that the corals are secreting and depositing any more calcium carbonate in the West Indian region than are the calcareous algæ. The massive beds of *Halimeda opuntia* off the Florida Keys (the same species, by the way, that is filling the lagoons of some of the South Sea atolls) are striking, as are the banks of *Goniolithon strictum* in the Bahamas and reefs of *Lithophyllum Antillarum* and *Lithophyllum daedaleum* along the shores of Porto Rico, yet probably none of these are so conspicuous and massive as are certain local aggregations of living corals in the same general regions. However, the lime-secreting plants appear to be much more generally and widely distributed, both horizontally and vertically, than are the corals, and the rate of growth is, of course, a factor of importance in any attempt to estimate the relative lime-depositing activity of corals and calcareous algæ. The notable studies and measurements of living corals by Dr. Vaughan at the Tortugas station of the Department of Marine Biology of the Carnegie Institution of Washington are beginning to throw a most welcome light on the rate of growth of the corals. No similar records of the rate of growth of the calcareous red algæ have as yet been published, so far as we are aware, but from the fact that these plants often cover and smother living corals one is perhaps justified in assuming that the growth of certain kinds of coralline algæ is superficially, at least, more rapid than that of certain kinds of corals. For the rate of growth of the calcareous green algæ we have scarcely any definite records except one by Finckh,[20] who observed in Funafuti a radio-vertical growth of three inches in six weeks in a tangle of *Halimeda opuntia* that had found its way through a hole in a board. This growth-rate, which is possibly more than a fair general average for the species, seems much more rapid than any thus far attributed to the corals.

With the dominance in reef-building activities resting sometimes with the calcareous algæ and sometimes with the corals, and with the Foraminifera and other groups also playing their parts, the problem of determining the "most important" constructive element in the calcium carbonate reefs of the world, ancient and modern, is naturally a most complicated and difficult one and one that may never be solved to the full satisfaction of those most interested. Alexander Agassiz, in 1894, in summing up the general result of his explorations of Bermuda and the Bahamas, which had revealed a condition of things not realized before, frankly remarked that it was a "significant example of how little we as yet know of the history of the formation of the coral reefs."[21] As a general proposition this remark seems almost as apt now as when it was made in 1894. However, since the day of the first illuminating borings into the "true coral atoll" of Funafuti, much evidence has accumulated tending to show that the importance of the corals in reef-building has been much over-estimated and that the final honors in this connection may yet go to the more humble lime-secreting plants.

Marshall A. Howe
New York Botanical Garden

[20] "The Atoll of Funafuti," p. 146.

[21] *Bull. Mus. Comp. Zool. Harvard Coll.*, Vol. 26, p. 278.

UNIVERSITY CONTROL

II

In a review of the different factors concerned with the administration of a university the corporation in ultimate control is the natural starting-point. It was becoming that the fellows of Yale College, a collegiate school primarily for the education of the clergy, should be representative

clergymen of the state. In general the trustees of the primitive American college were competent to administer its simple economy. But even then there were difficulties. Before the American Institute of Instruction meeting in Worcester, Mass., in 1837, the Rev. Jasper Adams, president of Charleston College, gave a lecture on "The relations subsisting between the board of trustees and the faculty of the university," stating that as far as he knew this had never been the subject of special investigation. He argues that the trustees should manage the funds of their institution, while the faculty should regulate the courses of instruction and the internal administration. Professors should be appointed by the trustees on the advice of and in accordance with the wishes of the faculty. It appears that in those days there was trouble through the trustees interfering with what the faculties regarded as their rights, notably at Hamilton College, concerning which the president wrote a pamphlet entitled "A Narrative of the Embarrassments and Decline of Hamilton College," which he attributed to meddling by the trustees with the business of the faculty. At that time President Adams and President Davis seem to have regarded themselves as professors rather than as trustees. According to President Adams:

> More than one board of trustees has ruined, and every board will ruin its college, which shall interfere with the province rendered appropriate to the faculty by the peculiar skill, knowledge and experience which their education, greater attention to the subject, and practical opportunities, have naturally, and as a matter of course, given them. . . . Many a faculty of a college, who felt themselves qualified, not only to sustain their institution, but to raise it to usefulness and renown, and gain for it the favor, confidence and patronage of the public, have found all their efforts discouraged, embarrassed and finally defeated by the conduct of their board of trustees. Plans of improvement, after having been matured by much labor and careful consideration, have been presented for acceptance and approbation, only to be retained with coldness and indifference, treated with neglect and finally rejected, after a hasty examination, for want of a competency to understand them. Favorable times and seasons have been permitted to pass by unimproved, and have been lost never to return, because the faculty had not power to act on the subject, and the trustees could not be induced to seize the favorable moment, and turn the occasion to the benefit of the institution. Under these circumstances, the faculty have been compelled to remain inactive, and let things take their course, or to resign their office in discouragement and disgust. In either case, the institution has been ruined.

The legal powers of trustees and regents are similar everywhere, but their actual part in the conduct of the institution varies greatly. It is likely to be larger when the board is small and when the members reside near by. In his Harris lectures on "University Administration" President Eliot says: "The best number of members for a university's principal board is seven," and with pleasing naïveté he adds a little later: "It is a curious fact that the university with the most fortunate organization in the country is the oldest university, the principal governing board, the President and Fellows of Harvard College, consisting of seven men." When the board of trustees is large and meets but rarely, there is usually an executive committee which with the president is in substantial control. The members of this committee are likely to be the friends and adherents of the president—in practise the president is likely to select the trustees and the members of their executive committee —and the faculties and professors are supposed to communicate with the trustees only through the president. Under our existing system, there should be an elected committee of the faculties which would meet with the executive committee of the trustees. It would in addition be advis-

able to permit the professors and other officers to elect for limited terms representatives—not necessarily from among themselves—on the board of trustees in the manner now becoming usual for alumni representation. It is undesirable for the individual professor to tease the trustees with his needs or grievances; but there should surely be some way by which trustees and professors can consider together the problems confronting the university. A joint committee of trustees and professors such as has just now been constituted to administer the Crocker Cancer Research Fund of Columbia University is an excellent plan.

