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SUMMARY

Table 1 indicates that if the continents are reduced to incipient inundation, sea level will rise approximately 241 meters, and will flood about 53 x 10^6 km.^{2} of land area, or a little over one-third of the present land area. The discussions indicate that the probable error is less than 10% and possibly less than 5%.

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TRADITIONAL AND ECOLOGICAL ASPECTS OF THE QUARTER SECTION

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ABSTRACT

The philosophical background of the rectangular land survey of the United States and its "geometric spirit" can be traced back to Descartes. An investigation of the legislative history of the "Ordinance for ascertaining the mode of disposing of lands in the western territory" reveals that the rational and geometric land division ignored the natural differences of the land and a mathematical impossibility as well: Square townships, sections and quarter sections were to be governed by the true meridians as the law decreed, but it is impossible because of the convergence of the meridians.

Legislation subsequent to the Ordinance made possible the purchase of tracts smaller than a section. After 1832, the "forty," that is, a quarter of a quarter section, could be obtained by first transfer of government land to private ownership. Nothing, after 1832, has basically modified the survey or the mode of first transfer.

A detailed study of the original surveyors' lists and their land descriptions and of the original book of Land Office Record Deeds at Winona, Minnesota, during 1855, shows that the pioneers

rarely bought a square shaped quarter section. They bought 160, 120 or 80 acres, or rather, whatever number of acres was actually contained in a quarter section, or half quarter section after "correction." Nineteen different shapes made up of four "forties" were discovered among 749 entries. When compared with the lay of the land and the original vegetation, the shapes show that the settlers attempted to adjust the shape of the quarter section to natural conditions as far as it was possible under law. The geometric spirit of the land survey prevailed as a tradition; the actual transfer of the land reveals concern for ecological principles.

SOME EFFECTS OF ARTIFICIAL DRAINAGE UPON AGRICULTURE IN BLUE EARTH COUNTY, MINNESOTA

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ABSTRACT

Poor natural drainage in Blue Earth County is caused by level topography, lack of natural outlet for surface water and heavy soils of poor internal drainage. The soil survey indicates 58% of the soils to be of a type which requires artificial drainage to maintain good tilth and production. The U. S. Drainage Census for 1920 reported about 32% of the county to be drained or to need drainage. The 1930 drainage census reported about 44% of the farmland within drainage enterprises to be unfit to raise any crop prior to artificial drainage.

Public enterprises include about 173,000 acres, not all of which is tiled, but which has potential outlet into the systems. Privately constructed drainage systems, of which there is no record, bring the total drained area to about 200,000 acres. Private drainage began soon after settlement, but public enterprises did not develop until 1898 with maximum activity between 1910 and 1920. A few systems have been constructed since World War II. Enterprise costs may reach $30 per acre and the farmer's tile system may cost $85 an acre. Within the county, less than 3% of enterprice areas have become delinquent. Most of the delinquent land has physical properties which make drainage unwise.

The results of artificial drainage upon agricultural land of Blue Earth County are: (1) an increased proportion of tillable land (2) a decreased proportion of wild pasture and waste land (3) a decreased acreage of wild hay (4) regular and dependable cropping (5) the fitting of drained land into a crop rotation plan (6) larger, rectangular fields, which lend themselves to mechanical handling and (7) increased land value. These results were found

to be true in varying degree in a detailed study of ten farms within the county. Land use patterns before and after drainage, maps of tile installations, field patterns before and after drainage and assessment records of land valuation were the criteria used.

Artificial drainage in Blue Earth County is representative of a marginal portion of heavy drainage activity in the northern prairie. It has enabled the county to assume active part in corn belt agriculture and has added to the economic growth and stability of the agricultural resources of the nation.

A COMMITTEE APPROACH TO THE STUDY OF REGIONAL GEOGRAPHY

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ABSTRACT

Two extremes are to be avoided in the preparation for teaching. One is the over specialization in a subject matter field without an acquaintance with psychology and educational methods. The other is educational specialization without proper foundation in subject matter. Too often, the geographer is an extreme case of overspecialization in subject matter who, in his teaching, relies upon the "lecture" method in the presentation of his subject.

To improve the method of presentation, a committee organization of the class is suggested. For example, the course in the geography of North America can be divided into ten to twenty units of work, with work sheets for the students to complete. The class can be organized into groups on the basis of individual interest. The committees can then go into "buzz" sessions to plan the mode of presentation to the rest of the class. Panel discussions, individual reports, class discussions, illustrations by means of maps, pictures, filmstrips, and hand-made slides are usually included in such plans.

The teacher functions as a resource person, acquainting committees with relevant sources which they do not locate on their own and drawing the class into discussion when the committee fails to do so. He also checks the work sheets of the completed units and administers frequent quizzes. He sees that the principles of group dynamics are employed in the committees and the class as a whole.

