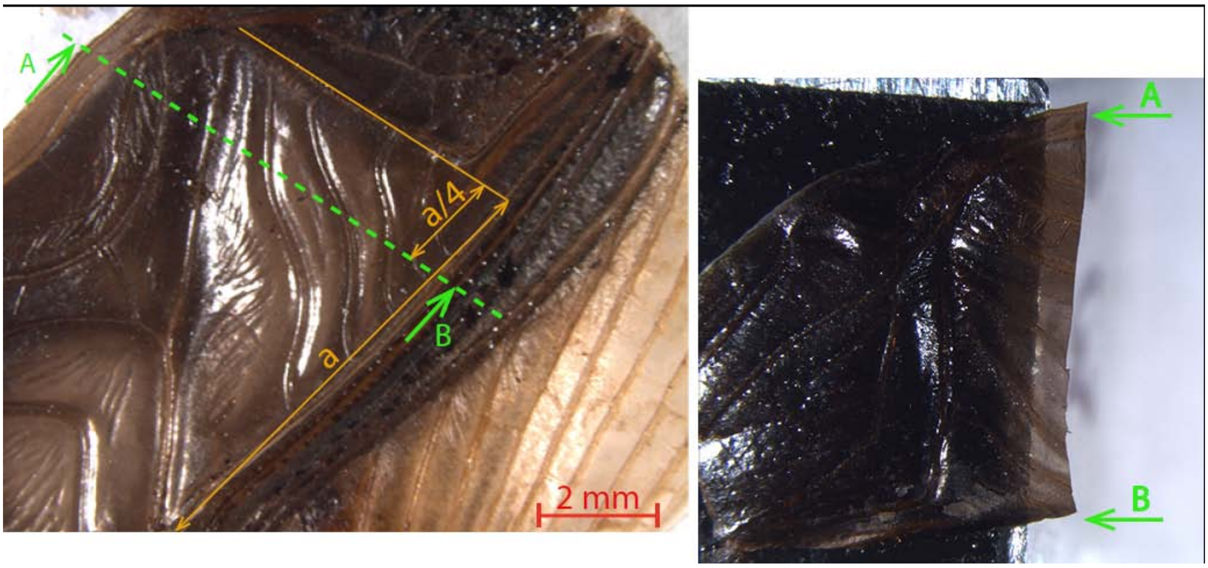

Fig. S1. Details of processing cricket forewings for measurement of harp thickness showing the axis along which the harp was cut.

