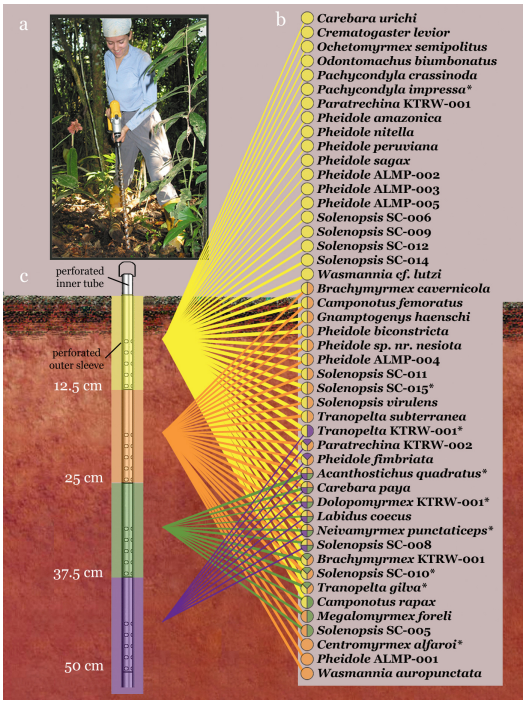
Subterranean Ant Probe:

Instructions and advice



Ryder Wilkie KT, Mertl AL, Traniello JFA. 2007. Biodiversity below ground: probing the subterranean ant fauna of Amazonia. Naturwissenschaften 94 (9): 725-731.

