problem of fall for the case in which the orbit is wholly external to the earth. The more complex case of a body falling down a bore-hole, or mine shaft, or the case in which the orbit lies partly without and partly within the earth's crust, is not considered. In view of the difficulties in the way of experimental applications it has not seemed to me worth while to extend the paper so as to include the additions and the modifications essential to these more complex cases.

The limitation referred to arises from insufficient knowledge as to the distribution of the earth's mass in respect to the plane of the equator. For nearly a century it has been generally assumed that this distribution is such as to make the two principal equatorial moments of inertia of the earth equal. In the absence of adequate information on this point I have followed the current assumption, the effect of which in the case of a falling body is to make its orbit independent of longitude. But I do not believe this assumption is justified, and I would take this occasion to urge upon astronomers and geodesists the great need for the settlement of this and other questions in geophysics of a systematic gravimetric survey of the earth. Any inequality in these moments of inertia produces also a necessary prolongation of the Eulerian cycle which figures so prominently in the theory of latitude variations, and it appears to me highly probable that this prolongation is due quite as much to that inequality as to an elastic yielding of the mass of the earth. R. S. WOODWARD

FUNCTIONS AND LIMITATIONS OF THE GOVERNING BOARD[1]

THE development of higher education in America during the past quarter of a century has no parallel in history. In no other country have private citizens lavished upon universities so many millions for equipment and endowment. In no other country have universities received from state or national governments so many millions for maintenance. The annual income of Columbia University is greater than the combined incomes of Oxford with her score of colleges—Oxford with a thousand years behind her, the great national university of England. The University of Illinois, which twenty-five years ago was scarcely the equal in income or equipment of a first class agricultural high school of the present day, has an annual income far greater than that of the great national university of Germany, at Berlin, an income greater than that of the Sorbonne—in short, an income far greater than is claimed for any of the ancient and famous universities of the Old World. More money—one may venture to assert, the figures are not at hand—has been spent upon buildings and equipment for the University of Chicago during the past fifteen years than has been spent upon the buildings and equipment for the University of Bologne throughout its thousand years of history.

But after all, vast endowments and stately halls of granite or marble do not make a university. A real university is the creation of great men. Only in an inspiring environment which lures to it real scholars and thinkers may a great university be created or maintained. The finer spirits of the republic of letters will shun and hate the stifling atmosphere of a university, no matter how vast its endowment or how splendid its buildings, that does not give its professors a feeling of security and of freedom.

Does the American university offer to its teachers such an environment? Some doubtless do, the vast majority unquestion-

[1] Speech delivered (July 9) before the National Educational Association, at Salt Lake City, by Edwin Boone Craighead, LL.D., D.C.L., president of the University of Montana.

ably do not. For reasons not hard to discern, many of our ablest scholars and bravest spirits have come to hate the very atmosphere of the university and are longing to escape from it and to turn their steps toward the big wide world of struggle and strife, where men are at least free to carve out their own destinies in their own way and by their own efforts. In no other civilized country have the great scholars and teachers so little influence in university administration. For many centuries Oxford has in the main been governed and administered by the thinkers and scholars and teachers within her own walls. "Elsewhere throughout the world," says an editorial in *Popular Science Monthly,* "the university is a republic of scholars administered by them—here it is a business corporation." In America the university is governed and unfortunately sometimes actually administered by men whose "life activities lie outside the realm they rule." "The very idea of a university as the home of independent scholars," says Professor Creighton, of Cornell, "has been obscured by the present system." "The disastrous effect of the system," says Professor Jastrow, of the University of Wisconsin, "is blighting the university career." "It is one of the most productive of the several causes," says Professor Ladd, of Yale, "which are working together to bring about the degradation of the professorial office." "If the proper status of the faculties is to be restored, if the proper standard of educational efficiency is to be regained, there must be," declares Professor Stevenson, "a radical change in the relation of the teaching and corporate boards." Says Mr. Munroe, of The Massachusetts Institute: "Unless American college teachers can be assured that they are no longer to be looked upon as mere employees paid to do the bidding of men who, however courteous or however eminent, have not the faculty's professional knowledge of the complicated problems of education, our universities will suffer increasingly from a dearth of strong men, and teaching will remain outside the pale of the really learned professions. The problem is not one of wages; for no university can become rich enough to buy the independence of any man who is really worth purchasing. Young men of power and ambition scorn what should be reckoned the noblest profession, not because that profession condemns them to poverty, but because it dooms them to a sort of servitude." "Whatever organizations may be necessary in a modern university," declared President Schurman, of Cornell, "the institution will not permanently succeed unless the faculty as a group of independent personalities practically control its operations."