If trustees are trustees and not directors, it does not greatly matter in practise how many of them there are or how they are chosen, so long as they are men of integrity and honor, representative of the common sense of the community. Even if the trusteeship is an acknowledgment of gifts made or hoped for, no great harm is done. But a self-perpetuating board with absolute powers, even though for a generation the powers may not be abused or even used, is intolerable in a democratic community. The president and directors of industrial corporations are elected by the shareholders and are increasingly supervised by the state. In the state universities the regents are elected by the people or appointed by their representatives, and the people may be regarded as the ultimate corporation. In the case of the private universities, it would apparently be wise to have a large corporation consisting of the professors and other officers of the university, the alumni who maintain their interest in the institution and members of the community who ally themselves with it. This corporation—or perhaps better the three groups of which it is composed—should elect the trustees. Thus there might be a board of nine trustees, one being elected annually for a three-year period by each of the three divisions of the corporation.

Several of my correspondents hold that the members of the community permitted to join the corporation of a university should be carefully selected. I should myself like to see the widest possible participation. If 10,000 or 50,000 people would join such a corporation, so much the better. They would pay dues, perhaps five or ten dollars a year, and would enjoy certain privileges such as attendance at lectures and concerts, the use of libraries, museums, rooms for meetings and the like. If many people are concerned with their university, it is well for them and for it. Some of them will become seriously interested, ready to aid with their counsel, their influence and their money. In New York City several institutions—the Metropolitan Museum of Art, the American Museum of Natural History, the Zoological Park, the Botanical Garden—are partly supported by the city, partly by boards of trustees and partly by members. The buildings are owned and the curators are paid by the city; the collections are owned and the research work is paid for by the trustees; the members have certain privileges in return for dues. In spite of obvious difficulties, the plan has worked well.

A large corporation holding the university in trust for all the people is clearly a step in the direction of public ownership. It is the ultimate fate of every corporation to be controlled by the state, and our private universities will surely become part of the system of public education. This should develop gradually rather than through such measures as have been required to obtain control of church property in other nations. When the people own their universities they will probably see the wisdom of delegating to those con-

cerned—namely, the officers of the university, its alumni and members of the community taking an interest in higher education and having knowledge of it—the right to elect the trustees. True democracy does not consist of government by the uninformed, but of government by those most competent, selected by and responsible to the people. In one of the leading state universities one third of the trustees are elected by the alumni; a second third might to advantage be elected by the teachers, the remaining third being elected by the people or their representatives.

When trustees in the state universities are elected by the people or their representatives and in the private universities are elected by the corporation consisting of officers of the university, alumni and members of the community, the question as to their powers and duties is perplexing. Much can be said in favor of giving them no more power than is vested in a trust company designated as trustee of an estate, and arguments can be urged in favor of a small paid board of experts having the ultimate decision on all questions. I seem to have been almost the only educational person in the country who approved of the principle of Mayor Gaynor's plan for a small paid board of education for New York City, and I should regard its present adoption as risky. This, however, is the correct method of democracy—experts selected by the people and paid for their work. The professors and other officers of the university should be such. Whether in addition to them it is desirable or necessary to have a board to coordinate and control their work, to regulate their duties and fix their salaries, is a question which can only be settled by experience. Certainly the commission form of government is preferable to an individual autocrat.

In the academic jungle the president is my black beast. I may seem to be in the condition of the animal suffering from the complication of diseases described in a recent issue of a New England paper:

> Patrolman Lindstrum went to East Elm Street recently and shot an alleged mad dog. The dog also was declared to have hydrophobia and rabies.

As a matter of fact neither barking nor biting is warranted. An eminent philosopher of Harvard University in a lecture to a class at Radcliffe is alleged to have depicted in eloquent terms the darkness of the life of him who has lost his religious faith and then to have added that the only compensation is a sense of humor. Whereat first one and then another of the students began to weep until all the eighty girls were in tears. It is more becoming for university professors to appreciate the semi-humorous absurdity of the situation than to fall to weeping together. I once incited one of my children to call her doll Mr. President, on the esoteric ground that he would lie in any position in which he was placed. Of course, the president is by nature as truthful, honorable and kind as the rest of us, and is likely to have more ability or enterprise, or both. But he really finds himself in an impossible situation. His despotism is only tempered by resignation; and in the meanwhile he must act as though he were a statue of himself erected by public subscription. In Tennyson's words:

> Who should be king save him who makes us free.

The argument for giving a free hand to the president is that this is the way to get things done. It should, however, be remembered that it is quite as important—and this holds especially in the university—not to do the wrong thing as it is to do the right thing. The time of the president is largely occupied with trying to correct or to explain the mistakes he has made, and the time of the professor is too much

taken up with trying to dissuade the president from doing unwise things or in making the best of them after they have been done. Administrative details should be attended to promptly and correctly; this is the proper business of secretaries and clerks. Then we need leaders, most of all in a democracy. But in a democracy leaders are the men we follow, not the men who drive us. In the university each should lead in accordance with his ability and character.

The trouble in the case of the university president is that he is not a leader, but a boss. He is selected by and is responsible to a body practically outside the university, which in the private corporations is responsible to nobody. In our political organization, the mayor, governor or president has great power, too great in my opinion, if only because it demoralizes the legislature; but they are responsible to the people who elect them. I object even more to the irresponsibility of the university president than to his excessive powers. The demoralization that the president works in the university is not limited to his own office; it has given us the department-store system, the existing exhibit of sub-bosses—deans, heads of departments, presidential committees, professors appointed by, with salaries determined by, and on occasion dismissed by, the president, all subject to him and dependent on his favor.

It is not my wish to depreciate unfairly the services of the American university president. Like the promoter in business and the boss in politics, he has doubtless been a factor natural and perhaps desirable in a given stage of evolution, when the growth of the complexity of society and the need of new adjustments have outrun the adaptability of the individual. It is probable that the president has increased appropriations and gifts; it is possible that he has promoted rather than hindered the development of the university and the extension of its work. The president, however, has not usually been the cause of gifts, professors and students, but only the means of diverting them from one institution to another, and on occasion of doing so in ways unworthy of the institution which he then misrepresents. The president has not infrequently sacrificed education to the fancied advantage of his own institution. Thus college entrance requirements have imposed studies in the high school which drive from it the majority of boys. The opposition of certain presidents of proprietary universities to a national university is not less pernicious, if it results from honest prejudice. The prestige of the president is due to the growth of the university, not conversely. He is like the icon carried with the Russian army and credited with its victories. President Eliot claimed that he had never asked for a gift for Harvard. During the lean years he was regarded as a poor money-getter; when the fat years came with the increasing wealth of the alumni and of the country, this opinion was reversed, but he had not changed. President Eliot is a truly great man, but his remarks on all sorts of subjects, usually wise but occasionally otherwise, were reported everywhere, not for their wisdom, but on account of his position.