The rewards of this method of presentation are tripled. The students show mastery of content and skill in geographic method that are superior to the achievement of control groups where the lecture method is used. When group processes are allowed to function, autocratic control by the teacher is ruled out and students

learn to participate in making decisions. Furthermore, one of the problems of youth in a changing society receives a partial solution.

The individual needs to experience the sense of belonging that comes from being accepted by his groups because he makes contributions to their achievement. He sometimes fails to obtain that sense of belonging from his family. Committee organization at school allows the individual to make contributions that others appreciate. He then has the satisfaction of experiencing a feeling of self-esteem and of acceptance by his fellows.

FORWARD AFTER FORTY YEARS

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ABSTRACT

When the N.E.A. met in St. Paul in 1914, the geographers attended the Science Section. A newcomer to the state, George J. Miller was convinced that geographers should have a section of their own. Some of the eminent American geographers gathered in a small restaurant in St. Paul and founded the National Council of Geography Teachers.

As soon as the National Council was formed the founders proposed state councils. The first state council was organized in Dr. Posey's office at the University of Minnesota. Thus, it was the initiative of Minnesota geographers that established the National Council and the first state council. The Minnesota Council did not affiliate with the national group until several years ago. *Why* it did not is a fascinating question somebody should answer.

For many years the *Journal of Geography* was edited by Dr. Miller and Miss Sletten at Mankato. A considerable number of outstanding American geographers have at one time been Minnesotans. Most of the institutions of higher learning in the state now have departments of geography, staffed by well-trained geographers. The state council is affiliated with the Minnesota Council for the Social Studies and the Minnesota Academy of Science. Geography has been restored to the social studies curriculum and will be studied at the elementary and the secondary levels again if there are classroom teachers with knowledge of geography. To train social studies teachers adequately is a real challenge to Minnesota geographers in the years ahead.

The recruitment and training of personnel in Minnesota will have to be accelerated to meet the demand for professional geographers in new fields of employment. Geographers can help the people of Minnesota achieve the peaceful world they yearn for by convincing them that mankind is dependent upon the natural

environment for meeting basic material needs and by showing them that wise and cooperative use of natural resources will make it possible to meet the basic needs of the human race.

AN INTRODUCTION TO THE SNOWY MOUNTAINS WATER DEVELOPMENT PROJECT IN AUSTRALIA

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ABSTRACT

In the Southeastern Highlands of Australia rise the Snowy River, which flows unchecked to the sea, and other streams which are not now fully utilized. The Snowy project, started in 1949, is a plan to provide two million acre feet of badly needed irrigation water for the western slope streams, the Murrumbidgee and the Murray. In addition, this project will create three million kilowatts of hydroelectric power, an amount which exceeds that of the present generating capacity of Australia.

The project is being developed in two parts. One includes several streams joined by tunnels which will supply water to the Murray River. The other, by means of similar structures, will give an even larger volume of water to the Murrumbidgee River. Each part includes several hydroelectric power stations.

While the whole is a long term project, various parts are to be finished at intervals. One phase was completed early in 1955. It included the Guthega Dam on the Snowy River, a tunnel carrying the water, and the Munyang Station which generates 60,000 kilowatts of power. By 1961-62, 500,000 acre feet of water and 660,000 kilowatts of power will be available. In two decades the project will be completed.

ELLSWORTH HUNTINGTON'S UNFAVORABLE CLIMATE

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ABSTRACT

The content of some geography textbooks shows that some authors still assume that high levels of human achievement are caused by favorable types of climate and vice versa. Most of these authors are conscious or unconscious disciples of the late Dr. Ells-

worth Huntington. If they knew how Dr. Huntington became interested in this topic, the inadequacy of the data and methods of investigation available to him, it is not likely that they would be willing to accept his conclusions as part of the verified knowledge upon which the present generation of geographers can build.

Dr. Huntington searched for a single causal factor to explain the rise and fall of centers of civilization in the past and the eminence of the centers of civilization in the modern era. Without acquainting himself with scientific method or with the field of social science, he mobilized all the evidence he could to prove his thesis that civilization was located in areas of optimum climate and that the rise of a center of civilization was concurrent with improvement in the type of climate and that the decline of a center of civilization was concurrent with a deterioration in the type of climate.

He accepted without question the Greek notion of the optimum climate of the "middle area"; he was extremely ethnocentric in his concept of "civilization"; his statistical methods were limited to descriptive techniques; he made no use of the techniques of sampling, analysis of variance, or of correlation which make it possible to generalize about the universe or to measure the existence and nature of relationships. His climatic data were crude and meager, as were his data of human energy and achievement.

