FLINN SCIENTIFIC

Pipets

2021 Resource Guide

Micropipets—single channel or multi-channel—are one of the essential tools used for liquid handling. You count on them for your specific pipetting tasks.

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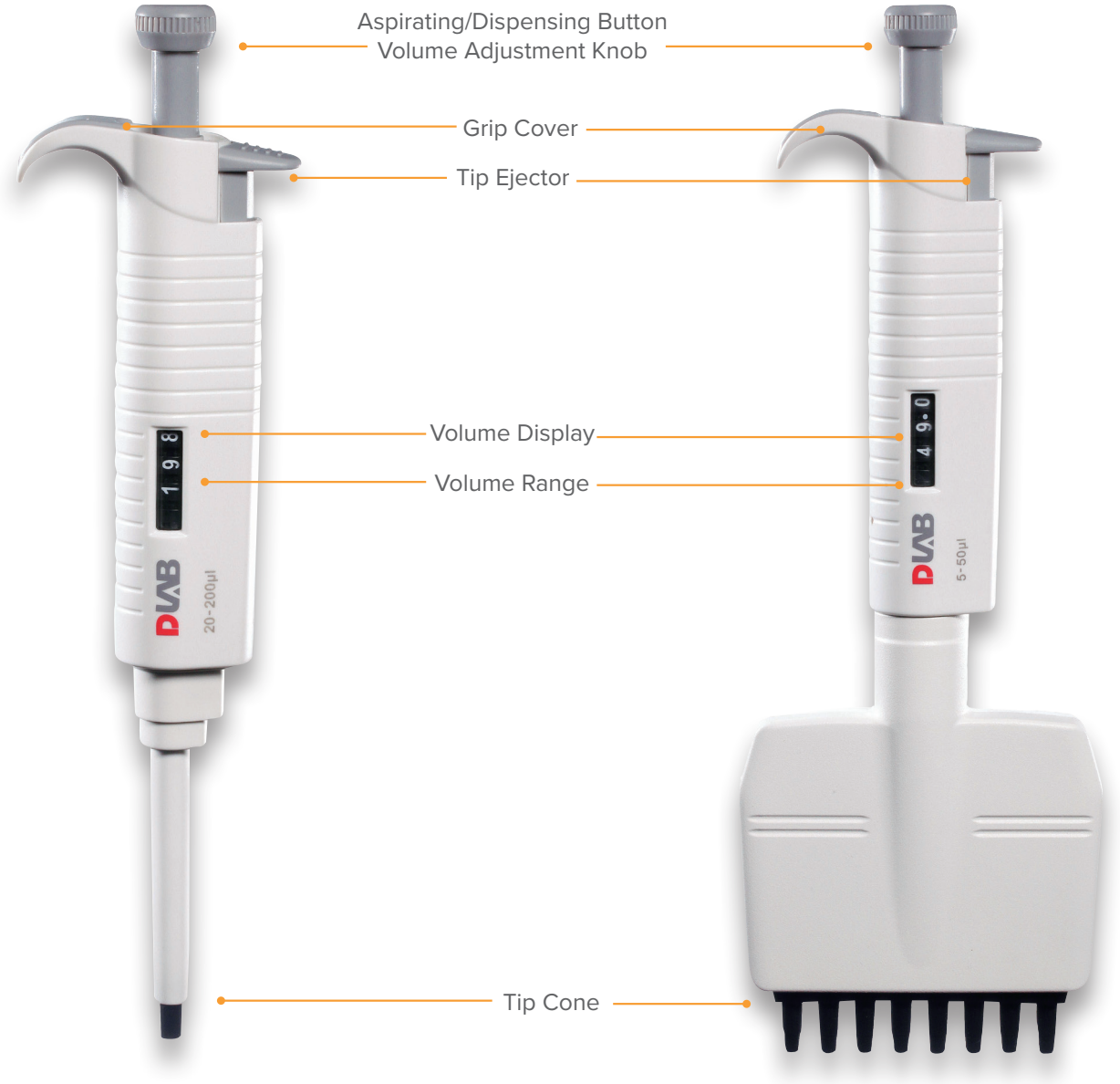
Structure of Air Displacement Pipets

SINGLE CHANNEL

MULTI-CHANNEL

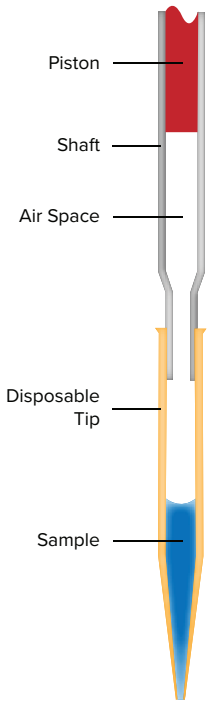


WHAT TYPE OF PIPET DO YOU NEED?

