THE OLD AND THE NEW IN PHYSICAL GEOGRAPHY.

BY L. H. WOOD.

Now and then we catch glimpses of the good work done in geography in some of our normal schools and universities; again and again we hear reports of the progress made in the German schools in every branch of geography; several good journals are constantly pushing to the front plans of work and exhortations to enterprise in this direction; excellent text books are being published, and some of the older and poorer ones have been laid on the shelf forever; teachers, generally, are alive to the conditions, and are satisfied that some great changes must soon take place in methods as well as material; these facts suggest "something new."

The use of the term "new" does not imply that no good work has been done in the past, nor that the old methods and the old teaching were all bad. Rather the "new" is an evolution, a survival of the best that thorough going teachers have used, coördinated with the recent ideas that are receiving the stamp of approval after a fair trial.

Like the phases of progress in other lines, the "new" in geography must come in gradually. Conservatism must temper enthusiasm. There is earnest devotion on the part of so many teachers to this subject, that the "new" may safely be grafted on the "old" and the two grow together until the graft becomes the fruit-bearing limb. Leading educators have already stated what the "new" should be, and in doing so have indirectly outlined the "old." So that, had *doing* followed sharply on the heels of *saying*, the new era would have been upon us long ago. But the inertia of the large mass of prejudice and ignorance must be overcome, and the "new," for some time, will be concerned with this task. The great universities and normal schools certainly have taken hold of this problem by the right handle. It now remains for superintendents and principals to do their part in coördinating the work of high schools and grades. This done, the millenium of geography will have dawned upon us.

As the high schools look to the universities for teachers to do a special work, so the grades must look to the high schools for teachers to do their special work of introducing correct methods in geography. As the high school supplies young teachers with correct notions of language, history and mathematics, so it should supply them instruction in the best methods of geography and normal ideas of what the material used should be. This creates a demand not only for teachers of the high-school branch of geography who know what the instruction in the grades should be, but also a certain part of the course planned with reference to the needs of the grades.

Such an arrangement of the high-school work need not impair the integrity of the secondary course in the science of physical geography, but will, as I shall try to show, be mutually beneficial to both classes of pupils.

The loose relation that exists between grades and between the grades and high school strikes me as the phase of the "old" most to be criticised at the present time. Where the superintendent is a disciple of geography, there is usually much stir along this line, and many plans and outlines are issued monthly, designed to systematize the teaching of the great mass of facts loosely combined under this subject. When the superintendent can teach the physical geography of the high school, he will, necessarily, flavor the programmes of work for the grades with the aroma of his own interest, and thus the high school and grades will be connected in part. But this is not the case in most schools. In fact, what I have learned from the majority of schools that I have visited, and from inquiries made in many parts of Michigan, not even this loose relation exists. As Mr. W. H. Snyder, in an article written for this *Journal* (March and April, pp. 20 and 62), so pointedly says: "The geography of the high school occupies a place where there can't anything else be easily put; it is taught by the teacher who can't do anything else very well; taken by the pupil not exactly suited for anything; taught with any book that is easy." Such a condition exists largely because the study in the high school is really the culmination of nothing that precedes; is not closely related to the geography that has occupied

the mind of the pupil for several years of his grade work, and has not, so far, been sufficiently useful to grade teachers to make it worthy of its place. But give the study its rightful place as the coördinator of the many facts gathered from the study of many lands in the grades, the loom, as it were, in which the loosely connected facts of political, physical, commercial and biological geography are neatly woven together into the fabric "Geography"; make it helpful to the young teachers who go from the high school to the grades; introduce into the course some of its bearing upon history and civilization, and it will soon come to occupy no mean position among the culture studies so long holding the favored places on our high-school programmes.

How can this be done? How can the high-school course be brought into closer relation with the grade work? "Aye, here's the rub." What part of a system will make the teacher of physical geography, if not an integral part of the geography department, at least in sympathy with those teachers who bear the burden of the subject? Several things are necessary to take teachers and subject out of the "old" rut and balance things up on the "new" plane.

In the first place, some teacher well versed in the subject must be given charge of the department from cellar to garret. What would become of the department of music and drawing in our schools if there were no head? And what can be expected from geography where as many loosely-related topics are left to be patched into a connected whole by a dozen different people? The "new" in thought and method must be grasped by some devoted teacher, and its truths be preached from the housetops until the corps of grade workers is converted. *Then*, coördination will have begun; one grade of work will not overlap another; high-school work will supplement grade work; physical geography will be introduced in proper proportion in the first grade as well as in the last, and the several phases of geography will come to receive, each its own share of attention in all the grades, because they have snugly nestled down to partnership in the mind of the teacher. In the past there has been too much dissection of the subject into its vital parts—into physical, political, commercial. A book has

