training; what is more, they are not properly appreciated. Not one man in a thousand knows the amount of harm that is done to young children by placing them under the tuition of testy, irritable, explosive, and neurotic teachers. B. A. HINSDALE.

Cleveland, O., Oct. 3.

Objects in Teaching.

THE value of objects in giving correct ideas was brought forcibly to my mind not long since while teaching a class in natural philosophy at the New York State Institution for the Blind, Batavia, N.Y.

It was my custom to place before them, the day before its uses and the principles which it illustrated were to be discussed, a given piece of apparatus, that, by becoming familiar with the form and construction, its application might the more readily be appreciated. One of the class, a young man blind from infancy, with a fondness for machinery of all kinds and a quick perception of the use of such as was placed before him, would frequently study the lesson in advance, picturing to himself as carefully as possible the apparatus described. These pictures, as he told me afterwards, were far from correct.

The thorough examination and understanding of each succeeding object, of whatever kind, add so much to the stock of correct concepts, which is valuable not only for itself, but for its aid by comparison in understanding others.

One of our most successful teachers described to her class, ranging in age from eight to twelve, as vividly as she could without naming it, a ladder. Among other things, she stated that it was made of wood, had parallel sides, etc., using such terms as would seem to be most readily understood, and then asked for the name of the thing described. For some time no one could tell: various things were mentioned, one boy suggesting 'map,' the maps for the blind being cut in relief from wood, with the sides of the frame parallel.

A little girl had for the first time a bird, a stuffed specimen, placed in her hands, and was much surprised to find that it had but two legs, having supposed until then that birds had four.

Whatever may be said for or against object-teaching for seeing children, that of blind children is successful proportionately as it is objective. J. T. MOREY.

Perkins Institution, South Boston, Mass., Oct. 3.

Color-Blindness.

IN the opening article in *Science* last week (Sept. 30) an idea was suggested, or recalled, that may be of value; and I offer it in view of the possible value. I have observed for twenty years or more a difference in the power of my two eyes, at times, to discriminate in light reds when viewed at a distance of fifty feet or more; and I think this difference in the visual power of the two organs depends very largely, if not altogether, on the way in which the eyes are used. If I have been occupied with work that called one eye into active exercise, where the mind was occupied in discussing the surface or object viewed, particularly if the light was variable, then I find persons appear different, according to which eye is used. Not only so, but the two eyes do not focus the same; the image, with the tired eye, being farther off than that from the eye that is rested, and of a dull gray color. If I go to a lecture under such circumstances, there appear to be two lecturers, — one pale and shadowy behind; and above, the other, which seems, perhaps by contrast, to take on a brighter hue. Under such circumstances, I close the tired eye, — as I have come to consider it, — and give it a rest, or go out into the fields and give it a feast on green. Now, may not the eyes of engineers vary as to visual power in the discrimination of colors with excessive use? If both eyes are exhausted and need rest, the individual would not be able to detect his own disability. Now, if that is so, it is of importance to the public that no one should be on duty for a great length of time, where the safety of any depend on the discriminating power of the eyes as to colors.

And would it not be well, in testing eyes, to note the condition of the individual, — whether fresh or tired, just from work or just from rest? GEO. F. WATERS.

Boston, Oct. 3.

Percentage of Ash in Human Bones of Different Ages.

REFERRING to Watt's 'Dictionary of Chemistry,' under the article 'Bone,' we find two tables of analyses of bones, — one by Von Bibra, and the other by Frémy. These two scientists do not arrive at the same conclusion. Von Bibra states that "the portion of inorganic matter in bone is smaller in youth than in age, although no regular gradation can be observed;" while Frémy holds that "the bone of a fœtus was found to yield the same quantity of ash as that of a woman of ninety-seven years of age." Although the actual number of analyses made by these investigators was large, yet simple inspection of their tables will show that very few were made of the same bone in each case; and it is evident that a comparison between a femur on the one hand, and a tibia on the other, could not be trustworthy.

It occurred to me as worth while to supplement their lists; and I here present what may be considered a report of progress in that direction, very much yet remaining to be done.

The extreme difficulty of getting supplied with material the history of which is both certain and satisfactory renders the work exceedingly slow.

The bone for examination was in every instance cut from the dense portion of the shaft of the femur. No subject was taken who had, so far as known, suffered from rickets or other serious bone-disease, and women of recent confinement were also excluded. All specimens were obtained either from living persons (amputations) or those recently dead. After crushing in a steel mortar, extracting with ether, and again crushing, the ash was determined by incineration in a platinum dish. The results are in the appended table.

