

Again, such blades, measuring usually five or six inches in length, by two in width, are not the only objects found buried in large numbers. Small leaf-shaped knives are found, often as many as one hundred together; arrow-points of various patterns have been unearthed, as well as grooved axes, celts, notched-pebbles or net sinkers, and even "ceremonial objects." Certainly not one of these can be called "unfinished." It is confusing to call any one form of stone weapon or tool a "cache implement." It would be just as logical to call the specimen hoarded in treasury vaults something different from the coin in circulation.

If, to return to the large blades, they cannot come under the category of unfinished objects, does this not strike a blow at the cunning inferences drawn from recent studies of quarries, where the Indian gathered his material for implement making? The various grades supposed to lead from the raw material to the finished product is a lovely picture as drawn by pen and pencil, but in truth fails to be reproduced in nature. It is but a fancy landscape, the like of which the sun never shone upon. A picture that is so seductive as to convince the unwary, but in truth befools the onlooker; a picture that makes essay writing a pleasant pastime, but —?

The pre-history of man in the Delaware Valley is not to be read by calling large stone blades unfinished, and the ruder forms scattered in the gravel the refuse arising in manufacturing the former. If this were true, there would be less of a problem to solve, but even then there would be as many difficulties in the way of accepting the Indian's modernity and in denying the palæolithicity of such objects as have that import in other countries.

When Holmes shall drive the fog away
That now enwraps the scene,
And in the light of later day
He stands with smile serene,
And points to how in modern time
The red man came equipped
With every blessing of the clime,
From elsewhere newly shipped;
We can but hope he'll name the date
When first upon the strand
This red man stood with heart elate,
And where he chanced to land.
Then, noble efforts nobly made,
Before he seeks a rest
Point out how far is *truth* displayed,
And just how far he guessed.

CHARLES C. ABBOTT, M.D.

Museum of American Archaeology, University of Pennsylvania, Philadelphia.

The Largest Trees in the World.

A RECENT article in *Science* (No. 523, Feb. 10, 1893, p. 76) repeats the old idea, which has been frequently refuted, that the *Sequoia gigantea*, or Big Tree of California is the largest tree known. It has been shown many times that these trees are surpassed in both height and girth by the gum trees of Australasia. A large number of species are known, and many of them are mentioned in Baron von Mueller's "Extra Tropical Plants," recently reviewed in these columns. An extract from this book will be of interest as giving the dimensions of some of these immense trees. Of *Eucalyptus amygdalina* it is said:—

"In sheltered, springy, forest-glens attaining exceptionally to a height of over 400 feet, there forming a smooth stem and broad leaves, producing also seedlings of a foliage different from the ordinary form of *E. amygdalina*, which occurs in more open country, and has small narrow leaves and a rough brownish bark. The former species or variety, which has been called *Eucalyptus regnans*, represents probably the loftiest tree on the globe. Mr. J. Rollo of Yarragon measured a tree which was 410 feet high. Another tree in the Cape Otway ranges was found to be 415 feet high and 15 feet in diameter where cut in felling, at a considerable height above the ground. Another tree measured 69 feet in circumference at the base of the stem; at 12 feet from the ground it had a diameter of 14 feet; at 78 feet a diameter of 9 feet; at 144 feet a diameter of 8 feet, and at 210

feet a diameter of 5 feet. [Thus, at a height in the air exceeding the height of almost every North American forest tree, this specimen had a diameter equal to most of our largest forest trees at the ground.] Other trees are known with a stem-circumference of 66 feet at 5 feet from the ground. Prof. Wilson and Colonel Ellery obtained at Mount Sabine a measurement of 21 feet 8 inches in diameter of a stem, where cut, the length being 380 feet. Colonel Ellery had repeatedly reports of trees seven axe-handles in diameter, and he met a tree on Mount Disappointment with a stem diameter of 33 feet at about 4 feet from the ground." Other species also attain enormous size. *Eucalyptus diversicolor* is known to grow 400 feet high, and trees have been measured 300 feet long without a branch! Boards 12 feet wide can frequently be obtained. *E. globulus* grows 300 feet high and furnishes ship keels 120 feet long. *E. obliqua* also attains 300 feet in height and 10 feet in diameter. A note in a recent number of *Garden and Forest* mentions a tree in Victoria 471 feet in height.

