

Businessmen and workers both realized that the methods of scientific analysis could be used to increase production and wages. It was used in World War I to improve productivity in Europe and America, and in the years after the war, scientific management became so integrated into industry that by 1940 it disappeared as a separate identity in industry.

Historical research has revealed that many portions of Taylor's books and experiments were prepared by his assistants Sanford Thompson and Morris Cooke. We need more information on both the early studies of human work prior to 1880, and the development of scientific management after 1901. Closer study of the literature on the science of human work and mechanics published before 1880, wills, deeds, and other public records in Pennsylvania, New Jersey, New York, and Massachusetts, and Taylor Archives at Stevens Institute of Technology, and the National Canal Museum Archives in Easton, Pennsylvania, may yield new knowledge.

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Marine Biological Laboratory

The Marine Biological Laboratory's (MBL) charter explains that it was founded in 1888 "for the purpose of establishing and maintaining a laboratory or station for scientific study and investigation, and a school for instruction in biology and natural history" (MBL Annual Report, 1888, p. 38). This combination of research laboratory and natural history school was new, and in setting the dual purpose, the trustees had resolved to try an experiment. Perhaps they would have lost their resolve and veered off track toward one function or the other when the two became at times difficult to balance. Yet, they also decided in the first year to make Charles Otis Whitman director of the new laboratory. Whitman was committed to the dual function, and he was a very dedicated and even rather stubborn proponent of what he believed was best. Whitman guaranteed that the MBL would be new and different. From the first, the laboratory was defined by three strong themes: innovation, independence, and the combination of instruction and investigation together.

Innovation appeared in the original mission, of course, but also in other actions. Whitman experimented with new courses and areas of research, including general physiology—a new field in the United States. He enthusiastically selected Jacques Loeb to direct his effort because he felt that Loeb was the best—even though Loeb was German and Jewish at a time when neither was very popular. Whitman introduced neurobiology with a course beginning in 1896—even though this brought in interests normally thought to belong to psychology or medicine. The second director, Whitman's protégé Frank Rattray Lillie, carried on the tradition by working to bring oceanography to Woods Hole through the Woods Hole Oceanographic Institution. Other examples abound, but the general theme is clear. Innovation has remained central to the MBL.

It is perhaps easier to be innovative because the bureaucracy remains small and less constraining than at universities and more "normal" year-round laboratories. The fact that until recently the MBL was only a summer lab helped allow people to come, try new things, and return home to the old and familiar if the innovations had not worked. Young researchers and students could try things without their department chairs or senior colleagues watching them. When people had good ideas which stretched beyond the available budget, Whitman, then Lillie, and then other directors worked to attract the funds to facilitate the work.

Although sometimes risky and sometimes resulting in failure, this spirit of innovation has produced a continuing sense of excitement and vitality for the laboratory.

Independence has allowed the innovation to work. Because no other institution oversees the MBL—no university or government agency or private foundation—the scientists run the place. Since 1897, scientists who work at the MBL become eligible to become corporation members who oversee the general decision making, while a board of trustees and administration carry out the policies.

As with any institution, financial pressures have, on occasion, pushed the laboratory to the brink of losing its independence. In the 1890s, a group of individuals connected with the University of Chicago offered to pay the bills in exchange for some oversight of the MBL. The trustees objected and fended off what they saw as the threat to their independence. In 1902, the situation became even more dire, and the recently established Carnegie Institution almost took over the MBL as a department of its larger operation. Fortunately for the cause of independence, the Carnegie Institution was not ready to take on such a project and agreed to offer temporary financial support rather than seeking permanent control. The generosity of the Carnegie Institution, Carnegie Foundation, Rockefeller Foundation, the General Education Board, Lillie's brother-in-law Charles Crane, many other benefactors, and eventually the government in the form of the National Institutes of Health and the National Science Foundation have made it possible over the years to maintain independence. The cost is in restricted funds and the inability to do everything that a larger endowment or greater operating budget might make possible, but the advantages have appeared to MBL scientists well worth the costs.

From the beginning, Whitman insisted on the complementary combination of research and teaching, saying:

The research department should furnish just the elements required for the organization of a thoroughly efficient department of instruction. Other things being equal, the investigator is always the best instructor. The highest grade of instruction in any science can only be furnished by one who is thoroughly imbued with the scientific spirit, and who is actually engaged in original work. Hence the propriety—and, I may say, the necessity—of linking the function of instruction with that of investigation. (Whitman, Director's Report, 1888, p. 16)

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The intention has always been to offer courses that complement rather than duplicate those “back home” and to take advantage of the available materials and questions raised by marine life. Course directors have limited terms, and they are given the resources to attract a diverse team of other instructors, so that the courses can remain fresh and responsive to scientific innovation.

The MBL faces a number of challenges. As costs escalate, it suffers from an insufficient endowment to secure the library and all activities comfortably. The MBL and Woods Hole are too small to allow as much expansion as some advocate. It is not possible to explore all aspects of biological research and teaching, and choices become more difficult as more options become available. It becomes more difficult—and more important—to hold on to the ideals of innovation, independence, instruction, and investigation that have defined the laboratory for over a century.

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Jane Maienschein

Marsh, George Perkins (1801–1882)

Physical geographer and environmental theorist. Born in Woodstock, Vermont, Marsh was educated at Dartmouth College. For a time, he worked as a teacher, businessman, and lawyer. He was largely unsuccessful in these occupations, finding greater satisfaction in scholarship. During his lifetime, he wrote widely on art, philology, religion, politics, and conservation. In 1843, he was elected to Congress as a Whig. Neither a great statesman nor a scientist, he was, nonetheless, influential at the interface of science and politics, being one of the strongest congressional supporters of the newly established Smithsonian Institution. In 1849, Marsh left Congress to become minister to Turkey. He briefly returned to private life in the United States in 1854, but spent the final twenty-one years of his life (1861–1882) as minister to Italy.