

MELZER'S REAGENT UPDATE, 2019

Lawrence M. Leonard

26 Amerescogin Rd.

Falmouth, ME, 04105

lleonar1@maine.rr.com

In 2006 I wrote a paper about Melzer's reagent which has chloral hydrate, iodine, and potassium iodide in it. I concluded other iodine substitutes without the chloral hydrate were not acceptable for the identification of white-spored agarics. The complete paper can be found at the FUNGI website, at the bottom of the Archives page; the website is the first endnote listed at the end of this paper (1).

Unless you have a hand-held DNA sequencer readily available for your identification of your unknown mushroom, you need some sort of a guide. Standard texts for fungi identification including *The Audubon Society Guide to North American Mushrooms*, Arora's *Mushrooms Demystified*, Miller's *North American Mushrooms*, my old favorite Smith's *How to Know the Gilled Mushrooms*, and others, all use the Melzer's amyloid reaction early in their keys for identification.

Melzer's is somewhat of a problem to get these days because it has chloral hydrate in it and there are better sedatives and hypnotics available than chloral hydrate. Recently I heard about a proprietary compound Visikol[®] (2), a polychlorinated alcohol which was used in the identification of downy mildews published in *Applications in Plant Sciences* in 2013 (3). The company sent me 5 mL to try as a substitute for chloral hydrate in the Melzer's formula. I mixed up varying concentrations of Visikol[®] with Lugol's solution (with iodine and potassium iodide as in Melzer's). I made 125 slides with 3–4 specimens/slide of amyloid positive (J+), amyloid negative (J-) and dextrinoid reactions with white-spored basidiomycetes. There was a problem with the solutions phase separating, and on the advice of the Visikol company, the solutions were shaken in a mechanical shaker for 5 minutes. This helped initially, but the solutions began to separate a few weeks later. Also, although results were

accurate for the J+ and J- fungi the dextrinoid results were not accurate. All in all, I cannot recommend Visikol[®] at this time as a substitute for chloral hydrate in Melzer's reagent.

In my 2006 paper I wrote that Melzer's was easy to get with a doctor's prescription from compounding pharmacies, however that is not completely true these days. (Compounding pharmacies have druggists who will mix up and dispense special prescriptions from scratch for salves and other medications.) Chloral hydrate has been in clinical use for humans since 1869 as a sedative and hypnotic. I remember ordering it as an intern many years ago. Chloral hydrate is scheduled by the government as class IV—the same as Xanax, Valium, and Darvon etc. These drugs clearly are readily available. Years ago, chloral hydrate was also readily available and was used in part as a sleeping aid but it is no longer popular. Accordingly, compounding pharmacies which used to make up Melzer's no longer keep chloral hydrate on their shelves. I have talked to a couple of these special pharmacies and some do not want to go to the bother and expense of ordering chloral hydrate to make Melzer's. However, I did talk to one in Maine and the head pharmacist said he would make up Melzer's. He would need a doctor's prescription written for a specific patient. Then the pharmacist said he would have to order chloral hydrate at about \$100 per 25 g. 100 mL of Melzer's has 100 g of chloral hydrate so 25 g would make about 25 mL. 5 mL of Melzer's lasts most amateurs for years using 1 drop/test for a total of about 100 tests. My Melzer's is more than 10 years old and is still good.

Chloral hydrate is widely advertised on the web coming from China and is very inexpensive (e.g. \$6.99 for 100 grams), but importing it would probably be a problem. Atom Scientific (4) sells Melzer's reagent in Britain very inexpensively for about \$6 for 30 mL, \$13 for 100 mL etc., but they will not send it to the USA. For do-it-yourselfers, chloral hydrate is also available from Sigma-Aldrich (5), a chemical vendor;

they will need a doctor's prescription with his/her government DEA number. In May 2019 they quoted 100 grams for \$56.60. Their order number for chloral hydrate is: C8383. Another possible option: MykoShop in Germany may sell and ship to USA.

Information about finding a compounding pharmacy in your state can be found at www.pccarx.com or call 1-800-331-2498. It may take a few phone calls to locate a compounding pharmacy willing to make up Melzer's; it took me three calls, but it is available and it is most helpful and necessary in the identification of white spored agarics. See my 2006 paper for further details with Melzer's formula and in dealing with the pharmacist. Remember you will also need a prescription from a doctor with a DEA number licensed in your state.

Summary

There is no good substitute for Melzer's reagent. Iodine substitutes without chloral hydrate (including Lugol's and Visikol[®]) were not acceptable for the identification of white-spored mushrooms in side-by-side tests. Chloral hydrate and Melzer's reagent are still available ... it is just going to take a little more work to obtain nowadays.

References Cited

1. http://fungimag.com/archives/Melzer_Lugol.pdf
2. <https://info@visikol.com>
3. Koroch, A.R., T.S. Villani, R.M. Pyne, and J.E. Simon. 2013. Rapid staining method to detect and identify downy mildew (*Peronospora belbahrii*) in basil. *Applications in Plant Sciences* 1(7): 1300032; doi.org/10.3732/apps.1300032
4. https://atomscientific.com/product/Melzer_reagent_For_Mycology
5. <http://sigmaaldrich.com>

Lawrence M. Leonard is a semi-retired orthopedic surgeon with a long love of myxomycetes and fungi with an especial interest in microscopic fungal anatomy; past-president of Maine Mycological Assoc. Inc., NAMA life member and received a number of NAMA awards for fungi photos. 📷