correct acidity where it now exists or where it may develop. The phosphorus is needed solely for its plant food value. The supply of organic matter must be renewed to provide nitrogen from its decomposition and to make available the potassium and other essential elements contained in the soil in abundance, as well as to liberate phosphorus from the raw mineral phosphate naturally contained in or applied to the soil.

It should be said here that throughout the work Professor Hopkins is concerned only with general farming, not with intensive agriculture where other fertilizers can be used with profit and must be if largest results are secured.

Chapters are given to the discussion of limestone, of phosphorus and of organic matter and nitrogen, as to their function, quantitative needs and maintenance. Then follow chapters on rotation systems for grain farming, live stock farming, the use of phosphorus in different forms and finally theories concerning soil fertility. The subject-matter of these chapters is of the greatest importance; the views presented are in the main fundamentally sound; they are well presented, and must have a very important influence in advancing agriculture in the United States.

Part III. contains an admirable digest of the more important field experiments bearing upon permanent agriculture, conducted at Rothamsted, England; in Pennsylvania, Ohio, Illinois, Minnesota, in the south and in Canada, pointing out their bearing upon the views expressed in the preceding sections.

Professor Hopkins has succeeded in producing a worthy companion volume to Hilgard's great work "Soils."

F. H. KING

MADISON, WIS.,
May 16, 1911

The Ice Age in North America and its Bearing upon the Antiquity of Man. By G. FREDERICK WRIGHT. Fifth edition, revised and enlarged. Pp. 800. 200 illustrations. 8vo, cloth.

The popularity of Wright's "Ice Age" is sufficiently attested by the fact that the fifth edition is now published under date of December 22, 1910, enlarged and embellished with many new and interesting illustrations.

The value of Professor Wright's work consists principally in the illustrations and descriptions he gives of glacial phenomena not only in North America, but in other portions of the world. The main criticism of this work, which has many good features, is that its author is too credulous, and has thus permitted many exploded "chestnuts" like the "Calaveras Skull," the "Lansing Skeleton" and the "Nampa Image" to find in him a defender of their antiquity. This tendency of Professor Wright is unfortunate, since it of itself throws doubt upon his power of critical discrimination in analyzing evidence pro and con in matters of geologic controversy. It is possible that Professor Wright's theological beliefs have unconsciously biased his judgment in matters pertaining to the age of the earth, and to the date of the glacial epoch. In spite of these defects, however, Professor Wright's "Ice Age in North America" will prove a useful work in enlisting popular attention, and study of these most interesting phenomena connected with the Pleistocene glaciation.

I. C. WHITE

SPECIAL ARTICLES

A SCALE FOR MEASURING THE MERIT OF ENGLISH WRITING

ONE inch may be said to be equal to another inch from any one of three lines of evidence. If the two are compared by a hundred experts, (1) the experts will all report the two as indistinguishable; or (2) if some of them do, by microscope, micrometer or the like, find a difference of a trifle plus or minus, the number finding the first inch plus will equal the number finding it minus; or (3) if each man is forced to report a difference, half will find the first inch plus and half minus.

One specimen of English writing may be said to be equal to another from the second or third lines of argument, the only logical difference between equating the two lengths and equating the two specimens of writing being that the variability of expert judges in the

latter case is so great that we never find all of them, and rarely find many of them in agreement, as to the indiscernibility of any difference. But specimens 571 and 220 below are, in merit as defined by, say, 100 competent persons, approximately equal, since if asked to report 571 as better, equal to, or worse than 220, there will be a large proportion of equals and the judgments "better" will approximately equal the judgments "worse." Of 110 competent persons, forced to make a distinction, 54 favored sample 571 and 56 sample 220.

571. VENUS OF MELOS

In looking at this statue we think, not of wisdom, or power, or force, but just of beauty. She stands resting the weight of her body on one foot, and advancing the other (left) with knee bent. The posture causes the figure to sway slightly to one side, describing a fine curved line. The lower limbs are draped but the upper part of the body is uncovered. (The unfortunate loss of the statue's arms prevents a positive knowledge of its original attitude.) The eyes are partly closed, having something of a dreamy langour. The nose is perfectly cut, the mouth and chin are moulded in adorable curves. Yet to say that every feature is of faultless perfection is but cold praise. No analysis can convey the sense of her peerless beauty.

220. GOING DOWN WITH VICTORY

I sat on the top of a mail-coach in Lombard street impatiently awaiting the start. 'Twas the the night of the victory and we would help spread the news over England.