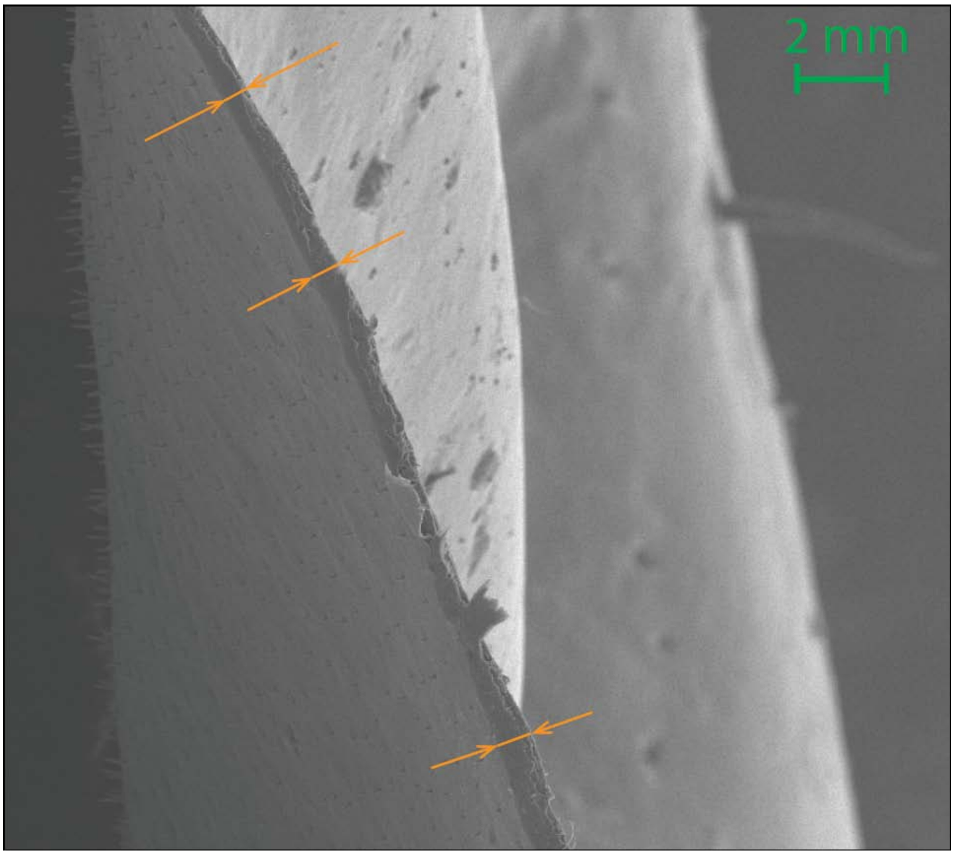

Fig. S2. SEM image of a transversely sectioned harp for thickness measurement.

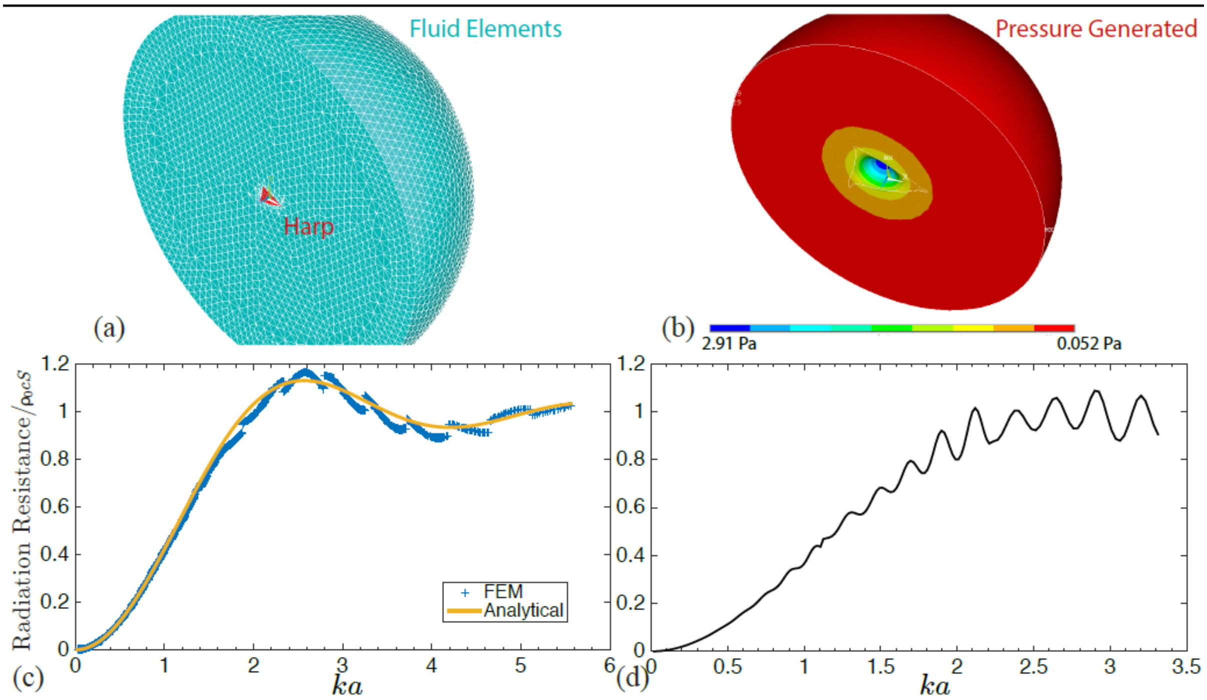

Fig. S3. FEM acoustic simulation: (a) FE model showing the acoustic elements surrounding the harp, (b) simulated sound pressure radiated from the harp, (c) simulated and analytical results of radiation efficiency (radiation resistance/$\rho_0 cS$) from a circular piston (where, ρ_0 is the density of air, c is the speed of sound in air and S is the area of the radiating source), and (d) simulated radiation efficiency (radiation resistance/$\rho_0 cS$) from the harp.

Table S1. Stridulation energetics at high frequencies: Details of calculations leading to values shown in Table 4 of manuscript. In these energetics calculations, we have travelled along two extreme directions - one, where we have kept the thickness constant and decreased the harp area and the other where we have kept the harp area constant and increased the hap thickness.