While I regard it as desirable to do what little I can to make ridiculous an institution which has become a nuisance, and while I should find my state of dependence on a president for my opportunity to serve the university intolerable if I concealed my views, I certainly do not wish to be understood as lacking in appreciation of the fine characters and high motives of most of the men who have served

as professors and later become presidents. They do not considerably, if at all, excel in character or ability beyond the average standard of the professorship, but they exploit before the world how high this standard is. The practise of many presidents is a sacrifice of their real convictions to the imagined exigencies of the situation. Most of them would agree that autocracy in the university is undesirable. Thus President Eliot writes:

> The president of a university should never exercise an autocratic or one-man power. He should be often an inventing and animating force, and often a leader; but not a ruler or autocrat. His success will be due more to powers of exposition and persuasion combined with persistent industry, than to any force of will or habit of command. Indeed, one-man power is always objectionable in a university, whether lodged in president, secretary of the trustees, dean or head of department.

Dr. Seelye, then president of Smith College, at the inauguration of Dr. Rhees as president of Rochester University, said:

> Autocracy, however, is a hazardous expedient, and is likely to prove ultimately as pernicious in a college as it is in a state. It induces too great reliance upon the distinctive characteristics of a despot, and too little upon those of a gentleman. One-man power is apt to enfeeble or to alienate those who are subject to it. . . . Successful autocrats are few, and however long their term of service, it is short compared with the life of an institution. If they leave as an inheritance a spirit which has suppressed free inquiry, and which has made it difficult to secure and retain teachers of strong personality, the loss will probably be greater than any apparent gain which may have come through the rapid achievements of a Napoleonic policy.

Under existing conditions—at least in our proprietary universities—it appears that the place which the president now fills, or wobbles about in, might be divided into three parts. There might be a chancellor, as in the English universities, a man of influence and of prominence, representing the corporation and the relations of the institution to the community, concerned with increasing the endowment and prestige of the university. Then there might be a rector, as in the German universities, elected annually or for some other limited period by and from the faculties, presiding at academic functions and the like. In the third place, there would be a secretary or curator, an educational expert in charge of administrative details. In a real democracy and with a people appreciative of the needs and service of the university, the former two officials would become superfluous.

It must be admitted that the situation is difficult. The alumni are no longer predominantly scholars or even professional men. They have more concern for football than for the work of the professor; any university club could get on better without its library than without its bar. But the alumni of a university should be not less intelligent and wise than the electorate of the nation. In both cases the ultimate control must be democratic, unless perchance we are following false gods. Experts and intellectuals are not, as a rule, to be trusted to act for the common good in preference to their personal interests. The professors of an endowed university can not be given the ultimate control. A monastery or a proprietary medical school must ultimately be reformed from without. We need the referendum and the recall because we can not trust those placed in authority, and we fear these measures because we do not trust the people. An aristocracy is deaf; a democracy is blind. But it is our business to do the best we can under the existing conditions of human nature. Advancing democracy has burned its bridges behind it. No one believes that a city should be owned by a small self-perpetuating board of trustees who would appoint a dictator to run it, to decide what

people could live there, what work they must do and what incomes they should have. Why should a university be conducted in that way?

The bible is often misquoted to the effect that "money is the root of all evil." The love of money and the lack of money are indeed factors in most of the difficulties of society. Next after the getting of men, the getting of money for the university is its most troublesome problem, and next after the proper treatment of men, the use of money is the most important question. He who holds the purse strings holds the reins of power. That the president should decide which professor shall be discharged and which have his salary advanced, which department or line of work shall be favored or crippled, is the most sinister side of our present system of university administration, more pernicious in the private universities, where dismissals and salaries are kept secret, than in the state universities, where salaries are published and teachers are, or should be, dismissed, as in the better public-school systems, only after definite charges.

To transfer the control of appointments and finances from the president to the professors would strike many as passing from purgatory to a worse place. A university executive said to me the other day that if the professors were in control the first thing that they would do would be to raise their own salaries. Well, perhaps worse things have been done. It may be admitted that this is what a president usually does for himself and to an extent beyond the dreams of the most avaricious professor. But there are at least two points of difference. First, the president may increase his salary by withholding a small sum from each professor, whereas the professors could only increase their salaries by obtaining the money for the purpose. Second, it is undesirable for a president to receive three or four times the salary of the greatest scholar or teacher on the faculty, as is the case at California, Columbia and other institutions. It is subversive of decent social and educational ideals for the president of Harvard University to be permitted to build on the grounds of the university a house for himself costing $100,000, and for the trustees of Columbia University to build for their president a house which with its grounds may cost twice that amount. But it would be in the interest of the university and of society if the salaries of professors were increased. Abuses are possible, but at present whatever makes the academic career more attractive to men of genius is in the interest of all the people.

The undeniable difficulties in the way of adjusting salaries and the conflicting needs of schools and departments, whether the decision rests primarily with the president, the trustees or a committee of the faculties, may be minimized by permanence of tenure and fixed salaries, and by giving the departments financial autonomy. President Van Hise, of the University of Wisconsin, and President Butler, of Columbia University, have recently pronounced in favor of the competitive system in the university. The former says: "There is no possible excuse for retaining in the staff of a university an inefficient man." The latter says: "A teacher who can not give to the institution which maintains him common loyalty and the kind of service which loyalty implies ought not to be retained through fear of clamor or criticism," and further in respect to equality of salaries: "In my judgment such a policy would fill the university with mediocrities and render it impossible to make that special provision for distinction and for genius which the trustees ought always to be able to make."