Up jumps the coachman followed by the guard, an instant's preparation, a touch of the lash and we are off! We are soon past the limits of the city out in open country, galloping, tearing along, a clear road ahead of us for the English Mail stops for nothing.

We dash in at villages, stopping but a moment with the mail, shouting the news of the victory and we are off again. Proud were we and had we not a right to be? The first to carry the great news through the land!

The memory of that ride is ever fresh in my mind and I will ever remember those hours as the most glorious in all my life.

The difference between 1 inch and 2 inches is said to be equal to the difference between 2 inches and 3 inches, because the experts will, as before, all agree or divide equally in their disagreement. The essential logic of their procedure will appear if we change the illustration.

Let their task be to examine the following pairs of lengths: I. (*a*) 10.0000 inches, (*b*) 10.0001 inches, II. (*c*) 10.0001 and (*d*) 10.0002, III. (*e*) 10.0001 and (*f*) 10.0003, IV. (*g*) 10.0001 and (*h*) 10.0004, V. (*i*) 10.0001 and (*j*) 10.0005, and to judge in each case whether the second line of the pair is shorter, equal, or longer. We shall find that even the experts make some wrong judgments with these very small differences, but that the proportion of right judgments increases as the difference increases, so that we can conclude that the difference between (*a*) and (*b*) is equal to the difference between (*c*) and (*d*), not because it is always judged so, but because it is *equally often* judged so, by experts. The basis for the scientific acceptance of a difference may then be that judgments of longer are more frequent than judgments of shorter. And the basis for the scientific acceptance of one difference as equal to another difference may be that the preponderance of judgments of longer is equal in the two cases. This is not the whole truth of the matter in the case of the equality of such differences as 1.0001 in.–1.000 in. and 1.0002 in.–1.0001 in.; but it is a part of it.

This part of it may be made true of judgments of differences in merit in English writing. For instance Specimen 627 is judged to have more merit as writing by young people in their teens than specimen 570 by 83 out of 110 competent persons. Specimen 570 is also judged to have more merit, similarly defined, than Specimen 603 by 82 out of the same 110 competent persons. The difference between Specimens 627 and 570 is then approximately equal to the difference between Specimens 570 and 603.

627. A SCENE

I think the sunlight is very beautiful on the water, and when it shines on the water it is very beautiful, and I love to watch it when it is so beautiful. The colors are so pretty and the noise

of the water with the sunshine are so attractive in the sunshine I wonder do other people love to watch the water like I do. I don't know as there is anything as lovely as the water waves in the sunlight of the glorious orb.

570. DESCRIPTION OF SCHOOL ROOM

Our school room is on the side of the school house and it is a awfully nice room and I like it because it is so nice and all the boys like it, there is a good many pictures on the wall and there is a clock on the wall. We like this school room and come to school most all the time.

603. A CHARACTER SKETCH

The man I am describing is a white man and he has nice hair and wears a hat, and his horse is black, I like this man and he has two eyes and his nose is red.

In this way it would be possible to discover specimens of English writing ranging from Specimen 607 (which may roughly represent zero merit in English writing by young people in their teens) up to the best writing known, by equal steps, so that Specimens 0, 1, 2, 3, 4, and so on, would have in part, the significance for merit in English writing that 0 inch, 1 inch, 2 inches, 3 inches, and so on have for length.

607. SKETCH

I words four and two came go billa guni sing hay cows and horses he done it good he died it goon I want yes sir yes sir oxes and sheeps he come yes sir camed and goes billum gumun oomunn goodum.

Such a series of specimens representing defined degrees of merit in composition would be of service to civil service examiners, college entrance examination-boards, high-school teachers of English, and any others who were concerned with measuring ability to write English, the changes produced in that ability by various forms of training, or the differences in it that distinguish certain groups.

An investigation designed to establish such a scale is now being made by Mr. M. B. Hillegas and myself. We should be very glad if any of the readers of SCIENCE would cooperate to the extent of sending us their ratings of the ten specimens printed below. All that is required is that the reader consider these as specimens of English writing by young people, choose the one that seems to him to have the least merit, number it 1, choose the one that has next least merit, number it 2, and so on, and send the record to M. B. Hillegas, Bureau of Education, Washington, D. C., or E. L. Thorndike, Teachers College, Columbia University, New York. For this purpose the following slip may be used:

I rank specimen 94 as
" " 196
" " 200
" " 300
" " 323
" " 434
" " 519
" " 520
" " 534
" " 627

Signed. .....

