the president of a society which I am proud to represent, and my colleagues, with two exceptions, were named in a similar manner. Can your anonymous correspondent suggest a better way to select members of such a board? I was not altogether pleased with the list of societies selected, and did not hesitate to say so. But I did not for that reason refuse to serve. None of the members of this board claims to be a genius, assorted or otherwise. I do not discuss the question whether Mr. Edison is the most wonderful man the country has ever produced. I know he invented the phonograph and the incandescent lamp, which is enough to have made him famous, even if he had then stood pat, like some others. But I know that he is a fertile and tireless worker, and I am glad to serve with him. During the past year I have attended nine or ten meetings of the board, at an expense to myself of over five per cent. of a year's salary as a professor, and at a still greater sacrifice of time, which, like the money, I can ill afford. But I have thought the sacrifice justified if I could be of some small use to the country at large. I have worked occasionally before for the United States government, and I do not expect pay—thanks it is not possible to get—but I do not expect to incur jibes from fellow-scientists. This is an age of cooperation, and I believe science is at the dawn of a great epoch. We all need to pull together. Under the circumstances I accordingly feel justified in calling upon "R" for an apology, disclaimer or disavowal—the word is unimportant—either in print, under his anonymity, which I do not ask him to break, or in private over his own name, which will be treated confidentially.

In case I have made a mistake, and the National Research Council is intended, the apology should be addressed to Dr. George E. Hale, but the principle is the same.

Arthur Gordon Webster

October 23, 1916

PREPARATION FOR MEDICINE

During the past two years I have become convinced that there is a very typical course of college study through which prospective medical students are almost invariably passed. This conviction is based upon personal experience, recent enough to be very vivid, and upon conversations with many medical students.

Assuming that a man has selected his medical school, it is a very simple matter for his adviser to pick up a medical school catalogue and indicate that so much physics, so much chemistry, so much biology and such and such experience in French and German will be required in order for the student to enter the chosen school. These requirements can usually be met in two years of college work. Whether or not a college degree is necessary, the fact remains that the majority of the men in our best schools hold such degrees, and have therefore had at their disposal two extra training years. It is with these two years that I am concerned, for if they have been properly administered they can be of vast value, and almost always they are completely misdirected. A typical premedical student usually takes a year of physics, two years of inorganic chemistry, a course in organic chemistry with very deficient laboratory work, and finally a year of biology. These courses, as a rule, more than fulfil the requirements for admission to the selected medical school, and the work as arranged occupies about two and a half years of the college course. It is taken with the usual classical subjects leading to an A.B. degree. The remaining year and a half are carefully directed toward medicine by filling them with biology!

Those of us who have recollections of our college ideas of medical study will agree that there was a mysterious omnipresent picture of human dissection which occupied the entire foreground of our conception, and behind it, rather remote, a surgical background which we might some day reach. Elementary biology with its varied dissections of lower forms fitted the picture beautifully, as did histology, embryology and finally text-book courses in human anatomy and physiology. The prospective medical student finds such courses very pleasant. They are not difficult. He works much harder upon them than upon his

other studies and his success confirms him in his belief that medicine is his proper career. I know that courses in experimental biology and plant physiology are offered, which demand the immediate use and observation of physico-chemical facts. It might be maintained that such work is very direct and valuable training for medicine but I can not agree with such an attitude unless the courses in question are preceded by more fundamental physics, chemistry and physical chemistry than is now required for medical school admission. Experimental biological courses of this type do not, in my experience, reach many men. The majority have been concerned with what amounts to elementary comparative anatomy and histology, work which meets the needs neither of medicine nor of the medical school and which, though it has an educational value of high order, does not lead to the definite scientific specialization which modern medicine demands. A medical student of to-day must have a larger understanding of physics, of chemistry, and of mathematics than is pictured in the admission requirements of the school catalogues.

It is interesting to many who have had a close view of medical education and who have observed the direction of medical school development since the four-year course became general, to follow the gradual absorption of hours which had been given to different branches of anatomy, by physiological chemistry, physiology and pharmacology. The day when anatomy was the only real laboratory study is long past, and it is perhaps not an extreme view to hold that gross morbid anatomy —dissection—will be still further cut in many schools during the next ten years.

