the early 1960s. Rudy Campell, an orthopedic surgeon from Pontresina, Switzerland, who was one of the founders of the International Commission for Alpine Rescue, believed in slow rewarming, while Mills advocated rapid rewarming. Mills challenged Campell to put one of his legs in ice water to be provided by the hotel, while Mills would do the same. Mills would then rapidly thaw his frozen extremity in warm water. Campell could rewarm his using whatever method he preferred. Unknown to Campell, Mills had lost his right leg in combat in the South Pacific in World War II. Of course, immersion in ice water cannot cause frostbite. Mills revealed his wooden leg before either of them had taken up the challenge.

I would like to thank Bill's wife, Elaine Mills, and Bob Whaley for their kindness in sharing their recollections. Bill Mills was too ill to contribute directly to this letter, but has been exceedingly generous to me for many years as a mentor and personal hero.

Ken Zafren, MD

Department of Emergency Medicine

Alaska Native Medical Center, Anchorage, AK

Division of Emergency Medicine

Stanford University Medical Center, Palo Alto, CA

References

1. Rodway GW, McIntosh SE, Askew EW. Bradford Washburn's 1962 NEJM Article "Frostbite: What It Is—How To Prevent It—Emergency Treatment"—Historical Background and Commentary. *Wilderness Environ Med.* 2011; 22:177–181.
2. Washburn B. Frostbite: what it is—how to prevent it—emergency treatment. *N Engl J Med.* 1962;266:974–989.
3. McIntosh SE, Hamonko M, Freer L, et al. Wilderness medical society practice guidelines for the prevention and treatment of frostbite. *Wilderness Environ Med.* 2011;22: 156–166.
4. Arie T. *Monograph on Frostbite; 1940.* (Translated and published by Defence Research Board, Canada; 1955). Narkomzdrav, USSR: State Health Committee; 1940.
5. Yoshimura H. Treatment of frostbite by rapid thawing. In: *Essential Problems in Climatic Physiology.* Kyoto, Japan: Nakoda Publishing Co; 1960:285–299.
6. Meryman HT. Freezing injury and its prevention in living cells. *Annu Rev Biophys Bioeng.* 1974;3:341–363.
7. Mills WJ Jr, Whaley R. Frostbite: Experience with rapid rewarming and ultrasonic therapy. *Alaska Med.* 1960;2: 1–4.
8. Mills WJ Jr, Whaley R, Fish W. Frostbite: Experience with rapid rewarming and ultrasonic therapy. *Alaska Med.* 1960; 2:114–124.
9. Mills WJ Jr, Whaley R, Fish W. Frostbite: Experience with rapid rewarming and ultrasonic therapy. *Alaska Med.* 1961; 3:28–36.
10. Paton BC. "From Larrey to Mills": The road to rapid rewarming—a commentary. *Wilderness Environ Med.* 1998;9:223–225.

In Reply to Dr Zafren

To the Editor:

We would like to thank Dr Zafren for his letter regarding our historical treatment of Bradford Washburn's 1962 *New England Journal of Medicine* article on frostbite. The information Dr Zafren relates is not common knowledge among the general scientific community, and the Alaskan views he expresses regarding this 1962 article are most fascinating. Medical history is not usually spiced with controversy, but differing interpretations are what, at times, make the pursuit of history particularly interesting and worthwhile. However, there are a few points to which we feel we should respond.

The Wilderness Medical Society (WMS) Frostbite Guidelines were peer-reviewed and endorsed by the WMS. They were referenced, in part, because the Guidelines were published in the same issue of *Wilderness & Environmental Medicine* as the Washburn commentary. Therefore, the reader of our commentary could easily refer to the Guidelines for literature that was reviewed in the process of formulating recommendations. The WMS Frostbite Guidelines simply represented the latest peer-reviewed article on the subject and, perhaps more importantly, it represents the first such publication on frostbite to attempt to grade the available evidence in an objective fashion.

As to Washburn's 1962 *New England Journal of Medicine* article being a work of plagiarism, a substantial component of the work is devoted to practical prevention and care of frostbite. Washburn was an experienced mountaineer. His field experience served as a basis to suggest practical ways to prevent and manage frostbite in challenging field conditions, not to mention his practical recommendations concerning diet in cold weather. These perspectives were certainly not borrowed from the work of Mills et al. This information (contained in the first 4 pages of the text) is a major part of Washburn's article, and is likely the reason that the *American Alpine Journal* published it as a practical article for high altitude and cold-weather mountaineers.

