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changes produced by an extensive earthflow located near the ghost town of Gothic, Colorado.

The earthflow resulted from the presence of excessive water combined with certain topographic, climatic, lithologic, stratigraphic, and structural conditions. Initial movement was sudden and catastrophic and only minor modifications of the mass have occurred since. 1923 has been established as the date of occurrence by mutually corroborative evidence supplied by local information, climatic data, and tree-ring analysis.

Microclimatic data show negligible differences in atmospheric conditions over the earthflow but confirm the high precipitation and evaporation rates, and extreme maximum-minimum temperature range known for the general region. Edaphic conditions — degree of stability, varying degrees of disintegration of the parent shale material, and progressive stages of soil development — play important roles in determining the distribution of the plant communities.

Emphasis in the vegetational study was placed upon the distribution and composition of the communities as determined by mapping and quantitative analysis. Eight xeric communities were recognized and their successional relations determined. There are three pioneer communities: the *Senecio atratus* community occurs on rock and soil talus; *Rosa Fendleri* forms one on both stable and unstable shale as does *Chaenactis Douglasii,* which composes the pioneer community of the main successional line. The Chaenactis community is succeeded by a Chaenactis-perennial forb community, which in turn is replaced by a perennial forb community as the shale is progressively broken down. After soil development, the successional line bifurcates — an *Artemisia tridentata* community occurring on dry sites and a perennial grass community on mesic ones. There is some indication that the perennial grass community is succeeded by a *Festuca Thurberi* grassland climax.

Permanent quadrats were established in order that future data may be obtained which will confirm or modify the present conclusions.

THE FUTURE OF BIOLOGY MAJORS

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Too many students in biology see only one goal — medicine. All too frequently after painful and futile attempts to get into a medical school, the disappointed pre-medic seeks refuge in being a biology major. Actually, too few talented students are attracted to the science of life. Why this situation exists and what we can do

about it is a problem that we as teachers and also we who are taking an active part in the work of biology must consider.

When a student challenges us with such questions as: "But what can I do in biology?" "What can I do other than teach?" are we ready with information or can we guide them sufficiently?

Going back to the pre-medic, we find another serious difficulty. He has had medicine as his one goal, and no incentive whatever to study biology, nor very little interest in that subject other than a means to an end. Yet, we are faced with the problem of instilling some spark in him. Often these young people are "dead wood" staying in biology simply because it happens to be the easiest way to get through and perhaps teach.

My particular purpose at this time is to emphasize what you as scientists, research workers, and educators already know, that here in Minnesota there is not only a need for all of us to assist in any action for more Ph.D.'s, and particularly in the biological field, but also that we do have opportunities to help personally in spite of our own busy schedules.

Medicine is naturally the strongest magnet. Its rewards are well publicized; its glamour is well portrayed. It is constantly kept in the public eye. Minnesota particularly has been a torch bearer, with the University of Minnesota an outstanding contributor to medicine. But the minds of many of our youth must be turned from medicine. It would seem plausible to weed out a number of students much earlier in their college careers than is being done at the present time. We can give them ample chance to learn more about the related fields of biology.

Suppose the young man starts out as a biology major. Are we doing our part in stimulating such an interest in the work that it attracts him to this field as a profession with an appeal equal to to that of the medical school? We might try to have our freshmen realize that well-trained people are needed more today than ten years ago, and that the competition they have to meet is much greater. Today a larger percentage of Americans possess a Master's degree and as a result the possession of a Ph.D. is more important than ever. For example, at the University of Minnesota the approximate ratio of Master's degrees to Ph.D. degrees is seven to one, whereas in 1940 it was four to one, the number of doctorates being approximately the same in number. True, a part of this condition is due to a temporary influence, but an increased enrollment for Master's work seems permanent.

We know from the report of the President's Commission on Higher Education that there is a great need for Ph.D.'s and our Minnesota youth have much greater advantages through our state facilities. There are thirty-five approved institutions of learning, yet here "for every gifted student who goes to college in Minnesota there is one that does not." The report, "Tomorrow's Re-

sources" by the Minnesota Commission on Higher Education, shows that although Minnesota is well aware of the demand for better-trained people, and also recognizes the shortages in scientific research, medicine, nursing, and pharmacy, this state ranks seventh from the bottom in its percentage of seventeen and eighteen year olds who are enjoying the privilege of a high school education. The report warns that our talented youth are being drained from the agricultural field. This, it points out, is serious since our state employs one-third of its labor in agriculture, and with the development of better machinery the demand becomes increasingly greater for talented well-trained youth who need to keep Minnesota's agricultural wealth.

But what are the opportunities for biology majors? Far from the well-defined requirements in medicine, we have the too little known biological fields. Minnesota ranks high among the first eight states in agriculture, but the vital fields of agronomy, soil science, economic agriculture, and plant pathology are so little known that many of our students fail to recognize such terminologies. We have too frequently overlooked the nature of these fields and quite generally by-passed their highly important contributions. It is our responsibility to define and to broadcast the possibilities of these and many other related biological outlets.

Furthermore, it is our responsibility to stimulate interest in research by assisting students with their individual investigations and by encouraging them to work out original techniques. If we are unable to show examples of our own efforts in research, we should exert every effort to arrange observational field trips to laboratories where research is in progress. At the same time, we should direct attention toward possible sources of scholarships, fellowships, assistantships, and grants.

It might be well for us to acquaint ourselves with the progress in our leading universities in the various branches of biology so that we can tell our students where they can get the very best training. An interesting graduate school is that of the U. S. Department of Agriculture established in 1922. Last year it boasted 4000 graduate students. Young people may work for a while in the Department then gain a release for advanced study. Under the Research Intern Program of this Department, opportunities are given to qualified graduate students and to faculty members for valuable research experiments, in most cases under excellent conditions. The Federal Security Agency under the Public Health Service of the National Institute of Health has published information concerning research grants and fellowships available. In the Division of Research for July 1947 to July 1948, there were 470 Fellows. The University of Minnesota had a share in these Fellowships. Congress has recognized a need for worthwhile research, for in 1946 it appropriated $917,000 and in 1949 it raised the amount to $7,778,000.

We should have a deeper realization of the many opportunities we have of passing on our rich heritage to others; to have a part in helping others to enjoy the things we do; to share the satisfaction of research.

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ENZYMES IN FISH MUSCLE

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SOIL EROSION AND CONSERVATION OBSERVATIONS IN THE NORTHERN AND SOUTHERN STATES

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