Correspondence.

Many-storied Birds' Nests.

To the Editor of the Scientific American:

As some discussion arose, a short time since, in the columns of the SCIENTIFIC AMERICAN. relative to the many-storied nests of the summer yellowbird, it might be of interest to your readers to mention that during the present season a friend of mine found a nest of that species composed of *five* stories, each of which, except the top one, contained a cow-bird's egg. The fifth story was not quite completed when the nest was taken, but the egg of the intruder was already more than half buried in the new structure.

W. L. SCOTT,
Librarian, Ottawa Field Naturalists' Club.
Ottawa, July 24, 1882.

Auroral Phenomena.

To the Editor of the Scientific American:

Last night, August 4, a remarkable, and, to me, unusual appearance of the aurora borealis presented itself. About ten o'clock there appeared in the northwest a single streamer, running from the horizon toward the zenith. At first sight I pronounced it a comet. For a short time it did not seem to vary perceptibly either in position or brilliancy, but a slow motion westward was soon observed, the streamer meanwhile maintaining a position parallel to itself. When first seen it was nearly parallel to Chi and Psi Ursæ Majoris, and pointed directly to Eta of the same constellation. Its length was about twenty degrees, estimating from a bank of clouds eight or ten degrees above the horizon. As it moved westward it gradually lost its brilliancy, and at the time of its disappearance was pointing to Cor Caroli. With the exception of some light in the north-northeast, I could see no other evidences of the aurora.

On the 16th July last, at Lake Kampeska, near Watertown, D. T., a very beautiful but not unusual aurora was seen. The arch of cloud on the northern horizon was well defined, and was seen to great advantage in that prairie region, where the horizon is like that seen at sea. There was hardly any noticeable variation in the color of the streamers, and the only peculiarity which struck me as unusual was the rolling of the luminous undulation—if we may so call them—parallel with the beams and from east to west This wave-like appearance is often seen rolling upward from the horizon toward the vanishing point of the beams.

T. A. WYLIE.
Bloomington, Ind., August, 1882.

How to See the Attitudes of Animals in Motion.

To the Editor of the Scientific American:

While the attention of the public as well as of scientific men is being called in your valuable papers to the curiosities of the motions of running animals, it may interest many to know how easily we may test the accuracy of instantaneous photographs for ourselves. Like many others, I have been experimenting in photography, and I devised a kind of quick moving shutter, which I could operate with my fingers by moving a lever outside the tube. It occurred to me to look at animals in motion by merely putting the tube to my eye without any lens and operate the shutter. Immediately I had before me a series of instantaneous views without the costly appliances, and at will I could verify the strange attitudes set before us by the photographs of Muybridge.

One who has not tried it will be surprised and pleased at the perfection and instantaneous character of the sights he will get of a moving object. It takes but a very short "exposure" to make the picture on our eye complete. The moving object is caught and shown to us just as it happens for the instant to be. Any device for opening the field of view quickly will answer, and in this way artists and scientific men can study the curious attitudes which any animal presents, and may reconsider, as Muybridge and others are doing, the conventional methods of representing a moving animal.

Since making the above-mentioned observation I have noticed an account of the same by a writer in *Nature*, but I believe my experiment was first.

S. H. BRACKETT,
Teacher Natural Science.
St. Johnsbury, Vt., August, 1882.

Lake Superior Iron Mines.

The fact that most of the Lake Superior iron mining companies are close corporations which do not publish returns of their income, and do not seek the aid of the general public, fully explains how little is really known of their success as business ventures. It is understood, in a general way, that while the cost of mining and delivering to market is low, the prices realized are high, and it is inferred that the profits must be large. We have been able to gather a few figures, which may serve to afford a clearer insight into the operations of these companies, which nature and circumstances have wonderfully favored.