These protests are made not merely by sore-headed, dyspeptic men whose principal business in life it is to growl and snarl, but by sober-minded, patriotic men, some of them the great scholars and thinkers of the nation. My own experience as a college executive confirms the opinion that the university career is becoming more and more repulsive to men of real ability. More and more also, our brightest students are turning from the teaching profession to enter the more independent and the more lucrative professions of law, of engineering, of medicine, of farming and of business. More and more students of mediocre ability, the wooden fellows without initiative or courage, are they who, subsisting upon scholarships and fellowships, turn towards the university career and work for the higher degrees. To become a Ph.D. appears to be the sole ambition of large numbers of them who, when the degree is won, seem satisfied to rest upon their laurels throughout the

remaining years of their lives. Of course rare and splendid exceptions there are, but more and more are able young men scorning the teaching profession as fit only for women and effeminate men. It has been humorously said that in the schools of the future, yea even in the universities, real men teachers will not be found except here and there a stuffed specimen in the university museum.

"Professor A," said the president of one of the best southern universities, "is a weak man."

"Of course he is," replied a well-known professor, himself a teacher of thirty years experience. "The very fact that he is a university professor is proof positive that he's a weak man. Nobody but a weak man or a blank fool would be a university professor."

In all earnestness, I may assert that during the past ten years I have talked frankly and sometimes confidentially with scores of able professors concerning the university career, and among them all I have found few men of real ability who have not felt more or less dissatisfied with the profession of teaching. "I love teaching and the work of the investigator," said a distinguished university professor only a few days ago, "but I feel so helpless and so dependent and so much like an hireling in the position I now hold, that I sometimes long to get out of the whole business."

There is something wrong somewhere if conditions such as are depicted even approximately exist. To change these conditions, to make the university an attractive place for great scholars and brave thinkers and lofty souls, and not, as it sometimes is, a stronghold for the politician, the time-server, the coward, the sycophant—that is a work worthy of heroes and statesmen and educators. Big endowments for universities are desirable if not indeed necessary, but big brave men in universities are equally desirable and far more necessary. Only the greatest men of the nation are great enough to teach and inspire the young men of the nation. That nation is greatest which has in proportion to its population the greatest number of real universities, and that university is greatest which gathers to it the largest number of great men. Your really big professor would rather exist on a pittance in a university where he feels free and independent, master of his own soul, than to live luxuriously in a splendidly endowed school, dependent upon the good will or the caprices of politicians and ward bosses, or shivering in fear of offending some multi-millionaire upon whose bounty his university exists.

What, then, is the matter with the university? Scores of able men, whom I much admire, would lay foul hands upon the university president as though he were the cause of our academic slavery. They denounce him as an autocrat and a tyrant who, having seized every prerogative that he did not find nailed down, "holds a Damascus blade over other men's lives, careers, reputations." They would see the "presidential office shorn of its unwise and unsafe authority," of its "limelight conspicuousness," of the "foolish and increasing pomp and circumstance" which usually and increasingly attend presidential installations and, in vulgar eyes, transform wire pullers and gumshoe educators into great men and commanding figures upon the educational horizon. They would reduce his salary to that of an ordinary professor, have him live in a house not bigger nor better than the houses of his colleagues. Indeed there are in our universities able men and otherwise lovely souls to whom the very sight of a university president seems to be, if one may judge them by their words, like the waving of a

red flag to an enraged beast. To them the university president is "the black beast in the academic jungle." They cut him to pieces with their ridicule, they lash him with their wit, they make him ridiculous with a humor that seems inexhaustible.

"I once incited," says the distinguished editor of *Popular Science Monthly* and of SCIENCE, Professor Cattell, of Columbia University,—"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." The time of the university president, he tells us, 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."