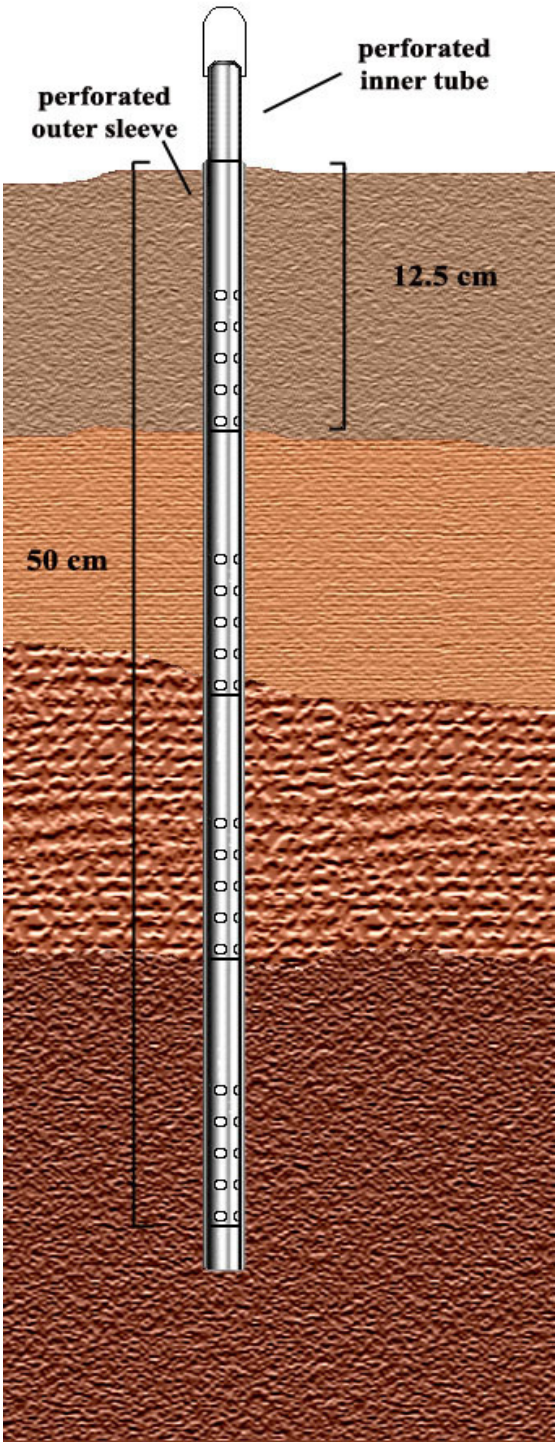


Diagram of probe in the ground

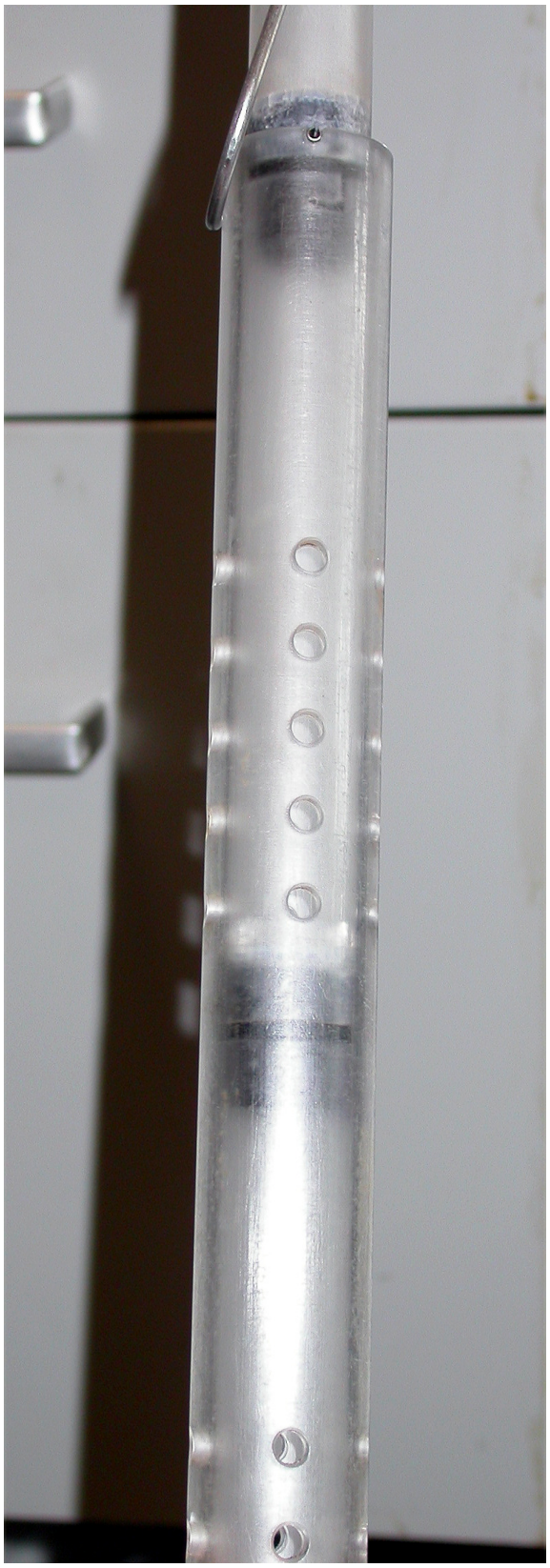
Each section is 12.5cm long. All 4 sections together equal 50cm, plus some unused extra length at top and bottom. The outer tube has an outer diameter of 2.5cm and an inner diameter of 2cm. The inner tube has an outer diameter of 2cm and an inner diameter of 1.5cm. The inner tube should fit securely within the outer sleeve with no loose space between them, while still maintaining its ability to easily slide in and out of its sleeve. ***This will require a good deal of turning on a lathe.***

Photo of probe

Inner tube is inserted into outer sleeve. The purpose of having the outer sleeve is so that you can remove the inner tube quickly and easily, collect your ants, and replace it. Replications are a breeze. The soil is not disturbed. The soil environment can be maintained as close to the original condition as possible, and thus information about vertical stratification of foraging can be collected.

