The material as received is in the form of (1) nodular, somewhat rounded masses, the largest perhaps the size of a goose egg; (2) in elongated cylindrical forms sometimes incompletely perforated, longitudinally, and (3) as rounded grains forming one of the constituents of a loosely coherent, silicious sandstone. The material is of a grayish color on the outer surface, indicating oxidation, but interiorly it has all the characteristics of genuine beeswax, both as regards physical conditions, color, smell, fusing point, and conduct towards chemical reagents.

In the letter accompanying, the wax is said to be found in masses of all sizes up to 250 pounds weight; that it occurs imbedded in the sand, being found while digging clams at low tide, and at a depth of 20 feet below the surface when digging wells. The material has been traced for a distance of 30 miles up the river.

Tradition has it that many hundred years ago a foreign vessel, (some say a Chinese junk) laden with wax, was wrecked off this coast. This at first thought seems plausible, but aside from the difficulty of accounting for the presence in these waters and at that date, of a vessel loaded with wax, it seems scarcely credible that the material could have been brought, in a single cargo, in such quantities, nor buried so deeply over so large an area. In a fragment of the sandstone above alluded to, the wax occurs in disseminated grains less than half the size of a pin's head and in such abundance that when ignited the stone falls away to a loose gray silicious sand. My correspondent states that the material has been mined by the whites for ever 20 years, but not to any great extent excepting the last 8 or 10 years, during which time many hundred tons have been shipped to San Francisco and Portland, and sold at the rate of 18 cents per pound.

Concerning the accuracy of the account as above given the present writer knows nothing. It is here given in the hope of gaining more information on the subject.

GEORGE P. MERRILL.

U. S. National Museum, Washington, D.C., June 9.

Books for Children.

WILL some specialists in natural history recommend some really satisfactory cheap books suitable for the guidance of children, ten years of age, in their rambles through the fields and woods? Most of the cheap books that I have seen do not give the necessary details for identifying specimens, and yet the naming of what is seen or collected is necessary for arousing enthusiasm in studying the forms of life. Some of the topics which I am inquiring about are as follows:—

The naming of free birds from their size, plumage, song, and habits; and the place and manner of constructing nests and habits of nesting. The naming of trees and shrubs from their bark and leaves. The naming of weeds and flowers found growing wild in the east-central part of the United States. The naming of land-snails, beetles, butterflies, and moths, and their habits.

Perhaps the Agassiz associations have made out lists of the specimens to be found in the various regions of the United States. If this has been done, I have not happened to see any notice of it.

In this connection, I wish to mention the work done by my own teacher in a suburban school at Cincinnati more than twenty years ago. The superintendent of the school, Mr. A. G. Weatherby, afterwards a professor in the Cincinnati University, was an indefatigable collector in various departments of natural history, and his enthusiasm was communicated to his pupils so strongly that there was hardly a boy in his school-room who had not a collection of local moths, land-snail shells, and fresh-water clam-shells. We had them all properly prepared and Mr. Weatherby named them for us; but we learned the localities in which different species were to be found through the broad experience of our teacher, and not from books. In fact, although many of our class of boys had almost complete sets of local snail-shells, and all named, yet I doubt if any of us ever looked into a work on conchology. I do not know whether any of Mr. Weatherby's early pupils have since become professional naturalists, as a result of his teachings, but I do know that the collecting excursions made under his direction were most beneficial as a means of sharpening our powers of observation, and added immensely to the happiness of boyhood.

I am sure that many readers of *Science* will be glad to get information such as I have asked for, as very few parents are able to help their children in classifying and naming the "finds" that they are continually bringing in from the fields.

FRANK WALDO.

Princeton, N.J., June 5.

Worms in the Brain of a Bird.

IN your issue of June 2 is a communication "Relative to Worms in the Brain of a Bird."

Your correspondent will find, by consulting "Fresh-Water Shell Mounds of the St. John's River, Florida," by Professor Jeffries Wyman, page 7, foot-note, an account of a parasitical worm commonly found in the brain of the "snake bird," or water turkey.

CLARENCE B. MOORE.

Philadelphia, June 6.

Note on a Supposed New Endogenous Tree from the Carboniferous.

IN the May number of the *American Geologist* (Vol. XI., 1893, pp. 285, 286, Pl. VI.) I find a short paper by Mr. H. Herzer on "A New Tree from the Carboniferous Rocks of Monroe County, Ohio," in which he describes, under the name of *Winchellina fascina*, a new genus and species. The discovery of a new genus of plants in the Carboniferous, a formation of which the flora is now so very well known, is of itself of considerable interest, but when we learn that it was an endogenous tree the interest deepens, and the discovery, if true, would be the most important addition to our knowledge of the ancestors of this great group of plants that has been made in many years.

