

fraction of radium in the body, by Marinelli and his group; (4) radium metabolism, by Norris and colleagues; (5) clinical findings, with Looney as the senior author; and (6) a discussion, authored by the heads of the divisions.

Ultimately, although four of these papers were published, the first and the last never materialized. However, it was 1955 before the series appeared in print. In the meantime Looney had left Argonne and was most eager to see the results of his two years of effort published. He had submitted for publication a paper on autoradiography of radium bone (Looney and Woodruff 1953), but that and his Argonne progress report (or "green back," as they were called) were all he had to show for his efforts.

After leaving Argonne, Looney published what he termed a thorough analysis of the late effects of early medical and industrial uses of radioactive materials. This analysis took the form of three long articles in the *Journal of Bone and Joint Surgery* (Looney 1955, 1956a, 1956b). He also wrote, with his Argonne coworkers, the fifth paper in the list above (Looney et al. 1955). Two additional papers were based entirely or in part on his Argonne studies (Looney 1954, 1956c). Finally, he published an article in *Science* (Looney 1958), suggesting that the maximum permissible level of radium be lowered. This profusion of publications, each with Looney, the former postdoctoral appointee, as the senior author, did not please the senior members of the Argonne radium program.

In retrospect, Looney served as a catalyst that got the Argonne studies of radium underway, and his role has been overlooked and underestimated. For several years after he left, while the examination of the Elgin State Hospital patients continued, the rate at which new radium cases were acquired and studied was very low. As noted above, 24 cases had been studied by July 1951; that number increased to 39 by January 1952, but after Looney left the rate slowed, so that only 43 cases were in the files by January 1953. In his paper published in 1955, coauthored by his Argonne colleagues, 45 cases are described: 6 dial painters, 19 Elgin cases, and 20 subjects given radium therapeutically. What was needed now was a new catalyst, a new finder of radium cases, to revitalize the program.

However, this period was not wasted. To allow detection of the lowest possible radium levels, techniques were developed and tested, equipment was built, and methods were pushed to the limit. Further, several new projects were underway that were to have direct bearing on the understanding of the metabolism of radium.

One of these new projects was the development of a method to concentrate radon from large volumes of expired breath on cooled charcoal