To achieve a song frequency of 20kHz

Increasing Harp thickness, keeping size constant

Species	Fold-change in rotational energy	Fold increase in stridulation energy	0.7*rotational energy + 0.3*stridulation energy		Song Frequency	Fold change of thickness = Fold change of mass		Plectrum Speed	Fold change in rotational speed =120 (since this is plectrum speed needed to excite a file with tooth spacing of 12microns at 20kHz)/scaled plectrum speed	Fold change in rotational energy		Tooth spacing	Fold change in stridulation energy (If tooth spacing becomes 12microns from a larger spacing, more teeth need to be struck, proprtionately increasing the energy required for strudulation)	
Gryllodes sp.	11.70	1.8	8.73		5.88	3.40		64.7	1.85	11.70		22	1.8	
T. portentosus	1.47	8.8	3.67		4.12	4.85		218	0.55	1.47		106	8.8	
G. bimaculatus	7.19	3	5.94		4.98	4.02		89.7	1.34	7.19		36	3.0	

Decreasing Harp size, keeping thickness constant

	Fold-change in rotational energy	Fold increase in stridulation energy	0.7*rotational energy + 0.3*stridulation energy		Song Frequency	Fold change of Area (current song frequency/10 kHz) = Fold change of mass	Fold change in size (square root of area fold change)	Plectrum Speed	Scaled plectrum speed (due to scaled plectrum radius)	Fold change in rotational speed =120 (since this is plectrum speed needed to excite a file with tooth spacing of 12microns at 20kHz)/scaled plectrum speed	Fold change in rotational energy	Tooth spacing	Scaled file spacing (assuming allometric scaling)	Fold change in stridulation energy (If tooth spacing becomes 12microns from a larger spacing, more teeth need to be struck, proprtionately increasing the energy required for strudulation)
Gryllodes sp.	3.44	1	2.71		5.88	0.29	0.54221767	64.7	35.08148315	3.42	3.44	22	11.92878871	1.0
T. portentosus	0.3	4	1.41		4.12	0.21	0.45387223	218	98.94414586	1.21	0.30	106	48.11045624	4.0
G. bimaculatus	1.79	1.5	1.70		4.98	0.25	0.498999	89.7	44.76021012	2.68	1.79	36	17.96396393	1.5

To achieve a song frequency of 10kHz

Increasing Harp thickness, keeping size constant

	Fold-change in rotational energy	Fold increase in stridulation energy	0.7*rotational energy + 0.3*stridulation energy		Song Frequency	Fold change of thickness = Fold change of mass		Plectrum Speed	Fold change in rotational speed =120 (since this is plectrum speed needed to excite a file with tooth spacing of 12microns at 20kHz)/scaled plectrum speed	Fold change in rotational energy		Tooth spacing	Fold change in stridulation energy (If tooth spacing becomes 12microns from a larger spacing, more teeth need to be struck, proprtionately increasing the energy required for strudulation)	
Gryllodes sp.	1.46	1.8	1.56		5.88	1.70		64.7	0.93	1.46		22	1.8	
T. portentosus	0.18	8.8	2.77		4.12	2.43		218	0.28	0.18		106	8.8	
G. bimaculatus	0.9	3	1.53		4.98	2.01		89.7	0.67	0.90		36	3.0	

Decreasing Harp size, keeping thickness constant

	Fold-change in rotational energy	Fold increase in stridulation energy	0.7*rotational energy + 0.3*stridulation energy		Song Frequency	Fold change of Area (current song frequency/10 kHz) = Fold change of mass	Fold change in size (square root of area fold change)	Plectrum Speed	Scaled plectrum speed (due to scaled plectrum radius)	Fold change in rotational speed =120 (since this is plectrum speed needed to excite a file with tooth spacing of 12microns at 20kHz)/scaled plectrum speed	Fold change in rotational energy	Tooth spacing	Scaled file spacing (assuming allometric scaling)	Fold change in stridulation energy (If tooth spacing becomes 12microns from a larger spacing, more teeth need to be struck, proprtionately increasing the energy required for strudulation)
Gryllodes sp.	0.86	1.41	1.03		5.88	0.59	0.76681158	64.7	49.61270926	1.21	0.86	22	16.86985477	1.41
T. portentosus	0.08	5.67	1.76		4.12	0.41	0.64187226	218	139.928153	0.43	0.08	106	68.03845971	5.67
G. bimaculatus	0.45	2.12	0.95		4.98	0.50	0.70569115	89.7	63.30049621	0.95	0.45	36	25.40488142	2.12

Table S2. In these energetics calculations, we have investigated an intermediate combination of thickness increase together with decreased harp size to arrive at the energy required to call at 20kHz and 10kHz.