Now, to be perfectly fair to Professor Cattell, it must be admitted that his hatred of university presidents is not against them as men, who, he admits, may be as truthful, honest and kind as the rest of the faculty, but against them as the products of a system that is calculated to produce sycophants, and bosses, and liars. It is doubtless true that some men, possibly many, have become college presidents not because of their merit, but because they are skillful politicians or successful wire-pullers, and it is also true that such men, when once they get into office, usually employ the methods of politicians and bosses. Such men build up a machine, gather around them a body of time-servers loyal to the administration, who also help to create for the real scholars of the university a chilling and forbidding atmosphere. Such presidents soon drive from their universities all the independent and high-spirited professors who can find places in other institutions and make miserable the lives of such professors as are too old to get away or are too ill-starred to find elsewhere an opening suited to their talents and attainments. Professor Cattell is doing a real service in pouring upon such men the contempt and ridicule they deserve. Such executives, whether they are found as principals of normal schools, superintendents of city systems, college heads or university presidents, deserve to be hung for high treason against the great republic of letters and the commonwealth of science. But let us not forget that they are the creatures, not the creators of a system that threatens, unless reformed, to turn over the temples of learning to educational gamblers and money changers, to bosses and politicians, to all the foul and loathsome creatures who, while "cowering to those above them always trample on those beneath them"—I mean the system that places in the hands of an external, irresponsible board the power to govern and to control in minutest details a great seat of learning.

Before I proceed further let me declare as emphatically as may be that the vast majority of trustees whom I have known I esteem as generous and upright men. It is the system, not the individuals that I am attacking. I wish that Professor Cattell could be induced to turn his vast learning to the consideration of this more fundamental question, and to let his illuminating wit play upon it—the question of the governing board of a university. May we not hope that President Pritchett of the Carnegie Foundation may get one of the really great educators of the world, or perhaps a committee of such educators, to write an authoritative bulletin on the functions and the limitations of the governing board, and place it in the hands of every school trustee in the land. This and other good literature bearing on the same subject

should be read by every university regent —indeed before taking oath of office he should perhaps be required to pass, before a committee of the faculty, an examination on the functions and limitations of a governing board. Such a bulletin, if widely read and studied by the great mass of thoughtful people, would do more for the cause of university education than the gift of millions to endowments. Indeed it may be confidently affirmed that the greatest single problem that concerns the American university is the problem of securing competent administrators.

The chief function of a university board is to resign if they find themselves incompetent or unable to do the work entrusted to them. If, however, they consider themselves competent, they should see to it, when vacancies occur, that they be filled by men intelligent enough and high-minded enough and patriotic enough to govern wisely a higher educational institution. Without a board composed of such men, the best endowed private university or the best supported state university is sooner or later likely to become, not a nursery of scholars and scientists and noble spirits, but a stronghold and a retreat of scheming, wire-pulling, snarling, backbiting, cringing, crawling, fawning pinheads and mediocrities and sycophants, bent on cutting the throats and destroying the reputation, of all who stand in their way—men who bear without whining the sting of the lash of their superior officers while administering still more heroic treatment to their own underlings.

The first essential qualification, both of a president and of a professor, is that he be a man, a brave, generous, high-minded man, and the first article in the creed of every real man is that, on the one hand, no matter how great the prizes to be won, he shall not cower to those above him, and, on the other, no matter what power may be placed in his hands, he shall not trample on those beneath him. Are our holy temples of learning to become a nursery of such men or are they to be transformed into what DeQuincey unjustly called the German universities, kennels of curs? It depends upon the governing board and upon the governing board alone.

It is true that back of the governing boards in state universities are the people who create the boards, or, as has happened in more than one state of the union, the people who create the bosses who create the governors who create the boards. In the strictest sense the people in a democracy are the sources of power and upon the people, in the last analysis, must fall whatever of glory or of shame is connected with their university administration. But since it is not possible to hold a whole people responsible we must turn to the men they intrust with authority, the trustees.

