Table S1. **Electrical properties of transverse muscle fibers from tentacles and arms (Mean ± SD and (range)).** Passive properties (R_m, C_{in}, and R_s) were determined as described elsewhere (Armstrong & Gilly, 1992). $G_{max\text{-}slope}$ was estimated for G_{Na}, and $G_{max\text{-}fit}$ was estimated for both G_{Na} and G_K as described in Methods. Significant differences between tentacle and arm fibers are indicated by asterisks (* = p < 0.01; 2-tailed T-test). All differences in G_{max} are highly significant (** = p<0.0001). Differences in G_{max} for G_{Na} between 480Na//220Na and 460Na//300K are marginally significant in tentacle fibers (p = 0.049), but they are significant for arm fibers (p < 0.01). Differences in the four G_{Na} parameters for tentacle fibers determined with an inactivating-prepulse procedure vs. no prepulse were not significant (0.58 < p < 0.85).

	R_{in} (Gohm)	C_{in} (pF)	R_s (Mohm)	$G_{max\text{-}slope}$ (nS/pF)	$G_{max\text{-}fit}$ (nS/pF)	$V_{1/2}$ (mV)	k (mV)
Tentacle G_{Na} 480Na//220Na (n=11)	1.5 ± 0.7	11.7 ± 3.7	4.3 ± 1.9	**1.8 ± 0.5**** (1.2 – 2.7)	**1.9 ± 0.5**** (1.3 – 2.6)	-10.7 ± 2.6* (-15.4 – -5.6)	8.0 ± 2.0 (6.3 – 12.6)
460Na//300K (n=19)	0.7 ± 0.6	15.4 ± 7.1	3.7 ± 2.4	**2.6 ± 1.1**** (1.5 – 4.8)	**2.6 ± 1.1**** (1.5 – 5.0)	-1.2 ± 6.1 (-11.2 – 9.9)	8.0 ± 1.2 (6.4 – 11.6)
Overall (n=30)	1.1 ± 0.8	13.5 ± 5.7	3.9 ± 2.3	**2.3 ± 0.9****	**2.4 ± 0.9****	-4.6 ± 6.4.7	8.0 ± 1.6
Arm G_{Na} 480Na//220Na (n=6)	2.2 ± 1.1	10.8 ± 2.1	6.7 ± 3.1	0.3 ± 0.1 (0.2 – 0.5)	0.3 ± 0.1 (0.2 – 0.5)	-15.5 ± 3.2 (-21.0 – -11.1)	6.8 ± 1.0 (5.8 – 8.6)
460Na//300K (n=13)	0.8 ± 0.4	14.0 ± 7.1	4.6 ± 2.5	0.1 ± 0.2 (0.0 – 0.4)	0.1 ± 0.2 (0.0 – 0.4)	-2.3 ± 3.3 (-9.6 – 1.5)	7.0 ± 2.8 (4.3 – 11.1)
Overall (n=19)	1.3 ± 0.9	13.0 ± 6.1	5.20 ± 2.8	0.2 ± 0.2	0.2 ± 0.2	-8.0 ± 7.5	6.9 ± 2.2
Tentacle G_K (n=13)	0.7 ± 0.6	16.0 ± 7.0	3.5 ± 2.7		**7.4 ± 2.4**** (4.4 – 12.5)	-8.5 ± 5.9 (-19.6 – 0.3)	7.5 ± 1.2* (5.6 – 9.3)
Arm G_K (n=12)	0.8 ± 0.4	13.9 ± 7.4	4.8 ± 2.5		2.5 ± 1.1 (0.6 – 4.1)	- 11.9 ± 7.0 (-25.6 – -0.1)	9.3 ± 1.3 (7.7 – 12.2)

Table S2. Kinetic properties of I_{Na} recorded in tentacle transverse muscle fibers [means ± SD (n)] and in giant fiber lobe neurons from the same species of squid (*Doryteuthis opalescens*). See Methods for details. Values for giant fiber lobe neurons (GFL, n=2) were obtained by graphical analysis of plots used in conjunction with preparation of a previously publishes study (Gilly et al., 1997). GFL neuron codes are 04SEP93P.GFL and 21MY92G.GFL. Recording condition (temperature and solutions) were essentially identical to those used in the present study for tentacle muscle fibers. Values for τ ON were determined by fitting a single exponential between cursors placed at time of peak I_{Na} and at the time of 0.75 peak I_{Na} (i.e., the final 25% of the rise of I_{Na} to the peak was fitted). Values for τ inactivation were determined in a similar manner with cursors positioned after the time of peak I_{Na} and after return of I_{Na} to the zero baseline. Fitting was carried out using the standard exponential fitting routine of Clampfit 9.0 employing a sum-of-squared-errors minimization method and a 4 point Chebyshev smoothing filter.