The colossal size of the trees of this genus is not the only peculiar feature they possess. Some are of exceedingly rapid growth, and are at the same time very durable. *Eucalyptus amygdalina*, for example, grew to a height of 50 feet in 8 years in the south of France. *E. citriodora* grew 20 feet high in 2 years in a district subject to protracted drought; and a trunk 40 feet long and 20 inches in diameter only broke after a flexion of 17 inches, under a pressure of 49 tons. *E. corymbosa* is very durable, fence posts that had been in the ground for 40 years showing hardly any decay. *E. globulus* grew 60 feet high in 11 years in California, and in Florida 40 feet in 4 years, with a stem a foot in diameter. The writer has seen trees in California, two years after planting the seed, 20 feet high; and the wood, although easily cut when green, becomes almost as hard as iron when dry. In Guatemala it grew 120 feet in 12 years and had a stem diameter of 9 feet. Railway sleepers made of *E. leucocorylon* were quite sound after being laid 24 years. Piles driven for a whaling jetty in 1834 were taken out in 1877 perfectly sound, although the water swarmed with *Teredo*. This was *E. marginata*. Still more remarkable is the fact that some species withstand excessive heat and also a considerable cold. *E. microtheca*, for example, resists a temperature of 18° F. in France and 154° F. in central Australia. Besides serving as a timber tree, many species of *Eucalyptus* are used medicinally, producing a volatile oil very useful in treating various infectious diseases, like scarlet fever, especially when applied externally. Grown in malarious districts, they possess the power of purifying the air. Altogether, the genus may be classed as one of the most remarkable in the whole world.

JOSEPH F. JAMES, M.Sc.

Washington, D.C., Feb. 24.

Fern Frost.

AT Greensburg, Indiana, on the morning of Jan. 24, the trees and fences were fringed with a beautiful feathery frost. It was really a snow frost, but the flakes or aggregations of crystals were fern-shaped instead of star-shaped. Every branch of a tree or wire of a fence bore a line of snow-frost on its south side, making a downy fringe of one-half inch, or more, in length. A weeping willow tree and a fence of wire-netting were most striking in this decoration.

The barometer was 30.15; temperature, 16; moisture about 90; the air seemed perfectly still, but on wetting the finger and holding it above the head the north side was cooled, showing that there was some movement and from what direction. This showed why the fern frost was arranged on the south side of twigs and other objects. There could have been no perceptible wind during the formation of this fern frost, for I could not touch a branch or twig without causing much of this fluffy frost to fall; and, later, little local breezes caused little snowfalls from the trees. However, during the formation of this frost there must have been just enough atmospheric movement to prevent deposition on the north side, while on the south side of twigs, etc., there was a region of still air in which the moisture was crystallized.

The ultimate crystals of each fern-like flake were prisms and hexagonal plates. The parts formed by prisms and very small hexagonal plates corresponded to the rachis and basal portions of pinnæ, while the expanded portions of pinnæ and pinnules were represented by hexagonal plates alone. The terminal plates were the largest. They diminished in size as they approached the axils, where they were replaced by delicate elongate prisms.

These fern flakes are simply modifications of star-flakes. Each fern-flake is one ray of a star, the point of attachment to the twig or wire corresponding to the centre of the star. Their attachment to a fixed support was a condition of unusual development, some being more than one-half inch in length. The completed star would have been gigantic compared with a star-flake formed in a snow cloud.

Some of these fern-flakes were still further modified so as to represent a half ray, resembling one-half of a fern frond divided longitudinally. Perhaps in such a one the axis of the fern-flake represented the line of demarcation between still air and moving air.

This was a kind of snow-cloud hanging on the trees, formed under the concurrence of particular conditions of temperature, moisture, and atmospheric movement. The conditions that favor the fringe-like, or one-sided, arrangement of frost must be very unusual.

Greensburg, Ind.

W. P. SHANNON.

On the Use of the Compound Eyes of Insects.

