

BIOTRON



Fig. 1.
Biotron
c. 1965.
[series 9/
3,
Biotron,
ns-701]

The biotron was erected in 1964 to provide a laboratory in which plant and animal experiments could be done which required close control of climate, disease and other environmental factors.

The Biotron is unique on the University campus in several ways. Its origins were entirely off campus. It is not the exclusive domain of any one department, and when it was built it was the only facility of its kind in the world.

The genesis of the biotron came from the report of a study internal to the National Science Foundation (NSF) in 1959. This study, conducted by the Botanical Society of America, stated the need for a facility devoted to controlled-climate experimentation on both plants and animals. Subsequent to this report the NSF invited institutions including UW to submit research proposals relating to such a facility. The University appointed a committee to develop a proposal. The Biotron committee was made up of botanists, zoologists and biochemists. It was chaired by Folke Carl Skoog, professor of Botany. After considering all proposals the NSF in June 1959 selected the University of Wisconsin as the recipient of the \$1.5 million grant for the construction of the Biotron.¹

The purpose of the Biotron was to provide scientists a way to study plants and animals in environments that could be controlled accurately with respect to temperature, humidity, disease, insect

population and other environmental criteria. The facility would be open to qualified researchers from institutions other than the UW. At that time (1959) there were a few limited facilities scattered around the world (including at the UW) for climate-controlled experimentation on plants (phytotrons), but there were no facilities that combined such labs for both plants and animals. The design and construction of the Biotron would be a voyage in largely uncharted waters.

By the end of June 1959 the Biotron construction committee (chaired by professor Robert A. Burris of biochemistry) had selected a site between the creek and the Walnut Street greenhouses, and south of Observatory Drive. In September 1959 the regents approved this choice. A meeting of world leaders in the controlled environment field was held in December 1959, and many ideas and directions were discussed for the Biotron. The next major decision of the committee was the appointment of a director of the Biotron. The choice went to Dr. Harold Senn of Ottawa, where he headed the Canadian government's plant research laboratories. Dr. Senn came to Madison September 1, 1960. He would prove to be a dynamic and highly effective leader of the Biotron effort.²

When Dr. Senn came to the project, the building committee had already developed the basic form of the building and its contents. It was to be a one story building of about 21,000 square feet, split nearly equally between plant and animal labs. The initial goal was to be able to mimic any environment on earth, including the extremes of the poles, but estimated costs were so high that the range was restricted to central Canada to the Argentine. It was assumed that the real extremes could be added later if needed. Animal sizes from mice to giraffes were discussed. In May 1960, architects Grassold and Johnson were chosen, along with several specialty contractors for mechanical and electrical systems, which were anticipated to be outside the normal range of sub-contractors.³

Serious reservations were already heard about the budget. The 1960 estimate of utility hookups to the relatively remote site was about \$160,000, or more than ten percent of the total available budget. In November 1961 the planners estimated that the cost of the facility if built to fully realize the vision of the NSF and the Biotron committee would be \$5.3 million. They further estimated that with all nonessentials removed the basic facility would cost \$4 million. The NSF approved the plans but would offer no further grants. However the NSF agreed to regard the original \$1.5 million as a contribution toward the project, which allowed the committee to seek other sources of funding. This drive for additional funding became the central difficulty in the entire project. Some attempts were made to design the facility in stages, a technique that had worked with more conventional University buildings, but which proved unwieldy with the complex high-tech Biotron. As Dr. Senn said it will be "more like a machine than a building".⁴

In May 1962 the National Institutes of Health (NIH) granted a \$1 million matching grant for the Biotron. But by July 1962 the regents were informed that approximately \$4 million was committed for the project and approved the preparations of preliminary plans for a building to cost an estimated \$4.2 million. The official notification of the bulk of the money came in January 1963 when the Ford Foundation contributed \$1.7 million. Construction was now estimated to start around July 1963. The NSF warned the University that further delays might jeopardize the original grant. Throughout late 1963 the planners struggled to master the technical problems in time to prepare final plans for construction. They were now aiming for spring 1964 as a starting date.⁵

A budget of \$4.2 million was approved by the regents in May 1964. When bids were opened on June 25, 1964 they were \$775,000 over budget. Director Senn immediately applied to the Ford Foundation, the NSF, and NASA, who all responded negatively. The Wisconsin state building commission agreed to match up to \$500,000 of private funds. The Biotron committee made some reductions in the plan, and took alternate bids to reduce costs by \$178,000. In August Dr. Senn was notified that the NSF could supply \$300,000 to match the state money. This grant at last provided the total necessary to let contracts for construction.⁶

