influences, doubtless due in part to the tact of the various general officers and to the very valuable services of the secretary of the Royal Asiatic Society of Bengal, Mr. J. van Manen.

Since the foundation of the Indian Science Congress Association, it had always been hoped that it might prove possible to arrange for an over-seas visit of the British Association to India. The necessity, for climatic reasons, of holding such a meeting during the cold weather (November to February), the middle of the academic year, offered serious difficulties. However, they have now been overcome, and, moreover, the precedent has been established of sending a delegation to a joint meeting with another organization. This is undoubtedly of great significance. Valuable as are personal contacts within a country, such contacts with workers in other countries and the opportunity of seeing the conditions under which they work are of even greater value, while the presence of a body of distinguished scientific visitors in India can not fail to be a source of inspiration to students and scientific investigators in that country.—*Nature*.

SCIENTIFIC BOOKS

MADAME CURIE

Madame Curie. A biography by EVE CURIE. Translated by VINCENT SHEEAN. Doubleday, Doran and Company, 1937.

THIS book is a reverent tribute to a gifted person and a sterling human being. Eve Curie, one of Madame Curie's two daughters, has put her soul into the work, and the well-known author of "Personal History" has done a fine job in translating it. Since the book is for the million and not for the select few, the emphasis is very properly on the personality of the heroine (and on *her* hero, Pierre Curie) This is as it should be; for the technical details involved in the discovery of radium have been described many times.

Much as one admires the scientist, the temptation here is to admire the woman as woman even more. In a world so distracted as the present, where the outlook of the caveman is applauded, the story of Marie Curie (and Pierre Curie, for the two are indissolubly bound) is the story of a noble spirit whose activity is, in a sense, a challenge to utter pessimism. Alas! We know only too well that great scientists do not always make fine men. What is called "truth" seems often a laboratory, but not a life necessity. But then, once in a while a Curie, a Rutherford, an Einstein appear if only to emphasize the absurdity of such a separation. All honor to the memory of a Marie Curie, who was a great scientist and a noble woman. All the more honor to her these days, when the tendency is for fanaticism to impose a goose-step rigidity of utterance; when tyrants seek to establish intellectual sterility.

The story starts with the child and the young woman in Poland. As Marie Sklodowska, the future Mme. Curie studies mathematics and physics in school and joins the rebellious Polish youth in their plan for an independent Poland. She lived to see a Poland reborn which set about persecuting its own minorities. But that was to come. In the meantime, we meet her again, this time in Paris. She lives in a garret six flights up. The room is cold, the food is scarce and the physics with Lippmann at the Sorbonne is absorbing. In 1894, when 27 years old, comes the touch of romance. She meets Pierre Curie. Somewhat later, Pierre discloses his love and his philosophy:

> It would be a lovely thing, in which I hardly dare to believe, to pass through life together hypnotized in our dreams: your dream for your country; our dream for humanity; our dream for science. Of all these dreams, I believe the last alone is legitimate. I mean to say by this that we are powerless to change the social order. Even if this were not true, we should not know what to do. And in working without understanding, we should never be sure that we were not doing more harm than good, by retarding some inevitable evolution. From the point of view of science, on the contrary, we can pretend to accomplish something. The territory here is more obvious and solid, and, however small it is, it is truly in our possession.

And so they marry, and work together and struggle together—on a salary of 300 francs a month, "comparable to that of a day laborer." Not until 1906, a few months before his death (he was run down by a truck and instantly killed), did Pierre get a chair of importance at the Sorbonne. In the meantime, they gave radium to the world. They took out no patents; they withheld nothing. "It would be contrary to the scientific spirit," said Marie; and Pierre agreed. They were carrying out their pact, to serve humanity; and humanity took what they gave, and thanked them very largely in polite speeches and empty honors.

Apparatus and equipment for the laboratory ate up the money obtained with the Nobel prize. The "laboratory" was an abandoned shed, with a leaky roof, and devoid of hoods to carry away poisonous gases. In bitterness does Marie write ("Pierre Curie," by Marie Curie): "Our society, in which there reigns an eager desire for riches and luxury, does not understand the value of science. It does not realize that

science is a most precious part of its patrimony." And again, in this book: "Humanity needs dreamers, for whom the disinterested development of an enterprise is so captivating that it becomes impossible for them to devote their care to their own material profit."

