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# the story behind the story

## Milli Meter

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The Evoluon in Eindhoven, Holland is one of the most spectacular science and technology teaching museums in Europe. It is a regular stop in the SIU-C sponsored History of Chemistry Summer European Travel and Study tours.<sup>1</sup>

While escorting the participants in the 1975 program through this museum we became aware of a poster of a beautiful woman (see figure) in the exhibit devoted to the fact that many scientists are immortalized in the name of a unit of measurement, e.g., Volt—Alessandro Volta; Ampere—Andre Ampère. Short biographies in Dutch and English accompany the portraits or photographs of the scientists. The caption under the portrait of the lady read: "Milli Meter. Daughter of an Alsatian woodcutter. Attracted the attention of a passing general and spent several years at court in Paris. Renowned for her beauty. Fell into disgrace after Napoleon's downfall, and died penniless, in Menton, 1794–1872."

Although suspicious from the start, several hours were spent in the library at home to get a lead on Milli Meter. After all, we were in Europe to learn something about the history of science, and unexpected information found in the prestigious Evoluon cannot be lightly dismissed. Eventually written inquiries were directed to the museum's scientific department. Ir. G. Ahsmann informed us that Milli Meter was introduced about nine years ago by the Evoluon's designer James Gardner, who was of the opinion that in an exhibition devoted to a large number of serious topics, it is necessary to introduce a few items that will make people smile. Mr. Ahsmann does not know the identity of the beautiful lady and only speculates that she could be Catherine Hübscher, the laundress that became famous in Sardou's play "Madame Sans Gêne." Perhaps our readers may have an opinion.

Any museum is filled with exhibits that many visitors do not properly view, mostly because of limited time. After just publishing an article on "Women in Chemistry Before 1900,"<sup>2</sup> we were attracted to the poster of a woman wondering if we omitted someone worthy of inclusion in our publication. One can only wonder how many visitors passing for nine years through the museum knew enough to spot a good and amusing spoof.

The word "meter" is derived from the Greek "metron" (to measure). Originally it was defined as the length of one-tenth millionth of the earth's meridian quadrant passing through Paris. Even fledgling scientists should know that



at the turn of the 19th Century this could not be measured with any accuracy worthy of a definition of a unit. One can only speculate what part of Milli Meter's heavenly body would be worthy of the standard of length.

## The Lithium Story

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Lithium is not, as far as is known, an essential element like copper, zinc, or cobalt. Yet for many persons with manic-depressive illness, treatment with lithium salts offers the opportunity to maintain normal behavior away from the extremes of mania or depression. A range of behavior analogous to that of manic-depressive illness can be seen in some patients with thyroids that are overly active (mania) or overly inactive (depression). These effects have

<sup>1</sup>Wotiz, John H., J. CHEM. EDUC., 49, 593 (1972).

<sup>2</sup>Wotiz, J. H., and Houlihan, S., J. CHEM. EDUC., 52, 362 (1975).

been known for some time to be associated with an excess or deficiency of iodine-containing compounds that stimulate thyroid action. The clinical analogy between the two situations with similar extremes of behavior led J. F. J. Cade, a psychiatrist, to suspect that a substance in urine might be the agent responsible for manic-depressive illness (1).

In Cade's studies, some samples of human urine from manic patients were unexpectedly toxic to guinea pigs when administered to the animals as an injection into the peritoneal cavity. Molecular species suspected in the first instance of causing this toxicity included nitrogen metabolites present in urine, for example, urea, uric acid, and creatine. Urea was found to be toxic in such experiments, but similar experiments using uric acid (8-hydroxyxanthine) were initially hindered by the very low solubility (2) in water of the acid (1 g in 15,000 g water) and its salts (1 g in 1200 g water for the sodium salt). The most soluble salt was needed, namely, the lithium salt, 1 g of which dissolves in 380 g water. When lithium urate and urea were administered together, the toxicity induced was much less than that of urea alone, indicating a protective coating for the lithium ion against the severe convulsive effects of toxic doses of urea (3).

Cade has described the next step in these experiments: "To determine whether lithium salts per se had any discernible effects on guinea-pigs, animals were injected intraperitoneally with large doses of 0.5% aqueous solution of lithium carbonate. A noteworthy result was that after a latent period of about two hours the animals, although fully conscious, became extremely lethargic and unresponsive to stimuli for one or two hours before once again becoming normally active and timid" (3).

Encouraged by these results Cade administered lithium carbonate and citrate to ten manic patients. After only a short period of taking the lithium salt outstanding success was apparent. For example, in some cases, after being established on a maintenance dose, patients were able to leave the psychiatric institution and return to regular employment.

Historically, lithium salts had been used in the nineteenth century for the treatment of various disorders, including epilepsy (lithium bromide), gout and malignancy (lithium cinnamate) (4). In such pharmacological preparations lithium served as the "carrier" cation for the anion of interest. The choice of lithium salts for the treatment of gout was governed by the same considerations that stimulated Cade—the fact that lithium urate is the most soluble of the urates.

At the present time lithium salts are used widely in the treatment of manic depressive illness. Although the detailed mechanism of action of lithium in such cases is still unknown (5, 6), it remains a dramatically effective treatment. Thus, in summary, "we have for the first time in the history of psychiatry a simple drug that controls a complex major mental illness" (7), yet the biological activity of this drug, lithium, was discovered in a quite indirect way, via the relative solubilities of salts of uric acid.

#### Literature Cited

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