been written in which the physical occupies the first half, and teachers have taught this text page by page, with the feeling that because the author was a great geographer, therefore the order of treatment should be religiously followed. This same book presents the physical geography systematically, in a more attractive form than do many of the high-school texts, with the result that when the pupil reaches the presumably more complete text he finds it dry and his interest takes a drop. Because this book emphasizes the physical too much, superintendents in many cases have gone back to the books that give the pupil more so-called information on the many important phases—as capes, bays, crooks and turns in the coast line, *et cetera*, from map questions. And as teachers turn once more to the cut and dried question-and-answer method of the text; so bad, because it binds the child down to too much serving of the text book, when his mind should be wrestling with the problems of his own environment and roaming to and fro upon the earth gathering data for the construction of his own geography. To overcome prejudice in this matter and institute a plan of work in which all the parts have their true balance, the specialist is needed. He must enter into the work in geography in the grades, as the drawing teacher enters his department. He must teach and inspire the teachers whose views of the subject are generally narrow and who like, as we all do naturally, to do their own little piece of work, forgetful that their piece joins others to make up the whole.

Such a special teacher might teach the physical geography of the high school; for, knowing the condition of the grade work, he could properly coördinate the primary and secondary phases of the subject. He might call his high-school course simply geography, and in it offer the material in such a way as to supplement the necessarily fragmentary teaching of the grades. He could thus adapt his course to the needs of the school, and at the same time train teachers to enter intelligently upon the grade work. He would certainly be able to illustrate the principles of physiography by type studies, too, at various points of the earth, and make due reference to the multitude of facts that illustrate every principle that he brings before the class. Then he would prove truly that

physical geography is based on the earth and not on the text book. His course would not then be a conglomeration of a half dozen sciences, but would stand forth among them all in its true place as a science, holding its own with proper dignity.

It is to be supposed that the child leaving the eighth grade has been taught to apply the more obvious truths of physiography to history, and that many of the simple facts of nature are already his own private property, acquired by the use of his senses, in and about his own home land. In geography proper his work has dealt with facts rather than with relations; he has been working in the inventory stage of his science; he possesses a large stock of facts concerning form, size, position and location of the natural features of the globe. Home geography has been pretty fairly mapped out. He has also begun work in the second stage of his science by tracing the relationship of many distinct groups of phenomena. He has studied the relation between deserts and mountains, deserts and rainfall, rainfall and rivers, rainfall and fertility of soil, gulf-stream and climate, movements of the earth and climate, the effect of temperature on plants, water and animals, the effect of temperature on the air, and many other such sets of relations. He has, in short, looked out of the geographical window of his soul to view the panorama presented by the organic and inorganic phenomena of the round world. If the pupil has such an equipment as this he should be fitted for good, solid work in the real science, physical geography. Having seen considerable of the human element in geography and history he can consent now, for a time, to be led away to the purely physical phenomena about him.

As high-school teachers we must limit ourselves on the side of fact and open the window of the soul on the side of relations; for this is the distinction between the primary and secondary aspect of the science. We must cause the pupil to experience as much pleasure in his tide of emotions arising from his conquest of a world of relations as he formerly did from that of curiosity in the accumulation of the facts. We must teach him that the power of seizing relations is the passport to this new land of promise. Too often the child does not have this passport on coming

to the high school, but has, rather, a thorough dislike of the subject acquired through bad teaching. When this is true the high-school teacher must take the pupil as he is and not as he is supposed to be. He must re-dress the old facts and bring them out clothed and in their right relations. When we have reached the strictly "new" era the necessity for this elementary work in the high school will be done away, and the broad reaches of a world-wide, beautifully true science will be laid open to the student of our high schools and academies.

THE PURIFICATION OF MERCURY.

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Many methods have been proposed for the purification of mercury in the "wet way," that is, by using acids and oxidizing mixtures, such as nitric acid, a mixture of nitric and sulphuric acids, and especially a mixture of sulphuric acid and potassium dichromate.

The impure mercury is shaken up with these reagents, or it is allowed to fall in a fine stream through a long column of the reagent. But with these reagents, none of the metals which are below hydrogen in the voltaic series can be removed unless some mercury is in solution. When mercury is dissolved in the reagent, however, all metals down to mercury in the series can be removed, except gold, silver, potassium, etc. As these "noble" metals are seldom found in mercury, the wet way is useful. The best reagent is a solution of some mercury salt, and a nitric acid solution of mercury nitrate of medium strength answers all purposes. A large jar partially filled with this solution serves as a receptacle for all "dirty" mercury. The mercury to be purified is brought into a separatory funnel (Squibb's form with a glass stopcock and stopper is best), and covered with a freshly prepared solution of mercury nitrate and nitric acid. After the mer-