What limitation shall be placed upon the governing board? Almost none whatever if it be a good board. As in good colleges no rules whatever governing conduct are imposed upon students except the single injunction that they be gentlemen, so in the ideal university the question of the limitations of the faculty, the president, the board, may scarcely arise because all work for common good. A good board is not necessarily composed of great scholars, of millionaires, of merchant princes, of brilliant statesmen, of mighty potentates in church or state. A board composed of such men would not necessarily be a good board —it might be. A good board like a good tree will bring forth good fruit, and a bad board bad fruit. A good board will not abuse its power. Since, however, under existing conditions bad boards may creep into control, it may be advisable to put limitations upon them. As in monarchies

where bad kings once had unlimited power to inflict injustice and to disturb the lives of men, the people for protection have so hedged him about as to make him almost a figure-head, so it may become necessary in our great universities to put such limitations upon the governing boards that it will not be possible at least for them to do much harm, if indeed they are not wise enough or intelligent enough to do much good.

What, then, is a good board? A good board is composed of a body of men, whether large or small, who have at least two qualifications: (1) plain, old-fashioned honesty and horse sense; (2) technical knowledge, whether acquired in or out of the university, sufficient to call to their service competent experts, and to sift the advice of these experts and, when this is done and only then, to inaugurate right movements and wise policies, and to reach conclusions in the solution of the delicate and difficult problems that continually face such a board. The besetting sin of the university board is that they either do not know how, or, knowing how, are too cowardly, to call to their service the best educational experts. Hopeless beyond any possibility of redemption, the board that does not know that while they may govern, they can not administer, the university. That belongs to the faculty and to the faculty alone. How many American colleges and universities have been injured, if not indeed absolutely ruined, by meddlesome interference on the part of trustees with the work of the faculties, by the taking upon themselves tasks for which they are wholly unfitted, tasks that belong to the faculty. Sad indeed the state of that university whose board removes able professors who have rendered long service, to make places for men not fitted for professorial chairs or, worse still, for political henchmen without either the character or the training that fits them to become instructors of youth.

Many illustrations are at hand. Just before leaving home I had a letter from a well-trained teacher, which, as nearly as I can remember, reads as follows: "I am seeking a position in another school for the same reason that induces forty of our professors and three heads of our state institutions to look for positions elsewhere." In that state politicians on the board and off the board have so long tinkered with the state institutions and so long harassed the professors in them, that good men can endure it no longer except under the compulsion of stern necessity.

Take another illustration. Only a few weeks ago an old friend wrote me as follows: "For God's sake help me if you can. For years I have been harassed to distraction by this ignorant, conceited, crooked board. I am not merely on the brink, I am in the very middle, of hell itself." That man is an educator, an M.A. and a Ph.D. of a great American university.

Take another. Not long ago the president of a well-known state university said to me that he had decided to resign his position, giving as his reason the constant interference of the board in matters that seemed to him to belong to the faculty. He pointed out many instances of this interference. One member of the board, a lawyer and a college graduate, one day tossed before him a big bundle of papers with the remark: "The faculty has been giving a good deal of time to courses of study. I have taken up the matter myself. The other day I went down to my office, took off my coat and worked for four hours preparing a curriculum for each department of the university. Here it is and I expect you to put it through."

"Our colleges," says J. J. Chapman, an

unusually brilliant writer, "have been handled by men whose ideals were as remote from scholarship as the ideals of the New York theater managers are remote from poetry. In the meantime the scholars have been dumb and reticent."

One more illustration. "It falls just beyond my experience," says Professor Jastrow, of the University of Wisconsin, "to have members of the faculty addressed by a member of the board as 'you men whom we hire.' It is within my experience to have professors summoned inquisitorially before a committee of the board to give an account of themselves, the interview conducted by the chairman with his feet on the table, and displaying a salivary agility that needs no further description." Such reminiscences, however, as Professor Jastrow well says, carry no sting. They are merely amusing. Such men are apt to be good fellows, or at any rate, open-minded.

It is really amazing how dependent our universities seem to be upon the legal fraternity. I am making no brief against lawyers—the best board member I have ever known was a lawyer, but he was a big one, a great jurist, a profound scholar—but lawyers as a class are usually the worst men on boards because they love to split hairs, whereas big business men are the best because they are accustomed to do big things.

But to return. What state university president has not encountered some young lawyer, perhaps an alumnus, who has felt it his duty to inaugurate university reform and to match his ignorance of university matters against the combined wisdom of a score of learned professors who have given the best years of their lives to educational problems? It would be a humorous, if indeed it were not so often a tragic, spectacle. As well might we call the mediocre lawyer of a country village to revise the decisions of the Supreme Court and to tell the members of that august body how to transact the nation's business.