94. SULLA AS A TYRANT

When Sulla came back from his conquest Marius had put himself consul so sulla with the army he had with him in his conquest siezed the government from Marius and put himself in consul and had a list of his enemys printy and the men whoes names were on this list we beheaded.

196. ICHABOD CRANE

Ichabod Crane was a schoolmaster in a place called Sleepy Hollow. He was tall and slim with broad shoulders, long arms that dangled far below his coat sleeves. His feet looked as if they might easily have been used for shovels. His nose was long and his entire frame was most loosely hung to-gether.

200

My dear Fred,—

I will tell you of my journey to Delphi Falls, N. Y. There is nice scenery along this route. The prettiest scene is in the gulf which is quite narrow, a small creek flows down it and the road follows along near its banks.

There are woods on either side, these trees look very pretty when they are white with snow.

In summer it is always shady and cool in them and the small fish may be seen darting back and forth in the water.

I hope I will have the pleasure of taking you over the route some time.

Yours sincerely,

300. THE PREACHER OF AUBURN

The most popular man of Auburn was the preacher. Although he had a very small salary he was contented. The preacher was kind to everybody. Little children loved him. Old soldiers liked to sit by his fireside and tell stories of the battles, which they had fought in. The beggars who came to his door, although chided for leading such an existence, were always clothed and feed.

The preacher was always willing to go to the homes where there was sickness or death. Here he helped in all things that he could.

In the church he preached with unaffected grace, and all who came to scoff at him remained to worship.

The minister was a contented, simple and kind man, whom the people loved.

323. ESSAY ON BURNS

As far as I can learn from the Essay on Burns, Mr. Carlyle considers that good poetry must contain the sincerity of the poet. The poem must show the author's good choice of subject and his clearness of sight. In order to have good poetry the poet must be familiar with his subject and his poem will show it.

The characteristics of a great poet, in Mr. Carlyle's opinion were sincerity and choice of subjects. A poet must be appreciative of nature and have a responding heart. Carlyle says a true poet does no have to write on subjects which are far away and probably come from the clouds. A truly great poet makes the most of subjects which are familiar to him and close to earth, as Burns did in his poems to the Field Mouse and to The Daisey.

434. A DIARY

I had an early run in the woods before the dew was off the grass. The moss was like velvet and as I ran under the arches of yellow and red leaves I sang for joy, my heart was so bright and the world was so beautiful. I stopped at the end of the walk and saw the sunshine out over the wide "Virginia meadows."

It seemed like going through a dark life or grave into heaven beyond. A very strange and solemn feeling came over me as I stood there, with no sound but the rustle of the pines, no one near me, and the sun so glorious, as for me alone. It seemed as if I felt God as I never did before, and I prayed in my heart that I might keep that happy sense of nearness all my life.

519. DE QUINCY

First: De Quincys mother was a beautiful women and through her De Quincy inhereted much of his genius.

His running away from school enfluenced him much as he roamed through the woods, valleys and his mind became very meditative.

The greatest enfluence of De Quincy's life was the opium habit. If it was not for this habit it is doubtful whether we would now be reading his writings.

His companions during his college course and even before that time were great enfluences. The surroundings of De Quincy were enfluences. Not only De Quincy's habit of opium but other habits which were peculiar to his life.

His marriage to the woman which he did not especially care for.

The many well educated and noteworthy friends of De Quincy.

520. A CHARACTER SKETCH

They were in fact very fine ladies; not deficient in good humour when they were pleased, nor in the power of being agreeable when they chose it, but proud and conceited. They were rather handsome, had been educated in one of the first private seminaries in town, had a fortune of twenty thousand pounds, were in the habit of spending more than they ought, and of associating with people of rank, and were therefore in every respect entitled to think well of themselves, and meanly of others.

534. FLUELLEN

The passages given show the following characteristic of Fluellen: his inclination to brag, his professed knowledge of history, his complaining character, his great patriotism, pride of his leader, admired honesty, revengeful, love of fun and punishment of those who deserve it.

627. A SCENE

I think the sunlight is very beautiful on the water, and when it shines on the water it is very beautiful, and I love to watch it when it is so beautiful. The colors are so pretty and the noise of the water with the sunshine are so attractive in the sunshine I wonder do other people love to watch the water like I do. I don't know as there is anything as lovely as the water waves in the sunlight of the glorious orb.

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