Know what kind of pipet you need for your experiment. If you have an experiment that requires the use of individual test tubes, a single-channel pipet is a good choice. If you need to do an immunoassay, a multi-channel pipet is the right one to use.

Pipet Comparison and Volume Ranges

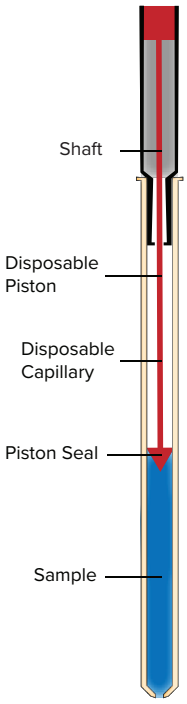
AIR-DISPLACEMENT PIPET



A volume of air remains between the piston and liquid.

Mainly used for aqueous or low-density solutions.

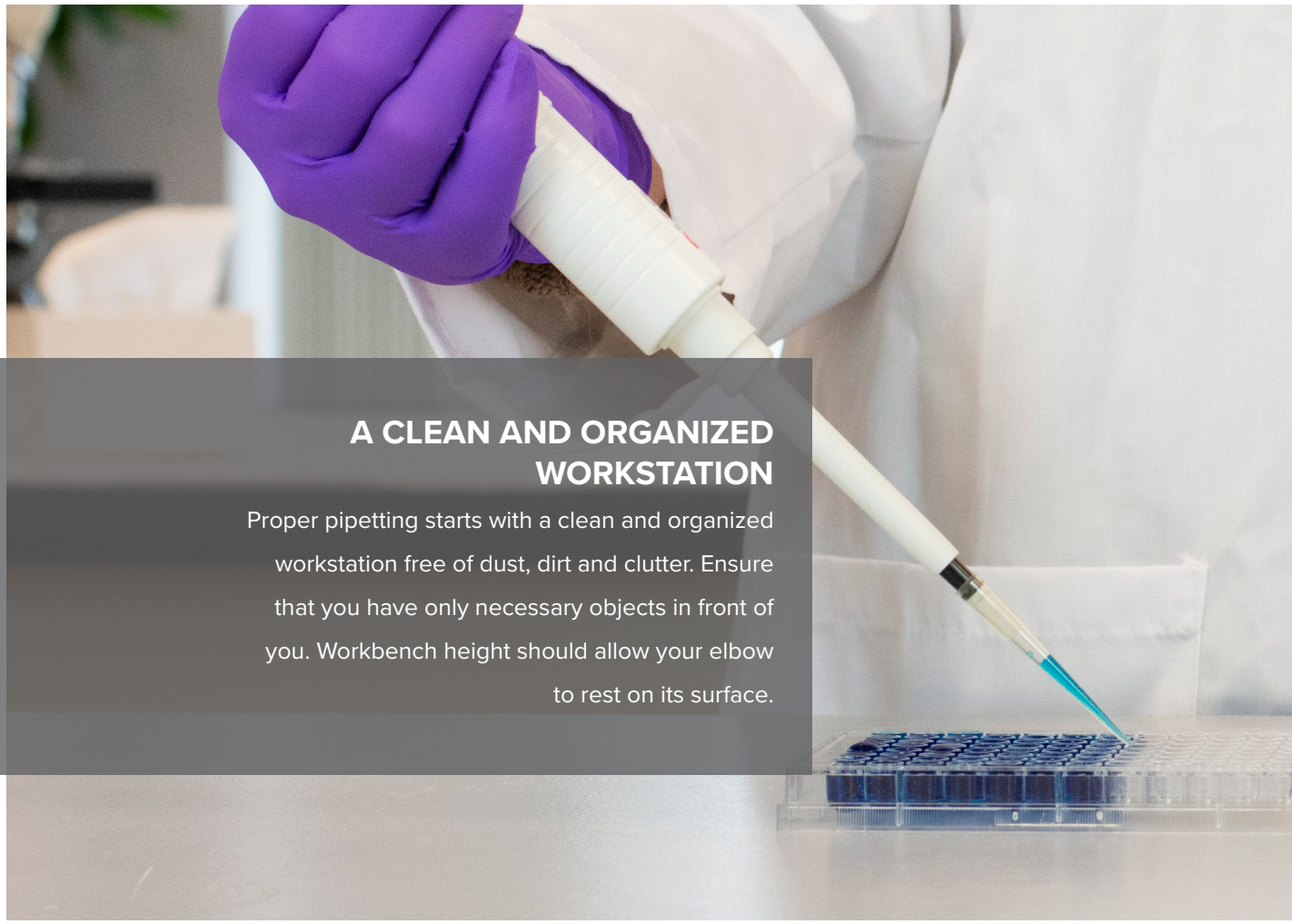
POSITIVE-DISPLACEMENT PIPET



Piston is in direct contact with sample; aspiration force unaffected by the sample's physical properties.

