



Figure S1. Frequency spectra of the calling song of 12 brachypterous Lebinthini species (genera *Agotecous* and *Lebinthus*). The spectral compositions show the same general profile across the species, with a weak low frequency peak (green arrow), harmonically related (approximately half the value) to the dominant frequency peak (red arrow). Further integer multiples of the green peak are visible in some species (ex: *A. azurensis*, *A. yahoue*, *A. obscurus*), suggesting that the green peak is the fundamental frequency of a harmonic series. However the results presented here for *A. robustus* suggest that the tooth strike rate of the system correspond to the red peak, i.e. the dominant frequency, which is then the real fundamental frequency generated by the stridulation. The green peak and subsequent uneven peaks are thus not part of the formal harmonic series (we refer at these peaks in the song as ghost frequencies).