Sheffield, and although the amount annually received from this source was not large, it seemed so, and was accepted as a token of public confidence most timely and encouraging. This disposition was good for the State and good for the College, and fully justified the action of Governor Buckingham and those who concurred with him in advocating this appropriation. A long line of governors from his time onward testified to the value of such an arrangement. Its termination, after almost thirty years of harmonious union, is much to be regretted among the unfortunate annals of divorce.

Soon after the reception of this grant, several members of the Faculty entered upon an educational campaign which can hardly be brought to mind, in a retrospect of this long interval, without provoking a smile at the enthusiasm of youth and at the "expulsive power of a new affection." The principal towns of the State were visited, and the chief men of the tribes were assembled to hear of the new education. Sometimes in lecture rooms, frequently in private parlors, once in a court house, once in the Governor's room at Hartford, and once in a fire-engine room, the story was told with the earnestness of conviction, if not with the graces of eloquence, and with the certainty not of history but of prophecy. Dana, a constant friend, had inaugurated the campaign some years before by a public address. Whitney's "Aim and Object" was distributed freely as a campaign document, and the newspapers, always responsive to the claims of the school, echoed these professorial utterances in villages and byways. The school did not reap much money from the farms or mills, but it made hosts or friends, whose favor has never departed. One of the most valued was Horace Bushnell, and Governor Hawley was another.

But why should further extracts be read from the book of Chronicles? Let us rather consider the significance of the circumstances, gifts, sacrifices, labors, methods and suggestions which have made the Sheffield School.

YALE AND SCIENCE.

From beginning to end this institution has been a department of a university, of a university which never suffered its love of letters to blind its eyes to the value of science. In the days of closely restricted income, during the first half of the century, chemistry, mineralogy, geology, botany, mathematics, physics, meteorology and astronomy were taught in Yale. Nor will any one think that scientific research was undervalued if he recalls the preparation of Dana's Mineralogy, the light that was thrown on meteoric showers, the studies of the aurora, and of the zodiacal light, and the search for an intra-mercurial planet. Very different would have been the Sheffield record if it were not associated with the fame, the fortune and the followers of a greater alma mater. Substantial advantages were bestowed by the mother upon her child—the use of the library and of the cabinets of mineralogy and geology. The Peabody Museum, the Winchester Observatory and the Street School of Fine Arts shed their light, like the sun, on all the University, but the gift of George Peabody especially contributed to the growth of a school in which mineralogy, geology and zoology were prominent subjects of instruction.

Still Sheffield has not been held by the leading strings of its mother. It has had a large amount of independence. Its funds, buildings, appointments have been its own. The professors have been its governing board, controlling its courses and its funds, subject to the oversight of the President and Fellows. On one occasion, at least, the Faculty asked permission of the astonished corporation to reduce their own salaries, and the request was granted!

NO "CONFLICT OF STUDIES."

Thus it has come to pass that no "conflict of studies" has been heard of; no hostility between science and letters; no "warfare" between science and religion. The Sheffield School has always stood for the idea of a liberal education in which scientific studies should predominate, but in which a moderate amount of Latin and of modern languages is required; history and economics are also taught. It is memorable that for a long period the greatest of American philologists was the daily instructor in French and German; and that the most learned study ever made of "Dan Chaucer and his well of English underfyled" proceeded form a Sheffield chair.

Slight perturbations in the academic and scientific orbits might interest a great astronomer, like Newcomb, but to the ordinary observer they were as imperceptible as the influence of Neptune upon Uranus.

"FREEDOM UNDER CONTROL."