There are advantages in a system of severe competition for large prizes under honorable conditions, as well as in permanent tenure of office with small salaries and a free life; but confusion and harm result from running with the hare and hunting with the hounds. If there is to be competition in order to retain university chairs, then the university must be prepared to forego able men or to compete with other professions in the rewards it gives. It must offer prizes commensurate with those of engineering, medicine and law, namely, salaries as large as from ten to a hundred thousand dollars a year. It is further true that under these circumstances a man must be judged by his peers. A university which dismisses professors when the president thinks that they are inefficient or lacking in loyalty to him is parasitic on the great academic traditions of the past and of other nations. A single university which acts in this way will in the end obtain a faculty consisting of a few adventurers, a few sycophants and a crowd of mediocrities. If all universities adopt such a policy, while retaining their present meager salaries and systems of autocratic control, then able men will not embark on such ill-starred ships. They will carry forward scientific work in connection with industry and will attract as apprentices those competent to learn the ways of research.

Permanent tenure of office for the professor is not a unique state of privilege. A president's wife has permanent tenure of office; he can not dismiss her because he regards her as inefficient or because he prefers another woman. Analogous social conditions make it undesirable that he should have power to dismiss a professor for similar reasons. In the army and navy, in the highest courts, to a certain extent in the civil service of every country, there is permanence of office. Indeed it is nowhere completely disregarded; service is always a valid claim for continued employment. A wife may be divorced by the courts, an army officer may be court-martialed, a judge may be impeached; but such actions are taken only after definite charges and opportunity for defence. Permanent tenure of office is intended to improve the service, not to demoralize it. It is attached to honorable offices, where public spirit and self-sacrifice are demanded, and the wages do not measure the performance. In Germany, France and Great Britain the permanence of tenure has given dignity and honor to the university chair, attracting to it the ablest men and setting them free to do their work.

Incitement to the best work of which a man is capable is not excluded from the university if the professorship itself is made a high reward, the essentials of which are permanence, freedom and honor. Men who have proved their ability for research need opportunity rather than extraneous stimulus. Still it is true that while the lack of prizes does not considerably dampen the spirit of research, it makes the academic career less attractive to those who should be drawn to it. Most of the graduate students in our universities are men of mediocre ability, drifting along with the aid of fellowships and underpaid assistantships to an inglorious Ph.D. and a profession with meager rewards. Several of my correspondents write that if large income, power and honor were not attached to the presidency, there would be no prize to attract men to university work. From my point of view it is altogether demoralizing that the reward held before the investigator and teacher should be the position of an executive, politician and promoter, which takes him away from the higher work for which he is fit. It is a curious

exposure of the situation when the president of our largest university can write:

> Almost without exception the men who to-day occupy the most conspicuous positions in the United States have worked their way up, by their own ability, from very humble beginnings. The heads of the great universities were every one of them not long ago humble and poorly compensated teachers.[14]

It would be well if some universities would maintain professorships so highly rewarded and regarded that the possibility of a call would exercise a beneficial influence throughout the country, and if each university would establish from one to ten professorships having a salary and a prestige equal at least to that of the presidency. Vacancies in these professorships should be filled by cooptation or election by the faculties or by a faculty committee; but even under the present system of presidential nominations, it would be better to have a few important appointments made publicly than a number of small increases in salary made secretly as the result of presidential favor.

I venture to supplement my argument by quoting from an address[15] made ten years ago, which seems less radical now than then, since socialism has ceased to be a nightmare for respectable citizens, since pensions have become general, since Harvard has adopted the plan of equal salaries with increments of $500 after each five years of service, since Senator Villas has made provision at the University of Wisconsin for super-professorships, since the president of a university is no longer sacrosanct. The paragraph reads:

> The university is those who teach and those who learn and the work they do. The progress of the university depends on bringing to it the best men and leading them to do the best work. Our president, Mr. Remsen, in his admirable inaugural address, told us that the chief function of the university president is to find the right man, and his chief difficulty the lack of enough such men to go round. He considered the question of how far an increased salary would add to the supply of good men. I quite agree with Mr. Remsen that a professor will do about the same kind of work whether his salary is $4,000 or $10,000. If anywhere, in the university it should be to each according to his needs, from each according to his ability. The professor who must live in a city or who has children to educate should be given the necessary income. He should have an adequate pension in old age or in case of disablement; the university should insure his life in a sufficient sum to provide an income for his wife and minor children. The professorial chair can be made attractive by freedom, responsibility and dignity, rather than by a large salary. Still it must be remembered that we live in a commercial age, and men are esteemed in accordance with their incomes. While it may not, or at all events should not, matter greatly to the professor, it may be well for the community that those who do the most for it should be paid on the same scale as those of equal ability in other professions. It may not be necessary to double the salaries of all university men, but it would probably be desirable to have certain prizes that would represent to the crude imagination of the public the dignity of the office and would perhaps attract young men of ability. The average salaries of teachers are about the same as in the other professions, but there are no prizes corresponding to those in the other professions. A clergyman may become a bishop, a lawyer may become a judge, a physician may acquire a consulting practise; and they may earn incomes of from $10,000 to $100,000. A professor can only earn a large salary and an apparent promotion by becoming president of his university; and this I regard as unfortunate. As Mr. Remsen told us that the professor would be pleased, but not particularly improved, by an increase in salary, I may perhaps be permitted to suggest that a president might be pained, but would not be seriously injured, by a reduction of his salary to that of the professor. My preference in this matter would be for the professor to have a fixed salary—perhaps $3,000 to $6,000, according to the expense of living

[14] "The American as he is," by President Nicholas Murray Butler.

[15] Read before the members of Phi Beta Kappa of the Johns Hopkins University, on May 2, 1902, and printed in *The Popular Science Monthly* for June, 1902.

in the neighborhood, with $300 to $600 subsidy for each of his children between the ages of 10 and 21. Advances in salary dependent on the favor of the authorities appear to be undesirable. If salaries must vary from $3,000 to $5,000, a man should be appointed at such salary as may be necessary, but should thereafter receive automatic increases, say of $500 after each five years of service. Then there should be a few research chairs in each university, promotion to which would be a mark of distinction, and occupancy of which would dispense from all routine work and carry a salary equal to that of the presidency.

It is awkward to urge a reform, such as an increase in the salaries of professors or the advance of a few salaries to that of the presidency, when this would become superfluous or undesirable, if society as a whole could be reorganized on a just economic basis. Elsewhere[16] I have discussed the question as follows:

The best reward for scholarly work is adequate recognition of the work as preparation for a career in life. At Columbia University a man takes his doctor's degree at the average age of 27 years. He is fortunate if he receives immediately an instructorship at $1,000 a year; the increments of salary are $100 a year for ten years, so that at the age of 37 he receives a salary of $2,000. In a commercial community the imagination is not stirred by such figures. The university is a parasite on the scholarly impulse instead of a stimulus to it.