Mainly used for viscous, dense, volatile and corrosive solutions.

	SINGLE-CHANNEL ADJUSTABLE	SINGLE-CHANNEL FIXED	8- AND 12-CHANNEL ADJUSTABLE
MOST COMMON VOLUME RANGES	0.1–2.5 µL	5 µL	0.5–10 µL
	0.5–10 µL	10 µL	5–50 µL
	2–20 µL	20 µL	50–300 µL
	5–50 µL	50 µL	
	10–100 µL	100 µL	
	20–200 µL	200 µL	
	50–200 µL	250 µL	
	100–1,000 µL	500 µL	
	200–2,000 µL	1,000 µL	
	1,000–5,000 µL	5,000 µL	
	2–10 mL		



A CLEAN AND ORGANIZED WORKSTATION

Proper pipetting starts with a clean and organized workstation free of dust, dirt and clutter. Ensure that you have only necessary objects in front of you. Workbench height should allow your elbow to rest on its surface.

Volume Setting

Even though there are fixed-volume pipets, the majority of micropipets are adjustable volume. In using an adjustable-volume pipet, hold the body of the micropipet in one hand and use the other hand to adjust the volume. When increasing the volume setting, rotate the knob slightly above the desired setting and then slowly decrease the volume until you reach the desired volume setting. When decreasing the volume setting, rotate the knob slowly until the desired setting is displayed.

