A couple of questions and answers about samples reported as wet weight and dry weight.

Depending on the year, sampling location and species some mercury data are reported as wet weight (WW) and some as dry weight (DW). Different laboratory techniques were used to determine the mercury concentration. You and your students can approximate between the two types of data reported, but it will take some math!

1. **Question:**

"I have a group that wants to compare dragonfly nymphs to fish. Our dragonfly data is in dry weight, and the muscle plug data is wet weight. Do you think these data are comparable for this reason? OR - would the fact that fish muscle plugs are wet cause a problem?"

Response (from Sarah Nelson):

Great question! This is a wonderful opportunity to do math - my favorite!

So, some data includes the weight data as well as Hg data. It includes dry weight of the dragonfly, wet weight of the dragonfly, and then the Hg concentration, reported by Hannah R. as ppm, dry wt.

Because you have wet weight (and the fish data do not have dry wt), you can easily convert the dragonflies to Hg on a wet wt basis, and that will make things more comparable. Very often I've seen fish data presented as wet wt in the literature, so this is a really common issue - scientists working on different organisms have different conventions for reporting data, which makes comparisons tricky, but not impossible.

It's an easy conversion but takes a minute to think through. Dried fruit might work as a metaphor: say you have 10 apricots. Together they weigh 20 ounces. Now dry them out, and you have dried apricots, little shriveled up things. There are still 10 of them, but now they only weigh 2 ounces. So you have 10 apricots per 20 oz wet wt (0.5 apricots/ounce ww), or you could also talk about them as 10 apricots per 2 oz dry wt (5 apricots/ounce dw). Just as a mental image - it seems like you're getting more apricot per ounce in the dry version, but really it's just water that's being added or subtracted.

Anyways, to convert:

Hg (ppm dw) = Hg (ng/g dw)
Then you have mass in grams, both wet and dry.
So, multiply Hg concentration on dry wt basis by dry weight, then divide by wet weight:
Hg (ng/g dw) x ### g dw / ### g ww = Hg (ng/g ww).

You're calculating the ratio of dry to wet weight to change the way it's reported.

In case you're wondering why anyone might ever need to understand this in a real world (not scientific research) context - look at dog food. Ingredients like chicken are defined in different ways. "Chicken" is chicken meat, measured on a wet weight basis. "Chicken meal" is processed, dried, ground chicken, measured on a - you guessed it - dry weight basis. So if you see "Chicken" as the top ingredient, it is mostly water, and ingredients are listed by weight - so it actually might be lower in the ingredient list if you are considering its non-water portion.

Here's an example web site that discussed this, and more detail:

http://www.boxerworld.com/forums/view_choosing-a-good-kibble-dry-dog-food.htm

2. **Question:**

I want to use some of the older data, but it's reported in wet weight, how can I compare it to the samples that are recorded in dry weight? Is there a conversion that I can use?

Response (from Sarah Nelson and Hannah Webber):

"From the best available (limited and variable) data, entomologists have told me that dragonfly larvae are probably about 80% moisture. That makes sense in light of a few samples where we have wet weight and dry weight of the dragonfly.

Compare steak to beef jerky (or grapes to raisins, etc.). Imagine that there is an amount of Hg is in the steak. Now dry out the steak.
What leaves the streak? Water.
Does the Hg leave? Nope, it's bound to the 'matrix' or cells of the critter (the critter called steak in this case!)

So if we weigh the 'steak' before and afterward the weight changes, but the amount of mercury does not. In fact, let's say that only 20% of the original weight is left (aquatic macroinvertebrates are about 80% water).
So if we get the Hg amount (7.4 ppb) and the wet weight (0.2149 g)... (these are numbers from the spreadsheet, not from steak, by the way) then how much Hg do we have in the whole sample?

We had 1.59 ug Hg in the whole sample (7.4 ppb * 0.2149 g). But really (taking out the water) we had 1.59 ug in 20% of that total weight (0.2149 g), so we had 1.59 ug in .043 g (which is 0.2149 g*0.2).
So our concentration is 1.59 ug/0.043g, which is a concentration of 36.91 ug/g.