Last year, the output of the mines of the old Marquette and the new Menominee region together was 2,321,315 gross tons, valued at $18,834,923. It is estimated, by good authority, that, besides paying for a vast amount of prospecting work, and laying aside heavy surplus funds, these mines paid in all about eight millions of dollars in dividends. We may quote the following: The Republic, with a capital of 100,000 shares, at $25 each, paid $10 per share, and is now quoted at $65. In 1872, the stock was in vain offered at $12.50. The Lake Superior, having 60,000 shares of $25 each, returned to its owners $13 per share, and is now selling at $75. The Chapin earned probably as much as $30 per share, and declared $25 per share on 20,000 $25 shares. The Cleveland distributed a like amount. Six years ago, shares in the Champion mine were obtainable at $6. Now $150 is offered in vain, the dividends last year having been $30 for every one of the 20,000 shares. The Lake Superior, which was in debt to the extent of $1,500,000 at the close of the panic, paid from 1873 to 1877 $13.50 per share, besides wiping out its indebtedness and accumulating a surplus. The Menominee Mining Company, which started only a few years ago with 4,000 shares, having a par value of $25, earned $1,500,000, and sold four of its mines, the Norway, Vulcan, Quinnesec, and Cyclops, to the Cambria Iron Company for the sum of $1,800,000 cash, for the proceeds of the present year, and a further royalty of fifty cents per ton. It refused an offer of $3,000,000 for its principal mine, the Chapin. These figures would seem incredible were they not fully borne out by the data of cost and selling price of ore. The maximum cost of mining, delivered in cars, including general expenses and the cost of exploration work, is not more than $1.75, while it does go as low as twenty-five cents in some open cut mines, where the cars can be run directly to the face of the cut. It is probably safe to say that the average cost does not much exceed $1 per ton. Most of the mines pay in addition a royalty of fifty cents per ton, and from sixty cents to $1.25 for rail freights to shipping points. The lake freights range from $1.10 to $1.35, so that the total average cost is, delivered at Cleveland, $3.75 to $4. Current quotations at Cleveland, which are, if anything, lower than the average, are, for Marquette ores, first-class hard Bessemer, $10 to $10.50; for second-class hard, $8.50; for first-class soft, $8.50; for second-class soft, $6.50; for high phosphorus hard, $6.25; and for high phosphorus soft, $5.25. For Menominee County ores, the following prices are obtained: For first-class Bessemer, $8.65; for high phosphorus hard, $6 to $6.25; and for high phosphorus, low grade, $5.25. Although the accepted limit for phosphorus in Bessemer ores is 0·1 per cent, buyers of Lake Superior ores rarely take them unless they run about one thousandth of one per cent for each per cent of metallic iron. Thus, a 60 per cent ore would not be taken if it ran higher than 0·060 per cent of phosphorus. It is impossible, in the absence of more than general information as to the relative quantities of the different grades of ores, to average the price realized. Taking it low, or at $7, it will be seen how handsome a profit the mining companies realize. Past experience, even in the dullest of times, has taught that, with the shipping, transportation, and marketing facilities then available, the mines producing the better grades have done well. With the enormous development of our Bessemer steel industry, particularly in the West, an outlet for this class of ores in much increased quantity is offered. It is not expected that the introduction of the basic process will impair the value of these mines, as for many years to come the new process has an enormous field in a direction not conflicting with the interests with which the Lake Superior iron mines are closely allied. Indeed, there are indications that a supply of suitable raw material might be obtained from the same region, and the occurrence of high phosphorus ores, running low in sulphur, and containing a small quantity of manganese, might prove of considerable advantage to smelters of basic pig.

During the last season prospecting has disclosed many promising mines, most of which are this year entering the list of producers. The old ones have, with the aid of the diamond drill, examined their ground thoroughly, and the great majority of them have ore in sight for many years to come. The managers of the mines are conspicuous for the energy with which they have adopted modern appliances, power drills, and high explosives, where needed, and long experience has taught them how to follow out the irregular deposits of some of the districts. The mines are, as a rule, in the hands of individuals and corporations whose business management is conservative, and who have persistently avoided appealing to the speculative public. The history of iron mining on Lake Superior, while it has its list of failures and reverses, has been singularly free from wild-cat schemes. The only deliberate swindle ever attempted turned out less disastrous to outsiders than those who concocted it themselves dreamed of, careful exploration having shown the presence of ore deposits where they were not suspected.—*Engineering and Mining Journal.*

Artificial Wood Ornaments.

Varied and partial success has, in the past, attended the production of embossed wood for furniture decoration and ornamentation. But wood, however thin, does not lend itself to the die as metals do, and the fiber on which its strength depends is more or less fractured in the operation. For this and other reasons it may not be superfluous for us to describe an entirely different process in use by B. Harrass, in Boehlen, in which an artificial wood is used.

The crude mass from which the articles are pressed consists chiefly of cellulose mixed with any sort of starch. The ordinary commercial cellulose, which is to be had in any quantity in the form of paper, is softened in water and thoroughly disintegrated. It is then put in a fine meshed sieve and the water drained off. It is then mixed with about 3 parts (by weight) of dry starch, made from wheat, rye, potatoes, Indian corn, etc., as well as 2 parts of rye or wheat flour, or corn meal, or any other flour that contains gluten, and very intimately mixed.