MY personal knowledge of Dr. Dallinger enables me to accept without hesitation his statement in *Science* of Jan. 6 (p. 11) that the wood-cut on page 908 of "The Microscope and its Revelations" corresponds in every particular with the photograph from which it was taken. I should, however, like to put myself right with your readers by explaining that the photograph to which I referred as "the original" was a positive print exhibited at the

meeting of the Royal Microscopical Society on Nov. 19, 1890, by Professor Bell, who said that it had been sent by Professor Exner to Dr. Sharpe, by whom it was lent for exhibition on that occasion. I examined this photograph with much interest at the close of the meeting and took the opportunity of making a sketch of it in my note-book at the time. This sketch undoubtedly shows the letter R to be the right way about, with the church facing towards the left; and although after a lapse of two years it might not have been possible to trust entirely to memory in the matter, it is impossible to suppose that I made otherwise than a true copy of the picture which I held in my hand. I therefore infer that the photograph to which Dr. Dallinger refers must have been printed the reverse way to the one which I saw as above stated.

R. T. LEWIS.

Ealing, London, S. W., England.

AMONG THE PUBLISHERS.

THE publishers of Mrs. Helen Mather's "One Summer in Hawaii," the Cassell Publishing Company, announce a new edition of that book. The present state of affairs in Hawaii have renewed interest in the subject. Mrs. Mather describes the people, their manners and customs, the natural resources of the island, and gives a personal description of Queen Liliuokalani, by whom she was entertained. The book is filled with illustrations showing the scenery and public buildings, and gives portraits of the Queen and her predecessors in office.

—G. P. Putnam's Sons announce for early publication "The Empire of the Tsars and the Russians," by Anatole Leroy-Beaulieu, translated from the third French edition by Mme. Ragozin; "Outlines of Roman History," by Professor Henry F. Pelham, of Oxford University, a work particularly designed for reading classes and higher-grade students; "Studies of Travel in Greece

CALENDAR OF SOCIETIES.

Anthropological Society, Washington.

Feb. 21.—Mrs. Matilda Cox Stevens, The Foundation of the Zuni Cult; Miss Kate Foote, Dual Civic Functions: A Study in the Evolution of Institutions; Thomas Wilson, Early Man in the Mississippi Valley.

Biological Society, Washington.

Feb. 25.—Sheldon Jackson, The Introduction of Reindeer in Alaska; M. B. Waite, Variation in the Fruit of the Pear due to Difference of Pollen; E. M. Hasbrouck, On the Development of the Appendages of the Cedar Waxwing; F. A. Lucas, The Food of Humming-Birds.

Philosophical Society, Washington.

Mar. 1.—Waldemar Lindgren, Two Neocene Rivers of California; Marshall McDonald, A Study of the Gulf-Stream in Relation to the Tile Fish.

Appalachian Mountain Club, Boston.

Feb. 27.—C. Willard Hayes, Through Alaska with Lieutenant Schwatka; an account of exploration in the Yukon Basin in 1891, and the first crossing of the St. Elias-Wrangell Range.

Mar. 8.—Edouard A. Martel of Paris, will be read by Frank W. Freeborn, The Land of the Causses. The Caves of Bramabiau, Dargilan, Padirac, etc.; Philip Stanley Abbot, His Ascent of the Weisshorn.

Society of Natural History, Boston.

Mar. 1.—E. S. Morse, A Curious Aino Toy; C. Willard Hayes and M. R. Campbell, The Structural Features (Geomorphology) of the Southern Appalachians.

Agassiz Scientific Society, Corvallis, Ore.

Feb. 8.—Charles Pernot, Smokeless Fuel.

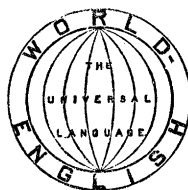
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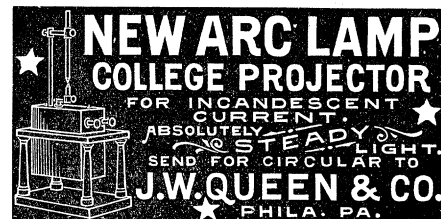
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