The first need of our universities and colleges is great men for teachers. In order that the best men may be drawn to the academic career, it must be attractive and honorable. The professorship was inherited by us as a high office which is now being lowered. Professors and scholars are not sufficiently free or sufficiently well paid, so there is a lack of men who deserve to be highly rewarded, and we are in danger of sliding down the lines of a vicious spiral, until we reach the stage where the professor and his scholarship are not respected because they are not respectable.

I should myself prefer to see the salaries, earnings and conveyings of others cut down rather than to have the salaries of professors greatly increased. When a criminal lawyer—to use the more inclusive term for corporation lawyer—receives a single fee of $800,000, our civilization is obviously complicated. Every professor who is as able as this lawyer and who does work more important for society can not be paid a million dollars a year. But neither is it necessary to pay him so little that he can not do his work or educate his children. I recently excused myself somewhat awkwardly for not greeting promptly the wife of a colleague by saying that men could not be expected to recognize women because they changed their frocks. She replied: "The wives of professors don't." It is better to have wit than frocks; but in the long run they are likely to be found together.

The first step of a really great university president would be to refuse to accept a larger salary than is paid to the professors. The second step would be to make himself responsible to the faculty instead of holding each professor responsible to him. The bureaucratic or department-store system of university control is the disease which is now serious and may become fatal. This subjection of the individual to the machinery of administration and to the rack wage is but an invasion of the university by methods in business and in politics from which the whole country suffers. We may hope that it is only a temporary incident in the growth of material complexity beyond the powers of moral and intellectual control, and that man may soon regain his seat in the saddle.

I myself accept the social ideal: From each according to his ability, to each according to his needs; and I believe that, thanks to the applications of science, the resources of society are sufficient to provide adequately for all. But the first step to take in our present competitive system is to make rewards commensurate with effective ability and a compromise between services and needs. I have pointed out that, apart from exceptional cases, the range of individual differences in many traits is about as two to one. Thus in accuracy of perception and movement, in quickness of recognition and reaction, in rate of learning and retentiveness of memory, in time and variety of the association of ideas, in validity of judgments, I have

[16] "The Case of Harvard College," an address before the Harvard Teachers' Association, *The Popular Science Monthly*, June, 1910.

found in laboratory experiments a range of difference of this magnitude. The able student can prepare a lesson or earn the doctor's degree in about half the time required by the poorer student. For the same kind of work and under similar conditions the value of the services of an individual varies within somewhat the same limits. A good laboring man or a good clerk is worth as much as two who are mediocre. The value of genius to the world is of course inestimable. A great man of science may contribute more than even the most successful promoter—a Rockefeller, a Carnegie or a Morgan—gets. But such contributions are made possible by the organization of society as a whole, and should in large measure be distributed among its members, preferably in the direction of making further contributions possible. Scientific men should receive adequate rewards, and the surplus wealth which directly or indirectly they have produced—it must be counted by the hundreds of thousands of millions of dollars—should, in so far as this can be done to advantage, be spent on further scientific research.

The available wealth in the United States and Great Britain suffices to provide a home and the tools of production for each family and the productivity of labor to provide an annual income of about $1,000 for each producer. If waste in production and expenditure were reduced, even to the extent that now obtains among teachers and scientific men as a group, there would probably be available $1,500 for each adult, including women engaged in the care of the home, or $3,000 for each family. If this were distributed on a range of two to one in accordance with ability, the more deserving teachers and scientific men with their wives would earn salaries of $4,000, in addition to owning their homes. An addition of from $250 to $1,000 should be allowed for each child requiring support and education, to be deducted in part from the incomes of those having no children, and allowance should be made for the varying cost of living in the city or the country and the like.

If the maximum income of a university professor or scientific man with a family should be from $5,000 to $10,000, no one should receive more, except to cover greater risks. There is no occupation requiring rarer ability or more prolonged preliminary training, and there is none whose services to society are greater. If there are to be money prizes—incomes of $20,000 or $100,000 or more—then they should be open to professors and investigators. Scientific ability is as rare as executive or legal ability, and is far more valuable to society. The lawyer who receives a fee of $800,000 for enabling a group of promoters to get ten times as much by evading the intent of the law, does not add to the wealth of society. The scientific man who increases the yield of the cereal crop by one per cent. adds $10,000,000 a year to the wealth of the country and five times as much to the wealth of the world. The scientific man who discovered and those who have developed the Bessemer process of making steel have, according to the estimate of Abram S. Hewitt, added $2,000,000,000 yearly to the world's wealth. There is no reason except the imperfect adjustments of society why the lawyer should receive large rewards and the scientific man a scant salary. Those who render services to an individual or group are likely to be paid in accordance with the value of their services to the individual or group; in our competitive system those who render services to society as a whole are not paid at all, or only partially and indirectly. Of our thousand leading men of science, 738 are employed in uni-

versities and colleges, 106 in the government service, 59 in research foundations. It is the duty of these institutions to provide adequately and liberally for their support and for their work.

The rewards of the academic and scientific career deserve detailed discussion because they are of fundamental importance to the university and to society. Professors and investigators should have adequate incomes, as large as is desirable for any social class, but above all they should have opportunity to lead a life free from distracting or dishonorable compromises. It should be emphasized that nothing here written is intended to promote a privileged class of university professors. Valparaiso University and Mr. Edison's Menlo Park Laboratory are useful, as well as Harvard University and the Rockefeller Institute for Medical Research. My concern is only that the university should be of the greatest possible service to the people and to the world. It may be that the great bulk of routine teaching and routine research can be done most economically under the factory system, with a manager to employ and discharge the instructional force and bosses to keep each gang up to a square day's work. But then the highest productive scholarship and creative research must find refuge elsewhere than in such a university.

