

# Bugging Out!

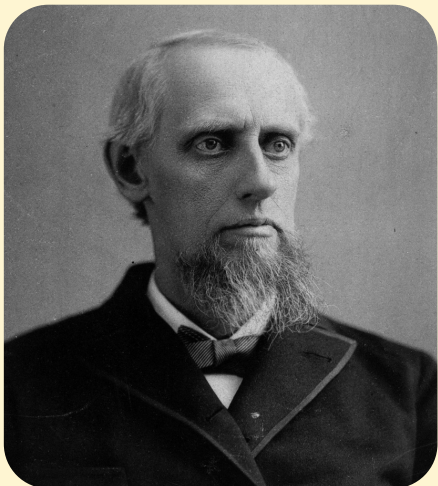


## An Insect Orchestra

Humans aren't the only musicians of the animal kingdom. Step outside during the summer months and you are sure to be greeted by a chorus of chirps and trills. The creators of many of these sounds are insects such as grasshoppers, crickets and katydids. So, what's up with these nightly concerts? Just like most humans, these types of insects communicate with each other through sound. When we hear these thrumming serenades, we can typically attribute them to certain insects attracting a mate. Who says romance is dead?!

We know why these insects make noise, now let's find out how. No, they don't build tiny instruments. Instead they create their sounds through something called stridulation. Stridulation is the act of creating sound by rubbing together specialized body parts. One of these parts, known as the file, consists of a series of ridges. The other part, called the scraper, is a flat edge which the file is quickly rubbed across. This action creates vibrations that we are able to hear.

Now that we understand how stridulation works, let's give it a try ourselves!



## Scientist Spotlight

American inventor **Amos Emerson Dolbear** (1837-1910) was among the first to acknowledge the correlation between temperature and the chirping of crickets. He published his findings in the November 1897 issue of *The American Naturalist* journal. Interestingly, while his entomological endeavors are well known, his primary area of study was in telecommunication, a field to which he contributed greatly. In fact, he even claimed to have invented the telephone before Alexander Graham Bell!

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## Stridulation Simulation

The file and scraper are located on the wings of crickets. They are able to chirp by quickly rubbing them together. Unfortunately, humans don't have files, scrapers or wings so we will need to get creative in order to make our own stridulations. Do you think that your simulated stridulations will sound exactly like a cricket? How about a grasshopper or a katydid?

### What You'll Need

- An object with ridges (water bottle, comb, etc.)
- A popsicle stick, pencil or similar object



### What You'll Do

- In one hand, hold your ridged object. This will be your file.
- In the other hand, hold your popsicle stick. This will be your scraper.
- Run your scraper across your file. What do you hear?
- Different species of crickets, grasshoppers and katydids make different sounding stridulations. Try changing the speed and amount of pressure you are using, your file and scraper materials and your pattern to create variations that result in a different sounding stridulations.
- With permission, visit this site to hear the stridulations of a few different species of insects: <http://songsofinsects.com/insect-song-interactive>. Now see if you can use your materials to create stridulations like the insects you heard!



**CRICKET**



**GRASSHOPPER**



**KATYDID**





## Bugging Out!

### Use Crickets to Take the Temperature!

Wow! We have learned all about stridulation, but did you know cricket chirps can be used to estimate the temperature? An estimate means to find something close to the correct answer. Because crickets are cold-blooded, they gain energy as the temperature rises, allowing them to stridulate quicker. The opposite is also true. As the temperature goes down, so does the rate at which crickets chirp. Do you think you'll get an accurate temperature reading using a cricket?

#### What You'll Need

- A place where you can hear crickets
- Thermometer
- Stopwatch (most cell phones have one built in)
- Pencil and paper to record your data

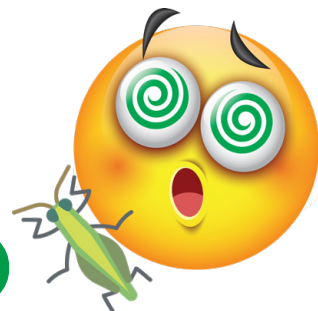
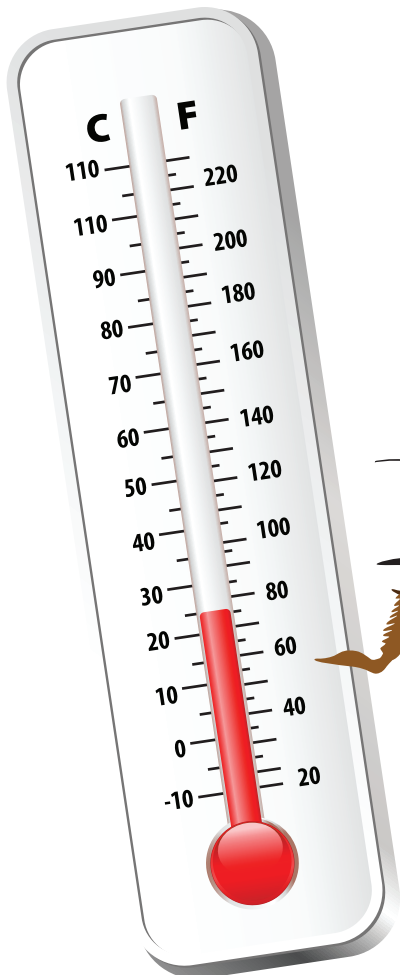
#### What You'll Do

- Once you have found a good location, focus your hearing on the chirps of an individual cricket.
- Start your stopwatch and count the number of chirps you hear in 14 seconds.
- Write down this number so you don't forget it.
- Take your number of chirps and add 40 to it. This will give you an estimated temperature in degrees Fahrenheit.
- Repeat this process at least two more times. Do your trials all look the same?
- Now test your cricket thermometer against a traditional one. How close were your temperature readings?

#### Learn More!

We're not trying to bug you ... oh, wait! Yes, we are! To learn even more about how insects communicate with odors, vision and sounds, check out this Naturalist Outreach video created by Cornell University students:

[www.youtube.com/watch?v=FEHbY-ZkzVo](http://www.youtube.com/watch?v=FEHbY-ZkzVo).



Time to bug out!