This mixture of cellulose, starch, and flour, is put in a suitable receptacle, pipes made of thin sheet metal are the best, and heated on a water bath for an hour. The tubes are then taken out and cooled to ordinary temperature. This cooking has converted the mass into a fibrous, tenaceous, glutinous substance, which is intimately mixed with an equal quantity of sawdust (or turnings). The stuff is then rolled out into sheets and dried in the air or in warm stoves, when they are ready to use.

The dies in which the mass is pressed are of iron, steel, or red brass, which are heated to 120° C. (248° Fahr.), and subjected to a pressure of 700 kilos per square centimeter (nearly 1,000 lb. per square inch). The stuff then becomes gummy, and fills out every corner of the mould fully. The article is at once removed from the mould while hot, and when cold very much resembles wood, being both hard and elastic, and in time gets as hard as bone. These articles can be worked and treated like wood; can be sawed, planed, and filed; dyed, polished, and glued.

Large articles can be veneered on the outside with natural veneer in this way. The mould is prepared and heated, and then from one to four strips of thin veneer, which have been previously coated on one side with glue or rosin and dried again, are put in the mould, according to its depth. This is covered with a layer of the dry and pulverized mass, from 2 to 20 millimeters thick, according to the depth. Thin and flat articles, like key-escutcheons, buttons, rilievos, etc., can be finished by once pressing, whereby the veneer becomes so firmly attached and united to the mass beneath, that it cannot be removed without destroying the article. In those having a high relief, and such as are hollow, the article is only partially formed by the first pressing, after which the press is opened again, and the reverse or cover, to which it almost always adheres, is taken off. If there are any spots not completely covered with veneer, a new strip is laid on after moistening the glue side. It is then covered with one large piece of dry veneer that covers the whole, and then put back in the press and the full pressure applied. On opening the press the article is taken out of the hot form finished.

To prevent the articles from drawing or warping after they are done, white pipe clay is added to the dry mass, and this also makes it more plastic, so it fits into the depressions better.

The artificial wood can also be directly veneered without using the pulverized material described, by placing the veneer that is glued on one side on the previously shaped or roughly pressed article, and then pressing it with the full force. Such articles are, however, more liable to warp.

To the pulverized and dried wood stuff there is added a small percentage of a binding material like dextrine, or albumen, or roasted and ground blood, and thus a strong connection is formed between the veneer and the pulverized wood mass, as well as between the latter and the artificial wood beneath. A good, dry, pulverulent mass for this purpose is obtained by mixing from 2 to 10 liters of pure cellulose (paper), with 6 to 30 liters of sawdust, 1 to 5 liters of dry dextrine in powder, or blood, albumen, rosin, etc., 1 to 5 liters of flour, and from ½ to 2 liters of pipeclay. To produce the color necessary for pressing it with the veneer, a small quantity of the dry color in fine powder is mixed with the powdered material.

Instead of pressing with the use of veneer as already described, *i. e.*, of putting the prepared veneer in the hot dye, then putting the dry cellulose on it in a powder, and then pressing it so that the real core of the article is of this mass, a saving of the latter is effected by using a large block of wood of proper shape, or by pressing in chips and small waste pieces of wood. This not only saves a good deal of material, but also gets rid of worthless bits of wood, and makes them valuable. For making very heavy articles, such as paper weights, pieces of metal could be pressed in as backing instead of blocks of wood.

A Cheap Ice Box.

With all the recent improvements in family refrigerators the price is still such as to be an item of considerable consequence to those of limited means. To dwellers in city houses, especially in "flats," the space they occupy is of more importance than their cost In some of these apartments they are supplied, built in the walls, while in others they are absent, so that the tenant who has none dislikes to buy, hoping that his next move will bring him one. In such a case the stationary wash tub is often brought into requisition for six days out of seven. To convert this into a refrigerator, plug not only the outlet but also the overflow, so that no sewer gas can enter. Then purchase a common japanned tin box such as are marked "bread" and sell for 50 or 75 cents. With a nail punch a few holes in the bottom, and put it in the stationary tub, letting it rest on blocks of kindling wood. In such a box 20 pounds of ice with the food for a family of five or six can be placed with ease. The ice does not melt faster than in a $10 ice box, and the water drains out into the tub as fast as it melts, and can be removed once a day by simply drawing the plug. Those who are using the device speak very highly of it, and it is not patented.