No.	Sex.	Color.	Nationality.	Occupation.	Died of.	Age in years.	Per Cent of Ash.	Remarks.
1	Speci	men	lost.					
2	Male	White	–	–	Phthisis	65	67.05	
3	"	Negro	–	–	"	21	65.89	Had scrofula
4	"	White	Russian	Sailor	"	23	67.28	Had syphilis
5	"	"	American	Farmer	–	33½	67 63	Amputation
6	Female	"	Irish	Actress	Peritonitis	23	67 66	
7	Male	"		–	Phthisis	60	67 55	
8	Female	"	Irish	–	"	24	68 29	
9	Male	"	–	–	"	57	67 73	
10	"	"	–	–	"	58	67.60	
11	"	"	–	–	"	57	68.82	[bowel-disease
12	Female	Negro	–	–	?	25	68 20	Died of some
13	Male	White	Irish	Laborer	Killed	21	67.73	
14	"	"	English	Brewer	–	31	66 51	Amputation
15	"	"	Irish	–	–	8	64.86	"
16	Female	"	"	Domestic	Phthisis	46	69.67	Married
17	"	"	French	–	Peritonitis	57	67.60	"
18	Male	"	American	Farmer	Old age	81	68.56	
19	Female	"	Irish	–	Apoplexy	60	69.33	Married
20	Male	"	"	Laborer	Bronchitis	74	68 72	
21	Female	"	American	–	Phthisis	44	68 30	Married
22	"	"	Irish	–	"	60	67.93	Insane.
23	Male	"	German	–	?	40	69.28	
24	"	"	"	–	?	53	68.23	
25	"	"	Irish	–	Phthisis	56	68.94	
26	"	"	"	–	Bright's disease	41	68 15	
27	"	"	"	Laborer	Dysentery	48	69.73	
28	Female	"	American	–	Phthisis	29	69 18	
29	"	"	"	–	"	34	69.82	
30	Male	"	Italian	Laborer	Tetanus	29	68.47	Effect of wound
31	Female	"	American	Domestic	Typhus-fever	24	67 99	
32	Male	"	–	–	Nephritis	49	69.35	
33	"	"	–	–	Alcoholism	58	68.69	
34	"	"	Irish	–	–	11	65.87	Amputation
35	"	"	German	–	Phthisis	59	68.93	
36	Female	"	Irish	–	"	29	69.03	
37	Male	"	"	–	Pneumonia	55	69.72	
38	"	Negro	–	–	Phthisis	45	69.06	
39	"	White	German	Brewer	?	40	69.31	
40	"	"	English	Tailor	?	73	69.85	
41	"	"	Irish	Laborer	Killed	38	69.05	
42	"	"	"	None	Phthisis	25	69.36	Drunkard
43	"	"	American	Hostler	Alcoholism	63	68.07	"
44	"	"	English	Coachman	"	43	65.11	Had syphilis
45	"	"	–	Shoemaker	"	45	65.16	Drunkard
46	"	"	–	Lawyer	Old age	70	62.82	
47	Female	"	–	Prostitute	Phthisis	26	65.23	
48	"	"	–	Domestic	"	31	65.61	Bone very brittle
49	Male	"	German	Shoemaker	"	38	63.98	
50	"	"	Irish	Laborer	?	61	63.54	

I think enough has been done to show that the common belief in the increased brittleness of bone with advancing years being due to increased percentage of inorganic salts, is without foundation. The appended table indicates that after manhood is reached, no variation in quantity of ash takes place as the years roll on.

"The greater brittleness of the bones in age is attributed by

Frémy to the increase in the proportion of the spongy tissue, the thickness of the hard and dense portion of the bones continually diminishing as age advances."

This has not been my experience. Transverse sections of the entire bone were made in each case, in order to test this very point, by observing the relative size of dense with spongy portion, and I certainly saw nothing to warrant Frémy's conclusion.

At the same time, small columns $\frac{1}{8} \times \frac{1}{8} \times \frac{3}{4}$ inch were cut from the dense portion of the shaft, and were broken transversely on a testing-machine, in order to determine the amount of brittleness. The most brittle specimen I had (No. 48), showed a rather thicker dense portion than usual.

I find the brittleness to be in the material rather than in the bone as a structure, and, in view of the analytical results, I cannot explain that brittleness, as Von Bibra does, by holding for the gradual increase in mineral salts.

I append a very imperfect table of the results obtained on the testing-machine. Every bone, as I received it, could not be cut so as to give a column of the size required for breaking. It will be noticed, that, in general, strength of bone diminishes as age advances.

BREAKING-WEIGHT FOR COLUMN OF BONE $\frac{1}{8} \times \frac{1}{8} \times \frac{3}{4}$ INCH, BROKEN TRANSVERSELY.

	Pounds.
25 years of age	75
26 " "	74
31 " "	50
38 " "	64
43 " "	58
45 " "	60
61 " "	55
63 " "	30
70 " "	54

Loss of material by the burning of the laboratory affected, in a measure, the completeness of the work.

WILLIAM P. MASON.

Rensselaer Polytechnic Institute,
Troy, N.Y., July 21.

Evidence of a Glacier-like Movement amongst Snow Particles.