The Carboniferous has been called the age of ferns, from the great abundance and high state of development enjoyed by this class of plants in this part of the Paleozoic system. Several supposed endogens have been reported from the Paleozoic, but they have sooner or later been shown to belong to other vegetable classes, and at the present time there is not a single form accepted by paleobotanists as belonging to this age. In fact it is not until well up into the Mesozoic that undoubted endogens made their appearance. This is, of course, negative evidence, but it is so strong that it requires the most positive and convincing evidence to prove their earlier ancestry.

The literature relating to the internal structure of plants of the Paleozoic is now very extensive, and from a careful study of this it appears almost beyond question that the supposed new endogenous tree is a fern-stem of a well-known type. I have not seen the original trunk or sections cut from it, but, judging from the somewhat imperfect description and figures, it is impossible to see any differences of importance between *Winchellina fascina* and *Psaronius cottæ* corda[1] from the Permian of Saxony. It also approaches very closely to *Tubiculites* (*Psaronius*) *relaxato-maximus*[2] Grand'Eury, a fern-stem from the Carboniferous of central France. The cell-bundles described by Mr. Herzer are quite unlike those of any monocotyledon with which I am familiar, but agree well with those described for fern-stems from the older rocks. The reference of this plant to the ferns is also quite in accord with facts that have long been known, for Dr. Newberry recorded the genus *Psaronius* as occurring "in great abundance" in the Carboniferous rocks of Ohio more than forty years ago.[3]

The genus *Psaronius* is a somewhat comprehensive one, and a number of more or less satisfactory genera have recently been separated out of it by Williamson, Renault, Zeiller and others, and it is possible that when the fossil under discussion is more

[1] Stenzel, Ueber die Staarsteine, Jena 1854, p. 867, Pl. xxxv., Fig. 1.

[2] Flore Carbonifère du Dépt. de la Loire. Mem. l'Acad. d. Sci., xxiv., 1877, p. 102, Pl. x., Figs. 3, 4.

[3] Annals of Science, No. 8, Feb. 1, 1853, p. 97.

thoroughly studied it will be found to belong to one of these recently differentiated genera. F. H. KNOWLTON.

U. S. National Museum, Washington, D. C.

Mean Values.

MISS PORTER'S kindly criticism (*Science*, June 2) of one point in the article, "Sun-Heat and Orbital Eccentricity" (*Science*, Apr. 28), gives occasion to say a work in regard to mean values. Since the mean value of n quantities is the arithmetic mean of their sum, it would appear at first glance as if the term were a perfectly definite one; but if the quantities to be averaged are successive values of a function of some variable, then clearly their magnitudes depend not only on the nature of the function, but also on the law of variation of the fundamental. Thus, suppose we have the isotherm, $pv = c$, and wish to know the average pressure between the volumes $v = v_1$ and $v = v_2$. It is necessary to make some assumption in regard to the variation of v. If its increments are supposed equal, we understand by the "mean value" of the pressure the average of the pressures corresponding to the values of v. If the volume is assumed to depend in turn on some other variable in such a manner that the abscissa-increments are not equal, the mean value will now be the average of the new series of pressure-ordinates corresponding to the series of values of v arising under the second assumption. Evidently these two means will in general be unequal, but one is just as properly the "real average" as the other. The formula for mean value may be derived by a method even simpler than the usual analytical one as given by Williamson and Todhunter. Let it be required to find the mean value of y where $y = f(x)$ and x is an equicrescent variable. If $y = f(x)$ be treated as a curve referred to rectangular axes, $\int_a^b f(x)\,dx$ is the expression for the area, A, bounded by the X-axis, two ordinates, and the portion of the curve intercepted between the bounding ordinates. Let $A = A'$, where A' is a rectangle whose base equals the base of A. Then the altitude of A' is the average of the ordinates in A. For let

$$\frac{y_1 + y_2 + \ldots\ldots y_n}{n} = y_0,$$

the average of the series of ordinates.

Then $y_1 + y_2 + \ldots\ldots = y_0 + y_0 + \ldots\ldots$ on to n terms.