On the spreadsheet: create 2 new columns...
column 1: you can do Hg ug/g (ww)*sample weight (wet).
column 2: then take that result and multiply that by (sample wet weight*0.2). That will give you a bootstrap dry wt. concentration.

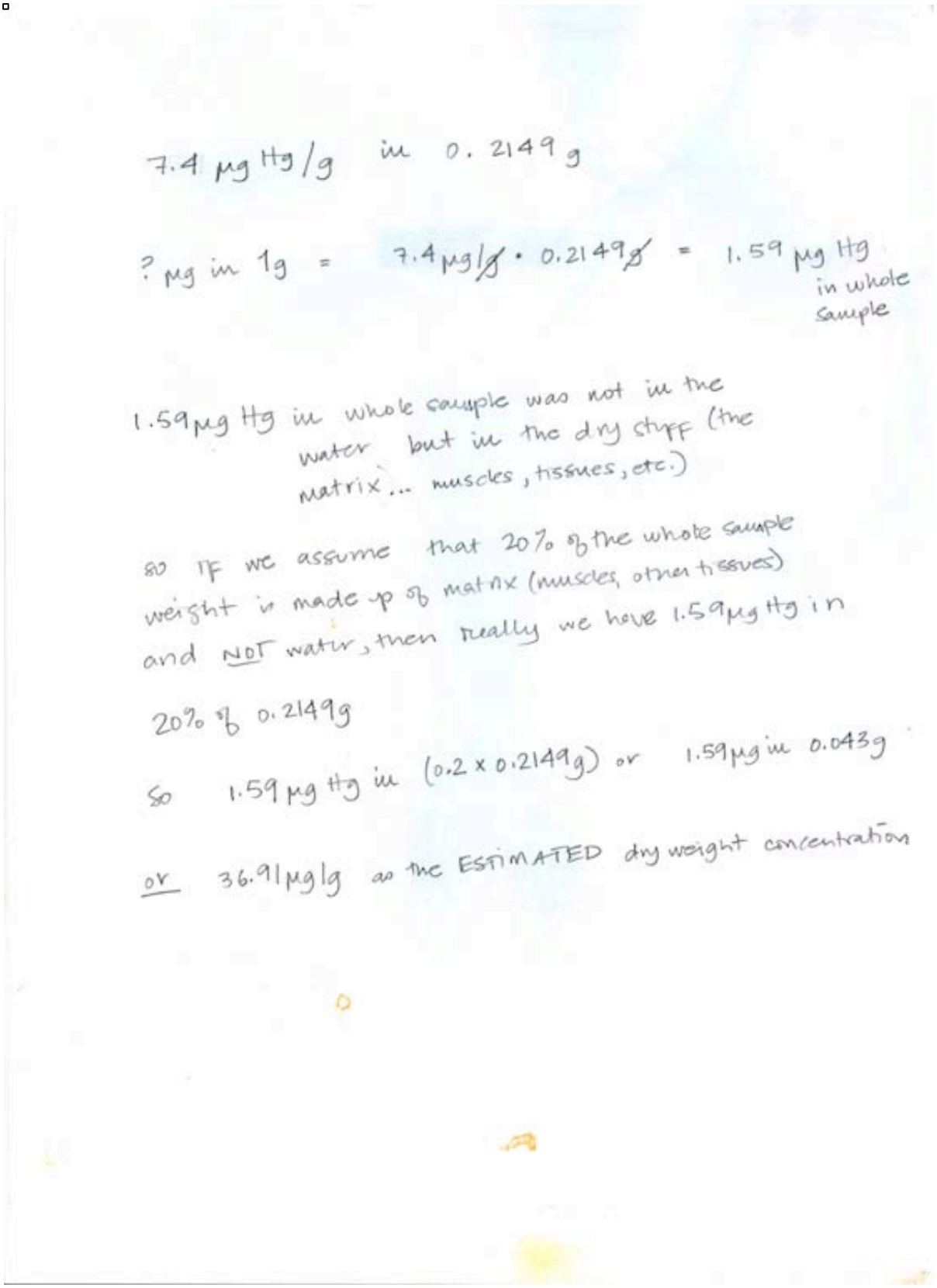

Figure 1: A little math goes a long way