We do agree that Washburn could have done a better job of referencing or attributing the work of Mills et al in his review. Mills' 3 important 1960 to 1961 articles^{1–3} are, however, found in the reference section. Washburn also states, after discouraging the practice of walking on recently thawed feet or toes, that "it would be wise to quote directly from a recent letter of a top authority

[Mills] in the treatment of frostbite. . .” and subsequently cited personal communication with Mills. Washburn also mentioned Mills et al in the article’s acknowledgement paragraph at the bottom of the title page. Of course, even though Washburn stated on the title page that “All illustrations are . . . kindly provided by William J. Mills, M.D. of Anchorage, Alaska,” if the images were in fact published without permission, no reasonable excuse for that exists. Nonetheless, we have to assume that the *New England Journal of Medicine* required copyright permission releases for such images in 1962. But, of course, we cannot speak with any authority on that particular topic. It did not, at any rate, occur to us that a reader familiar with cold injury would presume that Washburn did *any* of the original science he discusses since he had no qualifications to do so. Why a journal like the *New England Journal of Medicine* published a review article on this subject from a cartographer with no medical background is somewhat remarkable and adds to the intrigue surrounding the article’s “backstory.”

In regard to Washburn misrepresenting the work in his review, we find it hard to fathom that the editors and peer reviewers at the *New England Journal of Medicine* thought Washburn might have been performing original cold injury research when he had no formal medical background. And it is most interesting that Washburn’s article, when originally published in the 1962 *American Alpine Journal*, apparently had Dr Mills’ blessing (according to Dr Zafren’s account related here). Did this only become an issue of great animosity when it was reprinted—in essentially identical form—in the *New England Journal of Medicine*?

We hope that we made it clear in our commentary of the Washburn piece that Mills and his Alaskan medical colleagues were responsible for the major discoveries discussed in the 1962 *New England Journal of Medicine* article. For instance, we mention “. . . the first (published) major clinical experience with rapid rewarming was a report out of Alaska in 1960—which happened to be the vanguard of a series of important papers by Alaskan clinician-investigators (the series of three 1960 to 1961 articles).^{1–3} Washburn’s 1962 *New England Journal* review would not have been as important as it was nor had the impact it did without the original work of Mills, Whaley, and Fish published 2 years earlier”; and “The . . . series of 1960 to 1961 articles by Mills and his Alaskan colleagues were fundamentally (and clearly) responsible for a paradigm shift in frostbite treatment, and these papers must have, in large part, provided the impetus for Washburn to write his review in the first

place.” And the first sentence of our conclusion states “Washburn’s practical 1962 review of frostbite and its treatment highlighted the ground-breaking original work from Mills, Whaley, and Fish that emerged from Alaska in the immediate years prior to the *New England Journal* article.”

Lastly, for the upset the Washburn article apparently caused in parts of the Alaskan medical community, why was there no subsequent published response, such as a letter to the editor of the *New England Journal of Medicine* or elsewhere, which detailed Washburn’s transgressions as stated in Dr Zafren’s letter?

In conclusion, we wish to emphasize that we have the greatest respect for the work Dr Mills and his Alaskan colleagues did in the 1950s and 1960s to elucidate the effectiveness of rapid rewarming of frostbite injury and other aspects of cold injury treatment. In providing a commentary on the historical impact of the 1962 Washburn *New England Journal of Medicine* article, we were in no way attempting to take any credit away from Mills et al. The ground-breaking results from the studies of Mills and his fellow Alaskan clinician-investigators served to solidly establish not only rapid rewarming of frostbite as the initial therapy of choice for freezing cold injury, but many other foundational aspects of modern frostbite treatment as well.

George W. Rodway, PhD, APRN
University of Utah
College of Nursing & School of Medicine
Salt Lake City, UT

Scott E. McIntosh, MD, MPH
University of Utah
Division of Emergency Medicine
Salt Lake City, UT

Eldon Wayne Askew, PhD
University of Utah
Division of Nutrition
Salt Lake City, UT

References

1. Mills WJ, Whaley R, Fish W. Frostbite, I: Experience with rapid rewarming and ultrasonic therapy. *Alaska Med.* 1960; 2:1–4.
2. Mills WJ, Whaley R, Fish W. Frostbite, II: Experience with rapid rewarming and ultrasonic therapy. *Alaska Med.* 1960; 2:114–124.
3. Mills WJ, Whaley R, Fish W. Frostbite, III: Experience with rapid rewarming and ultrasonic therapy. *Alaska Med.* 1961; 3:28–36.