Multiplying by $\triangle x$ and summing,

$$\Sigma\,(y_1 + y_2 + \ldots.)\,\triangle x = \Sigma\,(y_0 + y_0 + \ldots.)\,\triangle x;$$

or, making n indefinitely large,

$$\int_a^b y\,dx = y_0 \int_a^b dx = y_0\,(b - a).$$

But $$\int_a^b y\,dx = A, \text{ hence } y_0\,(b - a) = A',$$

and, since $b - a$ is the base of the rectangle, A', y_0 is it saltitude.

For example, let it be required to find the mean pressure between the volumes v_1 and v_2. If the isotherm is $pv = c$, the area, A, in this case becomes

$$\int_{v_1}^{v_2} \frac{c}{v}\,dv = c \log\left(\frac{v_2}{v_1}\right);$$

its base is $v_2 - v_1$, hence the mean pressure is

$$\frac{c}{v_2 - v_1} \log\left(\frac{v_2}{v_1}\right).$$

This conception of mean values may be readily employed when a curve is expressed in polar coördinates. If $r = f(\theta)$, let x be written for θ and y for r. The Cartesian equation thus arising furnishes a curve which sustains peculiar relations to the original polar curve. The radii-vectores are taken out of their fan-shaped arrangement and placed equi-distant and parallel, with their extremities on the comon line, the X-axis. The pole may be viewed as having developed into this axis, whilst a circle of unit radius with pole as centre has developed into a straight line parallel to the axis, the radii-vectores keeping their normal position with respect to the circle. In finding the mean value of the radius-vector of an ellipse, $d\,\theta$ being constant, the figure A has three rectilinear sides: $x = 0$, $x = \pi$, and the X-axis. Its fourth side is the curve,

$$y = \frac{a\,(1 - e^2)}{1 + e \cos x}.$$

The base of the figure is π; hence the mean value is

$$\frac{1}{\pi}\int_0^\pi \frac{a\,(1 - e^2)}{1 + e \cos x}\,dx = a\,\sqrt{1 - e^2}.$$

It will be seen that the area-method serves only when the ordinates are equally distributed throughout the area A. In the dynamical problem of the earth's mean distance from the sun it is not θ (or x) which is the equicrescent variable, but t, the time. A must therefore be taken equal to

$$\int_{t_1}^{t_2} r\,dt,$$

for which $r = f(t)$ must be given; but, as is well known, the equation expressing the relation between r and t is transcendental and cannot be written in the form $r = f(t)$. Recourse must therefore be had to other devices for finding the mean distance when the problem is rendered kinematical by taking Kepler's second law into account. ELLEN HAYES.

Wellesley, Mass.

Iron and Aluminium in Bone Black.

WILL you kindly, in your next issue, print the following corrections to my article on "Iron and Aluminium in Bone Black," which has just reached me.

Page 300, first column. In twentieth line (from the bottom of page), after the word "permanent," insert, *and boil*. In nineteenth line (from bottom of page) remove the first two words: "and boil."

In twelfth line (from bottom of page) insert a decimal point between 5 and 0 at end of this line, for the figure must read 5.0 and not 50 grammes.

Page 301, first column. In twentieth line (from bottom of page) transpose after "iron." Instead of "aluminium, or the phosphate" then should stand: or the aluminium phosphate predominates.

J. G. WIECHMANN.

New York, June 7.

Estimated Distance of Phantoms.

IN *Science* of May 19, p. 269, Mr. Bostwick mentions the familiar experiment of binocular combination of regular patterns, such as a tessellated pavement or figured wall-paper, by means of ocular convergence, and states that in his case, although the figures of the phantom thus formed appear smaller, yet contrary to the statements of all other writers they do not appear nearer but farther off than the real object. This seems to me inexplicable if the phantom is really distinct.

As I have very unusual facility in making such binocular combinations, I will very briefly describe an experiment of this kind. I stand now looking down on the tesselated oil-cloth covering the floor of the library. By ocular convergence I slide the two images of the floor over one another in such wise as to combine contiguous figures. After perhaps a brief interval of indistinctness, the pattern appears with perfect clearness at half the distance of the floor and the figures of the pattern of half the real size. The sense of reality is just as perfect as in the case of a real floor at that distance. It seems to me as if I could rap it with my knuckle. Taking now this phantom as a real object, by greater convergence the plane can be brought up higher and higher, until by extreme convergence it is brought within three inches of the root of the nose and seen there with the greatest distinctness in exquisite miniature, the figures being only one-quarter inch in diameter. By relaxing the convergence a little, the phantom-plane may be dropped and caught on lower and