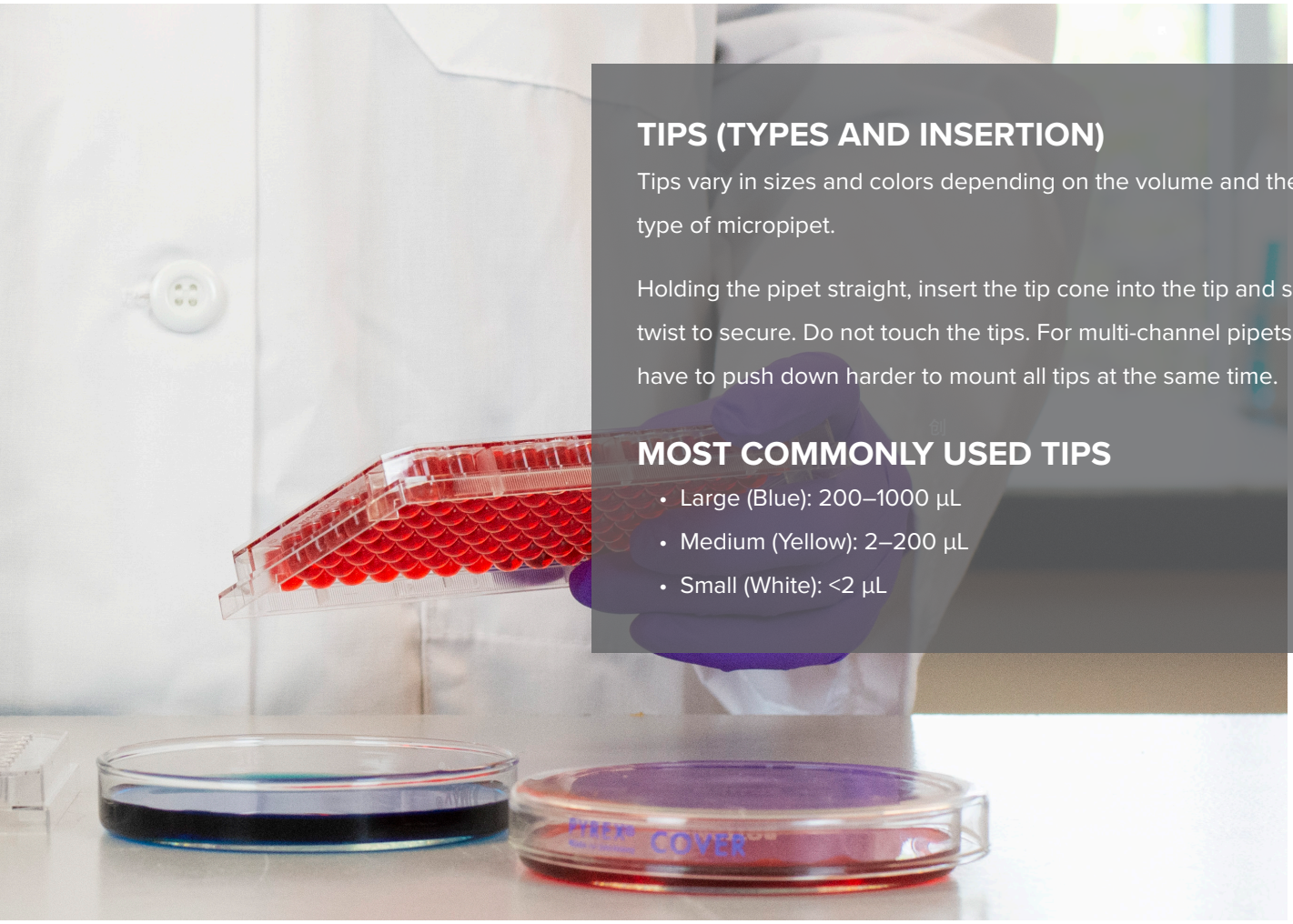
Aspirating/Dispensing

FORWARD (STANDARD) PIPETTING MODE

Recommended for aqueous/low-density solutions, such as buffers, diluted acids or bases.

Aspirating

- Hold the pipet vertically, and press the aspirator/dispenser button to the first stop position.
- Immerse the pipet tip about 3 mm into solution and allow aspirator/dispenser button to return to its initial position. Wait 1–3 seconds to ensure that all solution moves up into the tip.
- Carefully remove pipet tip from solution.



TIPS (TYPES AND INSERTION)

Tips vary in sizes and colors depending on the volume and the type of micropipet.

Holding the pipet straight, insert the tip cone into the tip and slightly twist to secure. Do not touch the tips. For multi-channel pipets, you may have to push down harder to mount all tips at the same time.

MOST COMMONLY USED TIPS

- Large (Blue): 200–1000 µL
- Medium (Yellow): 2–200 µL
- Small (White): <2 µL

Dispensing

- Place the pipet tip at 10–45° angle against the inside wall of the receiving vessel. Press the aspirator/dispenser button smoothly to the first stop position.
- Wait 1–3 seconds then press the aspirator/dispenser button to the second stop position to remove any remaining solution from tip.
- Remove the pipet from solution, and allow the aspirator/dispenser button to return to the initial position. Firmly press the tip ejector button to discard the tip.

REVERSE PIPETTING MODE

Recommended for high-viscosity or volatile solutions.

Aspirating

- Hold the pipet vertically, and press the aspirator/dispenser button smoothly to the second stop position.
- Immerse the pipet tip into the solution. Allow the aspirator/dispenser to move up to the initial position. Wait 1–3 seconds so all solution moves up into the tip.
- Carefully remove the pipet tip from the solution.

Dispensing

- Place the pipet tip at a 10–45° angle against the inside wall of the receiving vessel. Press the aspirator/dispenser button smoothly to the first stop position to dispense the solution.
- Wait until dispensing is complete. Do not dispense the remaining liquid in the pipet tip.
- Remove the pipet from solution, and discard the remaining liquid and pipet tip.

Calibration of a pipet must be done regularly, depending on the frequency of its use and the application. Annual calibration is recommended. If the pipet is used on a daily basis, calibration should be done more often, such as every 3 months.

Calibration

Enzyme assays are faster and easier when you use the correct pipets. To calibrate a micropipet, you need distilled water, a beaker, a thermometer, an analytical balance and weigh boats.

1. Measure the distilled water temperature to ensure accurate readings.
2. Put the weigh boat on the balance and tare it.
3. Place the tip on the micropipet, and set the volume to the smallest dispensable volume.
4. Prerinse the tip, and aspirate the calibration volume.
5. Dispense the water into the weigh boat, and record the weight.
6. Repeat the process at least 3 times.
7. Repeat steps 3–6 with the volume set to the largest dispensable volume.
8. Average the replicates for each volume tested, and use the appropriate formula to calculate the pipet's accuracy.

FINE-TUNING

You can fine-tune your micropipet using the basic calibration tool that most manufacturers include in the package. If the aspiration/dispensing volume setting is low, rotate the adjustment lock clockwise, using the calibration tool to increase the volume. If the aspiration/dispensing volume is high, rotate the adjustment lock counterclockwise, using the calibration tool to decrease the volume.

Cleaning and Storage

GENERAL CLEANING

External: You can use a common cleaning agent, such as soap, mild detergent or alcohol, to remove dust or dirt on the outside of your micropipet. Rinse with distilled water and air dry.