But she carried on. When Pierre died, she succeeded to his chair at the Sorbonne and continued the research work. Later on, with the establishment of the Curie Institute for Radium, she supervised the work of many—among them, the Joliots (her daughter, Irene, and her son-in-law), who were to receive the Nobel prize in their own right. She isolated radium in the pure state. For the second time she received the Nobel prize, the only instance of the kind on record. Years later, in Berlin, at the railway station, the crowd seemingly did not know whom to cheer more, Jack Dempsey or Madame Curie. But for all that, the august members of the French Academy of Sciences (with some notable exceptions) refused to elect her into their body because—she was a woman! In the spirit of science and logic with which he was so imbued, Academician Amagat closed his peroration with the declaration: "Women cannot be part of the Institute of France." The "immortals" finally gave way in 1922. They had become the butt of vaudeville performers.

Mme. Curie visited this country in 1922 to receive a gift of a gram of radium. She carried home this precious gift—a token from the women of America—together with as many honorary degrees as belong to President Butler.

She died in 1934. "Madame Curie," wrote Einstein, who knew her well, "is, of all celebrated beings, the only one whom fame has not corrupted."

To me the miracle of this volcanic period is that such women and men can be found to devote their lives to distant and often vague objectives in the midst of turmoil which distracts the minds of so many of us. These monks of 1938, devotees of the neutron, the hormone, etc., represent the immortal spirit which will not die.

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SPECIAL ARTICLES

SELENIUM AS A STIMULATING AND POSSIBLY ESSENTIAL ELEMENT FOR CERTAIN PLANTS

SELENIUM is the only mineral element known to be absorbed from the soil by food plants in sufficient quantities to render them lethal to animals.[1] Beath[2] and his associates have found that certain native plants —including several species of *Astragalus* (legume), *Stanleya* (crucifer), *Xylorhiza* (composite) and *Oonopsis* (composite)—always contain selenium when collected on seleniferous soils. The indicator plants frequently accumulate several thousand parts per million of selenium. Furthermore, the available evidence tends to show that some species of the indicator plants occur only on soils that contain selenium. The investigations reported by Byers,[3] as well as our own observations in South Dakota, Colorado, Wyoming, Idaho, Nevada and Utah, have shown a definite correlation between the distribution of Beath's indicator plants and the presence of selenium in the soil.

These facts obviously suggest that selenium may be an essential element for the growth of the indicator plants. Since the soils supporting these plants contain only small traces of selenium, it is evident that this element, if indispensable, belongs in the group of micrometabolic or microtrophic elements, which already includes manganese, boron, zinc, copper and perhaps others.

We have grown one of the indicator plants, *Astragalus racemosus,* in artificial media. This species occurs widely distributed, from North Dakota and Wyoming southward to Texas and New Mexico. Seeds that we had collected in South Dakota were germinated in quartz sand and then transferred to solution cultures and sand cultures. One set of plants was supplied with the usual mineral nutrients, and the other sets had in addition various concentrations of selenium (as sodium selenite) ranging from 1 to 243 ppm. Though receiving a considerable quantity of selenium from the seed, the plants which were given no additional selenium made slow growth in comparison with those which obtained selenium from the culture solution. Marked stunting of the plants deprived of selenium became evident within a few weeks after their transference to the mineral solution.

These experiments show that selenium has a pronounced stimulating effect on the growth of *Astragalus racemosus,* and they suggest that selenium may be essential for the development of this and other species of selenium indicator plants. After we had completed one set of these experiments, we learned from Professor Beath that he has obtained somewhat similar results with soil tests. Germination and growth of

[1] For literature review, see S. F. Trelease and A. L. Martin, *Bot. Rev.*, 2: 373–396, 1936.

[2] O. A. Beath, H. F. Eppson and C. S. Gilbert, *Wyo. Agr. Exp. Sta. Bull.*, 206, 1935. *Jour. Am. Pharm. Assoc.*, 26: 394–405, 1937. O. A. Beath, *Wyo. Agr. Exp. Sta. Bull.*, 221, 1937.

[3] H. G. Byers, *U. S. Dept. Agr. Tech. Bull.*, 482, 1935. J. T. Miller and H. G. Byers, *Jour. Agr. Res.*, 55: 59–68, 1937.