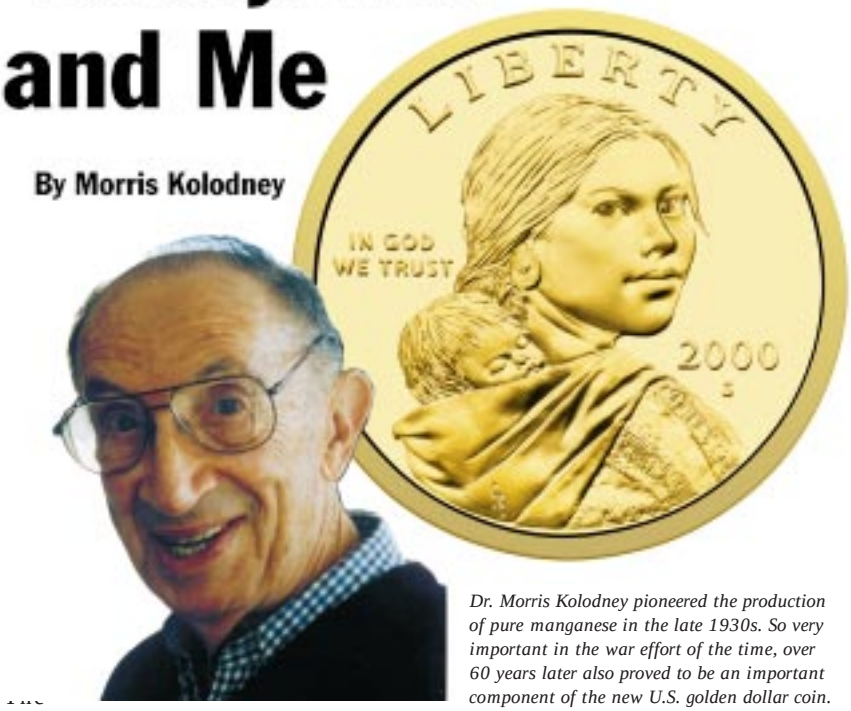
Sacajawea and Me

By Morris Kolodney



Dr. Morris Kolodney pioneered the production of pure manganese in the late 1930s. So very important in the war effort of the time, over 60 years later also proved to be an important component of the new U.S. golden dollar coin.

The front of the new U.S. golden dollar coin depicts Sacajawea, the Shosone woman who guided and translated for Lewis and Clark in their trek to the American Northwest in 1804-06. It has a three-layer composite construction of pure copper sandwiched between, and metallurgically bonded to, outer layers of manganese brass. Visit the U.S. Mint at www.usmint.gov.

What can possibly be the connection between me and the Shosone woman who guided and translated for Lewis and Clark in their trek to the American Northwest in 1804-06?

The tale begins long ago during my last couple of years as a student of chemical engineering at The College of the City of New York (CCNY) when I carried on paid industrial research for professors. Happily, my visibility won me an appointment as a teaching fellow with a full schedule in February 1934 at $1,000 per year. Seems paltry, but the Great Depression appeared irreversible, and presciently, I exp ed to enjoy teaching.

Knowing that future at CCNY w linked to graduate stu for the doctorate, began courses a Columbia University and since I expected teach electrochemist asked Colin G. Fink, sor in that discipline my mentor for PhD Dr. Fink was the inv chromium plating an innovations and had been secretary of the Electrochemical Society. He was fatherly and gemütlich, but I soon learned that he relied on his experience and intuition rather than theory.

Not only did Professor Fink welcome me into his stable of doctoral students, but he had a research project ready just for me. This was nothing less than the extraction of gold from seawater by electrolysis. Now, our oceans do carry a treasure of gold, but only because they are so vast. The amount of that precious metal is usually less than one ounce in even 100,000 gallons. Of course, Fink knew that if we simply passed a current through seawater, little more than hydrogen gas would emerge at the cathode, but he had a dream that if we spun the cathode fast enough, some golden magic would occur. Why? I don't know. Yet his faith was so strong that he had acquired an ultracentrifuge that rotated at 25,000 RPM, and he led me proudly to where it stood in its big wooden crate. This monster was to be the basis of my research.

Finks' dream was my nightmare. I thought the idea dotty, but couldn't say so. Dejectedly, I foresaw a couple of years of building massive equipment only to be followed by fruitless experimentation. Furthermore, I wanted to work at CCNY where I had a lab, numerous facilities, and the ability to putter at odd times.

After prolonged pondering, I concluded that salvation lay in quickly presenting an alternative so attractive that my mentor would not object to abandonment of the project sure to be dubbed Kolodney's Folly. My best bet seemed the pioneering production of a pure metal. I chose manganese because astonishingly, pure manganese metal was not available, although as a sibling of iron, nickel, and chromium, it would probably be a valuable alloying element.

I was lucky, hitting pay dirt fairly quickly and when Dr. Fink saw my early results he was enthusiastic, so I heard no more of the yellow metal from the sea. After I had investigated the usual factors that affect electrodeposition, we published "Electrodeposition of Manganese," in the *Transactions of The Electrochemical Society* in 1937. It was the first such exposition and it stimulated commercial interest.

My PhD research yielded a special electrode for extraction of manganese and was described in 1939, again in the

at fall, the Society met where I presented the sor Fink used his clout etary to publicize the ell beyond its realistic . The September 25, 39 issue of *Newsweek* aid, "A boon for America's military preparedness came at The Electrochemical Society's annual meeting in New York." The September 14, 1939 issue of *The New York Times* article headline said, "Vital War Metal Developed Here." I was embarassed by the exaggera-n, but enjoyed my 15 utes of fame.

pplied for a patent that was purchased immediately by the newly-formed Electromanganese Corporation. The price was $2500 ($28,000 in today's dollars) and my share paid for our first car. The company built a large electrolytic plant outside of Knoxville, Tennessee, where in the late 1940s I passed it each month on trips to Oak Ridge. Later, Union Carbide built one.

I began this story with the promise of a connection to Sacajawea. It is this: the beautiful coin bearing her image is made of a very unusual alloy, in which, as you've probably guessed, electrolytic manganese is an essential ingredient. It is unique, and the director of the U.S. Mint hopes to put as many as a billion of these dollars into our pockets and purses. (Some may wonder why electrolytic manganese was used in the new dollar coin. Of course, it imparts the

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gold color required by Congress, but other metals would serve that purpose. Far more important is the existence in the U.S. of about 15 million machines tuned to the "electrical signature" of the old Susan B. Anthony dollar coin. After months of failed experimentation, it was found that only alloying with manganese would avoid reconstruction of those machines.) And they are golden! Gold! So, by a wondrous weaving of chance, Professor Fink's dream has at long last been transformed into at least a replica of reality. That pleases me. ■

About the Author

Morris Kolodney *taught electrochemistry and metallurgy at The College of the City of New York and engaged in research and consulting for many years. During World War II, while at Los Alamos, he devised methods of producing both pure uranium and plutonium metals by electrolysis of fused salts, and electrolytic means of cleaning, etching, and coating these metals. He has also been a consultant on a variety of energy projects and is the author of many papers and patents.*