Dr. Michael Foster, the English physiologist, in a recent address has called attention to the fact that the increment of human knowledge transcends the power of man to assimilate it. This is most obvious when a course of preliminary education is considered. So many subjects are said to be "of the first importance," so many are "indispensable," that, like new wine in old bottles, they have burst the curriculum of our Fathers and overtaxed the capacities of youthful recipients. Elective systems, costly, vexatious and antagonistic to time-honored traditions, must now be provided in every college and institute of technology. It is one of the glories of the Sheffield that from the beginning students have here been permitted to choose a group of studies, the constituents of which were beyond their choice. "Freedom, under control," has been the rule of the house. Moreover these groups have not been set forth as professional courses, but as ladders leading up to special callings, as preliminary to modern professions and technical pursuits. One of the most advantageous of these courses has been preliminary to medicine. To follow the healing arts, which have made during the last half-century such wonderful advances, discipline is requisite in physics, chemistry, physiology, with prolonged laboratory practice and increasing familiarity with the normal functions of organic life. Such courses were projected here five and twenty years ago, and gradually the medical colleges are discovering their value. The Johns Hopkins Medical School, for example, allows no student to enter as a candidate for its four years' course unless he has had such a training, substantially, as that here offered many years ago, and never so advantageously as now.

AN INSPIRING DEGREE.

In the matter of Degrees, it is not possible to distinguish between the requirements of the school and those of the department of Philosophy and the Arts, nor is it important, for the greater includes the less. Certainly Yale and Sheffield are entitled to the credit of introducing among American institutions the degree of Doctor of Philosophy, demanding for it a high standard of attainments, and never bestowing the honor (not in a single case, so far as I can remember) by any irregular promotion. This degree has proved a powerful incentive to scholarship in this and other universities, and the list of *laureati Yalenses*, beginning, in 1861, with men now celebrated, is a list to be proud of. It is also noteworthy that the school has never yielded to the American tendency to multiply the forms of the baccalaureate degree, a multiplication almost as bad as tampering with the coins of the realm.

A large amount of freedom has been given to the students outside of the halls of learning. Twice an application was made for places at daily prayers in the college chapel, for scientific students; but none were provided, doubtless because the building by tradition and in construction was a collegiate and not a university chapel, and not because the scientific students were considered "past praying for." There has been no common table, no dormitory, no regular general assemblies of officers and students; on the other hand, there have been no rebellions against authority, no disorder, no hostility toward the faculty, no apparent trend toward irregular life, no lack of college spirit.

In the annual catalogue for many years the same phrase has been employed to express the object of the Sheffield School. These are the familiar words:

"The Sheffield Scientific School is devoted to instruction and researches in the mathematical, physical and natural sciences, with reference to the promotion and diffusion of science, and also to the preparation of young men for such pursuits as require special proficiency in these departments of learning."

By these double services this school is known. Indeed, if you would estimate the value of any institution of learning, measure its breadth and its depth; its breadth as revealed in the number, distribution and attainments of its pupils, by their success and renown; its depth, as shown by contributions, direct and indirect, made by its faculty and graduates to the advancement of knowledge.

OF SHEFFIELD GRADUATES.

There is no recent statement of the occupations of Sheffield graduates; but the brief phrases of the triennial, and an extended personal acquaintance, in places near and remote, justify the following assertions. Nearly two thousand men have here been graduated and many more have been well trained, according to their aptitudes, in science and in the applications of science to the useful arts. Many of them have proceeded to higher degrees, or have entered at once upon places which led up to a participation in the construction of public works, the conduct of industrial establishments, the charge of mills, mines, surveys and explorations, and the promotion of public health. Others, and some of the ablest, have entered upon the study of medicine. A large number have been called to chairs of instruction and investigation.

The earliest list of graduates was prognostic. Six of the seven Bachelors of Philosophy became teachers, one a geologist and an explorer of the western territory, one the botanist of the California Geological Survey, and a third one of the leading mineralogists of the world. Go to South Africa or to Japan, or to Turkey, to California or any of the trans-Mississippi States, inquire into the work of the United States Geological Survey, scan the membership of the National Academy of Sciences, look at the Faculty of Yale, of the Massachusetts Institute of Technology and of many other colleges, and you will come at once upon the Sheffield men.

As an example of their activity, a most interesting story might be appropriately told if the time would permit, respecting the adventures of a graduate of 1862, and his friend, in crossing the continent before the first Pacific Railroad was built, of their map of the Yosemite, and of their mountaineering in the Sierras, which culminated in the ascent of Mount Whitney. Then came the celebrated exploration of the fortieth parallel, and the subsequent organization of the United States Geological Survey, of which this distinguished scholar became the first director. Such achievements belong to the trophies of the school.