It is truly distressing that our universities should be so conventional and unimaginative, each trying to follow the lead of those bigger than itself, all lacking in fineness and distinction. The Johns Hopkins, Clark, Stanford and Chicago were founded one after the other with promise of higher things, and each has relapsed into the common mediocrity. Harvard and Yale maintain the traditions of scholarship; the Johns Hopkins and Chicago have not abandoned the ideals of research; Columbia looms up with the vastness and crudeness of the metropolis; the state universities exhibit the promise and the immaturity of our democracy. But each and all unite the scholasticism of the twelfth century with the commercial rawness of the twentieth century. Can there not be one university where the professor will have a study instead of an office, where the ideal set before the young instructor is something else than answering letters promptly and neatly on the typewriter, where men are weighed rather than counted, where efficiency and machinery are subordinated to the personality of great men? Could there not be a university or school, dominating some field of scholarship and research with its half-dozen professors and group of instructors and students drawn together by them? Might not means be devised by which the professor would be paid for the value of his teaching, service and research, and then be set free to do his work how and when and where he can do it best? It is not inconceivable that there should be a national or state university, with some features of the royal academies, rewarding with fellowships men of unusual promise and with professorships men of unusual performance, endowing the individual instead of the institution.

If it is not possible at present to have free professors and independent schools, we can at least strive for greater freedom of the individual and larger autonomy of the department within the university. As the position and salary of the professor should not depend on the favor of a president, so the department or school should be allowed substantial autonomy. There is nothing more disheartening to the members of a department or school than to have its activities prescribed or limited, its annual appropriation apportioned, by a centralized system. A great danger confronting the modern university is its own

bulk. In the evolution of organic life a limit is placed on the size which an animal can attain. Its surface increases more slowly than its mass, and there must be differentiation and division of labor in order that the animal may grow and react properly to the environment. Even then a limit is fixed; it is doubtful whether apart from the nervous system a structure more complicated than that of the mammal will be reached, or that animals much larger than man will survive. Only a polyp or similar creature can conduct a pure democracy; the organization of higher animals must be more complicated. The growth in size of the American university has been large and rapid. Faculty or town-meeting methods have become difficult or impossible; the institution drifts into autocratic and bureaucratic control. A representative or delegated system of government is necessary for the university, as a whole, but its divisions can maintain a family and democratic system.

President Eliot says[17] that a long tenure of office will be an advantage to the president and to the university he serves, but that the chairman of departments should be chosen for short periods and should generally be junior or assistant professors to give them opportunity and because "dangers from the domination of masterful personages will be reduced to a minimum under this system." It is not evident why it is less desirable to limit "the domination of masterful personages" in the office of the president or of the dean than in the department. But it is true that a departmental autocracy may be even worse than one on a larger scale, and for the reason that it is conducted in the dark. A president may say that a teacher "ought not to be retained through fear of clamor or criticism," but fortunately public opinion does prevent the more serious abuses to which the system is liable. In certain departments of certain universities instructors and junior professors are placed in a situation to which no decent domestic servant would submit. Clearly that is no breeding ground for genius and great personalities.

It can not be denied that the organization of the departments of a university is one of the difficult problems that confront us. The German plan, according to which the individual rather than the department is the unit, is in many ways preferable. But the American university conducts what is practically a secondary school in the first two years of the college, and it conducts professional schools which are not of university grade. The high schools and small colleges should take over the first two years of the college, establish schools of agriculture and of the mechanic arts, and conduct courses preparatory to medicine, law, engineering and teaching. In a large state, the state university would have one hundred thousand students, if it received all the young men and women between the ages of sixteen and twenty who should continue educational work. Such education should be provided locally and in connection with productive industry, as in the admirable plan adopted by the school of engineering of the University of Cincinnati, by which students work alternate weeks in the university and in the shop. Under President Eliot, Harvard placed both its college and its professional schools on a university basis; under President Lowell, it has moved backward in the direction of making the college a school of information and culture and of requiring the professional school to begin with the elements. To such an extent is the university the plaything of its president!

[17] "University Administration."

For administrative and financial purposes it seems necessary to organize the university into schools, divisions or departments, although for educational purposes as much flexibility as possible should be maintained. The scope and size of such a division should depend on convenience and local conditions, rather than on logical distinctions among the subjects taught. A small college or a small medical school can be conducted to advantage under one faculty. In a large university there is no need to have a separate department for each of the oriental languages because they differ from one another more than do the European languages, though it may be desirable to have separate departments for German and French. When a medical school, or even the work in a special science, such as chemistry, becomes large, it may be advisable to organize it into partly autonomous divisions. There is no gain in economy and usually a loss in cooperation and effectiveness when the entering class of a college or professional school exceeds fifty or a hundred, and when its faculty exceeds twenty or thereabouts. Colleges should remain small; if a university must have a great crowd of college students, they should be divided among separate colleges, as in the English universities. These colleges should not, however, consist of freshmen, as President Lowell plans, or of students belonging to a certain social class, as is likely to happen under the fraternity and club system, but of men having common intellectual interests. Even small colleges for general education should aim to excel and to do research work in some special direction. In the large university the residential colleges and departments should coincide, so that younger men will join a group of older students and instructors having similar interests and ends in life. As I have elsewhere remarked:

> The ideal is the zoological hall of the old Harvard, where apprentices of a great man and a great teacher lived together. This is told of again in the charming autobiography of Shaler. A boy from the aristocratic southern classes, with ample means and good abilities but no fixed interests, fell into this group. There he discovered his life work and pursued it with boundless enthusiasm. Nor did the fact that he devoted himself exclusively to professional work in natural history in college prevent him from writing Elizabethan plays in his old age. The number of men of distinction given to the world from this small Agassiz group is truly remarkable.

A group of some 10 to 20 instructors, having registered primarily under them from 50 to 200 students, is a good size for a school, division or department. Each can be well acquainted with the others and take a personal and intelligent interest in all the work of the department. At the same time the number is sufficient to permit the representation of diverse kinds of work and points of view, and to make possible the election of officers and a democratic control. The chairman or head and an executive committee should of course be elected, not named by a semi-absentee president. In a group of this character questions are not usually brought to a vote. In reaching decisions each member is likely to be weighed as well as counted. In my experience the junior members of a faculty or department take too little rather than too much share in its discussions and its control. If they obtained constitutional rights they might become more aggressive; if they should, so much the better. One of the serious difficulties of the present system is that the younger men do not share in the conduct of the university and do not feel themselves to be part of its life. Those who do not have their ideas before they are thirty are not likely to have them. The paraphernalia and camp baggage of modern civilization have become so heavy that they threaten to block its further advance. If men must devote thirty years to mere

acquisition, and be kept even longer in official subjection, there is not much chance that they will do anything else thereafter. What youth can do should be joined with what age can know.