While this fact is part of the ordinary observation of all who have a historical view of the gradual stuffing and squeezing of the medical course, it has evidently not become a possession of the average college adviser who directs the student to the very door of medicine. He has a keen recollection of the struggles of his own contemporaries as they plunged along through a solid old Scotch course in gross anatomy and he thinks that every medical student must prepare for the same fate. It is true that a thorough course in comparative anatomy together with such desultory work in human anatomy as college courses offer, and, indeed, all biological studies, may make a man somewhat more efficient in his medical anatomical course. But the trouble is that the medical schedules have changed and anatomy now takes at best a quarter instead of almost the entire working laboratory time. The student prepared as I have outlined, and it is the usual preparation, finds and readily acknowledges that he has taken the correct path to equip himself for a career in anatomy if he wishes to specialize in this subject, but he finds too that he has been thoroughly cursed by wasted hours if he heads out into the many other fields which make up medicine.

I may seem to have indicated a belief that human physiology and human anatomy have no place in the college course, but this is not my intention. There can be no doubt that the more widely these subjects are taught the better. Let them be emphasized increasingly for all who are not to study medicine. The prospective medical student, however, must lay his lines in harder places.

In my experience there are not many men, who at the end of their first two medical school years, look upon anatomy as their most difficult course. True, it may have required more hours of study than any other subject, but this was due rather to bulkiness than to the character of the work. Just as in college the ordinary man regards biology as easier than physics, so in the medical school, the average student finds the purely observational task which anatomy represents far easier than physiology or physiological chemistry. Certainly with the steady encroachment of physico-chemical material it is only a matter of a very short time when this statement will be true with even greater emphasis than it is to-day. There is only one line of safety, then, for the man who plans to take medicine. He must prepare on the side of physics and chemistry, taking as much of these two subjects as his college course will permit. He will naturally take enough mathematics to keep

abreast of his progress in physics. It is by these three staunch aids alone that the trio of physiology, physiological chemistry and pharmacology may be successfully faced.

It may be objected that the man who sacrifices his biological training—and by this I mean takes no more than the present minimum required by the medical school of his selection—while he may find himself in better shape for physiology, etc., will not be better off in his medicine and surgery later on. By the same voice we shall hear that *general practise* does not need this scientific underpinning. I do not know what the training of that vague person, the "practical family doctor," should be, but I do know that he will make poor shift to graduate well from the modern medical school unless he heed his early training, and poorer shift still to keep up with current medical literature later on if he has failed to appreciate the direction in which medicine is growing.

The constant establishment of surgical and medical research laboratories with the consequent injection of scientific methods into the practical branches, is a matter of general comment, and emphasizes the large influences which are shaping medicine into a science. It is possible that most men who advise college premedical students are somewhat aware of the facts which I have tried to bring out in this paper, but feel strongly that such early and emphatic specialization as has been advocated may have a narrowing influence. If this be their attitude they are not consistent in permitting wide excursion into anatomical biology with the idea of better equipment for medicine later on, and it is against the futility of such a course that I protest.

It is often hard to point out to students the utility of subjects, essentially somewhat abstract, in their relation to medicine. This is especially true when one is confronted by the fact that medical school catalogues do not advise the prospective student to fulfil the given requirements, and then if possible to extend his course in the directions I have indicated. Yet there is no doubt that the man well grounded in these fundamental subjects, which become very inaccessible after the medical school is once entered, possesses an advantage over his less fortunate fellows which can be turned to most vivid and permanent account.

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THE AURORAL DISPLAY OF AUGUST 26

To the Editor of Science: The notes by Dr. Nutting and others in Science on the Aurora of August 26 have been read with much interest by the writer. None of these, however, mentions the appearance of this phenomenon from a point as far south as Washington. On the evening in question, I was sitting on the front porch (facing north) of my residence here. It had been quite a warm day and in the north was a heavy bank of clouds in which lightning had been playing all through the twilight and early evening; the sunset glow seemed to be unduly prolonged back of this bank of clouds. My attention was first called to what I took to be a small, faintly luminous cloud, about the shape of a mirror image of the map of Nevada, which covered a portion of the constellation of the Great Dipper. The length of this supposed cloud was about equal to that of the handle of the Dipper, with the longer axis at right angles to the handle. After persisting for some time this little patch moved away rather rapidly to the west and disappeared, only to reappear in its original position after the lapse of several minutes. Meanwhile, the seemingly prolonged sunset glow above the bank of clouds in the north had become a fringe of pale steady light, apparently extending out over the edge of the cloud a considerable distance. While the small patch of light over the Dipper soon disappeared again, the glow back of the cloud bank persisted for a long time. No distinct color was observed, the light being a uniform faint white; no streaming or other movement was observed, except that of the small patch of light already described.

F. Alex. McDermott
Washington, D. C.,
October 26