

Novel natural products are the perfect assassination tools

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ARTICLE HISTORY

Received November 29, 2017

Accepted December 11, 2017

Published January 11, 2018

Recently, I was being filmed for a documentary while collecting an endemic New Zealand nettle in an effort to identify the active neurotoxic compound (Fig. 1). While performing the field extraction, I realized that if I accidentally squirted a drop of the liquid onto a mucosal surface, or potentially my skin, I would likely die from perturbations of the autonomic nervous system [1]. While the extract has been shown to contain histamine, 5-hydroxytryptamine, and acetylcholine, there is an unidentified neurotoxic compound [2]. This neurotoxic compound is potentially very potent as the known compounds do not explain the weakness, confusion, profuse sweating, salivating, labored breathing, and “writhing in agony from cramps” that are experienced when exposed to this plant [2]. Exposure to the concentrated extract could potentially be more severe than the typical clinical presentation. While accidental exposure to this concentrated extract could make the film very exciting, this realization of risk was particularly concerning since the active compound in this extract is unknown [1–4], thus treating this exposure would be difficult.

This awareness caused me to reflect on how an uncharacterized natural product is the perfect assassination weapon.

Everyone in ethnopharmacology has worked with individuals that have historic pharmacologic knowledge [5]. This project was no different. Except that during the interviews regarding this plant, the film producer requested that we go into deep detail regarding the motivation, goals, and vision of the indigenous New Zealand Māori. During that

interview, our Māori colleague made a specific comment around how it would be unacceptable to have the shared indigenous knowledge used for “...things like bioweapons.” I have previously published on neurotoxins [6–8], but I had never before considered the potential moral gravity of this knowledge as our Māori colleague did.

Analyzing the exhumed body of Yasser Arafat established that he was likely killed by polonium [9], and the ex-KGB officer Alexander Litvinenko was certainly assassinated with polonium [10,11]. Even for Mr. Litvinenko who was hospitalized for nearly three weeks, his polonium poisoning was only identified shortly before he died—this challenge identifying the poisoning agent was because of the rarity to test a patient’s polonium levels. Nonetheless, at least it is possible to test for polonium.

Uncharacterized natural products do not need to be synthesized, are relatively stable, and potentially entirely novel [12]. These characteristics make the compounds easy to get, easy to transport, and potentially hard to detect. These are desirable properties if you wanted to develop a tool for assassinations.

Those who are working in drug discovery can be the first people to translate powerful information on novel compounds into an easy-to-disseminate form that can be shared globally. However, with that ability to share knowledge comes a concomitant responsibility to consider the non-altruistic utility of this information as well, something I had forgotten but was at the forefront of our Māori collaborator’s mind.

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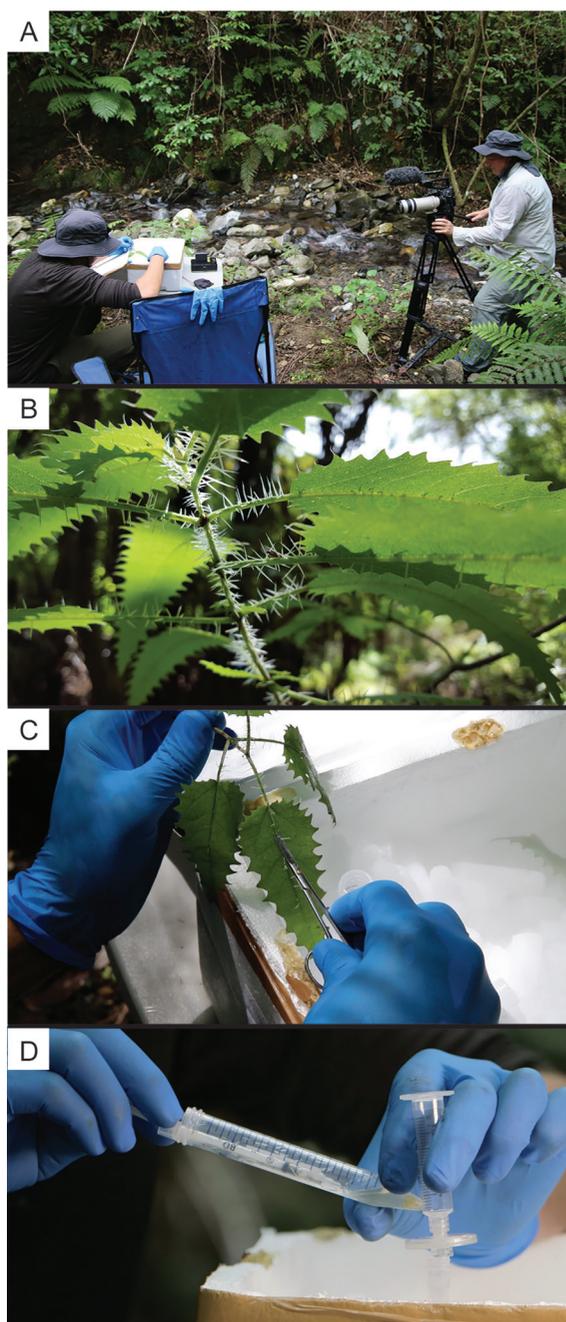


Figure 1. Making a documentary (A) of identifying the potential neurotoxic compounds in the New Zealand endemic nettle *Urtica ferox* which involved harvesting the white hair-like trichomes (B and C) and performing and extraction of the active compound (D) highlighted the risk of working with deadly, uncharacterized, toxic compounds. Photographs provided by Klaasz Breukel, Nelson Marlborough Institute of Technology, New Zealand, and John Irwin, Wild Sweet Productions, New Zealand.

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