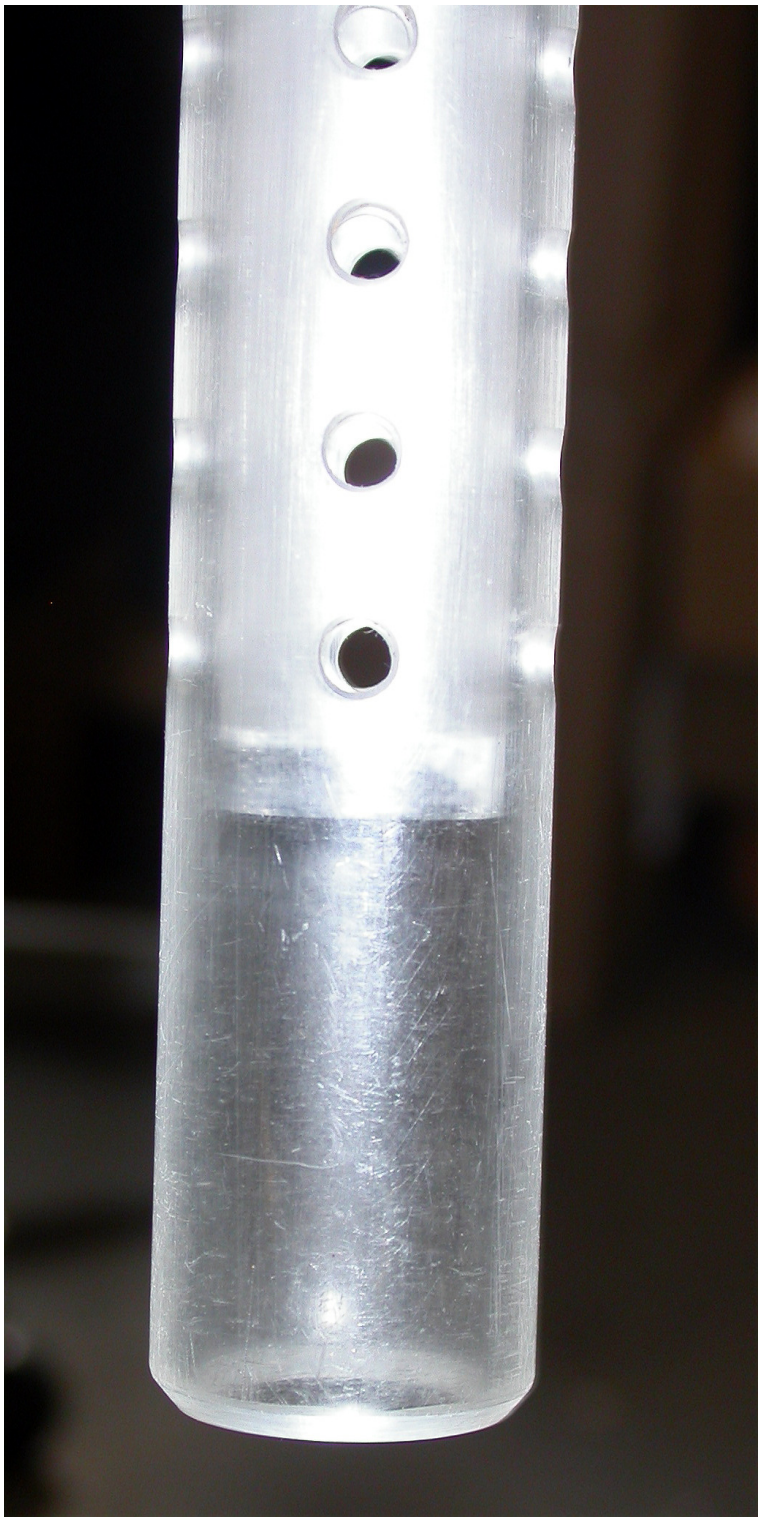
Photo of separated inner tube and outer sleeve

The outer sleeve is one single piece. The inner tube consists of 5 separate sections connected together (the 4 baited sections and the top handle).



Close-up of assembled probe

Note that the holes in the outer sleeve should line up with the holes in the inner tube (even though it doesn't quite look like it in the photo), so that any ant may walk from the soil, through the outer sleeve, and into the inner tube.



Bottom of probe

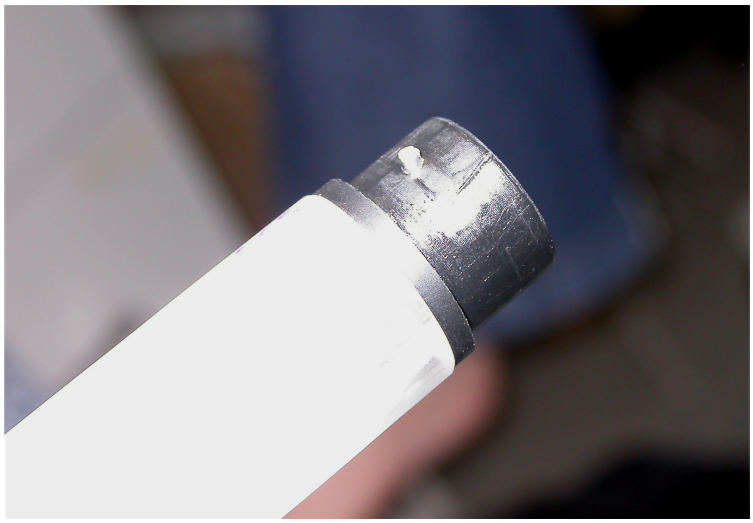
A close-up of the bottom of the assembled probe, showing the small amount of unused space. This is not necessary and can be adjusted.