Since most of his investigation of this topic was done before 1925, one should not expect him to possess the insight, the methodology, and the data available to the geographer of 1955. One should, however, recognize that the answer to the question, "Why is there a variation in time and place in human health, activity, and achievement?" which Dr. Huntington gave was grandiose speculative theory, not verified fact.

SOME GEOGRAPHICAL ASPECTS OF ARCTIC NORWAY

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ABSTRACT

The limits of Arctic Norway are not easily defined because latitude, temperature, and vegetation must be considered. While each is important in itself, the correlation among them is not close. Although approximately a third of Norway is north of the Arctic Circle, much of the land is not characterized by Arctic features. The 50° F. July isotherm corresponds closely with a vegetative delimitation that is frequently used to demarcate Arctic limits. This isotherm places only a small portion of Norway within the Arctic Region.

Arctic Norway is one of the earth's oldest continental land masses. The basic rock was laid down in Archean times and consists of such eruptives as granite, syenite, gabbro, gneiss, and crystalline schists. Sediments were laid down in the Cambrian-Selurian Period. In the early Quaternary Period, the land was enveloped by ice and remained slightly depressed until recent times. The erosive ice swept mountains away, leveled vast areas, ground up rock, and scattered debris over large areas. V-shaped valleys were changed to U-shaped valleys. Deep fiords and hanging valleys are numerous.

At present, the climate is influenced by the warmth of the North Atlantic Drift. Records for several recent years gave Tromso an average January temperature of 25.7° F. and an average July temperature of 52.5° F. Vardo, on the Barents Sea and definitely in the Arctic Region, had an average January temperature of 24.3° F. and an average July temperature of 46.7° F. during the same period. Arctic Norway has a short but intense growing season. Barley will ripen in some places in sixty days although one hundred days are required in the Oslo area.

About 35,000 people live in Arctic Norway. This region has the lowest density of population in Europe. The inhabitants are concentrated along the coast in small towns, some of them completely rebuilt since the end of the Nazi occupation. The general appearance is one of modern comfort and prosperity. Few people live on isolated farmsteads. Agricultural activities are similar to those pursued in Norway south of the Arctic Region. Hydroelectric power stations furnish the area with electricity. The waters off the coast of the Arctic Region teem with fish and the fishing industry is the major economy.

THE WEDGE INTERFERENCE FILTER FOR THE EXAMINATION OF PLANT PIGMENTS

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One of the topics frequently included in the laboratory work of a beginning course in botany is the absorption of light by a solution of chlorophyll. A number of difficulties may be encountered in this type of experiment. A relatively expensive piece of apparatus, the spectroscope, is required; the equipment probably remains unused for the rest of the year. Considerable time of the instructor is also required as the students are not familiar with the apparatus and only one student is able to use it at a time.

A filter holder was constructed of thin sheet aluminum and wood in such a way that an entering beam of light passes through a square glass absorption cell and then through a Wedge Interference Filter (Bausch and Lomb Optical Company). The cell is oriented in such a way that it covers half of the filter, thus per-

mitting a view of the normal spectrum adjacent to the absorption spectrum provided by an acetone or alcoholic extract of chlorophyll placed in the cell. A piece of frosted glass may be used as a viewing screen, placed directly in front of the exposed surface of the filter. This addition is especially helpful when a powerful artificial light source is used. No wave length scale is provided on the filter, but an idea of the scale may be obtained by using a fluorescent desk lamp which emits blue, green, and yellow mercury lines at 435, 546, and 758 millimicrons respectively. The locations of these lines and any other marks may conveniently be made on the surface of the frosted glass screen.

The apparatus was built at a cost of about fifteen dollars. For those who do not consider themselves adept at construction, a simpler model may be made using a cardboard microscope slide box and a few pieces of cellophane tape to hold the items together. The device may be used by several students at one time; the instructor may point out various features with the full assurance that the student and the instructor are observing the same region of the spectrum. Finally, the normal and the absorption spectra are displayed side by side so that comparisons are easily made.

TRENDS IN SCIENCE COURSES

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Frequently the question arises as to what is being done in high school and college science courses. This paper attempts to bring out some of the more important aspects of three factors which are relevant to the question: trends in enrollment; characteristics of science instruction offered; and recent innovations and their implications.

Trends in Enrollment. What we teach depends, in part, upon whom we teach. Since 1870 high school enrollments have been rapidly increasing, and though the general population has also increased, the *percentage* of students of high school age enrolled reflects the remarkable increase in high school attendance. In Figure 1 we see that the rapid increase in the percentage of students attending high school is now leveling off. However, the number of students that enter high school will continue to rise. The increase in school attendance has meant that the students may differ in some ways from those who attended earlier schools. For example, they differ in their aspirations—in 1880 about three-fourths of the youth in high school went on to college, whereas in 1950, less than one-fourth of high school graduates entered college (EPC, 1952).