IT has been conclusively proved that glaciers have a movement corresponding in every way, except in amount, with that of water similarly situated. I wish here to point out that snow particles, under certain corresponding conditions, have the same movement but of greater amount.

It appears to me that it would be difficult to draw a line with certainty between those solids whose particles are capable of such movements, and those which are not. I will admit that it were easy to point out this limit for solids that would show sensible movement in limited time; but to do so for solids under unlimited time and large pressure might not be so easy or possible. It seems unlikely that the few solids we have evidence of should be the only ones possessing these movements, particularly when viewed in the light of the fact that so many solids, after being transformed from the molten to their solid condition, exhibit the effects of a movement amongst their particles in longer or shorter periods after their change of condition. It is not, however, with a consideration of this limit that we have to do at present.

In Hudson Strait we had banked around the foundation of our house-walls with moss and rocks, so as to protect ourselves against the weather. This bank had a slope inwards towards the walls from the base. When snow remained permanently on the ground, we made use of it to build up an outside wall, two feet thick and eight high, over this bank, as a further protection against the weather.

Snow, it may be necessary for me to explain, exists, in northern climates, under somewhat different conditions from that in which we are accustomed to see it; so that, very shortly after it has fallen, extreme temperatures and high winds so alter it, that, whilst essentially granular snow, it has become so hard that it requires an iron (not a wooden) shovel to cut it, when, with sufficient care, blocks of unlimited size can be hewn out of it and transported. The particles are now arranged in a high degree of tension; so much so, that, when a block is struck a blow, it gives out a sound such as could be compared with that given out by a brick tile. It was with snow in this condition that our protecting walls were built. My attention was first called to a movement of the snow by noticing that the snow walls were leaving the building, as I at first supposed, by a 'topping' movement: I therefore built relatively heavy buttresses of snow to retain them, and then found that buttress and wall had partaken of this movement, which was of course lessened, as the buttresses had been built on comparatively level ground. In addition to this, the arches which we had made over the windows out of blocks of snow, of about a foot square and four to five feet long, had, of their own weight, passed from the arch through the straight line into very pendant inverted arches, having left a space on top of the wall between the snow blocks on either side, and become considerably attenuated on account of the increased distance covered, and at the same time remained cemented to the layer next below in the wall. W. A. ASHE.

The Observatory, Quebec, Sept. 26.

Grindelia glutinosa in Wisconsin.

THE note in *Science* of Sept. 23, on *Grindelia squarrosa*, reminds me of a curious fact concerning another species of *Grindelia*. Last July I found in the Menomonee valley, near the slaughter-houses west of the city of Milwaukee, a composite plant which I could not find in the list of Wisconsin plants published in the first volume of the 'Geology of Wisconsin.' The plant coincided completely with the description of *Grindelia glutinosa Dunal* in Gray's 'Flora of North America' (*Gamopetalæ*, p. 119). I found only one specimen, apparently in perfect health, growing on the Chicago, Milwaukee, and St. Paul Railroad track. Gray states that the species ranges along "the shore of California from Humboldt County and San Francisco to Santa Barbara Islands." The seed of this specimen must have been brought to eastern Wisconsin by one of the many trains which pass through the Menomonee valley to Milwaukee. It is certainly remarkable that two species of a genus not before represented in Illinois and Wisconsin should have migrated so far to the east of their original habitat, and should have both appeared in the same summer in both States.

W. M. WHEELER.

Milwaukee, Sept. 26.

Sections of Fossils.

HAVING lately had occasion to consult a paper published by the Geological and Natural History Survey of Canada, entitled 'Contributions to the Micro-Paleontology of the Cambro-Silurian Rocks of Canada,' by Mr. Arthur H. Foord, I wish to call attention to the method there pursued.

Having devoted considerable time to the monticuliporoid corals of the Cincinnati group, I have come to the conclusion that magnified views of the internal structure of these fossils are of little use in the determination of species. The paper in question deals entirely with these internal features. Several plates are given in illustration of new species, and, out of 67 figures of 12 species, 23 are of natural size. Many of these are very poor, and would be of little value in the determination of species. And as now more stress is laid upon the figure than the description, it follows that some of the species would be unrecognizable from either the one or the other. Thin sections to show the interior cannot be made without considerable skill, much labor, and time; and I think I am prepared to show, in a paper now in press, that even when made the features they show under the microscope are of no value whatever as specific characters.

JOSEPH F. JAMES.

Miami University, Oxford, O., Sept. 27.

American Caves.

IN the October *Scribner*, Professor Shaler states that the reason caves were not used as much in North America as in Europe, was, "the first peoples of this country had already attained an advancement in the arts which enabled them to make shelters," etc. This is not true. The first peoples of America were as rude as any in other continents; and the typical cave-dwellers of Europe were not any more primitive than Eskimos of recent date. It is much to be regretted that so erroneous an idea of ancient man in America should be set forth in a popular magazine. CHAS. C. ABBOTT.

Trenton, N.J., Oct. 1.