Internal: Cleaning the inside of a micropipet can be tricky since individual parts will need to be cleaned differently. Carefully disassemble the pipet and clean the lower part of the pipet using soap or mild detergent. Rinse with distilled water and air dry.

For the piston, coat the surface with a thin, uniform layer of grease.

Disassembly/Assembly Instructions (single-channel adjustable or fixed-volume micropipets):

1. Press the tip ejector button and hold.
2. Insert the calibration tool between the tip ejector collar and the tip ejector to release the locking mechanism.
3. Remove the tip ejector and tip ejector ring.
4. Remove the tools from the tip assembly and turn counterclockwise.
5. Remove the tip, piston, spring and filter (if any).
6. Clean and grease all the disassembled parts.
7. Reassemble the pipet and use it (without liquid) several times to spread the grease evenly.

AUTOCLAVING

Full-Autoclaving: Steam autoclaving can be performed at 121 °C, 1 bar pressure, for 20 minutes. After autoclaving, the pipet must be cooled down and allow to dry for 12 hours before use. Check the performance of the pipet after each autoclaving. It is recommended to grease the piston and seal of the pipet after 10 autoclavings.

Half-Autoclaving: Depending on the micropipet, autoclavable parts may vary. Most common autoclavable parts include the O-ring, piston and tip cone.

STORAGE

When not in use, micropipets should be properly stored. Pipet stands or racks are ideal storage options. Keep the pipets in an upright position, with tips removed, set at the highest volume and away from heat/moisture.

Troubleshooting

PROBLEM	CAUSE	SOLUTION
Leaking Pipet Tips	Damaged/loose or wrong size tip	Ensure that the tip is in a good condition and sits on the shaft tightly. Always use the correct tip.
	Contaminated/ corroded piston	Clean the piston with 60–70% ethyl alcohol and a soft tissue. Gently and evenly degrease the piston.
	Worn seal or O-ring	Check the seal or O-ring regularly. Don't use worn O-rings; replace them immediately.
Liquid Remains in the Tip	Wrong or contaminated tip	Ensure that you use the correct tip. Always change tips when using different solutions.
	Tip not aspirating/ dispensing the liquid correctly	Aspirate and dispense slowly. Repeat this at least 3–4 times.
	Tip not inserted correctly	Reinsert the tip, holding the micropipet in a vertical position and slightly twist to seat the tip on the shaft.
Aspirating/ Dispensing Button Not Working	Not enough lubrication on Piston or O-ring	Gently and evenly lubricate the piston or O-ring.
	Piston contaminated	Clean the piston with 60–70% ethyl alcohol and a soft tissue.
Pipet Blocked (Low Aspiration Volume)	Obstruction in the tip cone due to dried solution	Clean the tip cone with 60–70% ethyl alcohol and a soft tissue.
	Piston contaminated	Clean and grease both the piston and O-ring.
	Damaged O-ring	Replace the O-ring.
	Other	Return it to the manufacturer for maintenance.

Frequently Asked Questions

1. **When should I prerinse the tip?**
   It is recommended to prerinse a tip when you change a tip or increase the volume setting.
2. **Can I wipe the outside of the tip?**
   Yes. But use a tissue that is resistant, lint-free and inert to acids, bases and solvents.
3. **Why do I need a pipet holder?**
   A pipet holder prevents contamination, corrosion and breakage.
4. **How old is my micropipet? When was its last service date?**
   The serial number may include the manufactured date. Keeping a history of pipet maintenance will make it easier to determine its last date of service.
5. **How can I prevent piston corrosion?**
   After using corrosive solutions, always clean the piston with alcohol (i.e., 60–70% ethyl alcohol) and a soft tissue.
6. **Why is my pipet leaking?**
   Most common sources of leaks include a damaged/scratched tip holder, not enough grease on the piston or damage caused by organic solvents.
7. **I have a greased piston micropipet. Do I need to regrease my pipet?**
   A majority of pipets are greased piston pipets that must be regreased regularly to prevent possible leaks.
8. **Why do I need to store a micropipet in a vertical position? Can I leave it lying on the workbench?**
   Micropipets should always be stored in a vertical position to eliminate breakage or contamination due to chemicals on the workbench. Vertical storage prevents liquids from running inside the shaft of the pipet.
9. **What is the recommended immersion depth for the pipet tip when aspirating?**
   The immersion depth of the pipet tip is an important factor in aspirating a sample. The recommended depth may vary depending on the selected volume, but generally, the depth range will be 3–6 mm.
10. **Do I need to use gloves while pipetting?**
    It is not required but highly recommended since gloves protect against accidental spills and reduce body heat transfer to the pipet.