What president of long experience has not encountered the nouveau riche, the parvenu who, regarding the impecunious college professors as mere hirelings, as mere dirt and rubbish, undertakes to establish policies to prevent rise of salaries and thereby to place the institution upon a sound financial basis. Sometimes, though rarely, one encounters the business man who, feeling how successfully he had conducted his department store or factory, begins at once to apply factory methods to the delicate and intricate, the high and holy work of a great educational institution. He also regards the teachers as hirelings. Is it any wonder that when university professors find themselves placed in humiliating subjection to men of this stamp they become unhappy, dissatisfied, disgusted even with the university career?

Then there is the small demagogue content with any old job that pays his traveling expenses and gives him an allowance of five dollars a day. He is not necessarily vicious, but only needy. Presidents have had worse men to deal with. A box of cigars, a good dinner, a bag of peanuts, or even a generous slap on the shoulder, may hold in check for a whole day his mighty, all-consuming passion for reform.

But there is another type of men sometimes found on university boards which I can not adequately describe because of the limitations of the English tongue and the refinement and culture of my audience. He is the pinhead. While great men become modest when vested with vast power or supreme authority, the pinhead, although he may be honest, although he will neither lie nor steal, is apt to become the very oracle of wisdom as

soon as he finds himself settled for life on a self-perpetuating board. Low-browed, thick-headed, sometimes the holder of a college degree, now strutting like a peacock, now looking wise as the owl, an indomitable fighter, he baffles the genius and the ingenuity of the ablest executive. The intelligent ward boss or the politician of big dimensions, no matter how crooked, is not quite so bad a man on a university board as the miserable little pinhead who is to me what the president is to Professor Cattell, "the veritable black beast in the academic jungle." No logic, no array of facts, no appeal to educational experts can make the slightest impression upon his small, thick skull. He is firm as adamant, vindictive as the viper, and in constant communion with the Almighty God. When thrown into conflict with such a man there is nothing for the president to do but to hold up his hands and to pray without ceasing that the Giver of all good things may bountifully bestow upon him the saving sense of humor, without which even the ablest university president must find the academic world a cold and cheerless place.

The road that leads out of these deplorable conditions is perhaps a long and rocky road, but we must find it and make our way out to a freer air, a happier environment, or else the very life of the university as an acropolis of culture, as the stronghold of the "great and lonely thinker," as the nursery of noble and heroic souls, is absolutely doomed. University boards can not longer afford to ignore the faculties. In all large questions of university administration, the faculty should have a hearing and a voice. To give to the faculties the control that belongs to them, to create both for students and professors a happier environment, is, after all, the high duty of administrators. I have an abiding faith in the outcome. To all brave souls who are growing weary and faint-hearted, let me commend the words of Carlyle: "It is our duty to do the work that God Almighty has entrusted to us, to stand up and fight for it to the last breath of our lives."

The work of establishing and administering a university calls for the united efforts of faculty and board and alumni, who should work together in mutual trust and esteem for the uprearing of a real university, the most potent instrument that man has yet devised for his own advancement, for the enrichment of his life, for the development and diffusion of knowledge, and for "the enlargement of the boundaries of the human empire to the attainment of all things possible."

Edwin Boone Craighead

INDIAN REMAINS IN MAINE

Early this year, the archeology department of Phillips Academy at Andover sent an expedition to the state of Maine to carry on an exploration of various sites. By the end of August the party had located and mapped some hundred or more shell-heaps and village sites. Forty-eight shell-heaps were found within ten miles of Bar Harbor, and if the circle be extended to fifteen miles, there must be at least 75. Several of these were examined and some hundreds of bone and stone implements taken therefrom.

The coast from below Blue Hill to Bar Harbor (excepting the Castine region) was carefully investigated in the hopes that a "Red Paint People" cemetery might be discovered. But in spite of much searching, no undisturbed site could be located, although disturbed cemeteries were found at Blue Hill and Sullivan Falls and about one hundred stone objects removed therefrom.

The largest shell-heap lay upon Boynton's Point in the town of La Moine. This deposit is more than 200 meters long and 20 to 30 meters in width. It is roughly estimated that