yellow-breasted chat, and in the Pacific coast by (*I. v. longicauda*), long tailed chat. The western variety can hardly be distinguished from the eastern except by the longer tail and perhaps brighter colors. These birds are about 7 inches or a little more in length, having an extent of wings of 9.5 inches; wing a little more than 3 inches, the tail of the western bird being about the same length; bill, .65 inch long. They are slaty-brown on the head, neck and back; wings and tail brown, tinged with yellow; throat and breast bright yellow; underparts brownish-white; yellow of the throat bordered with white; a few white feathers about the eyes, and a faint light stripe from nostril to eye. They build quite a bulky nest in bushes or briars near the ground, and lay from four to six white eggs, spotted with brown. As a songster, for variety and execution, I think they are second only to the mocking bird in Oregon; but in the eastern States I do not think they can equal the brown thrasher or catbird.

In the breeding season the chats have a peculiar habit of flying up and dropping down nearly straight, beating the air with their wings incessantly. Occasionally they will remain almost stationary in the air for several minutes, beating the air with their wings and singing. At times they flap their wings so as to be heard some distance away.

A curiosity in the owl family is the pygmy owl. One variety (*Glaucidium gnoma*) is quite often seen in Oregon. They are well named pygmies, as they are only about 7.25 inches in length and 14.5 in extent of wings; tail, 2 85, of twelve feathers; bill, greenish-yellow with lighter tip; feet and claws brownish-black. This little owl appears very much like a miniature barred owl (*Syrnium nebulosum*), as it has a smooth head with no ear tufts, and is marked much like the barred owl, being of a slaty-brown, thickly barred and spotted with white, darkest on the wings and back, lighter on the underparts. This little owl I think is more of a day-bird than most of the family, as it may quite often be seen on cloudy days out hunting for mice and small birds, or even moths and insects, which I think sometimes form part of its food. It no doubt breeds in hollow trees, but I have never found its nest.

## TELEPHONING BY INDUCTION.

BY G. H. BRYAN, M.A., ST. PETER'S COLLEGE, CAMBRIDGE, ENGLAND.

THE wonderful revelations dealt out to an admiring public by some of our newspapers under such headings as "Science Notes" often afford infinite amusement to the initiated. Some recent experiments of Mr. W. H. Preece, F.R.S., on induction currents, have found their way into some of these collections of information in a form which makes them appear little short of miraculous. According to some accounts, Mr. Preece has solved the problem of "telephoning without wires." He had only to speak the word (so we are told) and the electric fluid *leapt across* the three miles of sea which separates the island of Flat Holm, in the Bristol Channel, England, from the mainland, and delivered its message with unerring accuracy into the telephone placed there for its reception. On reading such accounts as this the British public will exclaim, Oh! with a mixture of awe and admiration, and half a dozen "paradox mongers" will build up unintelligible theories of "the electric fluid and the way it radiates through the ether" or something of the kind — showing that Maxwell and Faraday are *wrong* and they themselves are *right*. Those, however, who know anything about electricity will smile when they see what impossibilities the presiding genius of the British Postoffice Telegraphs is credited with performing. In the first place they will know that either telegraphing or telephoning without wires is still an impossibility. Wires there must be, and the wires at the transmitting and receiving stations must form circuits enclosing a considerable area, but the important feature of the experiments is that the two different sets of wires may be some miles apart without any wire connecting them. Then, again, the idea that the "electric fluid" can jump across through three miles of air like a flash of lightning is absurd. What really happens is that every time that a current is passed through one circuit a current is "induced" in the other circuit, and when the current in the first circuit is stopped an "induced" current flows round the second circuit in the reverse direction to what it did before. This is the well-known principle of electro-magnetic induction, which has given rise to the induction coil, the dynamo, and indeed to most of our modern applications of electricity. The remarkable thing about the present experiments is that they show that this "induction" can not only make itself felt at such great distances, but can actually be utilized to transmit telephonic messages. At present we can only speculate as to the way this "inducing action" takes place, all that we can assert definitely is that *no* electricity passes from one circuit to the other. Even if we regard the action as magnetic, the "lines of magnetic force" do not go from one wire to the other, on the contrary they encircle the wires and do not anywhere terminate on a wire. Again, so far from the action travelling with unerring accuracy in any particular direction, the same message would be transmitted to a receiving apparatus placed anywhere in the neighborhood, provided that it was furnished with a sufficiently large circuit of wire, so that if several transmitting apparatus were in use at the same time in any particular neighborhood, the various messages would get confused.

Scientific discoveries such as this appear to be comparatively simple matters on paper, but they are usually the outcome of many years of patient experimenting It is more than six years since Mr. Preece described some similar experiments made with the telegraph wires running up the northeast and northwest coasts of England respectively. In these experiments, however, the primary current was produced by means of a powerful dynamo, but the induced current right over the other side of England was sufficient to produce a sound "very like a wail" in the telephone employed for its detection.

Feb. 10, 1892.

## LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

*On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.*

*The editor will be glad to publish any queries consonant with the character of the journal.*

### The So-Called "Cache Implements"

THERE has recently crept into archæological literature an unfortunate, because misleading, term for a well-known form of chipped-stone tool or weapon, that of "cache implement." This name has been suggested, on the ground of the erroneous assumption, that long, narrow blades of jasper, argillite, and other flakable stone were only to be found in "caches" or deposits, and then, continuing the argument, because so found, they were unfinished objects and in time were to be disinterred and converted, by further chipping, into knives, spear-heads, and, possibly, arrow-points There is not a scintilla of truth in this, so far as any living man now knows. It fits admirably, however, with a plausible theory by a coterie who have failed to make any important archæological discovery, and so is one of their mainstays in proving the modernity of America's native people; something that must be *proved* at all hazards; or, if not demonstrated, foisted upon the unthinking to secure the scientific prominence of a few archæological mugwumps.

When we examine a series of these "cache" implements, it will be seen that they are not too long, too broad, or too thick to be used as weapons or domestic implements, but lacking an evidence of a notched or narrowed base appear unavailable so far as the matter of attaching a handle thereto; *ergo*, an *un-handled* implement being an impossibility, they are unfinished. If, however, the reader will refer to "Remarks upon Chipped Stone Implements" (Bulletin of the Essex Institute, vol xv., 1883) he will find there pictured just such objects as I refer to, with short wooden handles secured by a "tenacious substance probably obtained from the cactus." Now, the Delaware Indians made most excellent glue by boiling together cherry gum and fish-bone and so could as readily have secured handles to these plain blades and, considering how frequently single whole specimens and broken ones are found on village sites, it is clearly obvious that they were in frequent use.

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 specie 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 befogs 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 Archæology, 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. leucoxylon* 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.