Voting rights in a department might be in proportion to the salary the officers receive; but such statutory regulations are scarcely needed. The real control is vested in the aggregate common sense of those concerned. The group may well be flexible in character. When courses of instruction and educational problems are under discussion assistants and even graduate students may be admitted to advantage. When the question is the promotion of an instructor, the group would naturally be limited to those of higher office. The chairmanship of the department might rotate among its members or the same head might be reelected continuously according to convenience. It by no means follows that the professor most eminent in research should be the executive head; on the contrary, it should usually be a man of competent administrative ability whose time is of less value. Every reasonable man believes in economy in administration and letting the men do things who can do them. Even the most important decisions can be left to the head of the department or its executive committee, so long as they represent and are responsible to the whole department.

The school or department should have complete control of its own educational work. So long as there is ample room for differences of opinion as to the value of different subjects and methods, it is well that there be variation and survival of the fit. Entrance requirements and degrees are among the chief obstacles to education. An instructor in Columbia University said recently to a student who had just received the highest grade assigned in the course: "Why did you take the course, if you don't want a degree?" If there must be degrees, it may be necessary to standardize them; but this should be done only to the extent of prescribing the amount of work to be done in the direction called for by the degree, this being determined by the time spent, weighted in accordance with the ability of the student. I shall print shortly statistics in regard to all doctorates of philosophy granted in the sciences by American universities. For each department of each university will be given the percentage of doctors who continued to pursue scientific work and the percentage who attained a given degree of distinction. If any police regulation is needed, such publicity is far better than the examination of a candidate before the faculty, or the requirement of all sorts of qualifications.[18]

Financial as well as educational autonomy should be given to the school or de-

[18] This paper is concerned with problems of administration, not with questions of teaching and research. The latter are by far the more important; indeed administrative methods are only of consequence in so far as they affect education within and without the university, research and the applications of knowledge. Incidentally I may remark that I should give the student the same freedom and the same democratic system that I should like to see the teacher enjoy. I should admit to the university any student and let him stay there so long as his presence did not do injury to others. I should let him choose his own work and his own methods of work, not because all kinds and methods of work are equally good, but because I regard myself as incompetent and most of my colleagues as even more incompetent to impose any system on the student. I should in large measure do away with grades, required attendance, required courses, required examinations and degrees, not because these things are not in some ways and in some cases useful, but because on the whole they do more damage than good. So far as possible, I should let students manage their own affairs, their dormitories, fraternities and athletics, their codes of manners and of morals.

partment. Its total income should be held as a trust fund, to be decreased only after full and public investigation. The laboratories, rooms, apparatus, equipment, library, etc., should be held in trust for the department, to be taken away against its will only for clear reasons and on the recommendation of a competent faculty committee. Under these conditions the members of a department will plan on a safe basis for the future, and will seek to increase its funds and facilities. I know of a case in which a professor obtained a gift of $100,000, made expressly "to increase the facilities of the department," and the income was assigned by the president and trustees to pay the salary of that professor against his earnest protest. I also know of a case in which a department which had built up one of the strongest laboratories in the country had those of its rooms especially devoted to research taken away and given to a weak department, to induce a certain professor to accept a call from elsewhere to the headship of the weak department. These are of course extreme cases and might seem incredible, if it were not that interference with the vested rights of departments is of frequent occurrence.

The Harvard plan of visiting committees which may take an active interest in the educational work and financial support of departments is commendable. Under the existing trustee system it might be well if one trustee would concern himself especially with one or two departments, attending their meetings and doing what he could to advance their interests. There can to advantage be within the university departments related to its educational work, but under independent control. Thus the most useful and vigorous division of Columbia University, with the possible exception of the faculty of political science, is the Teachers College, which is under its own trustees with a dean and faculty responsible to them. As a department of education under the trustees of Columbia College, it would probably have had no more leadership than the departments at Harvard or Yale. The educational alliance between Columbia University and the Union Theological Seminary is far better than a school of theology under the trustees of the university. There is no valid objection to two schools of law or two schools of chemistry, independently controlled, but enjoying the advantages of educational affiliation with a university. Endowed research institutions and municipal, state or governmental bureaus, can to advantage be placed near a university, contributing to and gaining from its educational work.

Appointments and the apportionment of funds are said to be questions insoluble under democratic control. But in spite of the difficulties the case is not so bad as autocratic one-man power. If there are fixed salaries with automatic increases, only three or four decisions must be made. Shall this man be appointed instructor? Shall he be appointed junior professor after five or ten years of service as instructor? Shall he be appointed full professor after five or ten years of service as junior professor? Who shall be appointed to super-professorships, if such exist? As a matter of fact under the existing system instructors and junior professors are nearly always nominated by the department or its head. They alone have the necessary information in regard to the men and the situation. The nomination of a full professor can be entrusted better to the department concerned than to a president. But such an appointment being for life and of immense consequence can not be too carefully guarded. It should be passed on by

a board or committee composed, say, of two members of the department, two members of allied departments and two distinguished representatives of the subject outside the university concerned. Such control would prevent undesirable inbreeding or the further deterioration of a weak department. Nominations should be made publicly—the English plan of definite candidates with printed records has much to commend it—and the power of veto should perhaps be given to the faculties as well as to the trustees.

The apportionment of the existing income of a department varies but little from year to year, and can safely be left to the department. Questions arise only when an increase which the department can not itself obtain is wanted, and there are general funds available, but not sufficient to supply all the needs of the university. Under the existing system each head of department grabs for everything in sight, and the president plays the part of an inscrutable and sometimes unscrupulous providence in the semi-secret distribution of his favors. No scheme could be more demoralizing. The correct plan is for each department to draw up its budget, with requests for increases and the reasons clearly indicated, the proposed budgets being printed and open to all concerned. Under these conditions unreasonable claims would not often be made by the departments. Plans for new departments and new lines of work could also be submitted by any responsible group. An elected committee of professors, with the assistance of an expert curator or controller, would then pass on the various budgets and proposals and adjust them to the available income, the reductions made by the committee being of course published. The budget for the university would then go to the trustees. It may be objected that under this plan existing work would be strengthened rather than new ground broken. But might not this be better than the existing presidential mania for expansion? It seems in fact probable that if many professors and junior instructors were concerned, there would be more new ideas than when the initiative is left to a single man, and further that wise plans would be more likely to be adopted and inexpedient schemes to be rejected.