Construction contracts were let by the regents in August 1964. Total contracts were for \$4.8

million. The general contractor was J. H. Findorff & Son for \$857,227. The funds were obtained as follows: the NSF, \$1.5 million, the NIH \$1 million, the Ford Foundation \$1.7 million, the state building commission and the NSF supplemental grant \$613,000. During the frantic efforts to complete funding, a groundbreaking ceremony had been held on August 27, 1964. Estimated completion was for fall 1966. The shell of the building was completed and the roof installed by July 1, 1965. The difficult and complex mechanical and electrical systems were begun the same month. Heating and ventilating work was begun in September 1965. Dr. Senn began to escort visitors and distribute users manuals to potential researchers.⁷

By May 1, 1966 mostly air-conditioning work remained. In late 1966 as the completion deadline was missed again, most delays were caused by the non delivery of U. S government surplus equipment that had been utilized during the cost reduction efforts. December 1967 saw the testing of major mechanical systems, with failures of a water supply main, and the nonperformance of some environmental controls. Although some systems were still under test, first plants were grown in March 1967, and the first formal research project was initiated in May, 1967. The official dedication was not held until September 18-19, 1970, nearly twelve years after the start of the project.⁸

The finished structure was a windowless rectangle of 151 by 209 feet 46 feet high sheathed in face brick with some cut stone trim over concrete block walls and reinforced concrete frame, a small first floor entry way on the north side allows entrance from Observatory Drive. The labs are on two floors, with a third level containing the maze of pipes and wiring of the mechanical systems. There are 48 climate controlled labs.

Notable experiments in the Biotron include the 1977 hatching of 4 eggs of the nearly extinct Siberian Crane. This and research on the effects of air-pollution and pesticides on rhesus monkeys have brought international attention to the Biotron. Animals from mice, to pigs, have been accommodated. Director Dr. Theodore Kozlowski says that in a pinch an elephant could be handled. Proposals for Biotron experiments can be submitted by anyone holding the rank of assistant professor or above. Since the Biotron is the domain of no single department, it is administered by the graduate school and its committee. The remarkable biotron is a jewel in the crown of Wisconsin's great University.⁹

1) *Regent's Minutes*, July 11, 1959, exhibit A, September 12, 1959; Research Proposal to the National Science Foundation for construction and equipping of a biotron, Burris to Wendt, October 6, 1959, Biotron building committee meeting minutes, December 21, 1959, NSF to Elvehjem, June 30, 1959, series 24/9/2 box 12; The Biotron, c. October 1961, series 54/0/3 box 188. *Capital Times*, August 14, 1959.

2) Froker to Elvehjem, June 22, 1959, series 4/0/3 box 188; Biotron building committee meeting minutes, June 22, 1960, series 24/9/2 box 12; *Wisconsin State Journal*, August 19, 1960; *Regent's Minutes*, September 12, 1959.

3) *Wisconsin Alumni Magazine*, June 1961, p. 16.

4) Burris to Wendt, June 13, 1960, series 24/9/2 box 12; Waterman to Elvehjem, August 11, 1961, Memo, July 18, 1961, Moseman to Senn, October 10, 1961, Review of the Biotron Project by Harold Senn, April 30, 1962, Notes on Conference Re Biotron, November 6, 1963, series 4/0/3 box 188; *Wisconsin State Journal*, August 26, 1964;

5) Peterson to Schmehl, May 22, 1962, Review of the Biotron Project by Harold Senn, April 30, 1962, Peterson to Schmehl, January 30, 1963, Stamberg to Peterson, February 4, 1963, Memorandum, Sites to Kinne et al, November 5, 1963, series 4/0/3 box 188; *Regent's Minutes*, July 13, 1962;

6) Senn to Harrington, August 14, 1964, Harrington to Senn, July 14, 1964, Peterson to Wisconsin State Building Commission, July 27, 1964, Biotron Construction Budget, April 1964, series 4/0/3 box 188.

7) *Regent's Minutes*, August 14, 1964, exhibit G; *Wisconsin State Journal*, August 26, 1964; Daily Cardinal, September 28, 1964; Biotron Progress reports, October 1964, July 1965, October 1965, November 1965, series 40/1/7-1 box 53;

8) Biotron Progress reports, October 1, 1965, November 1, 1965, January, May, June, October and November 1966, series 40/1/7-1 box 53; Biotron Progress Reports, March, April and May 1967, series 24/9/3 box 8; *Capital Times*, July 21, 1966; History of the Biotron, Dedication brochure, Archives Biotron subject file.

9) *Wisconsin State Journal*, July 3, 1978; *Madison Press Connection*, November 14, 1979;