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Dolbear's law

Dolbear's law states the relationship between the air temperature and the rate at which crickets chirp.[1][2] It was formulated by Amos Dolbear and published in 1897 in an article called "The Cricket as a Thermometer".[3] Dolbear's observations on the relation between chirp rate and temperature were preceded by an 1881 report by Margarette W. Brooks,[n 1] although this paper went unnoticed until after Dolbear's publication.[2]

Dolbear did not specify the species of cricket which he observed, although subsequent researchers assumed it to be the snowy tree cricket, "*Oecanthus niveus*".[1] [2] However, the snowy tree cricket was misidentified as *O. niveus* in early reports and the correct scientific name for this species is *Oecanthus fultoni*.[4]

The tree cricket *Oecanthus fultoni*

The chirping of the more common field crickets is not as reliably correlated to temperature—their chirping rate varies depending on other factors such as age and mating success. In many cases, though, the Dolbear's formula is a close enough approximation for field crickets, too.

Contents

Equations

Dolbear expressed the relationship as the following formula which provides a way to estimate the temperature T_F in degrees Fahrenheit from the number of chirps per minute N_{60}:

$$T_F = 50 + \left(\frac{N_{60} - 40}{4} \right).$$

This formula is accurate to within a degree or so when applied to the chirping of the field cricket.

Counting can be sped up by simplifying the formula and counting the number of chirps produced in 15 seconds (N_{15}):

$$T_F = 40 + N_{15}$$

Reformulated to give the temperature in degrees Celsius (°C), it is:

$$T_C = 10 + \left(\frac{N_{60} - 40}{7} \right).$$

A shortcut method for degrees Celsius is to count the number of chirps in 8 seconds (N_8) and add 5 (This is fairly accurate between 5 and 30°C):

$$T_C = 5 + N_8$$

The above formulae are expressed in terms of integers to make them easier to remember—they are not intended to be exact.

In popular culture

This formula was referenced in an episode (Season 3, Episode 2, "The Jiminy Conjecture") of the American TV sitcom *The Big Bang Theory* (although Sheldon referred to Amos Dolbear as Emile Dolbear and gave the year of publication as 1890). It is also referenced in two episodes ("Highs and Lows", "Jungles") of the British comedy show QI.

See also

- Arrhenius equation

Notes

1. According to Frings and Frings, this is: Margarette W. Brooks, "Influence of temperature on the chirp of the cricket", *Popular Science Monthly* 20 (1881), p. 268; citing "W.G.B.", a writer whom Brooks does not further identify.

References

1. Frings, Hubert; Frings, Mable (1957). "The effects of temperature on chirp-rate of male cone-headed grasshoppers, Neoconocephalus ensiger" (http://onlinelibrary.wiley.com/doi/10.1002/jez.1401340302/abstract). *Journal of Experimental Zoology*. **134** (3): 411–425. doi:10.1002/jez.1401340302 (https://doi.org/10.1002%2Fjez.1401340302). Retrieved 27 November 2012.

2. Frings, Hubert; Frings, Mable (1962). "Effects of temperature on the ordinary song of the common meadow grasshopper, Orchelimum vulgare (Orthoptera: Tettigoniidae)" (http://onlinelibrary.wiley.com/doi/10.1002/jez.1401510104/abstract). *Journal of Experimental Zoology*. **151** (1): 33–51. doi:10.1002/jez.1401510104 (https://doi.org/10.1002%2Fjez.1401510104). Retrieved 27 November 2012.

3. Dolbear, Amos (1897). "The cricket as a thermometer" (https://books.google.com/books?id=Jqco0ttVn0gC&lpg=PA970&ots=jVb2ir2UK1&dq=%22The%20Cricket%20as%20a%20Thermometer%22&pg=PA970#v=onepage&q=%22The%20Cricket%20as%20a%20Thermometer%22&f=false). *The American Naturalist*. **31**: 970–971. doi:10.1086/276739 (https://doi.org/10.1086%2F276739). Retrieved 27 November 2012.

4. Walker, Thomas J. (1962). "The Taxonomy and Calling Songs of United States Tree Crickets (Orthoptera: Gryllidae: Oecaiithinae). I. The Genus *Neoxabea* and the *niveus* and *varicornis* Groups of the Genus *Oecanthus*" (http://entnemdept.ifas.ufl.edu/Walker/buzz/s576lw62.pdf) (PDF). *Annals of the Entomological Society of America*. Entomological Society of America. **55** (3): 303–322. Retrieved 27 November 2012.

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