

A Practical and Inexpensive Device for the Manipulation of Mosquitoes and Other Small Insects¹

Carlos Brisola Marcondes² and Carlos José Carvalho Pinto^{2,3}

Abstract. Mosquitoes have been glued to card triangles fixed to entomological pins and to several bases, but when they need to be analyzed by molecular techniques, the glue may influence the reactions. Physical disablements on hands or low experience can jeopardize the manipulation of mosquitoes. Utilizing forceps, and a simple and non-expensive device, in which a nail, fixed to forceps, tightened by a rubber band, which grasps a leg of the mosquito, is fixed to modeling dough, is described.

Key Words. Mosquitoes, device, physical disabling, manipulation

For many years, mosquitoes and other small insects have been fixed to the tip of small triangles, fixed to #2 or #3 entomological pins. The lateral surface of the mosquito thorax must be glued to the triangle using Ambroid® and, more recently and more satisfactorily, nail polish (Gaffigan and Pecor 1997). Mosquito legs may be extended toward the pin to increase the integrity of the specimen, but it is better to expose the legs in sabethine mosquitoes (Diptera: Culicidae: Sabethini), which have color spots difficult to distinguish if the legs are directed toward the pin and partially covered by the triangle.

Pins are usually fixed to Styrofoam plates or spheres for observation at the stereoscopic microscope. A sophisticated (and expensive) pinned specimen manipulator has been utilized to handle the pinned mosquitoes at the Natural History Museum in London (R. Harbach, personal communication to coauthor CBM 2015). Other complex devices have also been described (Boyadzhiev et al. 2012, Gras 2014, Dupont et al. 2015).

Modeling dough (= Plasticine®) has been used for multiple activities, being more popular for children play, in cinematography for stop-motion animation, and as a jack-of-all-trades gadget in microscopy laboratories. Modeling dough has been utilized to manipulate arachnids, such as ticks (B. Harrison, personal communication to coauthor CBM 2015) as well as several insects, mostly for dissection. The authors have used modeling dough for many years, fixed to a Petri dish, with a flat part and a domed column (Figure 1). Although not much divulged, modelling clay permits to obtain any position for the mosquito, the pin

¹ Received on October 17, 2015. Accepted on December 27, 2017. Last revisions received on December 29, 2017.

² Department of Microbiology, Immunology and Parasitology, Center of Biological Sciences, Federal University of Santa Catarina, Campus Trindade, 88040-900 Florianópolis, SC, Brazil. E-mails: cbrisolamarcondes@gmail.com, carlospinto@ecb.ufsc.br, respectively.

³ The authors declare that there is no conflict of interest.

may be manipulated as a joystick and it constitutes a low-cost device. A search in Google Scholar for "modeling dough" (or plasticine), mounting and insect (or mosquito) did not indicate the utilization of this material, except for a short reference (Upton and Mantle 2010). A small piece of black card has been utilized below the mosquito (A. Fernandes, personal communication to coauthor CBM 2005), to check the color of the spots on the legs, mostly for sabethine mosquitoes.

If collected mosquitoes are intended for molecular analysis or are too numerous, mostly in localities whose fauna is little diversified and/or well-known, they cannot be glued to triangles on pins. In those circumstance, mosquitoes are usually grasped by one leg utilizing small forceps and rapidly observed under the microscope, to be discarded or preserved in isopropanol or in boxes with camphor or naphthalene, which is more toxic. However, the observer needs to be dexterous and know the mosquito fauna very well.

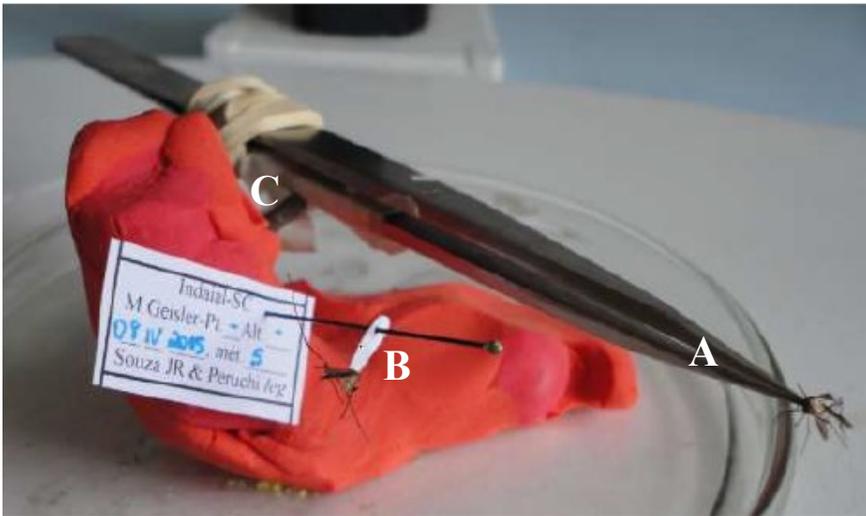


Figure 1. Device for handling mosquitoes not glued to a triangle (A), also showing a pinned mosquito stuck to the modeling dough (B), with two *Trichoprosopon* sp. mosquitoes. One nail, C, connects the forceps to the modelling clay.

Due to progressing arthrosis in the fingers, CBM had difficulty positioning *Anopheles* (*Kerteszia*) mosquitoes, to observe its R_{4+5} vein, to check its identification as *An. cruzii* Dyar and Knab or *An. homunculus* Komp (Consoli and Oliveira 1993). Hence, CJCP had to manipulate and identify the mosquitoes. Due to this limitation, a method for the manipulation of adult mosquitoes was developed. A nail is fixed by adhesive tape to the center of gravity of forceps, which is tightened by a rubber band. The adult mosquito is grasped by a leg with forceps, and the nail is inserted in modeling dough (Figure 1). Hard (and toxic

for ingestion) modeling dough (Faber Castell®, not Acrilex®) needs to be utilized. This device permits flexibility for the observation, without the limitations imposed by low skilled people. We expect this device will be useful for physically impaired or inexperienced people.

Acknowledgments

We thank medical entomologists, Aristides Fernandes (Faculdade de Saúde Pública/Universidade de São Paulo, Brasil) and the late Joaquim A. Ferreira Neto (Superintendência de Campanhas/Ministério da Saúde), from whom we learned the techniques herein described.

Literature Cited

- Boyadzhiev, P. S., T. S. Gechev, and A. D. Donev. 2012. A universal microscope manipulator. *Revista Brasileira de Entomologia* 56:125-129. <https://doi.org/10.1590/S0085-56262012005000016>
- Consoli, R. A. G. B. and R. L. Oliveira. 2003. *Principais mosquitos de importância sanitária no Brasil*. Editora Fiocruz. Rio de Janeiro, Brasil. 225 pp.
- Dupont, S., B. Price, and V. Blagoderov. 2015. IMP: the customized LEGO® pinned insect manipulator. *ZooKeys* 481:131-138. <https://doi.org/10.3897/zookeys.481.8788>
- Gaffigan T. and J. Pecor. 1997. *Laboratory and Field Protocols*. Walter Reed Biosystematic Unit, Smithsonian Institution. Washington, District of Columbia, USA. http://www.wrbu.org/VecID_MQ.html
- Gras, H. 2014. A multiaxis device for in-focus manipulation of objects under a dissecting microscope. *Journal of Microscopy* 256:1-5. <https://doi.org/10.1111/jmi.12152>
- Upton, M. S. and B. L. Mantle. 2010. *Methods for Collecting, Preserving and Studying Insects and Other Terrestrial Arthropods*. Australian Entomological Society. Canberra, Australia. viii + 81 pp.