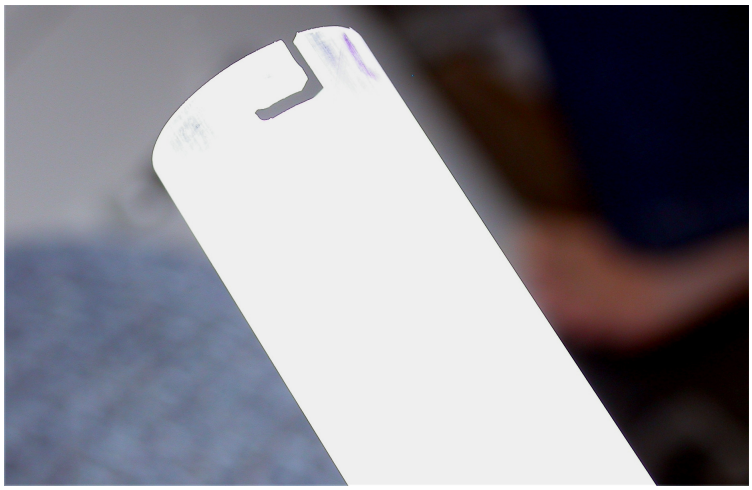
Close-up of top of probe

Top of probe showing the groove in the outer sleeve which receives the spring pin on the inner tube. When connected, this ensures that both tubes are properly aligned so that all holes match up.

Close-up of handle

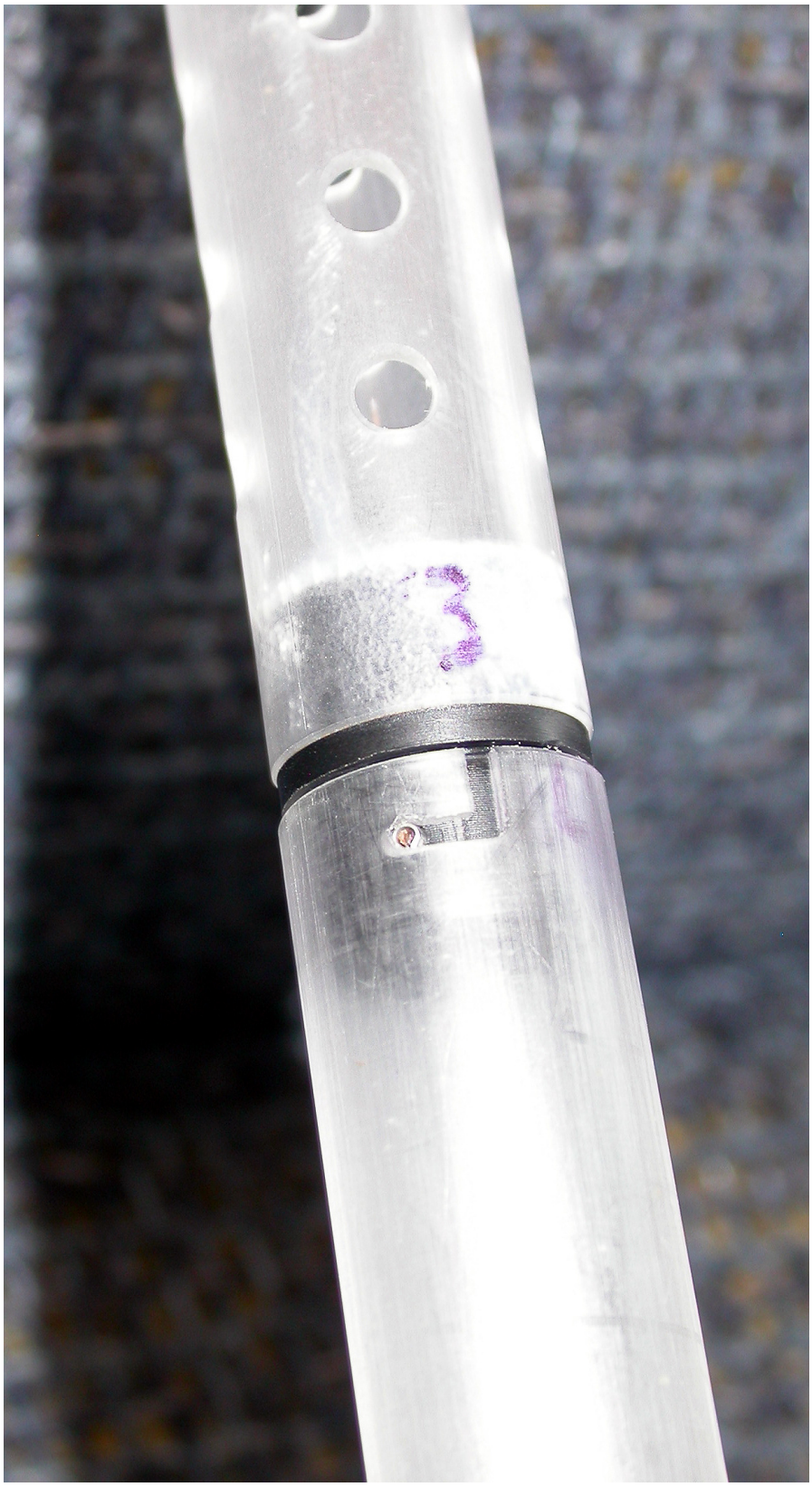
Simply drill two holes in top of inner tube and insert wire of appropriate weight. Stainless steel would be a good choice.





