*Data Extraction Protocol*

1. Enter **Genus** and **Species** as they are stated in the paper. If the taxonomic name has been updated since the paper was published use the updated nomenclature.

2. **Parameter\_value** should be the estimated value of either CTmax, CTmin, LT50, TEL50 or some other measure of species tolerance to heat or cold. The unit here is °C.

3. **Parameter**\_(tmax\_or\_tmin) indicate whether the parameter\_value is an estimate of upper (tmax) or lower (tmin) thermal tolerance.

4. **Error\_estimate** numerical estimate of the error associated with the parameter\_value. This should only be included if it is present in the paper or if it can be calculated from the raw data.

5. **Error\_type** indicates whether standard deviation (SD), standard error (SE), or 95% confidence (CI) intervals were used to estimate the error associated with the parameter\_value.

6. **Sample\_size** indicates the number of individuals that were tested to estimate the parameter\_value. If a range of sample sizes is given, write the range in this column (i.e 10-20).

7. **Metric\_type** there are different methods of measuring species’ thermal limits. If a ramping rate is used along with behavioural endpoints (i.e. onset of spasms, loss of muscular control, righting ability) then indicate *critical*. If the parameter\_value indicates the temperature at which the individual being tested dies, or a percent of individuals die (as in LT50), indicate *lethal*.

8. **Ramping\_rate** for experiments which test critical thermal limits, indicate the rate at which the temperature was increased until the individual reached a predetermined behavioural endpoint. This rate should be converted to °C/min if it is not already in these units in the paper.

9. **Ramping\_rate\_to\_reach\_ST** for certain studies a ramping rate is used to reach the starting temperature for lethal experiments. This is often done to avoid shock. This ramping rate is not the same as the one used for critical thermal limit experiments, thus it is included in a separate column. This rate should be entered in °C/h.

10. **Duration\_of\_chronic\_exposure** for lethal experiments this column indicates the amount of time that the individuals were exposed to a constant temperature.

11. **Pretreatment\_temp** temperature at which individuals were kept before testing their thermal tolerances.

12. **Pretreatment\_duration** number of days individuals were kept at the pretreatment\_temp before testing their thermal limits.

13. **Temp\_before\_pretreatment** indicates whether individuals were *held* at a constant temperature before testing them or whether they are field fresh (*FF*).

14. **Timing of collection** season when individuals used for testing were collected. Use the season associated with the hemisphere where individuals were collected.

15. **Lat\_of\_collection** latitude in decimal degrees where individuals were collected. If latitude is not provided in the paper look up the provided locality using the following link:<https://www.latlong.net/>. If the collection locality covers a large geographic area (i.e. London) use the centroid of the area.

16. **Long\_of\_collection** longitude in decimal degrees where individuals were collected. If longitude is not provided in the paper look up the provided locality using the following link:<https://www.latlong.net/>. If the collection locality covers a large geographic area (i.e. London) use the centroid of the area.

17. **Elevation of collection** elevation in meters where individuals were collected. If not indicated in the paper, look up based on geographic coordinates.

18. **Location description** Names of site, city, province, state, country where individuals were collected. Order from most to least specific. (i.e. Montreal, Quebec, Canada).

19. **REF** reference for paper where the data was extracted from. Written as author\_year.

20. **Life\_stage** indicates on which life stage tests were conducted. For example, adult or larva.

21. **Phylum** – taxonomic phylum of study species, look up if not provided.

22. **Class** – taxonomic class of study species, look up if not provided.

23. **Order** – taxonomic order of study species, look up if not provided.

24. **Family** – taxonomic family of study species, look up if not provided.

25. **Realm\_specific** – specific details on the species habitat (intertidal, subtidal, desert, alpine).

26. **Realm\_general** – indicates whether the species inhabits terrestrial, freshwater, or marine habitats.

27. **Notes** indicate whether there are any inconsistencies or concerns regarding the data.

\*All data entries should be lowercase and spaces should be replaced by underscores, except for in the location\_description and taxonomic classifications (Genus, Class, Family, ect...).

\*\*All missing data should be replaced with NA

\*\*\* Do not include papers which look at seasonal differences (i.e. CTmax in the summer versus the winter).

Dear heavy-lifting grad students of the QCBS working group:

**Intro:**

At the working group I anticipate that we will be analyzing 3 types of within-species data:

1. Thermal tolerance limits measured across different populations **and** different acclimation temperatures,

2. Thermal tolerance limits measured only across different acclimation temperatures, and

3. Thermal tolerance limits measured only across different populations.

As you will see in an email I will send to the whole group, we already have most of the type 1 and 2 data that we think exist based on a cross-check with the Globtherm database.

So, I was hoping that you guys could help with the type 3 data.

**The task:**

In the dropbox folder I have sent to you, there is a spreadsheet "GlobalTherm\_mul\_pop\_for\_extraction.xlsx”, subset from the Globtherm database (a published database on thermal tolerance limits curated by Joanne Bennet, who is part of our group). Each row is a species, and the first 94 rows are the species for which Joanne noted that the paper had population-level variation (as noted in Columns AZ and BA). [The rest of the rows are species for which there was no Y/N note in that column - so they *may* have population-level data, one day we should check, but ignore for now.] Each row has data and a citation for upper thermal limits (Tmax; columns C to U) and data with sometimes a different citation for lower thermal limits (Tmin; columns V to AO). Some species have data for both upper and lower thermal limits, others have only one or the other.

Where you see **your** name in the final column, I am hoping you can go into those papers (see the column REF\_max or REF\_min), and find the original paper (supplied in the dropbox folder “manuscripts\_Globtherm2”). From the paper we are asking you to extract the population-level data for Tmax and/or Tmin. To enter the data, go to “Globtherm2\_within\_species\_template”, and rename it with you initials in the dropbox. You can see my example file with “JS” at the end - I did the last 4 species on our list of 94. In this file, **each upper and lower limit estimate will be entered as a different row**. Don’t fret too much if you can’t fill in each column in that file - it is a bit of a wish list, and sometimes the lat/long/elevation data is not reported and needs to be looked up.

**Some info you will need:**

There are 2 main types of Tmax and Tmin data in these papers: (1) critical limits, which are assess by ramping the temperatures slowly and assessing when the organism loses critical motor function (e.g. loss of equilibrium or inability to right oneself), and (2) lethal limits, assessed by giving the organism a steady, chronic temperate, for some fixed about of time (e.g. 24h), assessing vitality after they are restored to a less stressful temperature, and reporting the temperature at which some fixed proportion of the individuals (e.g. 50%) didn’t survive.

Our plan is to enter the limit as reported in the paper, and then describe which type of thermal limit it is in some of the columns - metric\_type (critical or lethal), metric\_description (how the limit was defined), ramping\_rate (the rate at which temperature was increased or decreased in the critical limit method), and duration\_of\_chronic\_exposure (the duration of the exposure in the lethal limit method).

There are also different ways to “acclimate” the species before the limits are measured, and we want to record this so that the data can be compared. So, if there was an acclimation temperature and duration described before the thermal limit was assessed, that will go in columns: pretreatment\_temp, pretreatment\_duration, temp\_before\_pretreatment (the holding temperature before the acclimation regime started, or you can write “FF" for field-fresh), and timing\_of\_collection (winter/summer of field collection).

Please just email me like crazy if you have any questions - I am sure I am not explaining something. I understand that there may be a learning curve getting used to the data - and on the other hand some of you may be very familiar with these kinds of data. The more you can do collectively, the more prepared we will be on the weekend.