%	67%
	-13.5	64%	49%
	-14.0	46%	31%
PC+M	-13.0	96%	76%
	-13.5	92%	58%
	-14.0	87%	43%
G+M+A	-13.0	95%	90%
	-13.5	90%	74%
	-14.0	83%	63%
P+G+M	-13.0	82%	47%
	-13.5	64%	32%
	-14.0	51%	18%
P+PC+M	-13.0	86%	67%
	-13.5	73%	53%
	-14.0	42%	35%
G+PC+M	-13.0	88%	69%
	-13.5	77%	52%
	-14.0	62%	33%
P+G+PC+M	-13.0	84%	68%
	-13.5	72%	54%
	-14.0	56%	35%

Table S2

Ratio of average steady state J_o at a given value of ΔG_{ATP} to the V_{max} J_o for that fuel combination determined from Eadie-Hofstee analysis.

Fuel	ΔG_{ATP} (kcal·mol ⁻¹)	Pyruvate		Malate		2-OG		Aspartate		Oxygen	
		nmol·mg ⁻¹ ·min ⁻¹		nmol·mg ⁻¹ ·min ⁻¹		nmol·mg ⁻¹ ·min ⁻¹		nmol·mg ⁻¹ ·min ⁻¹		natom O·mg ⁻¹ ·min ⁻¹	
		Rat	Sparrow	Rat	Sparrow	Rat	Sparrow	Rat	Sparrow	Rat	Sparrow
P+M	-13.0	264 ± 39	141 ± 12	250 ± 22	162 ± 18	53 ± 23	42 ± 22	-	-	1294 ± 119	547 ± 63
	-13.5	205 ± 12	86 ± 3	180 ± 13	123 ± 15	40 ± 14	44 ± 24	-	-	1072 ± 91	416 ± 39
	-14.0	174 ± 25	62 ± 4	171 ± 13	98 ± 4	43 ± 11	29 ± 11	-	-	805 ± 58	275 ± 28
G+M	-13.0	-	-	358 ± 19	173 ± 7	139 ± 30	67 ± 33	509 ± 39	268 ± 40	1298 ± 114	705 ± 49
	-13.5	-	-	282 ± 45	156 ± 23	118 ± 32	64 ± 30	376 ± 79	205 ± 31	1056 ± 64	511 ± 54
	-14.0	-	-	221 ± 19	129 ± 9	125 ± 25	65 ± 28	313 ± 28	132 ± 31	754 ± 46	327 ± 35
PC+M	-13.0	-	-	137 ± 17	144 ± 5	-	-	-	-	618 ± 90	626 ± 32
	-13.5	-	-	104 ± 18	135 ± 19	-	28 ± 17	-	-	592 ± 89	481 ± 23
	-14.0	-	-	98 ± 15	118 ± 20	2 ± 2	19 ± 10	-	-	555 ± 70	354 ± 30
G+M+A	-13.0	-	-	513 ± 41	316 ± 19	368 ± 56	280 ± 66	438 ± 44	357 ± 50	678 ± 63	466 ± 34
	-13.5	-	-	479 ± 36	263 ± 18	374 ± 39	228 ± 39	438 ± 21	278 ± 27	642 ± 84	382 ± 43
	-14.0	-	-	428 ± 16	215 ± 23	334 ± 30	185 ± 23	404 ± 27	200 ± 18	589 ± 71	330 ± 25
P+G+M	-13.0	225 ± 26	49 ± 13	280 ± 28	179 ± 8	62 ± 16	99 ± 38	339 ± 12	220 ± 24	1498 ± 101	757 ± 69
	-13.5	165 ± 41	36 ± 11	219 ± 40	200 ± 12	50 ± 22	84 ± 34	223 ± 36	171 ± 18	1171 ± 119	509 ± 61
	-14.0	94 ± 17	10 ± 0.4	163 ± 17	117 ± 17	75 ± 23	60 ± 19	219 ± 23	115 ± 15	925 ± 102	288 ± 39
P+PC+M	-13.0	148 ± 21	43 ± 19	181 ± 33	141 ± 31	22 ± 10	45 ± 19	-	-	1101 ± 148	628 ± 55
	-13.5	121 ± 20	42 ± 9	172 ± 6	128 ± 32	19 ± 3	44 ± 17	-	-	933 ± 91	498 ± 29
	-14.0	68 ± 14	29 ± 7	134 ± 21	98 ± 12	13 ± 5	31 ± 13	-	-	722 ± 100	325 ± 28
G+PC+M	-13.0	-	-	275 ± 22	169 ± 22	116 ± 26	44 ± 24	334 ± 15	104 ± 28	1096 ± 87	699 ± 64
	-13.5	-	-	216 ± 22	136 ± 11	89 ± 14	31 ± 13	235 ± 35	71 ± 12	958 ± 82	522 ± 21
	-14.0	-	-	153 ± 7	189 ± 63	77 ± 19	41 ± 15	139 ± 28	44 ± 16	778 ± 79	331 ± 44
P+G+PC+M	-13.0	130 ± 15	34 ± 13	295 ± 32	227 ± 78	122 ± 28	66 ± 28	292 ± 36	96 ± 21	1221 ± 149	688 ± 72
	-13.5	77 ± 13	11 ± 7	214 ± 13	185 ± 37	87 ± 11	57 ± 23	254 ± 22	39 ± 20	1048 ± 102	542 ± 54
	-14.0	61 ± 16	11 ± 6	181 ± 10	146 ± 41	59 ± 12	49 ± 17	211 ± 21	43 ± 7	821 ± 61	357 ± 27

Table S3

Average utilization rates of pyruvate and malate, average appearance rates of aspartate and 2-oxoglutarate, and average oxygen consumption rates in rat and sparrow mitochondria.