To achieve a song frequency of 20kHz																
Decreasing Harp size, and increasing thickness 2 fold																
	Fold-change in rotational energy	Fold increase in stridulation energy	0.7*rotational energy + 0.3*stridulation energy		Song Frequency	Fold change of thickness	Fold change of Area	Fold change of Mass = Fold change of thickness * Fold change of Area	Fold change in size (square root of area fold change)	Plectrum Speed	Scaled plectrum speed (due to scaled plectrum radius)	Fold change in rotational speed =120 (since this is plectrum speed needed to excite a file with tooth spacing of 12microns at 20kHz)/scaled plectrum speed	Fold change in rotational energy	Tooth spacing	Scaled file spacing (assuming allometric scaling)	Fold change in stridulation energy (If tooth spacing becomes 12microns from a larger spacing, more teeth need to be struck, proprtionately increasing the energy required for strudulation)
Gryllodes sp.	6.88	1.4	5.24		5.88	2	0.59	1.18	0.766812	64.7	49.61270926	2.42	6.88	22	16.86985477	1.4
T. portentosus	0.61	5.7	2.13		4.12	2	0.41	0.82	0.641872	218	139.928153	0.86	0.61	106	68.03845971	5.7
G. bimaculatus	3.58	2.1	3.14		4.98	2	0.50	1.00	0.705691	89.7	63.30049621	1.90	3.58	36	25.40488142	2.1
Decreasing Harp size 0.6 fold, and increasing thickness																
Gryllodes sp.	7.02	1.4	5.34		5.88	2.04	0.60	1.22	0.774597	64.7	50.1164045	2.39	7.02	22	17.04112672	1.4
T. portentosus	0.88	6.8	2.67		4.12	2.91	0.60	1.75	0.774597	218	168.8620739	0.71	0.88	106	82.10724694	6.8
G. bimaculatus	4.31	2.3	3.72		4.98	2.41	0.60	1.45	0.774597	89.7	69.48132123	1.73	4.31	36	27.88548009	2.3

To achieve a song frequency of 10kHz																
Decreasing Harp size, and increasing thickness 1.5 fold																
	Fold-change in rotational energy	Fold increase in stridulation energy	0.7*rotational energy + 0.3*stridulation energy		Song Frequency	Fold change of thickness	Fold change of Area	Fold change of Mass = Fold change of thickness * Fold change of Area	Fold change in size (square root of area fold change)	Plectrum Speed	Scaled plectrum speed (due to scaled plectrum radius)	Fold change in rotational speed =60 (since this is plectrum speed needed to excite a file with tooth spacing of 12microns at 10kHz)/scaled plectrum speed	Fold change in rotational energy	Tooth spacing	Scaled file spacing (assuming allometric scaling)	Fold change in stridulation energy (If tooth spacing becomes 12microns from a larger spacing, more teeth need to be struck, proprtionately increasing the energy required for strudulation)
Gryllodes sp.	1.29	1.7	1.42		5.88	1.5	0.88	1.32	0.939149	64.7	60.76291122	0.99	1.29	22	20.66126811	1.7
T. portentosus	0.11	6.9	2.16		4.12	1.5	0.62	0.93	0.78613	218	171.3762877	0.35	0.11	106	83.32975459	6.9
G. bimaculatus	0.67	2.6	1.25		4.98	1.5	0.75	1.12	0.864292	89.7	77.52695809	0.77	0.67	36	31.11449823	2.6
Decreasing Harp size 0.75 fold, and increasing thickness																
Gryllodes sp.	1.10	1.6	1.24		5.88	1.28	0.75	0.96	0.866025	64.7	56.03184362	1.07	1.10	22	19.05255888	1.6
T. portentosus	0.14	7.6	2.39		4.12	1.82	0.75	1.37	0.866025	218	188.793538	0.32	0.14	106	91.7986928	7.6
G. bimaculatus	0.67	2.6	1.25		4.98	1.51	0.75	1.13	0.866025	89.7	77.68247872	0.77	0.67	36	31.17691454	2.6