V	$t_{1/2}$ ON		τ ON		τ inactivation	
	Tentacle	**GFL**	**Tentacle**	**GFL**	**Tentacle**	**GFL**
-20	0.580 ± 0.056 (10)	0.602	0.137 ± 0.056 (10)	0.104	1.276 ± 0.260 (10)	1.950
-10	0.510 ± 0.053 (6)	0.500	0.088 ± 0.018 (6)	0.098	0.948 ± 0.121 (6)	1.225
0	0.426 ± 0.047 (6)	0.393	0.078 ± 0.042 (6)	.078	0.790 ± 0.130 (6)	0.900
10	0.457 ± 0.42 (6)	0.352	0.053 ± 0.014 (4)	.062	0.612 ± 0.124 (6)	0.750
20		0.315		0.45		0.600
30	0.244 ± 0.048 (10)		0.0410 ± 0..011 (9)	.054	0.372 ± 0.096 (10)	0.550
40	0.257 ± 0..060 (6)	0.305	0.045 ± 0.007 (6)	0.044	0.365 ± 0.0422 (6)	0.525
50	0.256 ± 0.058 (6)	.0270	0.041 ± 0.007 (6)	0.395	0.333 ± 0.018 (6)	0.475

Table S3. Kinetic properties of voltage-dependent K conductance (G_K) in transverse muscle fibers of tentacle vs. arm. V_m is membrane potential after correcting V_p (= + 10 mV) for series-resistance error estimated at the time of peak I_K (See Methods). Half-time to peak I_K ($t_{1/2}$) and time constant of final 25% (τ_{ON}) were measured as defined in same manner as for measuring properties of I_{Na} (Fig. 4). Activating pulses were 20 or 50 ms long from a holding potential of -70 or -80 mV. The time constant of deactivation (τ_{OFF}) was measured at -70 mV. Only values of τ_{ON} in tentacle and arm fibers are significantly different at **p < 0.01*.** Values for the tentacle fiber discussed in conjunction with Fig. 6 (AUG1117C*) are included to indicate that measurements made in the absence (No TTX) and presence of TTX (+TTX) are in general agreement. These values are not included in the mean, because the activating pulse was only 10 ms long.

	V_p (mV)	V_m (mV)	$t_{1/2}$ (ms)	τ_{ON} (ms)	τ_{OFF} (-70 mV)
Tentacle					
AUG1117C* No TTX	10	2.3	2.56	2.22	3.12
AUG1117C* TTX	10	0.8	3.02	2.28	
AUG0817A	10	1.2	3.15	3.10	4.14
JUL2017C	10	1.1	2.54	3.58	7.72
JUL2817B	10	1.0	2.75	3.71	5.40
Mean ± SD (n=3)		1.1 ± 0.1	2.81 ± 0.31	3.46 ± 0.32	5.74 ± 1.81
Arm					
JUL1917A	10	0.8	1.94	0.97	3.72
JUL1917C	10	6.0	1.83	0.94	3.13
JUL1917D	10	5.2	2.04	1.32	3.71
JUL3117A	10	7.8	3.43	2.18	7.34
JUL3117B	10	7.7	3.15	2.00	5.03
AUG3017A	10	7.4	1.57	0.65	2.23
AUG3017B	10	6.4	1.66	0.70	1.91
SEP0217A	10	3.3	1.76	1.64	
SEP0217C	10	4.4	1.90	2.83	
Mean ± SD (n=9)		5.4 ± 2.3	2.14 ± 0.67	1.47 ± 0.75	3.87 ± 1.85
p		0.011	0.133	**0.0014***	0.176

Table S4. Properties of action potentials and values of G$_{max-fit}$ for G$_{Na}$ of individual transverse muscle fibers. RP is the resting set manually. V$_{peak}$ is voltage at the peak of the action potential, or in the case of arm fibers where the estimate of dV/dt Rise was made. G$_{max-fit}$ was determined as described in Methods. dV/dt Rise* is dV/dt Rise corrected for the effect of the depolarizing current pulse (See Methods).It was not possible to measure G$_{Na}$ in fiber AUG3117X*, because a high series resistance of the pipette prevented adequate voltage control. The number in parenthesis indicates the number of measurement series made.

Cell	R$_{in}$ (mV)	RP (mV)	V$_{peak}$ (mV)	G$_{max-fit}$ (ns/pF)	dV/dt Rise (mV/ms)	dV/dt Rise* (mV/ms)	dVdt Fall mV/ms
Tentacle							
AUG0817A (2)	260.0	-80.5	44.0	5.04	106.89	70.20	-135.31
AUG3117C (2)	116.0	-68.0	38.1	2.46	79.14	66.56	-77.13
AUG3117A (2)	423.9	-68.7	44.5	3.41	77.17	58.37	-77.62
AUG3117B (4)	165.1	-69.9	39.6	1.63	80.23	68.63	-106.12
AUG3117X* (3)	859.5	-69.8	9.7		49.28	27.14	-55.49
MAY1918B (2)	420.2	-79.5	27.2	1.67	38.62	10.38	-29.12
MAY1918C (1)	317.6	-83.5	37.6	3.02	49.64	27.97	-43.77
MAY1918D (2)	418.9	-69.5	40.1	2.94	56.92	44.55	-48.10
AUG0817B (1)	1729.4	-77.0	22.1	1.50	47.04	6.65	-55.95
Arm							
SEP0217A (1)	1526.0	-68.4	44.5	0.19	29.13	0.51	-17.55
SEP0217C (1)	358.9	-66.0	38.6	0.00	16.85	0.00	-5.67
MAY1918A (1)	361.1	-83.8	41.8	0.00	25.93	1.73	-16.00
MAY1818A (1)	1157.0	-71.1	50.8	0.32	36.52	0.51	-5.79