Joints

Close-up of the joint between each section of the inner tube with a spring pin pressed into the joiner. The joiner is made out of ABS and was turned with a lathe to get both ends to fit snuggly into the tubes. The bottom photo shows the groove which was created in the joining section, which received the pin. The joiner is securely glued to the top section and is only attached to the bottom section by the pin and groove system. The adhesive used was methylene chloride.



Section joints

This photo shows what the two sections look like when properly joined. Note that the pin must extend out only as far as the outer diameter of the tube, or it will impede the inner tube's ability to slide into the outer sleeve.

Bait

In our original experiment, we used bait of tuna, cookie crumbs, peanut butter, and oil-soaked bread. All four of these substances were thrown into each section to attract as wide an array of ants as possible. Other baits could certainly be tried. If you are specifically trying to collect a predatory ant, for example, you might try baiting with termites or other small ants.

Rain and flooding

Our original experiment was carried out in the Amazonian rainforest. There was a lot of rain. Only one of the 50 probes ended up flooded, however, and even that sample contained ants (in fact, an ant not found in any other probe and only found elsewhere in a *varzea* habitat). We simply put a plastic bag held down with pegs over each probe. A large leaf staked with twigs would probably work just as well.

Collecting

When collecting the ants, I recommend the following procedure:

1. Lift up the inner tube slightly and then twist it just enough so that any ants inside of the probe cannot run away. By simply twisting the probe so that the holes are no longer aligned, the ants will be trapped.
2. Pull the inner tube up so that only the first segment is above ground. Quickly separate it from the remaining sections and place into a fluon lined container (pre-prepared) where you can collect the ants at your leisure.

Repeat the procedure for the other sections.

Drills

In our original experiment we created the holes for the probes using a portable power drill (DeWalt 2-1/2" 24V cordless drill/hammerdrill with a 24" long auger drill bit attachment -- see Amy's website for a picture of the drill in action). We highly recommend that you use something similar, at least if you will be collecting in a similar environment (hard, clay, rooty, tropical soils). It is worth the expense and effort of carrying it into the jungle. With the drill, it was a breeze. Without the drill, it would have been impossible and not worth the effort. The drill can be purchased in a kit which includes spare battery and charger for $300-$400. The bit attachment is an Irwin Auger Bit with 1inch diameter and a twist length of 24 inches and an overall length of 29 inches. I believe it was in the $30-$40 range. Both were purchased at Home Depot.

Materials

The tubing is made out of polycarbonate. The joints are made out of ABS (acrylontitrile-butadiene styrene). Both can be purchased from McMaster-Carr, although I'm sure there are lots of other sources. The adhesive used to join ABS to polycarbonate was methylene chloride. I believe that the product Weld-On 16 contains this and is good for cementing polycarbonate to ABS.

Disclaimer

I did not build the probe myself. The construction was carried out by Jonathan Perry, the workshop supervisor here at the Boston University Biology Department. I have no idea if there are safety issues that need to be kept in mind when working with these materials. I suggest that only someone experienced with these materials and tools should do this.

Please share

This probe is a work in progress. Feel free to experiment with the dimensions, the materials, the layout, etc. Then, please let me know (karitr@bu.edu) what happened! I would love to know where you used it, how you used it, any changes you made to the design, what you caught, and of course any problems you encountered. I will add any new information I receive to this site so others can benefit.

--Kari T. Ryder Wilkie, 2007