It is never easy, in a public assembly, to review the progress of science or to estimate individual achievements. Many important contributions have no characteristics which are of interest beyond the circle of experts, or even intelligible. The speaker is certainly disqualified from making such a review or from weighing in a critical balance the services of the able men, his personal friends, who have constituted the faculty. Their presence forbids him to pronounce their names; yet he ventures to recall some facts which are known even to the inexpert, and to allude to others which the modesty of the faculty might be disposed to hide.

You have been reminded that the analytical laboratory, in the old white dwelling house ("the lab" of our college slang), was the first, and for a time the only "outward sign of inward grace" which was shown by the new school; even now the manifold activities of five great buildings do but magnify the importance of their elder departed brother. With increasing vigor and undiminished enthusiasm, the laboratory study of chemistry there begun has been prosecuted for fifty years, partly for its own sake and partly because of its relations to agriculture, mineralogy, metallurgy and physiology.

SCIENTIFIC AGRICULTURE.

Consider agriculture. These are the days when everybody is conscious that the welfare of the country, perhaps the stability of the government, is dependent upon "the crops," but not everybody remembers, when he sees the heavily laden trains, the well filled elevators and the wharves burdened with wheat, cotton and tobacco, that the national supplies are largely results of advances made by science. Every State in the Union now has its college of agriculture and the mechanic arts. It was not so when Norton came to Yale. He was a pioneer in the scientific agriculture of the United States: and with a longer life would have accomplished much more; for he knew how. He set the pace. When his mantle fell upon Porter, a student of Liebig's, twenty-six leading agriculturists, from every part of the country, were brought to New Haven, for a conference of many days, and it would not be difficult to show that this unique, primeval example of university extension had a powerful influence in promoting, on right principles, the study of agriculture. This was in 1860. It was estimated that five hundred persons from a distance came here to follow more or less of these lectures and discussions. Consequently, came the national grant associated with the name of Senator Morrill, an enactment due in no small degree to influences here put forth. From this congressional bounty, Cornell, Madison, Minneapolis, Berkeley and other universities of the Western States derive a considerable part of their revenues.

A pupil of John P. Norton's soon took the leadership in agricultural chemistry, and no one has outstripped him in the race. His books, his suggestions, his scientific memoirs, his researches, and his personal influence have made the school famous. The list of his publications is a long one, but it is more remarkable when tested by qualitative than by quantitative analysis. One of them, "How Crops Grow," is almost as widespread as the vegetation it describes. Like the Pilgrim's Progress, it is adapted to every clime. Early in the seventies the author began to advocate the establishment of experimental stations, and in due time had the satisfaction of seeing them established throughout the Union, while he became director of that in Connecticut. This achievement alone reflects great distinction on the Sheffield School. If it had done nothing but make and uphold this idea, its cost would have been repaid.

Closely associated in the promotion of scientific agriculture has been a different sort of mind, one whose unfailing resources, practical sense, and varied knowledge sometimes overshadow his ability as an investigator in four important branches of science. He was long a wanderer on the Pacific slope, collecting plants and experience, climbing mountains and difficulties; but he returned to New Haven at the regeneration of the school in 1864-5 and his post-exilian studies have been directed to heredity, the evolution of breeds and the transmission of acquired characters, and to the conditions of public health.

NEW HAVEN A MINERALOGICAL CENTER.

New Haven has been a center of mineralogical inquiry during the entire century. Its collections, which began with the famous candle box of Professor Silliman, were augmented by the cabinet of Colonel Gibbs, and have grown into the varied and comprehensive possessions of the Peabody Museum. These collections inspired the renowned treatise of James D. Dana, whose work has been extended and made more complete by the able followers connected with this school. Important contributions to the science of mineralogy, involving a great amount of accurate discrimination, were modestly put forth year after year by the director of the school as supplements to Dana's work. New localities were visited, and old localities were revisited, always with good results, not only in beautiful specimens, but also in positive contributions to science. His absorbing administrative duties have not dimmed his enthusiasm nor abated his energy. He is one of those men, rare at any period, who carry on the most special investigations in their own domain, while they show a broad sympathy with other workers, and a great capacity for perception, suggestion, encouragement and aid.

So in geology. Able investigators whose observations and publications have been important have gone hence