When schools and departments have autonomy, there is no need for much super-legislation and super-administration in the university. The machinery should be as simple as may be. Departments may be united into a school or college and elect a dean and a faculty or an executive committee to coordinate the work. A department can elect members to represent it in allied departments and on the faculties of the schools and colleges with whose work it is concerned. There should be an elected council or senate to represent the entire university and an executive committee which can confer with the executive committee of the trustees. There may at times to advantage be faculty meetings or plebiscites of large groups or of all the officers of the university. Questions concerning the entire university can be discussed to advantage by the fly-leaf method of the English universities, and a vote can be taken without a general assembly at a polling booth or by mail.

There are advantages and disadvantages in large faculty meetings. When all important matters are decided by administrative officers or executive committees and only trivial questions are discussed before the faculty, usually by certain polyphasiac members, its meetings are likely to fall into disrepute. Men are efficient in direct proportion to their responsibility. Further, a body of men is effective inversely as its

size and directly as the time it works together. A body of fifty men such as the faculty to which I primarily belong, meeting for an hour three times a year, without power or responsibility, is clearly dedicated to futility. But if any one supposes that university presidents would do better under these conditions, he should call to mind the conduct of the trustees of the Carnegie Foundation. It seems to be the case that in order to make large faculties real legislative bodies, it would be necessary to devote more time to their meetings than is expedient, and perhaps more common sense than is available. All parliaments, congresses and legislatures do their work through cabinets and committees; but these are responsible to the whole body. Some such plan is necessary in the university. Still the cynical attitude toward faculty meetings common in academic circles appears to be one of the sinister symptoms resulting from the existing methods of autocratic control. It is typical of existing conditions that the most recent university school to be established—the School of Journalism of Columbia University—does not have a faculty but an "administrative board." I belong to a club at the meetings of which each member must speak once and only once, not exceeding his share of the time, and the discussion is followed by a dinner. If faculty meetings could be made into educational and social clubs they would perform a useful function. The meetings of the faculty of arts and sciences at Harvard may give rise to complaints, but they have been of real service to the university.

Truth, openness, publicity, are the safeguards of free institutions. It is better to wash your dirty linen in public than to continue to wear it. The affairs of a university should be conducted in the full light of day. The proceedings of the trustees, the discussions and conclusions of faculties and of committees, the activities of the president, the work of professors, salaries and the provisions of the budget, the appointment of officers and the rare cases in which it is necessary to dismiss a professor, should be open to all. Light is an excellent disinfectant; what is of more consequence, it is essential to healthy life and growth. "And God said, let there be light: and there was light. And God saw the light, that it was good."

Several of my correspondents argue that if the control of a university were vested in its teachers, they would be distracted from their proper work of teaching and research. In a recent article[19] on "The University President in the American Commonwealth," President Eliot writes:

> Most American professors of good quality would regard the imposition of duties concerning the selection of professors and other teachers, the election of the president, and the annual arrangement of the budget of the institution as a serious reduction in the attractiveness of the scholar's life and the professorial career.

Do President Eliot and the lesser presidents and the few professors who share their views believe that university professors and other citizens of a city should not concern themselves with municipal government or vote for a president of the nation? Are we of the world's greatest democracy and in the twentieth century to revert to the theory that the common people should do the daily work imposed on them, and trust to the king and his lords to care for them?

In the preface to the first edition (1906) of the "Biographical Directory of American Men of Science," I wrote:

> There scarcely exists among scientific men the recognition of common interest and the spirit of cooperation which would help to give science the place it should have in the community. It is fully

[19] *The Educational Review*, November, 1911.

as important for the nation as for men of science that scientific work should be adequately recognized and supported. We are consequently in the fortunate position of knowing that whatever we do to promote our own interests is at the same time a service to the community and to the world.

Trade unions and organizations of professional men, in spite of occasional abuses, have been of benefit not only to those immediately concerned, but to society as a whole. President Eliot did not obtain commendation for calling the "scab" a hero. But if it is expedient to better the conditions under which work of any kind is done, this is of the utmost importance for education and research. If we can unite to improve the conditions of the academic career, so that it will attract the best men and permit them to do their best work, we make a contribution to the welfare of society which is permanent and universal. It may be that the time has now come when it is desirable and possible to form an association of professors of American universities, based on associations in the different universities, the objects of which would be to promote the interests of the universities and to advance higher education and research, with special reference to problems of administration and to the status of the professors and other officers of the university.

The space at my disposal is exhausted and many problems directly and indirectly concerned with the control of a university remain untouched. I am well aware that this paper is written in the spirit of the advocate and the reformer, rather than from the point of view of the judge and the responsible administrator. Against most of the suggestions which have been made valid objections may be urged. The only principle that I am prepared to defend whole-heartedly is that the university should be a democracy of scholars serving the larger democracy of which it is a part. A government of laws is better than a government by men; but better than either is freedom controlled by public opinion and common sense, by precedent and good will. As that nation is happy which has no history, so that university is fortunate which has the least administration, and my most inclusive answer to the question how to administer a university is—don't.

J. McKeen Cattell

Scientific Notes and News

The cost of preparing for publication the unfinished manuscripts left by the late Professor C. O. Whitman, together with that of the publication of the same in the best possible manner when ready, has been undertaken by the Carnegie Institution of Washington. Provision is also made for the maintenance of the large collection of pigeons, and for the current researches with them. Dr. Oscar Riddle, in charge of the work, has been appointed a research associate in the Carnegie Institution.

The University of California has conferred the doctorate of laws on Dr. George E. Hale, director of the Solar Observatory of the Carnegie Institution, and on two of its graduates, Dr. Sidney E. Mezes, professor of philosophy and president of the University of Texas, and Dr. E. C. Sanford, professor of psychology and president of Clark College.

Cambridge University will give the honorary doctorate of science to Major Leonard Darwin, lately president of the Royal Geographical Society.

The University of Manchester will confer the degree of doctor of science on Dr. B. H. Scott, F.R.S., the distinguished botanist.

Professor Nocht, director of the Tropical Institute at Hamburg, succeeds Professor Baelz as president of the German Tropical Society.

King Alfonso has given an audience at Madrid to Mr. Marconi, and has conferred on him the Grand Cross of the Order of Alfonso XII.