

*Tips and tricks of the trade*

# The Art of Pipetting

Anecdotal opinion on including pipetting workshops as part of the research curriculum.

## Lab Hint

The very first embracing of a micro-pipette, years ago, made me feel “I am a scientist”. But I still remember one of my undergrad practical classes, when my lecturer instructed us, the students, not to pipette as historians might do. Thus, there should be a scientist’s way of pipetting, right?

A few years later, I happened to overhear one of my labmates gossiping about “the terrible pipetting habits” of her research assistant! On another occasion with a former lab technician, staring in dismay at a box full of pipettes on his table, I couldn’t help but ponder his complaints: “Oh dear! I shall have to send them for an extensive and an expensive repair! I wonder when people will learn to maintain their pipettes!” I have also heard him lauding one of my former labmates who calibrated his pipettes frequently and got precise results.

Moreover, coming from a Third World country, I was *also* concerned about the running costs of a lab, on pipette maintenance. And if I recollect how I learned to pipette like a true scientist, I realise that now, for me, pipetting is more of an art in science; for its betterment. But how many errors might I have introduced in my earlier experiments, while learning?

## On pipetting workshops

These anecdotes implicitly emphasise the need to train beginners about pipetting. Liquid handling errors are one of the common culprits in obtaining non-reproducible results, yet taken for granted. I think the art of pipetting comes from a good foundation besides practice. Although one will inevitably learn while pipetting regularly, an appropriate introduction might save some time and money; and this is what many newbies seem to miss. Would it not be favourable to hold mini workshops to train them appropriately at the start of their career?

Further, it might also be worth making it routine, as part of the Standard Operating Procedures (SOPs) in every laboratory. This, in my opinion, could minimise the technical and volumetric errors, thereby im-

proving the quality of the results obtained. To do this, and to begin with, I would like to suggest, for instance, a collective training for lab technicians on liquid handling in the universities/research institutes, where such a programme is not yet part of the concept. From then on, the respective lab technicians might take the tips and tricks over to the students. Occasionally, they might also be refreshed on the developments in pipetting. After all, knowledge from research relies on its results!

## Suggested didactics

However much we advance in technology with automated liquid handlers and robotic pipettes, we still rely on manual pipettes. Various companies manufacture different types of pipettes for specific purposes. Pertinent to the lab or to the work one does, the choice of pipettes varies. However, the tips and tricks of pipetting lie in one’s brain and hands, rather than *just* in the pipettes.

Depending upon the lab, the choice of pipettes and pipette-accessories varies, too. Hence, taking students through the world of pipettes could be lab-specific, to let them fathom the tricks on:

- clever choice of pipettes and tips* - choosing pipettes over their compatibility with diverse solvents or solutions;
- modes of pipetting* - forward/reverse pipetting; vertical/oblique pipetting; to touch or not to touch the vessel, from/to the vessel the liquid comes from/goes to;
- factors affecting pipetting* - the significance of lab milieu; whether or not the whole lab is maintained in the same (local) climatic conditions, viz., the temperature/pressure/humidity; the necessity of pre-wetting the pipette tips; tricks for fast/slow pipetting; whether or when should the pipettes be equilibrated to the environmental conditions, and how;
- pipette maintenance* - the importance and the domestic techniques of calibration; the costs of commercial recalibration and new pipettes; and finally,
- personal care while pipetting*.

Although pipetting is an unavoidable task in the lab, it is often possible for even trained pipettors to suffer, especially dur-



ing manual pipetting into microtitre plates. The consequent technical and volumetric errors, besides health issues are not productive for research. Hence, it is also important to teach essential (arm) exercises or to implement ergonomic pipettes, where suitable. For instance, the results from the work by Rempel *et al.*, (*Work* 39 (2011), 195–200) suggest devising arm supports for pipettors for painless pipetting.

## Self-update

A vast amount of information lurks around the WWW on good pipetting practices. Some manufacturers provide useful and accessible resource libraries online, where one can find tutorials on pipette/liquid handling, such as, video tutorials, animations, fool-proof manuals, posters, and discussion forums. In addition, there are also webinars and workshops to get certified on manual and automated liquid handling.

Might these facets be heeded, would researching not be more fun-filled?

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Do you have any useful tips?

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